BESTO®

Building Destinies

Physics Catalogue & Experimental Guide

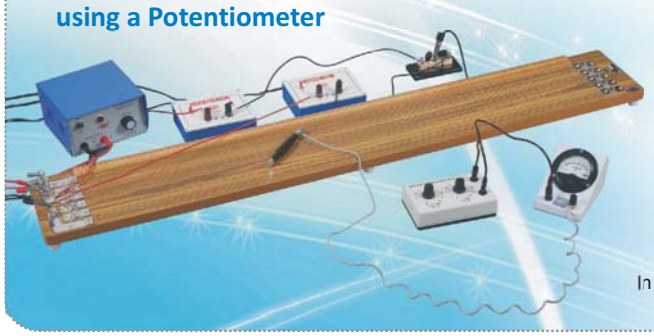
www.bestoinstruments.com

Only BESTO® has the complete solution.

- Designed & Tested by Teachers
- Detailed experiment manuals
- More than 100 experiments
- We have given complete details for more than 100 experiments

EXPERIMENT NO. 40

Compare EMF of Two Primary Cell by using a Potentiometer



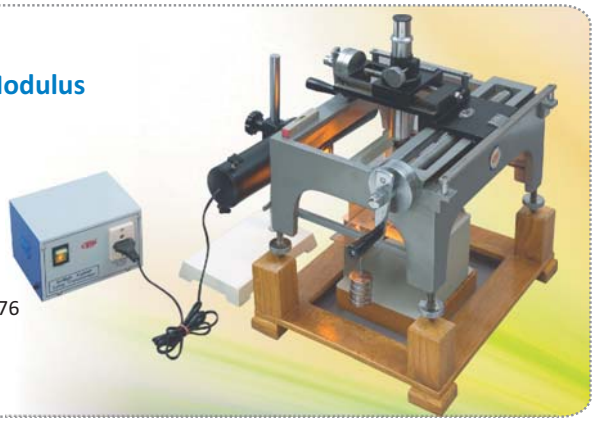
WHAT YOU NEED

- BESTO Potentiometer 10 wire, Cat No : 932
- BESTO Regulated Power supply 0-5V, 1 A, Cat No : 939
- BESTO Lechlanche Cell Substitute (Electronic version)
- BESTO Daniel Cell Substiute (Electronic version)
- BESTO Resistance Box 2-Dial.(x10,&x100), Cat. No. 969
- BESTO Galvanometer 30-0-30, MO65 on stand

In this experiment, please give voltage slightly more than 2V

EXPERIMENT NO. 100

To determine the Young Modulus, Rigidity Modulus & Poisson's ratio of the given material by forming hyperbolic fringes.



WHAT YOU NEED

- BESTO Co-ordinate Microscope, Cat. No. 1575.
- BESTO accessories for co-ordinate Microscope, Cat. No. 1576
- BESTO Sodium light source, complete set.

EXPERIMENT NO. 228

To determine the specific charge (e/m) of an electron using Thomson Method.

Cat. No. 2028

WHAT YOU NEED

- e/m by Thomson Method, Cat. No. 2028.

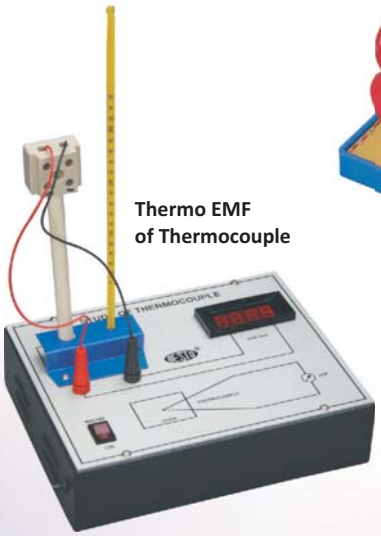
Did you know ??

Is there a difference in ordering the entire experiment and different modules of the same experiment?

Very little, When we structure together a whole module, it not only entails extra cost but also imposes upon us the additional liability of smooth functioning of the experiment. Thus a marginal amount of 10% is charged extra when the entire experiment is ordered.

Laser Spectrometer

Resistance Substitution Box



Thermo EMF
of Thermocouple

Solar Fan

Micrometer 2"- 3"

Digital LCR & Q Meter

Bending of Beam (As per Tamil Nadu Syllabus)

Uniform Bending

Non-Uniform Bending

Table of Contents

BESTO®
Built on trust

KALGIDHAR SCIENTIFIC WORKS
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•
Amarjeet Singh : 9896000489
Amandeep Singh : 9896042375

MEASUREMENTS - Meter Scales & Vernier Calipers

1. Meter Rule, Superior Quality

Double Scale, both edges divided in millimeters figured centimeters, opposite direction reading facility. Made of superior quality , seasoned wood

a)	one meter long
b)	half meter long

2. Meter Rule, Good Quality

Economy Model, without compromising on quality. Both edges are divided in centimeters & millimeters as above.

a)	one meter long
b)	half meter long

Cat. No. 2

3. Meter Rule, Routine Quality

Routine quality made from soft wood

a)	one meter long
b)	half meter long

Vernier Caliper is a device invented by French Mathematician, Pierre Vernier.

5. Vernier Caliper, Steel C.P.

Very superior quality steel chrome plated. The metric scale is graduated in millimeter for 12 cm and the 10-part Vernier reads is 0.1 mm. The English scale is graduated to 1/16 inch for 5 inches and its 8-part .

Vernier reads to 1/28 Inch with adjusting wheel and depth gauge. Elegantly packed in card board box, with detailed working manual.

Least Count 0.01 cm.

Cat. No. 5

Did you know ??

Least Count of Vernier Caliper

$$\frac{M}{n} = \frac{\text{Smallest division on the main scale}}{\text{Total number of divisions on the vernier scale}}$$

6. Vernier Caliper Stainless Steel

Same as Cat No. 5 but made from high quality stainless steel, (Stainless steel calipers retain their appearance even after repeated use), Packed in velvet case.

Least Count 0.01cm.

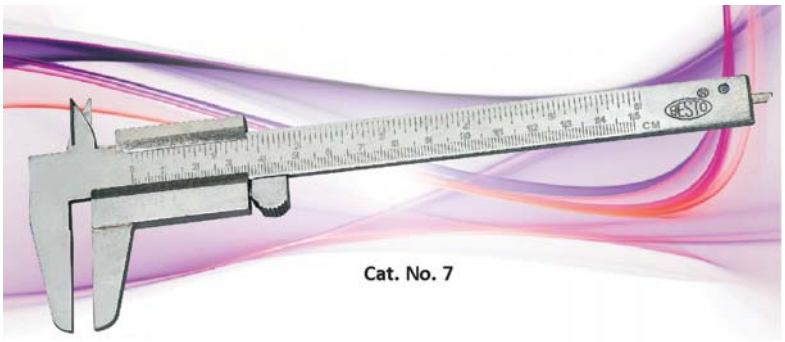
Measuring range 125mm/5inch, Graduation 0.1mm/1/28inch

Cat. No. 6

7. Vernier Caliper IME Type

Steel chrome plated model. One side graduated in inches for 6 inch and other side graduated in millimeters for 15 cm and the 10-part Vernier reads to 0.1mm. The moveable jaw can be held at any positions on the scale by means of a spring constant. Fine adjustment can be made by means of a convenient thumb operated strip which is allowed to disengage for fast adjustment. Packed in velvet case.

Least Count 0.01 cm.

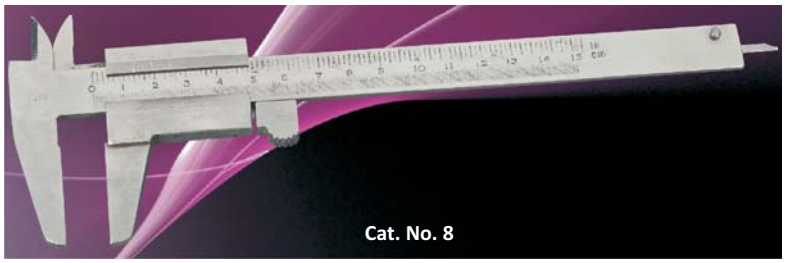


Cat. No. 7

8. Vernier Caliper IME Type

Same as Cat No. 7 with least count of 0.001 cm. Supplied in velvet case.

Least Count 0.001 cm.



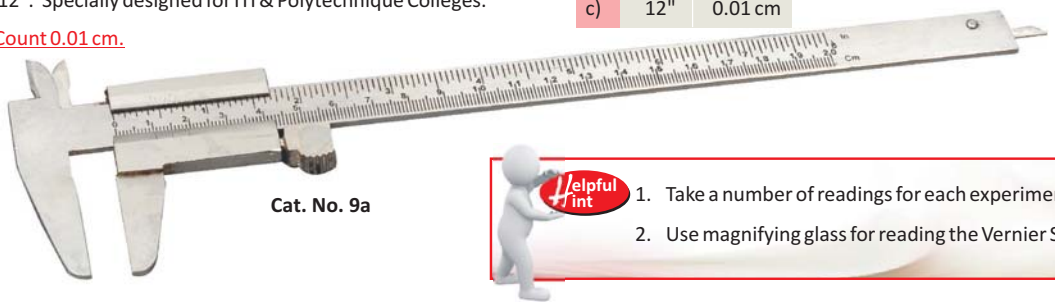
Cat. No. 8

9. Vernier Caliper IME TYPE

Steel chrome plated. One side is graduated available in 3 sizes in inches & other in centimeters. Same as Cat. No. 7, but in sizes - 8" or 10" or 12". Specially designed for ITI & Polytechnique Colleges.

a)	8"	0.01cm
b)	10"	0.01cm
c)	12"	0.01 cm

Least Count 0.01 cm.



Cat. No. 9a

1. Take a number of readings for each experiment.
2. Use magnifying glass for reading the Vernier Scale.

EXPERIMENT NO. 01

i. To measure the diameter of a small spherical/ cylindrical body with the help of Vernier Caliper.

ii. To determine the internal diameter, depth and outer diameter of a beaker with a Vernier Caliper.

WHAT YOU NEED

- BESTO Vernier Calliper of any type.
- Glass Beaker & Pendulum Bob / cylinderical body

MEASUREMENTS - Micrometer Screw Gauges

With the help of Vernier Calliper, we can measure length correct upto 0.01cm. When lengths are to be measured with greater accuracy say upto 0.001cm, Micrometer Screw Gauges are used

12. Mirometer Screw Gauge

This economical instrument is sufficiently accurate for beginners and for most elementary laboratory measurements. Superior quality, semi circular Welch pattern, dull nickel finish, oxidized threaded rod, individually packed in card board box, with detailed working manual.

	Size
a)	15 x 1 mm
b)	20 x 1 mm
c)	25 x 1 mm
d)	15 x ½ mm
e)	20 x ½ mm
f)	25 x ½ mm

Cat. No. 12b

13. Micrometer Screw Gauge (Stainless Steel)

The barrel and yoke are both nickel plated and the rod is made from rust proof stainless steel. Individually packed in a beautiful cardboard box with detailed working manual.

	Size
a)	15 x 1 mm
b)	20 x 1 mm
c)	25 x 1 mm
d)	15 x ½ mm
e)	20 x ½ mm
f)	25 x ½ mm

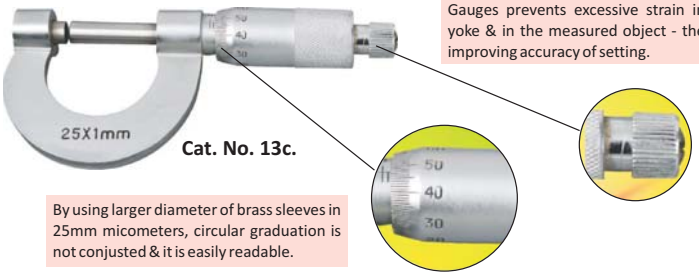
Cat. No. 13b

Did you know ??

Least Count of Screw Gauge

$$\text{Pitch} = \frac{\text{Linear Distance moved by the Screw}}{\text{No. of complete rotations}}$$

$$\text{Least Count} = \frac{\text{Pitch}}{\text{No. of divisions on the circular scale}}$$



Cat. No. 13c.

Ratchet on all BESTO Micrometer Screw Gauges prevents excessive strain in the yoke & in the measured object - thereby improving accuracy of setting.

By using larger diameter of brass sleeves in 25mm micometers, circular graduation is not conjusted & it is easily readable.

14. Micrometer-Moor and Wright Type

25 mm model for the quality conscious. The screw are of hardened stainless steel with ground threads and locking arrangements. Packed in velvet lined case.

	Size
a)	25 x 1 mm
b)	25 x ½ mm

Cat. No. 14

15. Demonstration Micrometer Model

This big sized demo-model is very effective in teaching large groups of students. The original model was designed and perfected by the physics department of Modern High School, Cicero, Illinois, where it is a valuable teaching aid. Approx. Length = 8", made from aluminium, back spray painted.

Helpful Hint The Zero correction will proper sign should be noted very carefully & added algebraically. Remember zero above to be added & below to be subtracted.

16. Micrometer Screw Gauge for Engineering

These special Micrometers are designed for ITI, Polytechniques, Engineering College Students & for Industries. The Barrel & Yoke both are nickle plated & the rod is made from steel nickle plated.

L.C.	0.01mm	OR	0.001inch
a)	0-25mm		0 - 1inch
b)	25-50mm		1 -2 inch
c)	50-75mm		2 - 3 inch
d)	75-100mm		3 - 4 inch
e)	100-125mm		4 - 5 inch

Cat. No. 16a

Cat. No. 16c

EXPERIMENT NO. 02

i. To measure the diameter of a wire.
ii. Thickness of small coin

WHAT YOU NEED

- Micrometer Screw Guage of any type
- Small piece of wire
- Coin & lead shot

Spherometer is an instrument used mainly to determine the radius of curvature of a spherical surface - based on the principle of micrometer screw gauge.

18. Spherometer - Disc Type

It consists of a small metal frame, supported by three legs fixed at the corners of an equilateral triangle. A screw of fine pitch passes through the centre of the metal frame. The screw forms the fourth leg. The main scale (or pitch scale) is marked on a metal strip fixed at right angles to the frame. This scale is marked in millimeters with zero mark at the centre (10-0-10mm). A circular scale is fixed to the screw head.

Cat. No. 18

It carries a circular scale divided into 100 equal parts. (In some cases it is divided into 50 equal parts). The edge of the circular scale is very close to the metal strip and the metal strip is used also as a reference line for taking the circular scale reading. The disc & scales are brass lacquered & legs are made of steel black painted.

a)	1/100
b)	1/200

19. Spherometer - Disc Type (Stainless Steel)

Same as Cat. No. 18 but screw and legs are made from rust proof stainless steel.

a)	1/100
b)	1/200

Cat. No. 19

EXPERIMENT NO. 03

To measure the radius of curvature of spherical surface using Spherometer.

WHAT YOU NEED

- Spherometer of any type
- Plain glass plate
- Double convex lens
- Watch glass

20. Spherometer - Double Disc

It comprises of a circular metal table 50mm diameter with three accurately positioned black painted steel legs and ordinary steel screw thread working in a long adjustable brass bearing. A circular scale is carried on the thread and a vertical scale on the table, enabling the user to take accurate micrometer type readings.

Cat. No. 21

21. Spherometer - Double Disc (Stainless Steel)

Same as Cat. No. 20, but screw and legs are made from high quality stainless steel

a)	1/100
b)	1/200

Cat. No. 22

22. Spherometer Demonstration Model

Extra large size with a circular aluminum disc of about 6cm diameter divided into 100 equal parts. Vertical scale is of aluminium black painted with reading 10 - 0 -10 mm.

Did you know ??

Least Count of Spherometer

(I) Value of one division on the main scale = ... cm

(ii) Distance through which the screw advances on the main scale in 10 rotations of the circular scale = l = ... cm

(iii) Number of division on the circular scale = n = ... cm

(iv) Pitch of the screw = p = l/10 = ... cm

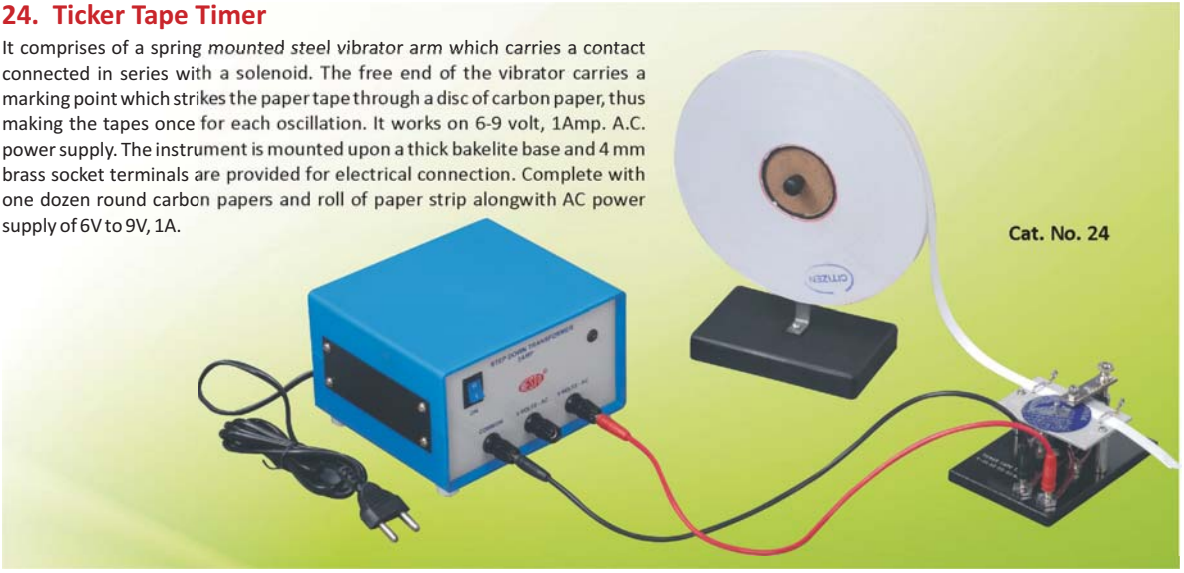
(v) Least Count (LC.) Of the spherometer = p/n = ... cm

Helpful Hint

- Take the lowest mark on the main scale on the zero mark and read upward as 1mm, 2mm, 3mm etc. So that all readings are positive.
- Measure distance between three legs accurately because square of distance comes in formula.

24. Ticker Tape Timer

It comprises of a spring *mounted steel vibrator arm* which carries a contact connected in series with a solenoid. The free end of the vibrator carries a marking point which strikes the paper tape through a disc of carbon paper, thus making the tapes once for each oscillation. It works on 6-9 volt, 1Amp. A.C. power supply. The instrument is mounted upon a thick bakelite base and 4 mm brass socket terminals are provided for electrical connection. Complete with one dozen round carbon papers and roll of paper strip alongwith AC power supply of 6V to 9V, 1A.



Cat. No. 24

26. Stop Clock BESTO

Smith type, encased in a metal case with fly-back action. At the right side of the case is the stop and start lever, the operation of which enables a timer to be started and stopped as desired. On the other side of the case is a press lever which returns the hands to zero, after the mechanism has been stopped by means of a stop lever. A subsidiary dial recording 0 to 60 minutes is provided below the second hand.

Least Count : 1 second

Cat. No. 26

28. Stop Watch (1/10th of a second)

This is first quality, precision made jeweled movement watch in attractive chromium plated case. The face of the stop watch is transparent for easy reading of graduations and figures. It has an arrangement for the 'start' and 'stop' of the watch. There is a lever at the top of the body when this lever is pressed for the first time, the watch starts, when the same lever is pressed for the second time, the watch stops. A third press on the lever brings the watch to zero reading. This stop watch reads 1/10th of a second.

Least Count : 0.1 second

Cat. No. 28

29. Digital Stop Clock

To overcome the difficulties experienced in mechanical stop clocks, BESTO has introduced Quartz controlled 3½ digit stop clock. The **START/STOP** operation is by means of a mini toggle switch and **RESET** by a push button. **RESET** is possible only in **STOP** mode to avoid accidental resetting while the clock is running.

Specifications :-

Range	999.90sec.
Resolution	0.1 sec.
Accuracy	± 0.1 % (Quartz controlled)
Display	12.5mm Bright seven segment display
Working Voltage	230 volts A.C. ±10%
Reset	By push Button
Least Count	1second

Cat. No. 29

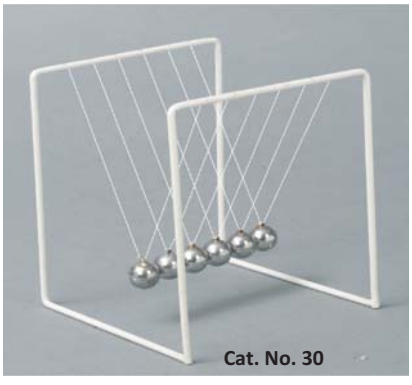
A Quartz crystal controls an electronic oscillator by its own natured frequency. The current from quartz controls oscillator works on the quartz crystal bob which has higher accuracy & precision.

30. Collision Ball

Demonstrates that for every action, there is an equal & opposite reaction. Lift & drop one ball to see one ball pop out from the other side. Lift two balls & ball pop out. Leave this popular toy on your desk for a school year of enjoyment & learning.

For demonstrating the collision of ball including 6 balls hung on an iron frame & Stand.

To demonstrate the conversion of energy & momentum



Cat. No. 30

Cat. No. 31

31. Simple Pendulum

Our Simple Pendulum consists of a brass bob of 1" diameter suspended by flexible and weightless stitching thread. The 2nd end of thread is tied to the rigid support. Supplied with heavy metallic base alongwith rod & special clamp.

A Simple Pendulum becomes a good time indicator and as such can be used a time measuring device.

Time Period T of a Simple Pendulum for length ℓ is given by

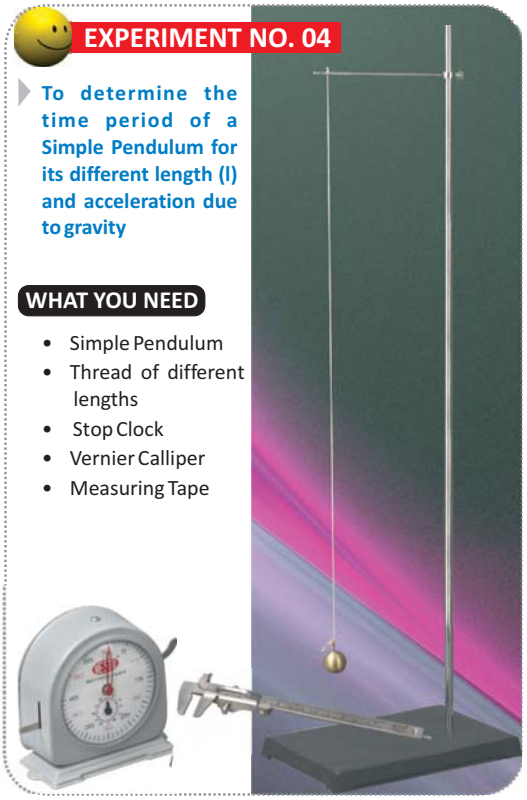
$T=2\pi\sqrt{\frac{\ell}{g}}$ or $g=4\pi^2\frac{\ell}{T^2}$

EXPERIMENT NO. 04

To determine the time period of a Simple Pendulum for its different length (l) and acceleration due to gravity

WHAT YOU NEED

- Simple Pendulum
- Thread of different lengths
- Stop Clock
- Vernier Calliper
- Measuring Tape



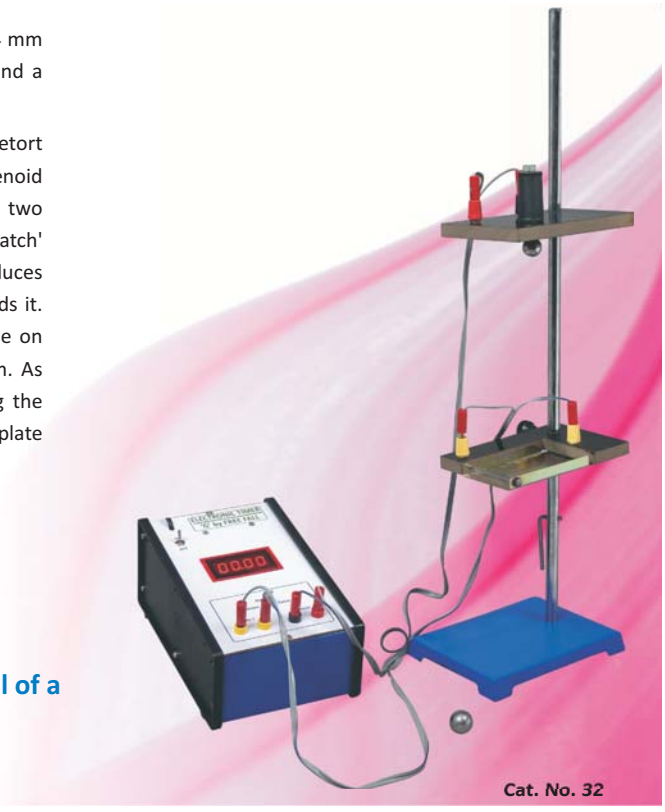
32. 'g' by Free Fall Method

It has an electronic timer unit on which there are four 4 mm sockets, two for gates and another two for solenoid and a toggle switch for release and catch the ball.

The other unit consists of heavy retort stand. The said retort stand carries two base boards. Out of them, one is solenoid holding base of size 149x97x113 mm providing with two banana sockets of 4mm. When the toggle switch is on 'Catch' position, the current is flowing in solenoid and it produces magnetic field and a steel ball make a attraction towards it. Another base connected to retort stand is of steel base on which the ball is dropped having base of size 115x60x2 mm. As well as switch is positioned on release, their, breaking the contact between solenoid and ball is dropped on steel plate and there is some time displayed on the timer.

Supplied with steel ball of 12 mm & 18 mm diameter.

For the measurement of the time of fall of a steel ball to determine the value of 'g'



Cat. No. 32

35. Physical Balance (7-Stone)

Basic general purpose balance. The hangers have double hooks for up thrust experiments and detachable pans. Capacity 200 grams, sensitivity 2 mg with 7-stone knife edge agates. Durable finish in golden colour lacquer with nickel plated fittings. The balance is mounted on a sturdy sunmica wooden base complete with leveling screw. The whole balance is housed in a teak wood show case with panel doors.

Supplied without weights.

Cat. No. 35

Specifications:

Knife Edges	Agate
Bearings	Agate
Capacity	200g
Sensitivity	2mg
Pans	Stainless Steel, Diameter 100 mm
Overall Dimensions	420x240x380mm (lxbxh)

36. Physical Balance (3-Stone)

Same as Cat. No. 35 but fitted with 3-stone knife edge agates, sensitivity 5 milligram, other specifications are same.

Supplied without weights.

Cat. No. 36

Specifications:

Knife Edges	Agate
Bearings	Agate
Capacity	200g
Sensitivity	5mg
Pans	Stainless Steel, Diameter 100 mm
Overall Dimensions	420x240x380mm (lxbxh)

All Balances listed on page 8 & 9 are strictly for Laboratory use and not for legal general use.

37. Chemical Balance

This balance has a lacquered brass beam engraved 50 scale divisions to each side. Each scale division represents 1/5mg rider on the scale. The pillar is finished in lacquered with nickel plated fittings and detachable pans which are suspended from double hooks. Mounted on a sunmica wooden base with levelling screws and housed in teak wood case, with front slider and panel doors. (Supplied w/o weights).

Cat. No. 37

Specifications:

Knife Edges	Agate
Bearings	Agate
Capacity	200g
Sensitivity	0.2mg
Pans	Inverse Stainless Steel, Diameter 70 mm
Overall Dimensions	365x265x455mm (lxbxh)

38. Analytical Balance

Best for rapid weighing, has a short triangular beam, rider scale graduated into 100 divisions with 0 at the center, fine selected edges, vertical arrest. Capacity 200gm, sensitiveness 1/10 milligram. Housed in teak wood case with slider and two panel doors. Mounted on sun-mica base with levelling screws.

(Supplied wlo weights)

Cat. No. 38

Specifications:

Knife Edges	Agate
Bearings	Agate
Capacity	200g
Sensitivity	0.1mg
Pans	Inverse Stainless Steel, Diameter 70 mm
Overall Dimensions	365x265x455mm (lxbxh)

43. Spring Balance Rectangular

Flat form with zero and adjustable device with anodized metal scale. Metal parts richly plated in high impact polystyrene body. Suspension loop at top and load hook at the lower head. Individually packed in a beautiful cardboard box.

	Capacity
a)	50 gms.
b)	100 gms.
c)	250 gms.
d)	500 gms.
e)	1000 gms.

Cat. No. 43

44. Spring Balance Tubular

Colour coded spring Balances for both force & mass measurement. Individually calibrated dual scale spring Balances has zero adjustment device with stainless steel suspension loop and load hook

	Capacity
a)	1N/100g(Brown)
b)	2.5N/250g (Blue)
c)	5N/500g (Green)
d)	10N/1Kg (Ivory)
e)	20N/2Kg (Red)
f)	30N/3Kg (White)

Cat. No. 44

45. Double Beam Balance

Two Pan Balance for accurate & rapid weighing upto 2000g when used with supplementary masses. The balance has centre indicating sliding masses to weigh upto 210g.

Spring loaded zero adjust compensator & magnetic damping are provided. Stainless steel pan of 150mm diameter.

Beams 0-200g x10g., 0-10g x0.1g.

Cat. No. 45

46. Accessories for Double Beam Balance

I. Set of additional masses : 1Kg., 500g, 200g & 100g. Made of M.S.

ii. Support rod : for under weighing facility.

iii. Un-calibrated tare beam : Capacity 200g.

47. Triple Beam Balance

A single pan, low form balance that has three notched beams with centre indicating sliding masses with total weighing capacity 610g. The capacity can be extended to 2610g with supplementary masses. Spring loaded zero adjust compensator & magnetic damping are provided. Stainless steel pan of 150mm diameter.

Beams 0-500g x100g., 0-100g x10g., 0-10g x0.1g.

Cat. No. 47

48. Accessories for Triple Beam Balance

i. Set of additional masses : these additional masses increase the range of triple beam balance upto 2610g capacity.

ii. Support rod : for under weighing facility

iii. Un-calibrated tare beam : Capacity 200g.

54. Analytical Weight Boxes Brass Wt (B Grade)

Velvet lined box with brass forceps & Brass C.P. Weight. 'B' Grade within the error limit of tolerance permitted by N.P.L. India, good quality Polish Box.

	Capacity
a)	1mg to 100 gms
b)	1mg to 200 gms

55. Analytical Weight Boxes Brass Wt (A Grade)

Class 'A' Brass Weights in superior quality teak wood box with sun-mica top. In this weight box, we provide our Test Certificate issued after testing all weights on our own precision Electronic Balance. Supplied with Test Certificate.

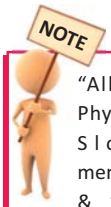
	Capacity
a)	1mg to 100 gms
b)	1mg to 200 gms

Cat. No. 55

56. Analytical Weight Boxes Brass Wt (B Grade)

'B' grade, Brass nickle plated masses and a box of fractional weight all nicely arranged in a tough plastic box, capacity 100gm.

Cat. No. 56



"All the Analytical & Physical Weight Boxes, Slotted Weights mentioned on Page No. 10 & 11 are strictly for laboratory use only and not legal for general use.

57. Analytical Weight Boxes S.S. Wt (A Grade)

Weights are made from stainless steel non-magnetic corrosion resisting quality. These are used for precision work and have good stability due to their corrosion resisting properties. Weights are arranged in velvet lined case of teak wood with sun-mica top (Class 'A') Supplied with Test Certificate.

	Capacity
a)	1mg to 100 gms
b)	1mg to 200 gms

58. Spare Analytical Gram Weights Brass C. P.

	Capacity
a)	1 gm
b)	2 gm
c)	5 gm
d)	10 gm
e)	20 gm
f)	50 gm
g)	100 gm

Cat No. 58

59. Fractional Weight Set Analytical

These are good quality aluminum weights from 1 mg to 500 mg with duplicate of 2.20 and 200 mg. a total of 12 weights in set. They are calibrated strictly within the error limit of tolerance permitted by N.P.L. India. Quality Class 'B'. These weights are supplied in a beautiful rour plastic case.

Cat. No. 59

60. Analytical Weight Box - 1g to 500g

Special Analytical Weights, set of 12 pieces in a heavy wooden storage box.

1x1 g, 2x2g, 1x5g, 1x10g, 2x20g, 1x50g, 1x100g, 2x200g, 1x500g.

Cat. No. 60

62. Physical Weight Boxes (Brass C.P.)

Superior quality having accurate brass weights in nicely Teak polished wooden box with sunmica top. Complete with forceps and fraction weights.

	Capacity
a)	100 gm
b)	200 gm

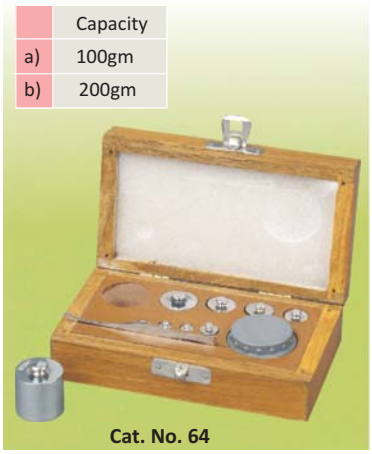
Cat. No. 62.

64. Physical Weights Boxes

(Cylindrical Weights, Brass C.P.)

Superior quality having most accurate cylindrical brass weights, complete with forceps and fraction weights, supplied in a superior quality, teak polish wooden box.

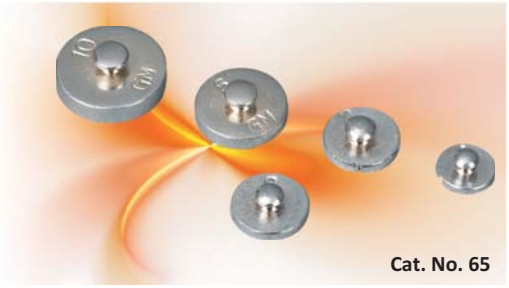
	Capacity
a)	100gm
b)	200gm



Cat. No. 64

65. Spare Physical Gram Weights Brass C.P.

	Capacity
a)	1 gm
b)	2 gm
c)	5 gm
d)	10 gm
e)	20 gm
f)	50 gm
g)	100 gm

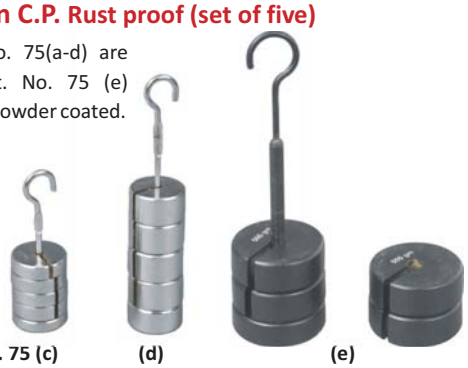


Cat. No. 65

75. Slotted Weight Iron C.P. Rust proof (set of five)

Slotted weights from Cat. No. 75(a-d) are chrome plated, whereas Cat. No. 75 (e) slotted weight 500g x5 is black powder coated.

	Capacity
a)	10 gm x 5
b)	20 gm x 5
c)	50gm x 5
d)	100gm x 5
e)	500 gm x 5



Cat. No. 75 (c) (d) (e)

76. Slotted Weight (Iron Black Painted)

Made from cast iron, black painted. These sets of slotted weights are particularly suitable for use with Sonometers or in such applications where large load is required.

Capacity 500gms x 5

Cat. No. 76

78. Slotted Weight Brass C.P.

These slotted weights are precisely turned from brass rods, carefully adjusted . These slotted weights are supplied either in chrome plated or in brass polish finish.

	Capacity
a)	5gmx5
b)	10gmx5
c)	20gmx5
d)	50gmx5
e)	100gmx5
f)	50gmx10
g)	100gmx10

Cat. No. 78(e) Cat. No. 78(g)

90. Overflow Vessel (G.I. Sheet)

G.I Sheet hammer-tone finish, the top edge is flared to add strength.

Used for experiments in density & specific gravity, Archimedes Principles etc.

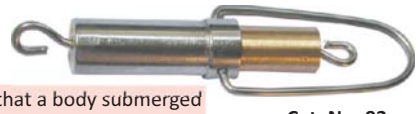
Cat. No. 90

92. Overflow Vessel (Plastic)

Polypropylene body, unbreakable, non corrosive white colour and has a spout to drain out overflowing liquids, used in laboratory for measuring displacement of liquids.

93. Bucket and Cylinder

Used to demonstrate the Archimedes's Principle. The Cylinder has a suspension hook at one end. All brass pipes with length 50mm (2").



Cat. No. 93

Bucket & Cylinder demonstrates that a body submerged in water looses weight equal to its own volume of water.

94. Specific Gravity Bottle (Borosil Glass)

Spherical pattern, the volume of the bottle is accurately adjusted at 27°C to the value etched on the surface. The bottle and capillary stopper are numbered for identification made from Borosilicate glass.

With Borosilicate Glass Stopper

	Capacity
a)	25 cc
b)	50 cc
c)	100 cc

With Teflon Stopper

	Capacity
d)	25 cc
e)	50 cc
f)	100 cc

Cat. No. 94

Excellent for determination of Specific Gravity of liquids.

96. Nicholson's Hydrometer

For Solid and liquid density experiments. It consists of a hollow metal cylinder, upper loading pan and bucket suspended of the bottom for stability and to hold the specimen, when immersed. Made from brass sheet.

	Capacity
a)	Medium
b)	Large

Cat. No. 96

97. Hydrometer Universal

Direct reading relative density hydrometers with shot loaded bulbs and parallel graduated stems. All glasses, ranges from 60°F, 0.700 to 2.000x0.10.

102. U-Tube Apparatus

For use as a manometer. It consists of a superior quality wooden stand fitted with wooden meter scale which is 0 to 45 cm from the bottom. Provided with small metal strips for supporting U-tube.

100. Hare's Apparatus

For comparing the densities of liquids by measuring the heights of two columns of liquid produced by applying suction to the short center limb. Comprising three limbed glass tube mounted on polished wooden stand with meter scale 45 cm long with '0' at the bottom. The Scale is divided in centimeters and millimeters. Supplied without rubber tube and pinch cock.

Cat. No. 100

104. Spare Hare's Tube

Unmounted & ungraduated borosilicate glass tube with a third short limb for connecting a suction tube.

105. Spare U-Tube

For use as a manometer. This is an unmounted & ungraduated Borosilicate glass U-tube.

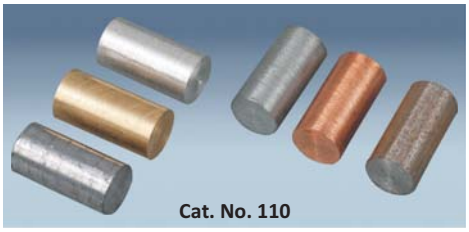
110. Metal Cylinders

These cylinders are often used in exercises with Vernier and micrometer calipers as well as for density and specific gravity measurement. The ends are carefully turned and surfaces are smooth.

Set of six different elements in cylindrical form for density in electrical and thermal experiments. The set consists of one piece each of brass, aluminum, copper, zinc, iron and lead solid cylinders.

Three different sizes available are :

	Capacity
a)	25 x 12 mm
b)	37 x 12 mm
c)	50 x 12 mm



Cat. No. 110

111. Metal Cubes

These metal blocks are intended for use as sinkers or for specific gravity measurements.

Set of six different metals. The set consists of one piece each of brass, aluminum, copper, zinc, iron and lead cubes.

Cat. No. 111

	Capacity
a)	10mm
b)	20mm
c)	25mm
d)	32mm

These metal blocks are provided either as such shown in the picture or with suspension at top or with a hole for thermometer depending upon the requirement.

112. Pendulum Bobs or Spheres (Set of six)

Comprising a solid turned different metals sphere with a small hook for suspension. Set of six different metals. The set consists one piece each of brass, aluminum, copper, zinc, iron, and lead.

Available in three different sizes:

	Capacity
a)	12mm
b)	18mm
c)	25mm

Cat. No. 112

113. Pendulum Bobs or Spheres (Spare)

With hook for suspension. Available in three different sizes and 6 different metals.

	Nature of Metal	(i) 12mm	(ii) 18mm	(iii) 25mm
a)	Brass			
b)	Copper			
c)	Aluminum			
d)	Lead			
e)	Zinc			
f)	Iron			

Cat. No. 113

114. Spare Aluminium Blocks

Aluminium Meatal Blocks for density determinations available different in size, Aluminium metal block, rectangular in shape. Supplied with hook.

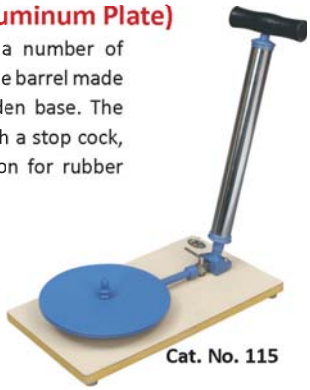
	Size
a)	2x2x3cm
b)	2x3x4cm

Cat. No. 114

115. Air Pump (with Aluminum Plate)

This air pump is suitable for a number of classroom demonstrations, single barrel made from steel pipe fitted on wooden base. The aluminum plate is provided with a stop cock, air inlet screw and a connection for rubber pressure tubing.

	Capacity
a)	12.5cm
b)	15.0cm



Cat. No. 115

116. Bell Experiment Apparatus

For demonstrating that sound cannot be transmitted in a vacuum. It consists of a 2 litre bell jar with a rubber stopper fitted with binding posts and connectors from which an electric bell is suspended. It operates on 3 to 6 volts, using either battery or a transformer.

Cat. No. 116

117. A Portable Diaphragm Type Vacuum Pump cum Air Compressor, Oil Free, Light Weight

Cat. No. 117

	Max. Flow Ltr./Min.	Max. Vacuum (in Hg.)	Max. Press (PSIG)	Motor H.P.
a)	15	22"	25	1/20
b)	15	27"	35	1/16
c)	45	22"	40	1/8
d)	45	27"	60	1/4

118. Magdebur Hemisphere

To demonstrate the pressure of the atmosphere. Two concave aluminum cups having diameter either 62mm or 75 mm are provided with handle and stop cock.

Cat. No. 118

119. Fluid Pressure Apparatus (Spouting Cylinder)

To demonstrate that pressure increases with depth. Sheet metal cylinder 400x68mm diameter with three equal size offices art different heights down on side.

Cat. No. 119

123. Pressure String (Simple Pascal Law)

For showing that pressure is transmitted equally in all directions. It consists of a hollow metal brass ball 5 cm in diameter with small holes along one circumference and a branch tube with piston. When held with the holes in a horizontal plane and piston is pushed in, water will stream out at the same distance from each hole.

Cat. No. 123

124. Water Level Apparatus

For showing that the level of the liquid in communicating tubes is the same regardless of their shapes. It consists of four differently shaped glass tubes connected at the bottom, mounted on a bakelite/plastic stand.

Cat. No. 124

MEASUREMENTS - Boyle's Law Apparatus

125. Boyle's Law Apparatus

Comprising two glass tubes, one closed at the top and other tube open. Their lower ends are drawn out and connected together by 1 meter of rubber tubing. Both tubes are mounted on sliding brackets which may be locked in any position on the metal supporting rods. Seasoned wood board approximately 44" high carries a meter scale graduated from 0 to 100 cm fitted on heavy iron base with levelling screws. Supplied without mercury and rubber tube.

Cat. No. 125

126. Boyle's Law Tube

Set of Two, ordinary glass tube

Cat. No. 126

127. Boyle's Law Burette

Borosilicate glass 25cc with stopcock.

128. Mercury

Highly purified mercury is required for use with Boyle's Law Apparatus. Packed in leak proof Polythelene bottles. Capacity 500 gms.

129. Rubber Tubing

Extra Soft Quality. Approx. Bore 6mm, Wall thickness 1.5mm. Coil of 10 meters.

EXPERIMENT NO. 05

i. **To study the variation in volume with the pressure for a sample of air at constant temperature (by plotting graph between P and between P & V).**

ii. **To find the atmosphere pressure from the above set of observations.**

WHAT YOU NEED

- BESTO Boyle's Law Apparatus
- Fortin's Barometer
- Thermometer
- Plumb Line
- a pair of set squares
- Clamp with stand

130. Geometrical Models and Figures

They include all principles of geometrical solids and figures discussed in elementary mathematics and physics are included. 16 different solids made of smoothly finished hardwood, medium sized, approximate size of each figure is 5 cm. All are supplied in a sliding box.

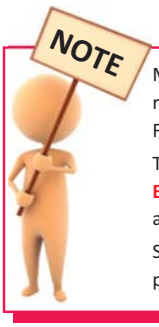
Cat. No. 130

183. Drawing Board

12"x 18"x 5/8 superior quality soft

184. Drawing Board

23"x 16"x 5/8 superior quality soft wood.



Mathematics is often is dreaded word among students and their parents. If teaching Maths involves erroneous representation, misrepresentation, lack of visualization, endless reptilian and meaningless memorization of Formulae, then it leads to the 'so prevalent' MATH PHOBIA.

To make Math more pragmatic and interesting, we have introduced a Mathematics Lab Kit from Page 16 to 20. **BESTO Math Lab Kit** is based on the DO and DISCOVER approach, thereby making learning Mathematics fun, and not a 'phobia'.

Students realize the importance and usage of maths as a tool in daily life as they discover mathematical principles, patterns and processes all by themselves, based on their experience, needs and interests.

201. Complete Math Lab Kit

BM-1 Dummy Clock (Wooden) : To teach time from 00.00 to 24 Hrs

BM-3A Counting Abacus (1-10)(Wooden)

BM-5 Student Abacus (Wooden)

BM-6 Game of Place Value (Wooden)

BM-7 Geo board-square (Wooden) : To teach different Geometrical shapes with the help of Rubber Bands

BM-8 Geo Board-Circle Wooden : To teach different Geometrical Shapes with the help of Rubber band with Circular Protractor Printed in the centre for: Ring of Circle Theorems : Angle in a circle, Angle in a semi circle, Angle in segment, Centre angle properties, Angle subtended in the same segment

BM-10B Geometry Box (Plastic) : To Draw & Teach Geometrical Concepts on Black Board

BM-11 Geometrical Solids (Wooden) : Set of 12 Three Dimensional (Wooden) Shapes available in different sizes:

a) 5x10cm Yellow

b) 15x30 cms Coloured

BM-12 Transparent Geometrical Shapes Set of 10 (Acrylic) Geometrical Shapes to show Inner Area Slant Height & Vertical Height

BM-13 Polyhedron & Their Nets : Set of 11 (Acrylic)

BM-14 Conic Section (Wooden) : Set of 4 cones showing :

Hyperbola Parabola

Ellipse Circle

BM-15 Cylinder cut in 8 parts (Wooden)

Bm-16 Derivation of Value of Pie (Wooden)

BM-17 Circle Fraction Disk : Showing different fractions of Circle

BM-18 Fraction of Circle (Wooden)

BM-19 Fractions of Square (Wooden)

BM-20 Fractions of Triangle (Wooden)

BM-21 Add & Count Rods (Wooden): Set comprising 32 pcs. of different size of rod and counting 1-10 is printed on the rod. This will help the child to count, learn numbers 1-10 and addition & subtraction

BM-24 Numbers Flash cards 1-20

BM-25 Shapes Board Big (Wooden)

BM-28 Shapes Sorter Moulds Plastic Geometrical moulds to make different shapes with the help of clay

BM-30 Time teaching Stamps (Wooden) : Rubber Set of 15

BM-32 Volume Relationship Set Crystal Plastic

- Hemi Sphere
- Sphere
- Cone
- Cube
- 2 Cylinders
- Frustum

All 4 inches height & 4 inches diameter to calculate & prove the relationship between the volumes

BM-34 Set of Volumetric Cups Plastic

BM-38 Kitchen Balance Plastic

BM-41 Meter Scale Steel

BM-42 Half Meter Scale Steel

BM-45 Measuring Tape 3m

BM-48 Ranging Rod Metal to perform Height & Distance Experiments at the ground level

BM-50 Cross Staff Metal to draw perpendicular lines in the ground

BM-51 Optical Square Metal to draw parallel lines in the ground

BM-62 Probability Kit

A. Dice-Set of 2 pcs

B. Playing Cards

C. Set of Pearls : Set of 400 marbles

BM-63 Efficiency in Packing

BM-67 Geometry Kit (ACRYLIC)

BM-68 Perpendicular Line segment is The Shortest (ACRYLIC)

BM-71B Graph Roll-up Chart 100x135cms

BM-72 Magnetic Graph Co-ordinate Board with marker pen (ACRYLIC)

BM-76 Pythagoras Theorem : (ACRYLIC) 50 pcs by arranging small square pieces to make side square

BM-77 Working Model of Pythagoras Theorem (Wooden)

BM-79 Triangle Kit (Group Activity set of 5 kits) : (ACRYLIC) To teach congruency of triangle, classification by their angle and sides.

BM-80 Ratio of Area of Similar Triangles : (ACRYLIC) To verify the result that ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

BM-81 Octant-3D (ACRYLIC)

BM-82 Identity Set-I (ACRYLIC)

BM-83 Identity Set-II (ACRYLIC)

BM-84 Identity Set-III (Wooden)

BM-85 Mensuration Kit (ACRYLIC)

a. Area of Parallelogram

b. Area of Triangle-set of 3

c. Area of Rhombus

d. Area of Trapezium

e. Mid point Theorem

f. Properties of Parallelogram

g. Quadrilateral formed by mid point of a quadrilateral

h. Algebraic Identities (Set of cubes)

i. Area of Circle (Wooden)

202. Dummy Clock (Wooden)

To teach time from 00.00 to 24 Hrs (BM-1)

203. Counting Abacus

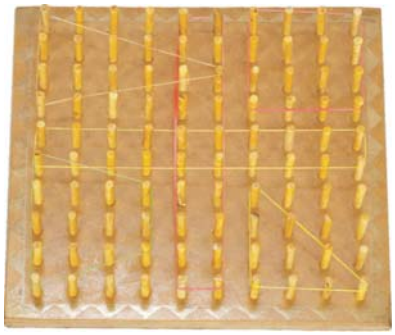
(1-10)(Wooden) (BM-3A)

205. Student Abacus (Wooden) (BM-5)

206. Game of Place Value (Wooden) (BM-6)

207. Geo board-square (Wooden)

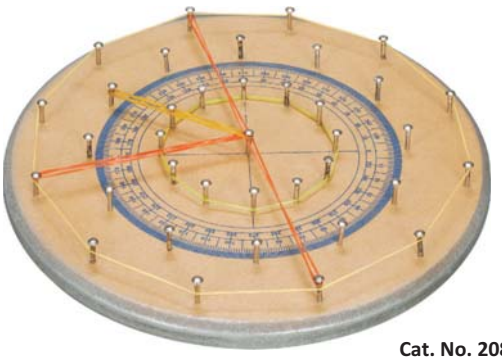
To teach different Geometrical shapes with the help of Rubber Bands (BM-7)



Cat. No. 207

208. Geo Board-Circle (Wooden)

To teach different Geometrical Shapes with the help of Rubber band with Circular Protractor Printed in the centre for : **Ring of Circle Theorems:** Angle in a circle, Angle in a semi circle, Angle in segment, Centre angle properties, Angle subtended in the same segment (BM-8)



Cat. No. 208

210. Geometry Box (Plastic)

To Draw & Teach Geometrical Concepts on Black Board (BM-10) B

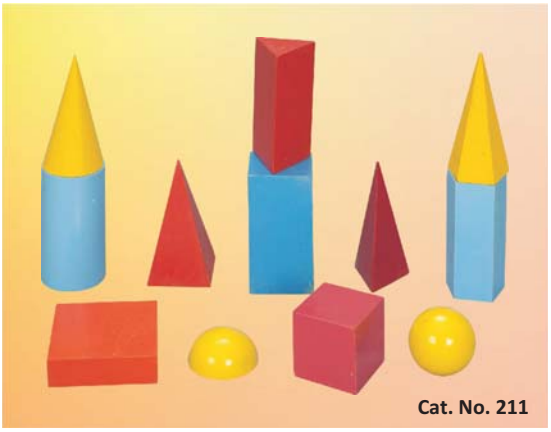
Cat. No. 210

211 Geometrical Solids (Wooden)

Set of 12 : Three Dimensional (Wooden) Shapes available in different sizes:

a) 5x10cm Yellow (BM-11) A

b) 15x30 cms Coloured (BM-11) D



Cat. No. 211

BESTO Math Lab kit is designed with following aims :

- To develop logical, critical & creative thinking
- To strengthen mathematic thinking skills
- To Create on opportunity to use mathematical vocabulary.

212 Transparent Geometrical Shapes

Set of 10 (Acrylic) Geometrical Shapes to show Inner Area, Slant Height & Vertical Height (BM-12)

Cat No. 212

213 Polyhedron & Their Nets

3Set of 11 Acrylic (BM-13)

214 Conic Section (Wooden) (BM-14)

Set of 4 cones showing :

Hyperbola Parabola

Ellipse Circle

Cat No. 214

215 Cylinder cut in 8 parts (Wooden)(BM-15)

Cat No. 215

216. Derivation of Value of Pie (Wooden) (BM-16)

217. Circle Fraction Disk :

Showing different fractions of Circle (BM-17)

218. Fraction of Circle (Wooden) (BM-18)

219. Fractions of Square (Wooden) (BM-19)

220 Fractions of Triangle (Wooden) (BM-20)

221 Add & Count Rods (Wooden) (BM-21)

Set comprising 32 pcs. of different size of rod and counting 1-10 is printed on the rod. This will help the child to count, learn numbers 1-10 and addition & subtraction

224 Numbers Flash cards 1-20 (BM-24)

225 Shapes Board Big (Wooden) (BM-25)

228 Shapes Sorter Moulds

Plastic Geometrical moulds to make different shapes with the help of clay (BM-28)

230 Time teaching Stamps (Wooden)

Rubber Set of 15) (BM-30)

232 Volume Relationship Set Crystal Plastic (BM-32)

- Hemi Sphere • Sphere • Cone
- Cube • 2 Cylinders • Frustum

All 4 inches height & 4 inches diameter to calculate & prove the relationship between the volumes

Cat No. 232

234 Set of Volumetric Cups Plastic (BM-34)

238 Kitchen Balance Plastic (BM-38)

241 Meter Scale Steel (BM-41)

242 Half Meter Scale Steel (BM-42)

245 Measuring Tape 3m (BM-45)

248 Ranging Rod Metal to perform Height & Distance Experiments at the ground level (BM-48)

250 Cross Staff Metal to draw perpendicular lines in the ground (BM-50)

251 Optical Square Metal to draw parallel lines in the ground (BM-51)

262 Probability Kit (BM-62)

A. Dice-Set of 2 pcs

B. Playing Cards

C. Set of Pearls : Set of 400 marbles

263 Efficiency in Packing (BM-63)

267 Geometry Kit (ACRYLIC) (BM-67)

268 Perpendicular Line segment is the shortest

(ACRYLIC) (BM-68)

Cat No. 268

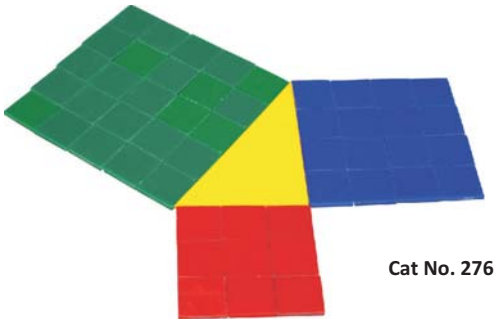
271 Graph Roll-up Chart 100x135cms (BM-71B)

272 Magnetic Graph Co-ordinate Board

with marker pen (ACRYLIC) (BM-72)

276 Pythagoras Theorem

(ACRYLIC) 50 pcs by arranging small square pieces to make side square (BM-76)



Cat No. 276

277. Working Model of Pythagoras Theorem (Wooden) (BM-77)

Cat No. 277

279. Triangle Kit (Group Activity set of 5 kits)

(ACRYLIC) To teach congruency of triangle, classification by their angle and sides. (BM-79)

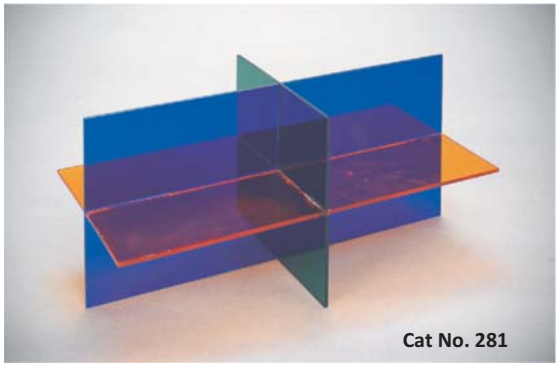
Cat No. 279

280. Ratio of Area of Similar Triangles

(ACRYLIC) To verify the result that ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. (BM-80)

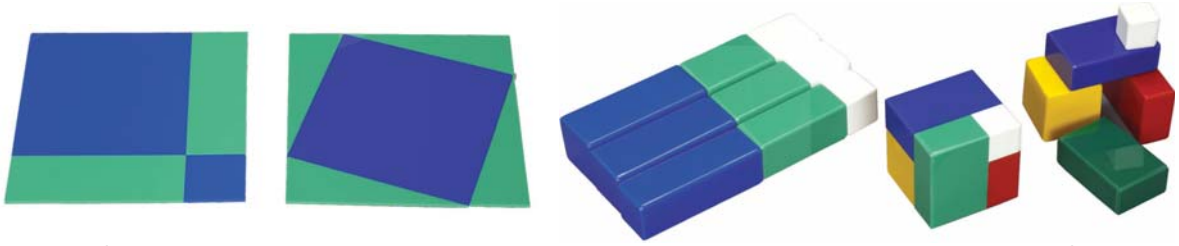
Cat No. 280

281. Octant-3D (ACRYLIC) (BM-81)



Cat No. 281

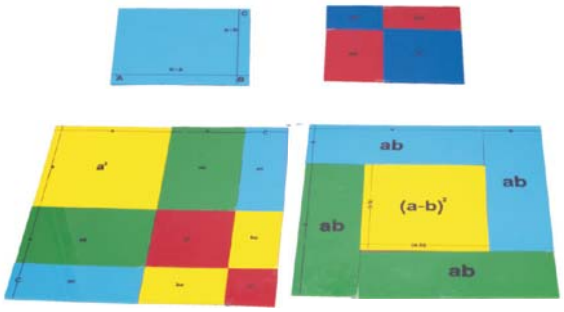
282. Identity Set-I (ACRYLIC) (BM-82)



$(a-b)^2$ $(a+b)^2$ Pythagores Thoerem $x^3+y^3+z^3$ $(a+b)^3$

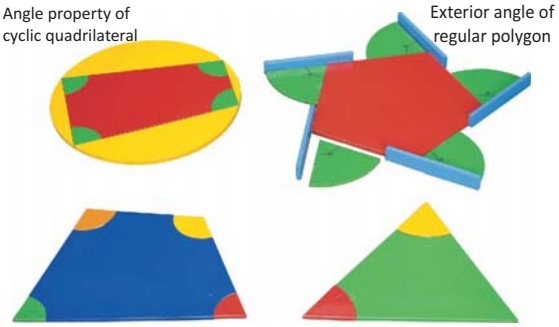
Cat No. 282

283. Identity Set-II (ACRYLIC) (BM-83)



Cat No. 283

284. Identity Set-III (Wooden) (BM-84)



Cat No. 284

285. Mensuration Kit (ACRYLIC) (BM-85)

a. Area of Parallelogram
b. Area of Triangle-set of 3
c. Area of Rhombus
d. Area of Trapezium
e. Mid point Theorem
f. Properties of Parallelogram
g. Quadrilateral formed by mid point of a quadrilateral
h. Algebraic Identities (Set of cubes)
i. Area of Circle (Wooden)

Cat No. 285

Panel Meters - Model MO-65

Practical Meters for Students use

Scales Permanently Printed on metal

Wide choice of Types and Ranges

Ammeters • Milli-Ammeters • Micro-Ammeters • Voltmeters • Milli-Voltmeters

Single or multiple range - A.C. or D.C.

•

Features

- **Easily Readable Scale**
- **Superbly Constructed**
- **Inexpensive**

•

Accuracy

1.5% or 2.5% of full scale

•

Popularity

Lacs of BESTO Meters are in use and their rapidly growing popularity proves their satisfactory performance

301. Round Panel Meter D.C.- 'A' Grade Model MO-65 (Without Stand)

- Overall size of the bakelite panel is about 82 mm dia with dial of about 57 mm dia.
- Scale length is about 47 mm ±2 mm.
- Accuracy ±1.5% F.S.D. with anti parallax mirror but without desk stand.

Common Ranges of 'A' grade Model MO-65 - Meters of Cat. No. 301 are listed below

	Type	Common Ranges
a)	D.C. Ammeter	1, 1.5,2.5,3, 5 Amps.
b)	D.C. Ammeter	10,15 Amps.
c)	D.C. Ammeter	20, 25, 30 Amps.
d)	D.C. Milliammeter	1,5,10,50,100,250,500, 750 or 1000 mA
e)	D.C. Microammeter	i) 0-25µA ii) 0-50µA
		iii) 0-100µA iv) 0-250, 300µA
		v) 500µA vi) 1000µA
f)	D.C. Voltmeter	3,5,10,50,100, 250 or 300 Volts
g)	D.C. Millivoltmeter	i) 25mV
		ii) 50, 100, 250, 500mV

302. Round Panel Meter D.C.- 'B' Grade Model MO-65 (without stand)

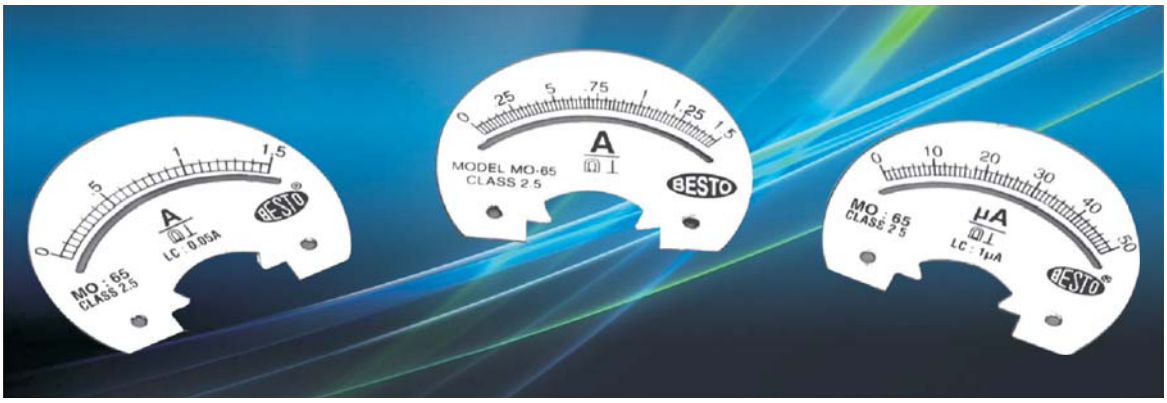
These BESTO Meters were developed by our Engineers for frequently use by students and for other applications where a rugged low-cost instrument of moderate precision was needed.

Specifications are same as Cat No. 301 but Accuracy ±2.5% of full scale deflection 'B' grade with anti-parallex mirror, but without desk stand.

Common Ranges of 'B' grade Model MO-65 - Meters of Cat. No. 302 are listed below

	Type	Common Ranges
a)	D.C. Ammeter	1,1.5,2.5,3, 5 Amps
b)	D.C Ammeter	10,15 Amps
c)	D.C. Milli-ammeter	1,5,10,50,100,250,300,500 or 750 mA
d)	D.C. Voltmeter	3,5,10,25,50,100, 250 or 300 Volts

Simplifying Calculations



Only we offers you all type of BESTO moving coil meters with different Least Counts printed on different dials.

We are always keeping stocks of different types of dials (having different number of Divisions) **to give you better accuracy. We have 30, 35, 40, 45, 50 & 60 division dials in stock round the year. Generally, we supply all the moving coil meters with proper/easy/minimum least count so that students don't get confused in calculating their values. (Simplified Calculations)**

This simplicity yields important benefits : success and satisfaction for our users, which is supported by the fact that

98%

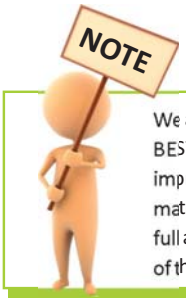
of our customers would recommend the Model MO-65 BESTO® Moving Coil Panel Meters

303. Meter Desk Stand

All ABS moulded (unbreakable) in conveniently inclined face fitted with two heavy lock type terminals and heavy Lead wires. From Bottom side it is closed with unbreakable plastic plate.

Please add the cost of above Meter stand in all our BESTO Moving Coil Panel Meters of Model MO-65 listed in the earlier pages.

Cat. No. 303



We are thankful to all the teachers since they were first demanded BESTO Meters because BESTO Meters have undergone improvements from time to time to take full advantage of newest materials and manufacturing techniques. They may be used with full assurance that they are the finest and most serviceable meters of their class.

304. Double Scale Meter Model MO-65

The conventional 'A' grade round panel meter of overall size of 85mm dia (Model MO-65) is mounted on a suitable desk-stand described under Catalogue No. 303 with 3 terminals. One terminal is common and the other two provide two different ranges. Supplied with stand. Some common ranges are listed below :

	Description
a)	1.5/3, 7.5/15, 15/30, 30/60 V or 1.5/30 V.
b)	10/100, 25/250, 50/500 or 100/1000 mA
c)	2.5/5, 5/10, 10/20 Amp
d)	50µA/25mA, 60µA/15mA
e)	250mA/2.5mA

306. A.C. Moving Coil Meter Model MO-65

'A' grade panel meter of overall size 82mm dia (Model MO-65) mounted in beautiful deluxe desk stand, hand calibrated accuracy 1.5% F.S.D.

	Description
a)	0-1, 1.5, 2.5, 3,5, 10 Amp.
b)	10,25,50,100,250, 300 & 500 mA
c)	3V or 5V
d)	10V, 25V or 50V
e)	100,300,500,600V
f)	100,300,500,750 µA

Cat. No. 304

Cat. No. 306

310. D.C. Galvanometer 'A' Grade Model MO-65 without stand

BESTO Galvanometer of Model MO- 65, the movement is the same superior quality as used in BESTO D.C. Voltmeters & Ammeters. The black bakelite case is likewise similar in size and shape. Accuracy 1.5% of full scale. Supplied without stand. Dial reading 30-0-30.

	Sensitivity
a)	20µA/division
b)	10µA/division
c)	5µA/division
d)	2µA/division
e)	1µA/division

Please add the cost of Meter stand of Cat No. 312 in all our BESTO Moving Coil Galvanometer listed under Cat No. 310 & 311.

311. D.C. Galvanometer 'B' Grade Model MO-65 without stand

Specifications are same as Cat No. 310 but accuracy 2.5% of full scale deflections, Supplied without desk stand. Dial reading 30-0-30.

Supplied with antiparallex mirror

Cat. No. 311

312. Meter Desk Stand for Galvanometer

Same as described under Cat No. 303.

320. Rectangular Panel Meter Model MR-100 (without stand)

Special Features :

- Housed in ABS non-breakable case with clear transparent high impact acrylic front cover. (Stand not included)
- Fitted at front with zero adjuster.
- Knife edge pointer with anti parallax mirror for accurate readings.
- The slanting front of meter inclines the scale of 45° permitting it to be read with equal ease from eye level also.

Technical Data :

- Scale Length : 95 × 65mm
- Accuracy : Class Index 1.5%
- Acrylic Meters may be subjected to wide variations in temperature or remain in the circuit continuously without seriously affecting the accuracy.
- All acrylic meters are manufactured and calibrated in a modern air-conditioned and state-of-the-art plant which has been designed and built specially for this work. These meters are guaranteed to perform satisfactorily. All our MR-100 meters are provided with anti-parallax mirror but without desk stand.

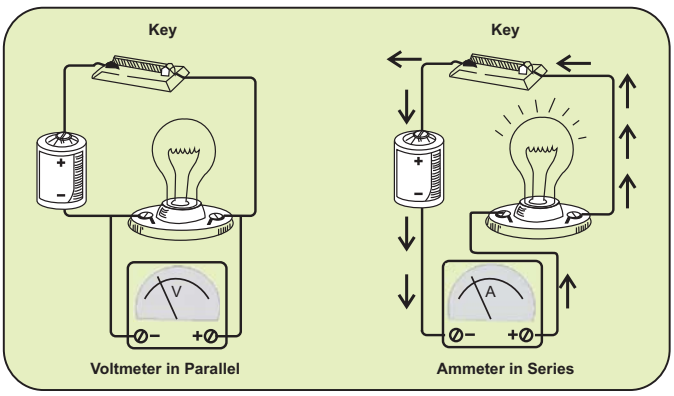
Some of the common available D.C. ranges are listed below :-

	Type	Common Ranges
a)	D.C. Ammeter	1, 1.5,2.5,3.5 Amps.
b)	D.C. Ammeter	10,15 Amps.
c)	D.C. Ammeter	20, 25, 30 Amps.
d)	D.C. Milliammeter	1,5,10,50,100,250,500 or 750 mA
e)	D.C. Microammeter	i) 0-25µA or 0-30 µA
		ii) 0-50µA
		iii) 0-100µA
		iv) 0-250, 300µA
		v) 500µA, 1000µA
f)	D.C. Voltmeter	3,5,10,25,50,100, 250 or 300 Volts
g)	D.C. Millivoltmeter	0-25, 50, 100, 250, 500 or 750mV

With Clear Transparent Acrylic Front Cover

- Voltmeters
- Millivoltmeters
- Ammeters
- Milliammeters
- Micrometers
- Galvanometers

Applications



Being a Large scale, reading in Model MR-100 Rectangular Panel Meters are very very easy as compared to reading in MO-65 meters. Being a Large scale, we can go upto 70 or 80 division Dials for much better accuracy.

321. D.C. Galvanometer Model MR-100 (without stand)

It is widely used because it is very compact, economical and user friendly, with dial reading 30-0-30 or 50-0-50 (available with different sensitivities)

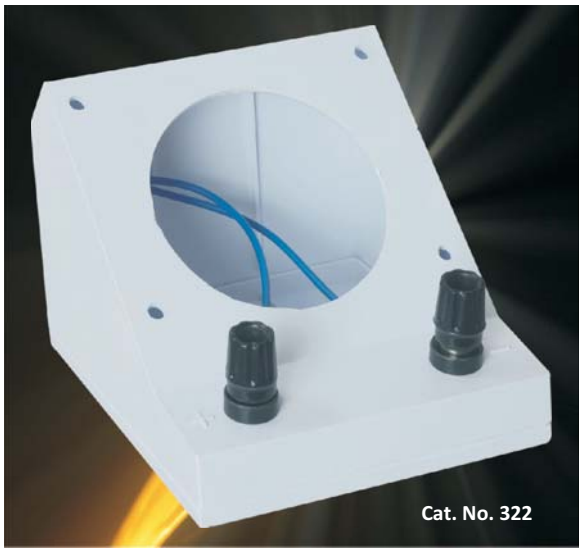
The portability, rugged construction, large clear scale & economically priced galvanometer is ideal for students' experiment. Its sensitivity of 20μA/div. is particularly suitable for slide wire bridges, potentiometers & experiments on induced e.m.f. Galvanometer with different sensitivities are listed in the table. Supplied without stand.

Cat. No. 321

	Sensitivity
a)	20μA/division
b)	10μA/division
c)	5μA/division
d)	2μA/division
e)	1μA/division

322. Meter Desk Stand for Model MR-100 Meter

Meter Desk stand for Model MR-100, non breakable stand moulded from first quality ABS heavy type, fitted with very fine quality (highly insulated) locked type terminals. Extra ordinary superior quality.



Cat. No. 322

323. A.C. Rectangular Panel Meter Model MR-100 (with stand)

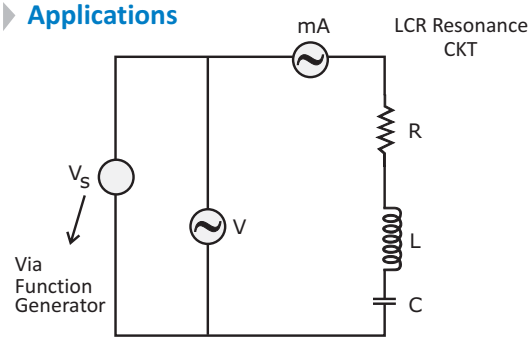
The almost universal use of Alternating Current (A.C.) in electric power transmission and consumption suggests that more time should be devoted to teaching the principles of A.C. in elementary physics. Student interest quickens when the practical advantage of A.C are shown. BESTO A.C. Acrylic meters (MR-100 Model) have been designed specifically for teaching and are especially suitable for use by students. These are economical, ruggedly constructed, have ample precision and are available in all commonly needed ranges. All our A.C. Rectangular panel meters are provided with stands.

Cat. No. 323

Some of the common ranges available are:

	Common Ranges
a)	0-250, 300, 500mA or 0-1, 1.5, 2.5, 3, 5, 10 A
b)	1-100 m Amp (any one single range)
c)	3V or 5V
d)	10V, 25V, 50V
e)	100, 300, 500, 600V
f)	100, 300, 500, 750μA

Applications



328. Ohms Meter

'BESTO' Ohm Meter is designed for measuring the resistance in electronics circuits.

The MR-100 model meter is used for ohm meter. The chasis is made from thick steel sheet with Aluminium top. The dry battery cell is fixed to chassis from the bottom side with the help of perspex sheet. The dry cell can easily be replaced by removing two steel screws.

This is basically of two types :

	Description
a)	Series Type 0-25 ohm
b)	Series Type 0-2000 ohm

Cat. No. 328

329. Digital Micro-Ohm Meter

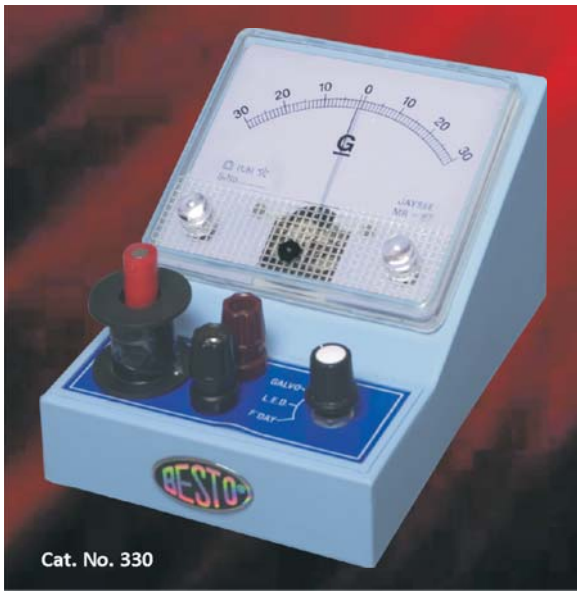
a).	Range 1 μΩ to 19.99 Ω in 5 decimal ranges.
b).	Range 1 μΩ to 19.99 KΩ in 8 decimal ranges.
c).	Range 1 μΩ to 19.999 KΩ in 8 decimal ranges.

Cat. No. 329

Faradays Laws

330. Faradays Laws

Student can perform two different experiments of Faradays Law by using the selector switch. How induced emf is changes by the moving a magnet in/out of a coil With the galvanometer and the second is with LED's. Kit is provided with a coil of thin copper wire, LED'S, bar magnet and deluxe model meter MR-87 on stand.



Cat. No. 330

Digital Meters (DC or AC), (DC & AC combined)

335. Digital Meter (D.C. or A.C.) (Mounted in non-breakable ABS Cabinet)

Cat. No. 335

Display	:	3½ digit, 12.5mm height, 7 Segment LED type
Auto Polarity Resolution	:	1 in ±1999 counts
Over Range Indication	:	Available 3 least significant digits, gets blanked in over-range condition.
Stand	:	Mounted in a beautiful ABS unbreakable cabinet.
Power Supply	:	Built in mains operated power supply workable on 230V AC ±10% V Ac, 50Hz.

Some of the common ranges available are:

	(i) D. C. Voltage	(ii) D.C Current	(iii) A.C. Voltage	(iv) A.C Current
a)	0-199.9mV	0-199.9µA	0-199.9mV	0-199.9µA
b)	0-1.999V	0-1.999mA	0-1.999V	0-1.999mA
c)	0-19.99V	0-19.99mA	0-19.99V	0-19.99mA
d)	0-199.9V	0-199.9mA	0-199.9V	0-199.9mA
e)	0-999.9V	0-1.999A	0-999.9V	0-1.999A
f)	–	0-19.99A	–	0-19.99A

(Price shown in Price list is for any one single range)

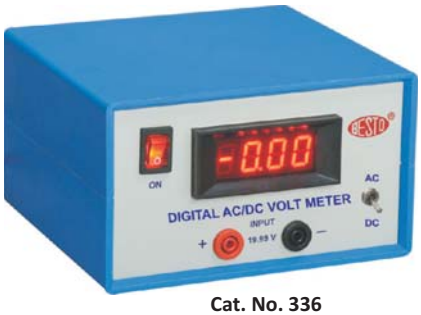
336. Digital Meter (D.C. & A.C. combined) (Mounted in non-breakable ABS Cabinet)

Same as Cat. No. 335, but in this Digital Meter we are having both choices - A.C. range as well as D.C. range with the help toggle switch. Rest specifications are same as per Cat. No. 335.

Some of the common ranges available are:

	(i) A.C. /D.C. Voltage	(ii) A.C. /D.C. Current
a)	0-199.9mV	0-199.9µA
b)	0-1.999V	0-1.999mA
c)	0-19.99V	0-19.99mA
d)	0-199.9V	0-199.9mA
e)	0-999.9V	0-1.999A
f)	–	0-19.99A

(Price shown in Price list is for any one single range)



Cat. No. 336

337. Economical Digital Meter

3½ Digit LCD , 9Volt Battery operated having following ranges.

D.C. Volts	199.9mV	1.999V	19.99V	199.9V	1000V
D.C. Amps	1.999mA	19.99mA	199.9mA	1.999A	19.99A

Choice of any one single range.

Cat. No. 336

Helpful Hint

AMMETER OR MILLI AMMETER OR MICRO AMMETER :

These are used to measure the magnitude of current in a circuit. It has low resistance and always connected in series.

