



Management
System
ISO 9001:2015
www.tuv.com
D. 97465-054



Republic of the Philippines
CAMARINES NORTE STATE COLLEGE
F. Pimentel Avenue, Brgy. 2, Daet, Camarines Norte

OFFICE OF THE BAC CHAIRPERSON FOR GOODS AND SERVICES

July 29, 2019


ADDENDUM NO. 2 Series of 2019 SUPPLY AND DELIVERY OF PHYSICS LABORATORY EQUIPMENT AND MATERIALS

This Addendum No. 2 for the project Supply and Delivery of Physics Laboratory Equipment and Materials is being issued in accordance with Revised IRR of R.A. 9184 specifically Section 22.5.2 & 22.5.3

This is to inform the prospective bidders of the **herein attached corrected Schedule of Requirements** in the Bidding Documents under Section VI – Schedule of Requirements.

Likewise, this is also to inform the prospective bidders on the modification made on **ITB Clause No. 12.1 (a)(ii)** of the Bid Data Sheet that the bidder's **SLCC similar to the contract to be bid should have been completed within five years** prior to the deadline for the submission and receipt of bids. And **ITB Clause No. 13.2** of the Bid Data Sheet that the **award is on per item basis.**

This Addendum shall form integral part of the Bid documents.


ROSALIE A. ALMADRONES, Ph.D.
BAC Chairperson for Goods and Services



Management System
ISO 9001:2015



OFFICE OF THE BAC CHAIRPERSON FOR GOODS AND SERVICES

Supply and Delivery of Various Physics Laboratory Equipment and Materials

Item No	Description	Quantity	Unit of issue	Unit Price	Total Price
1	Force Table	1	set	36,893.00	36,893.00
2	Mass & hanger Set	1	set	15,696.00	15,696.00
3	Air Track	1	set	138,349.00	138,349.00
4	Variable Output Air Supply	1	piece	97,734.00	97,734.00
5	Discover freefall System	1	set	72,815.00	72,815.00
6	Smart Timer	1	piece	52,589.00	52,589.00
7	850 Universal Interface	1	set	129,013.00	129,013.00
8	Capstone Site license (unlimited user	1	Unit	102,597.00	102,597.00
9	Small "A" Base	1	piece	7,443.00	7,443.00
10	Stainless Steel Rod	1	piece	6,472.00	6,472.00
11	Stainless Steel Rod	1	piece	5,340.00	5,340.00
12	Multi Clamp	3	piece	3,722.00	11,166.00
13	Table Rod Clamp	1	piece	9,223.00	9,223.00
14	Projectile Launcher	1	set	67,314.00	67,314.00
15	Plastic Balls	1	set	5,502.00	5,502.00
16	Ballistic Pendulum Accessory	1	set	16,667.00	16,667.00
17	Rotary Motion Sensor	1	piece	31,230.00	31,230.00
18	Spherical Mass Set	1	set	11,003.00	11,003.00
19	Attwood's Machine	1	set	11,003.00	11,003.00
20	Discovery Friction Accessory	1	set	7,445.00	7,445.00
21	Slotted Mass Set	1	set	20,065.00	20,065.00
22	Dynamics Standard System	1	set	88,511.00	88,511.00
23	Steel Balls	1	set	3,722.00	3,722.00
24	Triple Beam Balance (w/tare)	1	piece	40,615.00	40,615.00
25	Centripetal Force Apparatus	1	set	66,343.00	66,343.00
26	Triple Output power supply	1	piece	44,336.00	44,336.00
27	Hooke's Law Set	1	set	21,197.00	21,197.00
28	Basic Calorimetry set	1	set	21,197.00	21,197.00
29	Steam Generator	1	piece	101,456.00	101,456.00
30	Calorimetry Cups (12)	1	set	3,398.00	3,398.00
31	Heater/stirrer	1	piece	50,647.00	50,647.00
32	Thermal Expansion Apparatus	1	set	47,734.00	47,734.00
33	Field Mapper Kit	1	set	32,362.00	32,362.00
34	Modular Circuits Essential Physics	1	set	64,563.00	64,563.00
35	Alnico Bar Magnets (2 pack)	1	set	4,693.00	4,693.00
36	Air Core Solenoid	1	piece	27,508.00	27,508.00
37	Basic Coil set	1	set	46,116.00	46,116.00
38	Heavy Duty Galvanometer	1	piece	34,142.00	34,142.00
39	Basic Optics System	1	set	83,009.00	83,009.00
40	Diffraction Kit	1	set	62,783.00	62,783.00

1,699,891.00

1. Force Table

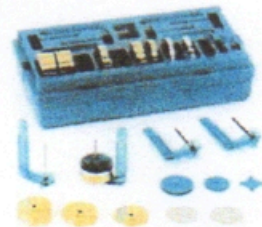
- [1] Removable legs for storage
- [2] Includes three low-friction pulleys with clamps
- [3] Adjustable pulley height for reduced parallax
- [4] Laminated surface with built in scale



2. Mass and Hanger Set

Includes:

- [1] 100 g mass (3)
- [2] 50 g mass (3)
- [3] 20 g mass (6)
- [4] 10 g mass (3)
- [5] 5 g mass (3)
- [6] 2 g mass (3)
- [7] 1 g mass (3)
- [8] 0.5 g mass (3)
- [9] mass hanger (4)
- [10] Molded Storage Box



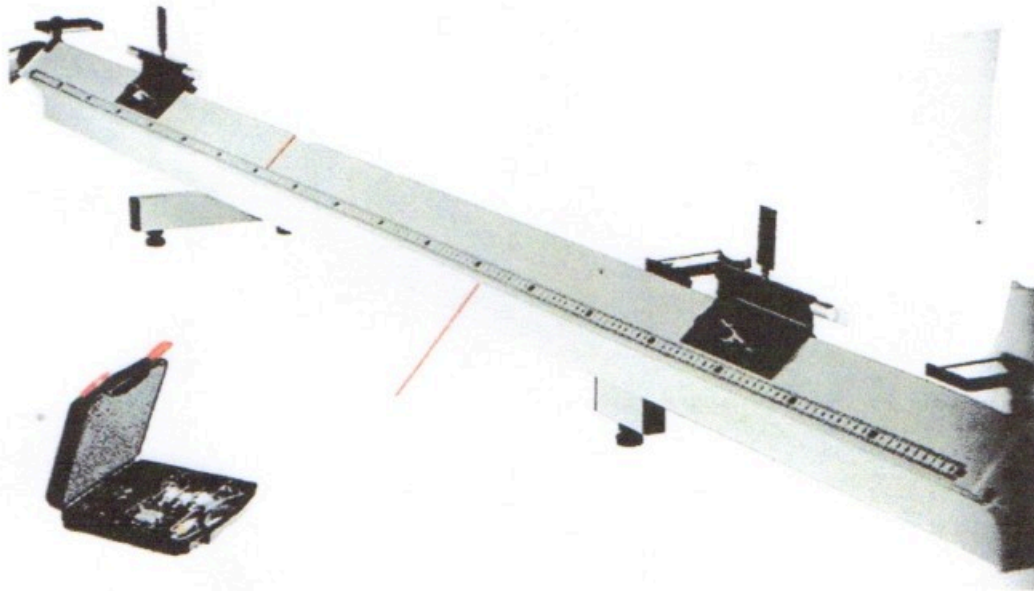
3 Air Track

- [1] 2-Meter long, extruded aluminum track with included scale
- [2] Square aluminum extruded track with 3mm thick walls.
- [3] Track mounted on "U" channel for strength; U-channel allows for realignment of track
- [4] Track guaranteed straight for life to 0.04 over full length
- [5] 382 air holes of 1mm diameter and 2cm spacing; 4 cm air supply inlet
- [6] Three-point support with Bilateral screw leveling
- [7] 2-meter long scale on both sides of track with mm resolution

