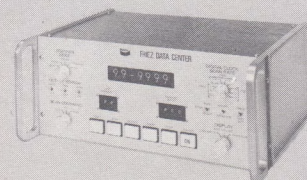
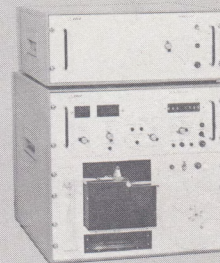
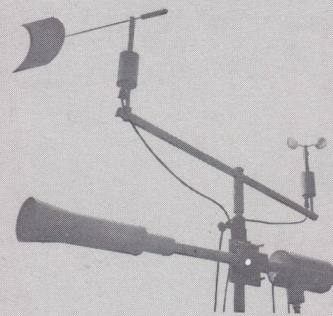


SCIENCE ASSOCIATES INCORPORATED

INSTRUMENTS & SYSTEMS
for the
ATMOSPHERE &
ENVIRONMENT

230 NASSAU ST. • BOX 230 • PRINCETON, N. J. 08540 • (609) 924-4470

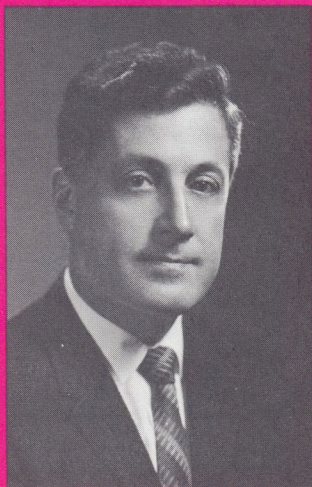
CATALOG No. 8
25th Anniversary





DAVID M. LUDLUM,
General Manager

Princeton University
Air Weather Service, USAF
Bendix-Friez
Franklin Institute
Weatherwise, editor
Science Associates, 1946-



DANIEL A. MAZZARELLA,
Sales Manager

Bucknell University
Naval Weather Service, USNR
U. S. Weather Bureau
Brookhaven National Laboratory
Bendix-Friez
Science Associates, 1961-



SCIENCE ASSOCIATES, Inc. was founded in 1946 to serve the needs of meteorologists and other scientists whose activities required the measurement of the atmospheric elements. There was no such agency in the United States then, and today we are still unique in the services we can render. After 25 years of experience, we continue to share our knowledge in this field and daily assist individuals, educational institutions, research organizations, government agencies, and industrial concerns who may have a requirement for instrumentation to measure the atmospheric elements.

There have been four guiding principles in Science Associates' development:

1. To present in a single catalog quality instruments, covering a broad range of specifications, in varying price classifications.
2. To serve as a consulting agency for all who desire assistance in selecting the proper instrumentation in accordance with requirements and budgets.
3. To expedite delivery of equipment, regardless of source, in a single shipment by carrying a large stock at our Princeton warehouse.
4. To assure satisfactory performance of equipment in accordance with guaranties and warranties and to continue to assist the customer in the operation of his equipment.

Our activities have grown in size and scope over the years, and our catalog has long served as a reference piece for information on quality meteorological instrumentation. We are pleased to present the current, 92-page edition of "Instruments and Systems for the Atmosphere and the Environment" in the hope that it will prove enlightening and be useful in your daily activities.

DAVID M. LUDLUM
General Manager

DANIEL A. MAZZARELLA
Sales Manager

DONALD R. CONNING
Sales Engineer

CARL E. LINDGREN
Purchasing Agent



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Nassau Weather Dials



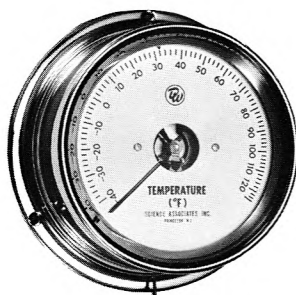
410



411



310



146



218-1

Outdoor weather on indoor weather dials—five indicators in matching cases make a harmonious display for public buildings, educational facilities, television studios and radio stations. Separate dials with black on a buffed aluminum background (or, white on a black background) indicate wind speed, wind direction, temperature, relative humidity, and barometric pressure. Each dial face measures 4" diameter; cases have 5" diameter mounting flange.