VOLTMETER OR MILLI VOLTMETER : These are used to measure the potential difference between two points in a circuit. It has very high resistance and always connected in parallel with the circuit.

GALVANOMETER : It is an instrument to detect the presence of current in an electric circuit.

"BESTO" portable meters are of robust construction and are fitted in sunmica surface/wooden cases, with removable cover and dust proof bakelite panel. These are most suitable for precision measurements in test laboratories and educational institutions. The meters are with knife edge pointers and antiparallex mirror scale of 150 mm approx. The movements incorporates hardened chrome plated pivots, synthetic saphire jewels and chemically treated hair springs. The meters confirm to IS : 1248 : 1983. The overall dimensions are 240 x 200 x 110 approx.

Cat. No. 340

340. Moving Coil Portable Meter (DC)

MOVING COIL METERS D.C. SINGLE RANGE :

Choice of any range

a) DC VOLTMETER / MILLIVOLTMER : 50mV, 100mV, 250mV, 500mV, 1V,5V, 10V, 25V, 50V, 100V, 250V, & 500V

b) DC AMMETER / MILLIAMMETER / MICROAMMETER : 50µA, 100µA, 250µA, 500µA, 1mA, 10mA, 50mA, 100mA, 1A, 5A, 10A & 25A

c) DOUBLE RANGE : Choice of any 2 ranges in Volts/Amps. In ratio of 1:2

d) TRIPLE RANGE : Choice of any 3 ranges in Volts/Amps in ratio of 1:2:4 Accuracy : ± 1% F.S.D

341. Moving Coil Portable Meter (AC)

a) Add extra in Volts ranges from 5V to 500V

b) Add extra in Amps. Range from 50mA to 10A Accuracy: ± 1% F.S.D.

342. Moving Coil Portable Meter (AC /DC)

a) AC /DC VOLTMETER : 5V, 10V, 25V, 50V, 100V, 250V & 500V

b) AC /DC AMMETER / MILLIAMMETER 500mA, 1A, 2.5A, 5A, 10A & 25A

c) DOUBLE RANGE : Choice of any2 ranges in Volts/Amps. In ratio of 1:2

d) TRIPLE RANGE : Choice of any 3 ranges in Volts/Amps in ratio of 1:2:4 Accuracy : ± 1% F.S.D.

Electrodynamo Type Wattmeters

343. Single Phase, Single Element

Choice of any Single Current range of 0.5A, 1A, 2.5A, 5A & 10A. Choice of any Voltage Range of 50V, 100V, 125V, 250V & 500V.

344. Single Phase, Single Element

Choice of any Single Current range of 0.5A, 1A, 2.5A, & 10A. But Choice of Dual Voltage Ranges : 50/100V, 100/200V & 200/400V & 250/500V.

345. Single Phase, Single Element :

Choice of Dual Current Range of 0.5/1A, 1/2A, 2.5/5A, 5/10A and choice of Dual voltage Ranges : 50/100V, 125/250V & 250/500V.

346. Single Phase, Single Element

Choice of dual current ranges of : 0.5A/1A, 1A/2A, 2.5A/5A, 5A/10A & 10A/20A. But Choice of triple voltage ranges : 75/150/300V & 150/300/600V.

347. Element, For 3 Phase 3 Wire Balance & Unbalance Load

Choice of Current	1A or 5A
Choice of Voltage	110V & 440V

348. Elements, For 3 Phase 4 Wire Balance & Unbalance Load.

Choice of Current	1A or 5A
Choice of Voltage	110V & 440V

350. Frequency Meter Principle : Moving Iron/mc With Transducer

Rated Voltage	115V/230V/440V (Single Phase)
Frequency Range	45-50-55 Hz, 40-56-60 Hz
Test Voltage	2000 Volts A.C.

421. Spot Reflecting Galvanometer

Applications: 'BESTO' Spot Galvanometer finds extensive use as a D.C. null detector in wheat stone bridges and potentiometers.

Mains feed: It is a 'mains' operated instrument but can operate on a 6 volt battery also. There is provision to operate this instrument can be operated on both as well as main supply 220 volts, 50Hz or 6 Volt Capacity.

Light Source: The light Source is 6 Volt and 0.3Amp bulb giving a bright spot on the scale.

Cat. No. 421

Construction : The galvanometer has built in lamp and scale arrangement and housed in a bakelite case. The highly sensitive moving coil system is suspended in a taut band manner in a uniform field of permanent magnet.

Scale : The scale is 150mm long and is marked for both centre and end zero use.

Zero Adjustment : The spot of light can be set at any point on the scale with the help of zero adjusting knob.

Sensitivity Control : The sensitivity is controlled by a 2-pole, 6 way switch. The switch Positions are D, 1/10, 1/100, 1/1000 and s/c

Working Voltage : 220 VAC

Time Period : 2 seconds

Technical Data

Dimensions: 220x 225x 132 mm (Approx.)

	Galvanometer Resistance In ohms	Critical Damping Resistance	Sensitivity Voltage
a)	100 ohms	1000 ohms	0.04 to 0.05 μA per mm deflection
b)	600 ohms	7000 ohms	0.04 μA per mm deflection

424. Ballistic Galvanometer (Improved Pattern)

Incorporates the following features.

- These galvanometer are rigid in construction, beautiful in design and easy to operate, with large periodic time.
- Large moment of Inertia of the moving part of the galvanometer.
- Deflection closely proportional to the electric charge.
- BESTO Ballistic Galvanometers undergo strict laboratory check before dispatch and are suitable for direct deflection measurements which are closely proportional to the current.
- These galvanometers can be used both as PERIODIC as well as APERIODIC instruments.
- An arrangement is provided in the instrument to make it APERIODIC by introducing a suitable resistance in parallel with the moving coil system.
- Zero adjusting and locking devices are provided. The Phosphor-bronze suspension strip prevents shifting of zero.
- The moving coil carries a specially polished front silvering concave mirror of 100cm. focal length, suitable for use with BESTO Lamp and Scale Arrangement.

a)	Galvanometer Resistance 100 Ohms and Time period Approximate 10-12 Seconds.
b)	Galvanometer Resistance 500 ohms and Time period Approximate 10-12 Seconds.

Cat. No. 424

436. 'BESTO' Lamp and Scale Arrangement

It is based on 'GRIFFEN' Pattern which is highly suitable for reflecting 'BESTO' Ballistic Galvanometers. It consists of a heavy steel cabinet made from S. W.G. 20 sheet of size 6" x4" x3½" with printed Aluminum panel on the top. In this steel cabinet, a step down transformer of 6 volts, 3.5 Amps is enclosed, which is suitable for the lamp house.

The lamp house is made from Aluminum-Silver Alloys, machined and finished in a pleasing Duco paint. It is fitted with a special 6 Volts 20 Watt bulb which is connected to the transformer with a special male-female detachable plug.

The lamp house is fitted with a rack and pinion arrangement for focusing. A double convex lens made from imported glass of 18mm diameter of 4" focal length is used in it for better results.

Cat. No. 436

The lamp house can slide up and down along the vertical rod fixed on a detachable box. The inclination of the lamp can be adjusted in vertical plane.

Bright light through the convex lens falls on the concave mirror of the 'BESTO' Ballistic Galvanometer and forms a bright spot on the translucent Perspex scale fitted in a special bracket above the lamp house which is divided into 25-0-25 cm. and 0 to 50cm.

438. Lamp and Scale (Workable on main)

Suitable for use with Reflecting Galvanometer with rack and pinion arrangement workable on 220 volts A.c./D.C complete with scale and its attachment plug and cord.

Cat. No. 438

439. Capacitance Substitution Box

Comprising 12 non-polarised capacitors ranging from 100pF to 0.47µF (470µF) using standard preferred values, in step ratios of approximately 1:2 Selection is by means of a rotary switch and external connection is via a pair of 4mm sockets. All capacitors are of ± 2% tolerance, 250V D.C.

Working with values as follows:

100pF, .001µF, .0022µF, .0047µF, .01µF, .022µF, .033µF, .047µF, .1µF, .22µF, .33µF, .47µF.

Cat. No. 439

440. Cell Holder

Single Cell Holder with 4 mm sockets, plastic moulded so a cell can be inserted only in a correct way.

Cat. No. 440

441. Variable Stabilized Power Supply

Specially designed for Ballistic Galvanometer Experiments. Stabilized Power Supply variable 0-2V & Current Capacity 100mA. Supplied with proper leads.

Cat. No. 441

EXPERIMENT NO. 07

To calibrate the given moving coil Ballistic Galvanometer or to determine the Ballistic reduction factor (Ballistic Constant by steady deflection method).

WHAT YOU NEED

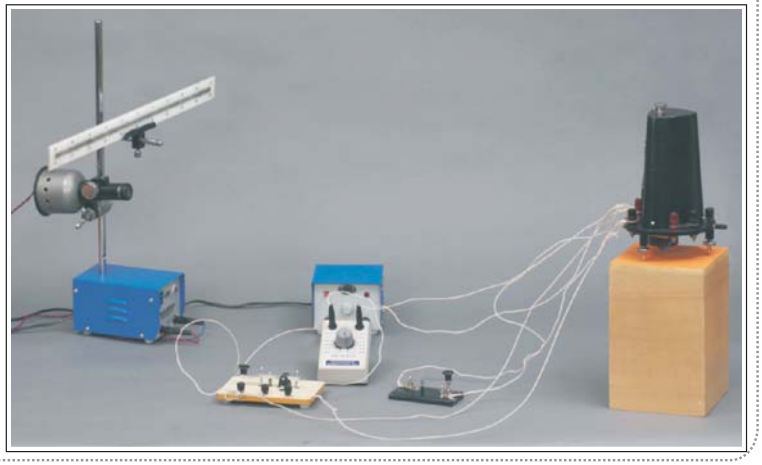
- BESTO Ballistic Galvanometer, Cat. No. 424
- BESTO Lamp & Scale, Cat. No. 436
- BESTO Two dial Resistance Box (Economical)
- BESTO Four dial Resistance Box (Economical)
- BESTO Single Dial Resistance Box x 1000ohms
- BESTO Reversing Switch, Cat. No. 496
- BESTO Special Power Supply for Ballistic Galvanometer & Tapping Key
- Wooden Block & Connecting leads

EXPERIMENT NO. 08

i). To determine the charge sensitivity of a moving coil ballistic galvanometer using a known capacitor.
ii). To find the logrithim decrement for a ballistic galvanometer.

WHAT YOU NEED

- BESTO Ballistic Galvanometer, Cat. No. 424
- BESTO Lamp & Scale, Cat. No. 436
- BESTO Capacitance Substitution Box, Cat. No. 439
- BESTO Morse Key
- BESTO Special Power Supply for Ballistic Galvanometer & Tapping Key
- Wooden Block & Connecting leads



EXPERIMENT NO. 09

To find the co-efficient of mutual inductance of two coils.

WHAT YOU NEED

- BESTO Ballistic Galvanometer, Cat. No. 424
- BESTO Lamp & Scale, Cat. No. 436
- BESTO Mutual Inductance Coil
- BESTO Four Way Key
- BESTO Special Power Supply for Ballistic Galvanometer & Tapping Key
- Standard Resistance 0.01 ohms
- Stop Clock & Simple Rheostat

100% Satisfaction GUARANTEED

All our products are guaranteed for one year. If for any reason you are not satisfied with any item you may return it for a replacement, a refund or credit. It's that simple.

EXPERIMENT NO. 10

To find the angle of dip in the laboratory using an Earth Inductor.

WHAT YOU NEED

- BESTO Ballistic Galvanometer, Cat. No. 424
- BESTO Lamp & Scale, Cat. No. 436
- BESTO Earth Inductor, Cat No. 1101
- BESTO Single Tapping Key
- Magnetic compass 2”
- Wooden Block & Connecting leads

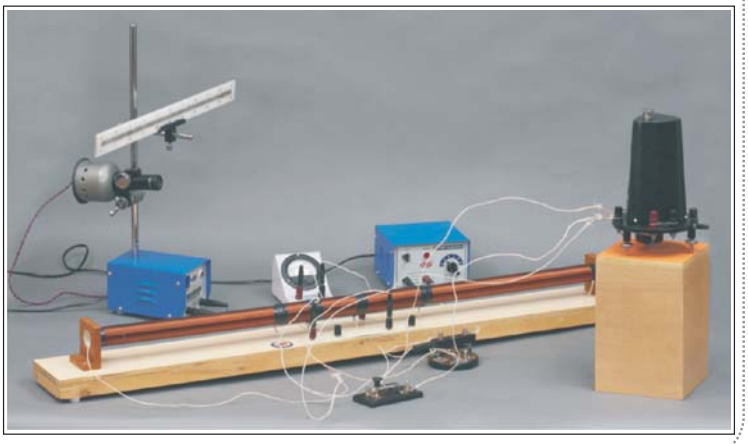
BESTSELLER

EXPERIMENT NO. 11

To find the magnetic induction field along the axis of a long closely wound solenoid using a search coil & ballistic galvanometer & hence to find the value of permeability of air μ_0.

WHAT YOU NEED

- BESTO Ballistic Galvanometer, Cat. No. 424
- BESTO Lamp & Scale, Cat. No. 436
- BESTO Solenoid Inductor, Cat. No. 1102
- BESTO Reversing Switch, Cat. No. 496
- BESTO Tapping Key
- BESTO Battery Eliminator 2-12V, 2Amp.
- BESTO Ammeter 3Amp. on stand.
- Wooden Block & Connecting leads



490. Plug Key (With Brass block of 9 mm)

With Brass blocks of 9 mm rectangular in shape with all brass terminals and screws.

	Size
a)	1 way
b)	2 way
c)	3 way

Cat. No. 491a

491. Plug Key (With Brass block of 10.5mm)

Thick brass block of 10.5mm fitted on heavy bakelite base provided with all brass terminals and screws.

	Size
a)	1 way
b)	2 way
c)	3 way

Cat. No. 491b

492. Plug Key (With Brass block of 12 mm)

Same as above but with brass block of 12mm thick mounted on a heavy bakelite base provided with all brass terminals.

	Size
a)	1 way
b)	2 way
c)	3 way

Cat. No. 492c

494. Plug Key Commutator 4 Ways Circular

Thick brass block are mounted on thick bakelite plate. The plugs and lugs are thoroughly interlaped for perfect locking. Terminals are provided on each segment with extra heavy blocks.

Cat. No. 494

496. Reversing Key Commutator M.I.P. Type

The four segments of gun metal are mounted on a bakelite base. The multi brush sweeping contacts move over either segment with a handle. Brass terminals are provided for the four segments and on the contact block.

Cat. No. 496

498. Pohl's Commutator

Used in experiments on hysteresis. The thick brass sheet contact arms and the joining strips are fitted on bakelite base. Operation of the contact arm is done with a bakelite handle. The terminals are provided on the sides of the square base. Max current 5 amp. Supplied without mercury.

Cat. No. 498

499. Charge and Discharge Key

Used for Charging and Discharging of a capacitor. Nickel plated brass strips and pillars are used. Three terminals for connection fitted on a thick bakelite plate.

Contact Resistance : 2 milli ohm approx.

Max. Current : 5 Amps.

Dimensions L×B×H : 150×100×80

Cat. No. 499

500. Raleigh's Key

Fitted on thick bakelite base with all brass parts.

501. Tapping Key (Single Contact)

Brass Strip (Nickel plated) with insulated knob and terminals mounted on a bakelite plate of high insulation.

Cat. No. 501

502. Tapping Key (Double Contact)

Two Brass strips (Nickle plated) & four terminals mounted on a bakelite plate on high insulation.

508. D.P. D.T. Switch

Machine moulded switch fitted on wooden base with brass terminals. This is a five ampere double pole double throw knife switch wire to reverse the current when the handle is thrown from one side to the other.

Cat. No. 508

512. Water Voltameter

Cup shaped with brass fittings and two graduated test tubes. The glass vessel is mounted on a sturdy wooden base fitted with brass terminals and Eureka wire electrodes. Supplied with brass metal test tube holder and graduated tubes.

Cat. No. 512

EXPERIMENT NO. 15

To find the electro-chemical equivalent of Hydrogen using an Ammeter & Water voltameter.

WHAT YOU NEED

- BESTO Water Voltameter, Cat. No. 512
- BESTO Battery Eliminator 2-12V , 2Amp.
- BESTO Ammeter 3Amp., Cat. No. 302/303
- BESTO Rheostat & Stop Clock

515. Hoffman's Voltameter

For demonstrating decomposition of water. This design is preferred for work of best precision. Platinum electrodes are used for electrolysis of water. The electrodes are mounted with rubber stoppers for insertion in the open ends of the voltmeter limbs. The glass unit has two connected limbs, integral with reservoir tube and funnel shaped bulb, with a stop clock at the top of each limb. Supplied with suitable metallic stand, helps to prevent accidental breakage. Glass parts are made from corning glass. Refer to Experiment No. 16

Preferred for Highest accuracy

•

Convenient to use

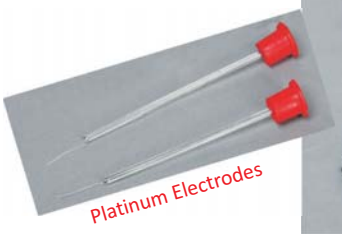
•

50ml Capacity

•

Least Count 2ml

Cat. No. 515



Platinum Electrodes

EXPERIMENT NO. 16

The production of Hydrogen & Oxygen from Water using Hoffman's Voltameter.

WHAT YOU NEED

- BESTO Hoffman's Voltameter as per Cat. No. 515
- BESTO Variable Power Supply 0-12V,
- BESTO Ammeter 1Amp., Cat. No. 302/303
- BESTO Rheostat 15ohms, 5 Amp.
- Dilute Sulphuric Acid
- Plastic Syringe
- Rubber Tubing
- Test Tube
- Small size glass trough
- Platinum electrode assembly with two suitable holders.

516. Copper Voltameter

It demonstrates the principle of electroplating.

It consists of three copper plates suspended from a moulded bakelite cover & placed on plastic jar. The two outer plates called "LOSS PLATES" are connected to one binding post on top and the inner "GAIN PLATE" is connected to the other binding post. All plates are firmly held in position when clamped and are easily inserted or removed. Chemicals are not included. Supplied in Plastic jar.

Cat. No. 516

518. Electric Non-Electric Apparatus

Fitted with two carbon rods, a LED and two terminals for D.C. Power Supply. Supplied w/o solution & supply. Designed exactly as per Maharasthra syllabus.

Cat. No. 518

522. Daniel Cell

This cell is steady & reliable and may be used as open or close circuit works. It consists of a zinc rod immersed in a very dilute solution of sulphuric acid in an empty porous pot which in turn, is immersed in copper sulphate solution. This cell consists of copper sulphate solution. This cell consist of copper pot of approx. Size 5½" x 3½". Chemicals are not included (only copper pot Daniel cell of Size 5½" x 3½", empty porous pot and zinc rod is provided.)

Cat. No. 522

524. Spare Copper Pot for Daniel Cell

Size : 5½" x 3½"

This cell is widely used for student experiment on the characteristics of Voltaic Cell. It has an emf of 1.08 V.

Cat. No. 524

525. Leclanche Cell

Because of its higher e.m.f. (1.5V) and lower internal resistance, this cell will deliver a stronger current for short period of time compared to the Daniel Cell. It consists of a plastic container 95 x 95 x 150 mm Length x Width x height. The rim is shaped to accommodate the cathode a zinc rod with terminal. (A carbon anode with terminal is sealed in a filled porous pot containing the depolarizer). Supplied with plastic container, filled porous pot & zinc rod.

Supplied without ammonium chloride electrolyte.

Leclanche cell is having large emf 1.5V, hence it is used in the circuit where intermittent large current is required.

Cat. No. 525

526. Daniel Cell Substitute

This is an electronic Daniel Cell works on 230V AC and gives regulated output of 1.08V.

Cat. No. 526

527. Leclanche Cell Substitute

This is an electronic Leclanche Cell works on 230V AC and gives regulated output of 1.5V.

Cat. No. 527

528. Zinc Plate with Terminal

For use with simple cell. Approx size 150 x 50 x 0.5mm fitted with brass terminals.

529.Copper Plate with Terminal

For use with simple cell. Approx size 150 x 50 x 0.6mm fitted with brass terminals.

530. Zinc Rod with terminal

For use with either Daniel Cell or Leclanche Cell. Size 140mm long, fitted with brass terminal.

	Diameter
a)	9 mm
b)	12mm

531. Carbon Rod

a)	150mm x 15mm (length x dia) Fitted with brass terminal
b)	75mm x 15mm (length x dia) Fitted with brass terminal

532. Porous Pot Empty

For use with Daniel Cell. Empty porous pot approx. size 150mm x 50mm dia.

Cat. No. 532

533. Porous Pot Charged

For use with the Lechlanche cell. Charged Porous Pot consists of Carbon anode with terminals is sealed in a filled porous pot containing the depolarizer.

Cat. No. 533

550. Resistance Coil Round Bakelite Type

Comprising a non-inductivity wounded coil of double silk covered constantan wire and enclosed in a circular moulded bakelite case. Two brass terminals are provided and the value of each coil is clearly marked on the top of the case. The Coil is adjusted to accuracy within ±0.1%. _Any range from 0.1ohms to 120ohms.

Cat. No. 550

551. Resistance Coil

A range of resistance units based on a high stability metal film

They offer improved accuracy and are less expensive than traditional resistance coils. Accuracy 1%.

Ohm	Max.V	Max.I
1	1.0	1.0
2	1.4	0.7
5	2.2	0.4
10	3.0	0.3
20	4.4	0.2
50	7.0	0.14
100	100	0.10
200	14.0	0.07
500	22.0	0.04
1000	30.0	0.03

Cat. No. 551

552. Resistance Coil with Short Circuiting Device

Suitable for insertion in circuits with standard cell or as a high resistance for use in series with sensitive galvanometer.

Comprising a carbon resistance of high value adjusted with double silk covered constantan wire to the actual value marked on the panel. The said adjusted coil is housed in a plastic case with a rectangular thick bakelite top, having brass block short circuiting plug. Two brass terminals are provided and the panel is clearly engraved with the resistance value.

	Range
a)	1K, 2K, 5K
b)	10K, 15K

557. Standard Resistance

These resistances incorporate the latest design and can carry comparatively large currents without being heated. The resistances are immersed in moisture free and non-corrosive oil contained in metal vessels. Manganin coils are used which are thoroughly aged. Silver soldered connections are used. Standard resistances of 0.1, 0.01 and 0.001 ohm are provided with 4 terminals while those of 1,10,100,1000 ohms are provided with 2 terminals only.

	Resistance (in ohms)	Max. Current (in Amp.)	Accuracy (in %)
a)	0.001	10	0.05
b)	0.01	10	0.05
c)	0.1	5	0.05
d)	1	3	0.01
e)	10	1	0.005
f)	100	0.5	0.005
g)	1000	0.2	0.005

558. Standard Resistance Box

Used as reference standard to be used with Kelvin or Million Meg-Ohmmeter.

Range	1milli-ohm to 1Killo-ohm - 7 different values.

Cat. No. 558

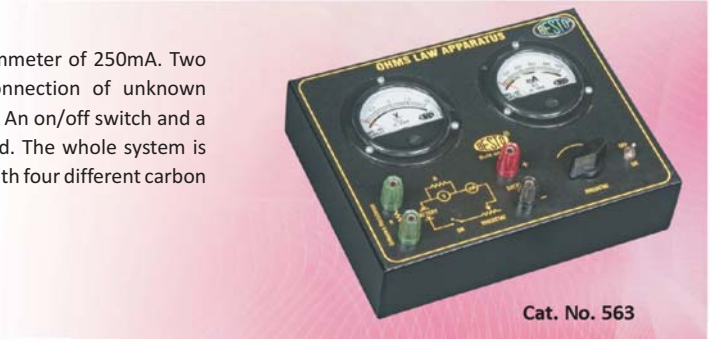
559. Resistance in Series & Parallel Board

It is a simple board to show the children how connection in series and connection in parallel works. Without Supply.

Ohms Law Apparatus, Resistance in Series & Parallel Kit

563. Ohms Law Apparatus

It consists of one voltmeter of 10 volt, one milliammeter of 250mA. Two 4mm socket terminals are provided for the connection of unknown resistance & another two terminals for D.C. Supply. An on/off switch and a potentiometer of 25 ohms, 3 Watt is also provided. The whole system is enclosed in a superior quality metal box. Supplied with four different carbon resistances and without D.C. supply.



Cat. No. 563

Cat. No. 564

564. Ohms Law Apparatus with built-in D.C. Power Supply

Specifications are same as above but we use 5V and 500mA meters instead of 10V and 250mA as stated above. A small D.C. battery eliminator of 6V, 500mA is built-in, in Ohms Law Apparatus. We need not to use D.C. Supply or D.C. Battery from outside.

Supplied with four different carbon resistances.

EXPERIMENT NO. 18

To verify Ohm's Law & hence find the unknown resistance .

WHAT YOU NEED

- Ohm's Law Kit as per Cat. No. 563 along with Battery Eliminator of 2-12V, 1Amp. or Ohm's Law Kit as per Cat. No. 564.

567. Resistance in Series

The unit consists of 2 meters - one Voltmeter of 10V & another Milliammeter of 150 mA. Three resistance R_1, R_2 & R_3 (of the order of 50 ohms each). Connected in series. Voltmeter 10V is mounted in box with their independent sockets. Milliammeter of 150mA is connected in series with all the three resistances & external input terminals. Built in DC regulated power supply of 10V, 500mA.

EXPERIMENT NO. 19

To find the resultant resistance when resistances are connected in series.

WHAT YOU NEED

- BESTO Resistance in series kit as per Cat. No. 567.

568. Resistance in Parallel

The unit consists of 2 meters - one Voltmeter of 10V & another Milliammeter of 200 mA. Three resistance R_1, R_2 & R_3 (of the order of 150 ohms each). Connected in parallel. Voltmeter 10V is mounted in box with their independent sockets. Milliammter of 200mA is connected with all the three resistances & external input terminals. Built in DC regulated power supply of 10V, 500mA.

EXPERIMENT NO. 20

To find the resultant resistance when resistances are connected in parallel.

WHAT YOU NEED

- BESTO Resistance in parallel kit as per Cat. No. 568.

Slide Wire Rheostats (Dia of Tube 4.4cm)

These are made in a variety of resistances and different current carrying capacities so as to satisfy every need. Some of the special features are:

Special Brass Rider

•

Excellent Heat Dissipation

•

Smoothly Operating

•

Durably Constructed

The sturdy construction & good heat dissipation of these rheostat make them ideally for general laboratory use.

Support: The bakelite or aluminum moulded support tights the pipe on each side with rod and nuts.

Tube/Pipe: Pipes are made from special porcelain.

Sliders: The guide rod carrying contact black is tightened with screws to the projection of the supports. The sliders are provided with Phosphorous-Bronze contact. These have double contact system and move smoothly on the sliding rod. Heavy brass block is provided for smooth movement for long life.

Terminals: Three brass terminals are provided. One terminal being connected to the sliding contact and the other two of the ends of winding, enabling the rheostat to be used as variable resistance or potential divider.

Winding wires: The layers of electrical oxidised Eureka wire wound on an insulating heat resistance porcelain pipe according to the length required.

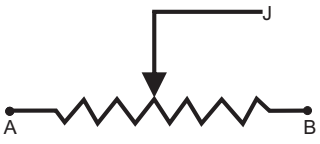
Description: Total resistance and max. current capacity is marked on the sliders.

WARNING: Since the rheostats are of open type, unprotected pattern, they should not be used on supplies in excess of 50 volts.

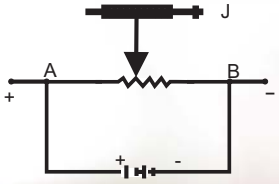
Rheostat Single Tube, Dia of Tube 4.4 cm. (Wound with oxidised Eureka Wire).

		A	B	C	D	E	F	G	H
Cat.	Tube Length →	15cms	20cms	25cms	30cms	35cms	40cms	45cms	50cm
No.	Amps ↓	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
615	8.0	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5
616	6.5	3.0	4.5	6.0	7.5	9.0	10.5	12	13.5
617	5.0	4.5	6.5	8.5	10.5	12.5	14.5	16.5	18.5
618	4.2	8	12	16	20	24	28	32	36
619	3.3	10	16	22	28	34	40	46	52
620	2.8	15	22	29	35	43	50	57	65
621	2.3	23	34	45	56	67	78	89	100
622	1.8	34	55	74	92	110	128	146	165
623	1.6	50	75	100	125	150	175	200	225
624	1.4	64	96	128	160	192	225	260	290
625	1.2	89	135	180	225	270	315	360	400
626	1.0	116	175	235	295	355	415	475	535
627	0.8	160	240	320	400	480	560	640	720
628	0.6	270	400	540	680	820	960	1100	1240

The two arrangements are shown in the following Figures



- Variable resistance
- Rheostat as variable resistance.



- Variable potential difference
- Rheostat as potential divider.

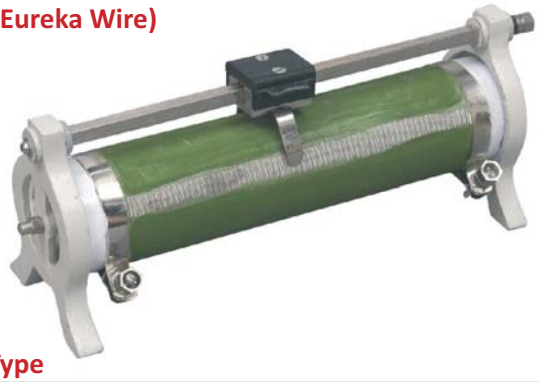
Slide Wire Rheostats (Dia of Tube 5.6 cm)

Rheostat Single Tube, Dia of Tube 5.6cm. (Wound with oxidised Eureka Wire)

		A	B	C	D	E	F	G	H
Cat.	Tube Length →	15cms	20cms	25cms	30cms	35cms	40cms	45cms	50cm
No.	Amps ↓	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
632	6.5	3.5	5.5	7.5	9.5	11	13	15	17
633	5.0	5.5	8	11	14	17	20	23	26
634	4.2	10	15	20	25	30	35	40	45
635	3.3	14	20	28	34	42	48	58	64
636	2.8	19	28	38	48	57	66	76	86
637	2.3	26	41	56	71	86	102	114	128
638	1.8	47	70	93	116	139	160	185	210
639	1.6	64	96	125	160	190	225	250	290
640	1.4	80	120	160	200	240	280	320	360
641	1.2	115	170	230	290	345	400	445	500
642	1.0	148	225	295	365	445	520	590	675
643	0.8	200	300	400	500	600	700	800	900
644	0.6	345	510	675	835	1000	1165	1300	1500
645	0.5	500	750	1000	1250	1500	1750	2000	2250
646	0.4	840	1250	1650	2070	2500	2900	3350	3750
647	0.3	1350	2100	2850	3600	4300	5100	6000	6750

Rheostat Groove Type (Wound with imported bare Eureka Wire)

Specifications are same as given on page 34 the only difference is that imported bare with Eureka wire (having high stability and strength) is wound on a thick wall porcelain/cement pipe having a deeply grooved outer surface to provide air conducts for convection cooling. Contact with Eureka resistance wire is made by two copper brushes having large contact area to give smooth current control and very little wear. The special brass slider moves the full length of the Rheostat, moves rapid with ease. For different ranges of groove type rheostat please refer to the following table :



Rheostat Single Tube, Dia of Tube 5.6 cm. Groove Type

		A	B	C	D	E	F	G	H
Cat.	Tube Length →	15cms	20cms	25cms	30cms	35cms	40cms	45cms	50cm
No.	Amps ↓	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms	Ohms
660	6.5	2	3	4.4	6	7.5	9	10.5	12
661	5.0	4.5	6.5	9	12	15	18	21	24
662	4.2	7	10	14	18	22	26	30	34
663	3.3	8	12	16	20	24	28	32	36
664	2.8	12	18	24	30	38	46	54	64
665	2.3	16	25	34	44	60	76	92	108
666	1.8	20	40	60	90	118	146	172	200
667	1.6	40	80	120	160	200	240	280	320
668	1.2	60	100	140	185	225	270	315	360
669	1.0	95	120	155	200	290	370	460	530
670	0.8	160	240	320	400	480	560	640	720
671	0.6	270	400	540	570	800	930	1070	1200
672	0.5	300	500	700	1000	1300	1600	1900	2200
673	0.4	360	660	975	1300	1625	1950	2275	2600
674	0.3	600	1150	1700	2250	2850	3400	3950	4550

676. Higher Range Rheostat for Electrical Engineering Lab

Specifications are same as given on page 35, the only difference is that imported bare Eureka Wire is replaced with Kanthal wire (having high stability and strength) is wound on a thick wall porcelain/cement pipe having a deeply grooved outer surface to provide air conducts for convection cooling. Contact with Kanthal resistance wire is made by two copper brushes having large contact area to give smooth current control and very little wear. The slider moves the full length of the Rheostat, moves rapid with ease. Different types of Higher Range Rheostat please refer to the table.

	Ampere	Ohms	Size	
a)	1.2	500	16" x2¼"	Single Tube
b)	1.6	360	22" x2¼"	Single Tube
c)	5.0	50	14" x2¼"	Double Tube
d)	5.0	100	18" x2¼"	Double Tube
e)	5.0	150	24" x2¼"	Double Tube
f)	10	20	18"x2¼"	Double Tube
g)	1.7	600	18"x2¼"	Double Tube

677. Wire wound Potentiometer/Simple Rheostat

A wire wound potentiometer rated @ 3 watt is fitted inside a moulded plastic casing with a knob at the top for varying the resistance. Three 4 mm sockets mounted at the top provided for potential dividing arrangement as well calibration clearly printed on the cover plate along side knobs.

Supplied with suitable leads.

	Ohms	Wattage
a)	50	3 Watts
b)	100	3 Watts
c)	250	3 Watts
d)	500	3 Watts
e)	1000	3 Watts
f)	10,000	3 Watts

680. Variac Single Phase/ Three Phase

Specifications :

Construction : Enclosed in a thick metal box, has air vents for cooling. The voltage can be adjusted and is indicated by a knob and dial on the top.

Termination : Mains input via main cable. Output via insulated 4mm socket terminals as well as 3 pin 15 Amp. Socket.

Indication : An On/Off indicator is provided.

Overload Protection : Slow blow fuse in output line.

Output Volts : 0-240 (Line voltage connection)
0-270 V (Over voltage connection)

The item is supplied with different current capacities as per requirement in hand. Output voltage 0-270V remains the same in each case. Other specifications are as described above.

	Current Capacity	Phase
a)	2 Amp.	Single Phase
b)	4 Amp.	Single Phase
c)	6 Amp.	Single Phase
d)	8 Amp.	Single Phase
e)	10 Amp.	Single Phase
f)	15 Amp.	Single Phase

	Current Capacity	Phase
g)	4 Amp.	Three Phase
h)	8 Amp.	Three Phase
i)	10 Amp.	Three Phase
j)	15 Amp.	Three Phase

This sturdily constructed Auto Transformer is ideal for operating heating devices, A.C. Motors and other equipment requiring adjusting input voltage.

Loading Rheostat Bank & Lamp load

684. Loading Rheostat Bank -Single Phase 250V AC -50Hz

CONSTRUCTION DATA :

BESTO Rheostats are wound on high grade porcelain tubes with low temperature. Nickel-Copper or Nickel-Chrome wire windings are terminated into inverted screw terminals. All the resistances are housed in a sheet metal box of sturdy angle iron frame and covered with perforated sheet. The unit is all sides ventilated to maintain free cooling.

TROLLEY :

The unit is mounted on four castor wheels for easy transportation in the laboratory. The live section of the unit is completely insulated from the body to avoid electric shock during operation. A thick bakelite panel is mounted on the front side of trolley. All the components (controlling switch, selector switches, fuses and terminals etc.) Are fitted on the front panel. The trolley (unit) is treated with premier and non corrosive heat resistant paint.


Cat. No. 684

LOADING RHEOSTATS SINGLE PHASE 250V AC-50Hz

	Max. Watt in KW	Max. Load Current	No. of Steps		
			250W	500W	1000W
a)	2.5	10A	10	- -	- -
b)	5.0	20A	4	8	- -
c)	6.0	25A	2	3	4
d)	7.5	30A	2	2	6
e)	10.0	40A	2	1	9

685. Loading Rheostat Bank - Three Phase 415V AC -50Hz

Star connected & 4 wire system

	Max. Watt in KW Max. Load		Current (A) per phase	No. of Steps / Phase	
	Per Phase	Total System		250W	500W
a)	1.0	3.0	4.15	4	- -
b)	1.7	5.1	7.00	1	3
c)	2.0	6.0	8.30	2	3
d)	2.5	7.5	10.50	2	4
e)	3.5	10.5	14.50	2	6
f)	5.0	15.0	21.0	4	8

Loading Rheostats are an Indispensable Equipment in Electrical Laboratory & Modern Industry for testing the finished products such as Power Generators, Electrical Meters, Transformers & Battery Chargers etc.

686. Lamp Load : Single Phase, 240v Ac, 50Hz

a)	Loading Capacity 4KW, Trolley type without lamps having step of 200 watt each
b)	Loading Capacity 6KW, Trolley type without lamps having step of 200 watt each

687. Lamp Load : Three Phase, 415V, Star connected & 4 Wire system

a)	Loading Capacity 4.5KW,Trolley type Dissipiation per phase. 1.5KW, Seven steps of 200W each and one step 100W, withoutlamps.
b)	Loading Capacity 6.0KW, Trolley type Dissipiation per phase 2KW, Ten steps of 200W each without lamps.

689. Loading Capacitor Bank

These are used to improve the Power factor of an electrical system, resulting in more efficient utilisation of electrical energy.

Cabinet : A thick bakelite panel is mounted on the front side of Unit. All the components (Controlling switch, selector switches, fuses and terminals etc.) are fitted on the front panel. The live section of the unit is completely insulated from the body to avoid electric shock during operation. The unit is treated with premier and non corrosive powder coating.


Cat. No. 689

LOADING CAPACITOR - Three Phase 440V AC 50HZ Delta Connection

	Max. Watt in KVAR		Max. Load Current (A) Per Phase	No. of Steps	
	Per Phase	Total System		1KVAR	2KVAR
a)	2.3	7	9.8	7	- -
b)	3.3	10	14.0	2	4
c)	5.0	15	21.0	1	7

690. Loading Inductor Bank - Single Phase

Construction Data : These are wound with dual coated H-class copper wire and silicon steel transformer grade lamination are used for minimum iron losses. Each inductor is vacuum impregnated treated with insulated varnish and oven baked for protection against moisture and prolonged used effects.

To provide rigidity & Durability, the loading inductors are designed with fixed steps. The fixed steps are precisely calibrated and provide accurate reactive loads.

Cabinet : A thick bakelite panel is mounted on the front side of unit. All the components (controlling switch, selector switches, fuses and terminals etc.)are fitted on the front panel. The live section of the unit is completely insulated from the body to avoid electric shock during operation. The unit is treated with premier and non corrosive powder coating.


Cat. No. 690

LOADING INDUCTOR : Single Phase 240V AC 50Hz

	Max. Load Current in(A)	Max. Wattage in KVAR	No. of Fixed Steps			
			0.5A	1A	2A	3A
a)	5	1.2	2	4	- -	- -
b)	10	2.4	2	1	1	2
c)	15	3.6	2	1	2	3

691. Loading Inductor : Three Phase 415V AC 50Hz, Star Connected & 4 Wire System

	Max. Load Current in(A)	Max. Wattage in KVAR		No. of Fixed Steps			
		Total System	Per Phase	0.5A	1A	2A	3A
a)	5	3.6	1.2	2	4	- -	- -
b)	10	7.2	2.4	2	1	1	2
c)	15	10.8	3.6	2	1	2	3

692. Single Phase Isolation Transformer of rating 1KVA

Primary Turns	0-132-229-264
Secondary Turns	0-132-229-264
Ratio	1:1
Type	Isolation Transformer
Bobbin Size	7 No. 3.5”
Bobbin Type	Nylon
Input / Output Voltage	230VAC

694. Measurement of Efficiency of Single Phase Transformer (Direct Loading)

Cat. No. 694

Technical Specifications:

- Two Nos. of Moving Coil Voltmeter of Range 300V AC of size 96*96mm provided with Input Terminals.
- Two Nos of Moving Coil Ammeter of Range 10A AC of size 96*96mm provided with Input Terminals.
- Two Nos. of Single Phase Wattmeter of Range 2KW of size 96*96mm provided with Input Terminals.
- One No of Miniature Circuit Breaker of Range 10Amps (MCB/ DP) Provided on the Input Side.
- Circuit Diagram Printed on Bakelite Sheet front panel with instrument connecting terminals.
- Panel board of portable wooden panel box is in Tappered shape for better view angle.
- Dimensions: 470 x 460 x 620 mm (L x B x H).
- Power Requirement: Single Phase 220V AC.

Standard Accessories:

- Single phase Variac 10 Amps. Cat No. 680 (e)
- Loading Rheostat 2.5 KW Single phase in 10 Steps of 250Watts Each Cat No. 684 (a).
- Single phase Isolation Transformer of Rating 1KVA Cat No. 692

695. Single Phase Transformer by Open Circuit and Short Circuit Test

Cat. No. 695

Technical Specifications:

- One No. of Moving Coil Voltmeter of Range 50V AC of Size 96*96mm Provided with Input Terminals.
- One No. of Moving Coil Voltmeter of Range 300V AC of Size 96*96mm Provided with Input Terminals.
- One No. of Moving Coil Ammeter of Range 1A AC of Size 96*96mm Provided with Input Terminals.
- One No. of Moving Coil Ammeter ofRange 10A AC of Size 96*96mm Provided with Input Terminals.
- One No. of Single Phase Wattmeter of Range 75 Watt of Size 96*96mm Provided with Input Terminals.
- One No. of Single Phase Wattmeter of Range 500 Watt of Size 96*96mm Provided with Input Terminals.
- One No. of Miniature Circuit Breaker of Range 10A, (MCB/DP) provided on the input side.
- Circuit Diagram Printed on Bakelite Sheet front panel with instrument connecting terminals.
- Panel board of portable wooden panel box is in Tappered shape for better view angle.
- Dimensions: 470x460x620mm (LxBxH)
- Power Requirement : Single Phase 220V AC
- Single point Patchcords of Size 2.5mm for Interconnections (Electrical) Instruction Manual

Standard Accessories :
Single Phase Variac 10 Amps Cat 680 (e)

EXPERIMENT NO. 22

i. To measure Efficiency of a single phase transformer direct loading.
ii. To calculate Voltage Regulation of a Single phase Transformer

WHAT YOU NEED

- BESTO Measurement of efficiency of Single Phase Transformer (Direct loading) Kit, Cat. No. 694 along with standard accessories.

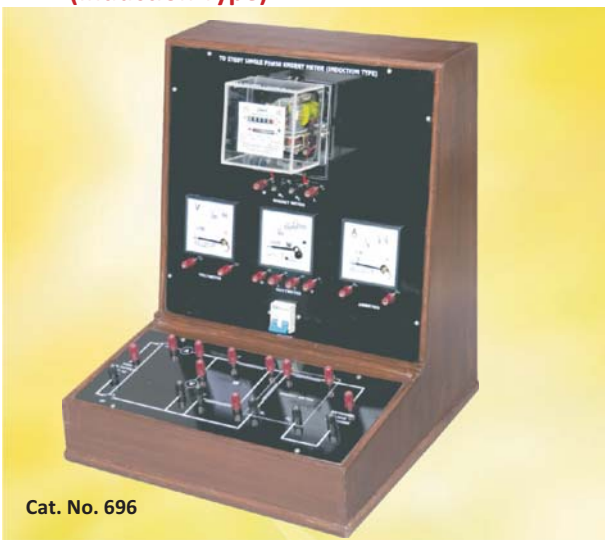
EXPERIMENT NO. 23

i. To find the equivalent Circuit parameters and different types of losses of a single phase Transformer.
ii. To Perform load test at unity power factor on a single phase transformer.

WHAT YOU NEED

- BESTO Single Phase Transformer by open circuit and short circuit test Kit along with standard accessories.

696 . Single Phase Energy Meter (Induction Type)



Cat. No. 696

Technical Specifications:

- One No of Moving Coil Voltmeter of Range 300V AC of Size 96*96mm Provided with Input Terminals.
- One No of Moving Coil Ammeter of Range 10A AC of Size 96*96mm Provided with Input Terminals.
- One No of Single Phase Wattmeter of range 2KW of Size 96*96mm Provided with Input Terminals.
- One No Induction type Single Phase Energy Meter of range 5-10A 240V, 1200Rev/KWh.
- One No. of Miniature Circuit Breaker of Range 415V/ 63 Amps (MCB/ DP) Provided on the Input Side.
- Circuit Diagram printed on Bakelite Sheet front panel With Instruments Connecting Terminals.
- Panel board of portable wooden panel box is in Tappered shape for better view angle.
- Dimension: 470 x 460 x 620 mm (L x B x H)
- Power Requirement: Single Phase 230V AC.
- Single point Patchcords for Interconnections (Electrical).
- Stop Watch Digital & Instruction Manual
- Dimensions (mm): 460(L) x 460(B) x635(H)

Standard Accessories :

- Single phase Variac 10 Amps. Cat No. 680 (e)
- Loading Rheostat 2.5KW Single phase in 10 Steps of 250Watts each Cat No. 684 (a)

697. Sumpner's Test (Back To Back) Test on Single Phase Transformer

Cat. No. 697

Technical Specifications:

- Two Nos. of Moving Coil Voltmeter of Range 300V AC of size 96*96mm provided with Input Terminals.
- One No. of Moving Coil Ammeter of Range 1A AC of size 96*96mm provided with Input Terminals.
- One No. of Moving Coil Ammeter of Range 10A AC of size 96*96mm provided with Input Terminals.
- Two Nos. of Single Phase Wattmeter of Range 500W of size96*96mm provided with Input Terminals.
- One No of Miniature Circuit Breaker of Range 16Amps (MCB/ DP) Provided on the Input Side.
- Circuit Diagram Printed on Bakelite Sheet front panel with instrument connecting terminals.
- Panel board of portable wooden panel box is in Tappered shape for better view angle.
- Dimensions : 470 x 460 x 620 mm (L x B x H).
- Power Requirement : Single Phase 220V AC.
- Single point Patchcords for Interconnections (Electrical)
- Instruction Manual

Optional Accessories

- Single Phase Variac 10 Amps Cat No. 680 (e)
- Single Phase Isolation Transformer 1KVA
- Thermometer 1000^{0}C

EXPERIMENT NO. 24

i. To study principle and construction of Single Phase Energy Meter.
ii. To compare energy consumption shown by energy meter with actual energy consumed by loaded circuit.

WHAT YOU NEED

- BESTO Single Phase Energy Meter Kit, Cat. No. 696 with standard accessories.

EXPERIMENT NO. 25

To determine the temperature rise and Efficiency of a single phase transformer (Sumpner's Test back to back).

WHAT YOU NEED

- BESTO Sumpner's Test, Cat. No. 697

Price of optional accessories is not included in price of Cat. No. 697

PHYSICS
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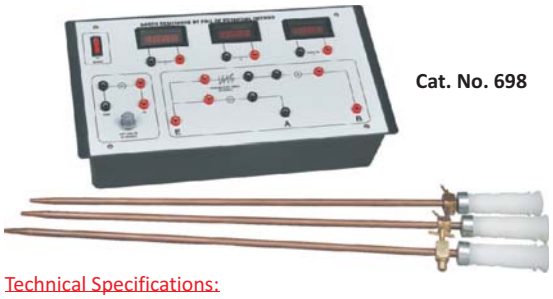
Built on trust

698. Earth Resistance by fall of Potential Method



Cat. No. 698

Technical Specifications:

- One No of Inbuilt power supply of range 0-12V DC / 2 ampere.
- Two No. of Digital panel meter for voltage measurement of Range 0-20V.
- One No. of DPM for Current measurement of range 0-200 mA.
- Three No. of spoke' made of copper 10mm thick & 750mm long with high density polypropylene handle.
- Circuit Diagram on top panel arrangement is in wooden box having separate space for power & connecting wires
- Dimensions: 470 x 460 x 620 mm (L x B x H).
- Power Requirement: Single Phase 220V AC.

Standard Accessories :

- Single point Patchcords for Interconnections (Electrical)
- Connecting Wires for Electrodes of Length 10Meter
- Earth Electrode of Copper 750mm Long & 10mm Thick with High Density Polypropylene Handle
- Instruction Manual

EXPERIMENT NO. 26

To study how the resistance of earth depends upon the position of auxiliary electrode (A moveable).

WHAT YOU NEED

- BESTO Kit as per Cat. No. 698 with all standard accessories

699. To Study Scott Connection of a Transformer

- One No. of Moving Coil Ammeter of Range 0-10Amp. AC of size 96X96mm Provided with Input Terminals.
- Two No. of Moving Coil Voltmeters of Range 0-300V AC of size 96X96mm Provided with Input Terminals.
- One No. of Moving Coil Voltmeter of Range 0-500V AC of size 96X96mm Provided with Input Terminals.
- One No. of MCB rating DP-25Amp. Provided on the Input Side.
- Circuit Diagram Printed on Bakelite Sheet Front Panel.
- Panel Board of Portable Wooden Panel Box. Is in Tapered Shape for Better View Angle.

Standard Accessories

- Variac 10 Amps Three Phase 680(i)
- Transformer 1KVA/230/230VAC With Tappings at 50% &

EXPERIMENT NO. 27

i. To obtain balanced two Phase Supply from balanced of supply by two single phase transformer.
ii. To Perform Polarity Test on a Single Phase Transformer

WHAT YOU NEED

- BESTO Kit of Scott Connection of a Transformer of Cat. No. 699 along with standard accessories.
- BESTO Battery Eliminator 2-12V , 2Amp.

700. Calibration of Wattmeter by DC Potentiometer

Cat. No. 700

Technical Specifications:

- In built power supplies 0-12V DC /1A, 0-75V DC/200mA, 0-3V DC/200mA and 1V DC/ 200mA. For current source, voltage source, working current source and as standard cell respectively.
- Two number of Digital Panel Meter for current measurement i.e. A_1 and A_2.
- One number of Digital Panel Meter for voltage measurement i.e. V.
- One number of Digital Panel Meter for galvanometer purpose i.e. G.
- Circuit diagram on front panel with input and output sockets.

  Voltage ratio box of range 300 /150/30/15/1.5 with ratio 1:5.
- DC slide wire potentiometer of 10 wire, Cat. No. 932.
- AC / DC Wattmeter of range 0-37.5Watts.

Standard Accessories :

- Singlepoint (4mm) Patchcords for Interconnections.
- Patchcords (4mm) Banana Plug & otherside Open.
- Voltage Ratio Box of range 300/ 150/ 30/ 15/ 1.5 with ratio 1:5.
- Potentiometer Ten wire with sunmica base.
- AC/ DC Wattmeter of Range 0-37.5 Watts
- Rheostat of Range 0-20 Ohms/ 1Amp.
- 3 Pin Power Cord (Mains Cord)

EXPERIMENT NO. 28

To study how to calibrate DC wattmeter by phantom loading using DC potentiometer for measurement.

WHAT YOU NEED

- BESTO Kit of Cat. No. 700 along with standard accessories

702. To Perform Block Rotor Test of Three Phase Induction Motor

Technical Specifications:

- Three Nos. of Moving Coil Ammeters of Range 5A AC of size 96*96mm Provided with Input Terminals.
- One No of Moving Coil Voltmeter of Range 500V AC of size 96*96mm provided with Input Terminals.
- Two Nos. of Single Phase Wattmeter of Range 2KW of size 96*96mm Provided with Input Terminals.
- One No of Direct Online Air Break Starter Suitable up to 5HP Three Phase.
- One No of Miniature Circuit Breaker of Range 400V/ 16Amps provided on the Input Side.
- Circuit Diagram printed on Bakelite Sheet front panel with instruments connecting terminal.
- Panel board of portable wooden panel box is in Tappered shape for better view angle.
- Dimension: 470 x 460 x 620 mm (L x B x H).
- Power Requirement: Three Phase 415V AC.

Standard Accessories:

- Three Phase Variac 10 Amps. Cat. No. 680(i)
- Three Phase Induction Motor 3HP with Loading Arrangement.

Features of 3-phase induction motor

- Type :Induction Type
- Input Voltage: 415V AC
- Output Terminals: Six
- Amperes: Four
- Frequency: 50 Hz
- RPM:1500
- Operated: Star/ Delta
- Mechanical Load: 50 Kg
- Digital Tachometer (Contact Type & Photo Type)
- Instruction Manual.

Cat. No. 702

EXPERIMENT NO. 29

i. **To study the power and power Factor of Three Phase Induction Motor.**

ii. **To find out short-circuit current with normal voltage to stater, To find out total leakage reactance of the motor as referred to primary. To find out total resistance of the motor as referred to primary.**

WHAT YOU NEED

- BESTO Kit of Cat. No. 702 with standard accessories.

703. Transformer 1KVA

Technical Specifications

- Output rating 1KVA
- Input voltage single phase 230/115VAC,50Hz Tapping at 50% & 86.6%
- Air cooled
- 4mm Terminal out for connections.
- Safety protected

705. Transformer 3KVA & 0.5KVA

Specifications are same as per Cat. No. 702

a)	3KVA
b)	0.5KVA

Global Warming Kits (Using Solar Cells)

725. Solar Fan

Working model in plastic base. When solar cell is placed in sunlight it converts solar energy into electrical energy, which in turn energises the motor and thus conversion of solar energy into electromechanical energy. This is a great introduction into the working and benefits of solar energy and it is a fun and educational project for the classroom.

Cat. No. 725

726. Micro Solar Car

No Batteries, No Plugs Just Power From The Sun! Easy to operate and fun to play. This micro wonder car uses 100% clean fuel technology powered by miniature solar cells. This little car zooms as soon as the sun shines on the solar panel, and slows down as solar panel angle changes and stopped when the sun is blocked. No assembly required.

727. Solar Energy kit

This kit is to demonstrate the effect of solar energy and its ability to be converted into different form of energy like storage of energy, electrical energy, light energy, sound and electromechanical energy .All the gadgets provided can be operated with charged battery as well as directly with the solar panel also. Solar kit is provided with NI-CD cells (2) with holder, solar panel with lead, a motor fan, music chip, an LED and small voltmeter, all are fitted on base enclosed in wooden case .

Cat. No. 727

728. Solar Water Pump

This kit is to demonstrate that solar irrigation could become economical and increased use of such system might be anticipated in future. A mini water pump is powered by solar energy, (solar panel included) allowing you to run your pump all day long with no operating costs!(no battery required) The kit comes complete with two heads for a tranquilly beautiful water display up to 2-3ft high. The panels are adjustable to receive maximum sunlight.

Cat. No. 728

729. Solar Water Heater

Solar water heater is device used for heating water by using solar energy. When sun rays falls on to the black coated copper pipes, which are arranged in a box covered with a glass sheet and they absorb sunlight efficiently and the hot water from the pipe is collected in tank. Kit is provided with water tank, tank stand, funnel thermometer and solar water heater (plate collector).size collector approx 10x10x1 and water tank capacity approx 2.5ltr.

Cat. No. 729

730. Solar Panels

Safe & Simple-to-use encapsulated mini-panel. Create various experiments by exposing and positioning the panel to the energy source. All mini panels are tested VOC (voltage open circuit), ISC (current short circuit), using one full sun condition PV panels can be joined together in series or parallel to produce higher voltages or ampearages.

Ranges volt range : 0.5v, 2v, 4v, 6v, 9v and 12v

Current ranges : 50mA, 100mA, 200mA, 400mA

Cat. No. 730

731. Solar Ni-Cd Cell Charger

This simple, portable solar battery charger provides a convenient method to charge rechargeable Ni-Cd batteries while learning about solar cells. This silicon solar cells are connected together in series, and each battery is protected with a blocking diode so that electricity flows only from the cells to the battery. A simple and safe experiment would be to measure the battery voltage at various intervals during charging under a lamp or in the sun.

Cat. No. 731

732. Solar Radio

It demonstrates how solar energy can be converted into sound energy. Students learn that more the sun rays fall on panel more would be the output is given to the radio. This is a great introduction into the workings and benefits of solar energy and it is a fun and educational project for the classroom.

Cat. No. 732

733. Solar Meter

Instrument is used to measure the power density of sunlight. Moving coil DC meter housed in non-breakable ABS plastic case with calibrated scale expressed in mW/cm^2 to show full sun intensity level and encapsulated with Solar cell.

Cat. No. 733

734. Solar Bulb

Working model in two parts wooden box. One part with solar cell and other is with bulb. When solar cell is placed in sunlight it converts solar energy into electrical energy and thus bulb glows.

Cat. No. 734

735. Wind Mill kit

This kit is to demonstrate the generation of electric energy by a wind energy (kinetic energy) or generation of electricity by moving a coil in a magnet. When air strikes the generator blade, it turns the coil of small generator to produces electricity and lights up a LED and a connected voltmeter indicates the amount of current being produced by the generator.

Cat. No. 735

Global Warming Kits (Using Solar Cell)

738. Solar Domestic Circuit

A complete demonstrative unit with schematic diagram that demonstrates how the energy can be saved using solar energy and also demonstrate that how connections / wiring is made in our houses. the unit is operating on low voltage Dc. All the components fuse, indicator, on/off switches, fan, bell, lamp are fitted on bakelite sheet. A knife switch is provided to changeover the Solar Panel voltage or DC (battery voltage).

Cat. No. 738

Demonstrates how the energy can be saved using Solar Energy

Interesting Activities based on Electrical Theory

Cat. No. 739

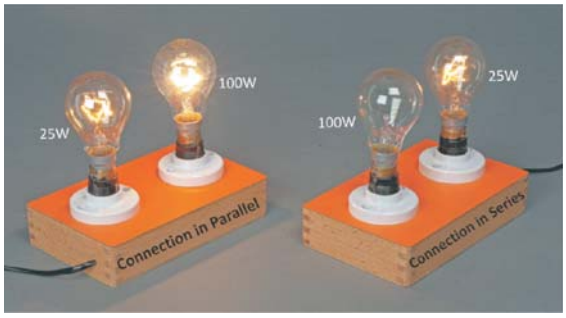
739. Domestic Electric Circuit

A complete demonstrative unit with schematic diagram that demonstrates how connections/wiring is made in our houses and also demonstrate that how the energy can be saved using solar energy. The unit is operating on low voltage DC. All the components fuse, indicator, on/off switches, fan, bell, lamp and two DC moving coil meters are fitted on bakelite sheet. A knife switch is provided to changeover the Solar Panel voltage. (Optional if required)

740. Connection in Series & Parallel

- Two bulbs of 25W & 100W connected in parallel is mounted on a wooden base.
- Two bulbs of 25W & 100W connected in series is mounted on a wooden base.

When we switch on the parallel board, both bulb of 25W & 100W will glow according to their intensities, but when we switch on the series board, the 25W bulb will glow with greater intensity as compared to 100W bulb.



Cat. No. 740

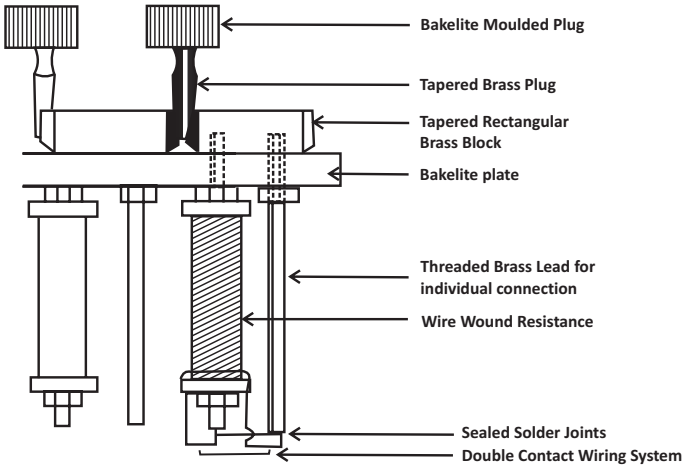
741. Principle of Wheatstone Bridge

To understand the principle of Wheatstone Bridge we have connected all the four bulbs to make a portable wheatstone bridge & at the balanced point we have given another bulb. When the bridge is balanced that is p/q = r/s, the centre bulb will not glow.

Cat. No. 741

Construction Details:

- In plug type resistance box the contact between plug and socket is the most important feature affecting reproducibility of results. We use tapered brass plug and split block. Although expensive to make, this is the best form of contact. It requires accurate machining to ensure interchangeability (i.e. plugs and lugs are cut to a fine taper and are interchangeable.). The plug heads are machine moulded, are of heavy insulated bakelite in a beautiful shape.
- Selected double cover Eureka or Managanin wire is wound on the bakelite spool. Sufficient heat treatment is processed through to avoid any appreciable shifting of values.



- The coils are mounted on the lower side to an insulating panel with the help of threaded brass leads and connected across the gap between the heavy brass blocks which are mounted on the panel. The top panel is provided with two heavy type brass terminals.
- The coils are clearly marked on the panel. The case is made of teak wood.

850. Resistance Box Plug Type (Constantan Coil)

Precision quality consisting of 12mm (approx. 1/2") thick rectangular brass block, non inductive, double covered Eureka Constantan wire is wound on bakelite spool, enclosed in a teak wood box. Accuracy ±0.1%.

Cat. No. 850

	Range	No. of Coils	No. of Plugs
a)	0.1 - 1Ω	5	6
b)	0.1 - 5Ω	8	9
c)	0.1 - 10Ω	9	10
d)	0.1 - 50Ω	12	13
e)	0.1 - 100Ω	13	14
f)	0.1 - 500Ω	16	17
g)	0.1 - 1000Ω	17	18
h)	1 - 10Ω	5	6
i)	1 - 50Ω	8	9
j)	1 - 100Ω	9	10
k)	1 - 500Ω	12	13
l)	1 - 1000Ω	13	14
m)	1 - 5000Ω	16	17
n)	1 - 10000Ω	17	18

852. Resistance Box Plug Type (Manganin Coil)

Specifications are same as per Cat. No. 850 consisting of 12mm (approx. 1/2") thick rectangular brass block, resistance coils are made from doubled silk covered Manganin wire. Accuracy ±0.05%.

Cat. No. 852

	Range	No. of Coils	No. of Plugs
a)	0.1 - 1Ω	5	6
b)	0.1 - 5Ω	8	9
c)	0.1 - 10Ω	9	10
d)	0.1 - 50Ω	12	13
e)	0.1 - 100Ω	13	14
f)	0.1 - 500Ω	16	17
g)	0.1 - 1000Ω	17	18
h)	1 - 10Ω	5	6
i)	1 - 50Ω	8	9
j)	1 - 100Ω	9	10
k)	1 - 500Ω	12	13
l)	1 - 1000Ω	13	14
m)	1 - 5000Ω	16	17
n)	1 - 10000Ω	17	18

Resistance Boxes -Dial Type (Constantan & Manganin Coil)

Resistance Box : Dial Type (Constantan & Manganin)

General : BESTO Decade Resistance Boxes incorporate the latest design switches so as to ensure low contact resistance. The moving contacts are constructed from phosphor-bronze lamination to ensure long life and repeatability of results. Eleven position switches are employed.

Panel : An insulating panel of bakelite enclosed in an elegantly polished teak wood box.

Resistance Coil: Resistance Coils are non-inductively wound, properly varnished and aged for permanence of values over a long period. Imported double silk covered manganin or constantan wire is used in Grade A and Grade B resistance boxes separately. Manganin has a negligible temperature coefficient against copper.

Accuracy : Accuracy is brought within the field ±0.05% to ±0.1% for constantan coils (B Grade) and ± 0.02% to ±0.05% for manganin coils (A Grade)

Contact Resistance : Contact Resistance per decade is of the order of 0.0015 ohm.

Cat. No. 872

	Range (CONSTANTAN COIL) Accuracy ±0.05% to 0.1%
864	Single Dial 0.01Ω to 0.1Ω
865	Single Dial 0.1Ω to 1Ω
866	Single Dial 1Ω to 10Ω
867	Single Dial 10Ω to 100Ω
868	Single Dial 100Ω to 1000Ω
869	Single Dial 1000Ω to 10000Ω
870	Double Dial (0.01×10 & 0.1×10)ohms
871	Double Dial (0.1×10 & 1×10)ohms
872	Double Dial (1×10 & 10×10)ohms
873	Double Dial (10×10 & 100×10)ohms
874	Three Dial having 0.01, 0.1 & 1Ω decades
875	Three Dial having 0.1, 1 & 10Ω decades
876	Three Dial having 1,10 & 100Ω decades
877	Four Dial having 0.1, 1, 10 & 100Ω decades
878	Four Dial having 1,10,100, 1000Ω decades
879	Five Dial having 0.1, 1,10,100 & 1000Ω decades
880	Five Dial having 1,10, 100, 1000 & 10000Ω decades

	Range (MANGANIN COIL) Accuracy ±0.02% to 0.05%
882	Single Dial 0.01Ω to 0.1Ω
883	Single Dial 0.1Ω to 1Ω
884	Single Dial 1Ω to 10Ω
885	Single Dial 10Ω to 100Ω
886	Single Dial 100Ω to 1000Ω
887	Single Dial 1000Ω to 10000Ω
888	Double Dial (0.01×10 & 0.1×10)ohms
889	Double Dial (0.1×10 & 1×10)ohms
890	Double Dial (1×10 & 10×10)ohms
891	Double Dial (10×10 & 100×10) ohms
892	Three Dial having 0.01, 0.1 & 1Ω decades
893	Three Dial having 0.1, 1 & 10Ω decades
894	Three Dial having 1,10 & 100Ω decades
895	Four Dial having 0.1, 1, 10 & 100Ω decades
896	Four Dial having 1,10,100, 1000Ω decades
897	Five Dial having 0.1, 1,10,100 & 1000Ω decades
898	Five Dial having 1,10, 100, 1000 & 10000Ω decades

Resistance Substitution Box

900. Resistance Substitution Box

Comprising 12 radio type resistances using standard preferred values covering the range 100 ohms to 470 kilo-ohms. In the steps ratio of 1:2 approx. Selection is by means of rotary switch & external connection is via 4mm socket.

Supplied with suitable leads.

	Resistance	Tolerance
a.	100 ohms	±10%
b.	220 ohms	±10%
c.	470 ohms	±10%
d.	1Kilo-ohms	±10%
e.	2.2 Kilo-ohms	±10%
f.	4.7 Kilo-ohms	±10%
g.	10 Kilo-ohms	±10%
h.	22 Kilo-ohms	±10%
i.	47 Kilo-ohms	±10%
j.	100 Kilo-ohms	±10%
k.	220 Kilo-ohms	±10%
l.	470 Kilo-ohms	±10%

Cat. No. 900

901. Economical Resistance Box : Dial Type

Theses unit employs high stability metal film resistance element having superior characteristics to traditional wire wound coils. It's equally suitable for AC or DC use. The individual decade are series connected in two dials, Three dials & four dials. We use high stability 1% carbon metal film resistance.

a.	Single dial	0.1x10, or 1x10 or 10x10 or 100x10 (choice of any single range)
b.	Two dial	0.1x10, 1x10 or 1x10, 10x10 or 10x10, 100x10 or 100x10, 1000x10 ohms (choice of any one single range)
c.	Three dial	0.1x10, 1x10, 10x10 or 1x10 10x10 100x10 or 10x10, 100x10, 1000x10 (choice of any one single range)
d.	Four Dial	0.1x10, 1x10, 10x10, 100x10 or 1x10, 10x10, 100x10, 1000x10 (choice of any single range)

Post Office Box - 6 dials (Manganin Coil)

905. Post Office Box - 6 dials (Manganin Coil)

With 6-decades, four series dials for resistance 1, 10, 100 & 1000 ohms and 2-ratio dials. Two terminals are provided for using the series dials as on ordinary dial type resistance box. The galvanometer and battery key are fitted with contacts. Range of measurement is 0.001ohms to 1, 11, 10000ohms. Coils are non-inductively wound with manganin wire. Accuracy ± 0.2% to 0.05% A grade.

Cat. No. 905

906. Spare Sensitive Galvanometer

Please add extra for sensitive Galvanometer having sensitivity of 20μA per division in the above P.O. Box.

Standard Cell

908. Standard Cell (Electronic Version)

Design for use Standard , Stable, Voltage Reference Source in applications such as standardization of Potentiometers, Instruments, calibrations, temperature & Voltage measurements & pH testing etc.

Housed in a small steel cabinet giving e.m.f of 1.0816 volts accurate between 10°C to 40°C temperature.

P.O. Box -Plug Type (Constantan & Manganin Coil)

- **The 3-Ratio P.O. Box has sixteen non-inductively would coils 1, 2,2, 5, 10, 20, 20, 50, 100, 200, 200, 500, 1000, 2000, 2000, 5000 ohms and two proportional arms each with coils of 10, 100, 1000 ohms.**
- **The 4-Ratio P.O. Box has sixteen coils as above and two proportional arms each with coils of 1, 10, 100 and 1000 ohms.**
- **Also incorporates infinity gap.**
- **Heavy, superior quality double brass terminals are provided and panel is clearly engraved with the nominal resistance values.**
- **Two spring keys having good contact for battery and galvanometer is also provided.**
- **The whole system is contained in a superior quality teak wood box.**

Resistance between 0.1 and 1111000 ohms can be accurately measured using a DC Battery.

910. P.O. Box 3- Ratio (Constantan Coil)

Consisting of 12mm thick rectangular brass block, coils are wound with constantan coil having Accuracy with ±0.1%. Other specifications are same as above.

911. P.O. Box 4-Ratio(Constantan Coil)

Consisting of 12mm thick rectangular brass blocks Constantan coil. Accuracy ±0.1%. Other specifications are same as above.

912. P.O. Box 3- Ratio (Managanin Coil)

Consisting of 12mm thick rectangular brass blocks and coils, wound with manganin coil having accuracy within ±0.05% Other specifications are same as above.

913. P.O. Box 4- Ratio (Manganin Coil)

Consisting of 12mm thick rectangular brass block Manganin coil, Accuracy within ±0.05%, other specifications are same as above.

P.O. Box listed from Cat No. 915 to 918 have following features.

- Extra ordinary heavy moulded plugs
- Suitable for Colleges, Universities and Research Labs.
- Extra ordinary heavy 14mm thick rectangular gun metal blocks.
- Export quality
- Accuracy ± 0.02% to ±0.05%
- Thick Hylum Sheet

915. P.O. Box 3- Ratio (Constantan Coil)

Consisting of 14mm thick rectangular brass blocks and coils, are wound with constantan coil having accuracy within ±0.1% Other specifications are same as above.

916. P.O. Box 4- Ratio (Constantan Coil)

Same as Cat. No. 915, but with 4 -ratio of P.O. Box

917. P.O. Box 3- Ratio (Manganin Coil)

Specifications are same as described above in both columns 14mm thick, rectangular brass blocks and accuracy ±0.02% to .005%

918. P.O. Box 4-Ratio (Manganin Coil)

Same as Cat No. 917 but with 4-Ratio of P.O. Box

EXPERIMENT NO. 32

To find the resistance of a Galvanometer by Post Office Box .

WHAT YOU NEED

- BESTO Post Office Box of any type
- BESTO sensitive Galvanometer either 1 or 2 micro Amp. per division, Cat. No. 310 d/e
- BESTO Variable stabilized power supply 0-5V, 1 Amp., Cat. No. 939
- BESTO Resistance Box Plug Type 5000ohms

EXPERIMENT NO. 33

i. To find the unknown value of resistance by Post Office Box .

ii. To find the unknown value of resistance (series & parallel) by Post Office Box .

WHAT YOU NEED

- BESTO Post Office Box of any type
- BESTO sensitive Galvanometer either 1 or 2 micro Amp. per division, Cat. No. 310 d/e
- BESTO Variable stabilized power supply 0-5V, 1 Amp., Cat. No. 939
- BESTO Unknown Resistance Box two dial

EXPERIMENT NO. 34

To find the co-efficient of resistance of Platinum using Post Office Box .

WHAT YOU NEED

- BESTO Post Office Box of any type
- BESTO sensitive Galvanometer, either 1 or 2 micro Amp. per division, Cat. No. 310 d/e
- BESTO Variable stabilized power supply 0-5V, 1 Amp., Cat. No. 939
- BESTO Platinum Resistance Thermometer
- Digital Thermometer
- BESTO Special Heater designed for this expt.
- BESTO Retort Stand with clamp

Potentiometers - 4 wire & 10 wire

926. Potentiometer 4-Wire with Pencil Jockey

Comprising four constantan wires of 24 SWG, one meter long, clamped under heavy Brass strips of SWG 18 and fitted by screws in such a manner so that it is easily replaceable and has negligible 'END ERRORS'. Each block is fitted with a heavy lock type brass terminal which is mounted on an 18mm thick ply wooden board with mica on top. The four wires are stretched along the both ends of two full meter scales.

Overall dimension: 1.12m x 100mm x 50mm high including terminals. Supplied complete with Pencil Jockey along with lead for connections & detailed working manual.

Cat. No. 926

932. Potentiometer 10-wire with Pencil Jockey

Mounted on a polished 18mm thick ply wooden board with teak wood colour sunmica on top, with 10 wires of SWG 24 connected in series, clamped under heavy Brass strips of SWG 18 and fitted by screws in such a manner so that it is easily replaceable and has negligible 'END ERRORS'. Overall dimension: 1.15mm × 175mm×50mm high including terminals. Supplied with pencil jockey along with lead for connections & detailed working manual.

Cat. No. 932

This compact & inexpensive potentiometer is ideal for introducing students to the methods and techniques of e.m.f. Measurement.

BESTSELLER

935. Potentiometer: 10-wire With Spring Type Press Jockey

Specifications are same as that of Cat No. 932. Pencil jockey is replaced by heavy brass N.P. spring type sliding jockey. Jockey slides on the metal rod within the due marks for scale reading. The jockey has ten sharp pencil-points, spring loaded contacts which can be used separately. The sliding contact key makes spring contact at any desired position. The design of the jockey permits high accuracy of reading and convenient position setting. This Potentiometer is also supplied with pulley arrangement system to tight the wires. The 'L' shaped end connections are given on the strips which adjust both ends for faulty '0' and end settings.

Cat. No. 935

927. Potentiometer 4-wire with Spring Type Press Jockey

Other specifications are same as per Cat. No. 926. Pencil Jockey is replaced by spring type brass sliding jockey. This Potentiometer is also provided with pulley arrangement system to tight the wires. The jockey moulded from brass alloy, sliding over the metallic rod provides maximum smooth movement. The jockey consist of four single sharp pencil springs loaded contacts are given separately. An overlapping Perspex pointer helps in reading the raised scale.

938. Potentiometer 1M, Single wire

Comprising a 0.56 mm constantan wire stretched along a meter scale subdivided into millimeters and centimeters, clamped to stout, plated brass end plates. the terminating strips are provided with heavy duty brass terminals & the whole is mounted on 18mm laminated board. Supplied with pencil jockey & lead.

939. Stabilized Power Supply (Variable 0-5V, 1A)

Specially designed for all BESTO potentiometer experiments. Variable from 0-5 V at 1A, Solid state regulated power supply. Supplied with leads.

Cat. No. 939

Special Pulley arrangement system is provided in both Cat. No. 932 & 935 to tight the wires.

940. Potentiometer - Dial Pattern

This compact and inexpensive potentiometer is ideal for introducing students to the method and techniques of e.m.f. measurement. The design is simple and accurate measurements can be done with it. There are either 10 or 14 or 22 coils arranged on a rotary dial plus a linear slide wire 50cm long and subdivided into 500 equal parts. Terminals for battery, galvanometer and test circuits are provided on the panel. A thick knife edge jockey is provided to make contact on the slide wire.

Supplied with range switch of 0.1 & 1.

a)	Potentiometer Dial Pattern with 10 coils.
b)	Potentiometer Dial Pattern with 14 coils.
c).	Potentiometer Dial Pattern with 22 coils.

Addition of Range Switch 0.1, 1 in Dial pattern potentiometers of Cat. No. 940 to make it more precise instrument.

949. Crompton Potentiometer

Voltage Dials :

Ist Dial 6×250mV = 1500mV

2nd Dial 500 divisions(slide wire) = 250mV

Total = 1750mV

- Each Slide wire division is equal to 1/2 millivolt or 500 microvolts.
- Coarse and fine rheostats are provided. Terminals for 2 volts battery, Galvanometer , standard cell are provided on the panel.
- Current is of the order of 125 m A.

  This potentiometer is supplied with a self standardization circuit built in, which renders standardization dependent on setting of voltage dials.

Cat. No. 949

951. Volt Ratio Box

For extending the range of crompton Potentiometer, provided with a number of tapping points giving multiples of 1.5V.

Ranges : 1.5, 15, 30, 150, 300, 750 V.

Resistance : 37,500 ohms.

Accuracy : ±0.02%

Cat. No. 951

952. Volt Ratio Box

Same as above.

Ranges : 1.5, 15, 30, 150, 300 V.

Resistance : 15,000 ohms.

Accuracy : ±0.02%

We can find unknown potential maximum upto 1.75 Volts with the help of Crompton Potentiometer. If we have to determine unknown potential more than 1.75 Volts, we have to use volt Ratio Box along with Crompton Potentiometer.

EXPERIMENT NO. 36

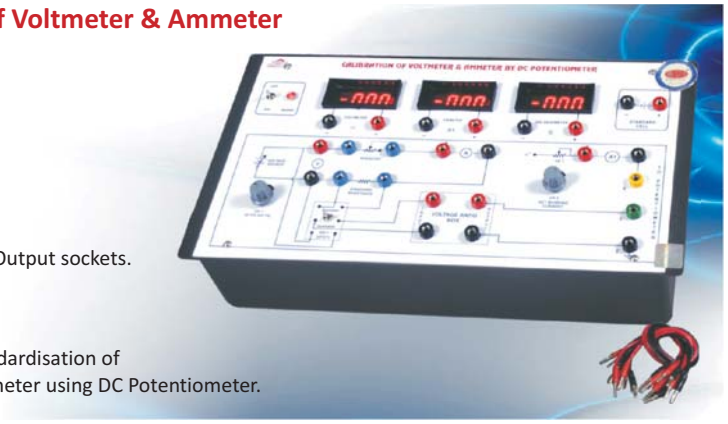
To find the unknown potential using Crompton Potentiometer.

WHAT YOU NEED

- BESTO Crompton Potentiometer, Cat No : 949
- BESTO Regulated Power supply 0-5V, 1A, Cat No : 939
- BESTO Spot Galvanometer, Cat. No. 421a.
- BESTO Standard Cell, Cat. No. 908.
- BESTO Power Supply (0-2V) whose unknown potential is to be determined.