Includes 2ea 13 cm long, 170 g gliders

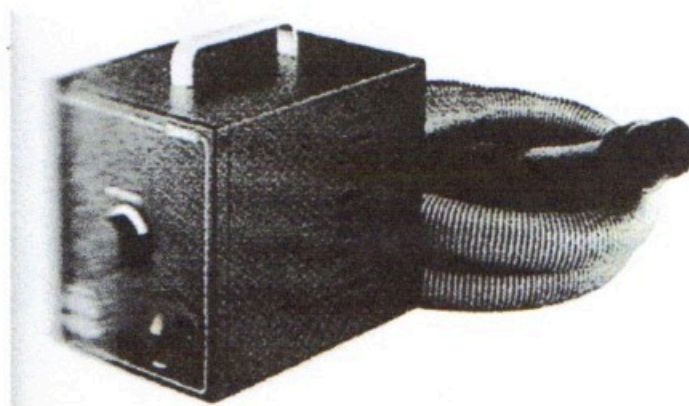
Includes 2ea 100 mm flags, 4 ea. 50g masses, Needle and wax for inelastic collisions

Ball bearing pulley, glider hook, 2g mass hanger, 5 accelerating masses, storage tray, elastic bumpers



4. Variable Output Air Supply:

- [1] Air supply volume = 36 cubic feet per minute at 0.122 psi.
- [2] Includes 2-meter hose
- [3] Low noise output

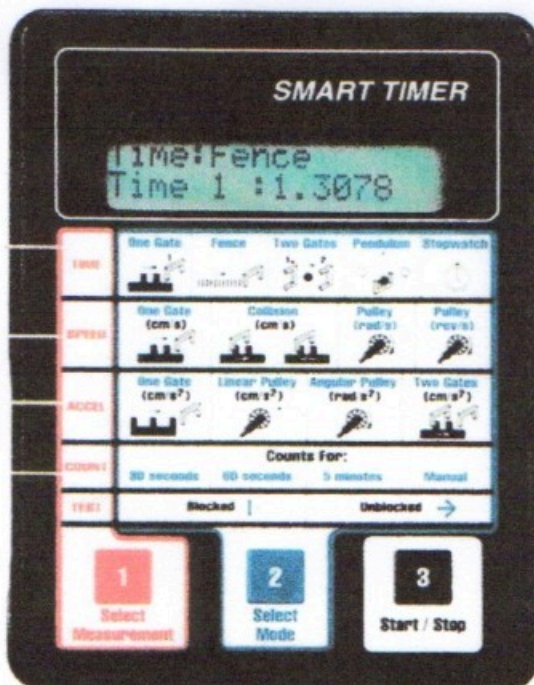


5. Discover Freefall System:

- [1] Determine g
- [2] Investigate air resistance dependence on mass, volume, cross-sectional area
- [3] Can be used to drop almost any small object by attaching a small steel washer and adhesive pad
- [4] Can be used with the Target Accessory ME-6854

INCLUDES:

- Drop Box
- Control Cable and Control Box
- AC Adapter
- Time of Flight receptor pad
- Timer Switch
- Release Washers (10)
- Release labels for attaching washers to object (50)
- Small nylon ball
- Large plastic ball
- Golf ball
- Hollow Golf Ball
- 1" and 5/8" Steel balls

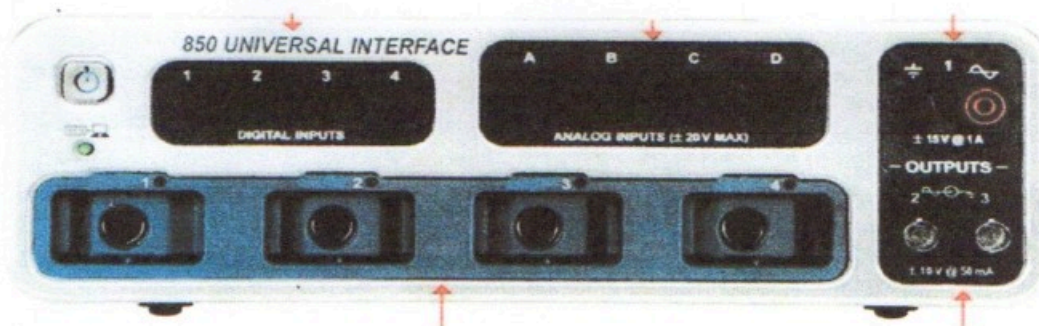


6. Smart Timer:

- [1] Measures Time, Speed, Acceleration, Counter for G-M Tubes
- [2] Crystal Controlled 0.01% Accuracy
- [3] Up to 5000 Counts/Second
- [4] 9,999,999 total counts
- [5] Able to use with Photogates, Smart Pulleys in various modes
- [6] Resolution: 100 us
- [7] Displays 2-line, 16-character, alphanumeric LCD
- [8] Two 1/4" stereo phone jack inputs, TTL compatible
- [9] 4 "AA" batteries or AC Adapter (included)

7. 850 Universal Interface

- [1] Four Analog Ports with high speed sampling up to 10 MHz
- [2] Measurement Range: +/- 20V; 1 M Ohm Input Impedance with +/- 250V Continuous Input Protection
- [3] 1X, 10X, 100X and 1000X selectable Voltage gain; 14-bit, 0.01 mV Resolution
- [4] Four digital Ports with sensor connect detection
- [5] Four PASPORT Sensor Ports for multi-measure digital sensors, supporting photogates, counters and timers
- [6] Three built-in Function Generators: One 15 Watt and Two independent High Frequency Function Generators
- [7] Nine different waveforms: sine, triangle, variable duty-cycle square wave, positive square, positive up and down ramp, positive and negative ramps, and DC
- [8] 0.001 Hz to 500 kHz frequency range
- [9] Amplitude Range: +/- 15V on one and +/- 10V on the other two Function Generators
- [10] Resolution: 7.3 mV, 12-bit DAC on one; 2.5 mV, 12-bit DAC on the other two function generators
- [11] Output Current: 61 microAmp resolution on one; 50 mA at 10V for the other two function generators
- [12] USB 2.0 computer connection
- [13] External Trigger Input/Output: BNC Jack which allows:
 - a) Synchronized multiple 850s
 - b) Signal direction controlled by software
 - c) 3.3VTTL, 51 Ohms
 - d) ESD Protection
- [14] 44-Pin Expansion Port to allow for:
 - 1) control and monitor future accessories such as stepper motors and circuit boards
 - 2) Access to 3 Signal Generators
 - 3) 8 Additional Digital I/O Pins
 - 4) 3 Additional Analog Differential Inputs (+/- 10V)
 - 5) High Speed PASPORT channel for self-identification of Plug-in Modules
 - 6) Power Sources: +5 V @ 500mA, +/- 12V @ +/- 300mA