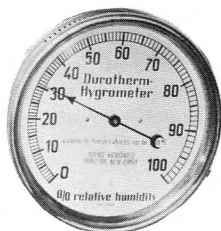
Except for barometric pressure unit, which is self-contained, all indicators operate on 115v 60 Hz. Anemometer and wind vane supplied with 100' cable, 2-cond. for speed, 5-cond. for direction. Hi-Lo ranges of 0-25 and 0-120 mph on speed dial with letters to intercardinal points and numbers for degrees on direction dial. Temperature dial $-40/125^{\circ}\text{F.}$, furnished with 100' of 3-cond. cable. Relative Humidity cable is 100', 4-conductors. Provisions can be made for longer cable lengths.

The Nassau Weather Dials are complete with accessories for installation and operation. Cases finished in brass. For chrome, add \$5.00/indicator. Dials with black on buffed aluminum are standard—if otherwise, please specify.

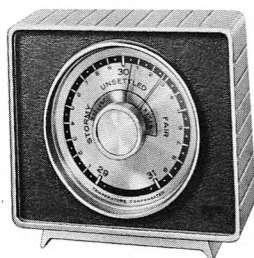
No. 410.	WIND SPEED	\$ 85.00
No. 411.	WIND DIRECTION	\$180.00
No. 146.	REMOTE TEMPERATURE	\$225.00
No. 218-1.	REMOTE HUMIDITY	\$375.00
No. 310.	ANEROID BAROMETER	\$ 75.00

No. 975. NASSAU WEATHER DIALS, complete set of five units. Brass cases. Wt. 18/shpg. 30 lbs. \$940.00

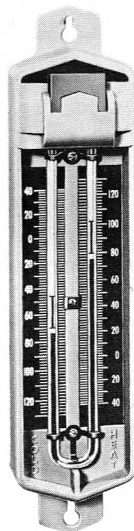
Home Weather Instruments



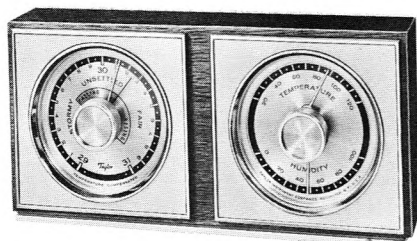
215-A



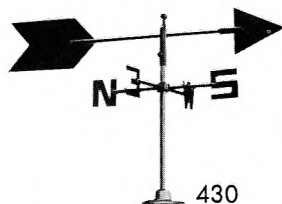
301



110



391



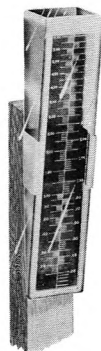
430



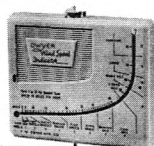
407



175



510



A knowledge of current weather conditions, as well as those expected in the immediate future, is most important for health and comfort in the home and for planning outdoor activities. Everyone should have the means at hand to keep track of the variations of the local weather elements. The following group of instruments has been selected for home use considering ease of operation, reasonable accuracy, and low cost.

No. 110. MAXIMUM-MINIMUM THERMOMETER. Registers the highest and lowest temperature each day or period until reset with a small magnet which is provided. Instrument should be placed in a shelter outdoors, on a porch with northern exposure, or at a protected location where rainfall, direct sunlight, or radiation will not affect the readings and where a free circulation of air exists. **\$11.70**

No. 215A. HYGROMETER. Indicates current relative humidity from approx. 5% to 100% on 3-inch dial face. If employed outdoors, hygrometer must be protected from rainfall, sunlight, and radiation. A shelter or porch location is recommended. Usable 32°/230°F. **\$9.00**

No. 301. BAROMETER. An expanded scale permits reading of the very small pressure variations which forewarn of weather changes. Should be placed in a convenient indoor location for easy reference as air pressure registers the same indoors and out. Should be free from drafts and variations in temperature and not subject to vibration or jars. **\$13.50**

No. 391. HOME WEATHER PANEL. A combined thermometer, hygrometer, and barometer for indoor display on shelf or desk. Enables one to keep track of indoor temperature and humidity for air conditioning or heating comfort, as well as barometric pressure for weather changes. **\$24.75**

No. 430. WIND VANE. A simple vane, designed for a quick visual check of wind direction, for installation on building or pole. The vane is 18 inches long and mounts on a small 11-inch mast which has cardinal point letters. **\$9.50**