Calibration of Voltmeter & Ammeter using DC Potentiometer

955. Electronic Unit for Calibration of Voltmeter & Ammeter



This unit consist of falling parts:-

- 1st DPM is for Voltmeter measurement (V)
- 2nd DPM is current measurement (A_1)
- 3rd DPM for Galvanometer purpose(G)
- In built power supplies, 0-12V DC/1A.
- In Built standard cell.
- Circuit Diagram on the Front Panel with input & Output sockets.
- A Bunch of connecting leads.

This compact Electronic Unit is very useful for standardisation of DC Potentiometer, Calibration of Voltmeter & Ammeter using DC Potentiometer.

EXPERIMENT NO. 37

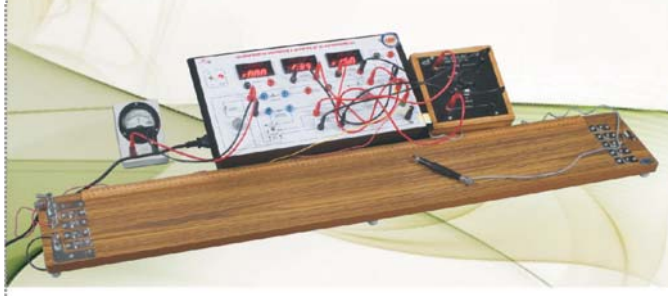
Expt 1. i) Study of standardisation of DC Potentiometer.
ii) Calibration of Voltmeter using DC Potentiometer.
iii) Calibration of Ammeter using DC Potentiometer.

i) Study of standardisation of DC Potentiometer.

WHAT YOU NEED

1st of all, we standardize DC Potentiometer with the help of Potentiometer 10 wire as per Cat No 932 & electronic Unit, as per Cat No 955.

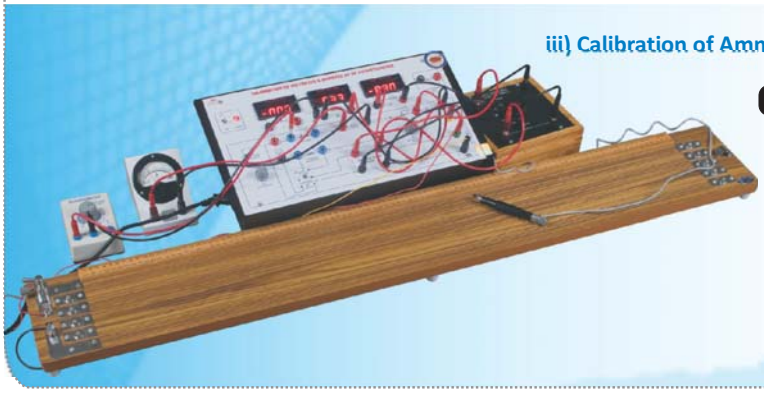
ii) Calibration of Voltmeter using DC Potentiometer when you need.



WHAT YOU NEED

- BESTO Potentiometer 10 wire, Cat No 932
- BESTO Electronic Unit, Cat No 955
- BESTO Volt Ratio Box, Cat No 951
- BESTO Voltmeter 10V, Mo65 on stand

iii) Calibration of Ammeter using DC Potentiometer.

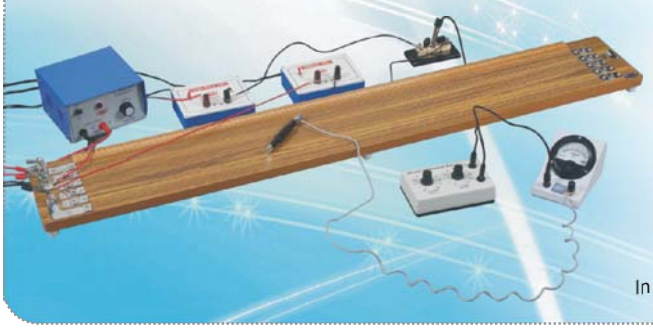


WHAT YOU NEED

- BESTO Potentiometer 10 wire, Cat No 932
- BESTO Electronic Unit, Cat No 955
- BESTO Volt Ratio Box, Cat No 951
- BESTO Ammeter 1.5 A, on stand
- BESTO Potentiometer/Variable Rheostat 50ohm, 3 Watt

EXPERIMENT NO. 40

Compare EMF of Two Primary Cell by using a Potentiometer



WHAT YOU NEED

- BESTO Potentiometer 10 wire, Cat No : 932
- BESTO Regulated Power supply 0-5V, 1 A, Cat No : 939
- BESTO Lechlanche Cell Substitute (Electronic version)
- BESTO Daniel Cell Substiute (Electronic version)
- BESTO Resistance Box 2-Dial.(x10,&x100), Cat. No. 969
- BESTO Galvanometer 30-0-30, MO65 on stand

In this experiment, please give voltage slightly more than 2V

EXPERIMENT NO. 41

To plot a graph between the difference of Temp. of two Junctions & Thermo EMF for a Copper Constantan using Potentiometer.

WHAT YOU NEED

- BESTO Potentiometer 10 wire, Cat No : 932
- BESTO Regulated Power supply 0-5V, 1 A
- BESTO Resistance Box Plug Type 10000 Ohms, Cat. No. 850n.
- BESTO Thermocouple Copper Constantan on stand
- BESTO Specially designed Water Bath
- Two Beakers Borosilicate Glass & mustard oil
- BESTO Sensitive Galvanometer, 1μA/div, MR-100.
- Thermometer & stand or Digital Thermometer

EXPERIMENT NO. 42

To Plot a Graph between the difference of the temperature of the two Junctions and Thermo EMF for a Copper constantan Thermocouple using a standard Cell.

WHAT YOU NEED

- BESTO Potentiometer 10 wire, Cat No : 932
- BESTO Regulated Power supply 0-5V, 1 A
- BESTO Resistance Box Plug type 10000 Ohms
- BESTO Thermocouple Copper Constantan on stand
- BESTO Specially designed Water Bath
- Two Beakers Borosilicate Glass & Mustard Oil
- BESTO Galvanometer 1μA/div, on MR-100 on stand
- BESTO An additional R.B (5000 ohm)
- BESTO Two way key.
- BESTO Standard Cell.

963. Meter Bridge or Wheatstone Bridge With Pencil Jockey

The four-gap bridge has a large and heavy copper strip of (SWG No. 18) mounted on a heavy 3/4" thick laminated base of size 45" x 4" x 3/4". Nine heavy Brass terminals lock type are provided to reduce the resistance to a minimum. The ends gaps are closed by removable Copper Binding pieces which are held in position by the terminals. The 24 SWG constantan wire is stretched along the top of wooden meter scale and securely clamped to the Brass end strips so that end errors are negligible.

Supplied complete with pencil jockey along with lead for connections. Includes detail working manual.

Overall dimensions: 1.12m × 100mm × 50mm, including terminals.

Cat. No. 963

964. Meter Bridge or Wheatstone Bridge with Spring Type Jockey

Other specifications are same as that of Cat No. 963. Pencil Jockey is replaced by superior quality spring type Brass Sliding Jockey, which moves on a metal rod. The brass strips are fitted on a laminated board of size 45"×5"×3/4". Includes detail working manual.

Cat. No. 964

965. Spare Pencil Jockey

Ideal for Wheatstone Bridge and all types of BESTO Potentiometers, bakelite moulded handle, brass plated contact and with a locating notch. A heavy lock type brass plated terminal is provided for connection with Lead. The shape of the jockey is large (different from the one available in the market) and easy to handle. Supplied without lead.

Cat. No. 965

966. Spare Lead

To connect pencil jockey with potentiometer and Wheatstone Bridge, a heavy wire lead of length 1.5 meter with U-shape brass clips connected at both the ends of the wire is provided.

Cat. No. 966

968. Fixed Voltage Stabilized Power Supply

2V, 200mA, Fixed Voltage stabilized power supply. Excellent quality for all types of Meter Bridge experiments. Supplied with leads.

Cat. No. 968

969. Dial Type resistance box (Two dial economy model)

This type of Decade Resistance Box is particularly good for use with Wheatstone Bridges. It consists of high stability . Carbon metal film resistance of 1 Watt having accuracy of ± 1%.

Cat. No. 969

a)	0.1x10 , 1x10 ohms
b)	1x10, 10x10 ohms
c)	10x10, 100x10 ohms

971. Temperature Co-efficient Resistance Coil

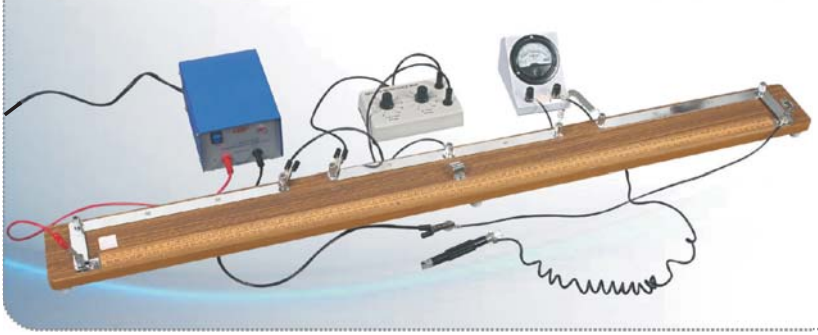
For determining temperature co-efficient resistance of copper, comprising a coil of fine enameled copper wire of about 7-10 ohms resistance, wound non-conductively on an insulating frame and connected to thick copper wire fitted with terminals.

The coil is enclosed in a glass tube of borosilicate glass to contain paraffin oil. The rubber stopper is drilled for a thermometer. Tube size approx. 100mm x25mm dia

Cat. No. 971

EXPERIMENT NO. 44

To find resistance of given wire using meter bridge & hence determine the specific resistance of its material.

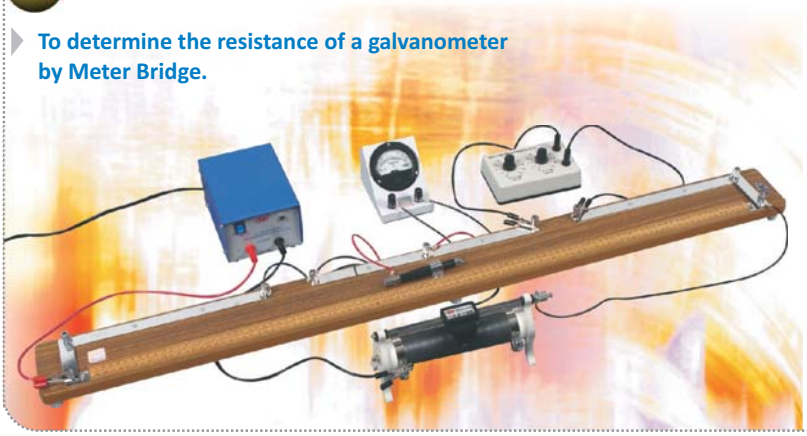


WHAT YOU NEED

- BESTO Meter Bridge, Cat. No. 963
- BESTO Fixed Voltage power supply, Cat. No. 968
- BESTO Two Dial Resistance Box 0.1x10, 1x10 ohms
- BESTO Galvanometer 30-0-30 MO65 on stand
- BESTO Micrometer 15x1mm
- BESTO Imported Manganin wire 50cm

EXPERIMENT NO. 45

To determine the resistance of a galvanometer by Meter Bridge.



WHAT YOU NEED

- BESTO Meter Bridge, Cat. No. 963
- BESTO Fixed Voltage power supply, Cat. No. 968
- BESTO Two Dial Resistance Box 0.1x10, 1x10 ohms
- BESTO Galvanometer 30-0-30 mounted on stand
- BESTO Rheostat 50ohm, 3 Watt. Cat. No. 697

EXPERIMENT NO. 46

To determine the temp. co-efficient of resistance of the given coil using meter bridge.

WHAT YOU NEED

- BESTO Meter Bridge, Cat. No. 963
- BESTO Fixed Voltage power supply, Cat. No. 968
- BESTO Two Dial Resistance Box 0.1x10, 1x10 ohms
- BESTO Galvanometer 30-0-30 Mounted on stand
- BESTO Specially designed Water Bath, Cat. No. 994
- BESTO Temp. Co-efficient Resistance Coil, Cat. No. 971, Thermometer & High Resistance Box 10000ohms

Different Types of Portable Wheatstone Bridges

975. Portable Wheatstone Bridge

This Bridge is fully portable with a built in sensitive Galvanometer and a dry battery.

Series Arm: There are 4 decades of 10×1, 10×10, 10×100 and 10×1000 ohms

Range Multipliers: A single rotary switch furnishes 7 range multipliers of X1000, X100, X10, X1, X0.1, X0.01 and X0.001.

Range of measurement : 0.001 ohm & 11.1 mega ohm.

Battery: A built-in dry battery of 4.5 volts. There is a provision for using external battery for measuring high resistances.

Galvanometer: Galvanometer of Model MO 65 with sensitivity 10 microamperes/ div. is used.

Push Buttons: Two push buttons for battery and galvanometer are provided.

Accuracy: Both series and ratio coils are adjusted to an accuracy of better than 0.05%.

Overall Accuracy of measurements is better than ±0.1%.

a)	Constantan Coil	Accuracy ±0.1%.
b)	Manganin Coil	Accuracy ±0.02%.

Cat. No. 975

This bridge is extremely useful for resistance measurements with a fair degree of precision.

976. Portable Wheatstone Bridge (Modified) with Varley & Murray Loop Test

- This bridge is exactly same as Cat No. 975 except for additional facility of Murray and Varley loop test for location of faults in cables. The bridge is also suitable for resistance measurements.
- For resistance measurements and varley loop test, there are 7 multiplying factors of ×1000, ×100, ×10, x1, ×0.1, ×0.01 and 0.001.
- For Murray loop tests, 3 additional multiplying factors of 10M, 100M and 1000M are provided.
- Special switching arrangement has been provided to carry out conductance tests, Varley loop test and Murray loop test.
- Rest of the features like series arm, battery, galvanometer, push buttons are same as in Cat No. 975.

a)	Constantan Coil	Accuracy ±0.1%.
b)	Manganin Coil	Accuracy ±0.02%.

NOTE: Also called electrical fault localiser or line tester

977. Portable Wheatstone Bridge (Economical Model)

Specification of this Portable Wheatstone Bridge is equivalent to Cat. No. 975 except **resistance dials are made of 1% metal film, carbon resistance instead of Constantan or Manganin Coil.**

Rest all the features like series arm (4 decades), range multipliers (7 ranges), Battery, Push Buttons & Galvanometers are exactly same as in Cat. No. 975

Accuracy : 1.25%


Cat. No. 977

In Portable Wheatstone Bridge of Cat. No. 975, both series arm & the ratio coils are manufactured from imported constantan / Manganin wire & overall accuracy comes to be better than ±0.1%, whereas in Cat. no. 977 all the four resistance dials (series arm) are manufactured from 1% carbon metal film resistances to give maximum accuracy of 1.25%

980. Kohlrausch Conductivity Bridge

- A circular slide wire is calibrated from 0.01 to 10 ohms A rotary dial furnishes six multipliers of 0.1, 1, 10, 100 & 1000 & 10000.
- Range of measurement is 0.01 to 100 K Ohm
- Terminals for supply and head phone/detectors are provided on the panel. A detector key is also provided. The position of slider is adjusted to the position of minimum sound or position of minimum A.C. signals.
- Accuracy of coils ±0.1%
- Accuracy of measurement ±1% at mid scale & ±2% overall.

Cat. No. 980

981. Induction Coil

For use with Kohlrausch Conducting Bridge.

Cat. No. 981

982. Hamburger Coil (Conductivity Coil)

Hamburger Coil with platinum electrode for use with Kohlrausch Conductivity bridge, Dip Type.

Cat. No. 982

984. Head Phone

Flexible type, with high resistance receivers, fully adjustable according to head-size.

EXPERIMENT NO. 48

To determine the conductivity of liquid by Kohlrausch Method

WHAT YOU NEED

- BESTO Kohlrausch Conductivity Bridge, Cat. No. 980
- BESTO Induction coil, Cat. No. 981
- BESTO Hamburger Coil , Cat. No. 982
- BESTO Battery Eliminator 2-12V, 2A, Cat. No. 1919(b)
- Head Phone or Null Detector or Digital Multimeter

988. Rayleigh Self Inductance Bridge

The ratio arm is in two dials of 1, 10, 100 and 1000 ohm each. The resistance arm is in three dials having decade of 0.1, 1 and 10. A slide having 0.17ohm resistance is connected in series with unknown L. The slide wire is calibrated into 170 equal parts for easy calculation. A special double key is fitted to bridge. The key is internally connected with terminal for connecting battery and Galvanometer. The bridge can also be used as an Wheatstone bridge.

Cat. No. 988

Industrial Kelvin Double Bridge & their experiments

990. Industrial Kelvin Double Bridge

Standard Resistance : There are 10 coils of .01 ohm each arranged on a rotary dial plus a circular slide wire of total resistance .01 ohm and 500 sub-divisions is equal to .00002ohms on the normal range.

Multiplying Ratios : A single rotary switch furnishes 5 multiplying ratios of x100, x10, ×1, ×.01 and 0.1.

Range of Measurement : The bridge has a range of 2 micro ohm to 11 ohm.

Panel : A bakelite panel enclosed in a teak wood box is used. Separate current and potential terminals, battery and galvanometer terminals, push buttons for battery and galvanometer are provided on the panel.

Cat. No. 990

Max. Current : 10A intermittently & 5 A continuously.

Accuracy : ±0.5% current 5 Amps upto 10Amps

Coils : Managanin Coils are used.

This bridge is very suitable for the use of wires & cable manufacturers. It is being extensively used for finding the resistance of transformer winding, contact resistance of relays etc.

991. Adjustable Heavy Duty D.C. Current Source

The unit is mains operated and can deliver a continuously adjustable D.C. Current of 0-10 Amp maximum.

The unit consist of a variac, a step down transformer, a bridge rectifier, filter circuit and an ammeter of 0-10A to read current.

Two heavy brass terminals are provided for output.

Input Voltage : 230volts A.C. Mains 50c/s

D.C. Output : Approximate 0-10V, Continuously adjusted to give a variable current of 0-10Amp depending upon external load.

Cat. No. 991

992. Conductivity attachment

It is an arrangement to hold specimens in the form of wires, rods strip etc. Separate current & potential terminals are provided. Distance between potential point is 50cm. It can hold specimen of any size between ½" dia rod to 42 S.W.G. Wires.

Cat. No. 992

EXPERIMENT NO. 50

To determine the resistance & specific resistance of given Copper rod with the help of Industrial Kelvin Double Bridge.

WHAT YOU NEED

- BESTO Industrial Kelvin Double Bridge Cat. No. 990
- BESTO DC Current Source Cat. No. 991
- BESTO Conductivity Attachment Cat. No. 992
- BESTO Spot Reflecting Galvanometer Cat. No. 421a.
- Special Heavy Leads.

993. Portable Kelvin Double Bridge

Potable Kelvin Bridge is used to measure the unknown value of resistance. It can measure from 0.00001Ω to 110Ω.

The instrument has following inbuilt parts :-

Ratio Dial : The instrument consist of one Ratio dial having multiplying range of 100, 10, 1 & 0.01.

Main Dial : The instrument consist of a Resistance dial having a table resistance of 1Ω divided into 10 equal step of 0.1 Ω

Circular Scale : A circular scale in series with main dial is provided on the panel. Having a table Resistance of 0.1 ohm divided into 100 equal steps of 0.001Ω

Galvanometer : Inbuilt galvanometer is fitted with in the instrument Terminal g_1 & g_2 are provided for connecting external Galvanometer-A selector switch is provided to select either inbuilt or external Galvanometer.

Press key : A double point press key is provided within the panel to bring galvanometer & battery into the circuit

Terminals : Four terminals C_1, P_1, C_2, P_2 are provided for connecting to four terminals unknown resistance coil, where C_1, C_2 are current terminal P_1, P_2 are potential terminals. C_1, P_1 is one pair of terminal and C_2, P_2 is another pair of terminal.

Cat. No. 993

Battery : Inbuilt supply is provided with in the instrument

EXPERIMENT NO. 51

To determine the resistance & specific resistance of given Copper rod with the help of Portable Kelvin Double Bridge.

WHAT YOU NEED

- BESTO Portable Kelvin Double Bridge, Cat. No. 993
- BESTO Conductivity Attachment, Cat. No. 992
- Special Heavy leads.

994. Special Water Bath

Hot (water, mustard oil or Silicon oil) is essential to most electrical & electronic Instruments. Supplied with 100 ml Borosilicate Glass Beaker to place in Brass Reservoir in the special water bath. Whenever hot water or oil is required that can be heated by pouring water or oil in the said beaker. Very useful for so many experiments in the electrical sections.

Cat. No. 994

995. Thermocouple Copper Constantan

Copper Constantan mounted on a superior quality bakelite strip. With two terminals & mounted on stand.

Cat. No. 995

996. Steam Boiler with heating Element

Steam boiler of 2 to 3 Litre capacity fitted with heating Element suitable for use with Callendar's & Griffith's Bridge.

Cat. No. 996

Callender & Griffith's Bridge & their experiments

997. Callender & Griffith's Bridge

Three in one - Carry's Foster Bridge, Potentiometer & Callender & Griffith's Bridge.

It is an improvement over the potentiometer. The 50cm long slide wire of 1ohm resistance is calibrated into 100 equal parts. 14 coils are arranged in series in dials from each being of 1 ohm resistance terminals arranged for appropriate working of different instruments. Jockey slides on brass rod.

Accuracy : ±0.05%

Cat. No. 997

998. Callender & Griffith's Bridge (New Type)

Cat. No. 998

The instrument consist of following parts fitted in a teak wood case.

Rotary Dial : A Rotary Dial of x1r is provided on the pannel having a total Res. of 10r.

Circular Scale : A slide wire Arrangement of 1r ohm is provided on the pannel having a scale with center zero divide int 100 equal parts.

Four terminal : Two pairs Terminal C_1 and P_1 are Provided on the pannel for connecting. C_1 & P_1 Terminal of Platinum Res. Thermometer.

Two pair of Terminal one for Battery and one for galvanometer is provided on the pannel.

One press key is provided to bring Battery into circuit.

999. Platinum Resistance Thermometer

This thermometer comprises a length of fine platinum wire of about 2.8 ohms resistance wound non inductively on a mica frame & soldered to stout copper leads. A pair of compensating leads are provided. All four leads being connected to terminals mounted on a suitably engraved insulating panel which is joined to the mica resistance frame by cork mount on to which is fitted a stainless tube. Since connections are soft soldered, this resistance thermometer is suitable for temperature work. Packed in velvet lined case.

Cat. No. 999

EXPERIMENT NO. 52

To determine the temp. co-efficient of resistance for Platinum, using a platinum resistance thermometer and Callender & Griffth's Bridge

WHAT YOU NEED

- BESTO Callender & Griffth's Bridge Cat. No. 997 / 998
- BESTO Power Supply 2V, Cat. No. 968
- BESTO Platinum Resistance Thermometer, Cat. No. 999
- BESTO Rheostat / Simple Potentiometer, Cat. No. 697
- BESTO Galvanometer 30-0-30 on stand
- Steam Boiler with heating element, Cat. No. 996
- Digital Thermometer

1001. Anderson Bridge for Self Inductance

Anderson Bridge is used to measure unknown value of Inductance. The instrument has following inbuilt parts fitted in a Teak Wood case.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connections.

Unknown value : Four unknown values are supplied with instrument.

DC-Supply : 5V DC supply are provided on the board for making DC balance.

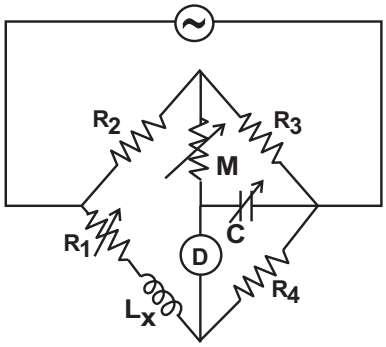
R_1 : Three decade dial of x1, x10 and x100 ohms.

M : Three decade dial of x10, x100 and x1000 ohm

C : Decade dial of x 0.01 mfd.

R_2 R_3 R_4 : Fixed 1Kohm.

Cat. No. 1001



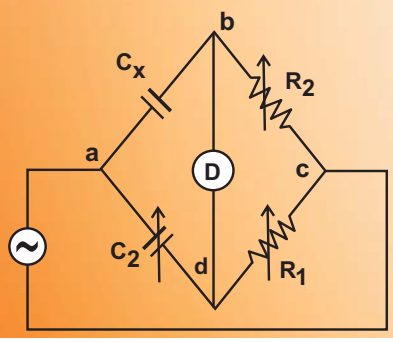
EXPERIMENT NO. 55

To determine the value of self Inductance by Anderson's Bridge with the help of digital detector.

WHAT YOU NEED

- BESTO Anderson Bridge Kit, Cat. No. 1001

Cat. No. 1002



1002. De-Sauty's Bridge

This bridge is used to measure the unknown value of capacitance. The instrument has following in built parts fitted in teak wood case.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display.

Unknown value : Five unknown values are provided on the board selected by a Rotary switch.

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connection.

R_1, R_2 : Two decade dial of x10 & x100 ohms.

C_2 : Decade dial of x0.1mfd.

EXPERIMENT NO. 56

To find the value of unknown capacitance by De-sauty's Bridge.

WHAT YOU NEED

- BESTO De-Sauty's Bridge Kit , Cat. No. 1002

Four Arm Bridges (Wein's Bridges)

1005. Wein's Series Resistance Bridge

The wein's bridge is used to measure the unknown value of capacity.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display (optional - sometime Digital null detector is replaced by small speaker).

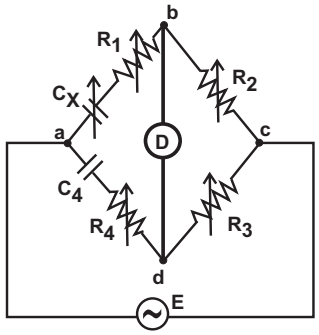
Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connection.

Unknown value : Five unknown values are provided on the panel selected by a Rotary Switch.

R_2 : Two decade dial of x10, and x 100 are provided on the panel.

R_1, R_3 and R_4 : Decade dial of x100 is provided on the panel.

Cat. No. 1005



EXPERIMENT NO. 57

To determine the capacitance of a Condenser with Wein's Series Resistance Bridge for Capacity Measurement.

WHAT YOU NEED

- BESTO Wein's Series Res. Cap. Bridge Kit, Cat. No. 1005

1006. Wein's Bridge Frequency Measurement

This bridge has been designed to calculate the unknown value of frequency of Bridge Oscillator.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display (optional - sometime Digital null detector is replaced by small speaker).

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connection.

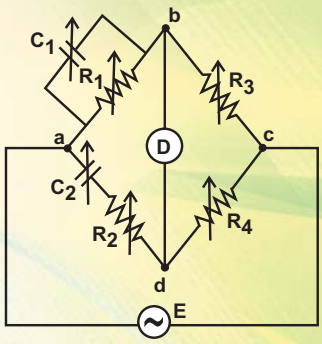
C_1, C_2 : Decade dial of 0.1mfd.

R_3 : Ratio Dial of 1, 10, 100 & 1000

R_4 : Ratio Dial of 2, 20, 200 & 2000

R_1 R_2 : Are mechanically coupled x10, x100, x1000 ohms.

Cat. No. 1006



EXPERIMENT NO. 58

To determine the unknown frequency of Bridge Oscillator by Wein's Bridge Frequency Measurement.

WHAT YOU NEED

- BESTO Wein's Bridge Frequency Measurement Kit, Cat. No. 1006
- Bridge Oscillator with three unknown frequencies.

1007. Maxwell's Inductance Bridge

Maxwell's Bridge is used to measure the unknown value of Inductance. The instrument has following inbuilt parts fitted in teak wood case.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connections.

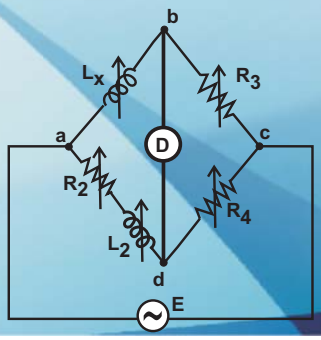
Unknown Value : Four unknown values are supplied with instrument.

R_4, R_3 : Two Decade dial of x10 and x100 ohms.

L_2 : Decade dial of x10 mH

R_2 : Decade dial of x1 ohm.

Cat. No. 1007



EXPERIMENT NO. 59

To determine the value of Self -Inductance by Maxwell's Inductance Bridge.

WHAT YOU NEED

- BESTO Maxwell's Inductance Bridge Kit, Cat. No. 1007

1008. Maxwell's Inductance Capacitance Bridge

By this Bridge the inductance is measured in terms of Standard Capacitance. The instrument has following parts :

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connections.

Unknown Value : Four unknown value are supplied with instrument.

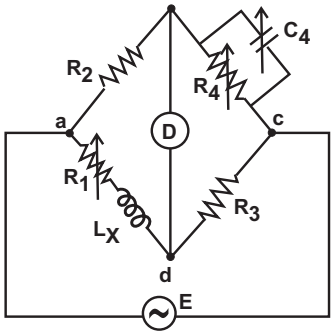
R_2, R_3 : Fixed 1K ohms.

R_1 : Decade dial of x1, x10, x100 ohms.

R_4 : Decade dial of x10, x100, x1000 ohms.

C_4 : Decade dial of x0.01 mfd.

Cat. No. 1008



It is to be noted that balance in this case is independent of frequency.

EXPERIMENT NO. 60

To determine the value of Self -inductance by Maxwell's Inductance Capacitance Bridge.

WHAT YOU NEED

- BESTO Maxwell's Inductance Capacitance Bridge Kit, Cat. No. 1008

Four Arm Bridges (Owen's & Hay's Bridges)

1009. Owen's Bridge

Owen's Bridge is used to measure the Unknown value of Inductance. The instrument has following inbuilt parts fitted in a Teak Wood Case.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connections.

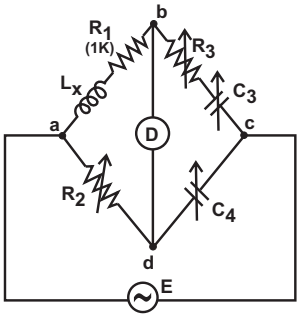
R_3 : Decade dial of X10, x100 and x1000 ohms.

C_3, C_4 : Decade dial of x0.1 mfd.

R_2 : Decade dial of x100 ohms.

R_1 : Internally fixed 1000 ohms.

Cat. No. 1009



EXPERIMENT NO. 61

To use Owen's Bridge to find low, moderate & large self Inductance L.

WHAT YOU NEED

- BESTO Owen's Bridge Kit, Cat. No.1009

1010. Hay's Bridge

Hay's bridge is used to measure the unknown value of Inductance. The instrument has following inbuilt parts fitted in a Teak wood case.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connections.

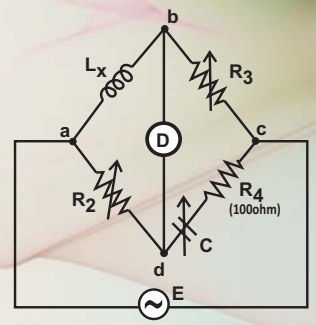
Unknown value : 4 unknown value are supplied with instrument.

R_2 , R_3 : Three decade dial of x10, x100 and x1000 ohms

C : Decade dial of x0.1mfd.

R_4 : Fixed resistance of 100 ohms

Cat. No. 1010



EXPERIMENT NO. 62

To use Owen's Bridge to find low, moderate & large self Inductance L.

WHAT YOU NEED

- BESTO Owen's Bridge Kit, Cat. No.1010

1011. Schering Bridge

Schering Bridge is used to measure the unknown value of Capacitance. The instrument has following inbuilt parts fitted in Teak Wood Case.

AC Source : The Bridge consist of sine wave signal of 1KHZ. The Amplitude of AC switch indicating lamp is provided on the bakelite board. Two sockets are provided for the output of AC signals.

Detector : For detecting small AC signals in the output, Null Detector is in-built with digital display

Circuit Diagram : The circuit layout on the board is quite spread out to facilitate convenient working & clear understanding. 4mm socket are provided for making connections.

Unknown value : Five unknown value are provided on the board selected by a Rotary switch.

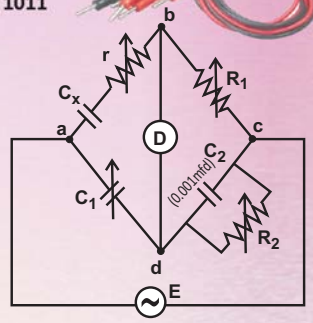
R_1 R_2 : Ratio Dial having step of 1, 10, 100 and 1000 Ohms.

r : Decade dial of x1 ohms.

C_1 : Two Decade dial of x0.001 mfd & x0.01mfd.

C_2 : Internally fixed of value 0.001mfd.

Cat. No. 1011



Basic Circuit Diagram of Schering's Bridge

EXPERIMENT NO. 63

Determination the value of low capacitance by Schering's Bridge.

WHAT YOU NEED

- BESTO Schering Bridge Kit , Cat. No. 1011

1012. Bridge Oscillator (Solid State)

Using operational amplifier, Wein Bridge oscillator for better stability. It provides pure sine wave 0-10 volt R.M.S. continuously variable output, giving fixed frequency 1KHz.

This bridge oscillator is used in almost all the four arm bridges.

Cat. No. 1012

1013. Bridge Oscillator (3 Frequencies)

this Bridge Oscillator is used to find unknown frequency or in 4 arm bridges, having three frequencies of 400Hz, 1KHz & 3 Khz.

1014. Null Detector

The Null Detector comprises a solid state amplifier having output stage with meter Indication. The instrument is supplied in metal cabinet with Duco Paint & Aluminium front panel. The said detector has been designed for use with AC Bridges (replaceable of headphone).

Cat. No. 1014

All our Four Arm Bridges are supplied with built in Bridge Oscillator & Null Detector (Digital AC Meter), but you can also use analog null detector or Head Phone from the outside. Similarly, some unknown values of Capacitors or inductances are also given in the respective instruments, but if you want to find some other value of capacitor or inductance, you can also connect unknown value of capacitor or inductance from outside.

Fixed & Decade Condenser Boxes

1015. Fixed Condenser Boxes

High quality silver mica, paper polyester and metal film condenser are mounted on the Plastic plate fitted in a steel turf Non ABS Plastic. Two 4 mm socket terminals are provided.

Working voltage 250 V for 0.01 mfd to 2 mfd capacitors and we use paper polyester capacitors upto this range.

Working voltage 350 V for 5 mfd to 40 mfd capacitors and we use electrolytic capacitors up to this range.

Cat. No. 1015

	Ranges
a)	0.01to 0.1 mfd (any one range)
b)	0.2, to 0.5 mfd (any one range)
c)	1 mfd
d)	2 mfd
e)	5 mfd
f)	10 mfd
g)	20 mfd
h)	40 mfd
i)	60 mfd

Decade Condenser Boxes

BESTO Decade Condenser Boxes are constructed from high quality silver mica, polyester and metal film capacitor (working voltage 250V) of extremely low power factor. The capacitors are mounted on a 4 pole 11 position high grade band switches, which are arranged on a bakelite panel and enclosed in a teakwood box.

1016. Single Dial Condenser Box

	Ranges
a)	10×0.001 mfd
b)	10×0.01 mfd
c)	10×0.1 mfd
d)	10×1 mfd

1017. Two Dial Condenser Box

	Ranges
a)	10×0.001 & 10×0.01 mfd
b)	10×0.01 & 10×0.1 mfd
c)	10×0.1 & 10×1 mfd

1018. Three Dial Condenser Box

	Ranges
a)	10×0.001, 10×0.01 & 10 ×0.1 mfd
b)	10×0.01 , 10×0.1 & 10×1 mfd

1019. Four Dial Condenser Box

Ranges
10×0.001, 10×0.01, 10×0.1, 10×1 mfd

Cat. No. 1019

- **Suitable for various experiments in electrical measurements.**
- **Intended for precision work**

EXPERIMENT NO. 65

To find the effective capacitance of series & parallel combinations of capacitance by calculating its reactances.

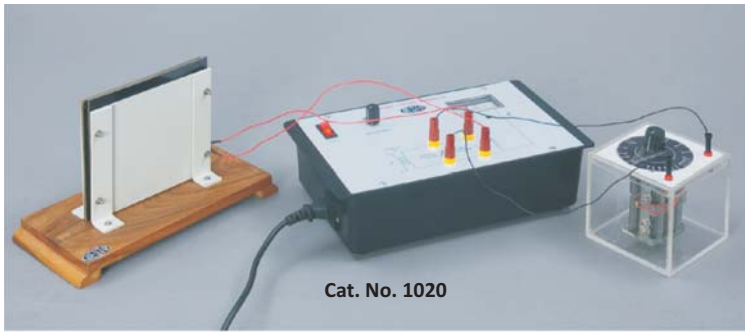
WHAT YOU NEED

- BESTO Step down transformer 2-12V, 2A.
- BESTO AC Voltmeter 20V
- BESTO AC Miliammeter 40mA
- Plastic Box containing 3-Capacitors in series
- Plastic Box containing 3-Capacitors in parallel.

1020. Dielectric Constant Apparatus (Solid & Liquid)

It consists of following parts.

- RF Generator (9-10MHz Approx.)
- Micro Ammeter (Range 0-50mA)
- Potentiometer for sensitivity selection
- Fixed Capacity (Metal)
- Variable Gang Capacitor
- Socket for test capacitor & variable Capacitor brought out at front panel
- One solid bakelite plate to be insert in gap of test capacitors.



Cat. No. 1020

Fixed & Decade Inductance Boxes

1021.Fixed Inductance Boxes

The air cored inductance coils are fitted in a steel turf bakelite case, elegantly finished. The frequency response is 1000 cycles/sec. Accuracy ±2.5%..

	Ranges
a)	100 micro Henry to 1000 micro Henry
b)	1milli Henry to 1000 milli Henry
c)	1000 milli Henry to 1500 milli Henry

Cat. No. 1021

1022. Single Dial Inductance Box

	Ranges
a)	100 micro Henry to 1000 micro Henry
b)	1 milli Henry to 10 milli Henry
c)	10 milli Henry to 100 milli Henry
d)	100 milli Henry to 1000 milli Henry
e)	1 Henry to 10 Henry

1023. Two Dial Inductance Box

	Ranges
a)	100 Micro Henry to 10 milli Henry
b)	1 milli Henry to 100 mill Henry
c)	10 milli Henry to 1000 milli Henry
d)	100 milli Henry to 10 Henry

1024. Three Dial Inductance Box

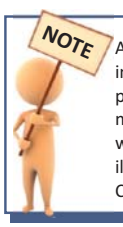
	Ranges
a)	100 Micro Henry to 100 milli Henry
b)	1 milli Henry to 1000 milli Henry
c)	10 milli Henry to 100 Henry

1025. Four Dial Inductance Box

	Ranges
a)	100 Micro Henry to 1Henry
b)	1 milli Henry to 10 Henry

1026. Five Dial Inductance Box

Range	100 Micro Henry to 1 Henry



As we are continuously improving & developing our products, the equipment may not agree in all details with the description and / or illustration shown in this Catalog.

1028. Induction Coils

This coil, specially designed for school use is suitable for vacuum tubes and audiometers etc. It is wound with insulated copper wire, has tungsten contacts and on/off reversing switch as communicator. Voltage tested condensers are fitted inside the teak polish wooden box. The top of the wooden box is provided with sunmica and relevant data engraved on the sunmica.

Terminals are provided for H.T. output and L.T. input of the coil. Up to 50 mm spark is obtained with 4 to 6 volt D.C. input .

	Length of Spark
a)	5mm
b)	10mm
c)	15mm
d)	20mm
e)	25mm
f)	50mm

Cat. No. 1028

1030. Anchor Ring

This consists of a specimen of iron in a ring form would with two uniformly spaced coils of wires. Soft iron ring is of dia. 75mm and cross sectional dia. is 9mm. The primary winding consists of 200 turns of insulated copper wire of proper gauge with binding post terminals and secondary winding consists of about 25 turns of fine wire.

Cat. No. 1030

1031. Self and Mutual Inductance Coils.

Has primary coil of 3000 turns and secondary coil of 1000, 2000 and 3000 turns.

1032. Self and Mutual Inductance Coils

Has primary coil of 500 turns and secondary coil of 100, 250 and 500 turns with different tappings, mounted on wooden bobbins 25mm diameter per pair.


Cat. No. 1032

1033. Self and Mutual Inductance Coils

Coils are mounted on wooden bobbin of 25cm diameter. Primary having 500 turns and secondary also 500 turns per pair.

1035. Induced Current Apparatus

It has the bulb in secondary and make and break arrangement in primary to show the phenomenon of self and mutual induction and principle of induction coil, workable on 6 volts.


Cat. No. 1035

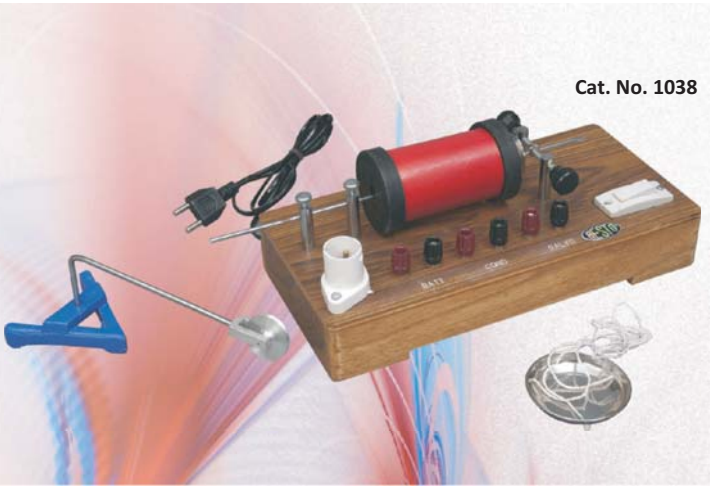
Make BESTO your one -stop source for science teaching supplies. We stock over 2000 items listed in this catalogue, so you are sure to get what you need, at competitive prices. And our professional staff has the expertise and dedication to make sure you to get what you need, when you need it - our service is excellent.

When you put togther your next order, we make your job a lot easier.

SO YOUR NEXT ORDER FROM BESTO® ONLY.

1038. Electrical Vibrator

A thin steel rod (called vibrator) is clamped at one end and passes through a small solenoid. The rod is slightly flattened at the free end and a hole is drilled in it so that a string can be tied through it. The solenoid is connected to A.C. mains through a suitable lamp resistance. A permanent horse shoe magnet is mounted on the base board and a steel rod passes between them. The thin rod is magnetized longitudinally. The solenoid and a horse shoe shaped magnet cause it to vibrate with the frequency of A.C. supply. The length of the vibrator is adjusted until its natural frequency corresponds with that of the supply. The whole unit is mounted on a polished wooden base, complete with pulley, pan and cord.



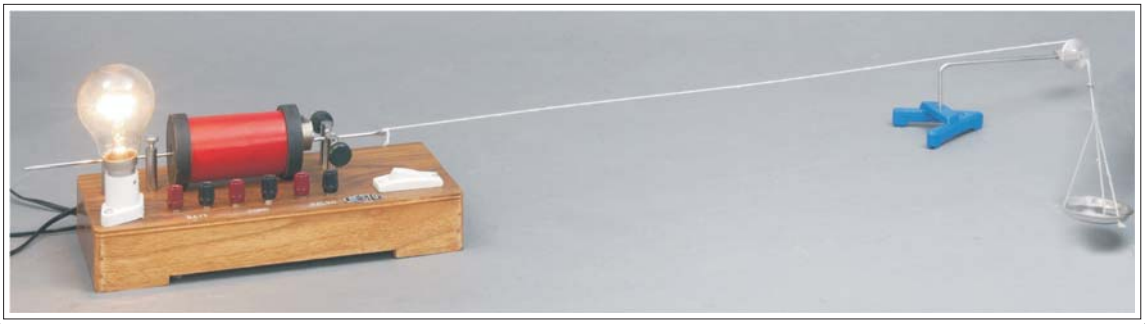
Cat. No. 1038

EXPERIMENT NO. 67

To find the frequency of AC Mains using Electrical Vibrator in transverse & longitudinal arrangements.

WHAT YOU NEED

- BESTO Electrical Vibrator, Cat. No. 1038
- BESTO Physical Weight Box -200gms, Cat. No. 62b
- Electrical Bulb 100 Watt.

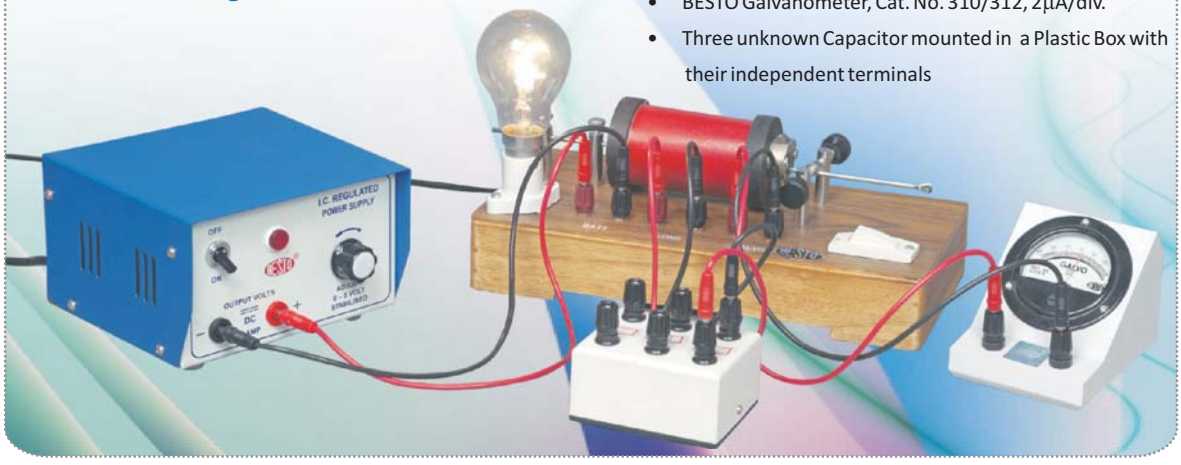


EXPERIMENT NO. 68

To determine the capacity of a given condenser using Electrical Vibrator.

WHAT YOU NEED

- BESTO Electrical Vibrator, Cat. No. 1038
- BESTO Power supply 0-5V, 1A, Cat. No. 939
- BESTO Galvanometer, Cat. No. 310/312, 2μA/div.
- Three unknown Capacitor mounted in a Plastic Box with their independent terminals



1053. Alnico Bar Magnet

An excellent pair of Alnico Bar Magnets that are exceedingly strong for their size and will resist demagnetizing conditions. North and South poles are permanently inscribed.

	Size
a)	37mm
b)	50mm

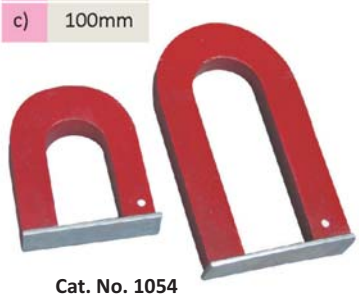
	Size
c)	75mm
d)	100mm

Cat. No. 1053

1054. Alnico Horse Shoe Magnet

Highly effective when high magnetic strength is required. These magnets will hold their force for a long time. Distance between the poles is 20mm.

	Size
a)	50mm
b)	75mm
c)	100mm



Cat. No. 1054

1055. Extra Strength Alinco Bar Magnet

A large Alnico Bar Magnet has a high magnetic force & bigger in size as compared to Cat. No. 1053

	Size
a)	50mm
b)	75mm

Cat. No. 1055

1056. Electromagnet

A coil is wound on each arm of a U shape bar of soft iron. The poles are 10mm in diameter and ends are ground flat to make good magnetic contact with iron armature. It will operate on one or more dry cells.

	Size
a)	3”
b)	4”

Cat. No. 1056

1057. Electromagnet

Demonstrates how electric current can be used to generate very strong magnetic fields. This two-part. dissectible electromagnet comprises a core and a yoke, with their mating surfaces precisely machined to very close tolerances. The core has a cylindrical coil wound with enameled copper wire on annular insulated bobbin, with both ends of winding terminating in crocodile clips. Back of the core has a cell holder that can be connected to coil using crocodile clips. Both core and yoke provided with steel eye-bolts. Generates tremendous lifting power.

Cat. No. 1057

1058. Magnetic Needle Stand

For Magnetic Needles, with Aluminium Base & Aluminium Rod of 6mm dia is mounted on the base. The Aluminium pillar supports a steel needle. Supply without needle.

Cat. No. 1058

1059. Magnetic Needles

Specially made highly magnetized with accurate brass center with low friction.

	Size
a)	75mm
b)	100mm

1060. Small Magnetic Compass (20mm Dia)

Very inexpensive magnetic compass specially suited for tracing the magnetic fields of bar magnet. Each compass has a polished aluminum case and a mounted glass top.

Cat. No. 1060

1062. Magnetic Compass

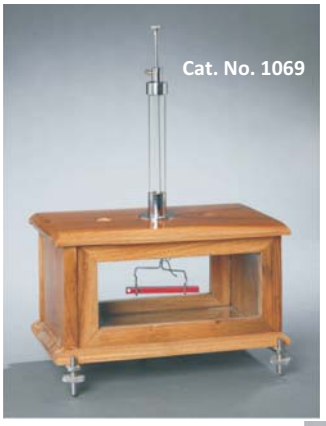
An excellent compass for general laboratory use. The dial shows cardinal points. The needle is well balanced and is mounted in an aluminum case with glass top.

Cat. No. 1062a

	Size
a)	50mm (2”)
b)	75mm (3”)
c)	100mm (4”)

1069. Vibration Magnetometer

Consisting of a superior quality polish wooden box slotted, and carries a glass tube fitted with simple torsion head to support, by means of a silk fibre, a strip holding magnet etc. Complete with one bar magnet and one brass bar. All metal parts are of magnet and one brass bar. All metal parts are manufactured from superior quality brass alloy. Size : 4''


Cat. No. 1069

1072. Dip Circle

Precision type. Designed for accurate and consistent readings. The important features of this instrument is the provision of fixed collars on the bearings screws which make the needle removal and replacement easy.

Specifications

Needle: Accurately balanced, this strongly magnetizes needle is 90 mm long with hard ended steel pivots working in a agate cup bearing.

Inclination Scale: Silvered brass 105 mm diameter, graduated 0- 90^{0} - 0 - 90^{0}x1^{0}

Horizontal Scale: Silvered brass 125 mm diameter, graduated clock 0- 360^{0} x 1^{0} with a circular spirit level.

Case: Aluminum alloy 120mm diameter approximately with easily removed windows on both sides.

Base: Heavy aluminum tripod base with three adjustable brass levelling screws.


Cat. No. 1072

1073. Deflection Magnetometer (Premium Quality)

The magnetic movements of a bar magnet can be compared quantitatively and the relative field intensities at various distance from a bar magnetometer.

A highly sensitive compass box (with a permanent magnet) is mounted at the center of a non-magnetic wooden base about one meter long, a metric scale extending outward from each side of the compass box for observing the position of the magnet tested. The compass direction is indicated in degrees. It consists of 18 mm thick laminated board (both side sunmica) with dimensions 40" x 5" with aluminum cup at the center for holding compass box. Supplied with permanent magnetic compass box (described under Cat. No. 1080) but without magnet.


Cat. No. 1073

EXPERIMENT NO. 70

To compare the magnetic moments of the given two short magnets by

i). equal distance method

ii). null deflection using a deflection magnetometer either in tan A or tan B position.

WHAT YOU NEED

- BESTO Deflection Magentometer, Cat. No. 1073
- BESTO Bar Magnets, Cat. No. 1053a /b.

Tangent Galvanometers & their Compass Boxes

1076. Tangent Galvanometer

It consists of a bakelite moulded ring 170 mm dia., with three sets of winding either 2, 50 and 500 turns or 2,5 and 50 turns (depending upon the requirement) respectively, carefully insulted, connected to heavy brass terminals. The number of turns is clearly marked between the terminals.

The ring is mounted on a pivoted round bakelite base which rotates on an aluminum tripod base fitted with three brass leveling screws. The high sensitive compass box (with permanent magnet) is mounted on a substantial brass pillar and is free to rotate upon it. The compass is 5" in dia. and has a scale graduated to single degrees. Overall height is app. 9". All brass parts are chrome plated.

Packed in a beautiful printed cardboard box.

Cat. No. 1076

What you can learn about

- Tangent Law
- Earth's Magnetic Field
- Magnetic Field Variation depending I,R,n.

1077. Tangent Galvanometer (Precision Type)

The horizontal component of earth's magnetic fields can be measured with good precision using this sophisticated instrument. Same as above but with heavy aluminum base fitted with three heavy type of brass leveling screws. Brass terminals are replaced by heavy superior quality 4 mm socket terminals.

The leveling screws and brass cup is lacquered in golden colour. The heavy tripod aluminum base is finished with superior quality Duco paint. Supplied with highly sensitive compass box with permanent magnet.

Packed in a beautiful printed cardboard box.

Cat. No. 1077

1078. Tangent Galvanometer Economy Model

Same as Cat. No. 1076 but with aluminium cup and aluminium terminals respectively. Brass leveling screws are replaced by bakelite leveling screws.

Supplied with 5" ordinary compass box of Cat. No. 1079.

Packing of Tangent Galvanometer

Operating Manual of Tangent Galvanometer

1079. Compass Box

(For deflection magnetometer or tangent galvanometer)

Compressing a bakelite moulding case with white aluminum dial graduated 0-90° four times. The magnet with aluminum pointer is pivoted at the jewel so as to move frictionless.

Cat. No. 1079

1080. Compass Box (Permanent Magnet)

(For deflection magnetometer or tangent galvanometer).

Compressing as thick bakelite moulded case of 125 mm dia. with black aluminum dial graduated 0 - 90° four times, anti parallax mirror slot. The special permanent magnet (small in size) and a light maximum damping) supported on a steel pivot by jewel bearing sets. The permanent magnet is designed in such a way so that it has maximum magnetic fields strength.

Cat. No. 1080

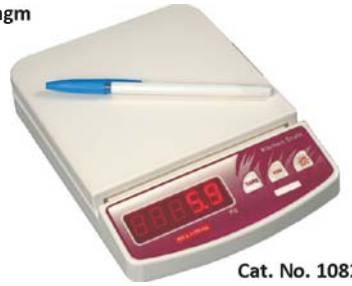
1081. Stabilized Power Supply (Variable 0-5V, 1A)

Specially designed for all BESTO Tangent Galvanometer & Stewart's Gee Apparatus Experiments. Variable from 0-5 V at 1A, Solid state regulated power supply. Supplied with leads.

Cat. No. 1081

1082. Digital Balance

Made in TAIWAN
Capacity : 600 gm
Accuracy : 100 mgm
with Adapter



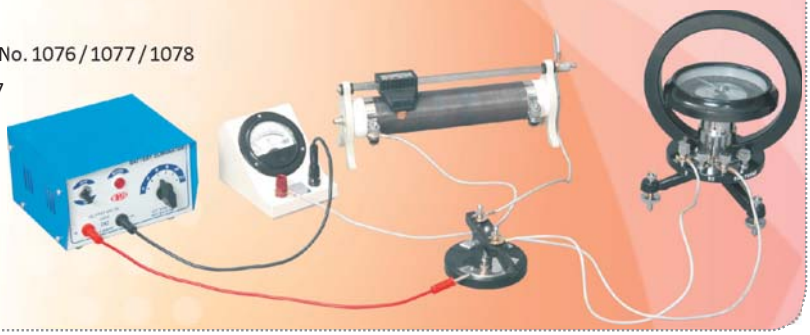
Cat. No. 1082

EXPERIMENT NO. 71

To determine the value of Horizontal Component of Earth's Magnetic Field (B_H).

WHAT YOU NEED

- BESTO Tangent Galvanometer, Cat. No. 1076 / 1077 / 1078
- BESTO Simple Rheostat, Cat. No. 677
- BESTO Reversing Key, , Cat. No. 496
- Spirit level
- BESTO Ammeter Mo65 on stand
- BESTO Stabilized power supply as per Cat. No. 1081
- Connecting wires & sand paper.

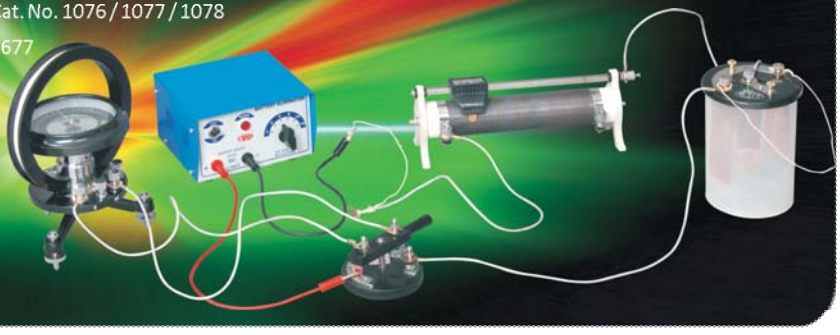


EXPERIMENT NO. 72

Determination of Reduction factor of a Two turns Tangent Galvanometer for using a Copper Voltameter.

WHAT YOU NEED

- BESTO Tangent Galvanometer, Cat. No. 1076 / 1077 / 1078
- BESTO Simple Rheostat, Cat. No. 677
- BESTO Reversing Key
- Spirit level
- BESTO Copper Voltameter
- BESTO Stabilized power supply as per Cat. No. 1081
- Digital Balance
- Connecting wires & sand paper.



Did you know ??

TANGENT GALVANOMETER CAN ALSO BE USED FOR MEASURING CURRENT.

On the reference of experimental value I =K tanθ shows that current I is proportional to tanθ.
Where K= reduction factor of the tangent galvanometer.
Hence Tangent Galvanometer can be suitably calibrated & used to measure the current.

1084. Stewart & Gee's Apparatus

It consists of a circular frame made from non- magnetic silver aluminum alloy. An insulating copper wire is wound on the frame. The ends of the wires are connected to the terminals which are fitted on the superior quality wooden board. A rectangular frame (made from anodized aluminum rods) is supported on wooden board. The anodized aluminum rods are graduated up to 50 cm on both sides.

Cat. No. 1084

Superior quality permanent magnet compass box moves on a platform (made from aluminum-silver alloy). This platform moves on the rectangular frame along the axis of the coil. Supplied with a superior quality compass box.

EXPERIMENT NO. 74

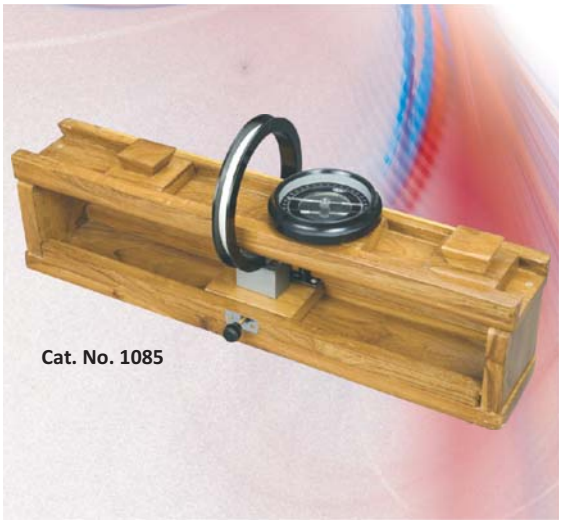
To study the variation of Magnetic Field with distance along the axis of a circular coil carrying current by plotting a graph.

WHAT YOU NEED

- BESTO Stewart & Gee Apparatus, Cat. No. 1084
- BESTO Variable stabilized power supply, Cat. No.1081
- BESTO Reversing switch, Cat. No. 496
- BESTO Simple Rheostat, Cat. No. 677
- BESTO Ammeter, 2 Ampere & Connecting leads.

1085. Field along the axis of the coil apparatus

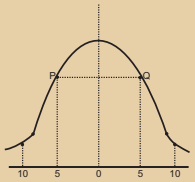
- Consists of bakelite circular coil with 20,30 & 50 turns.
- Centre zero wooden scale.
- Complete unit is made from superior quality teak wood except circular coil.
- Coil slides on the base.
- Supplied with permanent magnetic compass box



Cat. No. 1085

Principle :

Variation of the field along the axis of a circular coil is shown in figure.



Distance from the centre of the coil in cms.

The point at which the curve changes its direction of curvature are called points of inflexion (PQ). The distance between them is the radius of coil.

EXPERIMENT NO. 75

To determine the magnetic field at a point on the axis of a circular coil. (Field along the axis of the coil).

WHAT YOU NEED

- BESTO Field along the axis of the coil app., Cat. No. 1085
- BESTO Variable stabilized power supply, Cat. No.1081
- BESTO Reversing switch, Cat. No. 496
- BESTO Simple Rheostat , Cat. No. 677
- BESTO Ammeter, 2 Ampere & Connecting leads.

1087. Helmholtz Galvanometer

It consists of two equal coaxial coils (parallel to each other) separated by a distance equal to the radius of the coils.

The permanent magnetic compass is pivoted on the brass cup in the midway between them and in the same direction. The coils increase the uniformity of the fields in the middle and thus make it more sensitive. Supplied with a superior quality permanent Magnetic Compass box.

Cat. No. 1087

EXPERIMENT NO. 76

To determine the elctro-chemical equivalent of copper and reduction factor of Helmholtz Galvanometer.

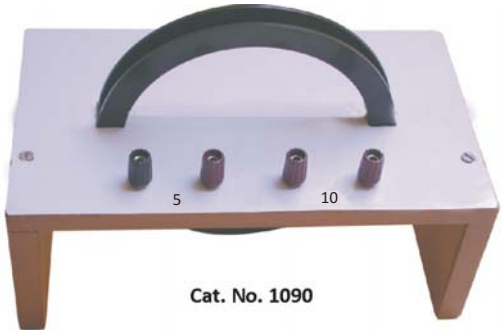
WHAT YOU NEED

- BESTO Helmholtz Galvanometer as per Cat. No. 1087
- BESTO Copper Voltameter, Cat No. 516
- Variable Power Supply 0-5V, 1A, Cat. No. 1081
- Reversing Key, Cat. No. 496
- Digital Balance, Cat. No. 1082

1090. Magnetic Field Apparatus

To demonstrate the production of magnetic field by current flowing in a solenoid.

A small wooden table supports a bakelite ring with three coils of enamelled copper wire of 5, 10, and 15 turns respectively connected to the terminals at the edge of the base.



Cat. No. 1090

1091. Oersted's Law Apparatus

To show the effect of electric current on a magnet. Comprises a cobalt steel magnetic needle, about 75mm long, with agate bearing supported on pivot mounted on insulated pillar on base and surrounded by a rectangular frame of non magnetic metal strip. Frame fitted with terminals for electrical connections. Passing the current through non magnetic frame causes magnetic needle to deflect as per Oersted's Law.

Cat. No. 1091

1092. Magnetizing and Demagnetizing coil

Low voltage, suitable for magnetizing and demagnetizing ordinary magnets, iron bars, strips etc. Comprises a solenoid wound with insulated copper wire and mounted on a base, complete with switch and 4mm terminals.

Solenoid-250mm long x 35mm internal diameter

Operating Voltage- 12V AC or DC at 6A

Magnetizing by AC or DC

Demagnetizing by AC only

Cat. No. 1092

1095. Van-de Graaf Generator - Hand Driven

Hand operated, mounted on base. For the generation of electric charge, useful in electrostatics and for studying various phenomena associated with electric charge. Comprises a near spherical dome supported on top of an insulated, clear Perspex pillar on the base. A removable flat rubber belt rotates through rollers mounted at both the ends of Perspex pillar. Lower roller shaft has a pulley driven by a hand operated crank through rubber belt.

The continuous rotation of the flat rubber belt results in the accumulation of charge on the dome, until electrical breakdown of air surrounding the sphere occurs. With sufficient charge build up on the dome, bringing the earthed discharge sphere sufficiently close to it results in the transfer of charge from dome to ground in the form of electric spark. Earthing terminal provided on the base. Supplied with discharge sphere, mounted on a long insulated handle.


Cat. No. 1095

1096. Van-de Graaf Generator - Motor Driven, Small

Useful for electrostatics experiments, where continuous source of high voltage is needed. A motor driven assembly encased in a sturdy metal box. The motor driven lower roller rotates the upper roller assembly located on top of the insulated Perspex pipe through a removable flat rubber belt. The continuous rotation of rubber belt results in accumulation of charge on the one piece near spherical metallic dome, charge being transferred continuously from rubber belt through charge collecting combs. Specially designed dome, with smooth and polished surface free of any surface imperfections, and without any sharp corner or edge to minimize charge leakage.

The motor operates on AC mains 220-240V, 50/60Hz, fused input through a 3-Core mains cable. Provided with indicator type ON/OFF switch. On bringing earthed discharge sphere, sufficiently close to the charged dome, transfer of charge from dome to the ground takes place in the form of electric spark jumping from dome to the discharge sphere. Under favourable conditions, it can develop electric potential upto 200kV, with a spark of upto 70mm length. 4mm socket terminal provided at the bottom for earthing and another 4mm insert on top of the dome for charge transfer or attaching accessories. Provides for necessary adjustment in all the critical components. Supplied complete with discharge sphere, mounted on a long insulated handle.

Cat. No. 1096

This 25 cms sphere is supported on a lucite column with a cast iron base. Includes cabeling for connection to Van-de Graaf generator or to ground.

1098. Gold Leaf Electroscope

Rectangular sheet metal case mounted in insulated base and provided with removable front and back sliding glass panels, one clear and other ground, respectively. Removable disc electrode mounted at the top through a moulded plastic bush insulating the disc electrode from the metal body to prevent charge leakage. The plastic bush has a plated metal blade on the underside for fixing the gold leaf. Case fitted with terminal at the side for earthing. Removable clear front slides up to allow insertion of ionizing material in chamber and fixing of leaves, when needed. A clear acrylic circular scale inside the chamber, graduated 0-90^0, facilitates the comparison of charge by means of deflection. Supplied complete with one pair of leaves.

Cat. No. 1098

1099. Gold Leaf Electroscope - Flask Type

Comprises a glass conical flask, sealed at the top with holed rubber stopper. A metal rod supports a disc terminal at the top of rubber stopper and a pair of foil leaves suspended inside.

Cat. No. 1099

1100. Pith Ball Pendulum

Two pith balls are suspended by a silk thread from an insulating stand approx. 16 cm high.

1101. Earth Inductor

This is an improved form comprising a coil of different number of turns (500, 1000, 2000 or 5000 turns) of 36 SWG copper wire wound on an aluminum metal ring (150 mm dia.) A stop limiting rotation to 180^0 of the ring is provided with the help of the spring. The cradle supporting the coil of cast non-magnetic alloy 200 x 210 x 115 mm high may be placed either on its base or side so that the axis of rotation of the coil is either horizontal or vertical . Terminals for connections are mounted on the cradle supporting blocks.

	No. of turns
a)	1000
b)	2000
c)	5000

Cat. No. 1101

1102. Solenoid Inductor

A useful instrument for calibrating a ballistic galvanometer. The Primary Coil has 1000 turns and is about 100 cm long fitted on a wooden board. The secondary is in section with separate terminals for each section. Every section of the secondary has its own number of turns marked on the wooden board. Secondary coil has three tapings of 100, 250 and 500 turns.

Cat. No. 1102

1103. Search Coil

For the determination of the Flux density in an air gap. This coil is wound on a mounted bakelite ring, wound with insulated wire, this coil has resistance of 25 ohms approx. Resistance 25 ohms, turns 100, mean dia 10mm.

For experimental detail of Earth Inductor & Solenoid Inductor, Please refer to Page No. 28. Experiment 10 & 11.

1108. Sonometer (Teak Wood, Brass fitting)

Comprising a teak wood resonance box 1140×125×100 mm length × width × height with meter scales one meter long subdivided in millimeters. One each brass and steel wires of S.W.G. 26 and 24 respectively, attached to a fixed bridge and tensioned by fine adjustment pegs: two moveable bridges, pulley and fixed screw to enable a third wire to be fixed for tensioning by weights. Wooden resonance box is made from superior quality teak wood and all metal parts are of brass.

Cat. No. 1108

1109. Sonometer (Teak Wood, Aluminum fitting)

Other specifications are same as that of Cat. No. 1108, only brass parts are replaced with aluminum parts.

1110. Slotted Weight

For use with above type of sonometers, capacity 500gm ×5, iron, black painted.

Cat. No. 1110

1111. Slotted Weight (Iron powder coated)

Manufactured from 50mm diameter, iron rod & this type of slotted weight is very much accurate than the above type.

500gm x5 powder coated

Cat. No. 1111

1113. Spare Electromagnet

Only Electromagnet for Sonometer experiment without step down transformer and without stand.

Cat. No. 1113

1112. Electromagnet and Transformer for Sonometer

These items are used to determine the frequency of A.C. mains by sonometer method. This apparatus consists of a suitable electromagnet with step down transformer of fixed voltages 6V & 8V and has a current capacity 2A. When this attachment is supported over a Sonometer and connected to a source of alternating current, the wire vibrates continuously. By adjusting the tension and the bridge position maximum resonance can be obtained. Supplied without Sonometer and without stand for holding the electromagnet.

Cat. No. 1112

1114. Stand for Electromagnet

Consists of retort stand of 7" x 5" x 10" x 3/8" along with suitable burette clamp. A suitable rubber cork with hole his provided to hold the electromagnet in a vertical direction. Supplied without electromagnet.

Cat. No. 1114

EXPERIMENT NO. 76

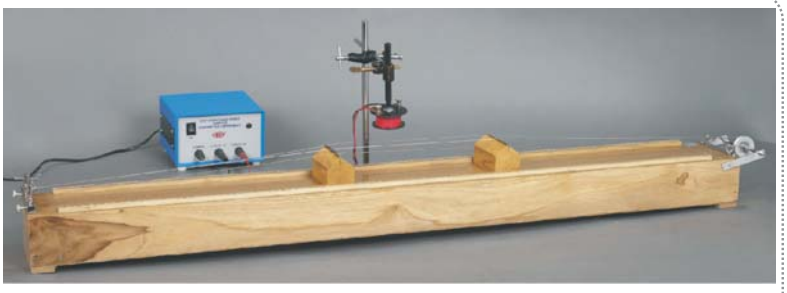
To determine the frequency of unknown tuning fork using a sonometer.

WHAT YOU NEED

- BESTO Sonometer, Cat. No. 1108
- BESTO Slotted Weights 500gm X 5, Cat. No.1110
- Sensitive Digital Balance & Rubber Pad

EXPERIMENT NO. 77

To determine the frequency of AC Mains using a Sonometer & electromagnet.



WHAT YOU NEED

- BESTO Sonometer, Cat. No. 1108
- Slotted Weights 500gm X 5, Cat. No.1110
- Sensitive Digital Balance
- BESTO Step Down Transformer & Electromagnet, Cat. No. 1112
- Stand for Electromagnet, Cat. No. 1114

1116. Wave Motion Apparatus (24-Pulleys)

It consists of 24 aluminum discs supporting a series of iron nickel rods. On revolving the handle the motion is transmitted successively from one rod to the next, appearing as a wave travelling to the top and back. The movement of the waves can be observed. All metal parts are fitted on a superior quality polished wooden board.

1117. Wave Motion Apparatus (18-Pulleys)

Same as above, smaller in size, has 18 aluminum discs instead of 24

1118. Reflection of Sound Apparatus

For proving that angles of incidence and reflection are equal for any setting. A protector (actual 'D') is screen printed on a superior quality laminated board. It consists of two independent arms containing 12" long stainless steel pipes. One arm is set at any arbitrary angle and other is adjusted till one listens to the maximum sound. At the position of maximum sound to angles will be equal as indicating by the 'D' reading.

Cat. No. 1118

1120. Ripple Tank Apparatus

A specially designed versatile apparatus for the investigation of the wave properties, such as wave propagation, reflection, refraction, diffraction and interference. Permits demonstration with an overhead projector or use as a free standing bench model, allowing investigations to be carried out directly. Comprises a rectangular plastic tank with clear bottom and sloped sides incorporating beach effect to eliminate unwanted reflections. The tank has four detachable legs mounted at its underside at the corners with a hole in the clear tray for water drainage. One end of the tank has clamps for supporting lamp holder with a pair of clamps on each side for mounting rippler support rods. Rippler assembly comprises of a rectangular plastic rod with series of holes suitable for mounting spherical dippers and a low voltage DC motor having eccentric cam attached to its shaft to produce oscillatory motion. Supplied complete with following accessories: Illuminant Assembly Set of 4 barriers a pair of bigger L-shaped (75×25mm) and a pair of smaller L-shaped barrier (25×25mm) 1 Curved Barrier, 2.5cm high, with uniform radius of curvature 1 Hand Stroboscope 1 Convex Lens 1 Concave Lens 1 Rectangular Block 2 Spherical Dippers Spare Elastic Cords for suspending rippler assembly.

Cat. No. 1120

1121. Ripple Tank Controller Simple

This unit provides fully independent, continuously variable DC output of 6V through a pair of colour coded 4mm sockets, for the ripple tank motor, along with a fixed Ac output through a pair of 4mm sockets, rated as 220Volts to operate the illuminant. The motor output are short circuit protected & the input to complete unit is fuse protected. Supplied with a detachable 1.5m mains lead

1123. Resonance Apparatus (Stainless Steel Pipe of 1" dia.)

A heavy Stainless steel tube (S.W.G. No. 16) 1.10 mm in length x 25 mm dia. is mounted next to a meter scale. The Stainless Steel pipe and meter scale is fitted on a superior quality polished wooden board. The lower end of the Stainless Steel pipe is sealed into a metal cup having a side tube connected by rubber tubing to a brass reservoir, also mounted on the support rod but with elevation adjustment. The length of the resonance column may easily be determined by measuring the distance between zero stop and the closed end of the tube with the meter rule. Supplied

Cat. No. 1123

1125. Resonance Apparatus, all Metallic (Brass Pipe)

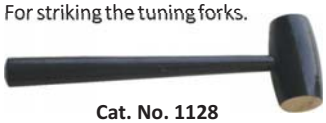
An economical model similar in specifications to Cat. No. 1123, consists of brass pipe and brass reservoir.

1127. Rubber Pad

For striking the tuning fork.

1128. Wooden Hammer

For striking the tuning forks.



Cat. No. 1128

1129. Rubber Hammer

For striking tuning forks.

Cat. No. 1129

1131. Tuning Fork aluminium

Most accurately calibrated set of 8 forks made from tone aluminium alloy, nicely finished and anodized for long lasting finish and accuracy . Packed in Plastic box.

PYE Type in aluminium alloy.

Cat. No. 1131

1132. Tuning Fork (Welch Type in aluminium alloy)

Same as Cat. No. 1131, but larger in size, equivalent to Welch Type in aluminium alloy. Packed in plastic box.

Cat. No. 1132

1134. Tuning Fork (WELCH Type, Light Weight)

These medium weight, WELCH type forks, are intended for student use and for general experiment work. They are often selected for student use and preferred for laboratory standards and for applications requiring longer duration of vibrations. The frequency in vibration per second and scale letters are pressed into the metal at the base of each fork. Supplied in a superior quality wooden box.

Cat. No. 1134

1135. Tuning Fork (WELCH Type Heavy Weight)

Because of large cross sectional area, the heavy type forks have greater frequency, stability and vibrate longer than smaller forks.

Cat. No. 1135

1136. Loose Tuning Fork (WELCH Type, Light Weight)

Any one loose tuning fork out of 8 forks having frequency 256, 288, 320, 341,384,426, 480, and 512 Hz..

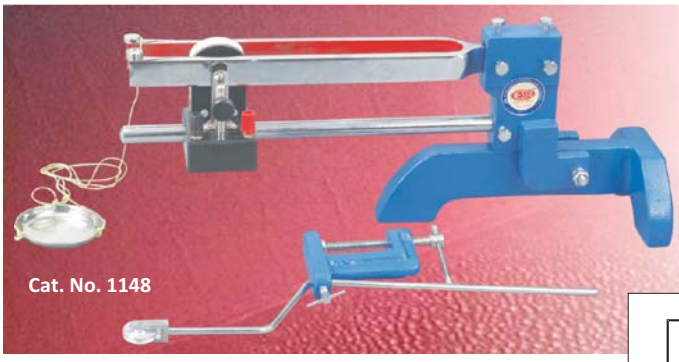
1137.Loose Tuning Fork (WELCH Type, Heavy Weight)

Any one loose tuning fork out of 8 forks having frequency 256, 288, 320, 341,384,426, 480,and 512 Hz.

1147. Melde's Apparatus (OSAW Pattern)

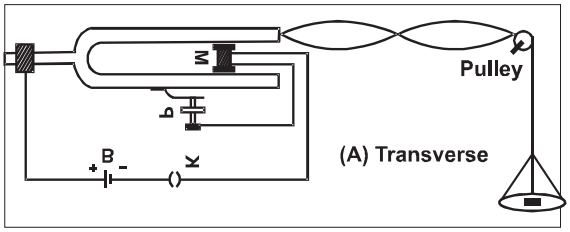
This massive and powerful fork which has a frequency of approximately 60 vibrations per sec., is ideal for producing standing waves and is mounted on a heavy cast iron base.

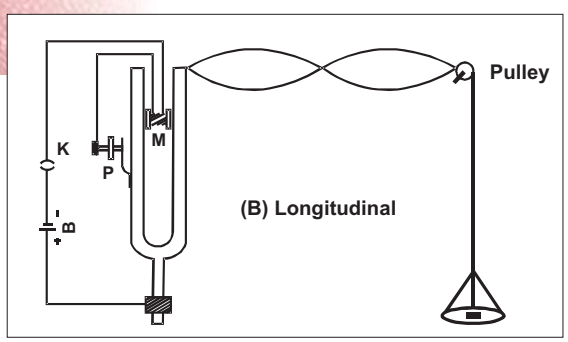
An electromagnet is arranged between the prongs of the fork without touching it. A small spring type strip is attached to the one of the prongs. A screw just makes a contact with this strip. Supplied with scale pan, bench clamp with pulley but without weights.



1148. Melde's Apparatus (INCO Pattern)

Other specifications are same as per Cat No. 1147 but on a sturdy streamlined base with provision for horizontal or vertical experiments (Transverse as well as Longitudinal arrangements).