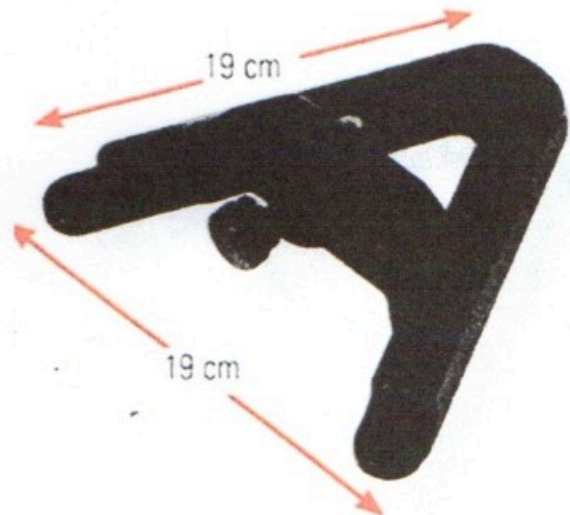


8. Capstone Site License (unlimited installation)

- [1] Data collection and analysis software
- [2] Works with MacOS and Windows
- [3] Contains the following features graphs, tables, oscilloscope, fft, histogram, calculator, video capture, video analysis, predictions, live data capture, stop and start conditions, play back for data and video
- [4] Electronic lab workbooks
- [5] Electronic journal including annotations
- [6] Video Analysis with the following features: zoom tool, vectors, auto tracking
- [7] 4 different modes of video modes: opening an existing video, capture an image, record a video and record a video with data
- [8] Compatible with mpeg-4, avi and quicktime video files
- [9] Calculator with ability to use measurements or user input
- [10] Undo/Redo
- [11] Ability to replay data or video capture including looping data and video
- [12] Ability to set non-common rate of sampling on sensors
- [13] Multiple language support
- [14] Data capture in FFT and Oscilloscope modes
- [15] Print capabilities

9. Small A-Base

- [1] 1.7 Kg Cast Iron Base
- [2] Can be used with threaded and non-threaded rods
- [3] Non-threaded rods from 9.5 to 13 mm diameter can be supported
- [4] Threaded rods must be 12.7 mm in diameter with 1/2" - 13 thread
- [5] 19 cm by 19 cm in size



10. Stainless Steel Rod

- [1] Manufactured from stainless steel
 - [2] Rod length = 120 cm
 - [3] Rod diameter: 12.7 mm
- Rods are non-magnetic, very rigid and durable

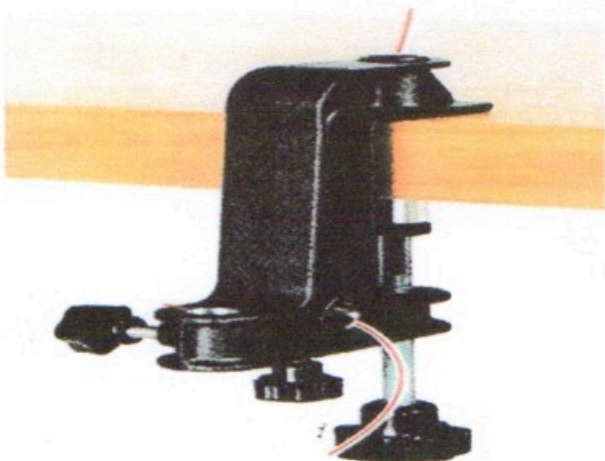
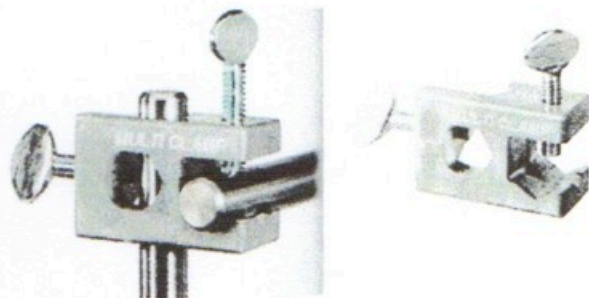
11. Stainless Steel Rod

- [1] 12.7 mm (1/2") diameter stainless steel rod
- [2] Does not mar, non-magnetics, very rigid, and durable
- [3] 25 cm long



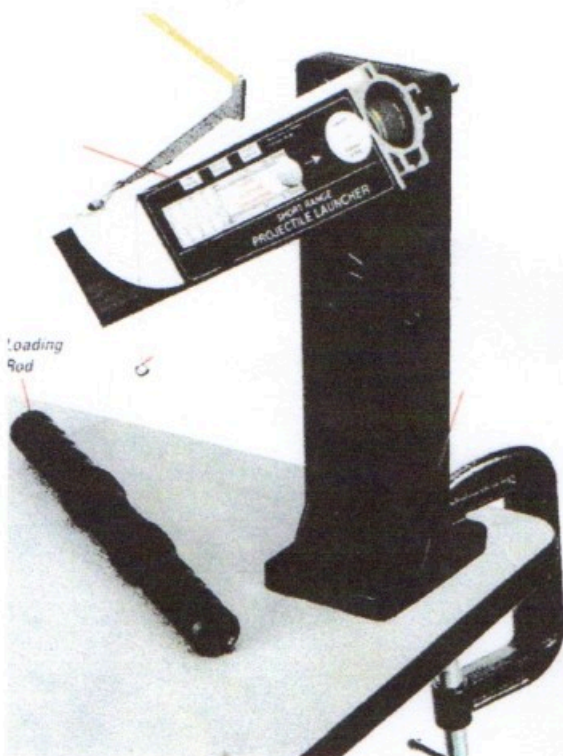
12. Multi-Clamp

- [1] Hold two rods at parallel or right angles
- [2] Fits rods up to 12 mm (1/2 in) diameter



13. Table Rod Clamp

- [1] Accepts threaded rod
- [2] Use non-threaded rods in 2 directions
- [3] 6.5 cm grip range