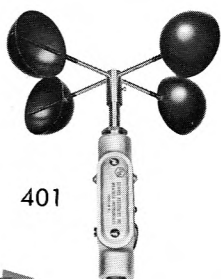
No. 407. WIND SPEED GAGE. Direct reading instrument for wind speed employs a pressure tube system to transmit from roof location through a 50'-long plastic tube to a fluid meter scale graduated in miles per hour. Indicator may be placed at any convenient location indoors. **\$25.00**

No. 510. FARM RAIN GAGE. Direct-reading instrument for measurement of liquid precipitation. Six inches capacity. Designed to mount on a post, out-of-doors, as far away from obstructions as possible. **\$4.00**

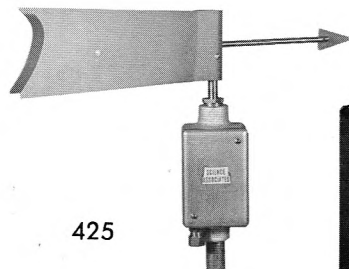
No. 175. SMALL WOODEN SHELTER. Has louvered sides for proper exposure and protection of No. 110 Max-min Thermometer and No. 215A Hygrometer. Should be placed on north wall or other shaded location. **\$34.00**

No. 1. AMATEUR WEATHER STATION. For home or elementary school use, this selection consists of Nos. 110, 215A, 301, 430, 510, and 175 described above. **\$81.70**

Junior High School Weather Station



401



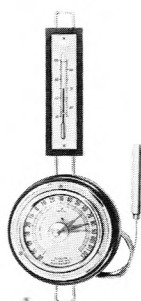
425



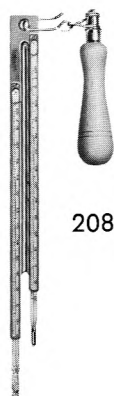
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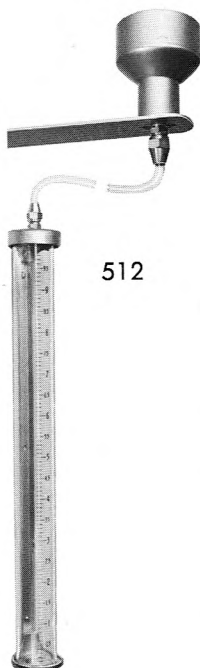
303



118



208



512

No. 2. JUNIOR HIGH SCHOOL WEATHER STATION. A group of instruments has been selected to bring the measurement of the variations of outdoor weather conditions directly into the classroom. Outdoor temperature, wind, pressure, and precipitation are indicated remotely on dials or scales located indoors. A portable psychrometer permits easy outdoor humidity measurements.

WIND: No. 450 STEWART WIND SET, consists of No. 475 Indicator which may be placed at convenient indoors location visible to students. It is wired electrically by low voltage cable to No. 401 Anemometer and No. 425 Wind Vane on roof. Green lower lamps, connected to the anemometer, flash once for each 1/60th mile of wind passing—the system is so calibrated that the total number of flashes of the two lower lamps for a period of 60 seconds equals the average speed of the current wind in miles per hour—10 flashes per minute means 10 miles per hour, etc. These are counted visually. The eight directional lamps in the circle represent N, NE, E, SE, S, SW, W, & NW—one lamp or two adjoining lamps will be lighted at a time, and these indicate the direction from which the wind is blowing. Anemometer and wind vane can be easily mounted on a television antenna support procured locally. Supplied with 115v to 6v AC 60Hz transformer and 60' cable. **\$85.00**

PRESSURE: No. 303 BAROMETER employs an improved aneroid mechanism giving more than twice the pointer movement for the same amount of pressure change as did former types. Large dial can be read easily. Barometer should always be located indoors, fastened firmly to wall or holder at eye level, where temperature remains fairly constant and away from drafts or direct sunlight. **\$32.00**