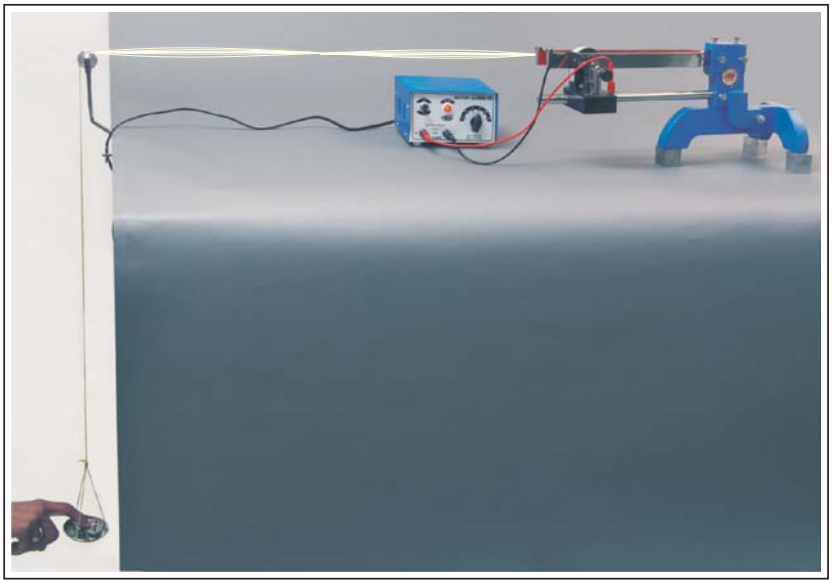




EXPERIMENT NO. 81

i). **To verify the law T x p^2 = constantan for Melde's Experiment, where T is the tension & p is the no. of loop, length of the rod remaining constant**

ii). **Determination of frequency of an electrically maintained tuning fork**



WHAT YOU NEED

- BESTO Melde's App., Cat. No. 1147/1148.
- BESTO Battery Eliminator 2-12V, 3 Amp., Cat. No. 1919.
- BESTO Physical Weight Box Brass C.P. 200gm., Cat. No. 62b.
- Measuring Tape.

1150. Spiral Spring

For demonstration of wave motion. This is a closely coiled iron spring, having ideal characteristics for demonstration of wave motion.

1151. K Constant Spring App.

If one end of a long flat spiral spring is fixed and the lower end is pulled by a short jerk and released, longitudinal waves are produced.

The apparatus consists of a spiral spring about 25mm diameter and 10cm length. The upper end of the spring is suspended from a chucknut and the lower end is provided with a small pointer which moves over a vertical wooden meter scale. The lower end is also provided with hook for carrying weights. All this setup is provided on a heavy metal base, supplied with weights.

Cat. No. 1151

1152. Elongation of Spring App.

A spiral spring of 15mm diameter and 10cm is firmly attached to a rigid clamp of a stand at its upper and with the help of a chucknut. A slotted weight (50×5 gm set) is attached to its lower end. A pointer is fixed in horizontal position at the lower end of the spring just above the hanger. A half meter scale is fixed vertically in the same stand. It is kept in front of the pointer such that the tip of the pointer moves just over the scale without touching it. Supplied with 50 × 5gm slotted weight.

Cat. No. 1152

EXPERIMENT NO. 79

To determine the force constant & potential energy of an oscillating system.

WHAT YOU NEED

- BESTO Elongation of Spring App., Cat. No. 1146

Kundt's Tube

1155. Kundt's Tube Deluxe Pattern

A glass tube 100 cm long and 3.8cm in diameter is mounted in a 'Y' on a metal base. A rod about 60 cm long is held firmly at its mid point in a sturdy clamp at one end of the base. One end of the rod has a metal disc attached to it and projects into the glass tube. The other end of the tube is closed by a close fitting piston mounted on the base such that its position in the tube is adjustable through 20cm. app. The 'Y' supporting the tube may be adjusted vertically and laterally until the metal disc will not touch the glass. Coiled spring attached to the 'Y' holds the glass tube in position.

Cat. No. 1155

EXPERIMENT NO. 80

To find the velocity of sound in the material of the given rod with Kundt's Tube given that velocity of sound in air at 0°C is 332m/s.

WHAT YOU NEED

- BESTO Kundt's Tube., Cat. No. 1155
- Lycopodium powder & Full Meter Scale

Experimental Note: When Lycopodium powder is placed in a line at the bottom of the tube extended lengthwise between two pistons, the free end of the rod is set into longitudinal vibrations by stroking with rosined cloth, the tight piston can be adjusted until the standing waves produced. This evidence by the appearance of nodes and anti-nodes between two ends, the spacing of which gives wavelength of the sound in air.

1165. Demonstration Transformer

A large scale transformer, ideal for classroom. The coils are fitted with intermediary outputs providing many transformation ratios.

Consisting of :

One magnetic circuits made up of highly permeable U-shaped metal sheeting which can be closed via two clamps with tightening screws.

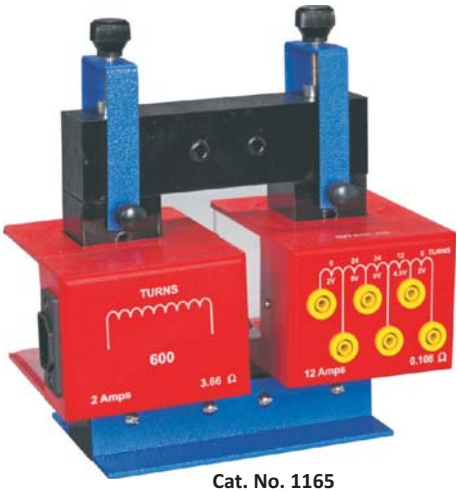
Section : 40x40mm. Length : 150mm. Height : 170mm

One coil of 6000 turns, 350ohms, 1max : 0.2A, Intermediary 2000 turns output.

One coil of 600 turns, 1max : 2.5A, mainly used to create the transformer primary. Provided with power supply cable.

One coil of 1200 turns, 12.5ohms, 1max : 1.25A, fitted with intermediary 400 and 800 turns output.

One coil of 72- turns, 1max : 12A has Intermediary 6, 30, 54 and 66 turns output.



Cat. No. 1165

1166. Coils for Demonstration Transformer

Wound on rectangular insulating bobbins, overall height 73 mm. These coils are wired to a panel mounting. The earth pin is wired to the front panel and 4mm socket. all connections are completely surrounded by the panel housing. A separate mains connector with moulded plug is supplied with each coil.

a)	50 turns	230V	d)	500 turns	230V
b)	100 turns	230V	e)	1000 turns	230V
c)	200 turns	230V	f)	2000 turns	230V

Cat. No. 1166

1167. Demonstration Transformer

For demonstrating the basic principle of operation of the transformers. Comprises a W-shaped laminated iron core mounted on base with a vertical bolt on its each side for clamping laminated 1-core or armature at its top. Also included are a set of three coils - one mains primary coil 240V AC, 50HZ, 2400 turns and two interchangeable secondary coils, 65 and 130 turns each giving outputs of about 6 and 12V respectively at a maximum current rating of 2A, with number of turns and current/voltage rating marked on each coil. Mains coil provided with a 2 core captive mains cable for input, while each secondary coil has a pair of 4mm socket terminals for output. Coils wound on insulated plastic bobbin having hollow rectangular cross-section to exactly fit middle arm of the core with negligible flux leakage.

Cat. No. 1167

1531. Student Polarimeter (Laurent's Half Shade) SPH - 8

Specially designed for easy to use, moderately priced, for colleges and research laboratories. Ideal for determining the specific rotation of optically active substances. Our Polarimeters are now extensively used in industrial laboratories as well. A corning glass tube is enclosed in a circular aluminum tube with top door for access and exclusion of external light. The circular scale is attached near the analyzer and the range of measurement is 0-360°. A movable Vernier on the scale enables reading of optical rotation to 60 seconds. Worm and gears combine rough and fine adjustment, provided with Half Wave Mica Plate, giving three parts field for easy setting, adjustable half shadow angles. This instrument can be used on monochromatic light only. When light passes through a polarized sheet and then through the solution, the emerging light is observed through rotatable polarized lens, analyzer which is used as eyepiece. The angle of light is rotated and read directly on the circular scale. Supplied on the adjustment stand, Packed in cardboard box with working manual.

1532. Student Polarimeter (Bi - Quartz) SPB - 9

Same as Cat. No. 1531, fitted with Bi-Quartz in place of mica, giving colored distinction, accuracy check

1533. Research Polarimeter RSP-10B (Research Model Half Shade for 200mm tube)

- Sensitive rotating half shade device
- Having angular and sugar scale from 0° to 360° and +130° to –30° I.S.S. Sub divided into 0.10 micrometer drum enable to read upto 0.05° by estimate workable for use with polarimeter tube 200mm.
- Analyser : Glans Thompson Prism.
- Arrangement for 35W sodium lamp light source, input 220V±10% VAC
- Borosil glass tube 200 mm
- Plywood storage cabinet, instruction manual, dust cover supplied

Cat. No. 1533

1534. Research Polarimeter RSP - 20B (Research Model Half Shade for 400mm tube)

Range of measurement	+130° to –30°
Vernier Accuracy	0.1°(I.S.S.)
Telescopic Magnification	4.5X
Least Count	0.05°
Analyser :	Glans Thompson Prisms
Polariser and Half shade	Prism System
Polarising Aperture	6 mm
Light Source	Arrangement for 35Watt Sodium Vapour Lamp Light Source Input
Tube	Borosil Glass Tube 400mm cut type 220V±10% VAC
Cabinet	Plywood Storage Cabinet

Our BESTO students polarimeters are having Vernier Reading of 1°, whereas BESTO Research polarimeters are having vernier reading of 0.05°. Research Polarimeter of Model-RSP-40B is recommended for low concentration solution due to Bigger size of Tube.

1535(a). Spare Polarimeter Tubes

With bulb in the center, 200 mm in velvet lined case.

Cat. No. 1535a

1535(b). Spare Polarimeter Tubes

With Cup in the center, 200 mm in velvet lined case.

Cat. No. 1535b

EXPERIMENT NO. 85

To determine the specific rotation of sugar using Laurent's Half Shade Polarimeter

WHAT YOU NEED

- BESTO Polarimeter Cat No. 1531
- Sodium Light source complete with Sodium Lamp 35 Watt, Transformer 35Watt & specially made ofl aluminium metal box to hold the sodium vapour lamp 35Watt
- Borosilicate Beaker 150 ml
- Funnels
- Borosilicate pipette 10 ml
- Small digital Balance

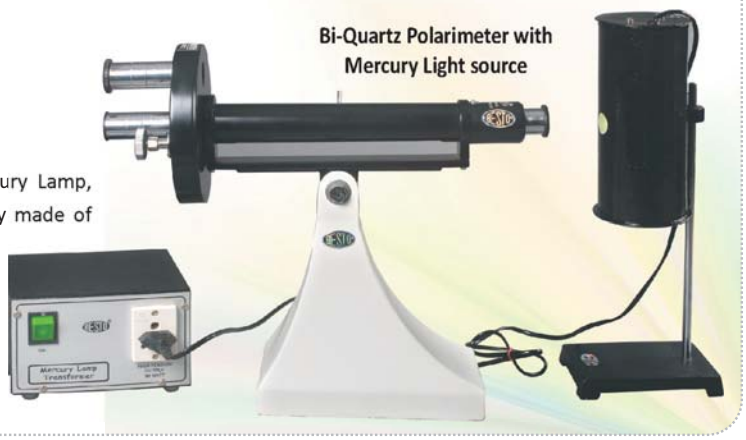
Half Shade Polarimeter with Monochromatic lightsource - Sodium Light

EXPERIMENT NO. 86

To determine the specific rotation of sugar using Bi-Quartz Polarimeter

WHAT YOU NEED

- BESTO Polarimeter Cat No. 1532
- Mercury Light source complete with Mercury Lamp, 80Watt choke for Mercury Lamp & specially made of aluminium metal box to hold mercury Lamp.
- Borosilicate Beaker 150 ml
- Funnels
- Borosilicate pipette 10 ml
- Small digital Balance
- Sugar etc.



Bi-Quartz Polarimeter with Mercury Light source

- For Sodium Vapour Lamp (35Watt), Sodium Vapour Lamp Transformer & Metal Box for Sodium Vapour Lamp,
- Mercury Lamp,(85Watt) choke for Mercury lamp & Metal Box for Mercury lamp, Please refer to Page No

Did you know ??

In Student Polarimeter of Cat No. 1531, you will see Half Black and Half Yellow/ white circle at initial reading & you will get same view after 180°, where as in Bi-Quartz, you will get full circle of violet colour at initial reading & again after 180°, you will get same circle of same colour.

1536. Astronomical and Terrestrial Telescope Combined

A high class telescope for school students for all-around purpose. It is light and easy to manipulate and has a high magnifying power. Overall length of Astronomical Telescope is 85 cm, fitted with high class achromatic objective of dia 45 mm, focal length 18" inches. Its high magnifying power that provides extremely sharp images. The telescope is provided with an extra erector tube which can be screwed into the main tube after removing the eyepiece and this Astronomical Telescopes is used as a Terrestrial Telescopes. Complete with velvet lined case. Superior quality with high class achromatic objective .

a)	Superior quality with high class achromatic Objectives
b)	Regular Quality

Cat. No. 1536

A high class telescope of superior quality for beginners & school students for all-round observations.

1537. Cathetometer L-Shaped

An instrument of great stability for quick, accurate handling. Life time stainless steel scales verniers and fine achromatic optics that make this a precision instrument of universal choice for normal experiments and for researches.

The instrument is designed for use in the vertical and horizontal planes. The vertical guide bar is made of gun-metal and is of a special type. It rotates on ball centres having bearings and can be clamped in any position. The cast iron frame which support the vertical guide bar, is fitted with levelling screws. Range either 50 cm or 100 cm erector tube which can be screwed

Cat. No. 1537

Measuring Range	0 to 50cm or 0 to 100cm
Length of Scale	103mm
Magnification of Telescope	10 X
Visual Distance	100 cm to infinity
Graduation	0.5mm in division

a) 50 cm long graduated bar
b) 100 cm long graduated bar

1538. Vertical Reading Microscope

The BESTO Vertical Reading Microscope consists of a microscope with rack focussing adjustment, mounted horizontally on an adjustable vertical column. The stereotyped design of the vertical column moving through 15cm by rack & pinion is now replaced by a superior quality vertical pillar carrying the scale with the entire 15cm vertical lift by smooth rack & pinion, moving inside a heavy vertical column carrying the brass vernier. Vernier spring is loaded for precise opposition to the scale. A guide slot and key ensure up & down movement in the same plane.

The stainless **steel scale & vernier is machine divided to accuracy** within ±0.01% or better.

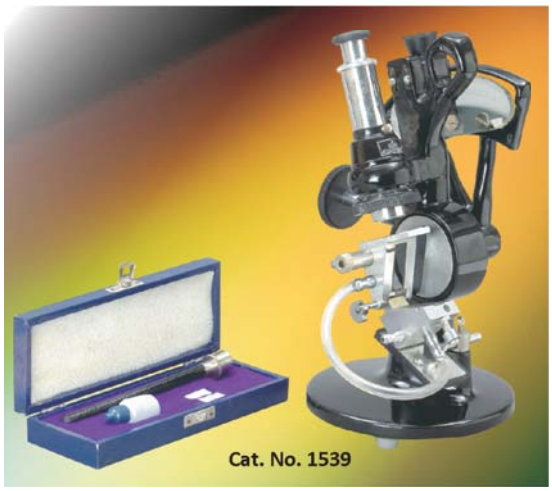
The horizontal microscope tube is mounted on the vertical column and is adjustable by smooth rack & pinion, through twin-knobs on both sides. The microscope moves on the machined inter ground guides.

Cat. No. 1538

1539. Abbe's Refractometer

The body of the instrument is fixed, with a leaning of 60°. Correct Refractive Index and Sugar Percentage can be read directly in the field. It consists of Abbe's Double Prisms with the Thermostat, Compensator, Telescope Mirror, Limb, Graduated Sector, Reading Magnifier and Radical Arm which carriers a Vernier. Abbe's Double prisms leaves a narrow space (about 0.1 mm) between the adjoining faces of the prisms. Compensator consists of the Amici Prisms which serve for reading the line of Ach. Separation.

Technical Data	
Measuring	ND. 1.3000 to1.7000 (Reflecting index)
Measuring Accuracy	± 0.001 by direct reading,
	± 0.0001 by estimation
Sugar %age in solution	0 to 95% (± 0.5%)


Cat. No. 1539

The instrument is also ideal for practical demonstration and experiments in chemistry & Physics Laboratories of schools, college and Universities.

1540. Hand Refractometer (Erma Japan Make)

With accuracy 2%, Built in Amici prism and special light reflection system for colour elimination to obtain sharp critical boundary line and optimum contrast.

	Ranges
a)	0 to 32 %
b)	28 to 62 %
c)	58 to 92 %


Cat. No. 1540

1541. Babinet Compensator

The instrument consists of two - round scales. One with index and the other with vernier. The first scale (index scale) is for tuning the analyser into the azymuth. The Second scale (Vernier Scale) is for measuring the degree of orientation of a wedge box.

The Wedge Box contains two wedges cut in mutually perpendicular direction of optics axis in quartz. The long wedge is movable by means of a micrometer drum, with the help of which accurate reading of the movement is taken. Micrometer screw minimum reading 0.001cm. (i.e. Least count)

Cat. No. 1541

EXPERIMENT NO. 87

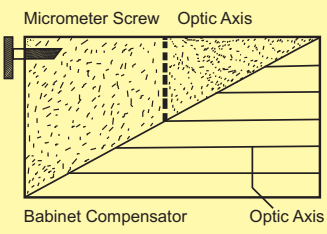
To analyse elliptically polarised light with the help of Babinet's Compensator

WHAT YOU NEED

- BESTO Babinet's Compensator Cat. No. 1541
- BESTO Sodium light source, complete set.

Did you know ??

It consists of two wedges of quartz of equal acute angles. The wedges are cut in such a way that the optic axis for one of the wedge is parallel to rectangular side but parallel to rectangular side but perpendicular to the plane of the figure as shown. Two wedges when placed with their hypotenuses.



In contact form a parallel plane of quartz. A cross wire is fixed in front of the upper wedge and a micrometer screw is attached to the wedge to give a relative motion. Thus by working with the micrometer screw the thickness of the Babinet compensator can be changed.

1542. Reading Telescope, Simple Form

This is a good general purpose laboratory instrument. It employs an achromatic objective of 25 mm aperture and 17.5cm focal length. The telescope is mounted on a sturdy stand with ½" steel C.P. rod, focus by smooth rack and pinion, 10X Ramsden eyepieces are used. Supplied with scale and scale holder.

Suitable for Compound Pendulum experiment.

The sensitive focussing adjustment and wide range of working distance make this telescope a useful laboratory instrument.

1543. Reading Telescope, College Pattern

The superior quality achromatic objective has an aperture of 25mm and focal length of 17.5cm. It contains a fine quality 10 x Ramsden eyepiece and 90° Cross Line Graticule. The working distance is adjustable by rack and pinion and the lens has focus from One meter to infinity. The carriage of the telescope (with up and down motion, improved design, college pattern) tube is fitted with vertical movement by a fine micrometer screw. Focussing arrangement is given by rack and pinion. Complete on a heavy metallic stand having pillar of 18" length of15mm diameter. Both tubes of telescopes are of brass metal. Supplied with scale and scale holder with detailed working manual.

For use with Mirror Galvanometer or an Optical lever or for general laboratory utility.

1544. Advanced Reading Telescope

Achromatic object glass focal length of 17.5cm and 25mm clear aperture. 10 x Ramsden eyepiece & focussing by rack and pinion (with up and down, to and fro motion) Range from 1000mm to infinity. Carriage for telescope with adjustable ring to stop adrupt falling, fitted with adjustable screws for precise vertical and horizontal positioning. Scale and scale holder are provided with the stand. 25mm dia steel pillar, 450 mm long fitted on a heavy cast iron base with three levelling screws.

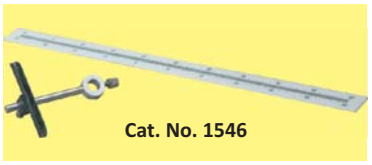
Both tubes of the telescopes are of brass. Supplied with scale and scale holder and fitted with cross line graticule.

1545. Optical Lever

For measuring the thickness of thin articles by optical method. Optical work 40mm dia plain mirror mounted on a metallic arc. The arc is mounted on a aluminium metallic base with two fixed legs and one levelling screw.

1546. Spare Scale and scale Holder for Reading Telescope

Life time machine dived Perspex scale divided in millimeters to 25 - 0 - 25 cm horizontally and 0 -50 cm vertically. Provided with scale holder. Suitable for reading telescope of either Cat. No. 1542 & 1543.



1547. Variable Rectangular Slit

Adjustment for Resolving Power of Telescope.

S.S adjustable slit with unilateral jaws movement through a micrometer head.

Cat. No. 1547

1548. Spare 10x Ramsden Eyepiece

Superior quality 10x Ramsden eyepiece. Suitable for all BESTO reading

Cat. No. 1548

1549. Spare 10x Ramsden Eyepiece with cross line graticule

Superior quality 10x Ramsden eyepiece. with cross line graticule built inside along with Brass Holder and Eye Piece.

Cat. No. 1549

1550. Metal Box to find resolving power

It consist of metallic box with two narrow slit. The spacing between these two slits are very very small of few mm. The metal box is fitted with electrical fitting for ordinary bulb. When the bulb glows, the slits are illuminated and one can resolve two narrow slits through reading telescope.

Cat. No. 1550

EXPERIMENT NO. 89

To determine the magnifying power of reading Telescope by slit method using Traveling Microscope

WHAT YOU NEED

- BESTO Reading Telescope Cat No. 1543
- BESTO Traveling Microscope Cat No. 1565
- Specially design brass slit in place of reading Telescope objective.
- BESTO Mercury Light source, complete set up
- One needle in an upright

EXPERIMENT NO. 90

To determine the Resolving Power of Reading Telescope

WHAT YOU NEED

- BESTO Reading Telescope Cat No. 1543
- BESTO Variable Rectangular slit Cat No. 1547 Direct Reading drum type
- BESTO Special metal Box having two slits 2-3 mm apart with light arrangement Cat no. 1550
- Measuring Tape 3 meter.
- BESTO Travelling Microscope Cat no. 1565

Cat No. 1542 - Simple Reading Telescope without up & down motion

Cat No. 1543 - Reading Telescope with up & down motion (fast moving)

Cat No. 1544 - Reading Telescope with up & down motion to & fro motion

1565. Intermediate Travelling Microscope

The travelling microscope consists of a cast iron base with machined vee-top surface and is fitted with 3 levelling screws, one being fixed. The microscope can travel horizontally 18cm and vertically 15cm with the help of slides. The slow motion knobs are provided for taking accurate readings. Vernier readings 0.01mm. The Microscope tube consists of an eyepiece 10X with 50mm or 75 mm objective, for holding objects horizontal stage, made of milky cenolite sheet provided on the base packed in beautiful wooden box.

Cat. No. 1565

- Ramsden 10x eyepiece with crossline graticule
- Objective 2" or 3"

100% Satisfaction GUARNATEED

All our products are guaranteed for one year. If for any reason you are not satisfied with any item you may return it for a replacement, a refund or credit. It's that simple.

1566. Advanced Travelling Microscope (TM-11)

It is an instrument for the measurement of small lengths e.g. the diameter of Newton's rings and narrow tubes etc. It consists of a compound Microscope mounted vertically or horizontally on a right metal frame so that it can be moved in a direction at right angles to its axis by means of a screw.

The displacement of microscope is measured with verniers which moves with the microscope along a scale fixed to the instrument.

Specifications :

Base: Properly painted heavy cast iron base, with two levelling screws. Top surface is machined for smooth sliding of a carriage having clamping screws for locking.

Horizontal Scale: The horizontal scale fitted in the bed of the machine divided on a life time stainless steel to a length of 0 to 20 cm in 0.5mm division.

Vertical Scale: The vertical scale fitted on the vertical pillar is also machine divided on a lifetime stainless steel to a length of 14cm graduated in 0.5mm division.

Verniers: Horizontal and vertical verniers, are provided. (Both are 50 divisions, such that 50 vernier scale division coincide with 49 main scale division).

Sliding Carriage: Sliding carriage slides along vertical metal bar of special design which is fitted on the horizontal carriage with slide on the top of the base. Fine motions screws are provided for fine adjustment both for horizontal and vertical movements.

The Slow Motion Guide Bar: The horizontal fine motion range is especially increased to app. 3cm for convenience. In taking measurements within this range, in one operation of the slow motion screw, without recourse to sliding adjustment of the carriage (The movement has obvious advantage for fine measurements falling with this extended range.) Vertical fine motion range is approx. 2.5cm.

Microscopes: Microscopes fitted on a vertical carriage can be clamped in vertical or horizontal or vertical plane of the Microscope. Eye piece is of Ramsden type and fitted with fine cross line graticule. Objective achromatic with a working distance of 50mm or 75mm approximately, focusing can be done by rack & pinion.

Objective and Eye Piece: Consisting of 10 x Ramsden eye piece and 2" or 3" focal length objective from highest quality optical glass.

The instrument is finished in the latest polychromatic finish with chrome plated brass parts. Supplied in a superior quality wooden box along with dust cover & instruction manual.

1567. Advanced Travelling Microscopes with Square Pillar & special drum type verniers

Salient Features

- The vertical square brass pillar is mounted on a traversing carriage that moves along the horizontal stainless steel scale and has a swing-out magnifier for reading the vernier.
- Precision lapped vertical and horizontal carriages with fine movements, free from lateral shift or chattering. Travels horizontally 165mm, vertically 120mm
- Square brass pillar, in which inlaid lifetime stainless scales.
- Measured to 0.01mm.

Cat. No. 1567

- Cross line graticule is provided in the eyepiece.
- Special Feature : Horizontal & Vertical verniers, in both case, drum types vernier are provided for Direct Reading (Easy Reading) .

1568. Advanced Travelling Microscope (Deluxe Model, TC-13, XYZ Motion)

For certain measurements it is more convenient to provide sliding motion to the microscope tube across the stage, in addition to all other usual movements. (This microscope is very useful in Newton's ring experiment and graph reading etc.) A sliding carriage is fitted on the top carriage which moves at right angle to the horizontal motion by means of rack and pinion. This motion is also graduated in millimeters with a vernier reading of 0.1mm. Supplied in a superior quality wooden box.

Cat. No. 1568

1570. Six Position Vernier Microscope (X & Z Motion)

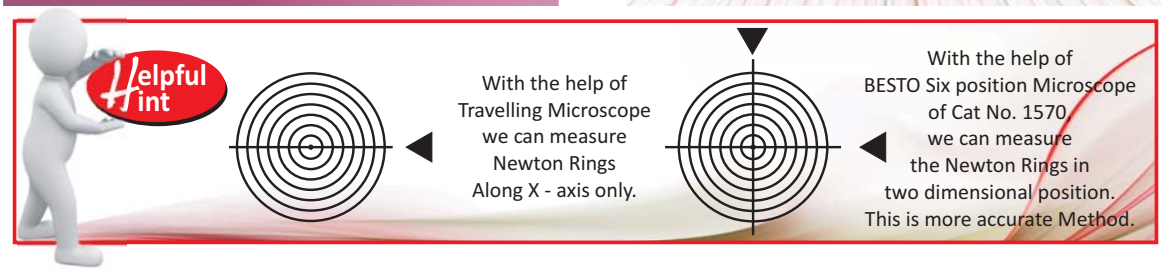
Microscope: Mounted on a travelling carriage fitted with 10x Ramsden eye piece, cross-line graticule, Achromatic object 75mm working distance, focussing by rack & pinion.

Scale: Graduated in half millimeters on inlaid strip of nickel silver, vernier attached, Microscope traverse, 16.5 cm.

Base: Heavy cast iron, top nicely machined, travelling carriage slides on the top, which can be clamped in any position. Fine motion screw for finer adjustment. Complete with case.

Motion : Special design measure object in X as well as in Z direction.

Cat. No. 1570



1571. Newton's Ring Apparatus

Comprising a small wooden frame of size 5"x3"x3" with a matt blackened inside and provided with a glass plate 4" x 3" x 1/8 mm mounted at an angle of 45° to reflect the light downwards on to a Plano-convex lens of 50mm diameter having 100 cm focal length which rests on a plain glass plate 3" x 3" x 3/8 on the base of the box.

Cat. No. 1571

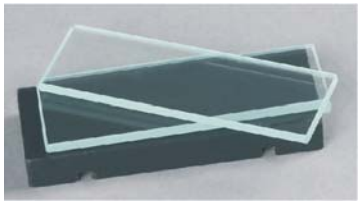
1572. Newton's Ring Apparatus

Interference fringes are clearly seen when the apparatus is viewed in sunlight, fluorescent light or monochromatic light. The glass plate and convex lens are held in a heavy aluminum frame having three adjusting screws. The frame is 9 cm in diameter and aperture is 5 cm.

Cat. No. 1572

1574. Air Wedge

Consisting of two optically plain glass plate of same thickness and having same length and width, resting on a black wooden piece..



Cat. No. 1574

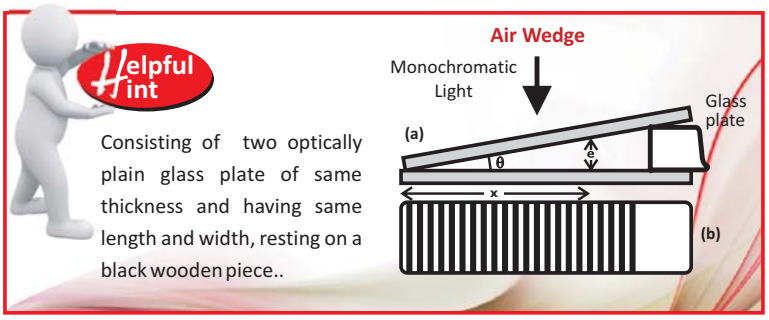
1573. Newton's Ring Microscope

A standard Microscope unit having 30x magnification is provided with a rotatable cross line and the eye piece can be focused as per individual's requirement. The whole microscope tube unit can be raised or lowered and can be clamped in any desired position. The focusing of the microscope unit is done by rack and pinion arrangement.

The longitudinal movement of the microscope saddle for the purpose of the Rings is done by rotating the drum. The 26 mm movement can be read by scale and on the divided drum to 0.001 cm.

Newton's Ring set consisting of the optical flat glass and one Plano-convex Lens (50mm radius) arranged inside a metal case resting over the stage of the instrument which can be adjusted for the alignment of the measuring line. An adjustable reflector plate in the required direction is fitted on to the side of the set. The condenser lens is provided in front of the reflector.

Cat. No. 1573



EXPERIMENT NO. 96

To determine the thickness of a thin foil paper by measurement of width of fringes in air wedge.

WHAT YOU NEED

- BESTO six Position Microscope, Cat No. 1570
- Wooden Reflector
- Lens on Wooden stand
- BESTO Air Wedge, Cat No. 1574
- BESTO Sodium Light source. Complete Unit.

EXPERIMENT NO. 97

Determination of the wave length of Sodium light by Newton's Ring method

WHAT YOU NEED

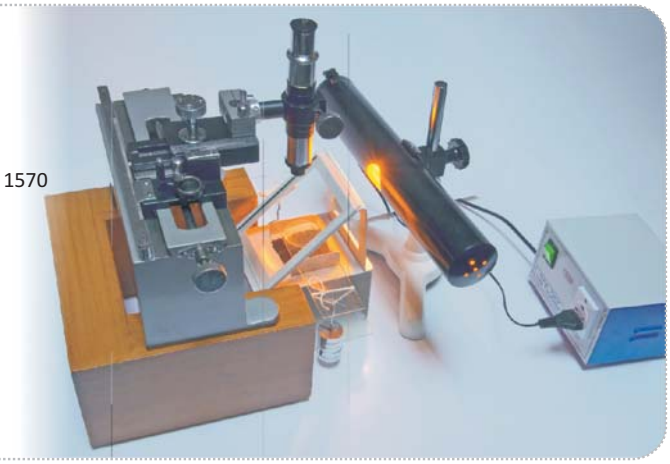
- BESTO Six position Microscope X-Z motion for Newton's ring as per Cat No. 1570.
- BESTO Sodium Light source, complete set up
- BESTO Newton Ring Apparatus, Cat No. 1572
- BESTO Wooden Reflector , Cat No. 1571
- BESTO Spherometer, Cat. No.

EXPERIMENT NO. 98

Cornu's Method

WHAT YOU NEED

- BESTO Six position Microscope X-Z motion, Cat No. 1570
- BESTO Sodium Light source complete set up.
- BESTO Special metal stand for Cornu's experiment.
- BESTO Slotted weight 50 gms x 5 – 2 set
- BESTO Glass Plate 10" x 2".
- BESTO Optical flat & Double convex lens.
- Small wooden Bed etc.



EXPERIMENT NO. 99

Determination of the wave length of Sodium light by Newton's Ring Microscope

WHAT YOU NEED

- BESTO Newton ring Microscope, Cat No. 1573.
- BESTO Sodium Light source, complete set up
- BESTO Spherometer
- Spirit Level 2"

Co-ordinate measuring microscope

1575.Co-ordinate Measuring Microscope CM-21

The BESTO Co-ordinate Measuring Microscope (CM-21) is characterised by carefully lapped micrometer screws and nuts provided with compensating spring device to eliminate back-lash and to minimise its development after prolonged use.

The linear carriage, carried on a rugged and aged cast frame, is provided with Micrometric motion through its entire 20cms. Range, read to 0.0001 cm directly on the Micrometric head. Micrometric heads are made of gun metal. A compensating spring device minimises development of back-lash after constant use over a long period. The machined opposing surfaces of the carriage and the frame and interground to give an oil smooth movement free from any lateral shift.

The cross carriage is carried on the linear slide and has a range of 10cms. Read directly to 0.0001 cm on the micrometer head.

The lifetime stainless scales are precision machine divided on the latest machines to give maximum accuracy. Micrometer drum heads are of large dia divided to read directly to 0.0001 cm.

The microscope tube is provided with rack and pinion focusing and is fitted with finest achromatic optics. The instrument is supplied with 3" objective and 10x Ramsden eyepiece with cross line graticule. Supplied in wooden box but W/O any accessories.

1576. Accessories for Co-ordinate Measuring Microscope

Complete set of accessories consist of following items.

a) Special Metal Box.

b) One Glass Plate of 10" x 2".

c) Two sets of iron slotted wts. 50 gms x 5.

d) One set each of Newton ring lens set & optical flat.

e) Wooden bench for placing co - ordinate microscope

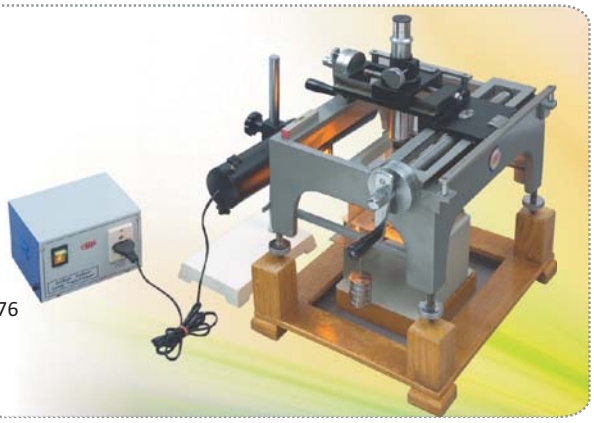
Special measuring microscope with least count of 0.0001cm.

EXPERIMENT NO. 100

To determine the Young Modulus, Rigidity Modulus & Poisson's ratio of the given material by forming hyperbolic fringes.

WHAT YOU NEED

- BESTO Co-ordinate Microscope, Cat. No. 1575.
- BESTO accessories for co-ordinate Microscope, Cat. No. 1576
- BESTO Sodium light source, complete set.

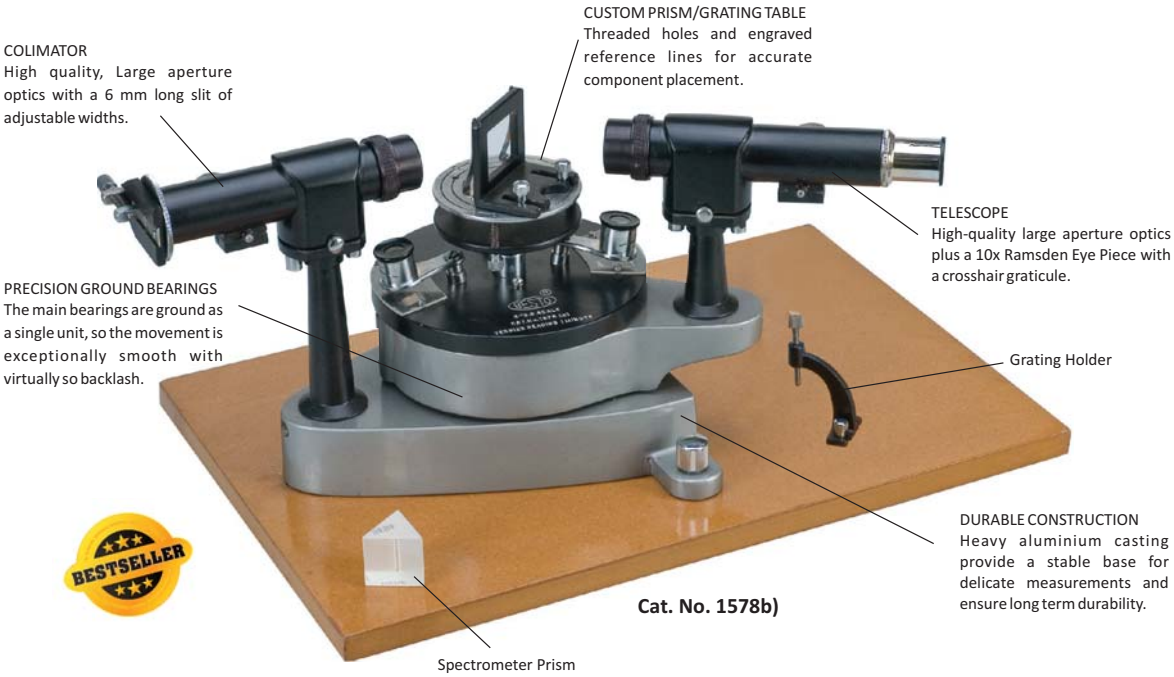


1577. Intermediate Spectrometer (6" S.S. Scale)

For Introductory class work

- A Basic measuring instrument for quantitative spectroscopy experiments, this instrument is mounted on a stable cast iron base with attached collimator and a rotating telescope platform and graduated circle.
- A 2.4cm. Diameter achromatic optical system with a 10x Ramsden eyepiece & cross line graticule.
- An 8 cm. Diameter prism/grating Table, fully adjustable with prism & grating holders and engraved ring pattern. Protected Circle15.0 cm with S.S. Scale.
- Vernier reading 1 minute. Supplied in a wooden case with 2” Brass spirit level.

1578. Advanced Spectrometer (5” or 6” S.S. Scale)



BESTSELLER

Cat. No. 1578b)

Our Advance Student Spectrometer is a solidly - constructed instrument, thoughtfully provided with features and accessories that assist students in making precise measurement of spectral lines or prism angle.

High Quality, large aperture optics produce sharp spectral images, while precision machining allows for precise rotation and accurate measurement.

Resolution to 1 minute of an Arc.

The 125mm or 150mm diameter, precision engraved degree plate is complemented by 2 precision engraved verniers, one on each side of instrument for convenient reading.

	Size	S.S.Scale
a)	5”	– –
b)	6”	– –

Supplied without Spectrometer Prism & Grating.

Collimator :

Focal Length : 178 mm

Aperture : 25 mm (adjustable by pinion & rack), adjustable rectangular slit.

Telescope :

Focal Length : 178 mm,

Aperture : 25 mm (adjustable by pinion & rack), fitted with 10x Ramsden eyepiece with cross line graticule.

Eyepiece :

Ramsden x10 fitted with cross wire.

Fixation Stand :

Located on the plate, it enables you to precisely position the prism & diffraction grating. Supplied in wooden case.

Reading minute : 1min. or 30 sec.

1585.Advanced Spectrometer Deluxe Type 6”

Specifications are same as per Cat No. 1578, only fine adjustment to the telescope and collimator tubes are provided laterally as well as vertically. This system is manufactured in 6”spectrometers only and provided with stainless steel scale .

- Size 6” (150mm).
- Vernier reading 1 minute.
- Collimator fitted with 6mm long circular slit

We are using very high quality 6mm long circular slit with S.S. jaws in our spectrometers of Cat. No. 1585, 1587, 1588 & 1592 for more accurate results.

1587. Advanced Spectrometer (7”)

The specification is similar to Cat. No.1578. BESTO 7” spectrometer is designed to meet the demands of a standard instrument for degree colleges and in technical labs.

Lifetime 178mm stainless steel scale and verniers, calibrated on the latest dividing machines to give maximum accuracy.

In our 7” spectrometer we provide special circular slit to the collimator. The slit of the collimator is from close grained stainless steel and slit jaws are finished and ground with the utmost care and optically tested for the accuracy of the edges. The two jaws are operated by a knurled ring and moves symmetrically from the centre and remain parallel at all openings. Supplied in a superior quality wooden box. Vernier reading 1 minute. We are also providing up & down motion to collimator as well as to telescope.

We are also providing up & down motion to collimator as well as to telescope in this model only.

1588. Advanced Spectrometer Deluxe Type 7”

Same as Cat. No. 1587 but with an improvement that the telescope and collimator are held in support rigidly and in perfect alignment. Vertical adjusting screws are provided to both the telescope and collimator. Clamping devices are provided to lock the telescope and collimator after adjustment i.e. fine adjustment to the telescope & collimator tubes are provided laterally as well as vertically.

1589. Spectrometers with Fine Vernier Reading

All types of spectrometers described under Cat No. 1578, 1585, 1587 & 1588 are supplied with fine vernier readings for more accurate results.

a)	For vernier reading to 20 sec. add extra
b)	For vernier reading to 30 sec. add extra
c)	For micrometer scale add extra

1592. High Grade Research Spectrometer 10" Deluxe Type

- The cone bearings are of selected material and the upper and lower parts of the arms are turned and ground in one operation giving the most accurate alignment. Clamps for telescope and prism table are designed so that no strain cones on the cone bearings from clamping, thus avoiding any disturbance of the axial alignment.

- Specially designed to meet the demands for a precision instrument for use in the Universities and Technical Laboratories.
- A versatile spectrometer for moderate precision
- Well suited for research labs.

- Scale 10" from lifetime brass scale, divided on the latest dividing machines. Accuracy of calibration within ±0.01%. Adjustment is provided to verniers for very fine opposition to the scale. The slit jaws are from stainless steel finely ground and the jaw movement is free of any spring action ensuring perfect parallelism at all openings.
- Finest achromatic objectives are used. Large aperture (32mm)
- Fine adjustment to the telescope and collimator tubes are provided laterally as well as vertically.
- Clamping devices are provided to lock the telescope and collimator after adjustment.
- The instrument is finished in a pleasing and practical finish & collimator fitted with special circular slit.
- 10" with Brass Scale with vernier reading 10 seconds.

There are 2160 lines for 10 seconds Spectrometer. It is not possible to engrave 2160 lines on S.S. surface of 10" diameter.

So whenever you place your order for 10 seconds spectrometer, you should be aware that you will get the spectrometer with brass scale only instead of S.S. Scale.

1597. Ultrasonic Diffraction Unit Superior Model

Consists of the following instruments

a) High resolution Spectrometer of 10" Brass scale as per Cat. No. 1592 with vernier reading 10 seconds. Used for Ultrasonic Diffraction apparatus.

b) R.F. Oscillator of higher frequency (1MHz to 8MHz) Digital type.

c) Liquid Tank

d) Crystal with holder

e) White Kerosene Oil

EXPERIMENT NO. 101

To determine the velocity of Ultrasonic Waves in a given Liquid (Kerosene Oil)

WHAT YOU NEED

- BESTO Ultrasonic Diffraction Unit, Cat. No. 1597.
- BESTO Sodium Vapour Light source, Complete set-up.

1598.Ultrasonic Interferometer

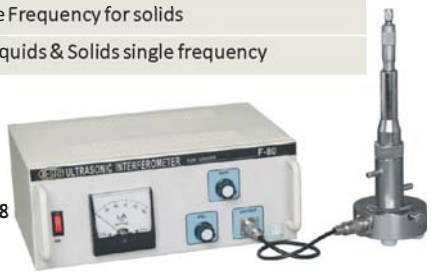
(To measure Ultrasonic Velocity in Liquids & Solids)

It is simple in design, rugged and gives very accurate and reproducibly results.

Experiments may be performed over a wide range of temperature from +30°C to +80°C on all liquids except those which reacts with the plating of the cell and crystal.

There is no danger of any change, such as depolymerisation, due to ultrasonic effect since a very small ultrasonic energy is required.

a)	Frequency 2MHz, Accuracy ± 0.3% for liquids
b)	Single Frequency for solids
c)	For Liquids & Solids single frequency



Cat. No. 1598

1600. Metallic Mount for Sodium Lamp

This aluminium metal box is round in shape & mounted horizontally on a sturdy metal base. Box is provided with one slit fitted with iris diaphragm to control the intensity of light. Bulb holders & lead of finest quality are fitted in box to give you trouble free working for long life. This mount is suitable for 35W as well as 55W Lamp. Supplied without bulb & transformer.

Cat. No. 1600

1602. Sodium Vapour Lamp Transformer

High grade laminations are used to avoid losses. The box is made from a thick metallic sheet. An Anchor make piano type switch is provided for on/off operation and a1.6m, 3 core flying lead is provided for main connection and output is via a special Anchor make 3 Pin socket is provided to avoid shock due to the leakage of the current. This transformer is an Auto Leak type, giving a starting voltage 440 V which automatically reduces when the lamp has struck.

a)	35 Watt
b)	55 Watt

Cat. No. 1602

1603. Sodium Vapour Lamp

Either Philips or Osram make Sodium Vapour Lamp is supplied.

This low pressure Sodium Vapour lamp works better than 99% of the visible output, concentrated in 5889 & 5895°A Spectra lines.

a)	35W Sodium Vapour Lamp
b)	55W Sodium Vapour Lamp

Cat. No. 1603

1604. Wooden Box for Sodium Vapour Lamp

The box is rectangular in shape and provided with slits on three sides equally spaced to enable three experiments to be performed simultaneously using one light source. Each slit is provided with a cover so that it can be closed when not required. Bulb holders of finest quality are fitted in wooden box with special cord.

a)	Wooden box for 35 Watts S.V. Lamp
b)	Wooden box for 55 Watts S.V. Lamp

1606. Metal Stand for Mercury Lamp

The Iron sheet box is round in shape & mounted vertically on a heavy cast metal stand. Only one slit is provided. Bulb holders & lead of finest quality are fitted in box to give you trouble free working for long life. Suitable for 80W lamp. Supplied without lamp & choke.

Cat. No. 1606

1607. Mercury Vapour Lamp Transformer

An 80 Watt choke of excellent quality is clamped on a heavy steel cabinet. An Anchor make piano type switch ad 5-pin socket is provided for on/off and output respectively.

Cat. No. 1607

1608. Mercury Vapour Lamp

Philips make Mercury Vapour Lamp is supplied.

With a rated output of 80W, this source provides sufficient intensity for almost any experiment.

With a good light source, student can investigate energy levels using a spectrometers.

Cat. No. 1608

1609. Wooden Box for Mercury Vapour Lamp

Specifications are same as per Cat. No. 1604 but its size is slightly smaller than the size of wooden box for sodium vapour lamp.

Suitable for 80W lamp.

Cat. No. 1609

1611. Spectral Tube Power Supply and Mount

This system is easy-to-use and inexpensive, with a variety of safety features that make it suitable for beginning labs. Mount any of the 8 different spectral tubes into the power supply and turn it on. The 26 cm long tubes are capillary-thin over the middle 10 cm, providing sharp, bright spectra.

Features

Student Safety: The tubes mount from the front of the supply and snap into moulded sockets that fully enclose the conductive ends. The all-metal case is electrically grounded.

Spectral Tube Safety: A current limiting transformer protects the tubes. A protective shield also helps safeguard the tubes, while blocking unwanted ambient light for clear viewing.

Power Requirements :

220 VAC, 50 Hz.

Cat. No. 1611

1612. Spectral Tubes

a. Argon
b. Krypton
c. Carbon Dioxide
d. Mercury
e. Helium
f. Neon
g. Hydrogen
h. Water Vapor

Cat. No. 1612

1613. LED Light Source

We have introduced new source of light. LED light source (in red colour). LED is housed in a special Aluminium case with 2 set of lenses. LED operates on a specially designed IC regulated power supply.

Cat. No. 1613

1615. Neon Tube

Special Neon Tube which is different in shape from neon tube listed in Cat. No. 1612. Designed for e/m by Zeeman effect.

1617. EHT Generator

Designed for above Neon tube only.

1618. Hg Calibration Lamp

Useful for e/m by Zeeman effect with power supply.

1619. Hydrogen Lamp

With power supply 410.2, 434, 486.1, 656.3mm Calibrated lines.

BESTSELLER

1620. Compact Light Source

A very efficient 12 V 100W quartz iodine lamp mounted in a well ventilated metal housing. Apertures 19 mm diameter are provided on two adjacent sides so that the lamp may be used either as an intense horizontal 'line' source, or end-on as a powerful 'point' source.

The aperture not in use may be closed by a pivoted shutter equipped with a lock screw.

The lamp house is mounted on a rod 160mm longx10mm diameter for supporting from an ordinary laboratory stand.

Dimensions of lamp house 78x78x153mm.

Supplied complete with 1mm of twin cable.

Cat. No. 1620

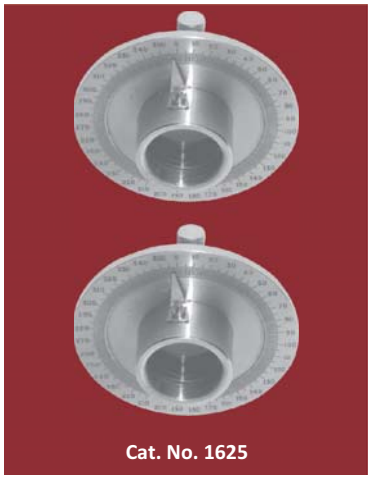
1625. Polarizer and Analyzer (Polaroid)

This apparatus consists of two identical units, each provided with Polaroid disc mounted in a rotatable mount, with aperture of 25mm. Both rotatable mounts have a lever to add rotation and a pointer which traverses a 75mm diameter brass silvered scale divided into 360°×1. The size is universal and can be fitted to any size of collimator and telescope.

To fit over the object end of telescope and colimator.

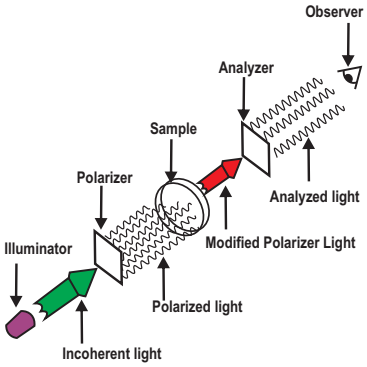
Polaroid Specifications

Thickness : 0.1 mm
Type : Nitrocellulose Polymer
Aperture : 25mm
Least Count : 1°



Cat. No. 1625

Supplied with or without rod.



Working of Polarizers

1626. Single Slit for Diffraction Experiment

All metallic diffraction grating clamp type and is fitted on prism table of spectrometer for interference of light experiment. Supplied with or without rod.

Cat. No. 1626

1627. Double Slit for Diffraction Experiment

All metallic diffraction grating clamp type and is fitted with two micrometers screw slides forming a double slit with fine edges in the centre of the vertical clamp holding device. Very superior quality. Supplied with or without rod.

Cat. No. 1627

1628. Gauss Eye Piece

It is Ramsden eye piece with a plain glass plate held between lens and eye lens at an angle of 45°. This item replaces the normal spectrometer eye piece when aligning the instrument.

1629. Hollow Glass Prism

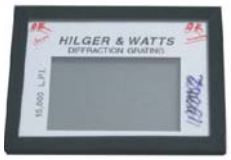
Made of ordinary glass plates properly cemented with optical cement.

	Size
a)	38×38×38 mm
b)	50×50×50 mm

Cat. No. 1629

1630. Diffraction Grating

Hilger & Watt type size 38×50 mm. Approximately 15000 lines per inch for use in the standard holder in the spectrometer table.



Cat. No. 1630

1631. Diffraction Grating (Imported)

Chineese make. Approx. 15000lines/inch

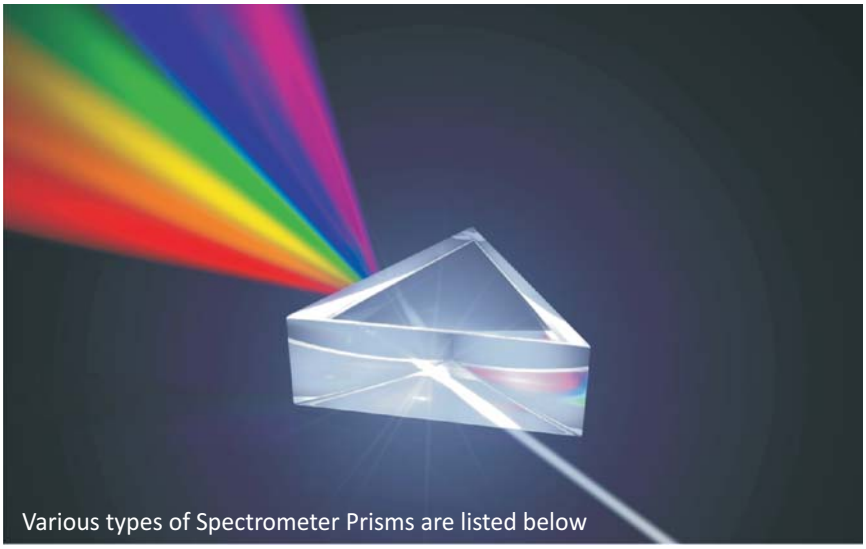
1632. Direct Vision Spectroscope with Wave-Length Scale

A compact visible spectrometer which allows the direct reading of spectral length and employs a prism for dispersion. It is also useful for flame test of basic radicals (sodium, strontium, potassium, copper etc.) There is a single eyepiece and independent focussing tube for the graticule, which carries an index at 590mm, with D' marked right below the scale, (corresponding to the wave length of sodium light) can be calibrated to a known light source by adjustment of knurled screw. The amount of light admitted to the spectroscope can be regulated by a variable slit, adjusted by a knurled ring round the rating tube.

Cat. No. 1632

1633. Spirit Level Brass

a)	2" (50mm)
b)	3" (75mm)
c).	4" (100mm)



R.I. = Refractive Index

1635. Prisms, Optically worked for Spectrometers, equilateral two face polished, 25×25mm height

	Nature of Glass	R.I. Approx.
a)	Borosilicate Crown Glass	1.51
b)	Dense Flint Glass	1.62
c)	Extra Dense Flint Glass	1.65
d)	Double Extra Dense Flint	1.71-1.74

1636. Prisms, Optically worked for Spectrometers, equilateral two face polished, 32×32mm height

	Nature of Glass	R.I. Approx.
a)	Borosilicate Crown Glass	1.51
b)	Dense Flint Glass	1.62
c)	Extra Dense Flint Glass	1.65
d)	Double Extra Dense Flint	1.71-1.74

1637. Prisms, Optically worked for Spectrometers, equilateral two face polished, 38×38mm height

	Nature of Glass	R.I. Approx.
a)	Borosilicate Crown Glass	1.51
b)	Dense Flint Glass	1.62
c)	Extra Dense Flint Glass	1.65
d)	Double Extra Dense Flint	1.71-1.74

1638. Calite/ Quartz Prism Equilateral

With optic axis parallel to refracting edge

	Size
a)	12.5x12.5mm
b)	18x18mm
c)	25x25mm

1639. Narrow angle Prism

Narrow Angle Prism optically worked made with white glass 32x32mm size.

	Angles
a)	5x87.5x87.5, 10x85x85, 15x82.5x82.5.20x80x80
b)	25x77.5x77.5, 30x75x75, 40x70x70,30x60x90

Cat. No. 1639

1640. Spare 10x Ramsden Eyepiece

Superior quality 10x Ramsden eyepiece, suitable for all BESTO reading telescopes, vernier microscopes and spectrometers.

Cat. No. 1640

1641. Spare 10x Ramsden Eyepiece

Superior quality 10x Ramsden eyepiece, with crossline graticule fitted inside the eyepiece.

Cat. No. 1641

1642. Ramsden Eyepiece 10x with Holder

Complete with Cross-wire graticule along with brass holder and eyepiece.

Cat. No. 1642

1643. Grating Holder

Spare Grating Holder suitable for all types of BESTO Spectrometer listed under Cat. No. 1578, 1585, 1587, 1588, 1592. All brass black painted.

Cat. No. 1643

1644. Prism Holder

Spare Prism Holder suitable for all types of BESTO Spectrometer listed under Cat. No. 1578, 1585, 1587, 1588, 1592. All brass black painted.

Cat. No. 1644

EXPERIMENT NO. 103

i. To find the wavelength of sodium light using Diffraction grating
ii. To find the grating element or no. of lines/mm
iii. To find the dispersive power of diffraction grating

WHAT YOU NEED

- BESTO Spectrometer 6" with Cat No. 1577 or 1578
- BESTO Sodium Lamp Unit, complete set up
- Reading lens 1½" or 2"
- BESTO grating 15000 lines/inch.
- Spirit level 2"

EXPERIMENT NO. 104

Determine of Resolving power of a Diffraction Grating by Spectrometer with the help of Mercury Light Source.

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO grating 15000 lines/inch.
- BESTO Slit for resolving power Cat. No. 1547
- Spirit level 2"
- BESTO Mercury light source complete setup.

Helpful Hint

In some books Expt. No. 87 is recommended by sodium light, but two wavelengths of Sodium light is very close to each other, so in case of resolving power performance of the said Expt. is not very good with Sodium light. So we are using Mercury Light Source with violet colour having wavelength of 4046.8°A & 4078°A & Yellow colour light with λ=5769.9°A & 5790.7°A on mercury light.

EXPERIMENT NO. 105

i. To determine the refractive index of the prism material using sodium light with the help of spectrometer.

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO Sodium Light source, Complete set
- BESTO EDF Prism 32x32mm
- Spirit Level 2"
- BESTO gravity15000 lines/inchSpirit level 2"

ii. To find the angle of prism by rotating Telescopic Method.

iii. To plot a graph between angle of incidence & corresponding angle of deviation to find the RI of prism

EXPERIMENT NO. 106

i. To determine the dispersive power of the material of the prism for violet & yellow colours of mercury light with the help of spectrometer.

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO Mercury light source Complete set.
- BESTO EDF Prism 32x32mm
- Spirit level 2"

ii To verify the Hartmann's formula

EXPERIMENT NO. 107

To study Hydrogen spectrum and determination of Rydberg's constant with the help of Spectrometer diffraction grating and hydrogen discharge tube.

WHAT YOU NEED

- BESTO Spectrometer 7" Cat No. 1587 or 1588.
- BESTO Hydrogen discharge tube with spectral tube mount.
- BESTO grating 1500lines/inch.
- Spirit level 2"

EXPERIMENT NO. 108

To find the dispersive power of a given prism using hydrogen discharge tube.

WHAT YOU NEED

- BESTO Spectrometer 7" Cat No. 1587 or 1588.
- BESTO Hydrogen discharge tube with spectral tube mount.
- BESTO EDF Prism 32 x32 mm.
- Sodium light source complete set.
- Spirit level 2"
- Formula used : $\mu = \frac{\mu_F - \mu_C}{\mu_D - 1}$

where μ_F & μ_C are refractive indices for F (Violet line 4861°A) for C (Red line 6563°A) of hydrogen spectrum respectively. Whereas μ_D is the refractive index for D (Yellow line 5893°A) on Sodium light.

First of all, find the angle of prism, minimum deviation & find the refractive index (RI) μ_D of prism using Sodium light.

With the help of discharge tube we can calculate Refractive Index for Red line μ_C & Violet line μ_F Once we get the Refractive Index for all the three colours we can calculate the dispersive power of Prism.

EXPERIMENT NO. 109

To verify Fresnel's formula for the reflection of light by Spectrometers

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO Polariser, set of two
- BESTO EDF Prism 32x32mm
- BESTO Sodium light source complete set (35Watt)
- Spirit level 2"

EXPERIMENT NO. 110

Determine of Resolving power of a prism for prominent Lines of Mercury by Spectrometer

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO EDF Prism 32 x 32 mm
- BESTO Slit for resolving power, Cat. No. 1547
- Spirit level 2”
- BESTO Mercury light source complete set-up.

EXPERIMENT NO. 111

To determine the refractive index of the calcite for ordinary and extra ordinary rays using Spectrometer and Sodium light.

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO Sodium Light source, Complete set .
- BESTO Calcite Prism 25x25mm with two faces polished.
- Spirit Level 2”
- Formula used $\mu = \frac{(SinA+Dm)/2}{Sin\ A/2}$
- BESTO grating 15000 lines/inch.

EXPERIMENT NO. 112

To find the thickness of thin film (Mica sheet) with the help of Spectrometer & Mercury light source

WHAT YOU NEED

- BESTO Spectrometer 7" with L.C. either 20 or 30 seconds.
- BESTO Mercury Light source, Complete set (80 Watt)
- Micrometer Eye piece.
- BESTO grating 15000 lines/inch.
- Spirit level 2”.
- Special X-Y-Z stand to hold Mica sheet.
- Table Lamp.

EXPERIMENT NO. 113

Determination of the refractive index of liquid using hollow prism for prominent colours (wavelengths) of mercury light with the help of spectrometer.

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1577 or 1578
- BESTO EDF Prism 32 x 32 mm
- BESTO hollow glass prisms 50 x50mm.
- BESTO Mercury light source complete set-up.
- Spirit level 2”

EXPERIMENT NO. 114

Determination of Separation between the plates of Fabry Perot Etalon

WHAT YOU NEED

- BESTO Spectrometer 6" Cat No. 1585
- BESTO Fabry Perot Etalon
- BESTO sodium light complete set-up.
- Spirit level 2”.
- Special rectangular table instead of prism table.

EXPERIMENT NO. 115

To study of absorption spectrum of Iodine Vapour

WHAT YOU NEED

- BESTO Spectrometer 7" with L.C. 30 seconds.
- BESTO Long Iodine Tube with power supply
- BESTO grating 15000 lines/inch.
- Spirit level 2”.
- Stand for Iodine Tube
- Source of white light complete set-up

1644. Laser Spectrometer

This is a advanced deluxe spectrometer of size 7" similar to cat No. 1588. In said spectrometer, we have made arrangement for Diode laser & detector instead of telescope & collimator.

Diode laser is held in support rigidly & in perfect alinement at the place of collimator. similarly output detector is held in support rigidly & in perfect alinement at the place of telescope. Vertical adjusting screws to aline the diode laser & detector. Supply with grating holder, grating, diode laser with power supply and output detector with digital meter.

Cat. No. 1644

EXPERIMENT NO. 116

To determine the wave length of diode laser with the help of laser spectrometer.

WHAT YOU NEED

- BESTO Laser Spectrometer 7", Cat. No. 1644.
  Complete set-up along with diode laser & output detector.

You can also study the effect of polarization with the help of above laser spectrometer & one additional set of accessories.

1645. High Grade Advance Spectrometer, 5"

High Performance Instrument

Scale : 125 mm dia. divided 0 to 3600 x 0.5 degree readable with vernier to 1 minute of arc.

Collimator : Achromatic objective lens 175mm FL, clear aperture of 32mm. Rack and pinion focussing mechanism. Adjustable slit 6mm long. Mounted on a fixed pillar.

Telescope : Achromatic: Objective lens 175mm FL, clear aperture of 32mm. Rack and pinion focussing mechanism. Mounted on a movable arm with slow and fine motion.

Ramsden Eyepiece : 15X magnification with cross line glass graticule and in and out focus adjustment.

Prism Table : 85mm diameter table is provided with three leveling screws and is marked with lines to assist placement of prism.

Standard Accessories : 1 Dense flint glass equilateral prism 32x32mm, 1 prism clamp for prisms up to 38mm high, 1 Diffraction grating holder, 1 Tommy bar for axis adjustment, 1 Wooden case.

Cat. No. 1645

1646. High Grade Advance Spectrometer 7"

Cat. No. 1646

NEW!

- Suitable for more advanced work
- Heavy cast aluminium alloy structure
- Independent telescope & table movement
- Double ended verniers reading to 30 seconds of arc
- CNC turned spindle set and other components.

Specification

Scale	:	The 177 mm diameter circle is fixed and both the telescope and table are fitted with independent double ended verniers reading to 30 seconds of arc and have independent fine and coarse movements. While coarse adjustment is done by releasing the clamping screw and moving by hand, fine adjustment is made by engaging the clamping screw and moving the tangent screw.
Collimator	:	Mounted on a fixed pillar. At one end is fitted 32mm dia clear aperture, 175mm focus achromatic objective and at the other end a 6mm long unilaterally adjustable slit.
Telescope	:	Mounted on a movable pillar. At one end is fitted 32mm dia clear aperture 175mm focus achromatic objective and at the other end a 15X Ramsden eyepiece and a glass crossline graticule. Both telescope and collimator have rack and pinion systems for focusing the objectives and means for levelling their optical axes and squaring them to the axis of rotation.
Prism Table	:	The 85mm diameter table is marked with lines to assist positioning of the prism with respect to levelling screws and has interchangeable clamping units for the prism and diffraction grating.
Standard Accessories	:	1 Dense flint glass prism, 1 Prism clamp, 1 Diffraction grating holder, 1 Magnifier glass, 1 Tommy bar for adjustment of optical axes, 1 Dust cove, 1 Wooden case.

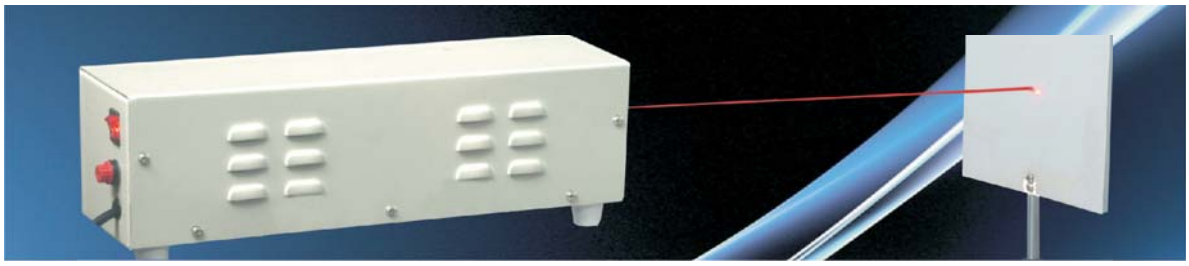
Top View

BESTSELLER

These High Grade Spectrometers of Cat. No. 1645 & 1646 are first time designed by BESTO®

Helium-Neon Laser (Red & Green Colour)

Students find Laser fascinating and experienced teachers know them to be first rate tools for teaching light, optics & related topics. BESTO offers a useful variety of high quality lasers and teaching kits designed specially for the educational laboratory.



1650. He-Ne Laser (Random/Unpolarised) Red

Ideally suited for simple, clear & easily comprehensive assemblies for interference, diffraction and holography experiments. The laser is constructed is such a way that is safe to use under any circumstances. Laser tubes alongwith SMPS power supply are housed in thick powdered coated aluminium Box. From the hole, the laser beam comes out.

Operating Wavelength	:	632.8nm (RED)
Beam Diameter	:	0.8mm
Beam Divergence	:	≤1mrad
Polarisation	:	random (unpolarised)
Mode	:	TEMoo
Output Power Stability	:	±2.5%
Power Input	:	220V AC±10%, 50Hz
Min. Operating Life time	:	15,000Hrs.
Shelf Life	:	10 years

	Output power	Colour of light	Polarisation
a)	1mW	Red	random
b)	2mW	Red	random
c)	5mW	Red	random
d)	10mW	Red	random

1651. He-Ne Laser (Polarised) Red

Same as Cat. No. 1650 but with Linear Polarisation (polarised laser).

	Output power	Colour of light	Polarisation
a)	1mW	Red	polarised
b)	2mW	Red	polarised
c)	5mW	Red	polarised
d)	10mW	Red	polarised

1652. He-Ne Laser (random/unpolarised) Green

Same as Cat. No. 1650 but with Green colour of light is coming out from the hole.

	Output power	Colour of light	Polarisation
a)	0.2mW	Green	unpolarised
b)	0.5mW	Green	unpolarised
c)	1mW	Green	unpolarised
d)	2mW	Green	unpolarised

Wavelength of Green Laser : 543.5nm

- For longer life, laser should be operated for a few minutes at least once in 15 days.
- Never look directly into the laser beam.
- Specify output power when ordering.
- All the teachers using Lasers should be properly trained in their use.
- Do not open the unit, high Voltage inside.
- Also specify mode of polarisation & colour of emission.

1654. Mount for BESTO He-Ne Laser

This rectangular stand (all metallic) is suitable for all types of **BESTO** He-Ne Laser described on the page no. 123. This upper black stand can be used on Optical bench as well as on the heavy base. This stand is used to align the He-Ne Lasers with other Optical components. It lets you remove & replace laser system quickly with confidence that it will still be centered exactly when you want it. Supplied with heavy base.

(Choice is yours, you want to use it either on Optical bench or heavy base)

Cat. No. 1654

1656. Optical Bench for BESTO He-Ne Laser

High quality precision bench suitable for more advanced work. This all Aluminium extruded from a hard aluminium alloy. These aluminium triangular optical bench are ideal for educational & general laboratory application.

Cat. No. 1656 — 1½ meter long

	Size
a)	½ meter long
b)	1 meter long
c)	1½ meter long

1657. Lens Mount

Lens is held in position by threaded rings inside a threaded bore of the device. Nylon washers which are provided with the mount can be used for the protection of the optics. Supplied with rod.

Specifications

Construction : Aluminium alloy.

Finished : Black anodized.

	Optic Dia(mm/inch)
a)	25/1"
b)	50/2"
c)	75/3"

1658. Screen

It is a thin aluminium plate with rod. Size 6" x 4".

1659. Pin Holes

Mounted in circular ring with rod. Indian make.

	Size
a)	50 - 100 microns
b)	100-250 microns
c)	250-500 microns
d)	upto 1000 microns

Please Note : Imported Pin Holes are also available from 1 to 1000 microns. Please ask for quotation.

1660. Single Slit

All metallic supplied with rod, used for diffraction of laser light through Single slit.

1661. Double Slit

All metallic supplied with rod, used for diffraction of laser light through Double slit.

1662. Grating Holder

Spare Grating Holder suitable for all types of grating used for laser experiments. Supplied with rod.

1663. Laser Grating

Hilger & Watt type size 38x50mm approx. 100 or 300 or 500 lines per inch. Indian make.

1664. Three-in-one Laser Grating

Cat. No. 1664

For demonstrating the principles of the diffraction grating and the way in which its properties are dependent upon the no. of lines per unit length. The gratings are 100lines per inch, 300lines per inch or 500lines per inch respectively. All are mounted in one frame.

1665. Different types of Grating & Slits for Laser Experiments

For investigation into effect of spacing & width of the slits on the interference pattern produced by single & multiple slits. Photographically reproduced & framed in 50x50mm plastic mount. Set of 13 slides

Cat. No. 1665

1666. Laser Power Meter

Power measurement 200mW to 20mW through 3½ digit laser power meter. Special quality photo detector (Semi conductor sensor) is provided. This photo detector is to be connected to the laser power meter. Battery operated as well as AC mains operated.

Cat. No. 1666

EXPERIMENT NO. 118

To study Electro-optic Effect using He-Ne Laser

WHAT YOU NEED

- Lithium Niopate Crystal
- High Voltage 2KV Power Supply
- Besto He-Ne Laser 2mW, Cat. No.1650b
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656c.
- Polariser & Analyser, Cat No. 1625.
- Detector with Digital Meter, Cat No. 1672.

EXPERIMENT NO. 119

To find Verdect's Constant of a Glass using He-Ne Laser (Faraday's Effect)

WHAT YOU NEED

- Besto He-Ne Laser 2mW as per Cat. No. 1650b
- Mount for He-Ne Laser as per Cat. No. 1654.
- Optical Bench for He-Ne Laser as per Cat. No. 1656C.
- Specially designed Solenoid.
- Digital Power Supply for above Solenoid.
- Imported Glass Rod of high Verdect's Constant.
- Polariser & Analyser as per Cat No. 1625.
- Detector with Digital Meter Cat No. 1672.

In Physics , the Faraday effect or Faraday rotation is an interaction between light & a magnetic field. Optical Isolators based on Faraday's effect have an important application in telecommunication preventing reflected Signals on Fibre optic cables from producing unwanted signals. Isolators are important when lasers are used because reflected light can cause havoc with the operation of the laser itself.

EXPERIMENT NO. 120

As per Maharashtra Polytechnic Syllabus

To determine the divergence of He-Ne Laser Beam.

WHAT YOU NEED

- BESTO He-Ne Laser 1mW or 2mW, Cat. No. 1650a or 1650b.
- Mount for He-Ne Laser, Cat. No. 1654.
- Output Detector with Digital Micrometer/Milliameter.
- Wooden Stand.
- Measuring Tape.

EXPERIMENT NO. 121

To determine the divergence of a Beam by measuring beam spot size.

WHAT YOU NEED

- BESTO He-Ne Laser 1mW OR 2mW, Cat. No. 1650a or 1650b.
- Mount for He-Ne Laser, Cat. No. 1654.
- Wooden Stand.
- Measuring Tape.
- Screen

METHOD

Expt No: 120 & 121 are the same, but method of performing the experiment of divergence of laser beams are different .

In Expt 120: We are increasing the distance between Laser & detector and corresponding output of detector is noted till its reading comes near to zero.

In Expt 121. We measure the Beam spot size at two different planes. The separation between planes is measured with measuring Tape. The divergence angle is calculated from the following

Equation $\theta_0 = \frac{W(z_2) - W(Z_1)}{D}$ Where $D = Z_2 - Z_1$

EXPERIMENT NO. 122

To determine the plane of polarization of a Laser Beam & verification of Malus Law.

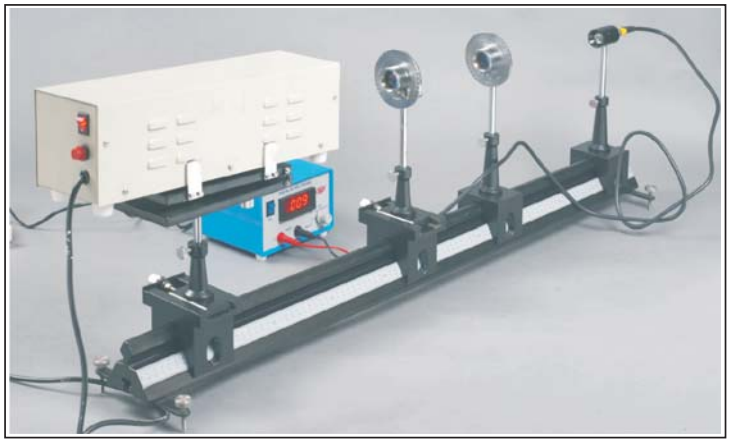
WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656b, one meter long.
- Polarizer & Analyser, Cat No. 1625.
- Detector with Digital Meter, Cat No. 1672.

Mathematically , as per the law, the measured intensity ϕ is given by

$$\phi = \phi_0 (\cos\theta_{A\text{-}P})^2$$

where ϕ_0 is measured intensity without the analyzer and $\theta_{A\text{-}P}$ is the difference between the second polarizer (called the analyzer) and the first Polarizer (called the polarizer).

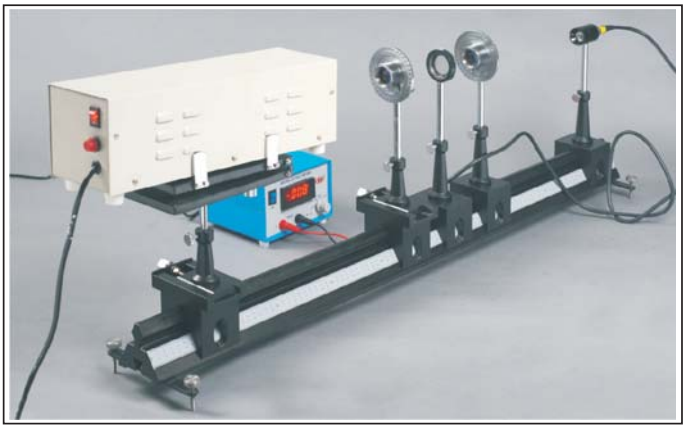


EXPERIMENT NO. 123

To observe the polarization effect of laser Light with help of Quarter Wave Plate.

WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b
- Mount for He-Ne Laser , Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656, one meter long.
- Polarizer & Analyser, Cat No. 1625.
- Detector with Digital Meter, Cat No. 1672.
- Quarter Wave Plate (1" diameter).



EXPERIMENT NO. 124

To determination the wavelength of Laser Beam. with the help of laser grating.

WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656b.
- Grating Holder, Cat No. 1662.
- Laser Grating either, Cat No. 1663 or 1664.
- Screen, Cat No 1658.

EXPERIMENT NO. 125

i. **To measure the Wavelength of He-Ne Laser Beam with vernier caliper.**

ii. **Another Expt. of measurement of Groove spacing of CD.**

WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b.
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656b.
- Special arrangement to hold stainless steel Vernier Caliper and CD.
- Stainless steel vernier caliper & CD

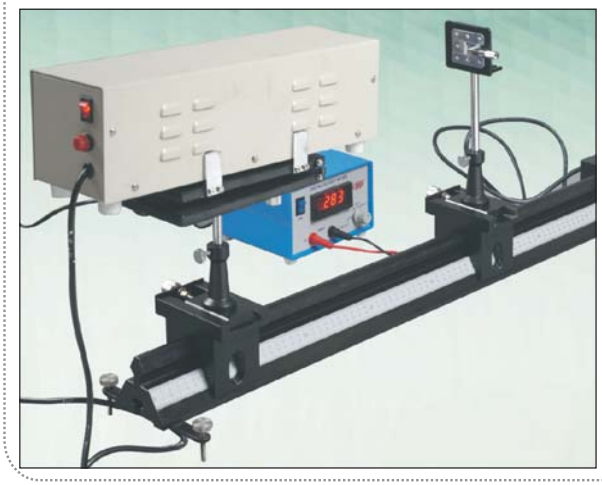
EXPERIMENT NO. 126

To study the phenomenon of double refraction and to determine the ordinary & extraordinary refractive indices of a double refracting quartz prism using He-Ne laser & polarizer.

WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656b.
- Polarizer & Analyser, Cat No. 1625.
- Detector with Digital Meter, Cat No. 1672.
- Calcite/Quartz Prism 25x25 mm, Cat No. 1638.

EXPERIMENT NO. 127



i. **To study the diffraction pattern of Light by single & double slit.**

ii. **To Determine the width of a Single Slit from the study of Fraunhofer Diffraction pattern.**

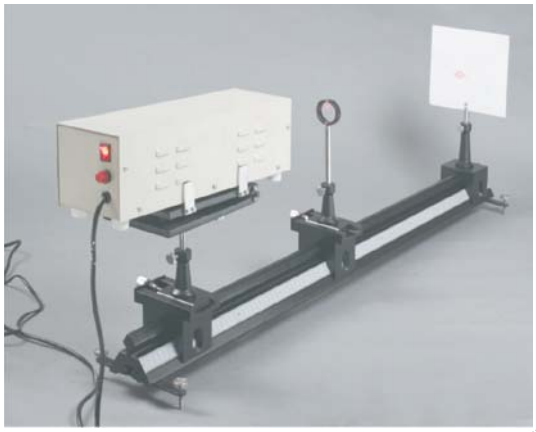
iii. **Determination of Slit width of double slit by diffraction Pattern.**

WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656b.
- Screen, Cat No.1658.
- Single Slit, Cat No.1626.
- Double Slit, Cat No. 1627.
- Detector with Digital Meter, Cat No. 1672.

EXPERIMENT NO. 128

To measure the diameter of Thin wire by diffraction Pattern.



WHAT YOU NEED

- BESTO He-Ne Laser 2mW as per Cat. No. 1650b
- Mount for He-Ne Laser as per Cat. No. 1654.
- Optical Bench for He-Ne Laser as per Cat. No. 1656b.
- Screen, Cat. No. 1658.
- Wire mounted in a circular ring.

EXPERIMENT NO. 129

To Study the external beam parameter of a laser

i. Power distribution within the beam.

ii. Spot Size of the Beam.

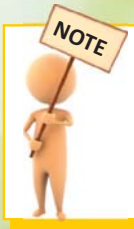
WHAT YOU NEED

- BESTO He-Ne Laser 2mW as per Cat. No. 1650b
- Mount for He-Ne Laser as per Cat. No. 1654.
- Optical Bench for He-Ne Laser as per Cat. No. 1656.
- Knife Edge mounted on micro positioner
- Photo detector with digital meter, Cat. No. 1672.
- Lense of sufficient large aperture

METHOD

The knife edge is manually inserted in the beam & corresponding output of the detector is noted.

Plot of Power output vs knife edge position is shown in the figure.



From the graph calculate the probable error by noting positions corresponding to 25% and 75% power output $\{2e_p=e_p(75)-e_p(25)\}$. Therefore $w_1=e_p/0.6745$. Which will give the beam spot size $2W_0=4w_1$.

In all He-Ne Laser Experiments from Expt. No. 118 to 130, we need optical bench of minimum length of one meter long of Cat. No. 1656b. All the above experiments can be performed in a better way with He-Ne Laser of 2mW, but in some cases we can also use He-Ne laser of 1mW. We can make any custom built experiment on He-Ne Lasers. Please ask for quotation depending upon the requirement. Double Rod Optical Benches can also be used instead of Aluminium extruded bench.

EXPERIMENT NO. 130

Diffraction of He-Ne Laser light by Pin Hole.

WHAT YOU NEED

- BESTO He-Ne Laser 2mW, Cat. No. 1650b
- Mount for He-Ne Laser, Cat. No. 1654.
- Optical Bench for He-Ne Laser, Cat. No. 1656b.
- Screen, Cat No.1658.
- Lens of Large focus.
- Any Pin hole from Cat No.1659.

Green & Red Diode Laser

1670. Diode Lasers (Green Colour) with Power Supply

In Diode Laser, the active medium is a semiconductor similar to that of a light-emitting diode. The most common and practical type of Laser diode is formed from a P-N Junction and powered by injected electric current.

Laser diode module consists of Laser diode fitted with a collimating lens in a metallic casing along with power supply. The laser module has 25mm diameter and 50mm length so that it can be held conveniently in kinematic or rigid mount. Collimating lens is aspheric and is anti-refelection coated. Fine tuned power supply assures a smooth switch on and hence long life for the diode.

Various models are available depending on the output power and wavelength.

Cat. No. 1670

Specification

Wavelength	:	532nm
Optical Power	:	3mW, 5mW, 10mW
Operating Voltage	:	3V
Operating Current	:	<250mA
Operating Temperature	:	15°C - 35°C
Storage Temperature	:	0°C -50°C
Spot Runs Range	:	500M
Spot Size	:	<6.5mm
Lifetime	:	>3000 hrs

	Optical power	Operating Voltage
a)	3mW	2.2-2.6 V
b)	5mW	2.2-2.6 V
c)	10mW	2.2-2.6 V

1671. Red Diode Laser with Power Supply

A compact, fully solid state instrument produces an intense beam of light at a wavelength 635-670nm for red colour. This semiconductor diode laser is mounted in a simple mount. Supplied completely with power supply. Operating voltage3V. Optical power 3-5mW.

Cat. No. 1671

1672. Detector with Digital Meter

This detector is used to record the contrast variation at the fringe pattern.

Detector: Special Photo Diode use for various laser experiments

In detector output measurement unit we are providing digital volt meter of three ranges 200 mV, 2V & 20V.

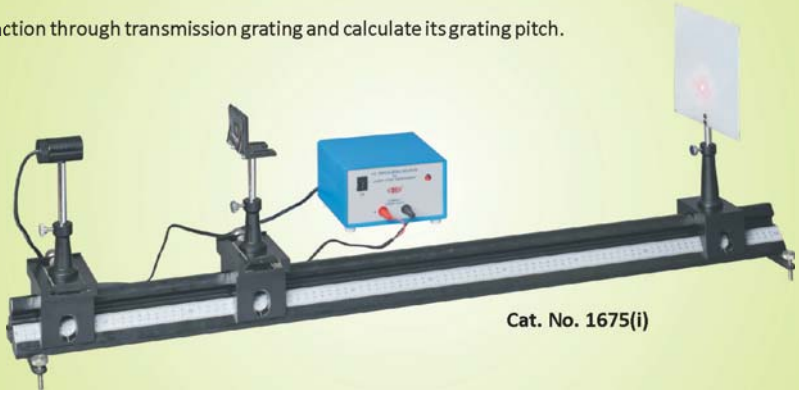
Cat. No. 1672

1675. Basic Diode Laser Kit, Model BDL-75

It's a new product from BESTO, very easy to use and simple, most suitable for undergraduate course. The kit briefly covers the fundamentals of Light principle like diffraction, refraction, interference etc.

The kit is very handy to use, one can demonstrate all experiments in a Class room. Consist of Laser diode along other Optical Components, performed so many experiments given below:-

i) Laser light diffraction through transmission grating and calculate its grating pitch.



Cat. No. 1675(i)

ii) With the help of 13 gratings you can observe Laser Light diffraction through Single Slit, double Slit, & interference of Laser Light when it passes through wire mesh, observation of airy's pattern when passes through pin hole.

Cat. No. 1675(ii)

iii) Observe fringe pattern, when laser light passes through Fresenel Bi-Prism.

Cat. No. 1675(iii)

iv) Stainless meter scale & CD along with special holder is also supplied, so that one can observe interference pattern when S.S Meter Scale & CD act as a reflection grating.

v) Observe fringe pattern, when laser light passes through right angled prism.

Cat. No. 1675(v)

vi) Observe fringe pattern, when laser light passes through slab.

Cat. No. 1675(vi)

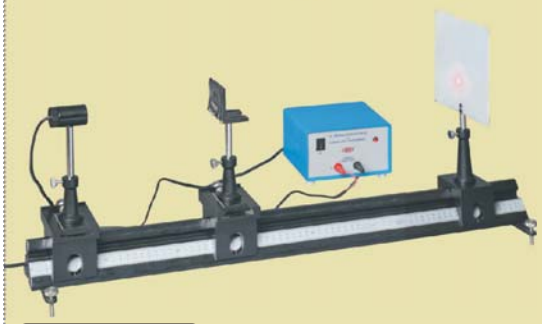
We have shown some of common experiment in basic Diode Laser kits. It covers all the experiment listed above. it consist of aluminum extruded optical triangular type bench of one meter long of Cat. No. 1656with riders & sliders, grating holder, laser grating, grating set of 13 to observe 13 different type of fringes, microscopic plate, Fresnel Bi-prism, prism table for spectrometer, right angle prism, slab, stainless steel scale, CD & special arrangement to hold stainless steel scale/CD, pin hole etc.

All components used are of research quality and made from laboratory grade material for long life.

Experiments with Laser Diode

EXPERIMENT NO. 131

To determine the wavelength of Laser diode.



WHAT YOU NEED

- BESTO Laser Diode, Cat. No. 1671
- Half Meter Aluminium extruded Bench, Cat. No. 1656a.
- Grating Holder, Cat. No. 1662
- Laser Grating either, Cat No. 1663 or 1664
- Screen, Cat No. 1658.

EXPERIMENT NO. 132

To determine the tiny particle size using Laser diode.

WHAT YOU NEED

- BESTO Laser Diode, Cat. No. 1671
- Half Meter Aluminium extruded Bench, Cat. No. 1656a.
- Grating Holder, Cat. No. 1662
- Lycopodium Slide
- Screen, Cat No 1658.

EXPERIMENT NO. 133

To determine the Numerical Aperture of Laser diode.

WHAT YOU NEED

- BESTO Laser Diode, Cat. No. 1671
- Half Meter Aluminium extruded Bench, Cat. No. 1656a
- Fibre Chuck Holder
- Fibre Holder
- Optical Fibre Cable One Meter Long with connector
- Screen, Cat. No. 1658

EXPERIMENT NO. 134

To determine the Polarization of Laser diode.

WHAT YOU NEED

- BESTO Laser Diode, Cat. No. 1671
- Half Meter Aluminium extruded Bench, Cat. No. 1656a.
- Polarizer & Analyzer
- Detector with Digital Meter, Cat. No. 1672

Optical Bench of Cat. No. 1656 extruded Aluminium triangular type bench being a very good quality and at the same time it is expensive also. All above experiments can also be performed on other type of Double rod optical benches & even on small wooden board (economical).

EXPERIMENT NO. 135

To study the Brewster's Angle & Polarisation angle of Acrylic plate & determine the Refractive Index.

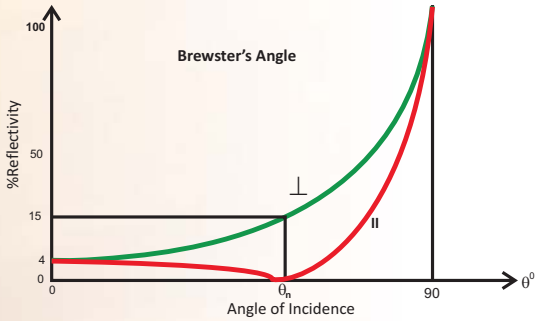


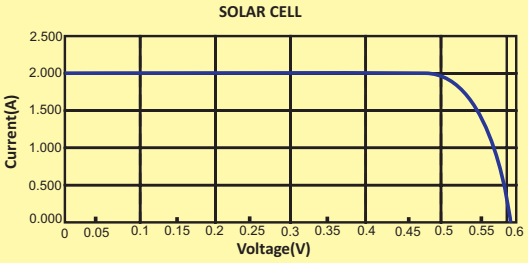
Fig. Graph of Fresnel's equation showing the percentage of incident light reflected for parallel and perpendicularpolarization.

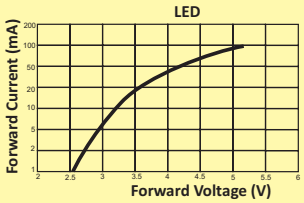
WHAT YOU NEED

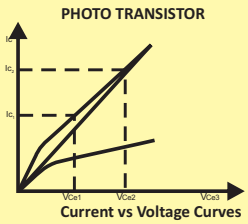
- Optical rail
- Goniometer with rail carriage
- Pinhole photo detector
- Diode Laser with power supply.
- Polarizer with rail carriage.
- Detector O/P measurement Unit.
- Kinematic laser mount with rail carriage.
- Glass & acrylic plate with holder.

EXPERIMENT NO. 136

i. Characteristics of Photo transistor.
ii. Characteristics of Photo diode.
iii. Characteristics of light dependent resistor (LDR)
iv Characteristics of solar cell.
v Characteristics of light emitting diode (LED)
vi Characteristics of opto-coupler.







WHAT YOU NEED

- Optical Cell
- Translation stage with detector.
- Opto-electronic measurement unit.
- Diode Laser with power supply
- Cell mount with rail carriage.
- Kinematic Laser mount with rail carriage.
- Detector output measurement unit.

1678. Standard Breadboard-Honeycomb

BESTO is now offering high quality Honeycomb Breadboards in several standard sizes. Distance of the first raw of mounting holes from the edge is 37.5mm. Nylon cups are fixed under each tapped hole for the protection of the core.

Specifications

Top Skin	:	2mm thick magnetic SS.
Bottom skin	:	3mm thick epoxy coated Aluminium
Core	:	Honeycomb core made of 0.25 mm thick ferromagnetic steel sheet
Core cell size	:	6 sq. cm. (Approx)
Flatness of the top	:	± 0.1mm over 300mmx 300mm area (non-cumulative error)
Mounting holes	:	Formed M6 tapped holes on top on 25mm grid.
Bonding	:	By custom semi-solid epoxy
Side walls	:	Compressed wooden particle boards to dampen acoustic vibrations.
Side wall finish	:	Black mat finish by mica layer.

	Sizes	Height (cm)
a.	60x30cm (24”x12”)	6
b.	60x60cm (24”x24”)	6
c.	90x30cm (36”x12”)	6
d.	90x60cm (36”x24”)	10
e.	90x90cm (36”x36”)	10
f.	120x90cm (48”x36”)	10
g.	120x120cm (48”x48”)	10

Experiments on Optical Fibre - Optical Bench Model

EXPERIMENT NO. 137 **OPTICAL FIBRE CHARACTERISATION APPARATUS (OPTICAL BENCH MODEL)**

i. To determine the mode of laser Beam.

ii. Determination of Fibre attenuation by cut-back method.

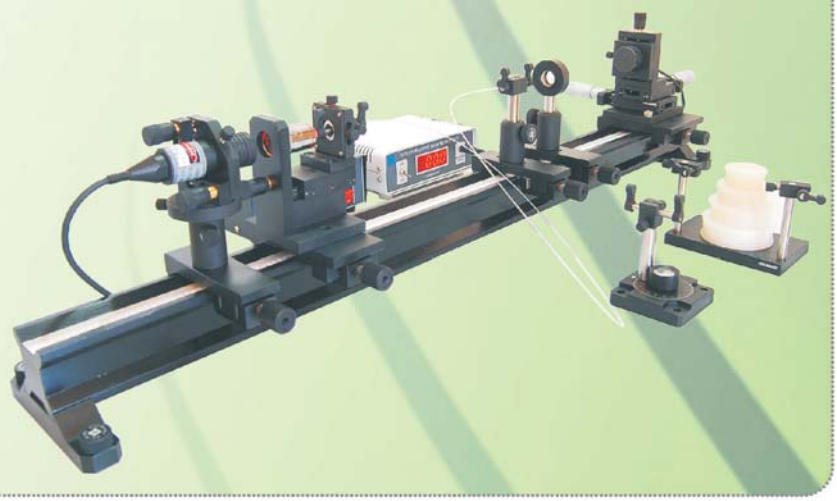
iii. Bending loss determination.

iv. Splice loss determination. Loss at the fiber splice could originate from either or a combination of the following possible misalignments.
   a. Transverse off set between the fiber ends.
   b. Angular tilt between the fiber ends.
   c. Longitudinal separation between the fiber end faces.

v. To determine the numerical aperture of optical fiber.

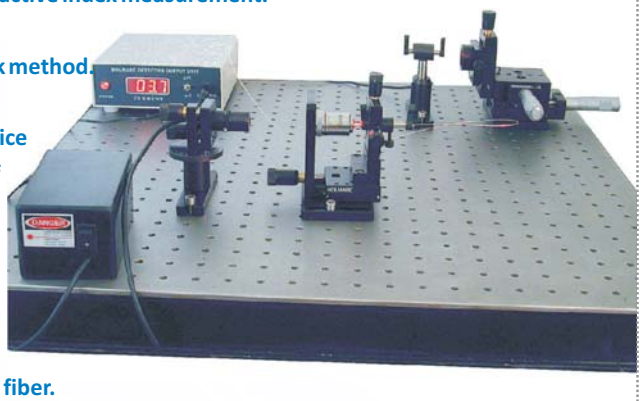
WHAT YOU NEED

- Optical Bench (Rail Type)
- Kinematic Laser mount with rail carriage
- Diode laser with Power supply
- Laser fiber coupler with rail carriage
- Bending loss apparatus
- Fiber holder with angular tilt.
- Fiber chuck holder with rail carriage
- Optical fiber samples.
- Pinhole photdetector
- Detector O/P measurement unit.
- XYZ translation stage with rail carriage
- Fibre Holder with angular tilt



EXPERIMENT NO. 138 OPTICAL FIBRE CHARACTERISATION APPARATUS (BREAD BOARD MODEL)

i. Study of total internal reflection in solids & refractive index measurement.
ii. To determine the mode of laser Beam.
iii. Determination of Fibre attenuation by cut-back method.
iv. Bending loss determination.
v. Splice loss determination. Loss at the fiber splice could originate from either or a combination of the following possible misalignments.
   a Transverse off set between the fiber ends.
   b Angular tilt between the fiber ends.
   c Longitudinal separation between the fiber end faces.
vi. To determine the numerical aperture of optical fiber.



WHAT YOU NEED

- Optical Breadboard.
- Laser fiber coupler.
- Fiber chuck holder.
- Detector O/P measurement unit.
- Kinematic Laser mount.
- Bending loss appts.
- Optical fiber samples.
- XYZ translation stage.
- Diode laser with Power supply
- Fiber holder with angular tilt.
- Pinhole photdetector.
- PMMA rod with mount.

1679. Analog Fiber Optic Transmission Demonstrator

Technical Specifications:

- In built IC Based DC regulated power supply +6VDC & 3VDC
- Pre amplifier stages consists of MIC (Microphone), Photodetector, Transistors(548) and biasing network of resistance and Capacitors.
- Power amplifier stages consists of impedence matching transformers (Driver Transformers), Transistors (8550) & biasing network of Resistance and Capacitors.
- Output section having LED's and speaker, Fiber optic cable for transmission of Signal
- Circuit diagram printed on Glass Expoxy PCB & different combination of Resistance & test points are brought out on front panel
- Glass Expoxy PCB used as front panel of 300mmx200mm & mounted on light
- Power requirement : 220VAC+ 10%, 50Hz • Weight : 3.0 kg Apprx. • Dimensions (mm) : 330(L)x225(b) x 75(H)

It consists of following items:-

· Optical Fiber Cable 2 nos(1mtr & 10mtrs Long with Connectors), MIC & speaker, Wooden assembly to hold Fiber cable, Graph paper, Power Chord, Patch Chords & Instructional manual

EXPERIMENT NO. 139

I Voice Transmission through optical fiber cable.
ii To study transmitter circuit & calculate its output power
iii To study receiver circuit & calculate its input power.
iv To study the attenuation of signal between transmitter & receiver end
v Measurement of numerical aperture.

WHAT YOU NEED

- Analog Fiber Optic Transmission Demonstrator Cat. No.1679
- Dual Trace CRO 20MHZ. Digital Multimeter
- Digital multimeter

1681. Bending loss apparatus Model-BL-LK

The bending loss apparatus is used to find the loss occurred in fiber when it is bent at different circular dimensions. Four different diameters i.e 65mm,55mm,45mm and 35mm are used to observe the losses. There are fiber holders to fix the fiber at the required position.

Cat No. 1681

1682. XYZ Translation stage Model TS-D-LK

The purpose of this mount is to scan a distance of 25mm in X & Y stages are a photo detector. X & Y stages are micrometer driven while Z stage is lead screw adjusted. The stage is made in a such a way that pinhole photo detector as well as a way that pinhole photo detector as well as fiber chuck cab be fixed to Z stage for fine adjustment and scanning.

Cat No. 1682

1683. Laser Mount Model LM-LK

Diode Laser is fixed in this mount using a grub screw. The mount is rotatable & the degree to which it is rotated can be measured. The height can be adjusted. There is a tilling arrangement in the mount to adjust and align the laser further.

Cat No. 1683

1684. Beam Splitter Mount Model BM-LK

This is used to hold the beam splitter. For most of the experiments, this mount has to be kept at an angle of 45 degree.

Cat No. 1684

1685. Beam splitter

Specifications:

Size: 50x50mm
Thickness: 4 mm
Substrate: N-Bk7 (schott)
Coating material: Protected AL
Back coating: SLAR
Ratio: 50:50
Surface Flatness: λ/4

Cat No. 1685

Monochromator

1690. Monochromator

The monochromator consists of a diffraction grating (dispersing element), slits, and spherical mirrors. The light source emits a broad spectrum of radiation as represented by the multi-colored line from the lamp to the grating. The diffraction grating disperses light by diffraction different wavelength at different angles. The grating is positioned so that required wavelength of light passes through the exit slit and all other color are blocked. The required wavelength which should pass through the exit slit is selected by rotating the angle of the grating. The mirror and slit positions remain fixed.
Stepper motor along with micro processor controlled electronics is used to drive the grating. The motorized movement of grating helps to achieve fine resolution compared to manual control. Moreover selection of wavelength is much easier in automated system. Monochromator with computer interface are also available.

Design	:	multi port Czerny-Turner Mo
Grating type	:	plane Holographic Reflectior
Grating Size	:	50X50
Ruling/mm	:	1200
Focal Length of Collimating Mirror	:	259mm
Focal Length of Focusing Mirror	:	259mm
Size of the Mirror	:	70mm
Main Mirror	:	Spherical
Angle between Incident and Diffracted Beam	:	20°
Dispersion	:	2.3nm/mm
Max. Wavelength	:	1300nm
Bandpass	:	0.16nm@50mm slit width
Resolution	:	0.2nm

Monochromator are available with various port configuration .

a)	Single I/P & O/P port
b)	Double I/P & O/P port

Cat No. 1690

1695. Laser Raman Spectrometer

Laser Raman Spectrometer is a useful instrument for the identification of wide range of substances in physic and chemistry laboratories. The procedure used in this case involves illuminating a sample with DPSS green laser and using a monochromator to examine the light scattered by the sample. It is a straight forward, non destructive technique requiring no sample preparation.

This experimental spectrometer is specifically designed for studying Raman emissions in CCl_4 when high power laser beam is passed through the solution. The apparatus suites well for post graduate level laboratory experiments in physics. The set up consists of 40mW DPSS, 540 nm laser, collection optics, sample mounts, stages, monochromator and detector. The monochromator is PC controlled and motorized. The experiment is conducted by scanning the emission spectrum by monochromator and recording the intensity of each interested wavelength from the detector. The readings are plotted on a graph.

Cat No. 1685

Key features include:-

Computer controlled, userfrindly interface, capable of automatic recording of Raman spectra.

Monochromator system with high resolution and low stray light.

Diode pumped solid state laser is used as light source.

When a light beam emitted by a laser device passes trough external optic path and irradiates the sample, the scattered light enters the monochromator. When the grating in the monochromator is rotated, light signal passes through a slit and falls on a highly sensitive detector (PMT). The detector output is send to computer for further processing, while a spectrum curve is being displayed on monitor.

Specification

Wavelength Range	:	200-800nm(Monochromator)
Wavelength Accuracy	:	$\leq$ 0.4nm
Wavelength Repeatability	:	$\leq$ 0.2nm
Stray Light	:	$\leq 10^{-3}$
Reciprocal of Linear Dispersion	:	2.7mm
Half-Width of Spectral line	:	$\leq$ 0.2nm @ 586nm

MONOCHROMATOR

Relative Aperture Ratio	:	D/F1/5.5
Optical Grating	:	1200 l/mm
Slit Width	:	0-2mm continuously adjustable.

Michelson Interferometer (Hilger & Watts)

1712. Michelson Interferometer based on Model developed by Hilger & Watts (London)

It is divided into two parts.

(1) Mechanical (2) Optical

Mechanical part consists of following items

a) Bed: Bed is optically ground, Length 250mm

b) Lead Screw: Lead screw is optically ground with its nut, length 200 mm Pitch 1 mm

c) Optical Mirror Mount: Kinematic mirror mounts are to hold the mirror which be aligned in to orthogonal direction by means of screws provided at the rare of the mount.

Optical Parts consist of the following items:

a) Beam Splitter

b) Compensating plate
Size 45mm× 32mm × 8mm
50mm× 35mm × 8mm

Beam splitter and compensating plates are covered from the same optically worked glass plate

Surface flatness	:	λ/10 (both faces)
Parallelism	:	5 arc sec.
Mirrors	:	2 nos.
Focal Length	:	25mm thickness 10mm
Front surface Coated	:	Coating material : Al with SiO_2
L.C. of Instrument	:	10^{-4} mm

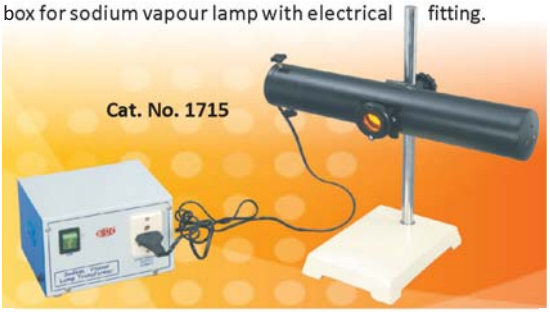
Cat. No. 1712

Supplied with Telescope of short Focal length to observe the fringes but supplied without any light source.

Different Light Sources for Michelson & Febry's -Perot Interferometers

1715. Sodium Light complete unit

Generally this light source is used for above Michelson Interferometer. Supplied with sodium vapour lamp transformer 35 W, sodium vapour lamp 35W & heavy metal box for sodium vapour lamp with electrical fitting.



Cat. No. 1715

1716. Helium-Neon Laser with stand

Imported Laser tubes along with SMPS Power Supply are housed in thick powdered coated aluminium box. From the hole the laser beam comes out. Supplied with rectangular holder & heavy base.

a)	1mW (random)
b)	2mW (random)

Cat. No. 1716

1717. Diode Laser with Power Supply (Red colour)

A compact, fully solid state instrument produces an intense beam of light at a wavelength 635-670nm for red colour. This semiconductor diode laser is mounted in a simple mount. Supplied completely with power supply.

Output power 3 - 5 mW

Cat. No. 1717

EXPERIMENT NO. 140

Determination of Wavelength of Monochromatic Sodium Light & find the thickness of a thin mica film.

WHAT YOU NEED

- Michelson Interferometer, Cat. No. 1712
- Sodium Light complete set up, Cat. No. 1715
- White Light source, mica sheet.

EXPERIMENT NO. 141

Determination of wavelength of Laser light (He-Ne Laser or Diode Laser)

WHAT YOU NEED

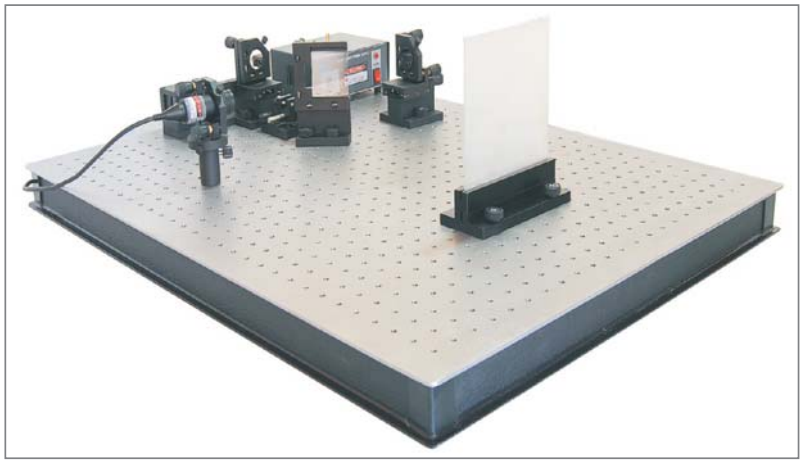
- Michelson Interferometer, Cat. No. 1712
- He-Ne Laser, Cat. No. 1716 or Semi conductor Diode Laser, Cat. No. 1675
- Stand to holder 20x objective
- Screen

1720. Michelson Interferometer (Bread Board Model) - Coherent Length of the Laser

Diode laser source typically emits two or three frequencies. If the beam consists of two frequencies, each of these frequency makes an independent interference pattern. In the event that the two mirrors are precisely equal in distance from the beam splitter, the fringe pattern will be the same regardless of the frequency. In the path lengths are not equal, there will be a case of anti-coincidence where the bright line from one set of fringes in located at the dark line of the other. This results in complete disappearance or low contrast in the observed pattern.

List of instruments supplied in this kit

- Optical breadboard
- 5mW diode laser with power supply
- Kinematic laser mount
- Beam splitter with mount
- Mirror mount with micrometer translation stage
- Mirror mount with precision translation stage
- Cell holder with detector
- Detector photo transistor
- Output measurement unit (Range 1µA - 200mA)

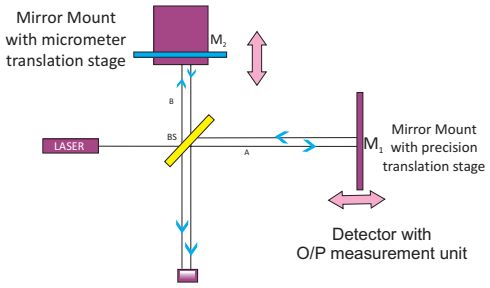


Salient Features :

A detector is used to record the contrast variation at the fringe pattern.

All components used are of research quality and made from laboratory grade material for long life without corrosion. The components are assembled on a breadboard and protected from dust and airflow by a transparent cover.

Experimental arrangement for Michelson Interferometer



EXPERIMENT NO. 142

i. To set-up Michelson Interferometer out of individual components & observe fringes.

ii. Determination of wavelength of Monochromatic light. We use Diode Laser with Wavelength of 650nm(RED). Green diode lasers are also available.

iii. Measurement of refractive index of transparent materials.

iv. To find the thickness of transparent materials. Various materials can be used for the measurement. Transparency, flatness and thickness are important factors.

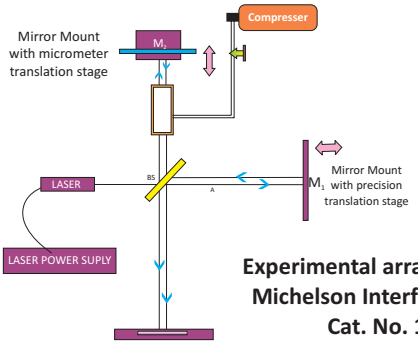
v. To determine coherent length or temporal coherence of given diode laser.

WHAT YOU NEED • Michelson Interferometer Kit, Cat. No. 1720

1722. Michelson Interferometer (Bread Board Model) (To find Refractive index of gas/air)

Same as Cat. No. 1720 but we can also study the change of refractive index of air with change in pressure & determine the refractive index of air.

It consists of list of items as per Cat. No. 1720 in addition to this it also consists of compressor, pressure chamber, valve & pedestal air pump etc.



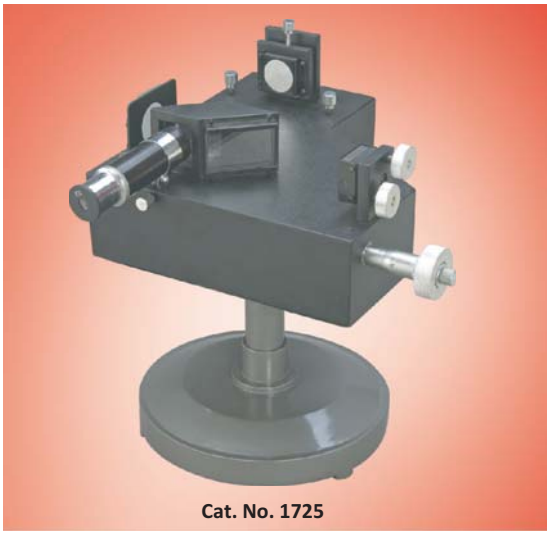
Experimental arrangement for Michelson Interferometer of Cat. No. 1722

1725. Michelson Interferometer Model SMI-25

This Model is mounted on a heavy iron base. It is most suitable for Educational Institution. Various Components are made from high precision machines, mounted on the aluminium base and the complete interferometer is mounted on a heavy cast iron base.

It consists of beam splitter and compensator Plates mounted in an aluminium housing. It is fitted on the aluminium base at 45° to two reflecting mirrors. All flat optics used have flatness of at least $\lambda/4$ and are protected with a layer of silicon Monoxide coating.

Least Count 0.01mm. It also consist of reading telescope of magnification 3x, fitted with Ramsden eyepiece & cross line graticule. 20x objective with mount is also supplied with interferometer (in case of work with He-Ne Laser or Diode Laser).



Cat. No. 1725

EXPERIMENT NO. 143

i. **Determination of Wavelength of Monochromatic Sodium light.**
ii. **Determination of Wavelength of He-Ne Laser or Diode Laser.**

WHAT YOU NEED

- Michelson Interferometer Kit as per Cat. No. 1680
- Sodium Light complete unit Cat. No. 1673
- He-Ne Laser with stand, Cat No. 1716 or Diode Laser with Power Supply, Cat No. 1717 • Screen

1726. Fabry Perot Interferometer Model SFP-26

It is specially useful for accurate measurements, comparison of wavelengths and examination of hyperfine structure of spectral lines. It is also used for measuring wavelength changes by application of magnetic field.

It consist of a partially coated mirror mounted in an alumminium housing. This module is placed in front of the moving mirror to set up the Fabry Perot Interferometer. Two adjustable screws are provided for making the two etalons parallel.

In built Telescope has a magnification of 3x and is fitted with a Ramsden eyepiece & a cross line graticule.

Cat. No. 1726

EXPERIMENT NO. 144

i. **Determination of wavelength of monochromatic light, sodium light by interferometer.**
ii. **Hyperfine structure of sodium lines by interferometer.**

WHAT YOU NEED

- Febry-Perot Interferometer Kit as per Cat. No. 1726
- Sodium Light complete unit Cat. No. 1715
- He-Ne Laser with stand, Cat. No. 1716 or Diode Laser with power supply Cat. No. 1717 • Screen

There are different Types of Michelson Interferometers. Every Institution is having different requirements. Some Institutions are using Michelson Inteferometer with Sodium Light, some are with He-Ne Laser & some are using diode laser. Please call us before placing the order of Michelson Interferometer & light Source.

1730. Fabry-Perot Interferometer Model FP-83

In Fabry-Perot interferometer, the distance between partially reflecting mirrors are varied by using coarse and fine translation stage driven by micrometers. One beam splitter is fixed and the other is mounted on the translation stage through a kinematic mount. The two axes kinematic mount is used to correct the parallelism between beam splitters.

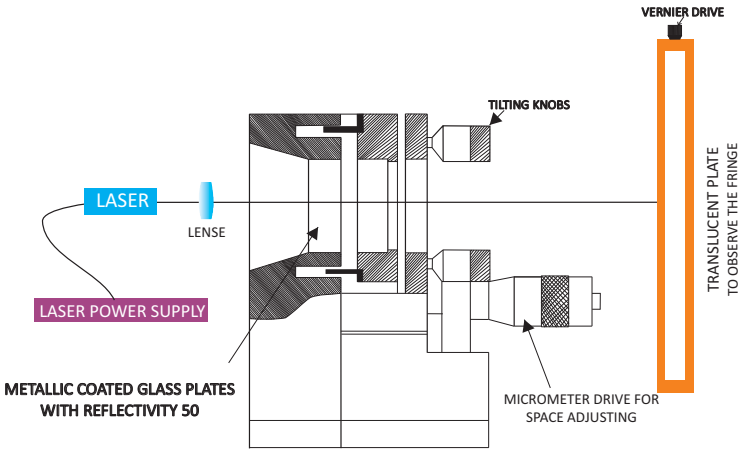
Translation stages are fitted with micrometers for both coarse and fine movements in order to get precision measurements. All components and modules are mounted on rail and carriage system for easy adjustments. The optics and mechanics assembly is made out of corrosion free materials.

Cat. No. 1730

List of instruments supplied in this kit

- Optical rail.
- Diode Laser with Power supply
- Kinematic Laser mount with rail carriage
- Fabry-Perot Interferometer with rail carriage
- Lens with mount and rail carriage
- Translucent screen with rail carriage

Fabry-Perot Interferometers are widely used in telecommunictions, lasers and spectroscopy for controlling and measuring the wavelength of light. Fabry-Perot interferometers also form the most common type of optical cavity used in laser construction.



Experimental arrangement for Febry-Perot Interferometer

The enclosed air gap generally varies from several millimeters to centimeters when the device is used interferometrically. If the gap can be mechanically varied by moving one of the beam splitters, the device is referred to as an interferometer. Its transmission spectrum as function of wavelength exhibits peaks of transmission corresponding to resonance of the etalon.

EXPERIMENT NO. 145

i. To find wavelength of Laser Light
ii. Determination of gap between the plates of fabry perot etalon from the fringe at pattern at different micrometer readings.
iii. To find the finesse and free spectral range (FSR) of etalon from the fringe calibration at different cavity thickness.
Free spectral Range (FSR) = 1/2nd in wave numbers.
Free spectral Range (FSR) = c/2nd in frequency.
Free spectral Range (FSR) = λ^2/2nd in Wavelength.
iv. To find the order of the center of the fringe spectrum.

WHAT YOU NEED

- Febry-Perot Interferometer Kit, Cat. No. 1730

1732. Sagnac Interferometer

The Sagnac effect manifests itself in an experiments setup called ring interferometry. A beam of light splits and the two beams are made to follow a trajectory in opposite directions. To act as ring, the trajectory must enclose an area. On return to the point of entry, the light is allowed exit to the apparatus in such a way that an interference pattern is obtained. The arrangement for Sagnac interferometer is as shown in the figure.

Sagnac interferometer employs modular in design and construction. Mirrors beam splitters and lasers along with mechanical mountings are supplied as individual modules which can be assembled on honeycomb breadboard.

The device consists of 800 mm x 600 mm honeycomb breadboard with a rigid and vibration resistant base for assembling the interferometer. Mirrors and beam splitters are held in precision kinematic mounts for fine alignments. Laser head is also held in a kinematic mount for fine tuning the direction of the laser beam.

Students gain hands on experience in optical instruments assembly by setting up the interferometer.

Sagnac effect is employed in current technology. One of the use is in inertial guidance system. Ring interferometers are extremely sensitive to rotations. In the Sagnac configuration, the position of the interference fringes is dependent on angular velocity of the setup. This dependence is caused by the rotation, effectively shortening the path length of one beam, while lengthening the other.

Cat. No. 1732

List of instruments supplied in this kit

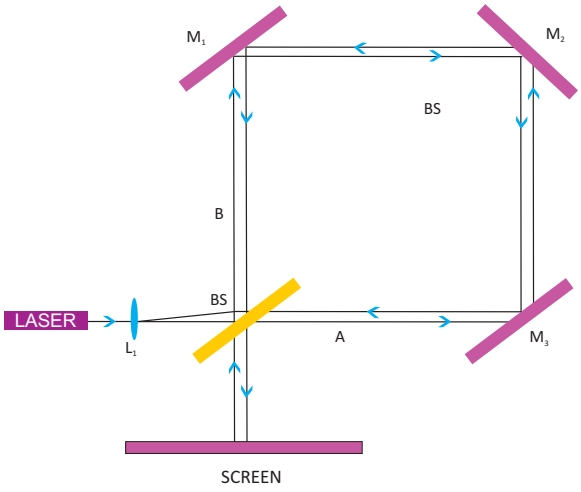
- Optical breadboard
- 5mW Diode Laser with Power supply
- Kinematic Laser mount with carriage
- Metallic beam splitter with kinematic mount
- Front coated mirror with kinematic mount
- Convex lens with mount

EXPERIMENT NO. 146

To set-up Sagnac interferometer out of individual components & observe fringes.

WHAT YOU NEED

- Febry-Perot Interferometer Kit, Cat. No. 1732



Schematic representation of Sagnac interferometer

1735. Rayleigh Interferometer

For measurement of refractive index of liquids & gases. The interference fringes are magnified in the instrument to over 100times by means of a cylindrical lens of the eye-piece which provides horizontal magnification. The fringes produced are sharp at the normal distance of distinct vision.

It consists of following items :-

a) Heavy metal platform
b) Collimator with circular slit is fixed at one end.
c) Telescope with cylindrical lens instead of Ramsden eyepiece is fitted on other side of the table.
d) One metal box which is fitted in the front of the telescope consist of Razor Glass Plate inclined at an angle of 45 deg. This box also contains compensation plates. The whole system is connected to micrometer screw gauge to record the readings.
e) Plane parallel optical glass cells for liquids.
f) Pair of gas cells with plane parallel windows for the measurement of refractive index of gases.
g) Vacuum pump single stage having displacement of 32 litres per minute with manometer. Supplied without sodium Lamp Unit.

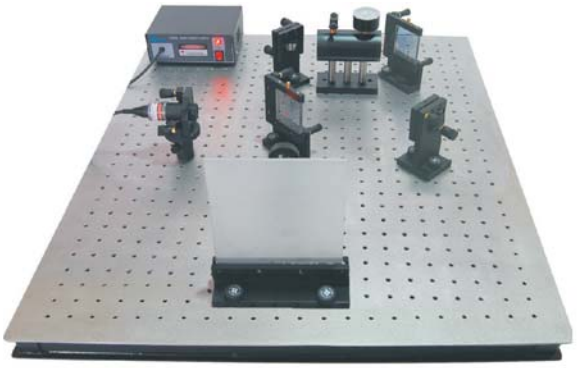
1737. Mach - Zehnder Interferometer Model MZ-37

This design concept followed in this device is similar to Sagnac interferometer. The device is assembled using modular building blocks on a rigid base. A honeycomb anti- vibration breadboard of size 800mm x 600mm is supplied as the base. Mirrors, beam splitter and diode laser along with their mounts are supplied as modular building blocks.

Interferometer is built by assembling the building blocks on the breadboard as per the desired optical layout. Optics and laser head are held using kinematic mounts with two axes fine adjustment for obtaining the interference fringes are done using kinematic mounts.

One of the simplest experiments using the Mach-Zehnder interferometer is measurement of the index of refraction of air with an airtight test cell placed in one of its optical arms of the interferometer. No other factors such as convective airflow should be present which can generate optical path differences.

The flexibility in fringe localization gives Mach-Zehnder interferometer one of the important advantage over other interferometers. Although many Mach-Zehnder interferometers use a rectangular arrangement, the parallelogram arrangements are also possible.



Cat. No. 1737

List of instruments supplied in this kit

- Optical breadboard
- 5mW diode laser with power supply
- Kinematic laser mount
- Metallic beam splitter with kinematic mount
- Front coated mirror with kinematic mount
- Gas cell with accessories
- Convex lens with mount
- Screen

EXPERIMENT NO. 147

i. To set-up Mach-Zehnder interferometer out of individual components & observe fringes.
ii. Determination of wavelength of monochromatic light.
iii. Measurement of refractive index of transparent materials.
iv. To find the thickness of transparent materials.
v. To study the refractive index change in gases under different pressures and the determination of refractive index.

WHAT YOU NEED

- Mach-Zehnder Interferometer Kit, Cat. No. 1737

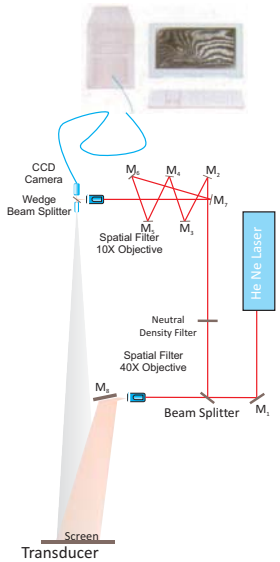
Sagnac Inteferometer and Mach-Zehnder, Inteferometer is very much similar to each other. If we are having complete kit of Mach-Zehnder Interferometer, we can perform experiment of Sagnac interferometer. On the other hand, if we purchase Sagnac Interferometer, with some more accessories like gas cell with accessories, convex lens, compressor etc. we can perform all the experiment of Mach-Zehnder Interferometer.

1745. Speckle Pattern Interferometry

Speckle Pattern Interferometry (SPI) determines the difference between two small deformation states of the same inspected object. Speckle-pattern-ineterferometry shows a fringe pattern, which can be interpreted as contour lines of the same state of deformation. The distance between two fringes corresponds to half the laser wavelength. Therefore SPI allows sensitive and non-contact detection of defects.

This instrument has been developed by ISRO Satellite center, Bangalore for NDT applications with Hollmarc Company. It makes use of speckle pattern interferometry along with CCD imaging techniques and image processing software for studying the static and dynamic conditions of the test objects. Hollmarc company has a technology transfer agreement with ISRO Satellite center for manufacturing and marketing this system with the permission of Hollmarc Company we have given this equipment in our catalogue.

The unit consists of opto-mechanical and optical components similar to those used for holography, assembled on a breadboard. He-Ne laser is used as light source. Instead of holographic plates, CCD camera is used for recording fringes.



1785. Constant Deviation Spectrograph (C.D.S)

(a) Collimating Tube : (Material : Brass Pipe) O.D.: 50mm I.D. : 44mm for fitting collimating lens

It is provided with rack & pinion arrangement and slit.

Slit is of circular type.

The jaws of the slit are optically ground.

It is provided with Holfmann's Diaphragm.

(b) Telescope Tube : (Material : Brass Pipe) O.D. : 50mm, I.D. : 44mm for fitting telescope lens

It is provided with rack & pinion arrangement for proper focussing of spectral lines.

Eyepiece ; (Ramsden Type) : magnification : 10x

In eyepiece holder a conical pointer is fitted in the focal plane of eyepiece.

(c) Corrected achromatic doublet are fitted in the lens holders of collimator and telescope tube.

Doublet dia : 44mm, F.L. : 350mm (14").

The Collimator and telescope tubes are fitted in cast iron blocks which are mounted on a machined cast iron blocks which in turn are mounted on a machined cast iron plate.

(d) Suitable gap is provided between collimating lens and prism table to accommodate high resolving instrument like Fabry-Perot Etalon.

(e) Prism Table is fitted on the machined cast iron plate and actuated by tangent screw to provide smooth rotation of the C.D.S. prism placed on it.

(f) Prism table is covered with a box of a aluminium casting having two gates.

One gate allows light coming from collimator to enter into C.D.S. Prism

Another gate allows light to be collected by telescopic objective after light being dispersed from C.D.S. prism.

(g) A calibrated drum (Calibration for visible region i.e. from 4000A° - 7000A°) is attached with the prism table assembly.

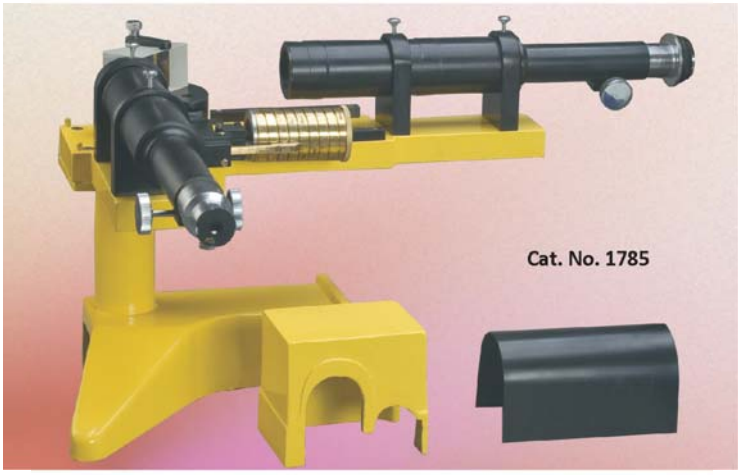
Accuracy of calibration $\pm$ 5A°

(h) Machined cast iron plate with drum assembly is fitted over the head of a heavy cast iron base.

The base and machined cast iron plate are painted in a staple Grey colour.

Collimator, Telescope, Prism table, Drum assembly are painted black.

Total Weight : 20Kg.



1786. Constant Deviation Spectrograph prism

Material optically Glass R.I. either μ = 1.717 or 1.78. Three faces of the prism are optically flat to surface finish $\lambda/10$.

a)	μ = 1.717
b)	μ = 1.78

(While placing order please specify the refractive index of the CDS prism.)

Cat. No. 1786

1787.Quarter Size Plate Camera

It is to take photographs of spectral lines. The quarter size camera is fitted in the place of telescope tube while taking photographs. The objective of the telescope is replaced by tele photo lens of the suitable focal length.

1788. Packet of Films

To take the photographs of the spectral lines, we are supplying imported films. Pack of 25 films.

Cat. No. 1788

1789. Fabry-Perot Etalon

The instrument is made in different sizes of spacers in silica. The mirrors are about 30 mm in dia & with clear aperture 25mm but other sizes can be manufactured if required by the customer specially. Both optically plane Glass plates are coated 50% each. Space between them is 3mm. It is used either with Mercury or Sodium Light.

Cat. No. 1789

Three screws are provided on the front face of the Fabry-Perot Etalon. With the help of these screws, one can adjust the position of the optically plane Glass plate.

1790. Fabry-Perot Etalon

Specifications are same as per Cat. No. 1789 but optically Glass plates are coated in the ratio 80% & 20% to be used with He-Ne Lasers.

Cat. No. 1790

1791. Edser Butler Plate

Mounted in a housing and provided with means for production of different types of fringes. The clear space for fringes is about 30mms and the plates are heavily aluminised for increasing the resolving power of the instrument, employed for calibrating spectrometer.

1792. Condensing Lens

Condensing Lens with mount and stand.

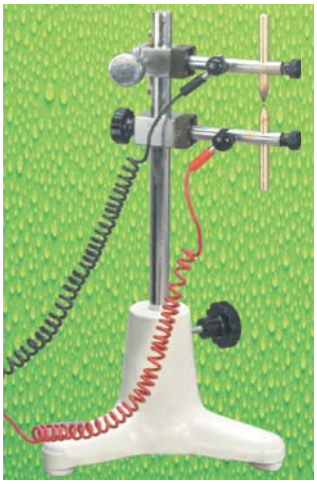
1793. Arc Power Supply

This Power Supply is specially designed to spark the brass / copper / iron rods. It is a D.C. Power Supply of 70V, 10A with Built-in variable transformer, bridge rectifier & dimmerstat.

Cat. No. 1793

1794. Arc Stand

This stand holds either brass rods or copper rods or iron rods. When we use this stand with above power supply, we can observe either brass / copper/iron spectrum. Supplied with one pair of iron rods, copper rods and brass rods.



Pair of
iron rods,
copper rods
&
brass rods

Cat. No. 1794

1795. Micrometer Eyepiece

Special Micrometer eyepiece to be used with CDS.

1796. Monochromator

Attachment to convert CDS into Monochromator.

1800. Micrometer Slide Comparator

(a) For Direct measurements upto 50mm in steps of 0.01mm (0.001cm) on a large micrometer head.

(b) The reading microscope screw & drum head, and the stage are carried on a sturdy base so that these are normally inclined at an angle of 45 degree. The stage 7.5 x 15cm is fitted with spring clips.

(c). The micrometers slide moves along a lifeline stainless steel scale and the movements are read directly on a largely drum head to 0.01mm (or 0.001cm through a vernier attached to it). The micrometer screw & nut are specially aged & normalised to ensure uniformly accurate performance with passage of time. Total range of movement 50mms.

(d) The reading microscope is provided with rack and pinion focussing. Optics highly achromatic.

(e) An extra support leg is attached to the base to enable the whole instrument to be brought to a horizontal reading position.

(f) Substage mirror in gimbals for reflecting light.

(g) Complete in a wooden case.

Cat. No. 1800

EXPERIMENT NO. 151

i. **To determine the wavelength of lines of the Copper, Brass & Iron spectrum using Mercury as standard & to take photographs of the Copper, Iron & Brass spectrum.**

ii. **To get a spectrum of mercury & brass on a given photographic plate & to measure the wavelength of prominent lines of brass spectra using Hartmann's formula.**

iii.. **A study of visible spectrum by using a constant deviation spectrometer or spectrograph : Determination of elements presents in an alloy by spectroscopic method.**

WHAT YOU NEED

- Constant Deviation Spectrograph, Cat. No. 1785
- Constant Deviation Spectrograph Prism, Cat. No. 1786(a) or (b)
- Quarter Size Plate Camera, Cat. No.1787
- Packet of Films, Cat. No. 1788
- Condensing Lens, Cat. No. 1792
- Arc Power Supply, Cat. No. 1793.
- Arc Stand, 1794.
- Micrometer Slide Comparator, Cat. No. 1800
- Mercury light source, complete set-up.
- Film developing Unit (not supplied by us)

Helpful Hint

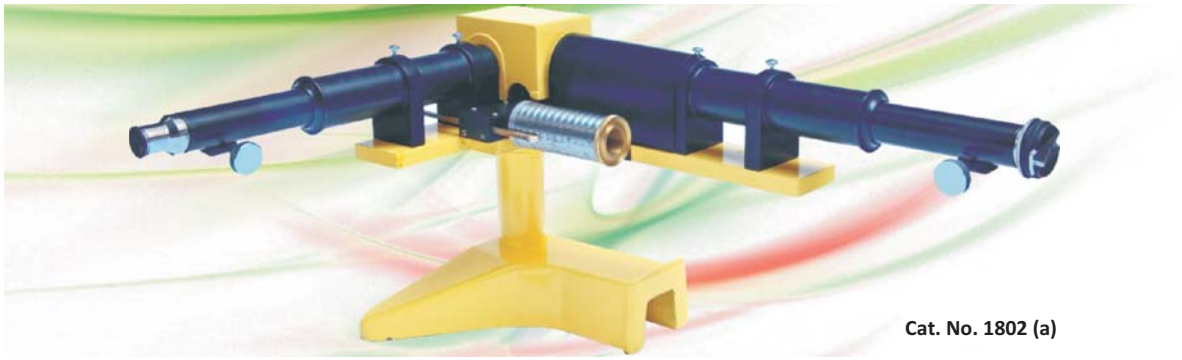
While placing order for CDS, please carefully place the order for CDS Prisms. There are two different types of CDS Prisms having refractive index of 1.717 or 1.78.

Every CDS is calibrated according to the refractive index of the prisms.

1802. Zeeman Effect

The atomic energy levels, the transitions between these levels, and the associated spectral lines discussed to this point have implicitly assumed that there are no magnetic fields influencing the atom. If there are magnetic fields present, the atomic energy levels are split into a larger number of levels and the spectral lines are also split. This splitting is called the Zeeman Effect. It consists of following instruments :-

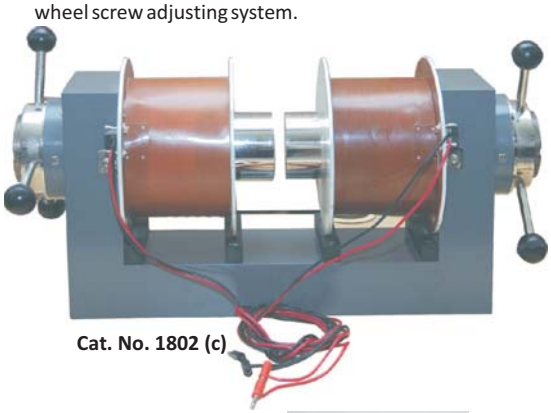
a) Constant Deviation Spectrograph as per Cat. No. 1785



Cat. No. 1802 (a)

b) Constant Deviation Prism as per Cat. No. 1786 (b). $\mu = 1.78$

c) A Strong Electromagnet capable of producing field of $W.m^{-2}$ order approximately 15 Kgauss. at 10mm air gap is supplied. The air gap is continuously variable with two way knob wheel screw adjusting system.



Cat. No. 1802 (c)

d) To operate the above electromagnet, a heavy duty power supply is supplied, smoothly adjustable from 0-3A per coil i.e. 6A.

Cat. No. 1802 (d)

e) Specially designed Neon, Discharge Tubes.

f) High Voltage Discharge Tube Generator for above Discharge Tube.

g) Wooden Stand for holding Neon Discharge Tube.

Cat. No. 1802 (e)

h) Specially designed Fabry-Perot Etalon (different from Cat. No. 1789/90) used before the CDS Prisms for obtaining interference spectra of split wavelength.

i) Micrometer Eyepiece as per Cat. No. 1795

j) Digital Gaussmeter

k) Condensing Lens with mount, Cat. No. 1792

Supplied without Quarter Size Plate Camera.

Optional Accessory : Quarter Size Plate camera
Photo measuring microscope or
Slide comparator

EXPERIMENT NO. 152

Determination of electron charge/mass ration from Zeeman effect and the calculation of energy shift due to the applied magnetic field.

WHAT YOU NEED

- Zeeman Effect, Cat No. 1802 (a) to (k).

In this experimental setup, the spectrum produced by atom in the magnetic field is resolved by Fabry-Perot Etalon. Fringe width changes in an external magnetic field is noted and e/m ration can be calculated.

Neon spectra image | Neon interface spectra image

1803. Zeeman effect with CCD camera

- e/m zeeman effect apparatus with F- Petalon with CCD Camera.
- Nine significant zeeman splitting spectral lines can be observed.
- F-P clear aperture : Dia 40mm
- Bench with riders
- Electromagnet with power supply
- CCD Camera with CCTV Lens
- Quarter wave plate
- Hg lamp with power supply
- Fringe of quartz: Magnetic Induction : 0-13000 hs telescope.
- Green Filter, Lens etc.

Discover the spiltting of the spectral lines of atoms within a magnetic field with the zeeman effect

1804. Zeeman effect with CCD camera with computer interface

Same as Cat. No. 1803 but with capture interface along with Fringe capture & Analysis system

1805. Fringe Capture & Analysis System

Specifications :

The sensitive device is a 3 cm long linear CCD consisting of 2048 pixels. Optical phenomena are displayed directly on the oscilloscope and/or a PC via the parallel port (no additional frame grabber required). CALIENS is used by teachers and students alike :

- To illustrate lectures (save and pint data plots)
- For short qualitative experiments (real time display)
- For long practical works (advanced functions on the PC)

Features :

- The optical head bearing the linear CCD (fits to regular holders)
- The control units for both oscilloscope and PC outputs
- A specific PC software to manage a large range of advanced functions

Through the PC interface you can work in any of the following modes :

- A real time mode to visualise time oscillating phenomena or to adjust to the experiment.
- A measurement mode to work on a frozen signal (with a large scale of measurement tools).
- Specific to experiment modes to work on spectrometry, interferometry, diffraction... On line help, most frequently used formulas, simulation are included in each of these specific modes.

Caliens Package

The CALIENS linear CCD camera includes :

- An AC/DC converter
- A complete set of documentation
- The acquisition and processing software
- The necessary cables and connectors
- A Box-case for transport and storage

All the necessary accessories to keep your camera in a good working order

Required Tools (you have to procure yourself)

- Minimum required PC :
- Pentium 120 MHz
- RAM - 16 Mo
- 5 Mo HDD free space
- Windows 95/98/NT/XP...

Computerise your Optical Experiments & Optic Lab.

Cat. No. 1805

OTHER INSTRUMENTS (OPTIONAL) : Analog or digital scope

OPTIONS FOR CALIENS

- Additional Filters : 2 polarising filters and 2 neutral density (0.9)
- Software development kit, to develop your own softwares with CALIENS

1810. Optical Bench Double Rod Standard Pattern (One Meter Long)

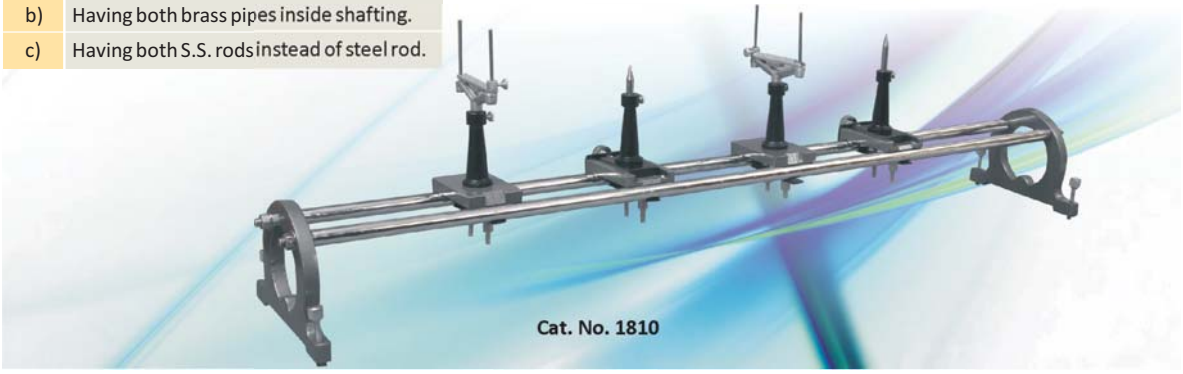
For advance research work, consists of two rods of different metals as per requirement in hand, supported by heavy cast iron feet, provided with 4 metal riders and 4 accessories. Two of the sliders have transverse motion and one rod is engraved in mms. Improved design, one meter long.

	Description
a)	Having both steel C.P. rods
b)	Having both brass pipes inside shafting.
c)	Having both S.S. rods instead of steel rod.

1811. Optical Bench Double Rod Standard Pattern (1½ Meter Long)

Specifications are same as per Cat. No. 1810 but the rods are supplied with 1½ meter length.

	Description
a)	Having both steel C.P. rods
b)	Having both brass pipes inside shafting.
c)	Having both S.S. rods instead of steel rod.



Cat. No. 1810

1812. Precision Optical Bench OB-15 (1½ Meter Long, extra-ordinary heavy pattern)

For accurate measurement of focal length of Lenses overall Length 1600mm, Scale length 1500mm (graduated in mms)

Specifications

Strong, inexpensive, made to standardized specifications with interchangeable parts, the Twin-Bar optical Benches have won wide popularity because of the excellence and robustness of their design. Provided with 3rd supporting rod.

The sliders are machined geometric fit on the tracks & are machined plane on the upper surface to ensure correct vertical fitting of the hollow pillars. Four sliders are provided as standard accessories to all our benches. Two of these are provided with fine cross-motion & two without cross motion. All the four sliders are fitted with hollow pillars of uniform specifications to take all types of BESTO bench accessories.

Standard accessories with BESTO Optical Bench OB-15 are :

i Lens Holder - 2 nos. ii Needles - 2 nos.

	Description
a)	Having both steel C.P. rods
b)	Having both brass pipes inside shafting
c)	Having both S.S rods instead of steel rod.

Cat. No. 1812

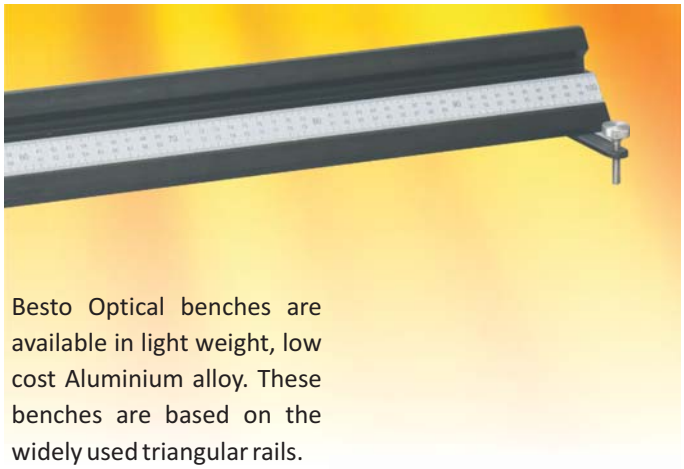
1814. Precision Optical Bench OB-16 (One Meter Long)

Specifications are same as per Cat. No. 1812 but rods are of one meter long.

	Description
a)	Having both steel C.P. rods
b)	Having both brass pipes inside shafting
c)	Having both S.S rods instead of steel rod.

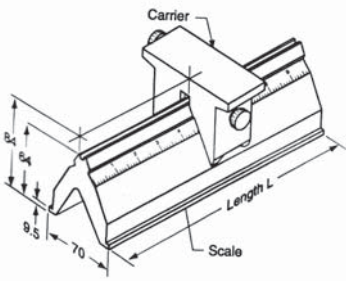
1816. Optical Bench - Triangular Rail Type

- Triangular Profile
- Free Standing Optical Rail
- Light Weight Aluminium
- Positioning scale in millimeters
- Length upto 1/2, 1 & 1½ mtrs.



Besto Optical benches are available in light weight, low cost Aluminium alloy. These benches are based on the widely used triangular rails.

These light weight Aluminum rails are ideal for educational & general laboratory applications. They are supplied with a simple positioning & calibrated scales in millimeters attached to the side of the rail.

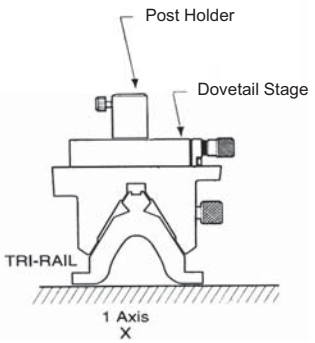


First Time in India Designed by us.

- Ideal for Teaching Labs
- Low cost Aluminium design

Need not to purchase Research Optical Bench

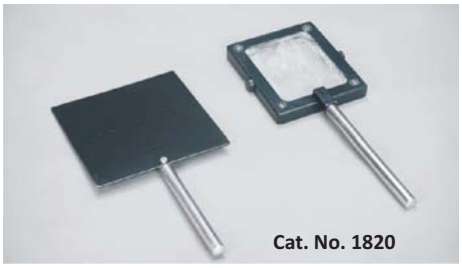
a)	Half Meter Long
b)	One Meter Long
c)	One & Half Meter Long



Carriers are made of aluminium which is machined & finished in black matt.

1820. Corona Plate

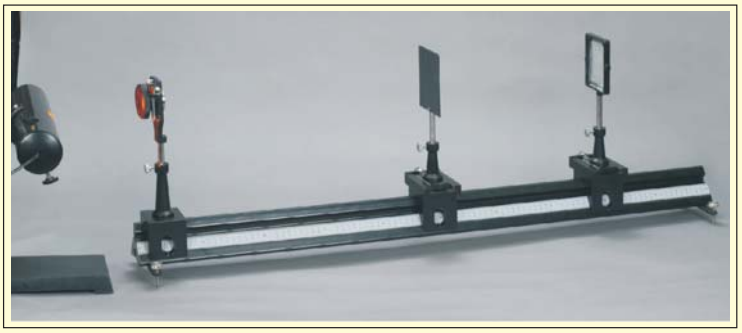
It consist of Black Brass Plate with small holes at equal distance from the centre of the Plate. Plate mounted in aluminium frame is supplied with rod. One glass Plate with rod is also supplied along with Brass plate.



Cat. No. 1820

EXPERIMENT NO. 153

To determine the diameter of particles of Lycopodium powder using Corona rings.



WHAT YOU NEED

- Corona Plate along with glass plate.
- Optical Slit
- Optical bench one meter long, Cat. No. 1656
- Lycopodium Powder
- Sodium vapour lamp Complete set.

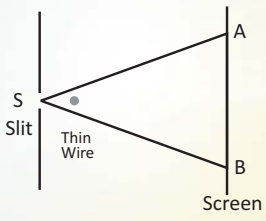
The diameter of particles of Lycopodium powder is given by : $d = 1.22\lambda D / x$

EXPERIMENT NO. 154

To find the thickness of a wire with the help of optical bench.

WHAT YOU NEED

- Optical bench with uprights
- Sodium Vapour lamp Complete setup
- Micrometer eyepiece
- Optical Slit
- Thin wire mounted in circular frame



Description of the apparatus:-

The action of the thin wire is shown in figure. When the thin wire is placed in the path of monochromatic light coming from the slit S, the light is reflected. Now the interference of light takes place. The two edges of the wire acts as the two sources. The interference fringes are observed on the screen AB or they can be seen in micrometer eyepiece.

EXPERIMENT NO. 155

To determine the wavelength of monochromatic light by diffraction at a straight edge (Study of diffraction by straight edge).

WHAT YOU NEED

- Optical bench with uprights
- Sodium Vapour lamp Complete setup
- Optical Slit
- Micrometer eyepiece
- Special slit with micrometer

Fresnel's Bi-prism Assembly

1835. Bi-Prism Assembly without Optical Bench

Fresnel Biprism set-up illustrates about the phenomenon of interference of light with the help of Bi-prism Expt., we can understand the concept of interference, image formation & the width of the fringes.

Consists of the following apparatus:

a) **Biprism Holder:** has the fine radial motion by a fine pitch screw.

b) **Micrometer Eyepiece:** Ramsden Eyepiece, 10x, is carried on a slider which moves along a micrometer screw. Accurately made. L.C.=0.01mm


Cat. No. 1835a


Cat. No. 1835b

c) **Auto Action/Lens Holder:** with automatic spring action for equal opening and closing of both sides.

d) **Optical Slit:** Optically true, precision ground stainless jaws, spring action for opening of jaws eliminated to ensure original accuracy even after prolonged use. Jaws open uniformly all along through a milled head. Jaw alignment tested for optical accuracy. Made for a lifetime of trouble-free use.

e) **Condensing Lens :** This lens is supplied with mount to condense the monochromatic Sodium Light.


Cat. No. 1835c


Cat. No. 1835d


Cat. No. 1835e

1836. Bi-Prism Assembly complete with Optical Bench

Fresnel Biprism setup illustrates about the phenomenon of interference of light. With the help of interference phenomenon, we can find the wavelength of monochromatic light source like sodium light in a very easy manner. Complete with optical bench of one meter long of Cat. No. 1656 with 5 riders & Bi-prism assembly as per Cat. No. 1835 and Fresnel Bi-prism of Cat. No. 1837. Supplied without sodium light source.


Cat. No. 1836

1837. Fresnel Bi-Prism

a)	30 x 40 mm
b)	40 x 50 mm

EXPERIMENT NO. 157

To find the wavelength of monochromatic Sodium Light using Fresnel Bi-prism.

WHAT YOU NEED

- Fresnel Bi-prism setup, Cat. No. 1836
- Sodium vapour lamp, complete setup, Cat. No. 1715.

1838. Research Optical Bench

The Bed is heavy cast iron with a strong control rib, throughly seasoned and aged before machining and grinding of its upper surfaces. Total length 180cm with a machined full length platform for the scale. The scale is from lifetime stainless steel fitted on its machined platform on the bed. Divided in mms to a length of 170cm. Accuracy of calibration ± 0.01%

The Carriages: Five carriages are provided to carry the standard experiement accessories. Under surfaces of carriages are machine true to fit the machined bed surface, and these machined surfaces are then jointly inter ground to give perfectly smooth sliding surfaces. While inter ground tests are carried out to ensure elimination of lateral shift during slide movements. Stainless Steel verniers fitted to the carriages read the scale of .01cm. The Bi-prism carriage is also provided with fine cross motion read by vernier to 0.01cm. Clamping arrangement is provided.

The standard experimental accessories fitted to the carriage are:

(i) Optical Slit : Manupulation of jaw movement free from any spring control ensuring maintenance of original accuracy even after prolonged use. The following adjustments are provided for the slit And its carriage.

a) Linear adjustment along the bed, read by vernier to 0.01cm.

b) Fine vertical adjustment by slow motion screw.

(ii) Bi-prism Holder : Provided with following adjustment:

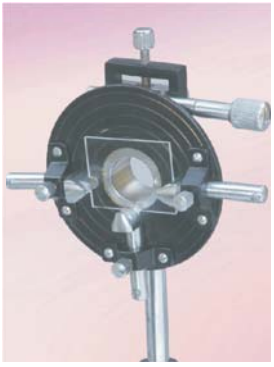
a) Linear adjustment along the bed, read by vernier to .01cm

b) Fine vertical adjustment by slow motion screw.

c) Fine cross motion by micrometer screw read by Vernier to .01cm

d) Quick radial motion along the horizontal axis

e) Fine radial motion along the horizontal axis.



(iii) Micrometer Eye Piece: Provided with the following Adjustments

a. Quick linear adjustment along the bed read by vernier to.01 cm

b. Fine micrometer vertical adjustment

c. Micrometer cross motion of the Eye piece along a 30-0-30 mm scale read on a micrometer head to .001 cm. Micrometer head fitted with anti back lash Device.

(iv) Auto Action Lens Holder : With automatic Spring action for equal opening and closing of both sides. Rest specifications of carriage are same as above.

v) Condensing lens with fifth rider is also supplied along with this bench.

(vi) Supplied with Bi-prism of 30x40mm

EXPERIMENT NO. 158

To find the wavelength of monochromatic Sodium Light using Fresnel Bi-prism.

WHAT YOU NEED

- Fresnel Bi-prism setup, Cat. No. 1838
- Sodium vapour lamp, complete setup, Cat. No. 1715.

1840. Nodal Slide Assembly

Consists of the following items

a) Nodal Upright: Consists of a combination of Single & double lens holder on a mount rotating along the vertical axis.

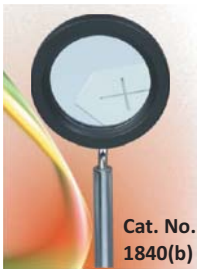
The combination lens holders are adjustable in height, and the single & twin lens holders can either be moved together by rack & pinion or relative to each other by sliding. These motions can be read by individual pointers on a mm scale.

Cat. No. 1840(a)

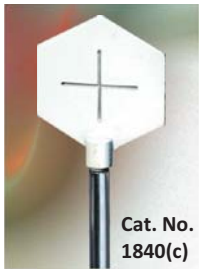
b) Mirror: Plain, inclinable with 3" steel C.P. Stem.

c) Optical Slit: With fine machined cross slit, one surface white & the other optical black, with 3" steel C.P. Stem.

d) Lamp House: an electric bulb is encased in a metal case with cord & pin. It works on 220V AC.



Cat. No. 1840(b)

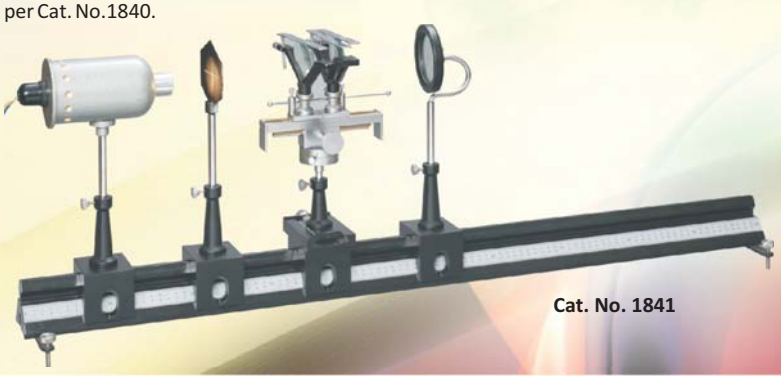


Cat. No. 1840(c)

Cat. No. 1840(d)

1841. Nodal Slide Assembly complete with Optical Bench

Complete with optical bench as per Cat No.1656(b) and Nodal Slide Assembly as per Cat. No.1840.



Cat. No. 1841

EXPERIMENT NO. 159

i. Determination of the focal length of the convergent lens.

ii. Determination of the focal length of the combination of convergent lenses.

iii. Verification of the relation.

$$\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{d}{f_1 f_2}$$

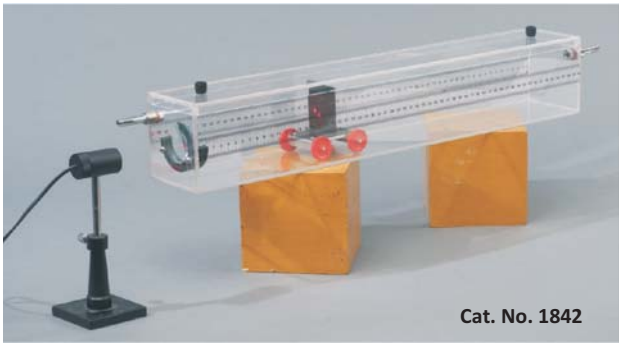
WHAT YOU NEED

- Nodal Slide Assembly complete with optical bench of Cat. No. 1841.

1842. Optic Trough

It consists of acrylic rectangular trough with graduation from 0-58 cms. It consists of Lens holder (combination of single & double lens) mounted on one side of rectangular trough. A small screen with four wheels is also supplied with this instrument.

Two semi conductors diode laser are mounted in such a way, so that we get two parallel beams of red laser. Supplied with diode laser power supply & two set of lenses.



Cat. No. 1842

EXPERIMENT NO. 160

i. Determination of the focal length of the single lens.

ii. Determination of the focal length of the combination of two lenses.

iii. To measure the focal length of the lens when medium of its surrounding is changed.

WHAT YOU NEED

- Complete set of optical trough.

1844. Lummar Brodhum Photometer Assembly

An experiment unit designed for work in degree science laboratories. The BESTO Lummer Brodhun Photometer assembly is assembled from the following standardized components.

Cat. No. 1844(a)

Cat. No. 1844(b)

Cat. No. 1844(b)

a) L.B. Photometer Head: A finely made instrument with the best imported optics and now with the latest system of rigid fixing of all optical components.

Light from two sources falls on either side of a uniform white opaque screen. Thus it is reflected by side reflectors (Optical prisms) and passes through the Lumner Brodhun cube. Observing the field through a telescope, the two light intensities are compared directly. The compact Photometer head is mounted in a swivel bracket to facilitate reversal of the slides.

b) Lamp House : 2 nos. On electric bulb is encased in a metal case with cord & pin, finished optical black.

1845. L.B. Photometer Assembly complete with Optical Bench

Complete with optical bench of one meter long of Cat No. 1656(b) with L.B. Photometer of Cat. No. 1844

Cat. No. 1845

EXPERIMENT NO. 161

To compare the illuminating powers (or Luminous of two given sources of light) using Lummar Brodhum Photometer.