14. Projectile Launcher

- [1] Range: up to 5 meters
- [2] Three repeatable launch positions: short, medium and long
- [3] String release trigger mechanism to minimize barrel movement
- [4] Fully enclosed spring mechanism for safety
- [5] Two bore sights for aiming
- [6] Built-in angle indicator and plumb bob to 0.5 degree resolution
- [7] Thick (12 mm) aluminum base for rigidity and easy clamping
- [8] Includes 3 plastic balls, plunger, 2 safety goggles and experiment manual
- [9] Zero to 90-degree pivot at the center of the ball's release position simplifies measurements
- [10] Design includes T-slot for the mounting a photogate bracket

15. Plastic Balls (10 Pack)

- [1] Brightly colored balls for the Projectile Launcher
- [2] 2.5 cm Diameter

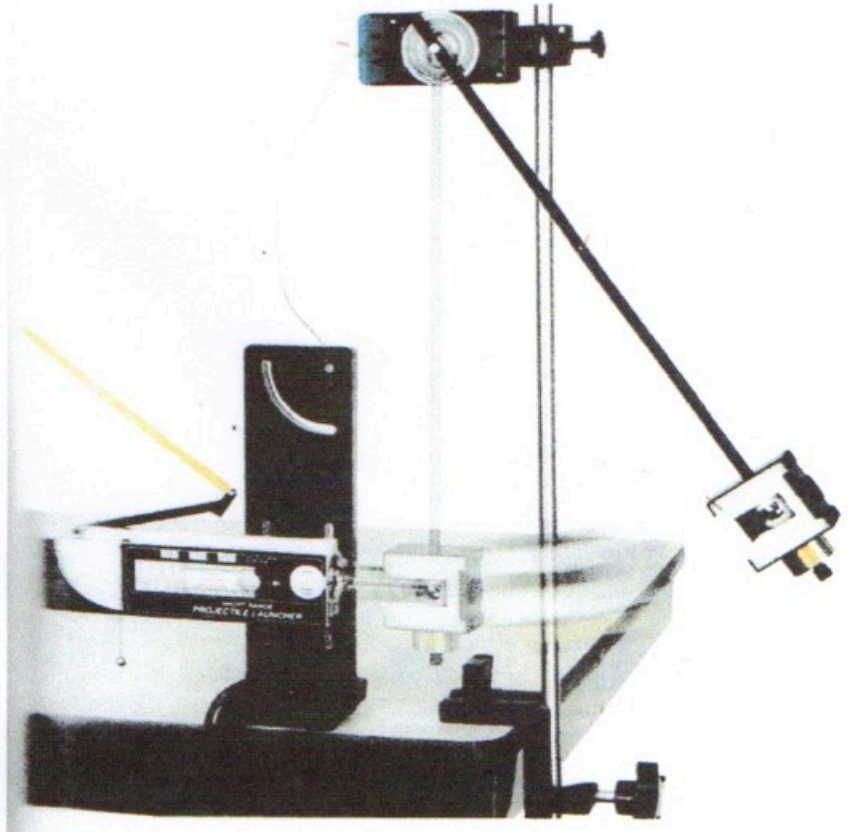


16. Ballistic Pendulum Accessory

- [1] Computer-based measurements
- [2] Both Elastic and In-elastic Experiments
- [3] Low Cost
- [4] Uses a Rotary Motion Sensor to measure speed of the catcher assembly and maximum height of the pendulum swing

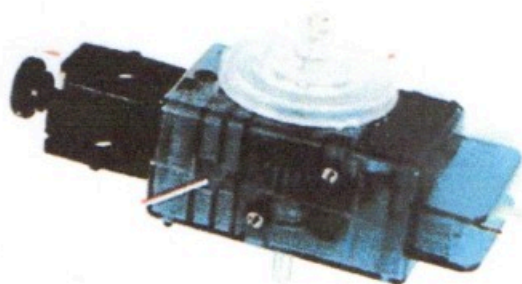
INCLUDES:

- Pendulum Arm with Catcher
- Ballast Mass
- Steel Ball



17. Rotary Motion Sensor

- [1] Maximum rotation rate: 30 rev/s
- [2] Resolution: 0.09 degrees
- [3] Three step pulley: 10, 29, and 49 mm diameter
- [4] Linear position resolution: 0.020 mm
- [5] Sensor capability description upgradeable due to built-in flash memory
- [6] Digital signal processing insures accurate, stable, and repeatable measurements
- [7] Constructed of tough, impact-resistant polycarbonate plastic



18. Spherical Mass Set

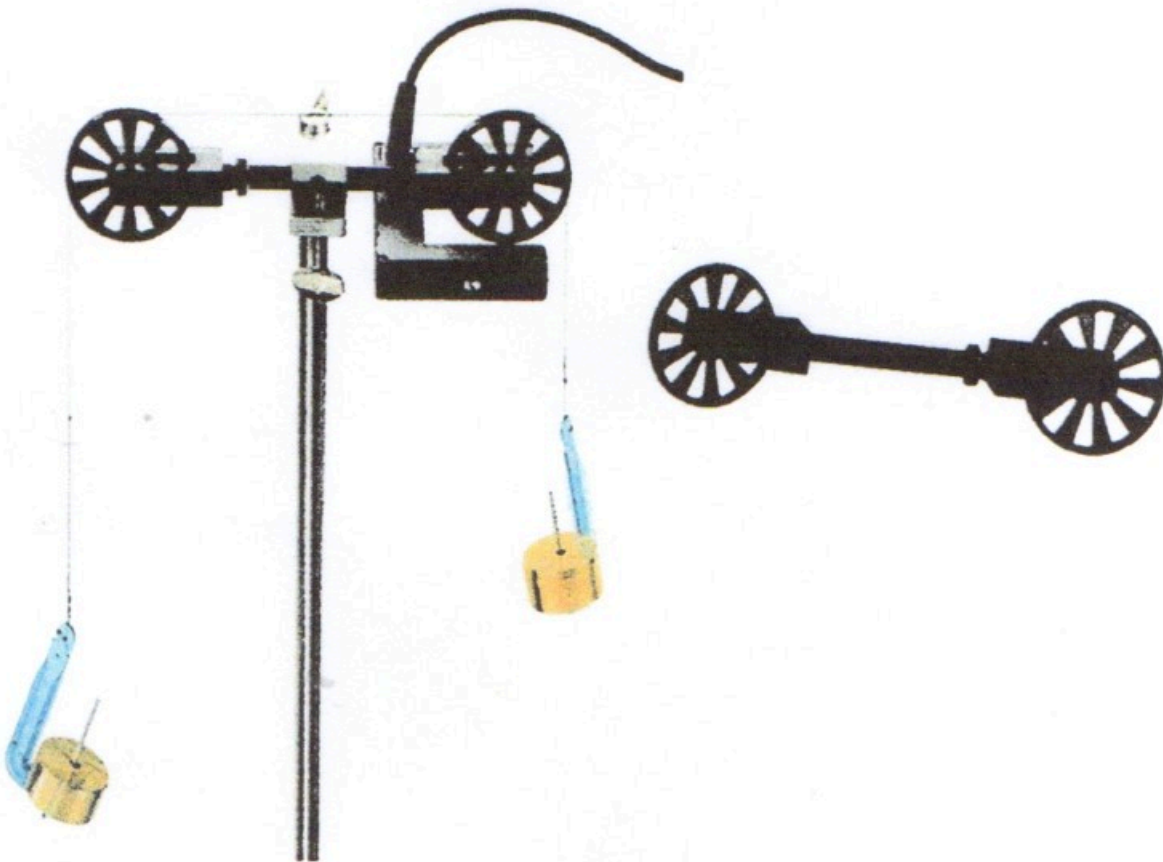
- [1] Includes 4 balls with a diameter of 2.5 cm each
- [2] Each ball features a different mass including hollow steel ball