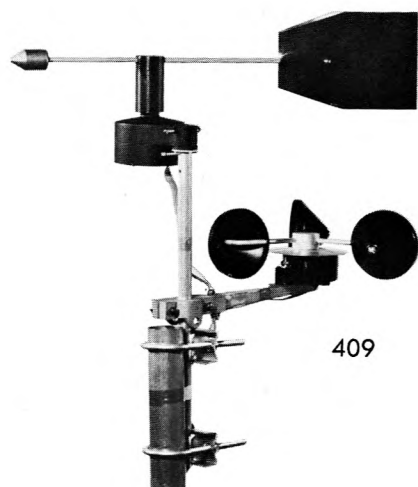
HUMIDITY: No. 208 SLING PSYCHROMETER employs the wet and dry bulb principle. For outdoor humidity conditions, instrument must be carried out-of-doors and whirled. A protective carrying case is available. After wetting sock, instrument is whirled by hand by means of an attached swivel until mercury in wet bulb will descend no farther (usually requires 60-120 seconds), then both thermometers are read. By consulting psychrometric tables or a slide rule, relative humidity and dew point values are quickly determined. **\$9.00**

TEMPERATURE: No. 118 INDOOR-OUTDOOR AND MAXIMUM-MINIMUM THERMOMETER is a combined instrument which indicates remotely current outdoor temperature and also the maximum and minimum extremes occurring since the last resetting. The max.-min. pointers are easily reset by hand through turning the knob at center of the dial. Range: $-40^{\circ}/+120^{\circ}$ F. Five feet of capillary tubing connects outdoor sensitive bulb with indoor dial. At higher cost, models with 20 feet of tubing (\$51.00) and 40 feet (\$62.00) are available. Outdoor bulb should be exposed preferably in a shelter, or on a north wall protected from rainfall and radiation by a shield. **\$28.00**

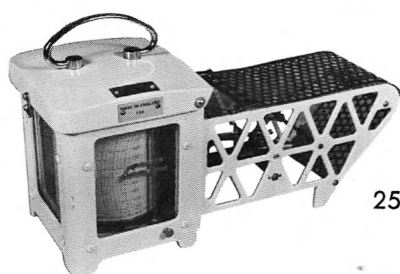
RAINFALL: No. 512 REMOTE VISUAL RAIN GAGE permits measurement in the classroom of current rainfall. The funnel to collect liquid precipitation is placed on the roof as far from obstructions as possible. A hollow flexible plastic tubing leads through a roof conduit or down side of building into classroom. Rainfall catch flows by gravity into graduated measuring glass which has a capacity of 10 inches. Standard plastic tubing length is 10 ft.—for longer lengths, add 15¢ per foot—this should be specified at time of original order. This gage is not suitable for snowfall measurement. **\$36.50**

No. 2. JUNIOR HIGH SCHOOL WEATHER STATION **\$190.50**

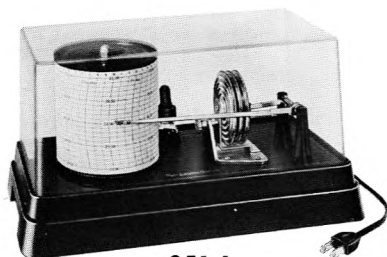
Senior High School Station



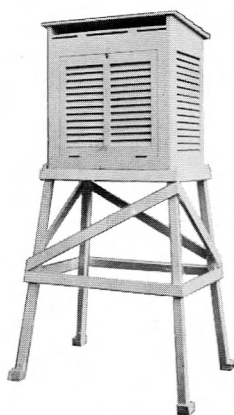
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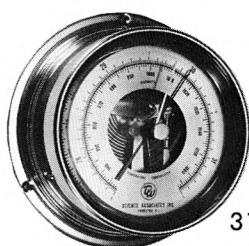
351-1



176



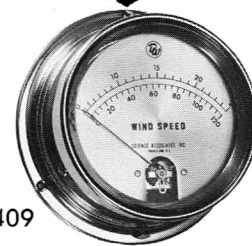
503
&
504



310



409



THE SENIOR HIGH SCHOOL WEATHER STATION comprises a group of quality instruments making up a complete observing station for a science department. Instruments for indicating all the weather elements are included, as well as those for recording temperature, humidity, and barometric pressure. It includes a standard U.S. Weather Bureau climatological station so that temperature and precipitation may be compared with similar observations made at thousands of locations throughout the country.