WHAT YOU NEED

- L.B. Photometer Assembly, Cat. No. 1845

1846. Sextant standard pattern

160mm radius, designed to give maximum accuracy. Made from a strip of stainless steel so inlaid in the circular arc as to be considered integrated with it.

Cat. No. 1846

1847. Stand for Sextant

Sextant stand brass fitting

Cat. No. 1847

EXPERIMENT NO. 162

i. **To find the vertical distance between two points using a sextant.**

ii. **To find the horizontal distance between two points using a sextant.**

iii. **To find the height of an inaccessible object using a sextant.**

iv. **To determine the angular diameter of the fun with the help of sextant.**

WHAT YOU NEED

- Sextant standard pattern, Cat. No. 1846
- Stand for Sextant, Cat. No. 1847
- Measuring tape five metre long.

1850. Mirrors Concave or Convex (O.T.)

Mirrors, highly slivered, optically true (spray painted at the back) with a beautiful ring on its outer surface Concave & Convex F.L. 10 to 25 C.M.

	Focal Length
a)	50mm
b)	60mm
c)	75mm

1851. Double Concave & Double Convex Lens

Spherical Double Convex and Double Concave Lenses highly polished and well edged. Manufactured from plate Glass.

Lens Dia 50mm

	F.L.	D/CX	D/CC
a)	10cm		
b)	15cm		
c)	20cm		
d)	25-100cm		

1852. Double Concave & Double Convex Lens

Lens Dia 60mm

	F.L.	D/CX	D/CC
a)	10cm		
b)	15cm		
c)	20, 25cm		
d)	30cm		

1853. Double Concave & Double Convex Lens

Lens Dia 75mm

	F.L.	D/CX	D/CC
a)	10cm		
b)	15cm		
c)	20,25cm		
d)	30, 40 cm		
e)	50,100cm		

1854. Double Concave & Double Convex Lens

Lens Dia 100mm

	F.L.	D/CX	D/CC
a)	10cm		
b)	15cm		
c)	20,25cm		
d)	30,40cm		
e)	30cm		
f)	50,100cm		

1855. Set of Six Lenses

Set of six lenses, best quality in superior velvet lined cases. Diameter 50mm

1856. Llyod's Mirror

Superior Quality

1857. Magnifiers Metalic

Magnifiers metallic highly chromium plated

	Dia	F.L.
a)	40mm	10 cm
b)	50mm	20cm
c)	60mm	20cm
d)	75mm	20cm
e)	100mm	15cm
f)	125mm	30cm

1859. Glass Slab

Glass slab from Sheet Glass Bubble less, prepare from Belgium plate, highly polished sides, English glass.

	Size
a)	75x50x12mm
b)	75x50x18mm
c)	100x50x18mm

1860. Glass Slab

From Indian Glass Moulded.

	Size
a)	100x60x25mm
b)	75x50x18mm

1861. Glass Prism ($1^1/_2$")

1½" (37mm) from Indian Glass moulded

1862. Glass Prism ($1^1/_2$")

As above. 'A' grade without bubble

1863. Glass Prism (2")

2" (50mm) from Indian Glass moulded Equilateral.

1864. Glass Prism (2")

Same as Cat. No. 1759. 'A' grade without bubble Equilateral.

1865. Liquid Lens Pointer

As per Tamil Nadu Syllabus. It consist of 4" brass needle along with a ring to hold any suitable retort stand. Supplied without retort stand and lens

MISCELLANEOUS ITEMS IN OPTICAL SECTION

1867. Newton (Colour Disc)

Mounted on a metal stand with driving wheel, belt and handle. Export quality.

Cat No. 1867

1868. Pin-hole Camera

Wooden Polished

1869. Periscope

Made from seasoned wood, superior quality

1870. Mirror strip

With copper back silvered

	Size
a)	75x50mm
b)	100x25mm

1871. Bench Magnifier (Magnascope)

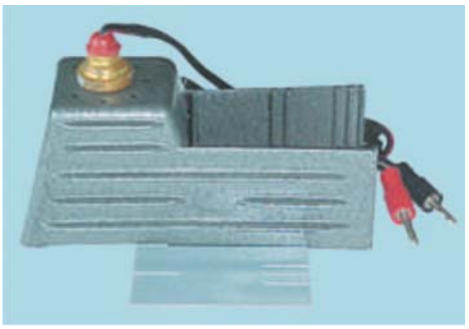
The magnifier is fitted with a precision lens of 150mm diameter and with an optical glass lens of 3x. It has maximum possible power for a lens of its size, consistent, with virtually no distrait or chromatic aberration.

It gives fatigue-free, stereo view equipped with round fluorescence tube (22Watt) which has shadow-less illumination. It is fitted on a universal stand fully adjustable vertically and horizontally, works on 220V A.C. Mains.

Cat No. 1871

1872. Ray Box

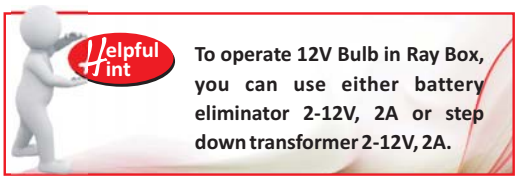
A ventilated lamp house having an open front with extended sides finned externally for heat dissipation and vertical internal grooves to accommodate a slit plate and a cylindrical lens. It has a light source comprising a 12 Volts lamps in a holder with 1 mtr of twin flex wire having banana plug. Complete with metal plate having single & triple slits and whitened on one side & black matt on the other side. Supplied without Cylindrical Lens 50 x 45 mm (FL +14D)



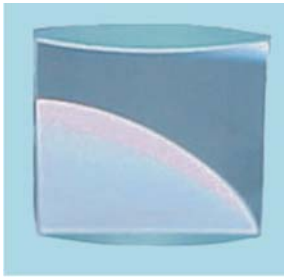
Cat. No. 1872

1873. Ray Box with Cylindrical Lens

Same as Cat. No. 1872, but supplied with Cylindrical Lens 50 x 45 mm (FL +14D).



To operate 12V Bulb in Ray Box, you can use either battery eliminator 2-12V, 2A or step down transformer 2-12V, 2A.



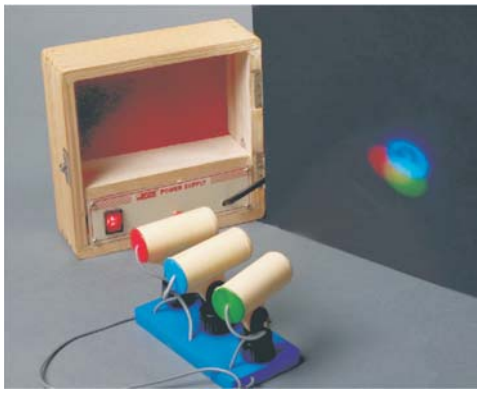
Cat. No. 1873

Kit for Primary & Secondary Colours

1875. Kit for Primary & Secondary Colours

It demonstrates that how the various colours are obtained by overlapping three primary colours of light. Kit is provided with three colour tubes - red, blue & green and adjustable movement that you can be easily moved up & down for overlapping of colours.

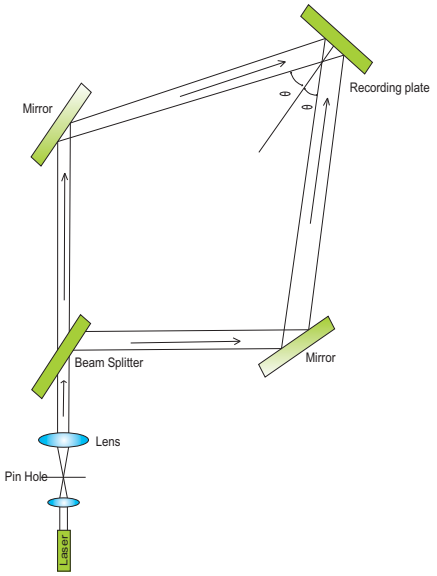
This basic technique of mixing of primary colours is used to produce various colours in television



Cat. No. 1875

1900. Holographic Kit

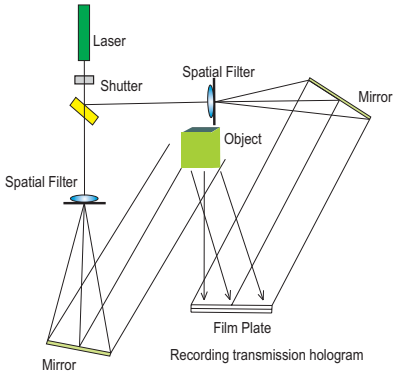
Besto holographic kit is a professional set up for shooting holograms in academic and research institutions. The equipment includes vibration isolated table, opto - mechanical modules, optical components, sample silver halide plates, processing chemicals, etc. All components and modules used in the kit are of industrial quality and reliablity. By changing the laser source and recording plates, the equipment can be used for commercial hologram shooting as well.



(I) Creation of Transmission Grating

The experiment involves the creation of transmission grating Using holography on a silver halide plate. The grating pitch is governed by the angle between the two incident beams that hot on the plate. We provide all the optics, opto - mechanics, laser, holographic plates, developing chemicals, etc. To perform the experiment.

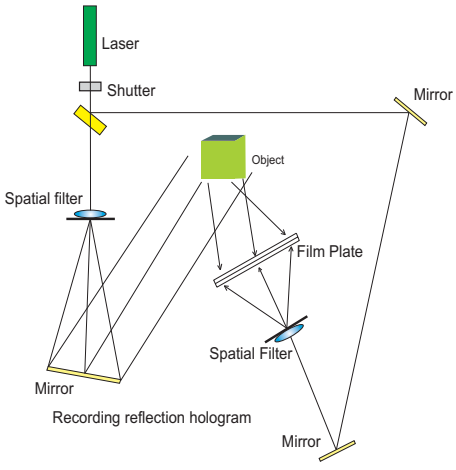
Our instruction manual contains experimental setups, principles, procedures, step-by-step instructions and required photographs for recording holograms.



(ii) Recording and Reconstruction of Transmission Holograms

The setup for the creation of reflection hologram is same as transmission hologram except the reference beam is lit from behind the plate. Controlling the beam ratio is very important in creating reflection holograms. We use variable beam splitter for the purpose.

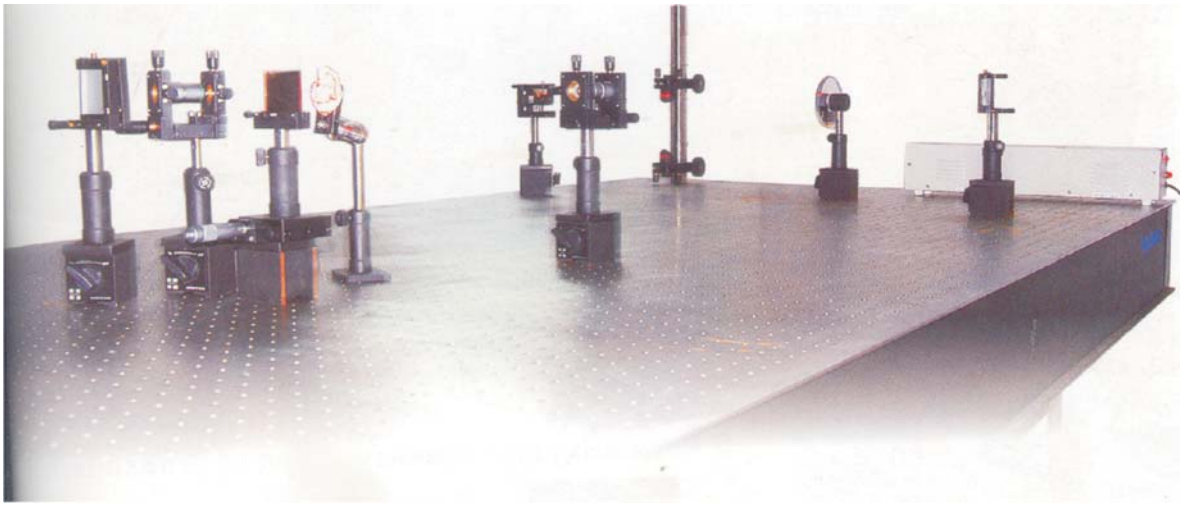
In the case of reflection hologram, a truly three-dimensional image can be seen near its surface. The hologram is illuminated by a “spot” of white incandescent light, head at a specific angle and distance located on the viewer’s side of the hologram.



(iii) Recording and Reconstruction of Reflection Holograms

To create a transmission hologram, laser beam is split into two. The beam reflected from the object is called object beam and the other one, a plane wave without any information, is called the reference beam. The exposure time varies from seconds to minutes depending on the object. Absolutely stable conditions are required during the exposure of the film. Variable beam splitters are provided to finely adjust the beam ratio.

To reconstruct the image, the plate is developed in the developer solution and is placed in its original position compared to the reference beam during its recording.



Components included in Holographic Kit

01) Optical honeycomb tabletop (1800x1200x200mm)
02) Pneumatic isolated support (inter connected)
03) He - Ne laser(5mW)
04) Laser clamp
05) Beam steering device (with magnet base)
06) 1" Mirror mount (with magnetic base)
07) 2" Mirror mount (with magnetic base)
08) Variable beam splitter mount (with magnetic base)
09) Spatial filter assembly with magnetic base
10) Screen
11) Object holder
12) Sample objects
13) Pinhole and microscope objective
14) Plate holder (with magnetic base)
15) 25mm dia mirror (Thickness - 4mm)
16) 50mm mirror (Thickness-5mm)
17) Variable beam splitter (Dia - 75mm)
18) Holography plate
19) Developer chemical
20) Plastic tray

Refer to page 157 & 158, we have given detail of Holographic kit. To install said Holographic kit, every engineering college /institute should have one dark room of minimum size 12' x 12' with minimum vibrations. This dark room must be fitted split AC (not window AC).

Please don't put any ceiling fan or table fan in the dark room. It's compulsory to install only split AC to get the room with minimum vibrations.

1919. Battery Eliminators BED-71

Designed to be safe and reliable source of low voltage D.C., for use in class rooms. Allows teachers to conduct experiments requiring a variety of direct current voltages while avoiding the decreased characteristics of partially exhausted dry cell.

Comprising heavy duty transformer wound with copper wire with high lamination to avoid losses, selector switch and bridge rectifiers (consists of full wave silicon diode bridge rectifier) with jewel light and safety fuse. Output 2-12 V D.C.in steps of 2, 4, 6, 8, 10 & 12V.

	Description
a)	Output 2 to 12 Volts D.C. at 1 Amp.
b)	Output 2 to 12 Volts D.C. at 2 Amp.
c)	Output 2 to 12 Volts D.C. at 3 Amp.
d)	Output 2 to 12 Volts D.C. at 5 Amp.

Battery Eliminator with full wave Silicon Diode Bridge Rectifier.

Cat. No. 1919

Permanent replacement of 1.5V dry cell. Battery Eliminator produces low voltage with current capacity to operate many Instruments.

1920. Battery Eliminator BED-71

Same as above but output voltage from 1.5 to 12 volts in 6 steps like 1.5V, 3V, 4.5V, 6V, 9V, & 12V.
Available in two different current capacities.

	Description
a)	Output 1.5 to 12 volts D.C. at 1 Amp.
b)	Output 1.5 to 12 volts D.C. at 2 Amp.

Cat. No. 1922

By Purchasing AC/DC battery Eliminator, you have got one additional feature, that you will get Step-Down Transformer absolutely Free in the same unit.

1922. Battery Eliminator A.C./D.C.

This versatile eliminator provides commonly used low voltage ranges of both alternating and direct current and has ample capacity for nearly all laboratory applications.

This unit contains a transformer with a variable voltage and a silicon diode bridge rectifier. Terminals for A.C. output are on one end and those for D.C. output at another end on the front panel. This battery eliminator can be used as a step down transformer also.

	Description
a)	Output 2 to 12 Volts A.C./D.C. at 2 Amp.
b)	Output 2 to 12 Volts A.C./D.C. at 3 Amp.

1923. IC Regulated Battery Eliminator (Stabilized)

Permanent replacement for 1.5V dry cell battery. Designed to be safe and a reliable source of low D.C. voltage. Solid state circuitry offers protection against inadvertent short circuits common in learning situations.

The unit incorporates an electronic overload cut-off which overcomes the inherent disadvantage of thermal magnetic devices and fuses. Input 230 VA.C., output 1.5V to 12 Volts in steps of 1.5, 2, 3, 4, 4.5, 5, 6, 8, 9, 10, 12V.

	Description
a)	Output 1.5, 2, 3, 4, 4.5, 5, 6, 8, 9, 10, 12V D.C. at 2A
b)	Output 1.5, 2, 3, 4, 4.5, 5, 6, 8, 9, 10, 12V D.C. at 3A

Cat. No. 1923

This type of eliminator is designed by us for first time, so that user can get all the ranges from 1.5 to 12V as well as 2 to 12V in one single unit.

1925. Fixed Voltage IC Regulated Power Supplies

High quality, well filtered, giving smooth fixed D.C. Voltage. Ideal for running many training boards like operational amplifiers (Type-741). Integrated Circuit Timer (Type-555) and Integrated Circuit Regulator (Type-723).

	Description
a)	5V or 6V at 1A
b)	5V or 6V at 2A
c)	9V or 12V at 1A
d)	9V or 12V at 2A
e)	15V or 18V at 1A
f)	15V or 18V at 2A

Fully Protected against short circuit, overload and overheating condition. Compact, robust and light in weight. Supplied without meter.

1926. Fixed Voltage IC Regulated Dual Power Supplies

Specifications are same as per Cat. No. 1925 except two Fixed Voltage Supplies are provided in this unit.

	Description
a)	±5V or ±6V at 1A
b)	±5V or ±6V at 2A
c)	±9V or ±12V at 1A
d)	±9V or ±12V at 2A
e)	±15V or ±18V at 1A
f)	±15V or ±18V at 2A

1927. Regulated Power Supply, Model PS-12

Application: General Purpose low cost laboratory power source ideally suited for analog and digital Ics

Output	:	For fixed voltage, viz +5V, -5V, +12V and -12V
Current	:	300mA max. for each
Regulation	:	±0.05% for no load to full load
Protection	:	Internally protected by over current and thermal shutdown.
Power Supply	:	220V ±10%, 50 Hz

Cat. No. 1927

1930. Training Board for the study of Power Supply (Solid-state)

The setup consists of a step down transformer, rectifier circuit (can be used as a half wave or a full wave rectifier) a filter circuit (on inductance and two capacitors) — the arrangement can be used for the study of various configuration of filters and a regulation circuit.

The following studies can be carried out with this set-up

1.	Study of rectification	(a) Full wave rectification
		(b) Half wave rectification
2.	Study of AC Component	(a) Efficiency of various types (Ripples) of filters - T type etc.
		(b) The effect of load
		(c) The effect of regulation
3.	Regulation charac.	(a) Effective load on regulation
		(b) The effect of change in mains voltage

Specifications :

Output	0-12 volts
Max. Current	200mA
Regulation	1%

Cat. No. 1930

1931. Analog Regulated Power Supply with two Analog Deluxe Meters

BESTO power supplies has been designed and manufactured as per exact engineering standards using superior quality components, offering overload/short circuit protection. A heavy duty stabilized power supply is useful for labs and workshops. The unit has voltmeter, ampere meter, Pilot light, on-off switch, variable power control knob. Coarse and Fine motion knob and two terminals are provided for output with grounded 3-wire power cord with fuse protection.

Cat. No. 1931

Specifications :

Line Regulation : 0.01% ± 10% from no load to full Load

Metering : (MR-100 Deluxe Meter with acrylic cover) Analog meter for simultaneous voltage and current reading.

Ripple and Noise : < 1mV RMS for low voltage supplies.
< 2mV RMS for high voltage supplies.

Latest technology using ICs, overload and short circuit protected. The following types of stabilized power supplies are available with above specifications.

	Output Voltage	Output Current	Meters
a)	0-15V	1A	2 Deluxe Meter
b)	0-15V	2A	2 Deluxe Meter
c)	0-15V	3A	2 Deluxe Meter
d)	0-15V	5A	2 Deluxe Meter
e)	0-32V	1A	2 Deluxe Meter
f)	0-32V	2A	2 Deluxe Meter
g)	0-30V	3A	2 Deluxe Meter
h)	0-30V	5A	2 Deluxe Meter
i)	0-30V	10A	2 Deluxe Meter

1932. Dual Tracking Supplies

The dual Tracking Power Supplies house two regulated power supplies mounted on single chassis. Other specifications are identical to Cat. No. 1931 power supplies. These types of supplies also have two deluxe meters to read output.

	Description
a)	0 to ±15V - 1A with 2 Deluxe Meters
b)	0 to ±15V - 2A with 2 Deluxe Meters
c)	0 to ±30V - 1A with 2 Deluxe Meters
d)	0 to ±30V - 2A with 2 Deluxe Meters

1935. Digital Regulated Power Supply With 2 DPM (3½ digit)

BESTO Digital Power Supplies has been designed and manufactured as per exact engineering standards using best quality components, offering overload/short circuit protection. Line Regulation is 0.01%. +10% Line variation & load regulation is 0.05% from no load to full load. Our 3½ digit Digital Panel Meters are compact panel meters for digital display of electrical quantities. These power supplies are very useful for R&D laboratories, control panel manufacturers, defence establishments etc.

	Output Voltage	Output Current	Meters
a)	0-15V	1A	2 DPM (3½ digit)
b)	0-15V	2A	2 DPM (3½ digit)
c)	0-15V	3A	2 DPM (3½ digit)
d)	0-15V	5A	2 DPM (3½ digit)
e)	0-15V	10A	2 DPM (3½ digit)
f)	0-30V	1A	2 DPM (3½ digit)
g)	0-30V	2A	2 DPM (3½ digit)
h)	0-30V	3A	2 DPM (3½ digit)
i)	0-30V	5A	2 DPM (3½ digit)
j)	0-30V	10A	2 DPM (3½ digit)

Cat. No. 1935

1936. High Voltage Digital Power Supply Model EHT-11

Specification

Application	EHT Source for photo multiplier tubes and other radiation detectors
Polarity	+ve or -ve as required
Output	0-1500V continuously adjustable
Max. Current	1mA
Stability	±0.02% for + 10% mains variation
Regulation	±0.05% for 0 to 1mA load
Display	3½ digit, 7 segment LED
Protection	Fully protected against overload and short circuit by current limiting technique

- Continuously variable
- Electronically regulated
- Fully Solid State Circuit
- Low Power Consumption

Cat. No. 1936

1937. EHT Power Unit

Suitable for electrostatics experiments and for driving vacuum devices such as the Deflection e/m Tube. The adjustable 5kV output is fully isolated and a backlit, digital meter monitors the output, An independent earth terminal is provided which enables the negative or positive side of the output to be earthed. There is a mandatory requirement to limit output current to 3mA. This provides an EHT output appropriate for electrostatics experiments with a short-circuit current of 60µA. An auxiliary output is provided to drive cathode heaters, etc.

Fixed Power Supply of 6V AC at 2Amp. is also provided separately.

Cat. No. 1937

- Continuously variable, 0-5kV at a maximum current of 2mA.
- Second output with 50MΩ safety
- Auxillary output, 6V AC at 2Amp.
- Digital back-lit display indicating EHT output.

1938. Low Voltage Digital Power Supply

This Power supply is a versatile, high specification power unit appropriate for demonstration purposes and for use by students in advanced courses. Provides continuously variable, 0-25V A.C. or D.C. at maximum current of 8.5A. A.C. & D.C. output voltages & currents are displayed on a large separate LCD display. A second button enables current & voltage to be selected. An internal fan keeps temperatures down when running at full load. Protection is provided by slow-blow fuse on the primary.

Cat. No. 1938

- Output voltage variable by rotary control knob up to 25V
- Continuously rated output of 8.5A, A.C. or D.C.
- Internal fan for cool-running.
- Digital displays for voltage and current for both A.C. and D.C.
- Slow-blow fuse protection on the primary.

1939. True RMS A.C. Millivoltmeter ACM-102

- Measures True RMS Voltage
- Accuracy 1%
- High Input Impedance
- High Stability
- Excellent Linearity

Specification

Voltage Range	20mV, 200mV, 2V & 20V
Frequency Range	10Hz to 200KHz
Input Impedance	1MΩ shunted by 25pf on all ranges
Accuracy	1% in the range 10Hz-100KHz, 2% in the range 100KHz- 200KHz
Display	3½ digit, 7 segment LED with auto polarity and decimal indication
Power Supply	220V ± 10%, 50Hz
Accessories	75cm shielded cable with a coaxial connector at one end and banana plugs on the other end.
Oscillator Output	0-300mV continuously variable
Frequency	1KHz (Sine) fixed

Cat. No. 1939

1940. True RMS A.C. Millivoltmeter ACM-103

Same as Cat. No. 1939 but with additional feature of oscillator output 0-300mV continuously variable & having fixed frequency of 1KHz (Sine Wave).

1941. Digital Gaussmeter DGM-102

Cat. No. 1941

Specification

Range	0-2 KG & 0-20KG
Accuracy	± 0.5%
Temperature	Upto 50°C
Display	3½ digit, 7 segment LED DPM
Power Supply	220V ± 10%, 50Hz
Transducer/Detector	Hall Probe - In AS
Special Feature	Indicate the direction of the magnetic field

1942. Digital Gaussmeter DGM-103

Same as Cat. No. 1941 but with additional range of 0-40KG.

- Measure down to 0.1 G
- Excellent Linearity
- Interchangeable Hall Probe

1943. Digital Gaussmeter DGM-204

Specification

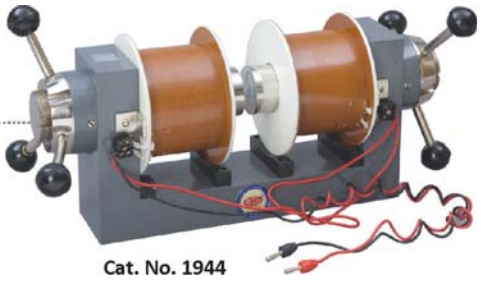
Range	0-200 KG, 0-2KG, 0-20KG & 0-40KG
Accuracy	±0.5% range
Resolution	0.1gauss at 200G range
Display	3½ digit, 7 segment LED Display with auto polarity and overflow
Transducer	Hall Probe - In As
Special Feature	Indicate the direction of the magnetic field

Cat. No. 1943

1944. Electromagnet EMU-50

Specifications

Field Intensity	7.5Kg. at 10mm air-gap
Pole Pieces	50mm diameter
Energising Coils	Two, each with a resistance of about 3ohms.
Power requirement	0-30V DC, 4A, if coils are Connected in series.
Weight	Approx. 33 Kg.



Cat. No. 1944

1945.Constant Power Supply DPS-50

Specifications

Current Range	Smoothly adjustable from 0-4A
Load Regulation	0.1% for load variation from 0 to maximum.
Line Regulation	0.1% for ± 10% mains Variation
Display	3½ digit, 7 segment LED Display
Application	Specially Suitable for Electromagnet Model EMU-50

Cat. No. 1945

1946. Electromagnet EMU-75

Cat. No. 1946

This type of Electromagnet is also available with tapered Pole Piece to 25mm diameter to increase the field intensity.

Specifications

Field Intensity	11Kg. At 10mm air-gap
Pole Pieces	75mm diameter flat
Energising Coils	Two, each with a resistance of about 12Ω.
Power requirement	0-90V DC, 3A, if coils are connected in series. 0-45V DC, 6A, if coils are Connected in parallel.
Weight	81 Kg.

1947. Constant Power Supply DPS-175

Cat. No. 1947

Specifications

Current Range	Smoothly adjustable from 0-3A per coil i.e. 6A
Load Regulation	0.1% for load variation from 0 to maximum.
Line Regulation	0.1% for ± 10% mains variation
Display	3½ digit, 7 segment LED Display
Application	Specially suitable for Electromagnet EMU-75

1948. Digital Microvoltmeter

Specifications

Range	1mV, 10mV, 100mV, 1V & 10V with 100% over-ranging
Resolution	1µV
Accuracy	± 0.2% ± 1 digit
Stability	Within ± 1 digit
Input Impedance	> 1000MΩ (10MΩ on 10V range)
Display	3½ digit, 7 segment LED with auto polarity and decimal indication
Power Supply	220V ± 10%, 50Hz

- Very low temperature drift
- Low DC input bias current-10pA
- Measures voltage down to 1µV
- Automatic polarity indicator

Cat. No. 1948

1949. Digital Nanoammeter

Specifications

Range	100nA, 1µA, 10µA, 100µA with 100% over-ranging
Resolution	0.1nA
Accuracy	0.2% for all ranges
Stability	Within ± 1 digit
Input Resistance	25Ω, 2.5Ω, 0.25Ω, 0.025Ω
Display	3½ digit, 7 segment LED (12.5mm height) with auto polarity and decimal indication
Input	Through amphenol connector
Power Supply	220V ± 10%, 50Hz

- Measures voltage down to 100pA
- All solid state and IC design
- Accepts either polarity of input current.

1950. Digital Picoammeter

Specifications

Multiplier	X1, X10, $X10^2$, $X10^3$, $X10^4$, $X10^5$
Resolution	1pA, 10pA, 100pA, 1nA, 10nA, 100nA
Accuracy	0.2% for all ranges
Stability	Within ± 1 digit
Input Resistance	2.5KΩ, 0.25KΩ, 25Ω, 0.25Ω, 0.025Ω
Display	3½ digit, 7 segment LED (12.5mm height) with auto polarity and decimal indication
Input	Through amphenol connector
Power Supply	220V ± 10%, 50Hz

- Measures voltage down to 1pA
- All solid state and IC design
- Very low offset current

Cat. No. 1950

1951. Hall Effect Set-up, DHE-21

Consists of the following :

Hall Probes (HPN-21, HPP-21)

Hall Probe (Ge Crystal)

Material	: Ge single crystal n or p-type
Resistivity	: 8-10 Ω cm.
Contacts	: Spring type (solid silver)
Zero-field potential	: <1mV (adjustable)
Hall Voltage	: 35-60mV/10mA/KG

Cat. No. 1951

Digital Millivoltmeter

Range	: 0-200mV (Resolution 100μV)
Accuracy	: ±0.1% of reading ±1 digit
Impedance	: 1 Mega ohm
Display	: 3½ digit, 7 Segment LED

Constant Current Generator

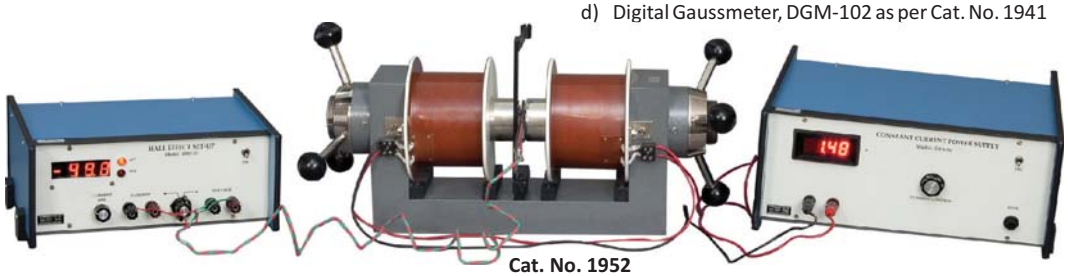
Currents	: 0-20mA (Resolution 10μA)
Display	: 3½ digit, 7 segment LED
Accuracy	: 0.25%; ±1 digit
Load Regulation	: 0.05% for no load to full load
Line	: 0.05% for ±10% changes

1952. Complete set of Hall Effect Experiment

The resistivity measurements of semiconductors cannot reveal whether one or two types of carriers are present; nor distinguish between them. However, this information can be obtained from Hall Coefficient measurement, which are also basic tools for the determination of carrier destiny and mobilities in conjuction with resistivity measurement.

The Hall effect experiment consists of the following :

a) Hall Effect Set-up Model DHE -21 along with Ge Crystal either p or n type as per Cat. No. 1951.
b) Electromagnet, EMU-50 as per Cat. No. 1944
c) Constant Current Digital Power Supply, DPS-50 as per Cat. No. 1945
d) Digital Gaussmeter, DGM-102 as per Cat. No. 1941



Cat. No. 1952

EXPERIMENT NO. 171

To study the Hall Effect in semiconductors and to determine Hall Voltage V_H, Hall co-efficient R_H,. the number of charge carries per unit volume n, the conductivity of the semiconductor sample σ, the carrier mobility μ and the Hall angle θ.

WHAT YOU NEED Complete set of Hall Effect Experiment as per Cat. No. 1952

1953. Apparatus for the Measurement of Susceptibility of Paramagnetic Solution by Quinks's Tube Method

The force acts on any substance when it is placed in a inhomogeneous magnetic field. This force depends on the susceptibility x, of the material, i.e. on ratio of intensity of magnetisation to magnetising field (I/H).

Quantitatively it refers to the extent of induced magnetisation in unit field. The force acting on a substance, either of repulsion or attraction, can be measured with the help of an accurate balance in case of solids (Gouy's Method) or with the measurement of rise in level in a narrow capillary in case of liquids.

From this measurement, the value of susceptibility can be calculated.

The apparatus consists of the following:

(a) Quincks's tube, QTT-01, Quink Tube Stand (QTS-01)
(b) Sample: $MnSO_4$, H_2O
(c) Electromagnet, EMU-50 as per Cat. No. 1944
d) Constant Current Digital Power Supply, DPS-50 as per Cat. No. 1945
e) Digital Gaussmeter, DGM-102 as per Cat. No. 1941
(f) Travelling Microscope as per Cat. No. 1566 /67.

Cat. No. 1953 (a)

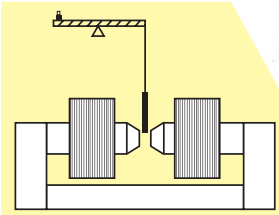
Note : For substances like $MnSO_4H_2O/FeCl_3$, EMU-50with tappered pole piece is sufficient, but for substances like water EMU-75 is required.

1954. Gouy's Method of Susceptibility Measurement of solids

In the Gouy method of susceptibility measurement, the solid sample in the form of a long cylinder (area of cross section A) is hung from the pan of a balance and is placed such that one end of the sample is between the pole-pieces of the magnet (field H) and the other one is outside the field. The force exerted on the sample by the in homogeneous magnetic field is obtained by measuring the apparent change (am) in the mass of the sample. The susceptibility x is given by x= 2amg/AH2.

If the sample is in the form of powder, it is filled in a long nonmagnetic tube which is then suspended from the pan of the balance. Appt. Consist of following

Cat. No. 1954



Schematic Diagram
Gouy's Balance Experiment

(i) Scientific Balance, KSB-07

Capacity	:	200 gms
Sensitivity	:	1/10 mg. by vernier
Beam	:	Hard Bronze/Brass
Arrestment	:	Circular, failling away type
Air Damping	:	Very quick and positive, beam coming to rest in 2-3 sec
Chainomatic Device	:	A gold plated chain is suspended from the beam with its other and screwed on the rotating drum on which a scale graduated from 0 to 10 div each division representing 1 mg is installed. By the movement of this scale before a vernier, reading upto 1/10th mg is taken.

(ii) Sample in the form of a long rod:
Set of 4 samples, 2 each of Ebonite and Wood

(iii) Constant Current Power Supply
Model DPS-175 , Cat. No. 1947

(iv) Electromagnet, Model EMU-75T, Cat. No. 1946

Pole Pieces	:	75mm tappered to 25mm
Mag. Field	:	22KG at 5mm air gap
Energising Coils	:	Two of approx. 13 ohm each
Power	:	0-90VDC, 3A, for coils in series 0-45VDC, 6A, for coils in parallel

(v) Gaussmeter
Model DGM-102, Cat. No. 1941
The experiment is complete in all respect.

EXPERIMENT NO. 172

To determine the magnetic susceptibili ty of solid by Gouy's Method.

WHAT YOU NEED Complete set of Gouy's Experiment as per Cat. No. 1954.

1955. PID Controlled Oven

This is high quality temperature controlled oven suitable for testing of electronic components & study of temperature transducers etc. The oven has been designed for fast heating and cooling rated which enhances the effectiveness of the controller. While the basic design of the controller is around the PID configuration for its obvious advantages, wastage of power is avoided by using a Pulse Width Modulated (PMW) switch. This combination has the advantages of both on-off controller and linear PID controller. The result is a good stable and accurate temperature control.

Specification of the Oven

Temperature Range	:	Ambient to 200°C
Stability	:	Short Range : ± 0.2°C. Long Range : ±0.5°C
Measurement Accuracy	:	±0.5°C (typical)
Oven Dimensions	:	Heating Chamber Inner Diameter : 25mm, Height : 100mm
Sensor	:	RTD (A Class)
Display	:	3½ digit, 7 segment LED (12.5mm)

Cat. No. 1955

1956. Dielectric Constant & Curie Temp. of Ferro Electric Ceramics App.

Description of the Experimental Set-up

1. **Probes Arrangement, DEA-01**

   It has two individually spring loaded probes. The probes arrangement is mounted in a suitable stand, which also holds the sample plate. To ensure the correct measurement of sample temperature, the RTD is embedded in the sample plate just below the sample. This stand also serves as the lid of temperature controlled oven. Proper leads are provided for connection to Capacitance Meter and Temperature Controller.

2. **DEC-Sample**

   Barium Titanate ($BaTiO_3$)

3. **Oven, DEO-01**

   This is a high quality temperature controlled oven. The oven has been designed for fast heating and cooling rates, which enhances the effectiveness of the controller.

4. **Main Unit**

   The Set-up consists of two units housed in the same cabinet.

(i) Oven Controller

Platinum RTD (A class) has been used for sensing the temperature. A Wheatstone bridge and an instrumentation amplifier are used for signal conditioning. Feedback circuit ensures offset and linearity trimming and a fast accurate control of the oven temperature.

Temp. Range	:	Ambient to 200°C
Display polarity	:	3½ digit, 7 segment LED with auto & decimal indication
Resolution	:	0.10C
Accuracy	:	+.50C (typical)
Stability	:	+0.20C
Power	:	150W

(ii) Digital Capacitance Meter

This is a compact direct reading Instrument for the measurement of capacitance of the sample.

Range	:	50-6000 pf
Resolution	:	1pf
Display	:	3½ digit, 7 segment LED

Cat. No. 1956

1957. Dielectric Constant Kit for Solid Samples

It consists of following :

a. Main unit for the measurement of Di-electric Constant for Solids at high temp. Upto 400°C
b. Sample PZT
c. Digital Capacitance Measurement Meter.
d. Dimmerstat 2 Amps
e. Digital temperature indicator.

1958. Curie Temperature for Ferro-Electric Material

It consists of

a) Digital voltmeter (0-9.99 V ac)

b) Audio oscillator (1KHz)

c) Standard Capacitors (pf, nf)

Dielectric cell consists of two 1" dia.gold plated brass discs fitted in between the cell holder.

Furnace : PID Controlled (RT 25° C) Thermocouple

EXPERIMENT NO. 173

To study Dielectric Constant as a function of temperature & Curie Temperature.

WHAT YOU NEED

- Curie Temperature Kit, Cat. No. 1958

1959. Curie Temperature Kit for Ferro-Magnetic Material

Ferri-magnetic (or ferrites) materials are complex oxides of iron and other metals. Knowledge of the Curie temperature of ferri-magnetic materials is of particular interest to the Physicists and the Engineers.

The Unit enables one to trace the B-H loop (hysteresis) of a ferromagnetic specimen using a C.R.O. A measurement of the area of the loop leads to the evaluation of energy loss in the specimen. As the temperature of the sample is increased, the area of the loop decreases. At Curie temperature, the loop becomes a straight line, indicating zero loss.

Curie Temperature Kit consists of:

i) Main Unit

ii) Furnace

iii) Digital Thermometer with Thermocouple Probe

iv) Ferrite samples

1960. Semi Conductor Diode Characteristics Apparatus (with four meters)

With built in dual IC regulated power supplies, fitted with selected semi conductor diode OA-79 or its equivalent, mounted on the front panel. Four MO-65 meters with their separate terminals are provided on the front panel. 0-1.5V & 0-10mA meters are used for forward bias characteristics apparatus whereas for reverse bias characteristics apparatus 0-35V and 0-50µA moving coil meters are used. Separate terminals for all the four meters, Semi conductor diode as well as for dual power supplies are provided on the front panel.

Supplied in a powder coated sheet metal box. High Quality aluminium panel is used for longer durability. Supplied with lead.

Cat. No. 1960

1961. Semi Conductor Diode Characteristics Apparatus (with Two meters)

This is a low price unit having two dual range meters instead of using three or four separate meters. One dual range voltmeter 1.5V/30V and another dual range meter of 50µA/10mA are used. Other specifications are same as that of Cat. No. 1960.

Cat. No. 1961

EXPERIMENT NO. 175

To study and plot the forward and reverse bias characteristics of 'Ge' & 'Si' semi conductor diodes.

WHAT YOU NEED

- Semi conductor / PN Junction diode characteristics App. either with 2 Meters or 4 Meters, Cat. No. 1960/61.

1962. Determination of Energy Gap in PN Junction Diode

Provided with two meters, power supply, PN junction diode & mini heating oven with thermometer for temp. measurement. Supplied with thermometer & leads.

Cat. No. 1962

EXPERIMENT NO. 176

To determine the Energy Band Gap in PN junction diode.

WHAT YOU NEED

- Energy Band Gap kit , Cat. No. 1962.

1963. Study of the energy band-gap and diffusion potential of P-N Junctions

The following studies can be carried out on any P-N Junction - Ge/Si rectifiers, LED's base emitter/collector - base Junction of transistors

(i) Reverse Saturation current I_0

(ii) Temperature Coefficient of Junction Voltage dV/dt

(iii) Energy Band Gap V_{G_O}

(iv) Junction Capacitance

Complete in all respect, including power supplies, temperature controlled oven and digital meters for measurement of current, voltage and temperature. Accessories required: CRO

Cat. No. 1963

1964. Zener Diode V-I Characteristics Apparatus (Forward & Reverse)

Instrument comprises of DC Regulated Power Supply 0-10 VDC 10mA, two dual range MO 65 meters are used for voltage & current measurement, Zener Diode is mounted on the panel, connections of Supplies, Meters & Zener Diode brought out at 4mm terminal.

High quality aluminium panel used for longer durability, housed in sheet metal box.

Cat. No. 1964

EXPERIMENT NO. 177

To study Forward & ReverseV-I Characteristics of Zener Diode.

WHAT YOU NEED

- Zener Diode Characteristics App. , Cat. No. 1964.

1965. Voltage Stabilization Characteristics of Zener diode with 2 meters

One continuously variable DC power supply of 0-30V. Two analog moving coil round voltmeter to measure Input & Output voltages are provided on the front panel. One series resistance & one zener diode of 8.2 V has been provided on front panel. Different type of load resistances selectable using band switch are also provided on the front panel.

High quality aluminium panel used for longer durability, High accuracy MO-65 Meters are used in this kit. Supplied with leads

EXPERIMENT NO. 178

To study the voltage stabilization charaterisitics of a zener diode .

WHAT YOU NEED

- Stabilisation Kit for Zener Diode, Cat. No. 1965.

1966. Junction Diode (PN) & Zener Diode Trainer Digital Model (Combined)

Complete Kit (Digital) in all respects with the following built-in-components :-

- Built-in two Digital Panel Meters to read Voltmeter & Microammeter/Milliammeter readings (20V & 2000 µA /200mA)
- Solderless Breadboard of Size 3½"x2½" is also mounted on substantial Hylem backing plate.
- Contents of Kit :

  1 Zener Diode 1Z5V6

  1PN Junction Diode in 4007

  1 Carbon Resistance of 270 ohm, 1 Watt.
- Spare plastic coated single Tinned copper wires (SWG No. 22) are provided for easy connection.
- Built-in variable stabilized power supply 3V and 15V (Selectable)

Cat. No. 1966

1967. Junction Diode (PN) & Zener Diode Trainer Analog Model (Combined)

This kit comprises four MO-65 Meters of range 1V, 10V, 10mA & 20mA. Consists of two built-in stabilised Power Supplies of 1V & 10V, housed in a sheet metal box with bakelite panel

Cat. No. 1967

EXPERIMENT NO. 179

To draw characteristic curve of PN Junction Diode in forward bias, determine its forward resistance and characteristic curve of Zener Diode in reverse bias.

WHAT YOU NEED

Junction Diode (PN) & Zener Diode Trainer Model either digital Model, Cat. No. 1966 or Analog Model, Cat. No. 1967

1968. Transistor Characteristics Apparatus (Analog Version Combined Model)

This apparatus is used to verify the Input, Output & Transfer Characteristic of PNP & NPN transistors in common emitter as well as in common base mode. It is a complete unit provided with all components, regulated power supplies, meters etc. to perform the experiment.

Features:

- Two built in continuously variable regulated power supplies
- Four MO-65 moving coil type meters are provided to monitor voltage & current with their separate terminals for each meter.
- Rugged construction, compact unit provided with self explanatory USER'S Manual
- Special design of sheet metal box, gives maximum visibility for scale of meters.
- Supplied with high quality connecting leads.

Cat. No. 1968

1969. PNP & NPN Transistor Characteristics App. (Digital version Combined Model)

Complete Kit (digital) in all respects with the following built-in components.

- Built-in two Digital Meters to read Voltage & Current (i.e 2V, 20V, 200mA & 200μA).
- Built-in variable stabilized power supplies 0-1V & 0-10V
- Banana sockets are provided for students to make connections themselves.
- Supplied with 10nos. safety leads with banana plugs.

Cat. No. 1969

EXPERIMENT NO. 180

To verify the input, output & Transfer characteristics of PNP & NPN Transistors in CE & CB Mode.

WHAT YOU NEED

- Transistor characteristics App., either Analog Model, Cat. No. 1968 or Digital Model, Cat. No. 1969.

Helpful Hint

Both model of BESTO Transistor Characteristic Appts - analog model as well Digital model are supplied with two separate PNP & NPN transistors with their independent sockets/terminals to conduct four experiments in a single Unit

I) Ch. of PNP Transistor in CE mode ii) Ch. of PNP Transistor in CB mode
iii) Ch. of NPN Transistor in CE mode iv) Ch. of NPN Transistor in CB mode

1970. FET Characteristics Apparatus

The board consists of two IC regulated power supplies: 0-10V continuously variable D.C. stabilized power supply and 0-15V continuously variable D.C. stabilized power supply.

The two voltmeters 10V and 15V are used for the said power supplies. One 15mA moving coil meter is also provided on the front panel. On/Off switch, jewel light and FET is mounted on the front panel. Supplied with leads & working manual.

Cat. No. 1970

EXPERIMENT NO. 181

To study the characteristics of Field Effect Transistors (FET)

a). Measurement of IDSS b). Drain Current v/s Drain Voltage c). Drain Current v/s Drain Bias Characteristics

WHAT YOU NEED

- FET Characteristics App., Cat. No. 1970

1972. UJT Charcteristics Apparatus & UJT as Relaxation Oscillator

Instrument comprises of two DC Regulated power supplies of 0-15V & 0-25V. Three analog meter are mounted on the front panel to measure voltage & current, UJT 2N 2646 mounted behind the panel & connections of supplies, meters, UJT are brought out on sockets.

Features :

High quality aluminium panel used for longer durability, High accuracy Mo65 square meters are used in the kit.

High quality computer power cord and patch cords used

EXPERIMENT NO. 183

To study V-1 characteristic & application of UJT as relaxation oscillator.

WHAT YOU NEED

- UJT characteristics App., Cat. No. 1972

1973. To study the Hybrid Parameters of a Transistor.

The following studies can be carried out with this setup.

1. Study of H_{11} parameter (input impedance parameter)
2. Study of H_{22} parameter (output admittance parameter)
3. Study of H_{21} parameter (forward current transfer ratio)
4. Study of H_{12} parameter (reverse voltage feedback ratio)

The setup is provided with a built in power supply.

WHAT YOU NEED

- True R.M.S. A.C. Millivoltmeter, Model ACM-103,
- Multimeter

1974. Photo Transistor Characteristics Apparatus

Instrument comprises of DC Regulated Power Supply 0-3VDC/150mA, two Analog meters fo voltage & current measurement, connections of supplies & photo transistor brought out at 4mm sockets.

- Lamp holder with 60W bulb
- Wooden Plank

EXPERIMENT NO. 184

To plot a graph between voltage & current at different intensity of light.

WHAT YOU NEED

- Photo Transistor Characteristics App., Cat. No. 1974

1975. MOSFET Characteristics Apparatus

Instrument comprises two DC regulated Power Supplies 0-15VDc /150mA & 0-25 DC/150mA, three MO-65 for Voltage & Current measurement. One MOSFET No. TRF-840 mounted behind the panel, connection of supplies, meters & MOSFET brought out at 4mm sockets.

EXPERIMENT NO. 185

To plot VDS vs ID for different values of VGS.

WHAT YOU NEED

- MOSFET Characteristics App., Cat. No. 1971

1976. Diac Characteristic Apparatus

Instrument comprises of DC Regulated Power Supply 0-50 VDC/150mA, two Analog meters for voltage & current measurement, one Diac mounted behind the panel, connections of Supplies & Diac are brought out at 4mm Sockets.

Features :

High quality aluminium panel used for longer durability, High accuracy Mo65 meters are used in the kit. High quality computer power cord and patch cords used.

EXPERIMENT NO. 186

To study V-1 characteristic of DIAC

WHAT YOU NEED

- DIAC Characteristics App., Cat. No. 1976

1977. Triac Characteristics Apparatus

Instrument comprises of Two DC Regulated Power Supplies 0-15VDC/150mA & 0-5 VDC/150mA, three analog meters for voltage & current measurement, Triac mounted behind the panel, connections of Supplies & Triac are brought out at 4mm Sockets.

Features :

Are same as per Cat. No. 1976

EXPERIMENT NO. 187

To study the V-1 Characteristics of triac in all the four Quadrants.

WHAT YOU NEED

- TRIAC Characteristics App., Cat. No. 1977

1978. Opto Coupler Characteristics Apparatus

In built of DC Regulated Power Supply of 5V DC, Square wave Function Generator 1Hz-200KHz, Photo Transistor (L14GIQ120) using for sensing. Two meter are (Ammeter 150mA & Voltmeter 10-0-10V DC) for Current & Voltage measurement. Circuit diagram printed on the front panel.

1980. Class 'c' Amplifier

Instrument comprises of fixed output DC regulated Power Supply of 5V, circuit diagram printed , components mounted inside the cabinet & important connections are bought out on sockets

EXPERIMENT NO. 190

To study the concept of resonance frequency in class C Amplifier.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1980

1981. Darlington Pair Amplifier

Instrument comprises of fixed output DC Regulated Power Supply of 12V. Transistors, Resistances and Capacitors are mounted on the front panel, Circuit Diagram is printed and connections of important points are brought out on 4mm

EXPERIMENT NO. 191

To study Darlington Pair Amplifier configuration and measurements of output impedence.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1981
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO

1982. Transistor Amplifier Circuits (CB,CE &CC Modes)

Instrument Comprise of fixed output DC regulated Power Supply ± 12V, Circuit diagram is printed and components mounted on the front panel & connections of important points brought out on Sockets.

EXPERIMENT NO. 192

To study frequency Response , Input Impedence , Output Impedence & -ve Feed Back of Common Base, Common Emitter & Common Collector Transistor Amplifiers.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1982
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO

1983. Audio Power Amplifier using IC TBA 810

Instrument comprise of Fixed output DC Regulated Power supply of 6V IC TBA 810, Circuit diagram is printed and important connections are bought out on 4mm sockets.

EXPERIMENT NO. 193

To study of frequency response and output power of audio power amplifier.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1983
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO

1984. FET Common Source Amplifier

Instrument comprise of fixed output DC regulated Power Supply, Circuit diagram is printed, components mounted behind front panel & connections of important points brought out at 4mm Sockets.

EXPERIMENT NO. 194

To study of Voltage Gain and frequency Response of a FET in a common Source Amplifier.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1984
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO

1985. Complementary Symmetry Amplifier

Instrument comprises of fixed output DC Regulated Power. Supply of 12V, Circuit diagram is printed, Components mounted behind the front panel & connections of important points brought out at 4 mm Sockets.

EXPERIMENT NO. 195

To study frequency response & output of a complementary Symmetry Amplifier.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1985
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO 20MHz

1986. Class 'A' Amplifier Class 'A', 'B', 'AB' & Push Pull Amplifier

Instrument comprises of fixed output DC Regulated Power Supply of 12V, Circuit diagram is printed, Components are mounted behind the front panel & connections of important points are brought out at 4 mm Sockets.

EXPERIMENT NO. 196

To study of output gain and Frequency Response of class 'A', 'B', 'AB' and Push Pull Amplifiers.

WHAT YOU NEED

- Electronic Training Board, Cat. No. 1986
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO 20MHz

1987. Biasing of Transistor in Class 'A' Amplifier

Instrument comprises of two fixed output DC Regulated short circuit and overload protected Power Supply, One DC moving coil Round meter, three different values of RL and RE selectable using Bandswitch provided on front panel, circuit diagram is Printed & components mounted on the front panel.

EXPERIMENT NO. 197

To study the effect of different biasing network on output gain and of and frequency response in class A operation.

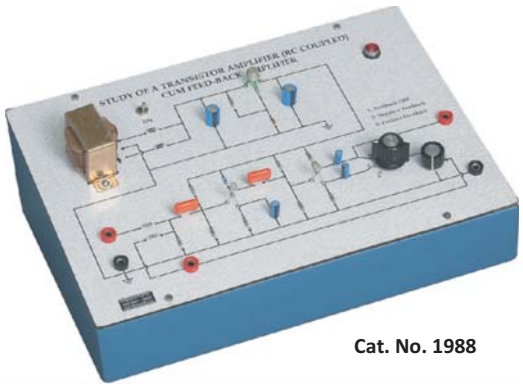
WHAT YOU NEED

- Electronic Training Board, Cat. No. 1987
- Audio Frequency Function Generator
- Digital AC Millivoltmeter
- CRO 20MHz

1988. Study of a Transistor Amplifier (RC Coupled) Cum Feedback Amplifier

The following studies can be carried out:

(a) Study of the basic circuit of a RC coupled amp.
(b) Frequency response of RC amplifier
(c) Effect of negative feedback on the gain and frequency response of the amplifier
(d) Effect of positive feedback on the gain and frequency response of the amplifier
(e) Verification of the condition of oscillation
(f) Study of different classes of amplifier



Cat. No. 1988

WHAT YOU NEED

- A.F. Oscillator
- True RMS AC Millivoltmeter, ACM 103

All instrument from Cat. No. 1980 to 1987 are provided with built in IC regulated Power Supply. High Quality aluminum or bakelite Panel is used for longer durability .

Step Down Transformer

BESTSELLER

1989. Step Down Transformer

The step down transformer can be used to supply low voltage, useful for many applications in the lab. The unit consists of a step down transformer with different tappings for different voltages, selected by selector switch. The A.C. output is obtained on the two terminals given on the front panel.

a)	Output 2-4-6-8-10-12 Volts A.C. at 2 Amp.
b)	Output 2-4-6-8-10-12 Volts A.C. at 3 Amp.
c)	Output 2-4-8-12-16-20 Volts A.C. at 2 Amp.
d)	Output 2-4-8-12-16-20 Volts A.C. at 3 Amp.

Cat. No. 1989

1994. Resistivity of Semiconductor by Four Probe Method at Different Temperature and Determination of the Band-gap.

The experiment consists of the following :-

(a) Four Probe Arrangement

(b) Oven (up to 200°C) with a power supply

(c) Sample : 'Ge' Crystal

(d) Four Probe Setup, Model DFP -02

This unit consists of the following :

Constant Current Generator

Open Circuit Voltage :		18V
Current Range	:	0-20mA
Resolution	:	10µA
Accuracy	:	±0.25% of the reading ± digit
Load Regulation	:	0.03% for no load to full load.
Line Regulation	:	0.05% for ±10% of mains changes.

Multi Range Digital voltmeter

Range	:	XI (0-200mV) and X10 (0-2V)
Resolution	:	100µV at XI Range
Accuracy	:	± 0.1% of reading ± 1 digit
Impedance	:	1 Mohm
Display	:	3½ digit, 7 segment LED (12.5mm) height with auto polarity and decimal indication.
Power Supply	:	220V±10% 50 Hz

Cat. No. 1994

EXPERIMENT NO. 199

To determine the conductivity of the material in thin films & to study its variation with temperature.

WHAT YOU NEED

- Four Probe Apparatus, Cat. No. 1994 or 1995.

1995. Resistivity of Semiconductor by Four Probe Method at Different Temperatures and Determination of the Band-gap (Advance Model)

Description of the experimental set-up

1. **Probes Arrangement, FPA-03 :** It has four individually spring loaded probes. The probes are collinear and equally spaced. The probes are mounted in a Teflon bush, which ensures a good electrical insulation between the probes. A teflon spacer near the tips is also provided to keep the probes at equal distance. The probe arrangement is mounted in a suitable stand, which also hold, the sample plate. To ensure the correct measurement of sample temperature, the RTD is embedded in the sample plate just below the sample. This stand also serves as the lid of the temperature controlled oven, Proper leads are provided for the current and voltage measurement.
2. **DFP 03-Sample :** Germanium crystal in the form of a chip.
3. **Oven, FPO-03 :** This is a high quality temperature controlled oven suitable for Four Probe Set-up. The oven has been designed for fast heating and cooling rates, which enhances the effectiveness of the controller.
4. **Four Probe Set-up, DFP-03 :** The set-up consists of three units housed in the same cabinet.

i. Oven Controller

Platinum RTD (A class) has been used for sensing the temperature. A wheatstone bridge and an instrumentation amplifier are used for signal conditioning. Feedback circuit ensures offset and linearity trimming and a fast accurate control of the oven temperature.

Temperature range :		Ambient to 473k
Stability	:	±0.5k
Measurement	:	±1K (typical)
Oven	:	Specially designed for Four Probe Set-Up
Display	:	3½ digit, 7 segment LED with auto polarity and decimal indication

ii. Multi Range Digital Voltmeter

iii. Constant Current Generator

Specification of Multi Range Digital Voltmeter & Constant Current Generator is same as per Cat. No. 1962.

Cat. No. 1995

1996. Electron Spin Resonance Spectrometer

In this method, use is made of the Zeeman interaction of the magnetic dipoles associated with the nucleus or the electron, when placed in an external magnetic field. Accordingly, they are identified as NMR (Nuclear Magnetic Resonance) or ESR (Electron Spin Resonance). This form of spectroscopy finds many applications in many diverse branches of Physics, Chemistry and Biology.

This set-up is designed, keeping in mind the basic objectives of a classroom experiment. The observation of ESR in low magnetic field and in a radio frequency makes this apparatus very simple, inexpensive and within reach of every Post Graduate laboratory.

The Electron Spin Resonance experiment comes complete along with following accessories:

(I) Helmholtz coils with an attachment for the ESR-HC

(Ii) ESR Sample : DPPH

(Iii) R.F. Oscillator (10MHz to 19MHz)

Optional Accessory : CRO

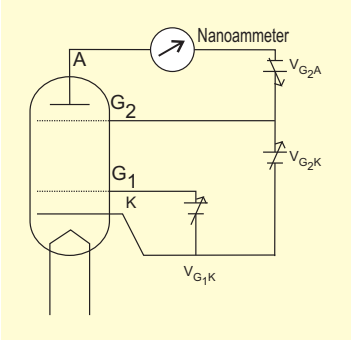
1997. Franck-Hertz Experiment

In 1914 Franck & Hertz experimentally proved that the energy transferred from electrons to atoms always has discreet values and the values obtained for energy levels are in agreement with spectroscopic results. Thus experimentally proving the Bhor's Model. It is a landmark experiment and can e performed in any college lab.

The experiment consists fo the following :-

- Argon filled tetrode
- Filament Power Supply
  3.6-4.3 continuously variable
- Power Supply for V_{G_1K}
  1.3-5V continuously variable
- Power Supply for V_{G_2A}
  1.3-15V continuously variable
- Power Supply for V_{G_2K}
  0-95V continuously variable
- Saw tooth waveform for CRO display
  Scanning Voltage :0-80V
  Scanning Frequency : 115+20 Hz
- Multirange Digital Ammeter
  Display : 3½ digit, LED
  Range : 10^{-7}, 10^{-8} & 10^{-9}A

The instrument can not only lead to a plot of the amplitude spectrum curve by means of point by point measurement, but also directly display the amplitude spectrum curve on the oscilloscope screen. This instrument can thus be used as classroom experiment as well as for demonstration to a group of students.



2000. LED Characteristics Apparatus

Instrument comprises of DC Regulated Power Supply 0-2.5 VDC/10mA, two round MO-65 meters for voltage & current measurement, LED's mounted on the front panel, connections of Supplies & LED brought out at 4mm Sockets/Terminals.

High quality bakelite panel is used for longer durability. High accuracy MO-65 Round Meters are used. Supplied with leads.

EXPERIMENT NO. 200

To study V-I Characteristics of coloured LED's.

WHAT YOU NEED

- LED Characteristics Apparatus, Cat. No. 2000.

2001. LDR Characteristics Apparatus

Instrument comprises of DC Regulated Power Supply 0-10V/10mA, two Mo65 meters for voltage & current measurement, LDR mounted on the panel, connections of Supplies & LDR brought out at 4mm Sockets/terminals.

High quality white bakelite panel is used for longer durability, High accuracy Mo65 round meters are used in the kit. Supplied with leads.

Standard Accessories :

I) Lamp holder with Bulb.

ii) LDR mounted on Bakelite case.

EXPERIMENT NO. 201

To plot a graph : Current versus Intensity of Light at different values of voltages.

WHAT YOU NEED

- LDR Characteristics Apparatus, Cat. No. 2001.

2002. Flashing & Quenching of Neon Bulb

Instrument comprises of High voltage DC Power Supply 250VDC/30 mA, 3 Capacitors (Paper Type) connected Behind the front panel, can be selected using toggle switches & One Neon lamp mounted on the front panel.

EXPERIMENT NO. 202

To calculate Charge & Discharge time of a Condenser.

WHAT YOU NEED

- Flashing & Quenching of Neon Bulb, Cat. No. 2002.

2003. SCR Characteristics Apparatus

Instrument comprises of two DC Regulated Power Supply 0-2V & 0-20V, three MO-65 round meters 2V/20V, 10mA & 50µA for voltage & current measurement, SCR mounted behind the panel, connections of Supplies, Meters & SCR brought out at 4mm Sockets/Terminals.

High quality white bakelite panel is used for longer durability, High accuracy MO-65 Round Meters 2V/20V, 10mA & 50µA are used. Supplied with leads.

EXPERIMENT NO. 203

To study V-I Characteristics of SCR.

WHAT YOU NEED

- SCR Characteristics Apparatus, Cat. No. 2003.

2004. Thermister Characteristics Apparatus

Instrument comprises of fixed DC Regulated Power Supply 5V One glass thermistor is kept in temperature controlled oven, Connections of Supply, Meter & Thermistor are brought out at 4mm Sockets/Terminals. One galvanometer of MO-65 meter is used.

High quality bakelite panel used for longer durability, Supplied with leads.

EXPERIMENT NO. 204

To plot negative resistance co-efficient (NTC) Characteristics of a Glass Thermistor.

WHAT YOU NEED

- Thermistor Characteristics Apparatus, Cat. No. 2004.

2005. Conversion of Galvanometer into Voltmeter

The unit consists of Mo65 Galvanometer of internal resistance of 100 ohms **(specially designed galvanometer)** & voltmeter 10V. Built in power supply of 10V along with two suitable resistances so that we can show how galvanometer is working as voltmeter of 5V & 10V.

2006. Conversion of Galvanometer into Ammeter

The unit consist of Mo65 galvanometer of internal resistance 100 ohms **(specially designed galvanometer)** & milliammeter of 100mA. Built in power supply of 10V along with two suitable resistances so that one can see how galvanometer is working as milliammeter/ Ammeter of 50mA & 100mA.

2008. Full Wave Rectifier

Provided with three meters of 20V AC, 20V DC & 100mA DC, Full wave rectifier with transformer with center tapped secondary and load resistor. The secondary terminals of the transformer connected to the p-regions of two pn junction diode. The centre tap is connected to the ground. The load resistance is connected across the common n-regions of the diode and the ground.

EXPERIMENT NO. 208

To study full wave rectifier using semi conductor diodes and determine rectifier efficiency and the load regulation.

WHAT YOU NEED

- Full wave rectifier kit, Cat. No. 2008.

2009. Half wave, Full Wave & Bridge Rectifier

The training board consists of centre tapped transformer along with inductance, resistance & capacitance (to be used in filter circuits).

EXPERIMENT NO. 209

To study half wave, full wave & bridge rectifier.

WHAT YOU NEED

- Electronic kit, Cat. No. 2009
- AC Voltmeter 10Volts
- Digital Multimeter
- Capacitor 0.1mfd

2010. Lissajous Figure Apparatus

Fixed Output DC Regulated Power Supply of +15V. Builtin Sine Wave Oscillator of 1 kHz frequency. Capacitor & resistance are mounted behind the front panel selectable through SPDT switches with connections brought out on sockets. One potentiometer (S) is mounted on the front panel to change the phase difference. One operational amplifier IC 741 is placed inside the cabinet with connections brought out on sockets for 180° Phase Shift.

EXPERIMENT NO. 210

To study the various Lissajous figures when sine wave signals of same frequency differs in phase.

WHAT YOU NEED

- Lissjous Patterns Apparatus, Cat. No. 2010
- Dual trace CRO 20MHz/I0 MHz

2011. Measurement of High Resistance using Substitution Method

Continuously variable, Over load & short circuit protected DC regulated power supply of 0-8 Volts. One galvanometer 30-0-30 (Internal resistance G=2K) is mounted on the front panel. 100k to 1 M resistances selected through band switch with output on sockets are provided on the front panel. One potentiometer (resistance S = 0-22K) with output on sockets is mounted on the front panel. Two unknown resistances X1 (200K) & X2 (470K) are also mounted on the front panel.

EXPERIMENT NO. 211

To Study the High Resistance measurement using Substitution Method.

WHAT YOU NEED

- High resistance substitution kit, Cat. No. 2011

2012. RC circuit as Low Pass & High Pass Filters

Circuit diagram for low pass, High Pass Filter Printed, three set of Resistances and three set of capacitors are connected inside and connections are brought out at 4 mm Sockets/Terminals.

EXPERIMENT NO. 212

To study & Plot graphs for RC circuit as Low Pass & High Pass Filters.

WHAT YOU NEED

- Audio Frequency Function Generator
- Dual trace CRO 20 MHZ.

2013. Tunnel Diode Ch. Appts.

In built DC regulated Power Supply of 5 volts. Two 3½ digit digital panel meter for measuring the voltage across resistance & tunnel diode (Range 0-2V DC). Current control on the front panel. Tunnel Diode-IM 3717

EXPERIMENT NO. 213

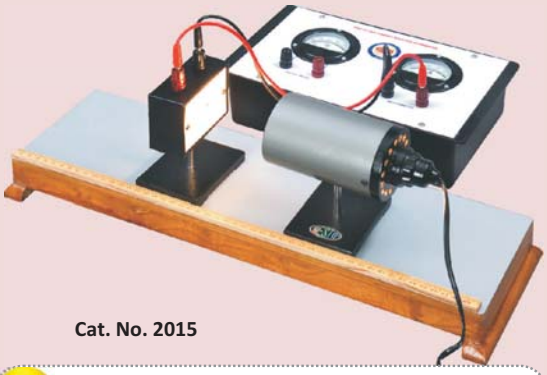
Voltage-Ampere characteristics resistance characteristics of a tunnel diode in forward bias.

WHAT YOU NEED

- Tunnel Diode Ch. Appts., Cat. No. 2013

2015. Photo Cell Characteristics Apparatus

Selenium Photo cell mounted in metal box. Supplied with light source with 60W lamp. Photo cell Kit with DC Microammeter of 1000μA & DC Millivoltmeter of 500mV mounted behind the panel, connections of Supplies, Meters are brought out on front panel.



Cat. No. 2015

EXPERIMENT NO. 215

To plot forward Characteristics of a Selenium Photocell & to verify inverse Square Law of light.

WHAT YOU NEED

- Photo cell Characteristics Apparatus, Cat. No. 2015.

2016. Solar Cell Characteristics Apparatus

One solar cell is mounted in a suitable suitable wooden box. Light source with 80 watt lamp is also enclosed in special metal box. Two analog meters are mounted on the front panel in a box. Supplied with built-in load resistances and suitable leads.

Cat. No. 2016

EXPERIMENT NO. 216

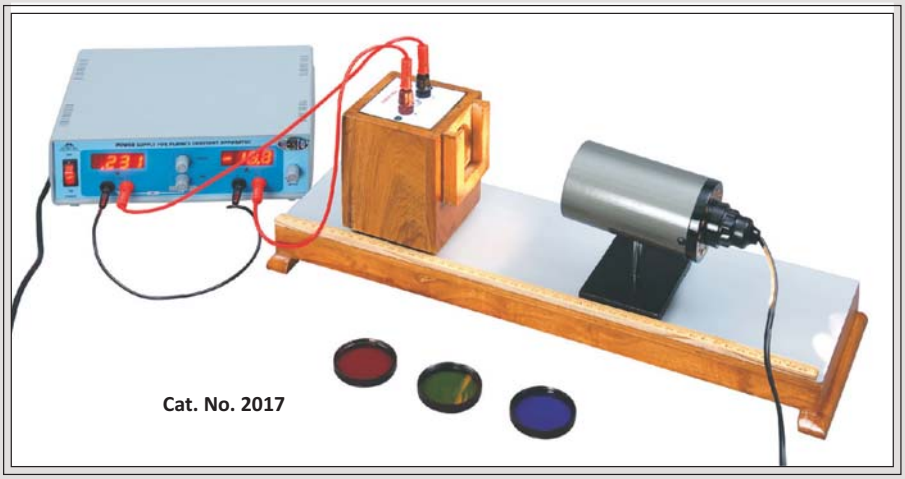
To plot Characteristics curve between voltage & current at different resistances of solar cell.

WHAT YOU NEED

- Solar cell Characteristics Apparatus, Cat. No. 2016.

2017. Planck's Constant Apparatus

DC variable regulated Power Supply of 0-1VDC. Vacuum type Photo cell mounted in wooden box having window for injecting light & also to fit the different types of filters. One wooden plank 30cm. long. Light source with 100W lamp & set of 3 filters. (Blue, green & Yellow)



Cat. No. 2017

EXPERIMENT NO. 217

To determine the value of Planck's constant by a Vacuum Type photo cell.

WHAT YOU NEED

- Planck's Constant Apparatus, Cat. No. 2017

2020. Planck's Constant Apparatus

The Apparatus consist of the following :

1. Photo Sensitive Device : Vacuum photo tube.
2. Light source : Halogen tungsten lamp 12V/35W
3. Colour Filters : 635mm. 570nm, 540nm, 500nm & 460nm.
4. Accelerating Voltage : Regulated Voltage Power Supply.
   - Output : ±15V continuously variable through multi-turn pot
   - Display : 3½ digit 7-segment LED
   - Accuracy : +0.2%
5. Current Detecting Unit : Digital Nanoammeter
   It is high stability low current measuring instrument
   - Range : 1000 µA, 100µA, 10µA & 1µ A with 100% over ranging facility
   - Resolution : 1nA at 1µA range
   - Display : 3½ digit 7-segment LED
   - Accuracy : +00.2%
6. Power Requirement : 220V + 10%, 50Hz or 110V + 10%, 60Hz as required.
7. Optical Bench : The light source can be moved along it to adjust distance between the light source and the phototube, scale length is 400mm. A tube is provided to install colour filter and a focus lens is fixed in the back end.

The set-up is complete in all respect, no additional accessory required.

EXPERIMENT NO. 220

To determination the value of Planck's Constant and work function of materials by photo electric effect.

WHAT YOU NEED

- Planck's Constant Apparatus, Cat. No. 2020

2021. Study of Planck's Constant by means of LED

Several proposals to measure the Planck's Constant for didactical purposes, using the current-voltage (I-V) characteristics of a light emitting diode (LED) have been made quite regularly in the last few years. The physical interpretation however is not completely clear and this has raised many discussions, which have been published almost with same regularity as the proposals themselves.

$$I=I_0 \exp [-e(V_0-V)/ \eta kT]$$

Where, e is electronic charge, k is Boltzmann constant, T is absolute temperature and η is material constant which depends on the type of diode, the location of recombination region, etc.

Cat. No. 2021

i) Dependence of current (I) on temperature (T) at constant applied voltage (V)

The following facilities are built in for this

Current Meter

- A highly stable current source with 3½ digit display.
- Range : 0-2mAwith resolution of 1 µA

Oven, PCO-01

- It is a small temperature controlled oven with built-in RTD sensor.
- Temperature adjustable from ambient to 338K
- Digital display of temperature
- High stability 1K

Variable Voltage Source (0-2V)

- A high stability voltage source with 3½ digit display

ii). Material Constant

To draw I-V characteristics of LED for determination of η, a variable voltage source and a current meter are provided with 3½ digit display.

iii) The wavelength λ of light emitted by LED

These are taken from LED datasheet or measured by a transmission grating, and are provided with the set of LED's.

EXPERIMENT NO. 221

To study the Planck's Constant (h) by means of LED.

WHAT YOU NEED

- Planck's Constant Apparatus, Cat. No. 2021.

2028. e/m by Thomson Method

It consists of following :

a. High voltage Power Supply with One digital meter provided to measure the deflection voltage. Complete with separate intensity, focus and deflection controls.

b. CRT- 3BP1 mounted on teak wood frame

c. Graduated teak wood platform to place magnets at the height of deflection plates.

d. Two small magnets

e. Deflection magnetometer compass box

Complete in all respects with working manual.

Cat. No. 2028

EXPERIMENT NO. 228

To determine the specific charge (e/m) of an electron using Thomson Method.

WHAT YOU NEED

- e/m by Thomson Method, Cat. No. 2028.

2029. e/m by Short Solenoid Method (Magnetron Valve method)

Kit Comprises of Low voltage DC Power Supply Unit with filament voltage & Solenoid current controls. Two meter are provided for Anode Voltage measurement. One Solenoid Unit mounted on Wooden stand & Valve is kept in the Solenoid pipe.

Complete in all respect.

EXPERIMENT NO. 229

To determine specific charge of an electron using Short Solenoid Method (Magnetron Valve Method).

WHAT YOU NEED

- e/m by Short Solenoid Method, Cat. No. 2029.

2030. e/m by Helical's Method

it Comprises of High Voltage Power Supply Unit with intensity, focus, X , Y deflection & Solenoid current controls. Two meters are provided in Power Supply to measure Acceleration Voltage & solenoid current. One Solenoid Unit Comprises Solenoid mounted on Wooden stand & CRT is kept in the solenoid pipe.

Cat. No. 2030

EXPERIMENT NO. 230

To determine the specific charge (e/m) of an electron using Helical Method.

WHAT YOU NEED

- e/m by Helical Method, Cat. No. 2030.

2031. Measurement of Electron Charge to Mass Ratio (Based on Thomson's Method)

Introduction

Our arrangement for measuring e/m, the charge to mass ratio of the electron is a very simple set-up. It is based on Thomson's method. The e/m-tube is bulb-like and contains a filament, a cathode, a grid, a pair of deflection plates and an anode. The tube is filled with helium at a very low pressure. Some of the electrons emitted by the cathode collide with helium atoms which get excited and radiate visible light. The electron beam thus leaves a visible track in the tube and all manipulations on it can be seen. The tube is placed between a pair of fixed Helmholtz coils which produce a uniform and known magnetic field. The socket of the tube can be rotated so that the electron beam is at right angles to the magnetic field. The beam is deflected in a circular path of radius r depending on the accelerating potential V, the magnetic field B and the charge to mass ratio e/m. This circular path is visible and the diameter d can be measured and e/m obtained from the relation

$e/m = 8V B^2 d^2$

This set-up can also be used to study the electron beam deflection for different directions of the magnetic field by varying the orientation of the e/m-tube.

Description of the Experimental Set-up

The central part of the set-up is the e/m-tube. This is energized by

(i) Filament current supply,

(ii) Deflection plates voltage supply,

(iii) Continuously variable accelerating voltage supply to the anode.

The tube is mounted on a rotatable socket and is placed between a pair of Helmholtz coils. The tube can be rotated about a vertical axis, varying the orientation of the electron beam with respect to the Helmholtz coils. This allows magnetic deflection of the beam to be demonstrated. Circular, helical or undeflected paths can be seen. The direction of the current can be changed. The magnetizing current I and the accelerating voltage V are respectively measured by an ammeter and a voltmeter mounted on the front of the panel. The diameter of the electron beam path is measured by a detachable scale mounted in front of the bulb of the tube. This scale has a slider with a hollow tube (fitted with cross wires at its both ends) to fix the line of sight while making the measurements of the beam path diameter. Base of the unit contains the power supply that provides all the required potentials and the current to the Helmholtz coils. The entire apparatus is contained in a wooden case for convenient storage.

Specifications

Helmholtz coils of radii 14 cm Number of turns 160 on each coil Accelerating Voltage 0 250V Deflection plates voltage 50V 250V Operating Voltage 220V AC/ 50Hz Typical results obtained with the above set-up for variation of the diameter of the electron beam path with the accelerating voltage for a current of 1A to the Helmholtz coils are shown in the following graph. They lead to e/m equal to 1.77 1011 coul / kg.

2036. Millman's Theorem

Instrument comprises of one fixed voltage 5V & another 1.2V to 10V, DC regulated power supply. Two moving coil analog meter 10V & 20mA are mounted on the front panel to measure voltage & current, circuit diagram is printed & important connections are brought out on sockets/terminals. Supplied with leads.

EXPERIMENT NO. 236

To study the Millman's Theorem in DC Network.

WHAT YOU NEED

- e/m by Millman's Theorem, Cat. No. 2036.

2037. Thevinin's Theorem

Instrument comprises of Variable DC Regulated variable Power Supply of 1.2V to 10 V. Two moving coil meters of 10V & 10mA are provided to read voltage & current. Circuit diagram Printed on the front panel & connections of Supplies, Meters & Resistances are brought out at 4mm Sockets/Terminals. Supplied with leads.

EXPERIMENT NO. 237

To verify the Thevinin's Theorem in DC network.

WHAT YOU NEED

- Thevnin's Theorem, Cat. No. 2037.

2038. Reciprocity Theorem

Instrument comprises of Variable DC Regulated Power Supply of 1.2V to 10 V. Three moving coil meters 10V, 10mA & 20mA are provided to read voltage & current. Circuit diagram Printed on the front panel & connections of Supplies, Meters & Resistances are brought out at 4mm Sockets/Terminals. Supplied with leads.