a

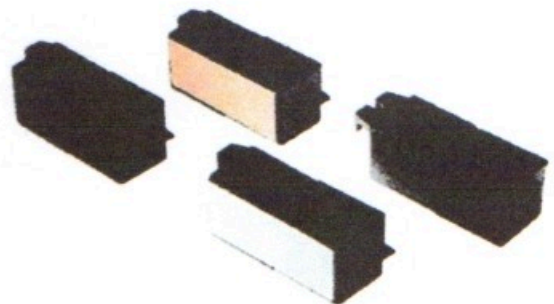
19. Atwood's Machine

- Two super pulleys mounted on a 6.4 cm long rod produce a classic, low-friction introduction to Newton's Second Law



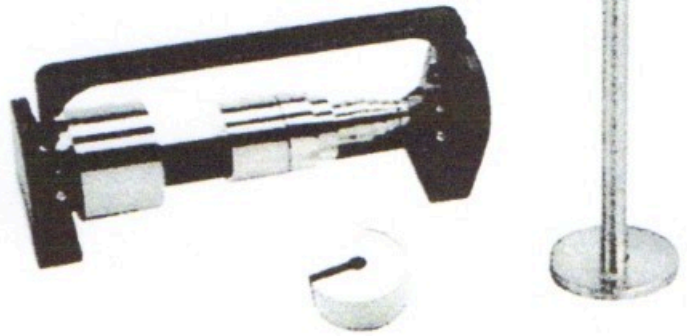
20. Discover Friction Accessory

- [1] Specially designed to work with PASCO carts and sensors
- [2] Students can discover concepts as coefficient of friction, static friction, kinetic friction and sliding friction equations
- [3] 2 Trays of identical plastic surfaces can be hooked together to explore surface vs. sliding frictional forces
- [4] 4 Friction Trays (1 Felt, 1 Cork, 2 Plastic)



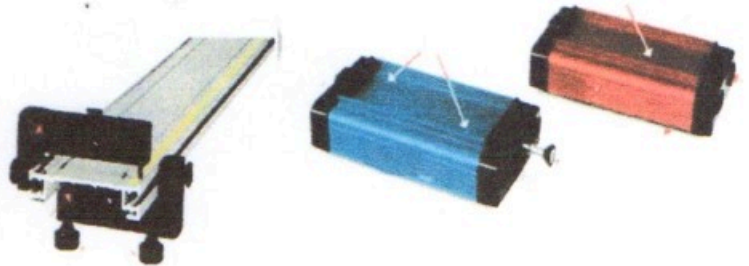
21. Slotted Mass Set (1 g resolution)

- [1] Resolution: 1 gram
- [2] Solid brass construction
- [3] Masses: 1 x 500g, 2 x 200g, 1 x 100g, 1 x 50g, 2 x 20g, 1 x 10g, 1 x 5g, 2 x 2g, 1 x 1g



22. Dynamics Standards System

Includes 1.2 m Aluminum Dynamics Track, Cart Mass (set of 2), Dynamics Track Feet (2), Dynamics Track End Stops (2) & Pivot Clamp, Super Pulley with Clamp, IDS Spring Kit, Friction Block-IDS, and Angle Indicator.

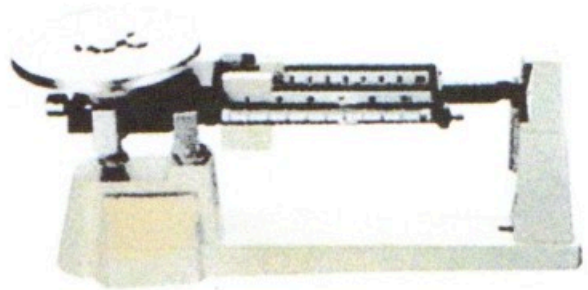


23. Steel Balls (4 Pack)

- [1] For use in the Short- or Long-Range Projectile Launchers
- [2] 2.5 cm diameter each

24. Triple-Beam Balance (with Tare)

- [1] Accurate, easy to use, durable and sturdy
- [2] Pan is removable with magnetic damping for quick and true measurements
- [3] Balance height can be adjusted
- [4] Capacity: 610 grams
- [5] Readability: 0.1 gram
- [6] Tare: 225 grams



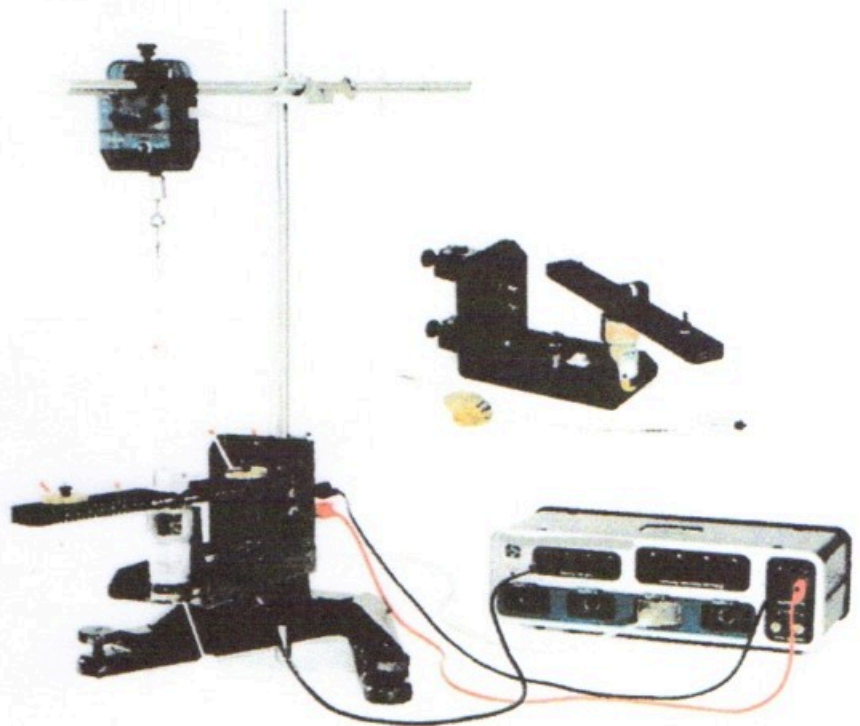
25. Centripetal Force Apparatus

- [1] Empirically Determine Centripetal Force by exploring the relationship between velocity, radius and mass
- [2] The metal frame can be attached securely either to a ring stand or tabletop
- [3] High quality motor provides years of use
- [4] Computer based measurements facilitate accurate and repeatable results