No. 409. THE NASSAU WINDMASTER will indicate outside wind conditions at any convenient location indoors: in the classroom, science laboratory, lobby or corridor for all to see. The electric anemometer and wind vane are located on the roof where there is a free air flow. Connected to the indoor dials by a seven-conductor low-voltage cable, the dials operate from regular 115v 60 Hz current, or can be easily adapted to battery operation. **\$265.00**

No. 310. NASSAU BAROMETER has a high quality aneroid movement in a matching case to the Windmaster. They make an attractive set when displayed together. A remote-reading temperature dial and a remote-reading humidity dial are also available to complete the set. The barometer dial is graduated in both inches and millibars for easy comparison of readings. **\$75.00**

No. 257. HYGROTHERMOGRAPH traces a record of temperature and humidity on a single chart. Thus records of maximum and minimum temperatures, as well as the time of their occurrence, are made available for permanent record. Recording period is seven days; chart drive is spring-wound. **\$135.00**

No. 351-1. ELECTRIC BAROGRAPH makes a trace of every variation in atmospheric pressure on a wide chart which has 1.5" of space for 1" change in barometric pressure. Both the extremes and the current tendency of the barometer are recorded in permanent form on the chart. Recording period is seven days; the chart drive requires regular 115v 60 Hz power supply. **\$72.00**

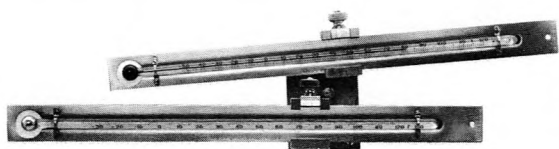
No. 111. MAXIMUM-MINIMUM THERMOMETERS are standard U.S. Weather Bureau instruments which register the highest and lowest readings since last resetting. They are easily reset while held in the convenient support. The thermometers should be exposed in a shelter. **\$39.50**

No. 176. INSTRUMENT SHELTER is the standard type employed by the U.S. Weather Bureau to house maximum-minimum thermometers and a hygrothermograph. It has louvered sides and a slatted floor to permit free air circulation and a double roof to reduce radiation effects. **\$130.00**

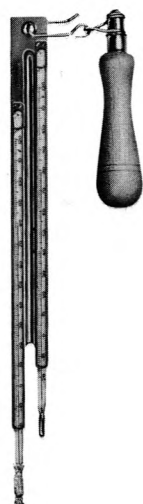
No. 503. RAIN AND SNOW GAUGE with No. 504 Support is the standard type of the U.S. Weather Bureau. It should be exposed in an open space away from trees and obstructions, preferably at ground level. If on a roof, it should be on a flat surface as far away from edges as possible to reduce eddy effects. In winter only the outer can without funnel is exposed to catch snowfall which then is melted and its water content measured. **\$83.50**

No. 3. SENIOR HIGH SCHOOL WEATHER STATION, includes above and Nos. 210 Psychrometer and No. 280 Slide Rule. **\$817.75**

Climatological Station



111



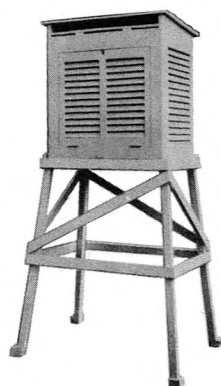
208



101



503



176

The basic climate history of the United States for the past hundred years has been recorded from the type of instruments shown on this page. All items illustrated here now meet the current Weather Bureau specifications. One can be assured that the readings of the Science Associates Climatological Station, if taken according to instructions, will be comparable to those made daily at approximately 10,000 similar installations throughout the country.

The instrument shelter houses the max-min thermometers (read and reset once a day), official thermometer (for hourly or periodic check observations), and sling psychrometer (for periodic humidity and dew point measurements).

The instrument shelter should be located as far away from obstructions as possible. A location at ground level over a grass surface is preferred. A flat roof site can be utilized if a wooden platform is built beneath the shelter to lessen the effects of radiation.

The rain and snow gage should be placed at ground level as far away from obstructions as possible. The support must be firmly attached to stakes or a platform to prevent tipping.

The U.S. Weather Bureau will certify your weather station as "approved" provided: (1) your instruments are standard types meeting Weather Bureau specifications, (2) your instruments are exposed properly and employed according to Instructions for Climatological Observers, (3) a representative of the Weather Bureau inspects and approves your installation. Science Associates, Inc., can assist you in fulfilling the above, but the ESSA-State Climatologist should be consulted to determine the local need for an "approved" station.