EXPERIMENT NO. 238

To verify the Reciprocity Theorem in DC network.

WHAT YOU NEED

- Reciprocity Theorem Kit, Cat. No. 2038.

2039. Norton's Theorem

Instrument comprises of Variable DC Regulated Power Supply of 1.2V to 10V. Two moving coil meters 10V & 20mA are provided to read voltage & current. Circuit diagram Printed on the front panel & connections of Supplies, Meters & Resistances are brought out at 4mm Sockets/Terminals. Supplied with leads.

EXPERIMENT NO. 239

To study the Norton's Theorem in DC Network.

WHAT YOU NEED

- Norton's Theorem Kit, Cat. No. 2039.

2040. Maximum Power Transfer Theorem

Instrument comprises of Variable DC Regulated Power Supply of 1.2V to 10 V. Two moving coil meters 20V & 30mA are provided to read voltage & current. Circuit diagram Printed on the front panel & connections of Supplies, Meters & Resistances are brought out at 4mm Sockets/Terminals. Supplied with leads.

EXPERIMENT NO. 240

To study the maximum power transfer in DC network.

WHAT YOU NEED

- Maximum Power Transfer Theorem Kit, Cat. No. 2040.

2041. Super Position Theorem

Instrument comprises of Two fixed Voltage DC Power Supply of 5V & 9V. Two moving coil meters 10V & 10mA are provided to read voltage & current. Circuit diagram Printed on the front panel & connections of Supplies, Meters & Resistances are brought out at 4mm Sockets/Terminals. Supplied with leads.

EXPERIMENT NO. 241

To study the Super Position Theorem in DC Network

WHAT YOU NEED

- Super Position Theorem Kit, Cat. No. 2041.

Helpful Hint

In all above theorems, resistance & potential are measured and currents computed. In order to make the analysis easy & clearer to understand, different types of theorems verifications board are supplied. Every theorem has a specific goal in its analysis. You can also connect digital meter from the outside in the above kits for better result.

2042. Verification of Network Theorems (Combined Model with analog meters)

Instrument comprises of 3 fixed output DC Regulated Power Supplies of 12V, 5V at 250mA current, 4 analog meters, Circuit diagram for all the 6 theorems printed on the front panel. Connections of Supplies, Meters, Resistances & Potentiometers are brought out at 2mm Sockets. Supplied with suitable leads.

Cat. No. 2042

2043. Verification of Network Theorems (Combined Model with Digital meters)

Same as above but supplied with **4 Digital Meters** for more better results.

EXPERIMENT NO. 237

To verify Superposition, Norton's, Thevinin's, Maximum Power Transfer, Reciprocity & Telegan Theorems (6 theorems on one board)

WHAT YOU NEED

- Network Theorems Kit, either Cat. No. 2042 or 2043

2044. Verification of KCL & KVL (Kirchoff's law)

Instrument consists of DC regulated Power supply, two MO65 moving coil meters for voltage & current measurement. Combination of resistances are mounted on front panel.

EXPERIMENT NO. 244

To study the Kirchoff's current & voltage law at nodes.

WHAT YOU NEED

- Kirchoff's Law Kit, Cat. No. 2044.

2045. Charging and dischargings of a condenser through resistance.

To study charging and discharging of a condenser. The apparatus is used to find the relationship between potential difference across a capacitor and the time taken during charging and discharging.

Complete with built in IC regulated power supply, workable on 230V A.C. Three resistances (having different values) are mounted with their separate terminals for different graph with the help of provided with digital meter & digital Stop clock.

EXPERIMENT NO. 245

To study RC time constant using various sets of resistances & capacitors.

WHAT YOU NEED

- Charging & dischargings of a condenser Kit, Cat. No. 2045.

2046. Series & Parallel Resonance LCR Kit

The apparatus consist of three resistances, one inductance and three capacitors with separate trminals for measurement of 'Q' Value, with two deluxe A.C. Moving coils meter for V & I. provided with connection leads.

EXPERIMENT NO. 246

To plot frequency vs current characteristic of LCR circuit when connected in series or in Parallel

WHAT YOU NEED

- Series & Parallel LCR Resonance Kit, Cat. No. 2046
- Audio frequency function generator, 100 KHz

2047. LCR Impedance Apparatus

Instrument comprises of AC Power supply 0-10 V AC selectable using band switch, two AC moving coil meters are used to measure voltage & current, three set of Resistances, three set of Capacitors & one Inductance connected inside & connections brought out at Socket/Terminals.

EXPERIMENT NO. 247

To calculate impedances & AC power factor of LCR circuit when connected in series & subjected to AC voltage.

WHAT YOU NEED

- LCR Impedence Kit, Cat. No. 2047.

Digital Training Boards have been developed with a view to organise a basic Training schedule. The electronic design has been kept as simple as possible. The complete circuit is engraved on front panel. Sockets are provided to make the connection with plugs. Complete with Power Supply, Output Indicator, Logic Inputs etc.

2051. Elementary study of Logic Circuit Trainer

Based on DTL (Discrete Components used) AND, OR, NOT Gates, provided with connection leads. Supplied without 5V Voltmeter.

2052. Apparatus to study 'OR', 'AND', 'NOR', 'NAND', 'NOT' Gates (Five Gates)

Stated gates built up using discrete components viz. resistances, transistors & diodes. Provided with built in power supply. NAND, NOT gates can be assembled using different combinations of OR, AND, NOR gate.

2053. Digital Trainer Model DT-04

Complete in all respects with following built-in components :

- Consists of fixed 5V power supply for IC.
- 2 No. Logic input switches
- 1 No. Logic output indicator
- A high quality solderless Breadboard of size 7" x 2½" with 840 tie points is mounted on the panel.
- Six Nos. IC's for AND, OR, NOT, NAND, NOR & EX-OR are fixed on full piece Bread Board
- Easy connectible wires are provided (plastic coated single tinned copper wire SWG No. 22)

Cat. No. 2053

EXPERIMENT NO. 253

To study the Basic Logic Gates using various IC AND, OR, NOT, NAND, NOR & EX-OR gates.

WHAT YOU NEED

- Digital Trainer Model DT-04, Cat. No. 2053

2055. Basic Logic Gates using TTL IC's 7 in 1

Instrument comprises of 5V/150mA DC Regulated Power Supply for logic '1' logic '0'. TTL IC's for 'AND', 'OR', 'NOT', 'NAND', 'NOR', 'EX-OR' 'EX-NOR' gates. Components soldered on the back side of hylum sheet and front panel connections are brought out at sockets/terminals NOR, NAND, EX-NOR Gates can be assembled using different combinations.

EXPERIMENT NO. 255

To verify the truth table for TTL IC's AND, OR, NOT, NAND, NOR, EX-OR & Ex-NOR gates.

WHAT YOU NEED

- Basic Logic Gates Kit, Cat. No. 2057.

2056. Study of 5 Gates - AND, OR, NOT, NAND & NOR gate.

It consist of fix voltage power supply of 5 volts for IC's. Two number logic input switches and 1 number logic output indicator. All the above 5 gates are mounted on the panel with their respected 14 pin IC.

Every pin of each IC is connected to the socket with their respective pin numbers. Very useful kit to under stand the behaviors of each IC. For 5 number IC's we are having 70 numbers of sockets on the board. Supplied with leads & working manuals.

EXPERIMENT NO. 256

To verify the truth table for TTL IC's AND, OR, NOT, NAND, NOR gates.

WHAT YOU NEED

- Digital Trainer Kit, Cat. No. 2056.

2057. Verification of Boolean Identities Demorgan's Theorem

Instrument comprises of DC Regulated Power Supply 5V/150mA, 4SPDT switches provided for selecting logic '1' logic '0', 5 Red LED output indicators, circuit diagram printed for 4 'OR', 4 'AND' 4 'NOT' gates. 4 'NAND', 4 'NOR' & 4 'EX-OR' with their respective IC's are placed inside the cabinet. Connections are brought out at sockets/terminals

EXPERIMENT NO. 257

To verify the truth table of 2 input AND gate, OR gate, NAND gate, NOR gate, single input NOT gates & their combinations. Verify of Boolean expressions & Demorgan's Theorems.

WHAT YOU NEED

- Digital Trainer Board, Cat. No. 2057

2058. Verification of truth tables of Logic gates using NAND & NOR gates

Instrument comprises of DC Regulated Power Supply 5V/150mA, 2 logic '1' 2 logic '0' inputs are provided on sockets, 2 Red LED output indicators, circuit diagram printed for 4 'NAND' 4 'NOR' gates and their respective IC's placed inside the cabinet. Connections are brought out at sockets/terminals.

EXPERIMENT NO. 258

To verify the truth table of AND gate, OR gate, NAND gate, NOR gate, NOT gate using NAND & NOR gates.

WHAT YOU NEED

- Digital Trainer Board, Cat. No. 2058

2059. Study of 4 Bit Adder and Subtractor

Instrument comprises of DC Regulated Power Supply 5V/150mA, 4 Logic inputs selectable using SPDT switches, 4 output LED indicators, circuit diagram of IC 7483 Printed on board. Connections are brought out at sockets/terminal on front panel.

EXPERIMENT NO. 259

To study the 4 Bit Adder and Subtractor using IC 7483

WHAT YOU NEED

- Digital Training Board, Cat. No. 2059

2060. Digital Trainer to Verify Adder and Subtractor using NAND Gates

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA for logic inputs, 4 SPDT switches provided for selecting logic '1' logic '0', 3 NOT gates for providing compliments of the logic inputs, 2 Red LED output indicator, circuit diagram printed for 5 number three input 'NAND' gate with their respective IC's placed inside the cabinet. Connections are brought out at socket/terminals on the front panel

EXPERIMENT NO. 260

To verify the truth table of Digital Half Adder, Half Subtractor, Full Adder, Full Subtractor using NAND gates.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2060

2061. Digital Trainer to study verify truth tables of Flip Flops

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 4 logic inputs, (bounceless) logic '1' logic '0' selectable using SPDT switches, 1 Hz monoshot clock pulse, Two output indicators, Circuit diagram for 'D', 'T' 'RS', 'JK' 'JK Master Slave' flip-flops are Printed, their respective IC's placed inside the cabinet. Connections for inputs & outputs are brought out on the sockets, 1 NOT gate for converting 'RS' flip-flop to 'D' type flip-flop.

EXPERIMENT NO. 261

To study & verify Truth tables of 'RS', 'D' Type, 'T' Type JK & 'JK Master slave' flip flops using TTL IC's.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2061

2062. Study / verify Truth tables of 'RS' 'D' Type flip flops using NAND & NOT gates

Instrument comprises of DC Regulated Power Supply 5VDC/150mA, 4 Logic '1' 4 Logic '0' inputs, 1 Hz monoshot clock pulse, Two output indicators, Circuit diagram for NAND & NOR Gates is Printed. Connections for inputs & outputs are brought out at the sockets/terminals

EXPERIMENT NO. 262

To Verify Truth table of RS D type flip flops using NAND & NOR gates.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2062

2066. Study of 4 Bit Ripple Counter Forward Reverse & Module

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 1 Hz monoshot clock pulse, Two output indicators, Circuit diagram for 4 'JK' flip-flops & 4 input NAND gate are printed. Connections for inputs & outputs are brought out at sockets/terminals on front panel.

EXPERIMENT NO. 266

To Verify Truth tables of 4 Bit Forward Reverse & Module Counters using JK Flip Flops & NAND gate

WHAT YOU NEED

- Digital Training Board, Cat. No. 2066

2068. Study of 4 Bit BCD Counter/ Decimal to Binary Encoder using IC 7490

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 1 Hz monoshot clock pulse, four output indicators, 7 segment display with decoder IC. Circuit diagram for IC 7490 Printed. Connections for various inputs and outputs are brought out at the sockets on the front panel.

EXPERIMENT NO. 268

To convert decimal input to Binary output using IC 7490.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2068

2069. Study of 4 Bit Up/Down Counter

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 4 SPDT switches provided for selecting logic '1' logic '0' , 1 Hz monoshot clock pulse, four output indicators, Circuit diagram for IC 74193. Printed Connections for various inputs and outputs are brought out at the sockets, two switches for selecting up or down counting to reset the counter.

EXPERIMENT NO. 269

To study verify truth table of 4 bit Up Down counter using IC 74193.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2064

2070. Study of Encoder, Decoder Circuits, Decimal to BCD Encoder & BCD to 7-segment Decoder.

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 4 SPDT switches provided for selecting logic '1' logic '0', 1 Hz monoshot clock pulse, four output indicators, Circuit diagram for IC 7490, IC 7447, 7-segment display are printed. Connections for various inputs and outputs are brought out at the sockets on the front panel.

EXPERIMENT NO. 270

To study Decimal to BCD Encoder & BCD to 7 segment Decoder.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2070

2071. Study of One input/Four output Demultiplexer using IC 74155.

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 4 SPDT switches provided for selecting logic '1' logic '0', four output indicator, Circuit diagram for IC 74155 Printed. Connections for various inputs and outputs are brought out at the sockets on the front panel.

EXPERIMENT NO. 271

To study 1-4 line Demultiplexer circuit using IC 74155.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2071

2072. Study of Left, Right & Programmable Shift Register.

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 4 SPDT switches provided for selecting logic '1 logic '0', 1 Hz monoshot clock pulse, four output indicators, Circuit diagram for IC 7495 printed. Connections for various inputs and outputs are brought out at the sockets, two switches for serial input Mode control.

EXPERIMENT NO. 272

To study verify truth table of Left, Right Programmable Shift Register using IC 7495.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2072

2073. Study of 4-1 line four input / one output Multiplexer using IC 74153

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 6 sockets for logic '1' logic '0' each, one output indicator. Circuit diagram for IC 74153 printed. Connections for various inputs and outputs are brought out at the sockets

EXPERIMENT NO. 273

To study 4-1 line Multiplexer circuit using IC 74153.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2073

2074. Analog to Digital (A/D) Convertor

Instrument comprises of DC Regulated Power Supplies 5 VDC/ 150mA, 0-10 VDC/150mA, + 15 VDC/150mA, 1 Voltmeter, 4 SPDT switches provided for selecting logic '1' logic '0', one output indicator, Circuit diagram Printed on the front panel. Connections of various inputs and outputs are brought out at sockets.

EXPERIMENT NO. 274

To study Analog to Digital convertors.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2074

2075. Digital to Analog (D/A) Convertor using R-2R Network

Instrument comprises of DC Regulated Power Supplies 5 VDC/150mA, ± 15 VDC/150mA, 1 Voltmeter, 4 SPDT switches provided for selecting logic '1' logic '0', one output indicator, Circuit diagram printed on the front panel. Connections of various inputs and outputs are brought out at sockets.

EXPERIMENT NO. 275

To study Digital to Analog convertor using R-2R network.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2075

2076. Digital to Analog (D/A) Convertor using Weighted Register Network

Instrument comprises of DC Regulated Power Supplies 5 VDC/150mA, + 15 VDC/150mA, 1 voltmeter, 4 SPDT switches provided for selecting logic '1' logic '0', one output indicator, Circuit diagram for weighted resistor network inverting circuit using IC 741 printed on the front panel connections of various inputs output brought out at sockets.

EXPERIMENT NO. 276

To study Digital to Analog convertors using Weighted Register network.

WHAT YOU NEED

- Basic Logic Gates using discrete components Kit, Cat. No. 2076

2077. Study of RAM Random Access Memory Circuit

Instrument comprises of DC Regulated Power Supply 5 VDC/150mA, 10 logic inputs selectable using SPDT switches, 4 LED output indicators, IC 7489 placed inside. Connections are brought out at sockets.

EXPERIMENT NO. 277

To study and verify the truth table of RAM circuit.

WHAT YOU NEED

- Digital Training Board, Cat. No. 2077

2078. Study of 4 Bit Binary to Gray Code Convertor

Instrument comprises of DC Regulated Power Supply 5VDC /150mA 4 Logic inputs selectable using SPDT switches, 4 output LED indicators, Circuit diagram Printed, IC's placed inside connections brought out at sockets on the front panel.

2079. Digital Training Board

To study and verify the truth table of

- TTL Logic gate
- Boolean Expression.
- Adders, Subtractors
- De-Morgan's Theorem
- Flip-Flops

2080. Logic Gate circuit trainer/Digital Computer-II (Bread Board Model)

Instrument comprises of two DC regulated Power Supplies of 5 VDC/1Amp+15VDC/150mA, 10Logic inputs with LED indicators selectable using SPDT switches, 1Hz, monoshot clock pulses, Breadboard is mounted on front panel to perform various experiments, 10 logic output indicators, 3 seven segment display mounted on front panel.

EXPERIMENT NO. 278

1. Study and verify truth tubes of Logic gates.
2. Verification of Boolean identities Demorgan's theorems.
3. Study and verify truth tables of Digital Address and Subtractors.
4. Study of Flip Flops and verification of their truth tables.
5. Study of counters, shift Registers and verification of truth tables.
6. Study of Encoders, decoders, and verification of truth tables.' Study of Multiplexers, Demultiplexers and verify truth tables.

WHAT YOU NEED

- Basic Logic Gates using discrete components Kit, Cat. No. 2076

2085. Linear IC Trainer

Lucidly illustrated User's manual unravels analog electronics concepts through brief theoretical reviews followed by experiments, self test questions and exercises. Modularly designed Front Panel contains all commonly used components for doing at least 10 experiments.

It consists of specially designed brass sockets of 2mm inner diameter which are press fit by special techniques on bakelite panel. Specially designed patch cords (with spring action) of pin diameter 2mm are provided so that the students can make interconnections themselves and do various experiments.

Cat. No. 2085

Board Consist of following :

- DC Regulated Power Supplies
  Fix + 12V / 250mA, Variable 0 to + 5 V / 250 mA.
- Sine Wave Oscillator of 1 KHz at 0.5 V p-p is built-in.
- Functional diagram of IC 741 with input points is printed on board. Additional 8 pin IC Base with machine pins is provided for putting any other IC of your choice.
- Digital Voltmeter 0-20 V DC - 1 No.
  3½ Digit, LCD Display, Mains operated.
- Assorted Values of Resistances - 11 No.
  100, 1K, 3.3K, 5K, 10K, 22K & 100K ohms etc.
- Assorted Values of Capacitances - 3 No.
  0.1, 1 & 10uF
- Potentiometer 10 Kohm, Linear - 1 No.
- 2mm Interconnection Leads - 10 No.
- Toggle switch with selection of Input or Output V is provided.
- Comprehensive USER's Manual for doing at least 10 experiments on OP-AMP 741 is provided.

For other kits of Operational Amplifier Please refer to Page No. 193

2086. Digital IC Trainer

It consists of specially designed brass sockets of 2mm inner diameter which are press fit by special techniques on bakelite panel. Specially designed patchcords (with spring action) of pin diameter 2mm are provided so that the students can make interconnections themselves and varify the truth table as mentioned in User's Manual. Various experiments on logic gates, Flip-Flop & Counters can be done.

Cat. No. 2086

Board Consists of following :

- DC Regulated Power Supply 5 V/1 Amps.
- Special IC Base of 14 Pin for inserting any IC of 14 pins -1 No.
- Special IC Base of 16 Pin for inserting any IC of 16 pins - 1 No.
- Logic Input Switches (Bounceless) - 8 No.
- LED Indicators (Buffered)- 10 No.
- Clock Generator - 1 No.
  (0.1, 1, 10 & 100 Hz)
- 7 Segment Display with Decoder IC 7447 - 1 No.
- 2mm Interconnection Leads. - 10 No.
- 74 LS 08 (AND), 74 LS 32 (OR), 74 LS 04 (NOT), 74 LS 00 (NAND) 74 LS 02 (NOR) & 74 LS 86 (EX-OR)-1 No. 7474 (D Flip Flop 74LS76(JK Flip-Flop) & 7490 (Decade Counter) can be mounted on 14 or 16 pin IC Base.
- Comprehensive USER's Manual for doing experiments on Logic Gates, Flip-Flops & Decade Counter is provided.

We can provide additional Breadboard having 2 terminal strips & 1 distribution strip (having total 840 tie points) instead of special IC Base of 14 pin & 16 pin at additional cost. Hook Up wire is required for connection with Breadboard & if IC is mounted on IC Base as mentioned in our regular model, then you can do all practicals with 2mm interconnection leads.

2088. Project Board

It consist of the one breadboard having two terminal strips & one distribution strips (having total 840 tie points) It consist of two fixed power supplies of 5 volt, 1 Amp and ±12 volt 250mA. Very useful project board upto higher secondary school students.

Cat. No. 2088

2090. Discrete Component Trainer

Lucidly illustrated User's manual unravels analog electronics concepts through brief theoretical reviews followed by experiments, self test questions and exercises. Modularly designed Front Panel contains all commonly used discrete components.

It consists of specially designed brass sockets of 2mm inner diameter which are press fit by special techniques on bakelite panel. Specially designed patch cords (with spring action) of pin diameter 2mm are provided so that the student's can make interconnections themsleves and do various experiments.

Cat. No. 2090

It consists of following items on main panel :

a) Power supply of +5V, +12V, -12V each of 250mA
b) Silicon, Germanium diodes, Zeners.
c) PNP & NPN Transistors, FET
d) One speaker
e) 12 different values & wattage of carbon film resistances.
f) 12 assorted values of capacitors from 100PF to 1000uF.
g) Integrated Circuit (IC) Base & IC 74LS00- 1 No. each
h) LED, LDR, Photo diode, Solar Cell
i) Logic Switches (4 No.) & LED indicators (4No.) etc.
j) 2 mm Interconnection Leads - 10 No.

2091. Discrete Component Trainer

Board showing different Active & Passive Components.

- Big Size Board of approx. 30"x24" with acrylic cover with locking facility & Wall mounting Type, have following specifications.
- Different Power Suppliers, Fix ±5V/1A & + 12V/0.5 A & Variable 0 to ±15V/250 mA are provided on front panel. Insulated Socket for 230V AC are also provided.
- Digital Meters, LCD Display for measurement of V, A & ohms. having multiple ranges in V, I & R.
- Different Transistors (12 No.), small & big, Power transistor with h_{FE} measurement facility by digital meter.
- PN Junction Diode (of 1A & 5A) Varactor, Schotty, Zener, Rectifier of 30 Amps. diode, Signal diode, 1 Photo diode, FET, UJT, SCR mounted on front panel.
- 20 Resistors of different watts, 15 different capacitors,
- 2 LED (Green), 2 LED (Red) 2 LED (Blue) 2 LED (Dual),
- 1 LDR, 1 Solar Cell, Traiac/Diac pair, 4 Potentiometers, 2 inductors, Relay, and transformer (PT, CT, etc.), 1 speaker are mounted on board.
- 4 different Switches, 2 IC Base with 5 different Ic's Fuse with holder, 7 segment with decoder Ic's.
- Suitable Interconnection Leads, 2mm stackable - 20 No. & Comprehensive User's Manual is also provided.

Cat. No. 2091

2095. Boltzman Constant Kit

The experimental kit provides the following facilities :

(a) A digital millivoltmeter (0 -9.99 V) to measure the voltage across the diode.

(b) A highly stabilized power supply whose voltage can be varied in steps of 1 mV using a ten turn potentiometer.

(c) A digital current ammeter (0 -500 mA).

(d) Diodes: Silicon diodes & Germanium diodes.

EXPERIMENT NO. 280

To determine the Boltzman Constant by using V-I characteristic of Semi conductor diode.

WHAT YOU NEED

- Boltzman Constant Kit as per Cat No. 2095

2096. Lattice Dynamics Kit

It consists of an Audio oscillator with amplitude control and facility to vary the frequency from 0.9 KHz to 90 KHz. It has built in power supply and output stage to match the impedance of simulated lattice.

Another part of Lattice Dynamic Kit consists of transmission line, which simulates one dimensional mono-atomic and di-atomic lattices. The only additional equipment needed is a General purpose C.R.O.

EXPERIMENT NO. 281

The following experiments may be performed with the help of this kit:

i) Study of the Dispersion relation for the "Mono-atomic Lattice" and Comparison with theory.

ii) Determination of the Cut-off frequency of the Mono-atomic Lattice.

iii) Study of the Dispersion relation for the Di-atomic Lattice, Acoustical mode and Energy gap.

WHAT YOU NEED

- Lattice Dynamics Kit, Cat. No. 2096
- Dual Trace CRO, 20MHz

2097. Capacitance And Permitivity Kit

- Completely self contained : no other measuring instruments are needed.
- No calibration required.
- High sensitivity : change of the order of 0.1 nf can easily be detected.
- Integrated circuit electronics.
- Linearity better than 1% f.s.d.

In operation it produces an output current proportional to capacitance.

DESCRIPTION

The Kit consists of reed relay switch with it's A.C. supply, integrated circuit current amplifier and 0- 100 micrometer housed in a cabinet. In addition, a pair of capacitor plates 0.25m x 0.25m x 4 mm, a Perspex sheet, two capacitors (500 pf each), and set of perspex/ polythene spacers are provided with the kit.

EXPERIMENT NO. 282

To study

i. Series and Parallel combination of capacitances.

ii. Factors that determine the capacitance of a parallel plate Capacitor (area of overlap, distance between the plates and the medium).

WHAT YOU NEED

- Capacitance and Permitivity Kit Cat. No. 2097

2098. Fourier Analysis Kit

The Kit consists of a stabilized power supply (6-0-6), a function generator and the analyzer. Square, triangular and clipped sine waveforms are generated by a specially designed integrated circuit function generator whose output frequency can be varied in the range of 500 Hz to 15 KHz using the 100K Ten Turn potentiometer. The output level of the sine and triangular waves can be varied using the amplitude control provided on the front panel of the unit. The only equipment needed for the experiment is any general purpose C.R.O. available in laboratory.

2099. Universal B-H Curve Tracer

We have developed technique to quickly trace B-H loop of ferromagnetic materials of any shape without winding primary and secondary coil on the sample. The present technique is specially designed for teaching and industrial applications. Universal B-H Curve Tracer is a self contained instrument and need any low cost C.R.O having X-Y gain. In this technique, B-H loop is formed by simply inserting the specimen in a magnetizing coil. It make use of a specially designed integrated circuit probe to measure the flux density B. Any magnetic specimen, e.g. a 4-inch nail, soft iron wire or a hacksaw blade can be inserted in a magnetizing coil without disturbing the arrangement.

Change of the specimen results in a different shape of the hysteresis Curve. Even 10MHz CRO is sufficient for the B-H Loop.

2101. Applications of IC 555

Instrument Comprises of DC Regulated power Supply 5 VDC/150mA, IC 555 & various components kept inside the cabinet & connections are brought out at 4mm sockets.

EXPERIMENT NO. 285

To assemble & study Astable, Monostable, Bistable Multivibrators & V to F Convertor

WHAT YOU NEED

- Application of IC 555 Kit, Cat. No. 2101
- DMM & Dual Trace CRO

2102. Hartley Oscillator

Hartley's Oscillator is intended for generation of high frequency signals like carrier wave signals in a communication system. This consists of a Tank circuit made up of an inductor and a fixed capacitor shutted by a voltage variable capacitor network. Using this trainer the student experiments how variable frequency is generated.

Instrument comprises of DC regulated Power Supply. Circuit Diagram printed & components mounted on front panel

EXPERIMENT NO. 286

To study the Frequency and Waveshape generated by a Hartley Oscillator.

WHAT YOU NEED

- Hartley Oscillator Kit, Cat. No. 2102
- Dual Trace CRO

2103. Colpitt's Oscillator

Colpitt's Oscillator has fairly good frequency stability, can be used for wide frequency ranges and it is easy to tune. This similar to shunt-fed Hartley's Oscillator, except that two capacitors are used in the tank circuit instead of a tapped inductor. The frequency adjustment is possible both by varying the capacitor or inductor.

Instrument comprises of 12V DC Regulated Power Supply, Circuit diagram is printed & components are mounted on front panel.

EXPERIMENT NO. 287

To study the Frequency and Waveshape generated by a Colpitt's Oscillator.

WHAT YOU NEED

- Colpitt's Oscillator Kit, Cat. No. 2103
- Dual Trace CRO

2104. RC Shift Oscillator

Phase shift Oscillator is a Sine Wave generator. The cascaded phase shift network provides necessary feedback voltage required to enable the circuit oscillate in association with active components using either OP-Amp or transistor configuration. The frequency range depends on the values of RC components selected in the phase shift network. The trainer has all the active components like Op-Amp, and transistor, built-in power supplies, appropriate value of components, variable uncommitted potentiometer etc. to perform the experiment.

Instrument comprises of 12V DC Regulated Power Supply, Circuit diagram is printed & components are mounted on front panel.

EXPERIMENT NO. 288

To study the Frequency and Wave shape generated by a Phase Shift Oscillator.

WHAT YOU NEED

- RC Shift Oscillator Kit, Cat. No. 2104
- Dual Trace CRO

2105. Tuned Collector Oscillator

In built Power Supply of ±12V.

Gang capacitor is provided as standard accessory.

The circuit diagram of oscillator is provided on the front panel.

EXPERIMENT NO. 289

To study the working of tuned collector oscillator and observe its output.

WHAT YOU NEED

- Tuned Collector Oscillator Kit, Cat. No. 2105
- Dual Trace CRO

2106. Crystal Oscillator

Instrument comprises of fixed output DC Regulated Power Supply of 12V, circuit diagram is printed, components are placed inside the cabinet & important connections are brought out on sockets.

EXPERIMENT NO. 290

Study the working principle, wave shape & frequency generated by a crystal oscillator.

WHAT YOU NEED

- Crystal Oscillator Kit, Cat. No. 2106
- Dual Trace CRO

Different Types of Operational Amplifier

2110. Operational Amplifier Trainer (IC741)

Complete Kit (Digital) in all respects with the following buit-in components:-

- Built-in ± 1.2V power supply for IC 741.
- 0-5V, 0-5V : 2 continuously variable power supply.
- Spare resistances 22K, 4.7K, 3.3K : 1 no. Each ,47K, 1K, 33K: 2 nos Each & 10K : 3 nos. & IC 741 : 1 no.
- Solderness Breadboard of size 3.5" x 2.5" is also mounted on substantial Hylem backing palte.
- Spare plastic coated single Tinned copper wires (SWG No : 22) are provided for easy connections.
- Digital meter with selector switch to read V_1, V_2 & output voltage (V_0)

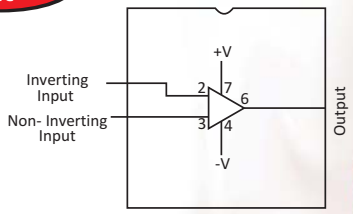
Cat. No.2110

Principle :

Operational Amplifier are high gain differential amplifiers and are known so because they are used to perform a number of operations e.g. summing, Inverting, non-inverting etc. Such amplifiers are available in the form of an integrated circuit-IC 741.

Helpful Hint

CONNECTION OF IC-741



IC741 is 8-Pin IC and in our expt. there is no need of Pin No. 1,5 & 8

EXPERIMENT NO. 292

To constant basic amplifier (Op-Amp.) using IC741

WHAT YOU NEED

- Operational Amplifier Trainer Kit, Cat. No. 2110 (Student Model) or Study of 741 Application, Cat. No. 2111 (Advance Model)

2111. Study of 741 Applications

Features :

Study of Linear and non-linear applications as :-

- Integrator
- Differentiator
- Summer
- Subtractor
- Voltage to Current converter
- Current to voltage converter
- Astable Mode
- Precision rectifier

Cat. No.2111

1. Built-in power supply
2. Built-in square wave and triangular wave Generator
3. Built-in current source.

2112. Op-Amp as a Differentiator

2113. Op-Amp as a Integrator

2114. Op-Amp as a Subtractor

2115. Op-Amp as a Summer/Adder

2116. Op-Amp as Voltage Follower

2117. Op-Amp as a Schemit Trigger

2118. Op-Amp as a Inverting & non-invertng Amplifier.

All Operational Amplifier Kit from Cat. No. 2112 to 2118 are supplied with built-in ± 12 V Power Supply. 0-5V Variable Power Supply and One DPM

2120. Digital LCR Meter

R : 0.0001W - 99.99 MW

C : 0.01 pF -19999 µF

L : 0.01 µH - 9999 H

D : 0.0001 - 9.999

Q : 0.01 – 9999

Cat. No. 2120

Technical Specifications:

Measuring Parameters	L-Q , C-D , R-Q
Test Frequency	100 Hz , 1 kHz , 10 kHz
Level	0.3Vrms
Accuracy	0.25%
Display Range	R 0.0001W -99.99 MW C 0.01 pF -19999 µF L 0.01 µH -9999 H D 0.0001 - 9.999 Q 0.01 - 9999
Sampling Rate	5 times/sec.
Equivalent Circuit	Series, Parallel
Test Mode	Auto, Hold
Calibration	Open circuit, Short circuit and Zeroing Test Ports, 5 terminals
Display Mode	Direct readout
Operating Ambient	°C - 40°C, =90% RH
Power	AC110V or 220V ± 10% , 50/60Hz
Power Consumption	20VA
Dimension	350 mm × 110 mm × 340 mm

2121. FET Volt-Ohm Meter (VOM-60)

BESTO FET VOLT-OHM is an electronic voltmeter for quick and precise measurement of D.C. and A.C. voltage as well as resistance values. Large measuring ranges with high input impedance make the instrument ideal for a wide variety of laboratory, workshop and testing branch. Basic Operation:Voltage measurements are based on the bridge principle. The D.C. voltage applied to the input is fed to the bridge circuit via an attentuator and unbalance this bridge circuit, which indicates in built in calibrated meter. A. C. Voltage rectified through a double diode and subsequently measured by the bridge circuit. Resistances are measured in a calibrated network.

Cat. No. 2121

Specifications

Meter	For better accuracy Meter used with basic movement of 100µA.
AS ELECTRONIC D.C. VOLTMETER	
Ranges	Seven 0-1.5, 5, 15, 50, 150, 500 and 1500 volts FSD
Accuracy	±3%
Input resistance	11 Megohms
AS ELECTRONIC A.C. VOLTMETER	
Ranges	Seven 0-1.5, 5, 15, 50, 150, 500 and 1500 volts FSD
Accuracy	±5%
Input resistance	1.5 Megohms
AS ELECTRONIC OHM METER	
Ranges	Seven 0-1K, 10K, 100K ohms and 0-1,10,100,1000Megohms FSD
Accuracy	±3%

This unit is housed in an attractive metal cabinet.

2125. Analog Signal/Function Generator

This is very useful and versatile laboratory instrument and it provides three basic waveform- sine, Square and Triangular waves.

Description:

BESTO Function Generator is completely an IC-Version and generates frequencies from 1 Hz to 100 KHz in five version decade ranges. The amplitude of the waveforms can be varied from 20mV to 20V, peak abut zero level with the help of 3 step coarse control and fine control. The instrument is housed in a sturdy metal cabinet with a facility of a stand on the bottom side to tilt the instrument.

Cat. No. 2125

Wave forms	Sine, square & triangle waveform
Frequency range Switch	This switches has five ranges providing multipliers, ranging from 1 Hz to 100 KHz (X 1,X 10, X100, X1K, X10K)
Waveform Switch	Sine, Square & Triangular wave may be selected by changing this particular switch given below the frequency range switch.
Frequency Dial	Varies the frequency between the extreme of the selected range and this dial calibrates for 1 to 10.5.
Course Amplitude Switch	There is three step attenuator providing range of 0.2V, 2V and 20V maximum amplitude.
Find Amplitude Switch	The amplitude of the selected function can be varied from 10% to 100% of the value, selected by the coarse switch.
Output	Lock type terminals are provided to deliver the output signal with an internal source
Output Voltage	Variable up to 20V (p/p) into 50 ohms impedance

2126. Analog Function Generator (0.1Hz to 1MHz)

Output	Sine, Square, Triangle Wave Frequency
Range	0.1 Hz to 1 MHz in 7 decade steps
Output Voltage	0-20 V p-p Continuously Variable
Output Impedence	600 ohms.

2127. Digital Function Generator (0.1Hz to 1MHz)

Output	Sine, Square, Triangle Wave
Frequency Range	0.1 Hz to 1 MHz
Output Voltage	0-10 V p-p Continuously Variable
Output Impedence	50 & 600 ohms.
Digital Display	4 Digit Freq. Counter provided

2128. 2MHz Function Generator (Digital Display)

Specifications :

Frequency Range	0.2 Hz to 2 MHz in four ranges.
Display	7 Segment Digital, 4 digit Display
Function	Sine, Square, Triangle, Ramp, Pulse & TTL pulse output.
Output Amplitude	25 V p/p open circuit
D.C.offset	Upto ± 15 V into open circuit & 7.5 V into 50 ohms.
Drift	0.1% after warm-up time of 10 minutes
Output Impedance	50 ohms & 600 ohms switch selectable
Duty Cycle	(5 to 9 % or better) Continuously Variable for continuous working
Attenuator	0 to 60 db variable (2 x 20 db step attenuator and 20 db fine control)
Amplitude Flatness	Better than 0.5 dB

Characteristics :

Sine	Distortion : < 1% upto 100 KHz < 3% upto 1 MHz & < 5% upto 2 MHz
Square	< 50 nsec. rise and fall time at 10V p-p output. Square wave symmetry : ± 2 %
Triangle Linearity	< 1% deviation from straight line at 1 KHz and maximum amplitude Ramp/ Pulse Duty Cycle20% to 80% variable to 100 KHz
VCO/ FM Modes	Available
Trigger Output	TTL Pulse provided
Power	230 V ± 10%, 50 Hz

2130. Function Generator 5MHz (with frequency Counter upto 30MHz)

Technical Specifications

Frequency Range	0.1Hz - 5Hz in 7 ranges
Output /Waveform	Sine, triangle, Square positive & negative Pulse Positive & negative ramp
Output impedence	50 Ohms ± 10%
Amplitude	Not Less than 20V p-p (open circuit)
DC Voltage	0 - ± 10V continuously adjustable
Symmetry range	90:10 - 10:90
Attenuation	20dB, 40dB, 60dB
Rising Edge of Square	Less than 100ns
Sine Characteristics	
Distortion	Less than 1% at 10Hz - 100KHz
Frequency response	0.1Hz 100KHz : < ± 0.5dB
	1000KHz 5NHz : <± dB
TTL/CMOS Output level	TTl Low level less than 0.4V in pulse wave less than 3.5V. CMOS low level than 0.5V pulse wave, high level 5V - 14V continuously variable
Rising Time	Less than 100ns
VCF Input Output voltage	-5V - 0V ± 10%
Max. Volt-controlled	1000:1
Input Signal	DC - 1KHz
Frequency counter	
Measuring range	1Hz - 30MHz
Input impedance	Not less than 1Mohms 20pF
Senstivity	100mV ims
Max. input	150V(AC+DC)
Accuracy	less than 0.003% ± 1 digit
Power Supply	230V ± 10% , 50Hz
Dimension	310W x230 Hx90Dmm
Weight	3Kg Approx

- **Frequency 0.1Hz-5MHz in 7 ranges**
- **Output waveform: Sine, square, Triangle, ± Ramp, Pulse**
- **TTL/CMOS output**
- **1Hz-10MHz Frequency Counter**
- **Attenuation : 20dB; 40db & 60dB (20+40dB)**

2131. Digital Function Generator (10MHz)

Output	Sine, square ,Triangular , Ramp & Pulse waves
Frequency Range	0.1 Hz to 10 MHz
Digital Display	3.1/2 Digit LED Freq. Counter provided
Output Voltage	0 - 20 V p-p Continuously Variable
Output Impedence	50 & 600 ohms.

Battery Chargers

2132. Battery Charger

For Charging battery from 230VAC, 50cycles line. This charger is recommended for general use in laboratories, especially where the drain on the battery is quite severe. The charger is equipped with a heavy transformer, silicon diode bridge rectifier, ampere meter, current control switch and safety fuse.

D.C. Output 2-4-6-12 volt selectable at

	Current
a)	2 Ampere
b)	3 Ampere
c)	4 Ampere
d)	5 Ampere

2150. Transistor PNP
On board with diagram

Cat. No. 2150

2151. Transistor NPN
On board with diagram

Cat. No. 2151

2152. Junction Diode
On board with diagram

Cat. No. 2152

2153. UJT Transistor
On board with diagram

Cat. No. 2153

2154. Thermistor
On board with diagram

Cat. No. 2154

2155. Light Dependent Resistance
On board with diagram

Cat. No. 2155

2156. Field Effect Transistor
On board with diagram

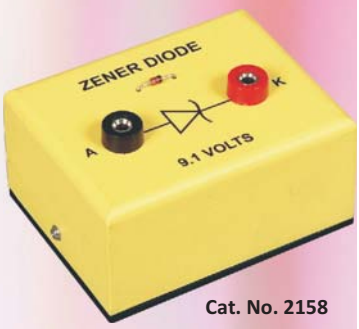
Cat. No. 2156

All these electronic components on board are supplied without leads, if you want leads, please add the cost of Leads. Refer to Cat. No. 2182.

2157. Photo Diode
On board with diagram

Cat. No. 2157

2158. Zener Diode
On board with diagram



Cat. No. 2158

2159. Photo Transistor Unit
On board with diagram

Cat. No. 2159

2161. Digital Multimeter Economical Model

Pocket sized, multimeter with 3½ DPM Rugged, easy to read. Low cost suitable for higher secondary classes or general work.

2162. Analog Multimeter, low cost

A useful pocket size multimeter for basic electrical measurements when high degree of sensitivity is not required.

2165. Diode Valve Characteristics Apparatus (Regulated Power Supply)

This instrument is designed to work on 230V A.C. it consists of 0-250 volts at 25mA continuously variable, well filtered D.C. stabilized power supply. Two moving coil meters (Voltmeter of 250V and millammeter of 25mA) are provided to read voltage and current. On/Off switch with jewel light and diode valve is fitted on the panel.

2166. Triode Valve Characteristic Apparatus (Regulated Power Supply)

The unit consists of 0-300 volts continuously variable filtered stabilized D.C. Power Supply for teh plate. One MO-65 meter of 300 volts is used for plate current and 3rd 0-15 Volt (floating) for the bias voltage. On/Off switch with jewel light and triode valve is fitted on the front panel.

2167. Tetrode/ Pentode Valve Characteristic Apparatus (Regulated Power Supply)

It consists of two separate power supplies giving stabilized output 0-300 volt at 30mA. Three MO-65 moving coil meters are used.

1. Double Range meter 0-300V/300mA
2. Double Range meter 0-300V/30mA
3. Single Range meter 0-10 V D.C. (reversible)

On/off switch with jewel light and valve is fitted on the front panel.

2168. Triode Valve 6J5
On board with diagram

2169. Diode Valve 6H6
On board with diagram

2170. Tetrode Valve 6V6
On board with diagram

2171. Pentode Valve 6SJ7
On board with diagram

Millikan's Oil Drop Apparatus

2175. Millikan's Oil Drop Apparatus

The principal elements of the assembly are a specially designed condenser, a light source and a measuring microscope, all are mounted on a common support.

Consists of a heavy cast iron base which is mounted on a steel pillar that carries the microscope and the lamp house. The microscope can be adjusted smoothly by slow motion screw in the horizontal as well as in the vertical direction. An automizer is also fitted on the same carriage. The apparatus does not need any critical adjustment and the oil drops appear in microscope within seconds. The microscope is provided with a micro meter scale.

2176. Power Supply for Milkman's oil Drop. Apparatus.

It gives IC regulated D.C. Output 0-300 volt continuously variable to be applied to condenser plates and a 6 volt at 3A A.C. supply for the lamp house.

Different Types of Leads

2180. Leads with Banana Plug

Two Banana plugs connected by flexible plastic insulated copper wire of 14/36". The leads are provided with different lengths of flexible wire.

a) Leads with flexible wire of 10cm in length
b) Leads with flexible wire of 25cm in length
c) Leads with flexible wire of 50cm in length
d) Leads with flexible wire of 100 cm in length

Cat. No. 2180

2182. Leads with Banana Plug & Crocodile Clip

One end of flexible wire are connected with banana plug & other end is with crocodile clip , length 18"

These leads are generally supplied with Battery Eliminators or with Electronic Components on board.

Cat. No. 2182

2181. Leads with Stackable Banana Plug

4mm plugs connected by length of flexible, plastic insulated copper wire. Each plug has a transverse 4mm hole for extra connection and the insulating body is of flexible mould plastic. The leads are provided with different lengths flexible wire.

a) Leads with flexible wire of 10cm in length
b) Leads with flexible wire of 25cm in length
c) Leads with flexible wire of 50 cm in length
d) Leads with flexible wire of 100 cm in length

Cat. No. 2181

2251. Digital Control System

Specifications

- Second order simulated process (analog Process)
- Built -in D/A and A/D circuits (8-bit)
- 8085 based µP-kit as digital controller with user software in 8K EPROM
- 16- bit arithmetic for algorithmic calculations
- Square wave test input (internal)
- 16 built-in levels of P, I and D gains each.
- Complete flexibility for the user to develop own software
- IC regulated internal built-in power supplies
- Detailed literature and patch cords included
- Essential accessory - a CRO

EXPERIMENT NO. 321

i. Identification of the controlled process, its gains, time-constants.
ii. Study of sampling period variation on the system response.
iii. Designing P, PI, PD and PID controllers.
iv. Advanced algorithms implementation.

WHAT YOU NEED

- Digital Control System Kit, Cat. No. 2251.
- Cathode Ray Osciloscope

- Digital Controller implementation on µP- kit
- Simple Op- amp based analog plant
- CRO display of response
- Design and test new algorithms

Cat. No. 2251

2252. A.C. Servomotor Study

Specifications

- 2-phase A.C. Servomotor - 12V/ 50Hz per phase
- Small generator for loading
- 4-digit speed display
- 3-digit time constant display
- 3½ digit r.m.s. voltmeter
- 3½ digit D.C. panel meter
- Voltage regulated internal supplies
- Detailed literature with sample results

EXPERIMENT NO. 322

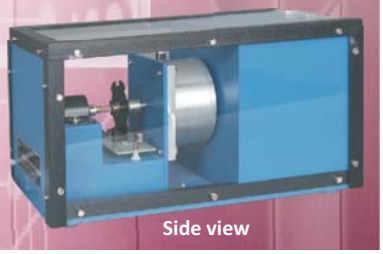
i. Inertia and friction parameters
ii. Time constant
iii. Transfer function

WHAT YOU NEED

- A.C. Servometer Study Kit, Cat. No. 2252.

Cat. No. 2252

- Torque computation through electrical leading.
- Determination of motor parameters - inertia and friction
- Digital display of time constant
- Transfer function evaluation



Side view

2253. D.C. Motor Study

Specifications

- Study of a 12V, 8W D.C. Motor
- Small generator (2W)for speed pick up and loading
- 4-digit speed display
- 3-digit time constant display
- 3½ digit voltmeter and current meter for D.C. measurement
- IC regulated power supply
- Supporting literature with experiment details.

EXPERIMENT NO. 323

i. Torque - speed characteristics
ii. Evaluation of Inertia and friction parameters
iii. Back e.m.f. Constant
iv. Mechanical Time constant
v. Transfer functions of the Motor & the generator.

WHAT YOU NEED

- D.C. Motor Study Kit, Cat. No. 2253

Cat. No. 2253

2254. D.C. Position Control System

Specifications

- Position control of a 12V,1A D.C. gear Motor (50)rpm.
- Provision for positive and negative techo generator feed back Techo constant:2V/1000 rpm approximately.
- Calibrated dial for reference and output Position: resolution 1^0
- µP based waveform capture card.
- Literature and patch cords included.
- Built- in 3½ digit DVM for signal measurements.
- Built-in step signal and IC regulated power supplies for electronic circuits.
- Servo- potentiometers with full 360^0 Rotation
- Separate unit for motor in a see-through cabinet.
- Essential accessory - a CRO.

EXPERIMENT NO. 324

i. Operation of the position control system for different values of the forward gain and angular position commands.
ii. Step response studies for various values of forward gain.
iii. Study of the effect of velocity feedback on the transient & steady state performance of the system as well as its stability.

WHAT YOU NEED

- D.C. Position Control System kit , Cat. No. 2254.
- Cathode Ray Oscilloscope

Cat. No. 2254

2255. A.C. Position Control System

Specifications

- 2-phase Servomotor 12V/phase,50Hz, 10W
- Power amplifier for driving
- Servo potentiometer type error detector
- In-built 10.00V (rms) panel meter
- Step response capture/display card
- Detailed literature with typical results Included
- Complete unit except a measuring CRO

EXPERIMENT NO. 326

i. Error detector characteristics phase reversal Amplifier gain measurement
ii. Phase difference between Control and reference windings
iii. Step response study

WHAT YOU NEED

- A.C. Position Control System kit, Cat. No. 2255
- Cathode Ray Oscilloscope

- 2-phase A.C. Servometer
- Servo Potentiometer for positioning sensing
- Transient response capture/display
- In-built rms voltmeter on panel

Cat. No. 2255

2256. D.C. Speed Control System

Specifications

- Speed control of a 12V, 4W permanent magnet D.C. Motor
- Speed range: 0 to 3000 rpm (typical)
- Opto- interrupter based speed in rpm
- 4-digit speed display in rpm
- Electronic techo generator for feedback
- Separate unit for motor in a see- through cabinet
- Essential accessory - a CRO
- Smooth, non-contact eddy current- brake for loading
- Built- in 3½ digit DVM for signal measurements
- Built- in IC regulated internal power supply
- Supporting literature and patch Cords included

EXPERIMENT NO. 327

i. Effect of loading on the speed of motor in the open loop.
ii. Steady state error variation with forward gain.
iii. System time constant variation with forward gain.
iv. Effect of forward gain on disturbance rejection.
v. Determination of the motor transfer function and techometer characteristics.

WHAT YOU NEED

- D.C. Speed Control System kit , Cat. No. 2256.
- Cathode Ray Oscilloscope

Cat. No. 2256

2258. Temperature Control System

Specifications

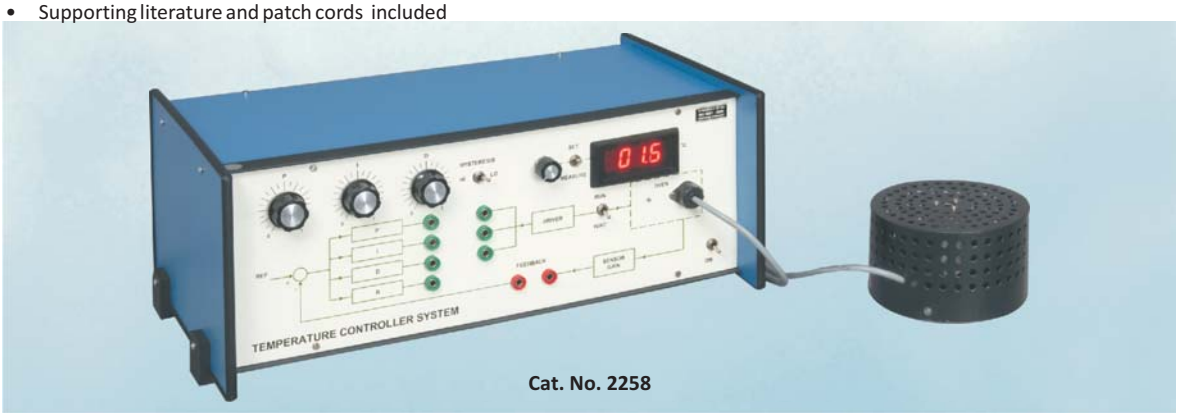
- Temperature controller with facilities for P, I, D and relay control blocks
- Operating temperature: Ambient to 90° C
- Separate controls for P, I, D channel gains
- Two settings for relay hysteresis
- Fast 25W oven fitted with IC temperature sensor
- Digital display of set and measured temperature on a 3½ digit built-in DVM
- Buffered output for recorder
- IC regulation in controller circuit power supplies
- Supporting literature and patch cords included

EXPERIMENT NO. 328

i. Identification of the oven parameters
ii. Study of ON-OFF temperature control (with adjustable relay characteristics)
iii. Study of P, PI, PD and PID controls having adjustable coefficients

WHAT YOU NEED

- Temperature Control System kit , Cat. No. 2258.



Cat. No. 2258

2259. PID Controller

Specifications

- Simulated blocks- dead time (transportation lag), integrator, time constants, error detector and gain
- PID Controller (Configurable as P, PI, PD or PID)
  Prop. Band : 5% to 50% (Gain 2-20)
  Integral time : 10msec-100msec
  Derivative time : 2-20msec
- Built-in 3½ digit DVM for d.c. Measurements
- Built-insignal sources
  Set value : -1V to +1V
  Square wave : 1V p-p (min.) at 40HZ
  Triangular wave : 1V p-p (min.) at 40HZ
- Built-in IC regulated power supply
- Detailed literature and patch chords included
- Essential accessory - a CRO

EXPERIMENT NO. 329

i. Open loop response of various process configurations (10 in all) -Combination of time-constants, delays etc.
ii. Study of closed loop response for above .
iii. P, PI, PD and PID design and performance evaluation in each case.

WHAT YOU NEED

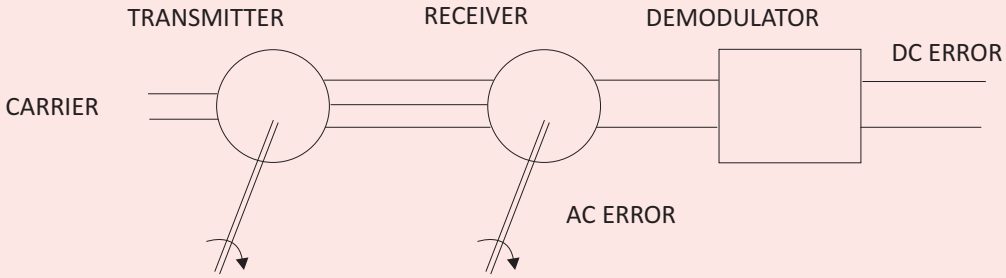
- PID Controller kit, Cat. No. 2259.
- Cathode Ray Oscilloscope

Cat. No. 2259

2260. Study of Synchro Devices

- Synchro transmitter-receiver pair with calibrated dials
- Locking system for receiver rotor
- Receiver use as control transformer
- Built-in balanced demodulator circuit
- Panel meter for AC/DC voltages
- Only an external CRO required

Cat. No. 2260



Schematic Diagram

2261. Linear Variable Differential Transformer

Specifications

- LVDT
  Range: ±50mm or total 100mm
  Sensitivity: 25mV/cm
  Operating frequency: 5KHz±5%
- Displacement measurement on a mm scale with fine motion control
- Carrier source (internal): 5KHz±5%; 1.5V (nominal)
- Built-in 3½ digit DVM for output reading
- IC based balanced demodulator circuit
- IC controlled internal power supplies
- Essential accessory - a CRO

EXPERIMENT NO. 330

i. Variation of modulated output with displacement
ii. Input - Output characteristics
iii. Determination of linear range and transducer gain

WHAT YOU NEED

- Linear Variable Differential Transformer kit, Cat. No. 2261
- Cathode Ray Oscilloscope

Cat. No. 2261

2262. Study of Magnetic Levitation System

Specifications

- Object suspended in air by magnetic force.
- Highly nonlinear system control through linearization.
- Controller design to maintain stability.
- Position changing by reference.
- Built-in power supplies, meters etc.
- Detailed technical literature included.

EXPERIMENT NO. 331

i. To develop the transfer function of the system through laboratory measurements
ii. To design/implement PD and lead compensation with different parameter
iii. To simulate the system in MATLAB and study in detail various control option & their response

WHAT YOU NEED

- Magnetic Leviation System kit, Cat. No. 2262.

Cat. No. 2262

2263. Study of Stepper Motor

Specifications

- Single stepping and free running modes of operation with speed variation and direction reversal -internal TTL circuit.
- 360° motion Servo-Potentiometer position picked up for motor dynamics
- Operation through microprocessor kit sample control programs provided
- Stepper motor specification
  Torque : 2.8 Kg-cm
  Step angle : 1.8°
  Power : 12V,1A/phase
- Essential accessory - a CRO

EXPERIMENT NO. 332

i. Manual stepping through push button switch, Measurement of step angle.
ii. Speed and direction control logic by recording the pulse sequence.
iii. Study of resonance effect at various speeds
iv. Display and measurement of the dynamic characteristics of the motor in the wobble mode.
v. Calculation of 'single' stepping and 'slew' regions.
vi. Programming the microprocessor kit to implement features like direction, speed, angle of rotation, number of steps or an arbitrary motion
vii. Study of the effect of inertial and frictional loading on the dynamic performance.

WHAT YOU NEED

- Stepper Motor Kit, Cat. No. 2263.
- Cathode Ray Oscilloscope

2264. Relay Control System

Specifications

- Simulated electronic relay using high speed Ic's
- Simulated 2nd order linear plant. Facility for displaying x and x. signals
- Dead zone variable from 0-600mV
- Hysteresis variable from 0-500mV
- Built-in signal sources -Sine and Square
  Amplitude: 0-1V (min.) Variable Frequency :
  10,20,40,80,100,200,400,800 and 1000Hz
- IC regulated internal power supplies
- Literature and patch cords included
- Accessory- a dual beam CRO

EXPERIMENT NO. 333

i. Study of the relay characteristic and display of the same on CRO for different values of hysteresis and dead zones.
ii. Study of the effect of hysteresis on system stability. Graphical analysis to predict sustained oscillation.
iii. Phase plane analysis of relay control system for various values of Hysteresis and Dead Zones. View the trajectory for different hysteresis and dead zone.

WHAT YOU NEED

- Relay Control System, Cat. No. 2264.
- Dual Trace CRO 20mHz

2265. Compensation Design

Specifications

- Simulated "uncompensated" system having adjustable damping. Peak percent overshoot M_p variable from 20% to 50%, and steady state error variables from 50% to 0.5%
- Compensation network implementation through built-in variable gain amplifier. Gain is adjustable from 1 to 11
- Built-in square and sine wave generators for transient and frequency response studies.
- Frequency adjustable from 25Hz-800Hz (approx)
- Essential accessory - a CRO

EXPERIMENT NO. 334

i. Lag/Lead compensation in the frequency domain
ii. Lag/Lead compensation in the s-plane
iii. All the above design problems may be undertaken for a very wide range of design specifications
iv. The implementation of the compensation network has been made very convenient by a pre-wired amplifier with calibrated gain

WHAT YOU NEED

- Compensation Design Kit, Cat. No. 2265
- Cathode Ray Oscilloscope

Cat. No. 2265

2266. Study of Second Order Networks

Specifications

- Active RLC network using 3-Op Amps
- Damping 1.1-0.1(approx)
- Square Wave 35-700 Hz., 0-1V (typical)
- Sine Wave 35-700 Hz., 0-1V (typical)
- Essential Accessory- a CRO

Cat. No. 2266

EXPERIMENT NO. 335

i. Observe and trace from the CRO screen the step response for different values of ζ.
ii. Compute approximate values of equivalent Network parameters.
iii. Plot the frequency response for various of ζ & observe resonance.

WHAT YOU NEED

- Second Order Network Kit, Cat. No. 2266.
- Cathode Ray Oscilloscope

- Active second order network
- Damping control-over-, critical-, & under-damping
- Built-in sine wave signal
- Needs an external CRO for response study

2267. Linear System Simulator

Specifications

- Simulated first, second and third order system of type-0 and type-1
- Calibrated variable gain amplifier (Resolution 1 : 1000)
- Built-in signal sources:
  Square wave and Triangular
  Frequency : 45-90Hz
  Amplitude : 0-2.5V approximately
- Trigger output for perfectly steady display on CRO
- Uncommitted amplifier for phase adjustment
- Provision for disturbance inputs
- Complete in all respect, except a measuring CRO

EXPERIMENT NO. 336

i. Open and closed loop step response of First Order type-0 system for various values of gain
ii. Open and closed loop step response of Second Order type -0 and type-1 systems
iii. Response of third order system
iv. Steady-State errors for closed loop configuration through triangular wave Input.
v. The number of experiments possible on the unit is not limited to those suggested Above.

WHAT YOU NEED

- Linear System Simulator Kit, Cat. No. 2267.
- Cathode Ray Oscilloscope

Cat. No. 2267

2268. Potentiometers Error Detector

- High quality servo-potenteometers of 360° shaft rotation
- Requires an external CRO for a.c. Studies
- Built-in signal and power sources
- 3½ digit DVM for measurements

EXPERIMENT NO. 337

i. Linearity study of the error detector.
ii. Determination of error detector gain.
iii. Use of A.C. Supply for the error detector Introduction to the phase reversal of error Signal.

WHAT YOU NEED

- Potentiometer Error Detector, Cat. No. 2268
- Cathod Ray oscilloscope

Cat. No. 2268

- High Quality Servo Potentiometers
- 360° Mechanical, 355° Electrical Span
- DC & AC operation
- 3½ Digital Panel Meter for all measurement

2269. Light Intensity Control System

Specifications

- Built-in 3½ digit DVM
- Built-in IC regulated power supplies
- Literature and patch cords included
- Seven lamps 6V/300mA
- 5Hz square wave and triangular wave for dynamic response study

EXPERIMENT NO. 338

i. Characterization of light panel & light sensor blocks
ii. Study of a practical single loop feedback control system which includes:
   a. Disturbance study b. Error monitoring
iii. Performance improvement through P-I control
iv. Evaluation of dynamic behaviour

WHAT YOU NEED

- Light Intensity Control System Kit, Cat. No. 2269.

Cat. No. 2269.

2270. Study of Temperature Transducers

Specifications

- Temperature controlled oven upto 150^0 C with digital temperature display
- Digital voltmeter on the panel for sensor output measurement
- Built-in interfacing circuit and switched gain instrumentation amplifier
- IC regulated power supplies and detailed manual

EXPERIMENT NO. 339

Temperature - output voltage characteristics of the following transducers in the temperature range of room temperature to 150^{0}C and determination of their Parameters.

WHAT YOU NEED

- Temperature transducers kit, Cat. No. 2270

2271. Stroboscope

Specifications

- Speed range : L:50-2000 rpm, M:50-6000 rpm, H:50-12000 rpm
- Crystal controlled accuracy
- Mains Operation
- Display : 5 digit LCD
- Freq. Control : Fine & Coarse
- Weight : Approx. 1 kg.
- Portable Model with strong plastic body
- With carrying case

Cat. No. 2271

2275. SCR Firing Circuits

2276. SCR Communication Techniques

2277. Phase Control using Techniques

2278. Switching Action of a BJT

2279. Switching Action of FET

2280. Thyristor Firing Circuit Kit (UJT Controlled SSCR Time Delay)

2281. Zero Voltage Switching using SCR

2282. Step up Chopper

2283. SCR Single Phase half wave, Full wave, fully controlled Bridge

2284. Three phase Fully Controlled Converter

2285. Single Phase Cyclo Converter

2286. SMPS Trainer Kit

2287. Jine's Chopper

2288. Morgan's Chopper

2289. Series Inverter using SCR's

2290. Parallel Inverter using SCR's

2291. Single Phase Inverter (using power mosfet)

2292. Chopper Circuit (using Poerr Mosfet with Motor)

2293. DC Drive Trainer

2294. Single Phase Half Controlled DC Drive

2295. SCR Ring Counter

Delivery position for all the instruments listed in our Catalog from Page No. 199-207, Cat. no. 2251-2271 is 7-8 weeks time, whereas instruments of Power Electronics listed on this page, Cat. No. 2275-2295 will be delivered within 3-4 weeks time.

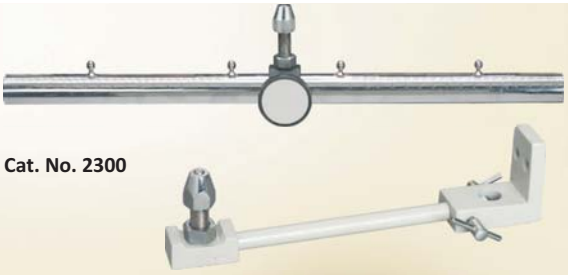
Please call us for details specifications of each & every item from Cat. No. 2275-2295

As we are continually improving and developing our products, the equipment supplied may be advanced in details with the description and/or illustration shown in this catalogue. In other words all the specifications are subject to change without prior notice.

2300. Maxwell's Vibration Needle Graduated

It consists of a hollow cylindrical brass tube open at both ends provided with a small chuck (torsion head) in the middle of which is fixed a plane mirror. The length of the hollow brass tube is 40cm, diameter is 18cm and graduated with scale divided in millimeters on both sides from 0 to 15cm and with vernier to read 0.05mm.

Two solid brass cylinders and two hollow brass cylinders, all of length 10cm long are provided so that when place end to end, they fill the hollow tube completely. Supplied with superior quality clamp of Cat. No. 2316



Cat. No. 2300

To determine the modulus of rigidity (η) of Copper or given wire by dynamical method using Maxwell's Needle.

EXPERIMENT NO. 341

To determine the value of modulus of rigidity (η) of copper by dynamical method using Maxwell's Vibration Needle.

WHAT YOU NEED

- BESTO Maxwell's Vibration Needle graduated, Cat No. 2300
- Small piece of copper wire with suitable length & thickness
- BESTO Screw Gauge 20 X 1mm, Cat No. 12 (b)
- BESTO Spring Balance 1Kg or Digital Balance
- BESTO Stop Clock & Measuring tape
- BESTO Reading Telescope, Cat No. 1543

2302. Rigidity Apparatus (Searle's Pattern)

One can find the modulus of rigidity and Young's modulus for the material of a wire by Searle's method.

The 30cm long wire under test is connected to two brass rods about 30 cm long at their mid points by two screws fitted at the ends of the wire. The rods are suspended from hooks. Complete with three test wires and connecting screws.

2303. Stand for Rigidity Apparatus

A specially designed stand for above Rigidity apparatus

Cat. No. 2302

EXPERIMENT NO. 342

To find the Young's Modulus, modulus of rigidity (η) & Poisson's Ratios (σ) for the material of a given wire by Searle's Method.

WHAT YOU NEED

- BESTO Rigiditiy Apparatus, Cat No. 2302
- Stand for Rigdity Apparatus, Cat No. 2303
- BESTO Screw Gauge 20 X 1mm, Cat No. 12 (b)
- BESTO Vernier Caliper cat No. 5
- BESTO Stop Clock & Measuring tape
- Thread, Candle and Match Box
- Digital Balance or Spring Balance 1 Kg.

2304. Rigidity Apparatus (Dynamic Method)

It consists of an iron rod of length 16" and diameter 1". The circular rod is graduated 15-0-15 cm. The circular weight with thumb screw which fits into the rod is also provided. Supplied with superior quality clamp of Cat. No. 2316

Cat. No. 2304

2315. Torsion Pendulum (5" Brass Disc)

The torsion pendulum is an interesting example of simple harmonic motion, often overlooked by students. It is helpful in explaining the meaning of moment of inertia and moment of torsion and how they affect the period of vibration. The one end of suspension wire hangs from a Universal Clamp with the help of a chuck nut and the other end is clamped to a solid brass disc of 12.5cm dia and 1.25cm thick with the help of a chuck nut. A heavy metal ring of the same metal (brass) and the same outside diameter as the disc is included. When ring is placed on the disc, the moment of inertia, and therefore the period of vibration of the system, is Increased. Supplied with universal clamp of Cat. No. 2316.

Cat. No. 2315

To determine the modulus of rigidity of the material of the given wire by dynamical method using a Torsion pendulum.

2316. Spare Universal Clamp

Spare universal clamp which can be fitted to the wall as well as to the retort stand, useful for torsion pendulum, inertia disc, inertia bar and Maxwell needle etc.

Cat. No. 2316

Our universal clamp can be fitted to the wall as well as to the retort Stand.

EXPERIMENT NO. 343

To determine the modulus of rigidity (η) of the material of a given wire using Torsion Pendulum.

WHAT YOU NEED

- BESTO Torsion Pendulum, Cat No. 2315
- Experimental wire with suitable length & thickness
- BESTO Screw Gauge 20 X 1mm, Cat. No. 12b.
- BESTO Vernier Caliper, Cat. No. 5
- BESTO Stop Clock & Measuring tape
- Pointer on stand

2317. Torsion Pendulum (Bridge Type, Small Size)

Consists of an aluminum disc 25 cm diameter. Another small disc of iron C.P. having same diameter as the interior of a grooved area of the bigger disc. (the small disc has approx. 8 cm dia and 1.25 cm thickness). A tall U-Shape metal bridge with a split chuck, fitted into disc enable accurate suspension and torsion. Article of irregular dimension as large as brick can also be inserted in the U-Shaped suspension. Supplied with wall bracket.

Cat. No. 2317

2318. Torsion Pendulum (Bridge Type, Bigger Size)

Same as Cat. No. 2317 but diameter of aluminum disc 25cm (larger size) and another smaller disc of Iron C.P. has diameter of 10.5 cm and thickness 1.25 cm.

EXPERIMENT NO. 344

To determine the moment of inertia of an irregular body with the help of Torsional Pendulum (Bridge Type)

WHAT YOU NEED

- BESTO Torsional Pendulum, Cat No. 2317/2318
- Small piece of copper wire with suitable length & thickness
- BESTO Screw Gauge 20 X 1mm, Cat. No. 12(b).
- BESTO Spring Balance - 1Kg / Digital Balance
- BESTO Stop Clock & Measuring tape
- BESTO Reading Telescope, Cat. No. 1543

2322. Torsion Apparatus Searle's Horizontal Pattern (Half Meter Long)

Two cast iron feets each with 3 through holes and grub securing screws, separating by two support rods approx 600mm long, one of which is graduated in cm and mm. The wheel 165mm dia. over groove moving on ball bearings is provided with chuck to hold the test rod of 55cm long and 5mm dia with two aluminum scales graduated 30-0-30 in single degrees, mounted on pillar support, which are adjustable along the rod, two pointers with clamp for attaching to specimen, on each of brass and steel rods, cord and hook for carrying masses. Supplied without weights.


Cat. No. 2322

2323. Torsion Apparatus Searle's Horizontal Pattern (One Meter Long)

Same as Cat. No. 2322 but with length of rod approx.1100mm.

2325. Torsion Apparatus Searle's (Vertical Pattern) or Barton's App.

A steel frame mounted on a heavy cast iron base with leveling screws. Upper end of the rod (under test) 900mm length and 5mm dia is clamped by a 3-jaw chuck and the lower end is clamped into the axis of a torsional drum which can be rotated by putting load in the scale pan passing over two frictionless pulleys. Freely sliding three circular scales graduated in single degrees can be clamped at any position. Three pointers for clamping to the test rod are provided. Complete with three other rods, strings and two scale pans, but without weights.

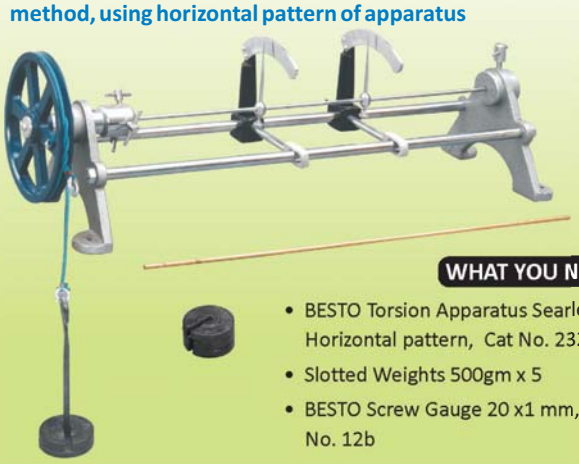
EXPERIMENT NO. 347

To determine the modulus of rigidity of a wire by statical method, using Barton's Apparatus.

- BESTO Barton's Apparatus, Cat. No. 2325
- Slotted Weights 500gmx5
- Screw Gauge 20x1mm, Cat. No. 12b
- Vernier Caliper & Measuring Tape

EXPERIMENT NO. 346

To determine the modulus of rigidity of a wire by statical method, using horizontal pattern of apparatus



WHAT YOU NEED

- BESTO Torsion Apparatus Searle's, Horizontal pattern, Cat No. 2322/23
- Slotted Weights 500gm x 5
- BESTO Screw Gauge 20 x1 mm, Cat. No. 12b
- Measuring Tape & Vernier Caliper

2327. Poisson's Ratio of Rubber Appt.

Consists of a cycle rubber tube of about one meter length with a small pointer, slotted weight, hanger, clamp, burette and a rubber stopper on a heavy cast iron stand. The metallic stand is provided with levelling screws to make the apparatus vertical.


Cat. No. 2327

EXPERIMENT NO. 348

To find the relationship between the longitudinal strain & lateral strain in case of rubber tube & hence to find Poisson's Ratio for rubber.

WHAT YOU NEED

- BESTO Poisson's Ratio Rubber Apparatus, Cat No. 2327
- Measuring Tape & Measuring Cylinder
- Travelling Microscope, Cat. No. 1565

2330. Hook's Law Apparatus

It consists of a support with mounted millimeter scale, a spiral spring, a hanger for weights. The scale is 12cm long, engraved on a plane mirror to permit parallax illumination by reflection and mounted with elevation adjustment on a support rod. The steel spring 1cm in diameter and 3 cm long when unstretched is suspended from a hook above the scale. Weights not included.

Cat. No. 2330

EXPERIMENT NO. 349

To determine the restoring force per unit extension of a spiral spring by statical & dynamic method & also to determine the mass of the spring.

WHAT YOU NEED

- BESTO Hook's Law Apparatus, Cat No. 2330
- Slotted Weights, Brass 10gm-5 pcs.

2331. Fletcher's Trolley

All metal, capable of being assembled and dismantled easily. A large metal trolley with removable cylindrical weights is fitted with wheels which run with very little friction on a track of two steel rods 150cm long. The rail rods are held in heavy clamps which are fitted in two vertical rods, mounted on cast iron feet. the steel vibrator is fitted to one of the vertical rods and frictionless pulley to the other. The unit is capable to verify the law under different conditions. Complete with cord, scale pan, brush and ink.

Apparatus for Applied Mechanics

2332. Deflection of Beam Appts

Consisting of two knife edge and supports , a hanger with knife edge, and a pointer moving over a graduated scale. Complete with scale pan and two beams, one of iron and the other of wood each beam is 120cm in length . Without weights.

2333. Bending of Beam Appts

It consists of brass beam 9mm square one meter long resting on the two knife edges fixed on heavy stands at the bases of which are fitted leveling screws. A central knife edge with hanger rests on the beam at the top of which is provided a pin. Complete with a cast iron slotted weights set having two weights of 1 Kg, two weights of ½ and a hanger of 1 Kg.

2334. Shear Force Appts

Consisting of two knife edge supports on stand and a seasoned wooden bar 180 cm long which is hinged at one point of its length. The dynamometer is with an adjusting screw for restoring line of beam under load conditions. Complete with three sliding U shaped weights.

2335. Bending Moment Appts

Consisting of well seasoned wooden beam 180 cm long hinged at a distance of 60 cm from one end, spring balance is with adjusting screw so as to compensate the initial extension of the spring and to keep the beam horizontal under any load. Complete with three U shaped sliding weights and two knife edge end supports on stands.

2336. Stresses in Beam Appts

Consisting of a well seasoned wood beam 180cm long with two knife edge end supports on stands and two strips. A device with a pointer and roller is applied to magnify strains. Complete with four weights of 1, 0.5, 1.5 and 2 kg (one weight each)

2337. Link Polygon Apparatus

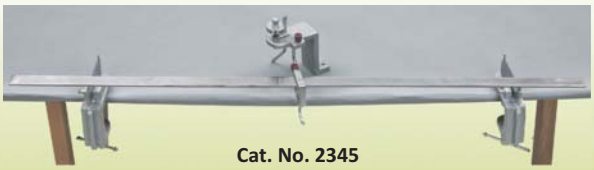
The apparatus is provided with five linkages and connectors, having hooks to which pans are hung. These are fixed between two pulleys around which rope is run to connect to two extension type spring balances. The unit is very useful for the study of arches, abutments and piers. The wooden rectangular beam is fitted with scale. Without weights.

100% Satisfaction GUARNATEED

All our products are guaranteed for one year. If for any reason you are not satisfied with any item you may return it for a replacement, a refund or credit. It's that simple.

2345. Bending of Beam Apparatus

Consisting of two G. clamps with knife edge top. Comprising a metal powdered coated bar of 100cm length having width 25mm and thickness 4.5mm. Sharp knife edge with hanger is also provided which moves on the metal bar. A spherometer fitted on a cast iron stand with electric contacts is also provided, Supplied w/o weights.



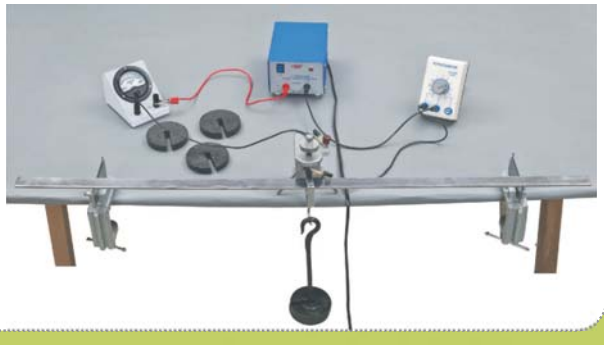
Cat. No. 2345

EXPERIMENT NO. 350

To determine the Young's Modulus of a given beam supported on two knife edges & loaded at the middle point.

WHAT YOU NEED

- BESTO Bending of Beam Apparatus, Cat No. 2345
- BESTO Vernier Caliper, Cat. No. 5
- BESTO Galvanometer, Cat. No. 311/312
- BESTO Stabilized Power Supply 0-5V, 1A
- BESTO Variable Potentiometer
- Slotted Weights 500gmx5 & Measuring Tape



Cat. No. 2346

2346. Bending of Beam Apparatus Koenings Method

It consists of a brass beam 9mm square, one meter long, resting on the knife edges of two heavy table G-clamps. A sharp knife edge with hanger rest on the beam. Two tilting type mirrors (like optical lever) are also provided for this apparatus supplied w/o weights.

2347. Y by Uniform & Non-Uniform Bending (as per Tamil Nadu Syllabus)

Consisting of two knife edges with heavy supporters, one meter scale with pin at the centre, two nos. Iron C.P. slotted weights 50gms x 10

EXPERIMENT NO. 352

To determine the Young's Modulus of a given beam by uniform & non-uniform bending.

WHAT YOU NEED

- BESTO Bending of Beam Apparatus, Cat No. 2347
- BESTO Vernier Caliper, Cat. No. 5
- BESTO Screw Gauge 20 x 1mm, Cat. No.12b
- BESTO Travelling Microscope, Cat. No. 1565
- Measuring Tape & Wooden Support for T.M.