INCLUDES:

Frame with Mounted 12 VDC Electric Motor

Connecting Cable, Ball Bearing Swivel' Connecting Hardware for Photogate, Mass Holder for "Free Mass", Mass Holder for "fixed mass", 5 g Mass (2), 10 g Mass (2), 20 g Mass (2)



26. Triple Output Power Supply

[1] Digital Meters: voltage and current

[2] Constant Current Mode:

output voltage: continuously variable

line regulation: $\leq 0.05\% + 10 \text{ mA}$

load regulation: $\leq 0.05\% + 10 \text{ mA}$

ripple and noise: $\leq 3 \text{ mA rms}$

[3] Constant Voltage Mode:

output voltage: continuously variable

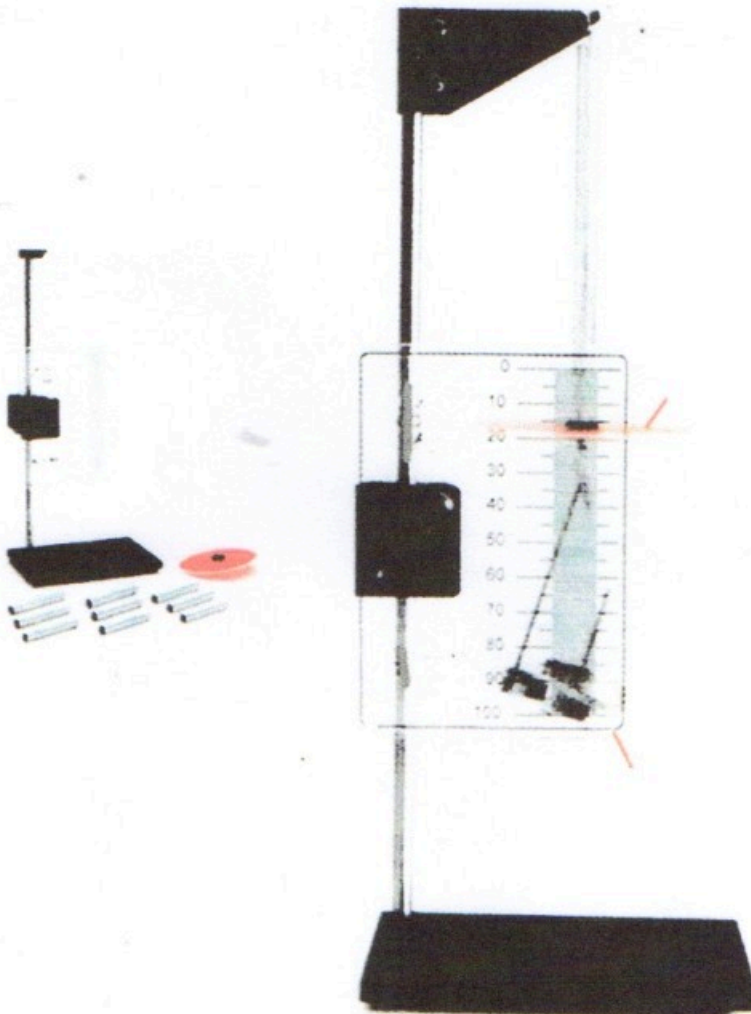
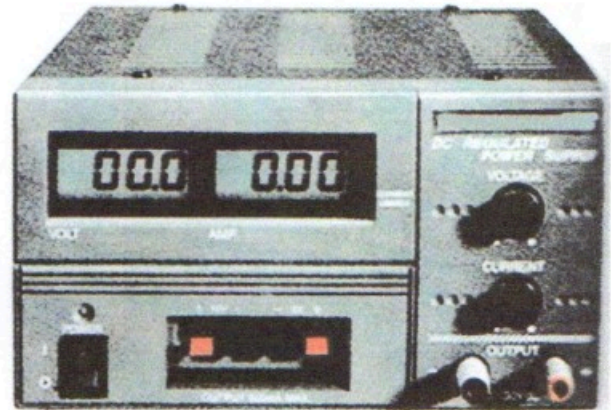
line regulation: $\leq 0.05\% + 10 \text{ mV}$

load regulation: $\leq 0.05\% + 10 \text{ mV}$

ripple and noise: $\leq 5 \text{ mV rms}$

[4] Power Source: AC 110/220 VAC, 50/60 Hz

[5] Dimensions: 29 x 13 x 15 cm (5.5 kg)



27. Hooke's Law Set

[1] Investigate relationship between the force applied to a spring and the amount of stretch on the spring

[2] Includes stand with heavy base

[3] Transparent scale with mm resolution built-in on the stand

[4] Horizontal support for spring

[5] Brightly colored stretch indicator

[6] Includes 3 sets of 3 springs with identical diameter and length but different spring constants, total of 9 springs included

[7] Spring constants are 5N/m, 8N/m, 70N/m

28. Basic Calorimetry Set

- [1] Six Styrofoam calorimeters
- [2] Thermometer with range of 20° C to 110° C with 1° resolution
- [3] Water trap and plastic tubing included
- [4] Aluminum, copper and lead included for specific heat determination
- [5] Instruction manual and experiment guide



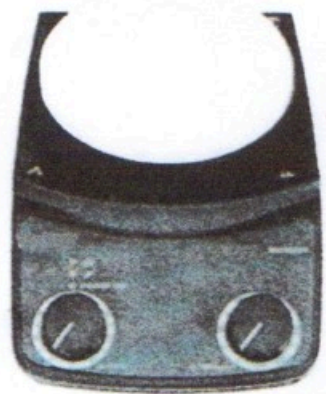
29. Steam Generator

- [1] Steam output is 10 gram/minute
- [2] Variable power (0 - 400 watts) for adjustable steam flow
- [3] Automatic safety shut-off
- [4] Internal electric coils
- [5] Dual steam ports
- [6] Baster included for removing hot water for experiments



30. Calorimetry Cups (12)

- [1] For use with Basic Calorimetry Set for experiments in Thermodynamics
- [2] Made of Styrofoam which have excellent thermal properties
- [3] Set of 12 in the pack

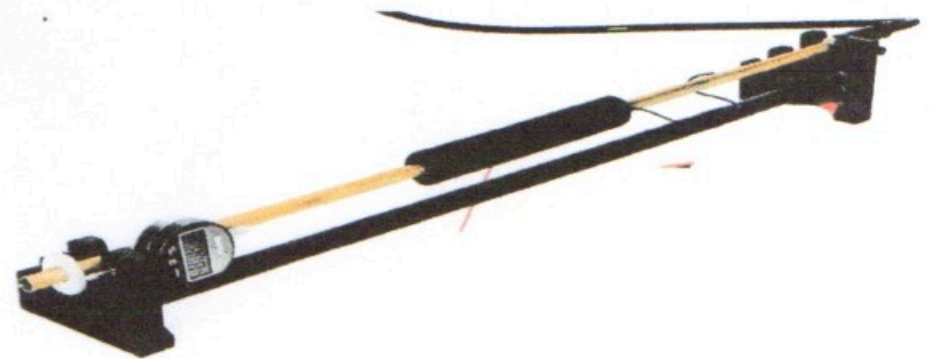


31. Heater/Stirrer

- [1] Speed Range: 50- 1500 RPM
- [2] Plate Diameter: 135 mm
- [3] Max Temperature: 310 °C

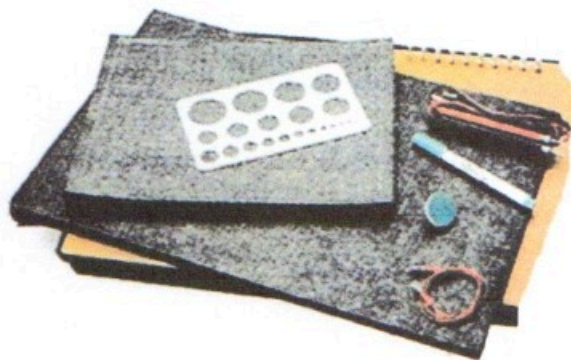
32. Thermal Expansion Apparatus

Includes: Base with built-in digital gauge and connections for the thermistor and banana plugs.
Expansion Tubes with built-in thermistor (3)



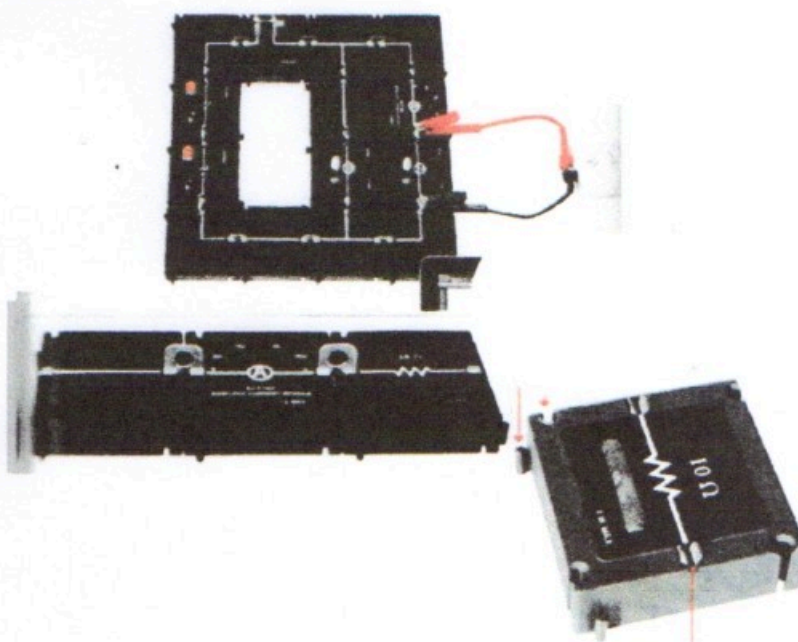
33. Field Mapper Kit

- [1] Includes silver-based conductive ink pen and circular template
- [2] Includes 50 sheets of conductive paper with cm grid (23 x 30 cm)
- [3] Includes 10 pushpins and 3 connecting wires
- [4] Includes 21 x 48 cm plastic tray with corkboard top



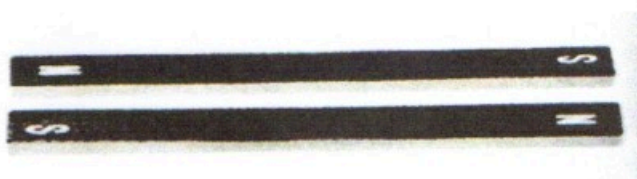
34. Modular Circuits for Essential Physics

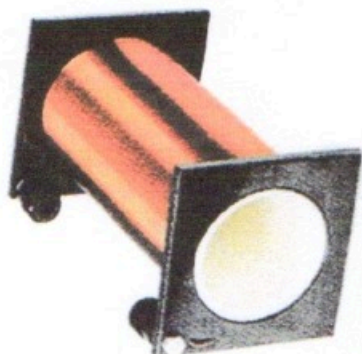
- [1] Eliminate the mess of wires and allow students to build circuits that end up looking like circuit diagrams, strengthening their conceptual understanding.
- [2] Includes: Wireless Current Sensor Module, Wireless Voltage Sensor, Corner Module (4), Straight Module (5), Tee Module (2), Spring Module, Switch Module, SPDT, Switch Module, SPST, 10 ohm Resistor Module, 33 ohm Resistor Module, 100 ohm Resistor Module, Capacitor Module, Light Bulb Module (3), Potentiometer Module Motor Module, LED Module, 1000 Turn Coil Module, Battery Holder Module (2), Battery, AA (2), Jumper Clips (45), Diode, Leaded Resistors (6), Leaded Capacitors (2), Small magnets (8), Plotting Compass, Alligator Clip Jumper Wire, Storage Tray, Downloadable Experiments (12)



35. Alnico Bar Magnets (2 Pack)

- [1] Dimensions are 150 mm by 13 mm
- [2] Made of Alnico alloy
- [3] Polarity indicated by notched north poles
- [4] Magnets fit into a St. Louis motor



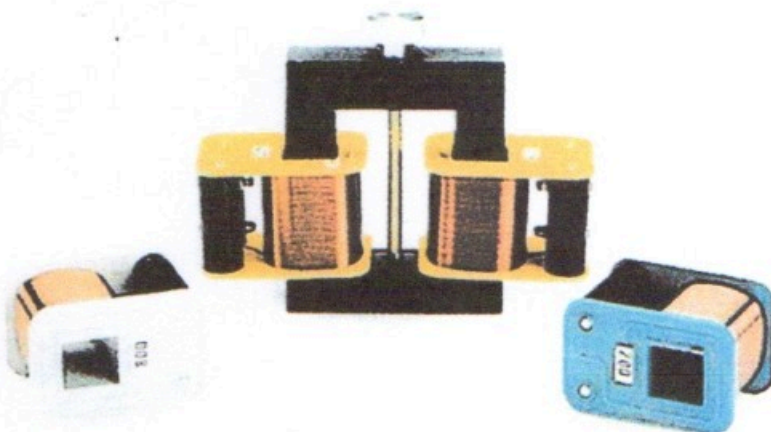


36. Air Core Solenoid

- [1] Has an inner diameter of 5.5 cm and a length of 14.5 cm
- [2] Maximum current of 5 A produces 125 Gauss magnetic field