Uniform Bending

Non-Uniform Bending

2348. Cantilever Apparatus

In this apparatus, a hook is provided to one end of powdered coated bar having dimension 100×1.8×0.3 cm (L×B×W). The whole metallic bar is marked with lines. All lines are separated from each other by a distance of 5cm. The cantilever bar is held horizontally keeping its breath in horizontal position.

Cat. No. 2348

2355. Compound Pendulum (Steel C.P.)

It consists of a powdered coated steel bar of dimensions 100×3.75×0.5cm with a number of equidistant holes drilled along its length at equal intervals of 5 cm. The pendulum is provided with two removable knife edges passing through any one of the holes. Complete with wall bracket & two removeable knife edges.

2356.Compound Pendulum (Brass C.P.)

A chrome plated brass bar of dimension 100×25×0.5 cm bored at equal intervals of 5cm and provided with two removable knife edge. Complete with wall bracket.

2357. Compound Pendulum (S.S., Rod Type)

It consists of a stainless steel rod of 1 meter long and 1.0 cm diameter. The S.S. rod is marked with lines at equal distance of 5 cm. Two circular removable knife edges are provided, complete with wall bracket & two circular knife edges.

EXPERIMENT NO. 354

To study the variation of T with L for a compound Pendulum & then to determine

i. **The value of acceleration due to gravity (g)in the laboratory.**
ii. **The position of centre of gravity of the bar.**
iii **The radius of gyration (K) of the bar about an axis passing through C.G. & perpendicular to its length.**

WHAT YOU NEED

- BESTO Compound Pendulum of any type, Cat. No. 2355 / 56 / 57
- BESTO Stop Clock
- BESTO Reading Telescope, Cat. No. 1542 (Optional).
- Stand, Cat. No. 2362 (Optional)

2358. Spare wall Bracket for Compound Pendulum or Kater's Pendulum.

Spare wall Bracket suitable for Compound Pendulum or Kater's Pendulum.

2359. Spare knife Edge for Compound Pendulum

Spare knife edges suitable for Compound Pendulum of Cat. No. 2355 & 2356, set of two knife edges.

2360. Kater's Reversible Pendulum (Steel C.P.)

It is a compound pendulum constructed on the principle that centre of oscillation and centre of suspension are interchangeable. It consists of a steel rod of 120cm long and 1.0 cm dia capable of two adjustable knife edges facing each other. Two metal weights (made of cast iron) of dimension 7.5 × 3.75cm (length × diameter) and (3.5 × 3.75cm) respectively can be made to slide along the length of the bar and can be clamped in any position. Two wooden weights exactly similar to metal weights can also slide along the bar. With the help of this apparatus we can find acceleration due to gravity at a place.

2361. Kater's Reversible Pendulum (Brass or S.S.)

Specifications are same as above but it consists of brass or stainless rod instead of steel C.P. rod. Two metal weights are also made of brass instead of cast iron. Other specifications are same as Cat. No. 2360

EXPERIMENT NO. 355

To determine the value of acceleration due to gravity (g) at a place by means of Kater's Reversible Pendulum.

WHAT YOU NEED

- BESTO Kater's Pendulum of any type
- BESTO Stop Clock
- Stand, Cat. No. 2362 (Optional)

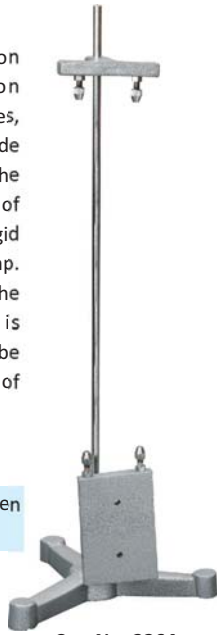
2362. Stand for Kater's Reversible or Compound Pendulum

This stand is suitable for all types of compound pendulums or Kater's pendulums listed above. Heavy type stands having approx. height 52 inches.

2364. Bifilar Pendulum

It consists of a heavy cast iron rectangular plate of dimension 15×10×1.5cm. The plate has six holes, two holes on top, two holes on front side and two holes on the third side of the top. The plate is suspended by means of two strings of equal lengths from a rigid support (i.e. a heavy 'T' shaped clamp. with two split chucks is provided on the heavy base.) When the plate is suspended freely, the two strings will be equally inclined to the horizontal face of the plate.

We can find Moment of Inertia of a given metal of rectangular Cross Section.



Cat. No. 2364

2365. Force into Force Arm /Lever Apparatus

It consists of a half meter aluminum strip with stone agate knife edge at the centre. The aluminum strip is first black painted and after that it is screen printed as 25-0 25cm with zero at the centre. Two plastic hooks, which move along the aluminum meter scale, are also provided. These plastic hooks are used for carrying brass slotted weights. Supplied w/o weight.

Cat. No. 2365

2366. Slotted Weight Brass C.P.

Following brass weights are suitable for the above Lever App.

a)	5x5 gms.
b)	10x5 gms.
c)	20x5 gms.

Cat. No. 2366

2367. Lever Apparatus

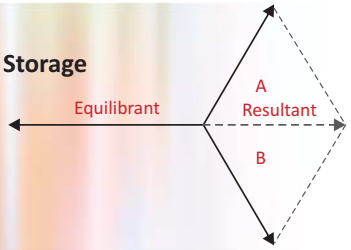
(Apparatus for verification of Law of Moments) Consisting of an aluminium graduated beam fitted into a pivoted stirrup and spirit level on a metal base, the top of the beam is provided with notches all along for hanger carrying weights. With two set of brass slotted weights each set containing four weights and one hanger of 20 gms.

2368. Universal Force Table

For experimentally verifying the laws of triangle, parallelogram and polygon of forces. Comprising of a circular 40cm diameter aluminium disc, graduated into 360 degrees. Complete with levelling screws, clamping devices to fix the table at any desired angle, five sliding clamp, pulleys, central ring, string and five sets of iron nickelled slotted weights, each set containing nine weights and one hanger of 50gms each.

Cat. No. 2368

- High Accuracy
- Easy, Compact Storage
- Inexpensive



2369. Viscosity of Water using as Oscillating Disc

This consists of following :-

a) Oscillating Disc of Brass
b) Water Chamber of Oscillating Disc
c) Heavy Stand for Disk Suspension

Supplied without Lamp & Scale Arrangement.

Accessory required for this Experiment : Lamp & Scale Arrangement

2370. Fly Wheel Without Counter

Comprising of carefully machined and balanced cast iron wheel of about 20 cm in dia and 4.4cm thick, and steel spindle supported on the ball bearings in strong iron brackets. The sides of the wheel are red or grey painted. The top of wheel is chrome plated and is marked with a thick red line. A pointer is fixed to one of the brackets. Diametric hole is drilled in the shaft to take a pin and cord. The base is provided with four holes so that the apparatus can be fixed on a wall, complete with cord and hook.

Cat. No. 2370

Angular Acceleration and Moment of Inertia can be accurately Measured with this inexpensive instrument.

•

Well balanced wheel mounted in ball Bearings

2371. Fly Wheel With Counter

Same as Cat. No. 2370 but provided with superior quality Indian make revolution counter.

Cat. No. 2371

2372. Moment of Inertia Table

It consists of an aluminum disc of approximately 6" dia with a groove. The circular aluminum disc supports five semicircular masses which just fit into a groove, concentric with the circumference. It can be suspended by a steel wire pivoted at the centre of a long frame work, provided with circular base which is also fitted with leveling screws. Supplied with four different shapes of masses (Rectangular, Square, circular and triangular.)

EXPERIMENT NO. 358

To determine the Moment of Inertia of an irregular body, about an axis through its centre of gravity & perpendicular to its plane by Dynamical Method (Inertia Table)

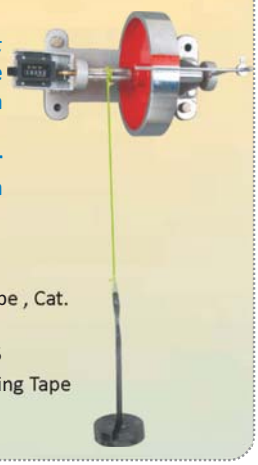
WHAT YOU NEED

- BESTO Inertia Table, Cat. No. 2372
- BESTO Stop Clock, Cat. No. 26
- BESTO Vernier Caliper & Spirit Level 2" Brass
- Digital Balance • Reading Telescope, Cat No. 1542

EXPERIMENT NO. 357

i. To find the torque τ and hence to find the moment of inertia of a flywheel.

ii. To find the angular acceleration a of a flywheel.



WHAT YOU NEED

- BESTO Fly Wheel of any type , Cat. No. 2370/71
- Slotted Weights 500 gm x5
- BESTO Stop Clock, Measuring Tape & Vernier Caliper
- A piece of Chalk

2373. Inertia Disc

Consisting of a brass disc about 15cm in diameter, 6 mm thickness, with arrangement for clamping a split chuck. Supplied with wall bracket.

Cat. No. 2373

2374. Inertia Bar

It consists of a solid brass rod of length 30cm and diameter 1.5cm with centre split chuck for clamping and suspending. Supplied with wall bracket.

2375. 'G' Clamp

For general use in laboratory

a)	3"
b)	4"
c)	5"
d)	6"

Cat. No. 2375

2380. Young's Modulus Apparatus (Iron Frame)

Dr. Searle's design. It is a famous instrument for determining the Young's modulus of a wire and is indispensable where most accurate measurements are desired. The instrument consists of two iron frames connected by a link. The frames are fitted with self centering chucks.

An accurately graduated micrometer screw to read 0.01mm is fitted on a frame. One end of a sensitive spirit level is pivoted to one of the frame, the other end on the points of a micrometer screw is fitted in other frame. Complete with iron C.P. Chucks, cast iron ceiling attachment and torsion weight but w/o velvet case.

Cat. No. 2380

EXPERIMENT NO. 360

To determine the Young's Modulus of the material of a wire by Searle's Method.

WHAT YOU NEED

- BESTO Young's Modulus Apparatus, Cat. No. 2380/81/82
- BESTO Screw Gauge, Cat. No. 12b
- Measuring Tape

2381. Young's Modulus Apparatus (Iron Frame, Brass Fitting)

Similar to above, but brass parts fitted (Maximum iron C.P. parts, which are used in above Cat. No. 2380 are replaced by brass C.P. Parts) w/o velvet case.

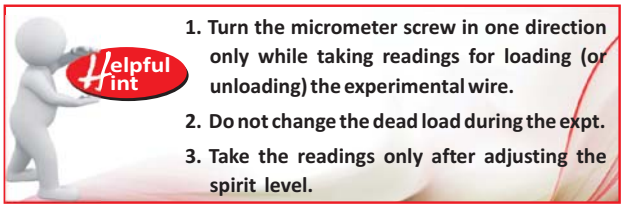
2382. Young's Modulus Apparatus (Brass Frame, Brass Fitting)

Similar to Cat. 2380 but all parts are of brass except torsion weight (i.e. rectangular frame, pin vice, ceiling attachment, screws, rings etc. all are of brass make), without velvet case.

2383. Young's Modulus (Vernier Type)

Simple form but efficient. Consists of a brass scale 10cm long and vernier to read 1/10mm with V slide clamp guides for wire ceiling attachment and torsion weight.

Cat. No. 2383



1. **Turn the micrometer screw in one direction only while taking readings for loading (or unloading) the experimental wire.**
2. **Do not change the dead load during the expt.**
3. **Take the readings only after adjusting the spirit level.**

2385. Young Modulus of a Metal Rod By Interference Method

The experimental rod carries 2 metal plates at different points. These metal plates support a glass plate and a lens. One is on the top of other adjusted by 3 springs and screws. On applying a load the rods bend slightly, increasing the distance between the plate and the lens.

Newton's rings are observed before applying the load. As the load is applied gradually the rings run into the centre, disappearing one at a time. To the right is a microscope fitted with a micrometer eye piece scale for observing and making measurement upon the rings. The instrument is supplied w/o weights & Sodium Lamp Unit.

Cat. No. 2385

EXPERIMENT NO. 361

To determine the Young's Modulus of the metallic rod by using Searle's Optical Interference Newton Ring Method.

WHAT YOU NEED

- BESTO Young's Modulus of Metal Rod App, Cat. No. 2385
- BESTO Slotted Weights, Iron C.P. 100gm x 5
- BESTO Sodium Vapour Lamp Unit, complete set

2390. Inclined Plane

This is an economical form of inclined plane consisting of 60×10cm board either with glass top or sunmica top, hinged to the base board of size 45×10cm. The pulley is attached to one end of the upper board. The upper board (plane) can be set at any angle by clamping the wing nut. Complete with graduated aluminum arc and iron N.P. Roller. Supplied with wooden carriages of 10x10cm with look for determine the force of friction.

2391. Inclined Plane

Same as Cat. No. 2390 but with brass arc and brass N.P. Roller.

2392. Inclined Plane(Deluxe Pattern)

Heavy cast Iron base 45×15×2.5cm thick hinged to wood. Plane comprising two wood strips 47.5×6.2×2cm thick, 2 cm apart, rigidly jointed at ends by metal cross pieces. One strip with 5 cm extension carrying a clamp for holding pulley at any angle. Aluminum pulley 4.5cm in diameter on stem 15cm long.

The angle can be read in degrees and the hypotense and vertical height of the force triangle can be read in cm directly from the scale on the sides. The plane can be inclined up to 45 degrees. Supplied with iron roller and S.S. scale pan.

2393. Friction Slide Apparatus

Simple type having a wooden board 50x10cm. With glass surface, a frictionless pulley is fixed to one end, one sliding wooden board is provided to determine the force of friction, supplied with scale pan but without weights.

EXPERIMENT NO. 362

To find the downward force along the Inclined Plane acting on a trolley/roller on account of gravitational pull of earth and to study its relationship with the angle of inclination of the inclined plane.

WHAT YOU NEED

- BESTO Inclined Plane, Cat. No. 2390/91/92
- BESTO Physical Weight Box, Brass C.P. - 100gm

2394. Friction Slide Apparatus

It is very interesting to study different laws of friction with it. Comprising of a 75x15cm, wooden board and a frictionless pulley at one end, a scale pan with the following accessories but without weights.

1. One set of three wooden carriages with different bottom surface (Wood, glass and iron).
2. One carriage with frictionless rollers.
3. One set of three different surfaces for friction board - a glass plate, a plywood and felt cloth.

2395. Combined Inclined Plane & Friction Slide Apparatus

Consisting of a wooden plane 90x18cm having adjustment for setting the required angle precisely. Complete with frictionless pulley, linear and circular scale, pan a wheeled trolley and a set of eight slide draws having bottom of different materials. Without weights.

2396. Coil Friction Apparatus

It consists of aluminium drum and three frictionless pulleys mounted on wooden board 60x75cm in size. The pulleys can be fixed to give a lap of 1/4 or 3/4 full circumference of the drum, complete with cord and two scale pans, but without weights.

2397. Combined Coil & Belt Friction Apparatus

It consists of metallic pulley of 30cm, diameter with two grooves one for rope and the other for belt. On the back a circular sturdy wooden disc graduated at 10 degree interval is provided. A rotating pulley is fixed at the circumference of the scale. Complete with one belt and rope. The whole apparatus is mounted on a heavy vertical stand. Weights are not included.

2400. Parallelogram of Force App. (Wall type)

For demonstrating the principles of parallelogram. The apparatus comprises a strong drawing board 45×30cm fitted with two hooks for fixing to a wall. The whole board is painted black. It is supplied with two nos. z-pulleys and 3 sets of iron C.P. slotted weights (50gmx5), 5 No. Drawing sheets, one packet of drawing pin & two numbers of mirror strip, but without cord.

Cat NO. 2400

2401. Parallelogram of Force Apparatus (Wooden Stand Type)

This product is similar to the wall type but is intended for use in laboratories where wall space is limited. A thick plywood pieces of thickness 12mm having dimension 45×30cm on a substantial wooden stand supplied with 2 sets of z-pulleys and 3 sets of (50gms x 5) slotted weights, 5 No. Drawing sheets, one packet of drawing pin & two numbers of mirror strip, but without cord.

Cat NO. 2401

EXPERIMENT NO. 364

To Verify parallelogram low of forces

WHAT YOU NEED

- BESTO Parallelogram of Force App., Cat. No. 2401/2402
- Spring Balance Half Meter Scale

2402. Pulley Clamp Pattern (Z Pulley)

This pulley is specially designed for screwing to a parallelogram of Force Apparatus. This pulley will accept 25mm thick board.

Apparatus for Applied Mechanics

2403. Polygon of Forces Apparatus

Consisting of a wooden board of 75x70 cm, size, provided with two wall brackets and four adjustable frictionless aluminium pulleys, complete with four one kilogram.

2404. Triangle & Parallelogram of Forces App.

The black board is made of wood and fixed within a wooden slotted frame of over all size 75x70 cms. Four frictionless pulleys are adjustable in the slots of the frame and the frame is provided with suitable arrangement for fixing it to a wall. The unit is complete with four hangers and 16 iron nickelled slotted weights of 50gms each.

2405. Polygon & Triangle of Forces Apparatus

Same as above but with six pulleys and 24 iron nickelled slotted weights and four hangers of 50 gms each.

2406. Parallel Forces Apparatus

(Simple supported beam type supported at its ends) For verification of condition of equilibrium of parallel forces, law of lever and forces on beam etc. Consisting of two thrust type 10kg, tubular, spring balances fixed on wooden polished board, a wooden bar with steel back plate. Complete with stirrups, hooks and two 1 kg. weights.

2407. Parallel Forces Apparatus

Same as Cat. No.2406 But fitted with 10 kg. Dial type compression balance.

2408. Parallel Forces Apparatus Overhang Beam Type

The apparatus is with two circular dial type 10kg, extension spring balances. Complete with suitable stnads, a wooden beam, with scale and slots at regular intervals, four stirrups, hooks and two 1 kg. Weights.

2410. Capillary Tube Clamp

The apparatus comprises a metal frame, on which three capillary tubes of 10cm long Borosilicate glass and of different internal diameters are clamped with the help of small metal brackets. The 9mm rod is also attached to a metal plate, so that the complete clamp can be held in any stand for determining the surface tension of liquid by capillary rise method.

Cat. No. 2410

2411. Slow Motion Stand (Rising Table)

A machine cast aluminum table 10cm dia with a stem of 12cm can be lowered or raised to a desired height and can be tightened with a thumb screw. In addition to this coarse movement, fine adjustment is provided by a flush in arrangement. The whole arrangement is fitted on a heavy circular base with three leveling screws.

2412. Capillary Tube App.

It consists of rising table (as described under Cat. No. 2411) and capillary tube clamp (as described under Cat No. 2410) In this case three leveling screws of rising table are replaced by two leveling screws and one long rod to hold the capillary tube clamp of Cat No. 2410

2413. Searle's Surface Tension Balance

A cast iron base carries a vertical pillar terminating in a horizontal frame. A chrome plated steel wire is stretched across the frame.

A light weight metal pointer approximately 200mm long with an adjustable counterpoise is attached to the centre of wire by means of a small clamp. A plastic scale is carried on the end of the arm extending from the torsion frame and is calibrated 5-0-5 cm. A small mass pan of 40mm dia is attached to the pointer. The sensitivity of the balance is ultimately dependant upon the modulus of elasticity of the torsion wire and the wire supplied.

EXPERIMENT NO. 365

i. To find the surface tension of water by Capillary Rise Method.

ii. To compare the surface tension of two liquids

WHAT YOU NEED

- BESTO Travelling Microscope, Cat. No. 1565/66/67
- BESTO Caplliary Tube Apparatus with Capillary tube clamp. Cat. No. 2412
- BESTO 250ml Borosilicate Glass Beaker

EXPERIMENT NO. 366

To determine the surface tension of a given liquid by Searle's Torsion Balance Method.

WHAT YOU NEED

- BESTO Searle's Surface Tension Balance, Cat. No. 2413
- BESTO Physical Weight Box, Cat. No. 62
- BESTO Vernier Caliper, Cat. No. 5
- BESTO Screw Gauge 20x1mm, cat. No. 12b
- Small rectangular glass plate / A dish
- Glass trough containing the given liquid

2415. Jaeger's Surface Tension Apparatus

Cat No. 2415

This method is suitable for the purpose of studying the variation of surface tension, with concentration of solution of common salt in water.

Complete with manometer tube fitted on the stand, conical flask with side tube, dropping funnel, three different bore jets and beaker etc.

EXPERIMENT NO. 368

To determine the Surface Tension of liquid (Water) by Jaeger's Method.

WHAT YOU NEED

- BESTO Jaeger's Apparatus, Cat. No. 2415
- BESTO Travelling Microscope , Cat. No. 1565
- BESTO Beaker & Thermometer
- Adjustable Stand

2416. Poiseuille's Viscosity Apparatus

A capillary tube of fine bore is fitted on a wooden board. Then two ends are joined by a rubber tubing which is joined to two upright L-shaped glass tubes forming the manometer with scale. With the help of a pinch cork, a steady flow of water is maintained. Complete with a three limbed constant level tank of brass, one stand with rubber tube and glass parts of corning glass.

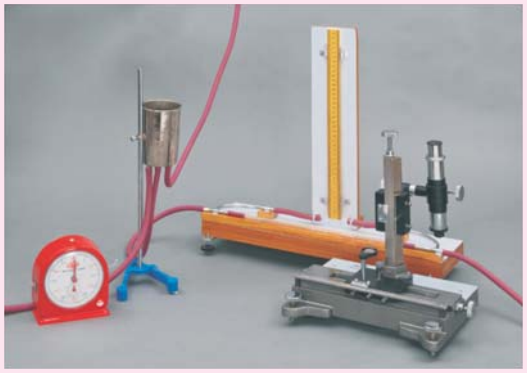
Cat No. 2416

EXPERIMENT NO. 369

To find the co-efficient of viscosity of water by noting its flow through a capillary tube of uniform bore by Poiseuille's Viscosity Method.

WHAT YOU NEED

- BESTO Poiseuille's Viscosity Apparatus., Cat. No. 2416
- BESTO Travelling Microscope, Cat. No. 1565
- BESTO Stop Clock
- Plastic Graduated Cylinder/Jar
- Spirit Level



2417. Quinck's Surface Tension Apparatus

This method is usually used for the determination of surface tension of mercury. It comprises a circular metallic plate with three leveling Screws.

Cat No. 2417

EXPERIMENT NO. 370

To find Surface Tension and angle of contact of mercury with glass by making observations on a large flat drop of mercury.

WHAT YOU NEED

- Quinck's Surface Tension, Cat. No. 2417
- Travelling Microscope, Cat. No. 1565

2420. Viscosity Apparatus Stoke's Method (With Glass Tube)

This method is based on the application of Stoke's law to the fall of spheres through the liquid. With the help of this apparatus, we can determine the viscosity of a transparent liquid like glycerine or caster oil.

A corning glass tube of 35mm dia and one meter long is made to stand firmly in between two upright bars with the help of clamps on a heavy cast iron base. The lower side of tube is closed, whereas on the upper end a rubber cork with hole is provided. Supplied with medium wall borosilicate glass tube. Glass tube is graduated in centimeters from 0 to 100 cm.

Cat. No. 2420

2421. Viscosity Apparatus Stoke's Method (Without glass tube)

Same as Cat. No. 2420 but supplied without borosilicate glass tube.

EXPERIMENT NO. 371

To determine the co-efficient of viscosity of glycerine or castor oil by Stoke's Method.

WHAT YOU NEED

- BESTO Viscosity Apparatus by Stoke's Method, Cat. No. 2420
- BESTO Stop Clock & glass funnel
- BESTO Screw Gauge 20x1mm, Cat. No. 12b
- Experimental Liquid (Glycerine)
- Steel Balls of different sizes & Measuring Tape
- Rubber band of different colours

2422. Viscosity of a Liquid by the Co-axial Cylinder (Viscometer Searle's Pattern)

The value of the coefficient of viscosity for a liquid such as glycerine may be obtained at any desired height. The inner cylinder is graduated in mms and slot is covered by a transparent cover, complete with scale pans and releasing Pins.

Cat No. 2422

EXPERIMENT NO. 372

To determine the co-efficient of viscosity of a highly viscous liquid like Caster Oil or Engine Oil, Glycerine, Honey and Transformer Oil by Searle's Viscometer

WHAT YOU NEED

- BESTO Viscometer Searle' Pattern, Cat. No. 2422
- BESTO Stop Clock
- BESTO Vernier Caliper, Cat. No. 5
- Physical Weight Box, Cat. No. 62

2423. Viscometer Ostwald

Comprises glass U-tube with two bulbs, connected by a capillary tube. Borosilicate glass.

Cat No. 2423

2426. Mechanism of Pulley Apparatus

All metal make as per Bombay Vico pattern, supplied complete with two aluminium pulleys of 2" diameter and two pans. This setup is provided with a superior quality Duco painted sheet metal stand, but without any weights.

Cat. No. 2426

2427. Pan for Mechanism of Pulley Apparatus

Spare pan aluminium with hanger of thread is supplied.

2428. Aluminum Pulley (1.5" dia., Brass Frame)

a)	Single pulley, single hook
b)	Single pulley, double hook
c)	Double pulley, supplied in parallel mount or in line mount.
d)	Triple pulley, supplied in parallel mount or in line mount.

Cat. No. 2428

Apparatus for Applied Mechanics

2430. Pulley Demonstration Set

Almost every kind of pulley experiment can be demonstrated with the help of this equipment. It is very much interesting and of educational value to students, comprising of wooden polished base of 100x20 cm size with two metal supports, and a horizontal bar having eight adjustable collars with hooks from which pulleys can be suspended. The following accessories are provided with the unit.

Single pulley with two hooks	7	Slotted weights 10 gm	3
Pulley tripple long	2	Slotted weights 20 gm	3
Pulley tripple parallel	2	Slotted weights 50 gm	2
Wheel and axle	1	Slotted weights 100 gm	7
Capston	1	Slotted weights 200 gm	4
Slotted weights hanger 50 gm	7	and 20 meter cord.	

Slotted weights and hangers are made of iron and duly nickelled.

2431. Bell Crank Lever

A wooden right angled lever with fulcrum at the angle, the horizontal arm is of 75 cm and vertical arm is of 20 cm., A spring balance with adjustable wingnut is attached to the shorter arm. The lever arm is with scale and grooved at every 5 cm. Complete with one sliding weight of 1 kg.

2432. Compound Lever

Comprising of two iron beams connected to each other and fitted on two different stands, well balanced with a scale pan. All metal parts fitted on wooden polished base, Complete with 1 kg. Weight and a physical iron nickelled weight box 1-50 gms.

2433. Laws of Moments Apparatus

A well balanced machine turned aluminium disc rotating at about its axis and can be clamped on a tripod stand in vertical plane. The disc moves on ball bearing and has number of holes, two pins carrying scale pans may be inserted into the holes at any desired place. Complete with horizontal graduated mirror scale and plumb lines.

2434. Cranked Compound Lever

All metal parts, mounted on wooden base with spring balance and a set of slotted weights.

2435. Compound Wheel and Axle :

Student quickly grasp a clear understanding of the mechanical advantage of the wheel and axle using this all metallic smooth running apparatus. The wheel is of 35cm dia and axle in 3 steps of 20, 10 and 5 cm reducing diameter supported on ball bearings in iron brackets. The base is provided with holes to fix the apparatus on wall. Complete with snatch pulley block, cord and hooks. Weights are not included.

2436. Wheel and Differential Axle

All metal wheel of 30 cm diameter. The axle having diameter of 15 & 7.5 cm respectively giving a ratio of 1:2:4. A steel axle passes through the centre of the wheel which is mounted on ball bearing in cast iron brackets reducing friction to minimum. The base has holes to fix the apparatus on wall. Complete with snatch pulley block, cord and hooks but without weights.

2440. Winch Crab Single Purchase

Fitted with heavy cast iron wall brackets. The grooved wheel is of 25 cm diameter and gears are machine cut. This apparatus is used for experiments in efficiency of mechanical advantage Weights are not included.

2441. Winch Crab Double Purchase

Experimental type.

Same as above but with double set of gearing arrangement.

Without weights.

Cat. No. 2441

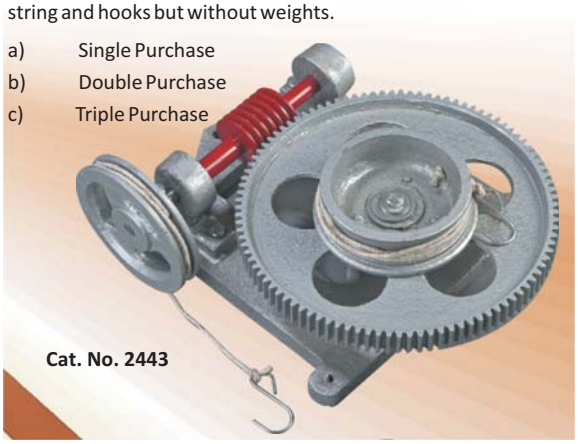
2442. Geared Jib Crane

Strongly built frame mounted on a heavy cast iron base and comprising of single and double wheels. The gears are machine cut and the jib is 1:2 meter high and tapered at both ends, the machine is capable of working either single or double purchase. Complete with cord and hooks. Without weights.

2443. Worm and Worm Wheel

An all metallic self contained apparatus useful for demonstrating the efficiency of worm and wheel and also the principle of work. Consisting of a machine cut worm gear of 25cm diameter, carrying a metal drum of 12 cm diameter, and machine cut worm on steel spindle carrying a 12 cm diameter pulley. The whole arrangement is fixed on heavy cast iron bracket capable to be fixed to a wall. Complete with effort pulley, string and hooks but without weights.

a) Single Purchase
b) Double Purchase
c) Triple Purchase



Cat. No. 2443

2444. Shear Legs Apparatus

Mounted on sturdy wooden base with provision for changing the width between legs, complete with two tubular compression balances, one tension balance and scale pan. Without weights.

2446. Worm and Worm Wheel

A self contained apparatus, consisting of a 80 teeth cut worm gear carrying a metal drum of 8cm dia pulley. The whole arrangement is fitted with string and hooks. Weights are not included.

2447. Screw Jack

All Metallic construction accurately machine cut screw with a pitch of 5mm carrying a double flanged turn table of about 20cm diameter. Fitted on a heavy cast iron base and complete with two adjustable pulleys, cord and hooks. Weights are not included.

Cat. No. 2447

2448. Screw Jack

Small size, experimental model, an aluminium turned pulley of about 10 cm dia is fitted on a screw jack fitted on a 12cm dia metallic circular base with an adjustable pulley and a linear vertical scale. Overall height of the model is about 15cm without weights.

2449. Compound Screw Jack

Consisting of a jack screw of 4 T.P.I. and double start carrying load platform. The nut of the screw is fitted on a pedestal bearing and is keyed to a worm gear of 40 teeth operated by a worm screw. The spindle of the worm screw is provided with an effort wheel of 15cm diameter. Weights are not included.

2450. Jointed Roof Truss on Wheels

The apparatus is about 1.2 meter in length and strongly constructed in all metal, one leg is fitted on a immoveable bracket and the other on rollers. Spring balances show tension on the rod and the compression on rafters. Complete with specially made dynamomete, cahin and pan, but without weights.

2451. Simple Jib Crane

Consisting of a tubular compression balance, pivoted about an axis fitted to the base. The tie chain has an adjustable angle bracket and fitted with a 10 kg extension balance. Complete on wooden base with 1.2 meter jib. Without weights.

2452. Rope Brake and Dynmometer

Consists of a cast iron truly machined wheel of 45 cm. Dia with a groove. The steel axle is mounted on call bearings to minimise friction and assembled on a sturdy wooden frame. Provided with an extension balance, rope and a set of slotted weights and hanger.

2501. Ring and Ball (Hand Form)

It consists of a brass ball of 18mm in diameter, secured to amounted brass ring by a chain. The ring is mounted on a brass rod with a superior quality wooden handle. When both ball and ring are at the same temperature, the ball passes easily through the ring. When the ball is heated, it will no longer fit until cooled or until the ring itself is heated.

Cat No. 2501

For demonstrating the thermal expansion.

2502. Ring and Ball (Hand Form)

Same as above but with brass ball of 25mm in diameter.

2503. Ring and Ball on stand(Mounted Form)

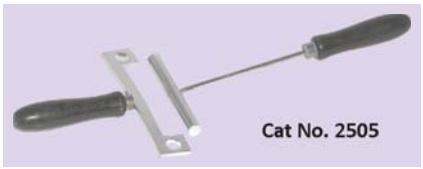
An 18mm brass ball and a ring through which it will just pass are supported on a vertical rod. When expanded by heat, the ball will no longer pass through the ring. Overall height is 27cm.

For illustration, expansion by heating and contraction by cooling.

Cat No. 2503

2505. Bar and Gauge

Comprising a bar of iron 108mm long×11.5mm diameter mounted at its midpoint on a support rod fitted with a wooden handle, and a brass gauge 150×28mm with a cut out, with a wooden handle, which just admits the bar lengthways. Two holes are provided on brass gauge, which passes the circular bar endways when cold.



Cat No. 2505

The Principal used in metallic thermostat is illustrated by this bar.

2506. Compound Metal Strip

It consists of two different types of metals strips, joined together lengthwise, with a wooden handle attached to one end. As the thermal expansion of the two materials is unequal, the bar will bend when heated. Four different types of compound metal strips are available.

a)	Iron & Aluminum	c)	Iron & Copper
b)	Iron & Brass	d)	Brass & Copper

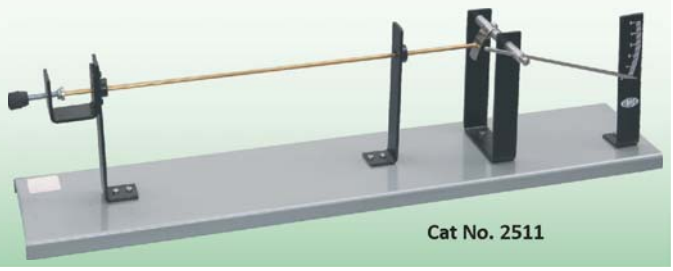
Cat No. 2506

To study the bending of a bimetallic strip on heating and to find which of the two metals has larger linear expansion.

2511. Linear Expansion Simple Form

The simple, rugged construction of this inexpensive apparatus has made it very widely used for elementary work. The apparatus consists of a heavy metallic base of size 50×10 cm with four vertical pillars. One supports a pointer, pivoted at its upper end, with the free lower end traversing on arbitrary scales. In the same pillar there is a supporting bracket for the specimen rod. The second pillar carries the arbitrary scales. The third pillar holds the brass rod from the center. The fourth pillar supports the second end of the specimen rod (brass rod) and has an adjustment screw for setting the pointer to zero. Dimensions of the brass rod are 12.5×5/32 inches.

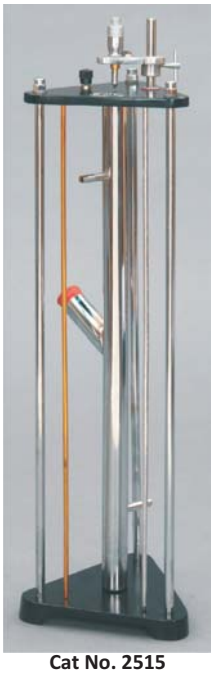
A simple pattern for showing thermal expansion of brass rod when heated either by spirit burner or candle.



Cat No. 2511

2515. Linear Expansion Apparatus (Vertical / Horizontal Pattern)

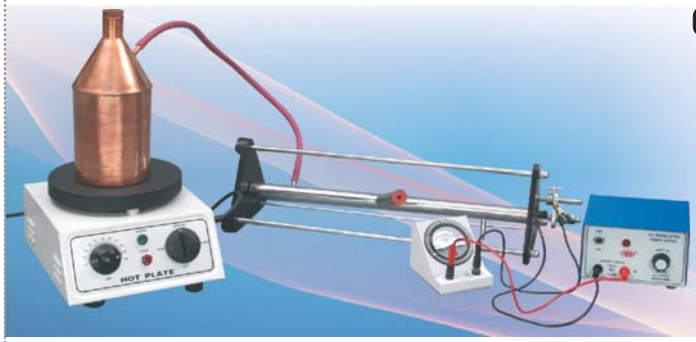
This complete apparatus consists of a nickel plated steam jacket (brass pipe of 50cm long and 2.5cm in diameter)containing one out of three test rods, a micrometer heavy support assembly to mount the steam jacket vertically, fitted with superior quality spherometer. The brass pipe (steam jacket) has a welded inlet and outlet tube for steam and opening for a thermometer. Complete with three test rods but without thermometer.



Cat No. 2515

EXPERIMENT NO. 375

To determine the co-efficient of linear expansion of a given metal rod by Gumber' Apparatus. or Linear Expansion Apparatus



WHAT YOU NEED

- Linear Expansion Appt. as per cat. no. 2515.
- Steam Generator/Boiler
- Hot Plate.
- Rubber Tubing.
- Regulated power supply variable 0-5V, 1Amp.
- Galvanometer on stand.

Another simple method to determine the coefficient of fixed expansion of a given metal rod is to use Cat. No. 2515, steam generator/Boiler & Hot plate. Need not to use regulated Power Supply & Galvanometer.

2518. Searle's Apparatus for Thermal Conductivity of copper

Comprising of a copper bar 25mm in diameter and 300mm in length fitted with a steam jacket heater at one end to be supplied from a steam boiler, and a copper water cool spiral at the other end. The bar has tubes for inlet of water and for thermometers. Fitted in a superior quality wooden case.

Packed with felt for thermal insulation and removable from the front showing the construction. Supplied without steam boiler and thermometer.

Cat No. 2518

2519. Searle's Apparatus for Thermal Conductivity of copper

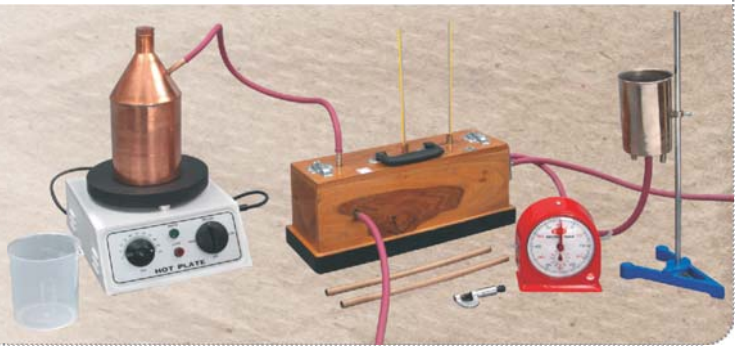
Same as Cat. No. 2518, but with copper bar of 37.5mm in diameter.

EXPERIMENT NO. 376

To find the co-efficient of Thermal Conductivity of Copper using Searle's Conductivity Apparatus.

WHAT YOU NEED

- Searle's Thermal Conductivity Apparatus, Cat. No. 2518/19.
- Two numbers Half Degree Thermometers.
- Two numbers Precision Thermometers 110^{0} x1/10.
- Steam Generator/Boiler.
- Hot Plate, Digital Balance & Stop Clock.



2521. Lee's Disc Apparatus

For determining the relative conductivity of thin layers of materials, it consists of cylindrical brass slab of 11cm dia and 10.5mm thickness. On this is connected another 4.5cm deep brass hollow cylinder (steam chest) of the same dia with inlet and outlet tubes for steam. A hole for thermometer is drilled radially in each, and the cylindrical brass slab is fitted with eyelets to enable it to be suspended by three strings from a stout annular ring. The ring is held on a heavy BESTO Retort Stand complete as above with accessories but without thermometer.

2522. Lee's Disc Apparatus

Same as above but the brass cylindrical slab is replaced by iron cylindrical slab of same size.

2523. Spare set of Sample Discs

For use with Lee's Disc Apparatus comprising one each of 11cm diameter discs of glass, hylum and cardboard.

2528. Thermal Conductivity of Metal Apparatus

Comprising strips of copper, iron, aluminum and brass with nominal thermal conductivities of 395, 72, 240 and 128 $Wm^{-1}K^{-1}$ respectively, mounted on a wooden ring.

EXPERIMENT NO. 377

To find the co-efficient of Thermal Conductivity of a Bad conductor by Lee's Method.

WHAT YOU NEED

- Lee's Disc Apparatus, Cat. No. 2521/22.
- Two numbers Thermometers 110^0 x1/10.
- Stop Clock
- Screw Gauge
- Vernier Calliper
- Hot Plate
- Steam Boiler

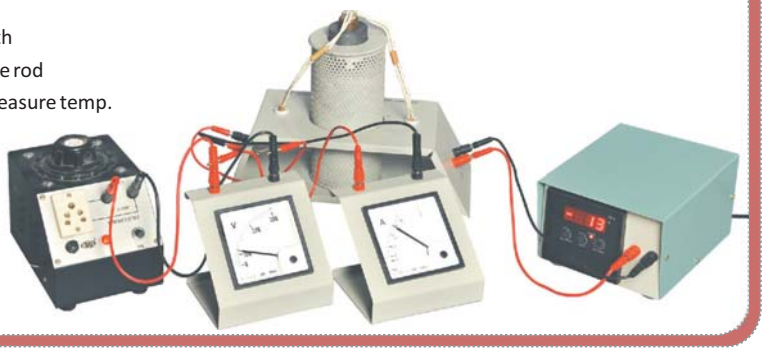
Helpful Hint

Diameter of the Disc should be equal to that of Cylindrical vessel & the metallic disc & should be measured in two perpendicular directions.

2529. Study of Variation of Specific Heat of Graphite with Temperature

It consists of following instruments :

a) Graphite rod of 50mm dia 300mm length
b) Circular heater at the top of the Graphite rod
c) Chro-Alu Thermocouple Provision to measure temp.
d) Sturdy Stand for Graphite assembly
e) Voltmeter 300 V with Stand
f) Ammeter 1 Amp with stand
g) Dimmerstat 2 Amp
h) Digital Temperature Indicator



2530. Co-efficient of Linear Expansion of given material with Fizeau's Method

It consists of following instruments :

a) Study Base for the unit
b) Vertical movement to adjust the height of the sample
c) Small furnace to heat the sample
d) Angle adjustment bracket to keep the glass slides.
e) Travelling Microscope Cat. No. 1566
f) Digital Temperature Indicator
g) Sodium Vapor Lamp 35 Watt
h) Wooden Box for Sodium Lamp
i) Transformer for Sodium Vapour Lamp
j) Dimmerstat

2533. Copper Calorimeter (Wooden)

It consists of a rectangular teak wood box of size 9.5×9.5×cm fitted with a thermometer holder and packed with felt for thermal insulation. It consists of a copper calorimeter of 3"×2" size. Supplied with a copper stirrer but without thermometer.

Cat No. 2533

2534. Copper Calorimeter (Wooden)

Same as above but with copper calorimeter of 4"×3" size.

2538. Joule's Calorimeter (3"x2")

It consists of a copper vessel of 3"×2" with outer vessel as a superior quality teak wood box of size 9.5 × 9.5 × 11.5 cm fitted with bakelite lid with hole for thermometer and stirrer.

Cat No. 2538

2539. Joule's Calorimeter (4"x3")

Same as above but with copper Vessel of 4"×3" size.

EXPERIMENT NO. 379

To determine the mechanical equivalent of heat using Joule's Calorimeter.

WHAT YOU NEED

- Joule's Calorimeter, Cat. No. 2538 or 2539
- Step Down Transformer 0-20V, 3Amp
- Rheostat
- AC Ammeter-5A
- AC Voltmeter-20V
- Stop clock
- Connecting wires
- Digital Balance
- Digital Thermometer

2552. Steam Boiler Copper

Cylindrical body with conical top and short neck for bung. Fitted with steam outlet tube riffled for rubber tubing.

	Description
a)	1 Litre
b)	2 Litre
c)	3 Litre

Cat. No. 2552

2554. Steam Heater, Copper

Comprising a cylindrical copper boiler of size 150mm ×100mm with an inclined brass heating chamber 25mm diameter, closed by sliding inner tube provided with bakelite top.

On raising the inner tube slightly the heated material slides down, the chute into the calorimeter. Thick copper joint-less pot is used. The body is provided with a long steam outlet tube to prevent any possibility of scalding the user's hands.

Cat. No. 2554

2555. Steam Heater, Copper

Same as above but with small size and light pattern

2556. Hope's Apparatus

Comprising a cylindrical vessel, surrounded by an annular trough, in which is to be placed a mixture of ice and salt. The respective temperature of the water at the top and bottom of inner cylindrical vessel are measured over a period as the water cools. Supplied without thermometer.

	Description
a)	G.I. Sheet
b)	Brass
c)	Copper

Cat. No. 2556

2557. Hypsometer Copper

Comprising a Copper boiling vessel with a steam jacked in a tube. A lid with a tubule is provided, which holds the thermometer under test in a cork, supplied without thermometer.

2562. Thermal Conductivity of Rubber Tubing Apparatus

Consists of a copper calorimeter of size 4"×3" described as per Cat. No. 2534, Steam boiler 2 litre as per Cat. No. 2552(b), thermometer 110^{0}C and measuring cylinder.

Helpful Hint

Other major items required for determining thermal conductivity of rubber tubing are-Digital Balance, Traveling Microscope & Stopclock.

2563. Continuous flow Calorimeter (Callender and Barne's Method)

The apparatus consists of a horizontal corning glass tube open at both ends. The heating element is a coil about 40cm long of Ni-chrome wire and is wound spirally inside the axis of the glass tube. The element is easily detachable and is encased in a wooden case lined with felt and provided with a hinged cover. Terminals are brought at each end of the tube for the electrical supply. The horizontal tube is connected either by rubber tube or rubber cork to the inlet and the outlet system, each having a short vertical extension to accommodate a thermometer.

The complete apparatus is mounted on a polished wooden base board. Supplied with constant level tank fitted on stand but without thermometer & Transformer.

Cat No. 2563

2564. Transformer for Callender & Barne's Appts.

Specially designed for use with above apparatus having five tappings of 6, 12, 18, 24 & 30 volt A.C. And current 3 Amp.

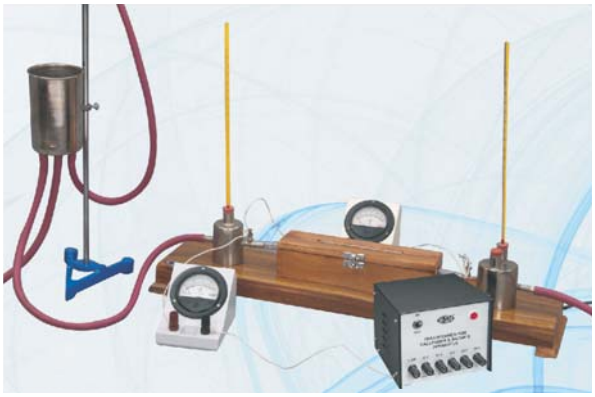
Cat No. 2564

EXPERIMENT NO. 380

To determine the mechanical equivalent of heat by Callender & Barne's Constant Flow Method

WHAT YOU NEED

- Callender & Barne's Apparatus, Cat. No. 2563
- Two numbers Thermometers 110^{0} x1/10.
- Stop Clock
- AC Ammeter 0-3A
- AC Voltmeter 0-40V
- Callender & Barne's Transformer, Cat. No. 2564
- Digital Balance
- Screw Type Pinch Cock & Graduated Cylinder



2565. Constant Level Tank

For maintaining a uniform flow of water through calorimeter or other equipment regardless of pressure fluctuations in water supply line. The level cannot rise above a central overflow tube in the chamber.

Consisting of a copper vessel of 100×75mm diameter with tubes for water inlet, outlet and overflow. A clamp for attaching to any 9mm support rod is provided. Supplied with suitable retort stand.

Cat No. 2565

2566. Conductor of Heat Apparatus (Four Metal Apparatus)

An aluminum metal box (20×12.5×5cm) has four apertures on one side through which rods of brass, aluminum, iron and copper pass. The dimension of each rod is 5"×5/32". The outer end of each rod has a cavity in which a lump of paraffin with a low melting point is to be placed. When hot water is put in an aluminum metal box, the different metals melt the paraffin at different rates. A top aluminum lid is also provided to close the metal box.

Cat No. 2566

2568. Stefan's Radiation Constant Apparatus

Comprising a blackened hollow hemisphere about 25cm dia, fitted in a wooden board lines with tin, and a steam chamber above the hemisphere to measure them an uniform temperature by passing steam through it recorded by two thermometers- Heavy silver disc soldered a bottom to copper - Constantan thermocouple housed in Ebonite tube with lid Engraved on ebonite tube are Disc Constants, mass and Area, Complete with one extra similar thermocouple for calibration is supplied.

Cat. No. 2568

2569. Stefan's Constant Kit

Built-in IC regulated power supply, two moving coil meters & small bulb to find Stefan's Constant.

Cat. No. 2569

EXPERIMENT NO. 382

To find the value of Stefan Constant

a. Calibration of Thermocouple

A graph is plotted between galvanometer deflection θ taken along the X-axis & temperature difference T (Difference between temp. of water both & room temperature).

b. To measure $\frac{d\theta}{dt}$

WHAT YOU NEED

- Stefan's Constant Apparatus, Cat. No. 2568
- Steam Generator with heating arrangement
- Two numbers Thermometers 110^{0} x1/2.
- Thermometer 110^{0} x1/10.
- Stop Clock
- Spot Reflecting Galvanometer
- Vernier Caliper
- Digital Balance

2570. Stefan's Constant Kit

This contains two copper plates with heater element in between, three thermometers , built-in power supply, A.C. Voltmeter, AC Ammeter and their controls. The Kit is self contained and needs no additional equipments.

EXPERIMENT NO. 383

To determine the value of Stefan's Constant by black copper radiation plates (Electrical Method).

WHAT YOU NEED

- Stefan's Constant Apparatus Kit, Cat. No. 2570

Cat. No. 2570

2572. Newton's Law of Cooling Apparatus (Brass Sheet)

Consists of two copper calorimeters 2"×1". Resting inside a trough which stands in an outer tank. The latter is fitted with a wooden top with two holes for thermometer. Supplied without thermometer, but with stirrer. The outer tank is made from Brass. Sheet

Cat No. 2572

2573. Newton's Law of Cooling Apparatus (G.I. Sheet)

Same as Cat. No. 2572 but outer tank is made of G.I. sheet instead of Brass sheet.

2574. Newton's Law of Cooling Apparatus

University Pattern — Comprising two units, each with double walled joint-less brass vessels richly nickel plated and highly polished with non-conduction cover through which is suspended a 7.5×5cm size copper calorimeter. A second covering protects the top of the calorimeter from dust and heat losses. The annular spaces between the double walled vessels are connected by T-Tubes, which enable water at same temperature to be kept circulating through them. Superior quality.

Cat No. 2574

2576. Solar Cooker Working Model

Very superior quality in working condition.

Cat. No. 2576

2577. Forbe's Conductivity Apparatus

A long uniform metallic bar is fitted on wooden board as shown in the picture. One experimental bar is also provided. Supplied without accessories.

Cat. No. 2577

EXPERIMENT NO. 385

To determine the specific heat of liquid (Glycerine) by the method of cooling.

WHAT YOU NEED

- Newton Law of Cooling App, Cat. No. 2572/73/74
- Digital Balance
- Glycerine
- Heating Arrangement (Hot Plate)

EXPERIMENT NO. 386

To determine the co-efficient of Thermal Conductivity of the given bar using Forbe's Method.

WHAT YOU NEED

- Forbe's Apparatus, Cat. No. 2577
- Thermocouple
- Heating Arrangement
- Thermometer & many more

2601. Chemical Thermometer (Mercury Filled)

These permanently filled thermometers have been subjected to test under rigid conditions. Easier reading stem, yellow back and mercury filled thermometers. Length of thermometer is approximately 12 inches and diameter is 7 to 8mm. All of the thermometers listed below are for partial immersion.

The quality of these thermometers are very superior because these thermometers are screen printed and imported yellow capillary is of higher quality than the Indian white capillary is used in all our BESTO Thermometers. Each thermometer is individually packed in a plastic case. These thermometers are exactly as per design of Zeal England Make. Supplied with BESTO Trade Mark only.

	Temperature Range	Graduation	Length (In inches)
a)	-10 to 50° C	1°C	12
b)	-10 to 110° C	1°C	12
c)	-10 to 110° C	½°C	12
d)	-10 to 150°C	1°C	12
e)	-10 to 250° C	1°C	12
f)	-10 to 360° C	2°C	12
g)	220° F	1°F	12
h)	400° F	1°F	12

2603. Precision Thermometer (Mercury Filled)

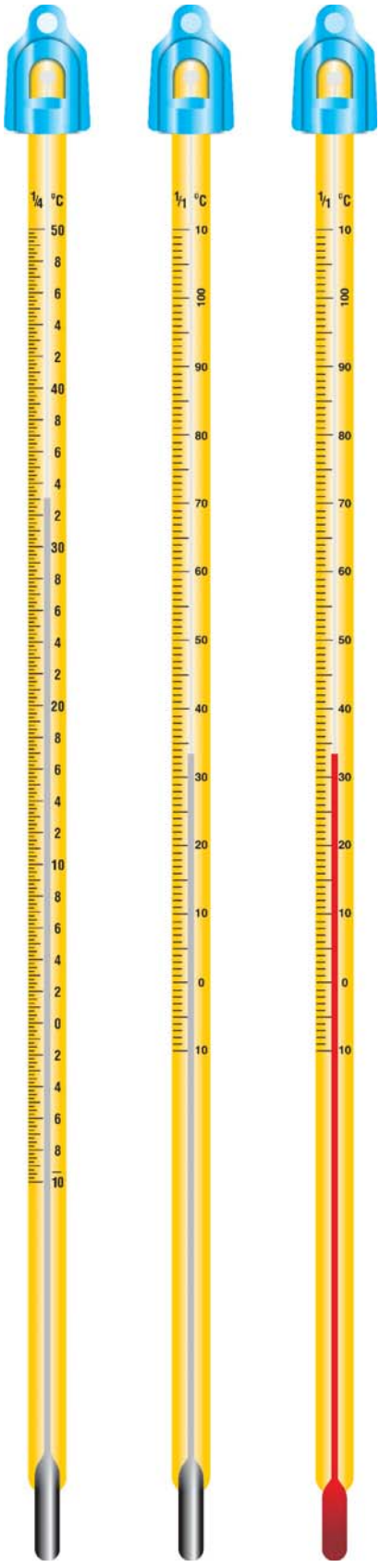
Same as Cat. No. 2601 but these thermometers are calibrated in fractional degrees and can therefore be used for more precise work. Very accurate permanently marked clear reading stem. The outer diameter of the stem is 7 to 8mm. Imported yellow capillary is used.

	Temperature Range	Graduation (In inches)	Length
a)	-10 to 50° C×1/5	0.2°C	12
b)	-10 to 50° C×1/10	0.1°C	16
c)	-10 to 110° C×1/5	0.2°C	16
d)	-10 to 110° C×1/10	0.1°C	18

2604. Red Alcohol Thermometer

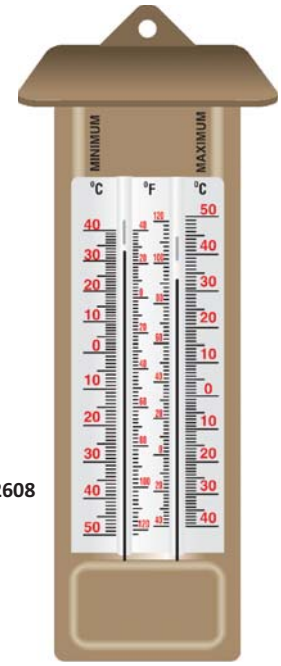
This is an engraved stem Centigrade/Fahrenheit thermometer filled with red spirit instead of mercury. It is intended for use when a general utility thermometer that is extremely easy to read is desired. Same as Cat. No. 2601, with imported yellow glass with screen printing. Red Alcohol filled thermometer, packed in plastic case.

	Temperature Range	Graduation	Length (In inches)
a)	-10 to 50° C	1°C	12
b)	-10 to 110° C	1°C	12
c)	-10 to 150° C	1/2° C	12
d)	220°F	1°F	12



2608. Maximum & Minimum Thermometer

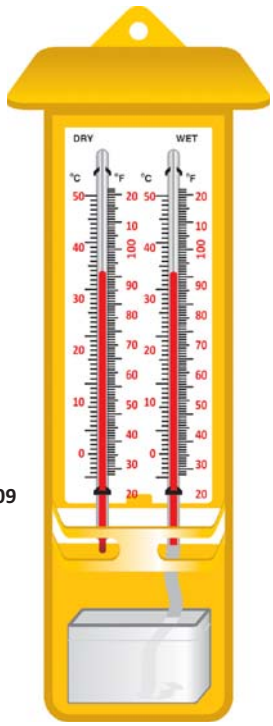
Deluxe Model with Magnate Plastic Body .
Range : -30°C to 60°C



Cat. No. 2608

2609. Wet & Dry Bulb Thermometer

Deluxe Model with Plastic Body . include humidity , chart C & F
Range : -10°C to 50°C



Cat. No. 2609

2611. Sectional Working Model of 2-Stroke Petrol Engine

All parts in aluminum alloy and metal. Ignition is shown by means of a miniature bulb. Carburetor and fuel supply are sectioned with a Crank handle for manual operation. Mounted on a polished wooden base with printed diagram.

2612. Sectional Working Model of 4-Stroke Petrol Engine

All parts in aluminum alloy and metal. Ignition is shown by means of miniature bulb. Carburetor and fuel supply are also sectioned with a Crank handle for manual operation.

Mounted on a polished wooden base with printed diagram.

2613. Sectional Working Model of 2-Stroke Diesel Engine

All parts in aluminum alloy and metal. Ignition is shown by means of miniature bulb. Carburetor and fuel supply are also sectioned with a Crank handle for manual operation. Fitted on a polished wooden base with a printed diagram.

2614. Sectional Working Model of 4-Stroke Diesel Engine

All parts in aluminum alloy and metal. Ignition is shown by means of a miniature bulb. Fuel supply is also sectioned with Crank handle for operation. Fitted on polished wooden base with printed diagram.

2615. Steam Engine Model (Lower Range)

Horizontal Pattern, school model.

2616. Steam Engine Model

An all metallic and amusing working model. The brass cylinder is section and cut and is covered with a glass plate. Complete with working parts; — piston, slide valve — link motion and reserving method can be observed. The movement of wheel is light enough to demonstrate working even by blowing with the mouth.

2617. Steam Engine Model (Electrically Heated)

Operation of a commercial steam engine can be well illustrated by this working model. Its simplicity and reflectiveness for teaching the principles of steam engine has made it to be very widely used. It has a horizontal boiler mounted on a base along with a flywheel, cylinder and sea valve. Provided with glass screen and whistles mounted on the top of the boiler. Before switching on the engine one must take precaution that water in the tank must fill above the level of the glass screen. Connecting cord and plug are provided.

2620. Fortin's Barometer (Precision Form)

This is an instrument for making precise barometric pressure correction in laboratory operations. It is also used in weather observations, factories, mines and power plants.

The mercury cistern is constructed on the Fortin Principle adjustable to zero, indicated by an ivory point in the cistern. The glass barometer tube is carefully made and annealed and mounted in a brass metal casing. The Metrical and English system scales read from & from 640 to 810 mm with vernier reading to 1/100 inch and 1/10 mm.

The mercury level is adjusted by means of a knurled screw mounted at the bottom of the casing. When the knurled screw is turned all the way into the casing mercury fills the entire system and the tube accepts a very small volume to allow for thermal expansion. The barometer tube and scales covering the glass are made from corning glass. The barometer is mounted on a polished wooden board fitted with metal thermometer. Supplied without mercury.

2621. Fortin's Barometer Case (Soft Wood)

Case made of Superior quality Haldu wood with glass on three sides

2622. Rain Gauge without Jar

This durable non-rusting, all metal gauge consists of a funnel 4" in dia fitting into the top of cylindrical vessel of the same diameter. When the inner tube is removed, the outer case serves as an overflow container.

a)	G.I. Sheet
b)	Brass Sheet
c)	Copper Sheet

Cat. No. 2622

Miscellaneous Items

2625. Solar System

With nine planets electrical fitting, school model.

2626. Solar System

With nine planets electrical fitting, college pattern. Superior quality, with built in DC battery eliminator.

2627. Dynamo A.C.

On nicely polished wooden board with driving wheel and bulb. superior quality.

2628. Dynamo D.C.

On nicely polished wooden board with driving wheel and bulb. superior quality.

2629. Dynamo A.C./D.C.

superior quality.

2630. Electric Motor

Heavy pattern on wooden base with Newton Colour Disc. Export Quality.

2631. Electrical Demonstration Bell

All parts clearly visible; rigid construction to show the connections; mounted on a vertical stand.

As we are continually improving and developing our products, the equipment supplied may be advanced in details with the description and/or illustration shown in this catalogue. In other words all the specifications are subject to change without prior notice.

A Microwave test bench is an assembly of various microwave components held together by Nuts & Bolts. It consists of a microwave source (Oscillators) at one end. The waves generated are led down by a wave guide through various components so that student can observe the propagation of waves & their interaction.

2635. Three Port Ferrite Isolator

Circulators are matched three –Port devices and these are meant for allowing microwave energy to flow in clockwise direction with negligible loss but almost no Transmission in the anticlockwise direction. Frequency range : 8.2-12.4 GHz

2636. Variable Attenuators

These are simple and conveniently type set-level attenuators to provide at least db (1.5 bd in V & W Bands) of continuously variable attenuation.

These consists of a movable lossy vane inside the section of a waveguide by means of a micrometer, the configuration of lossy-vane is so designed to obtain the low VSWR characteristics over the frequency band.

These are meant for adjusting power level and isolating a source from the load etc.

Cat. No. 2636

2638. Frequency Meters

Direct Reading Frequency Meter to give direct frequency on the dial provided. These are recommended of frequency and easy readings are desired in laboratory and production testing.

These consists of a section of waveguide connected to a tunable resonant cavity of high Q. The cavity absorbs some power at resonant cavity of high Q. the cavity absorbs some power at resonant frequency. These are designed to have 5 Mhz resolution & off-resonance VSWR of 1.01.

Frequency range 8.2 to 12.4 GHz. Calibration Chart provided.

Cat. No. 2638

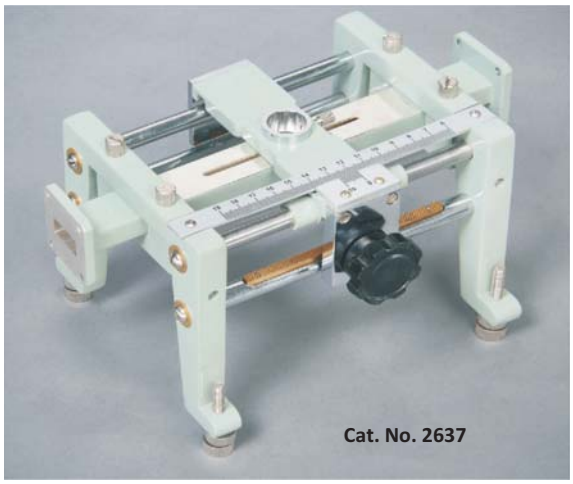
2637. Slotted section with precision waveguide slotted line and probe-carriage.

Slotted Section consists of a precision waveguide slotted line and the probe carriage. The wavelength slotted line, comprise of an accurately machined section of waveguide in which a small longitudinal slot has been cut which is a basic means for monitoring wave –patterns inside the waveguide system. Such data may be transformed into impedance of the terminal load of unknown system of components, percent of transmitted power, degree of antenna-match and other characteristics of waveguide.

A precision built probe carriage has a centimeter-scale with a vernier reading of 0.1mm least count.

Frequency range 8.2 to 12.4 GHz Max. residual VSWR 1.01.

Total Vernier travel 15cm typical.



Cat. No. 2637

2639. Tunable Probe

Tunable probe is designed to be used with slotted line section. These are meant for exploring the energy of Electric Field in a suitably fabricated section of waveguide. The depth of penetration into a waveguide section is adjustable by the knob of the probe.

The tip picks up the RF power from the line, this power is rectified by crystal detector which is fed to the VSWR meter or indicating instruments.

Frequency Range : 8.2 to 12.4 GHz
Output Connector : BNC

Cat. No. 2639

2640. Detector Mount (Tunable)

Tunable detector mount are simple and easy to use instruments for detecting microwave power through suitable detector.

Frequency Range : 8.2 to 12.4GHz
Output Conector : BNC

Cat. No. 2640

2641. Movable –Shorts

Movable Shorts consists of a section of waveguide, flanged on one end and terminated with a movable shorting plunger on the other end. By means of this non-contacting type plunger a reflection co-efficient of almost unity can be obtained.

These are available in other frequency bands also.

2642. Precision Movable –Shorts

Precision Movable Shorts are similar to movable shorts accept that a non contacting type plunger is driven by the micrometer of least count 0.01mm for precise movement and reading of plunger.

Frequency Range : 8.2 to 12.4GHz
Micrometer : 40 mm

Cat. No. 2642

2643. Matched Terminations

It is a nonreflective termination based on tapered flap. These are useful for VSWR measurements of various waveguide components. These are also employed as a precise reference loads with Tee junctions, directional couplers etc.

Frequency Range : 8.2 to 12.4 GHz
VSWR : Better than 1.02
Average Power : 2 watts

2644. Waveguide – Stand

Waveguide stands are meant to accept the components of respective bands for setting up a waveguide test bench and system.

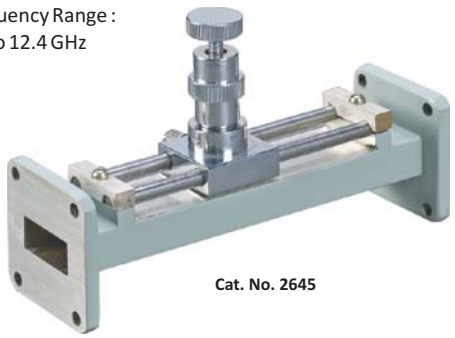
The height of stand is adjustable with a locking screw. These consists of a C.I. base with supports of different frequency bands.

Cat. No. 2644

2645. Slide Screw Tuner

Slide Screw Tuner are used for matching purpose by penetration and position of a screw in the slot, provided in the centre of waveguide section. These consist of a section of waveguide, flanged on both ends and a thin slot is provided in the broad wall of waveguide. A carriage carrying the screw is provided over the slot.

Frequency Range :
8.2 to 12.4 GHz



Cat. No. 2645

2650. Liquid Dielectric Cells

Liquid Dielectric cell are used to measure dielectric constants of low loss liquids. It consists of a section of waveguide with micrometer driven plunger mounted on a E-plane bend and surrounded by a temperature control water jacket.

An outstanding feature of this cell is its compact and rugged design.

Cat. No. 2650

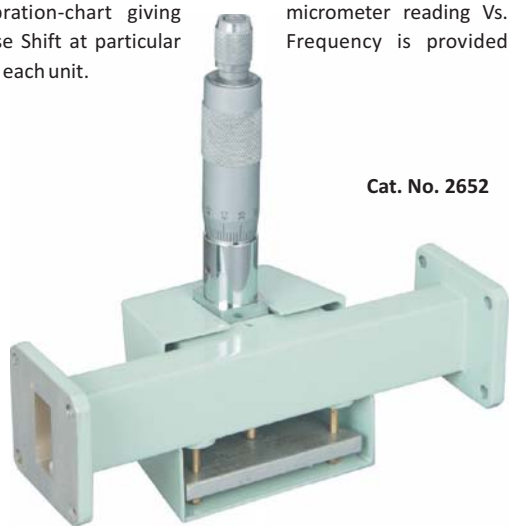
2651. Solid Dielectric Cell

Solid Dielectric cell consists of a section of waveguide flanged on both ends and one end is terminated with a polished fixed reflector. These are meant for measurement of dielectric constant of solids.

2652. Waveguide Phase - Shifters

Waveguide Phase Shifter consists of a section of waveguide flanged on both ends with a dielectric vane, which is movable by means of a micrometer inside the waveguide.

These Phase Shifters provides a phase-shift of around 180°. A calibration-chart giving micrometer reading Vs. phase Shift at particular Frequency is provided with each unit.

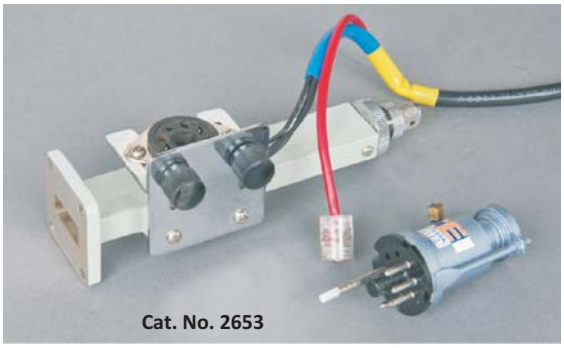


Cat. No. 2652

2653. Klystron & Klystron Mounts

Klystron Mount for mounting corresponding Klystrons such as 2K22, 2K25, 732A/B, 726A or RK-5979 etc.

These consists of a section of waveguide flanged on one end and terminated with a movable short on the other end and terminated with a movable short on the other end. An octal base with cable is provided for connecting these mount to Klystron power supply (Model KP-151)



2654. Klystron Power Supply (Model KP-151)

Model KP-151, is a state-of-the-art solid state, regulated power supply for operating low power Klystrons such as 2K25, 723 A/B, RK 5976, 726, 2K22 etc.

Model KP 151 incorporates a number of proprietary features :-

a) Regulated Beam Supply, Repeller and Filament Supply voltages.

b) Overload TRIP protection for Beam Supply Output.

c) LED Digital metering for Beam voltage, current and Repeller voltage.

d) Stand-by mode.

e) Ultra compact and Reliable.

In addition to AM and FM modulation of Beam current, a provision for externally modulating the klystron supply with desired signal waveform has been provided.

Model KP-151 utilizes quality components, rugged construction and ergonomically designed front panel. A careful handling of the instrument will provided years of trouble free service.

2655. Klystron Cooling Fan

This is provided for keeping the klystron cool.

2657. Gunn Oscillators

Model 2152 Gunn Oscillators are solid state microwave energy generators. These consists of waveguide cavity flanged on one end and micrometer driven plunger fitted on the other end. A gunn-diode is mounted inside the waveguide with BNC (F) connector for D.C. Bias.

Each Gunn Oscillator is supplied with calibration certificate giving frequency Vs. micrometer reading at 200 MHz intervals.

2658. Pin Modulators

Model 451 Pin-Modulators are designed to modulate the CW output of Gunn Oscillator. It is operated by the square-pulses derived from the UHF (F) connector of the Gunn Power Supply Model X-110.

These consists of a Pin-diode mounted inside a section of waveguide flanged on it's both end. A fixed attenuation vane is mounted inside at the input port to protect the oscillator.

2659. Gunn Power Supply (Model X-111)

Model X-111 Gunn Power Supply has been designed to operate high frequency Gunn oscillators and where PIN Modulators are not available, in this supply variable frequency square wave modulation is provided on the bias supply itself.

Front panel digital meter reads the Gunn bias and the current drawn by the Gunn-diode through a switch.

This consists of a regulated D.C power supply 2.0 to 12.0 V variable and a square wave generator of variable frequency 850 to 1150 Hz.

Cat. No. 2654

2660. Different type of cables

a)	BNC to BNC Cable
b)	BNC to Open Cable

2663. Solid-State VSWR Meter (Model VS-411)

Model VS-411 is a calibrated high gain amplifier tuned at one frequency to be used for measurement of VSWR, impedance and relative power levels. The meter indicates the signal level in proportion to the input, which is calibrated directly in VSWR and db.

Input Selector Switch is provided for NORMAL and EXPAND range.

Cat. No. 2663

Specifications

Amplifier type	High gain tuned at one frequency
Frequency	1000 Hz ± 2%
Sensitivity	0.1 microvolt at 200 ohms for full scale.
Band-width	25-30 Hz.
Noise-level	Less than 0.02 microvolt.
Range	70 db min. in 10 db steps.
Accuracy	±0.15 db on one range
Meter-Linearity	1% of full scale
Scale-Selector	Normal, Expand
Gain-Control	'Coarse' & 'Fine'
Input	BNC (F), 200 ohms impedance

BESTSELLER

2664. Smith's Chart Pad of 100 purchase

2665. Fixed Short

2666. Wave Guide Cavity

EXPERIMENT NO. 390

i. To study the Characteristics of Reflex Klystron

ii. To study Frequency, Guide Wavelength & free Space Wavelength.

iii. To measure the SWR & Reflection Coefficient.

iv. To measure Impedance of a load.

v. This is the basic Microwave test bench using klystron Source.

WHAT YOU NEED

- Klystron Power Supply, Cat. No. 2654
- Klystron & Klystron Mount, Cat. No. 2653
- Isolator, Cat. No. 2635
- Frequency Meter, Direct Reading Type, Cat. No. 2638
- Variable Attenuator, Cat. No. 2636
- Slotted Section, Cat. No. 2637
- Tunable Probe, Cat. No. 2639
- Detector Mount, Cat. No. 2640
- Movable Short, Cat. No. 2641
- Matched Termination, Cat. No. 2643
- VSWR Meter, Solid State, Cat. No. 2663
- Waveguide Stands, Cat. No. 2644
- Slide Screw Tuner, Cat. No. 2645
- Cooling Fan, Cat. No. 2655
- BNC to BNC Cable, Cat. No. 2660
- BNC to Open Cable, Cat. No. 2660
- Fixed Short, Cat. No. 2665

EXPERIMENT NO. 391

i. To study the Characteristics of Gunn Diode.

ii. To study Frequency, Guide Wavelength & free Space Wavelength.

iii. To measure the SWR & Reflection Coefficient.

iv. To measure Impedance of a load.

WHAT YOU NEED

- Gunn Power Supply, Cat. No. 2659
- Gunn Oscillator, Cat. No. 2657
- Pin Modulator, Cat. No. 2658
- Frequency Meter, Direct Reading Type, Cat. No. 2638
- Variable Attenuator, Cat. No. 2636
- Slotted Section, Cat. No. 2637
- Tunable Probe, Cat. No. 2639
- Detector Mount, Cat. No. 2640
- Smith Chart of 100 pcs., Cat. No. 2664
- Movable Short, Cat. No. 2641
- Matched Termination, Cat. No. 2643
- VSWR Meter, Solid State, Cat. No. 2663
- Waveguide Stands, Cat. No. 2644
- Slide Screw Tuner, Cat. No. 2645
- Cooling Fan, Cat. No. 2655
- BNC to BNC Cable, Cat. No. 2660
- BNC to Open Cable, Cat. No. 2660
- Fixed Short, Cat. No. 2665

EXPERIMENT NO. 392

i. To measure dielectric constant of Solids.

ii. To measure dielectric constant of Liquids.

iii. To measure Phase Shift.

iv. To measure 'Q' of a Cavity.

WHAT YOU NEED

- Klystron Power Supply, Cat. No. 2654
- Klystron & Klystron Mount, Cat. No. 2653
- Isolator, Cat. No. 2635
- Frequency Meter, Direct Reading Type, Cat. No. 2638
- Variable Attenuator, Cat. No. 2636
- Slotted Section, Cat. No. 2637
- Tunable Probe, Cat. No. 2639
- Detector Mount, Cat. No. 2640
- Solid Di-electic Cell, Cat. No. 2651
- Liquid Di-electric Cell, Cat. No. 2650
- VSWR Meter, Solid State, Cat. No. 2663
- Waveguide Stands, Cat. No. 2644
- Wave Guide Phase Shifter, Cat. No. 2652
- Cooling Fan, Cat. No. 2655
- BNC to BNC Cable, Cat. No. 2660
- Precision Movable Short, Cat. No. 2642
- Waveguide Cavity, Cat. No.
- Fixed Short, Cat. No. 2665

EXPERIMENT NO. 393

To Study the Faraday Rotation effect and its properties.

WHAT YOU NEED

- Klystron Power Supply, Cat. No. 2654
- Klystron & Klystron Mount, Cat. No. 2653
- Isolator, Cat. No. 2635
- Frequency Meter, Direct Reading Type, Cat. No. 2638
- Variable Attenuator, Cat. No. 2636
- Detector Mount, Cat. No. 2640
- VSWR Meter, Solid State, Cat. No. 2663
- Waveguide Stands, Cat. No. 2644
- Cooling Fan, Cat. No. 2655

Faraday Rotation Setup Consist of following components :-

a) Circular to Waveguide Transition - 2Pcs.
b) Round Waveguide with Magnetic Coil
c DC Power Supply
d) Ferrite Fitted inside the round Waveguide
e) Round Waveguide Stands
f) Rotary Joint, I-Type

EXPERIMENT NO. 394

To Prove Bragg's Law using Microwave Diffraction Spectrometer

- Microwave radiations are mono-chromatic, Plane polarised and coherent and they behave like waves. Many laboratory experiments in optics can be performed easily with simple microwave equipments, Reflection, Refraction and polarization including to prove Bragg's Law can be performed with this microwave Diffraction Spectrometer.
- It consists of a goniometer with one stationary and other rotatable arms. Each of these arms has to adjustable stands. These stands holds the transmitting horn on one end and the receiver horn on the other.
- The Polyfoam containing the steel balls structure is kept in the center. A 0-360° found scale with a pointers is provided to read the position of rotatable arm.

WHAT YOU NEED

- Klystron Power Supply, Cat. No. 2654
- Klystron & Klystron Mount, Cat. No. 2653
- Variable Attenuator, Cat. No. 2636
- Frequency Meter, Direct Reading Type, Cat. No. 2638
- Waveguide Stands, Cat. No. 2644
- Cooling Fan, Cat. No. 2655
- Isolator, Cat. No. 2635
- VSWR Meter, Solid State, Cat. No. 2663
- Detector Mount, Cat. No. 2640
- Pyramidal Waveguide Horn
- Mechanical Turn Table with crystal Structure i.e. Diffraction Spectrometer
- Coaxial to Waveguide Adapter
- Coaxial Cable N to N

INDEX

Let me appreciate & thanks to my friends
Dr. Davinder Mehta,Physics Deptt, Punjab University, Chandigarh
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It gives me great pleasure in conveying my Heart felt appreciation to all our clients for the successful completion of First coloured Catalogue of Physics Instruments.

Please send your feed back to my personal

E-Mail ID : amarjeet_bhatia67@yahoo.in

One day DREAM asked LIFE;
"when will we all come true?"
"Never!"; life replied.
"B'coz the day when you all will come true,
I will lose my meaning!"
Let's dream and act together to BE BETTER!

Love

Amarjeet Singh
09896000489

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