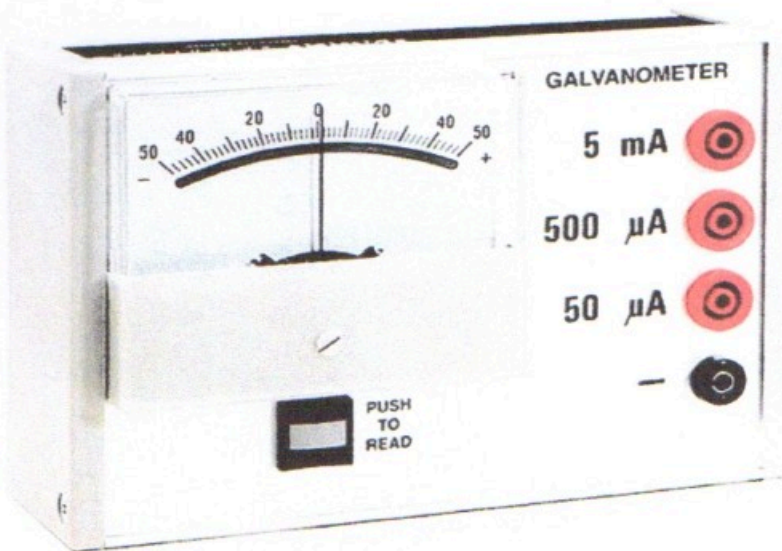
37. Basic Coil Set

- [1] Includes one 200 turn, two 400 turn, and one 800 turn coils
- [2] Includes "U" shaped laminated iron core
- [3] Coils are color coded for easy turn number identification
- [4] Coils have banana plug connectors



38. Heavy-Duty Galvanometer

- [1] DC Ranges: 50 μ A/500 μ A/5 mA
- [2] Internal Resistance: 1.5 k ohms/170 ohms/17 ohms
- [3] Accuracy: $\pm 2\%$



39. Basic Optics System

[1] Large 50 mm diameter optics components mounted in protective holders that snap directly onto aluminum track

[2] Built-in metric tape makes measurement of image and object distances quick and accurate

[3] Versatile Light Source doubles as table-top Ray box for studies in Reflection, Refraction, Color Addition & Snell's Law System

INCLUDES:

1.2m Aluminum Optics Bench with built-in metric tape

Geometric Lens Set (+100, +200 mm lens)

White Plastic Viewing Screen that Snaps on Track

Basic Optics Light Source (specifications as follows:)

[1] Single 10-watt quartz-halogen bulb provides bright, easy-to-see illumination without a lot of heat

[2] Provides a Point Source, Crossed Arrow Object with metric Scale, Three Primary Color Source and 1, 3, or 5 Ray Source

[3] Use free standing or easily clip directly to Basic Optics Track

Ray Optics Kit (specifications as follows):

INCLUDES:

Double Concave and Convex Lenses, Trapezoid

Triangular Mirror Accessory with

Concave, Convex and Plane

Reflective surfaces

Hollow Lens to fill with a liquid or use as an air lens

Optics Table (specifications as follows):

[1] Provides an excellent viewing surface for ray optics

[2] Polar grid printed directly on the table allows for easy measurement

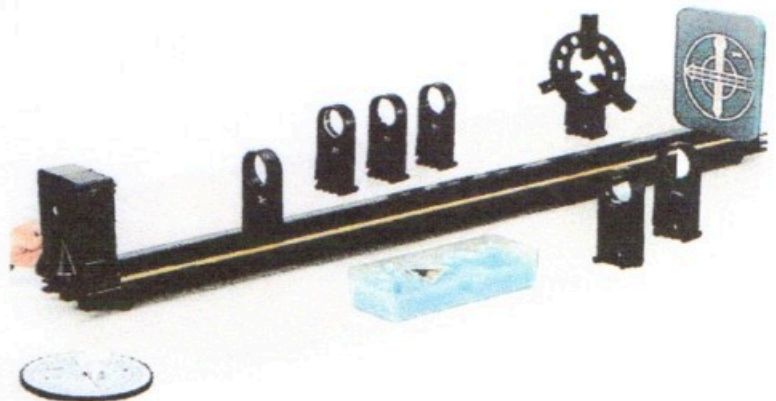
[3] Includes an acrylic cylindrical D lens

Adjustable Lens Holder

Accessory Lens Set (+250, -150 mm lens)

Convex/Concave Mirror Accessory

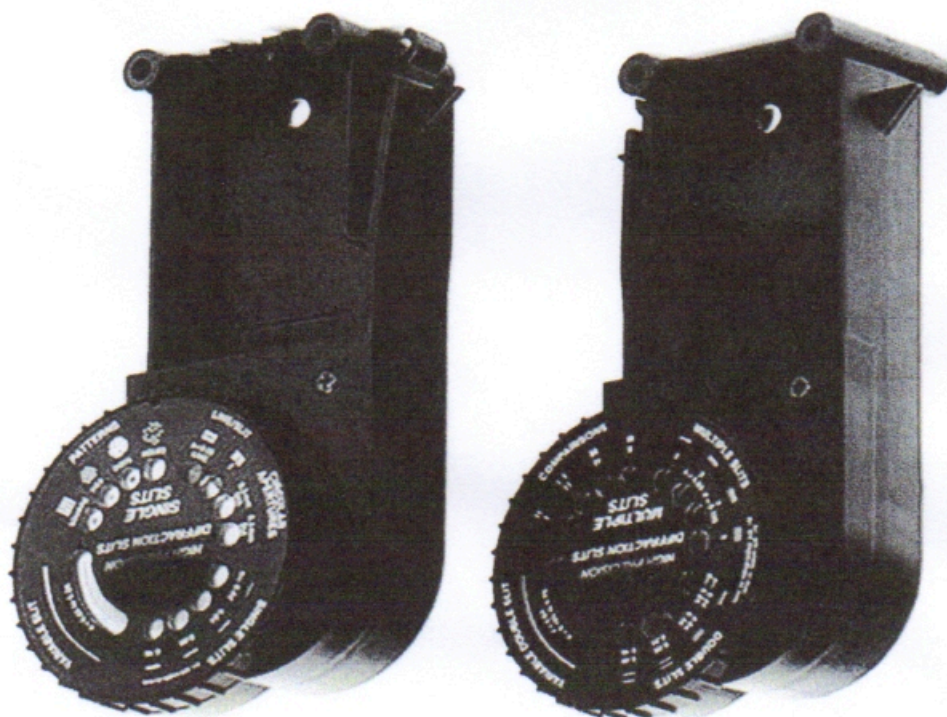
Experiment Manual and Storage Box





Engr. Genaro G. Balane
Dean - College of Engineering

Reviewed By:



40. Diffraction Kit
Contains Diode laser and Slit set