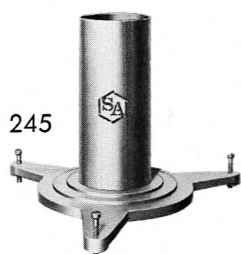
A basic Climatological Station consists of:

No. 176. Instrument Shelter with support	\$130.00
No. 111. Max-min thermometers with support	39.50
No. 503. Rain and Snow Gage, with No. 504 Support	83.50
No. 101. Official thermometer	8.50
No. 208. Sling psychrometer	9.00
No. 7. WEATHER BUREAU CLIMATOLOGICAL STATION	\$270.50
No. 7M. CLIMATOLOGICAL STATION, metric graduations	\$275.50

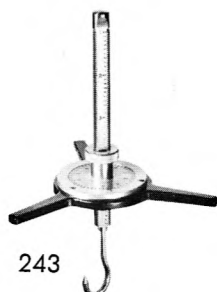
Evaporation Station



AN Evaporation Station measures air temperature, relative humidity, wind movement, precipitation, amount of evaporation from an exposed water surface, and the temperature of the water surface. The Approved Climatological Station on the opposite page is an integral part of the Evaporation Station. All instruments in Climatological Station and Evaporation Station designed and fabricated to meet U.S.W.B. specifications. Instruments with metric graduations also available.



245



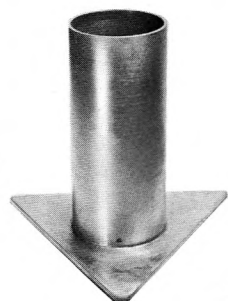
243

No. 242. EVAPORATION PAN is of cylindrical design USWB Drawing, #450.9104/A—10 inches deep and 47½ inches inside diameter. It is constructed of monel metal and rests at the surface of the ground on a platform. Wt. 40/shpg. 52 lbs. **\$266.00**

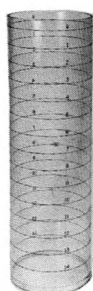
No. 245. STILL WELL is placed in the evaporation pan and provides an undisturbed water surface around the hook gage. A cylinder, 8 inches high and 3½ inches diameter, it mounts on a heavy triangular base containing leveling screws. Wt. 13/shpg. 17 lbs. **\$60.00**

No. 243. HOOK GAGE is a micrometer consisting of a hook at the end of a stem which is graduated to tenths of an inch. Its arms rest on top of the still well with the end of the hook just at the surface of the water. Wt. 2/shpg. 4 lbs. **\$65.00**

No. 243M. HOOK GAGE, metric graduations, 10 cm. to .01 cm. **\$75.00**

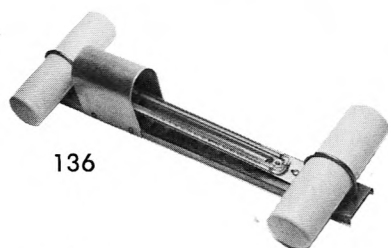


246



No. 246. FIXED-POINT GAGE AND MEASURING TUBE. An alternate design for Nos. 243 & 245. A pointed rod stands within a cylinder of noncorrosive metal, 3½" in diameter and 10" high. A sturdy metal base holds the gage in position so that the point of the rod will be 7½" above the bottom of the pan. Two small openings on side of cylinder permit flow of water into still well. A transparent measuring tube having a cross-section 1/100th of the evaporation pan is employed to determine the amount of water to 0.01" necessary to replace that lost by evaporation. **\$93.00**

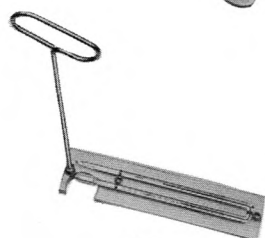
Accessories: Measuring Tube only \$24.00



136

No. 136. FLOAT MAXIMUM-MINIMUM THERMOMETER is a Six type with U-shaped tube and magnet reset (USWB Drawing #450.9013). Provided with a shield, it is mounted horizontally on a float supported by a non-magnetic frame. The thermometer rides approximately one-quarter of an inch below the surface of the water. Replacement thermometer, \$29.00. Wt. 1/shpg. 3 lbs. **\$55.00**

No. 136C. FLOAT MAXIMUM-MINIMUM THERMOMETER, Celsius graduations, -20/50°C. **\$60.00**



137

No. 137. SUBMERGED MAXIMUM-MINIMUM ASSEMBLY. USWB Drawing #450.9103B. An alternate design to No 136. Standard range 20/110°F. (Alternate range -40/120°F. \$35.00). **\$35.00**

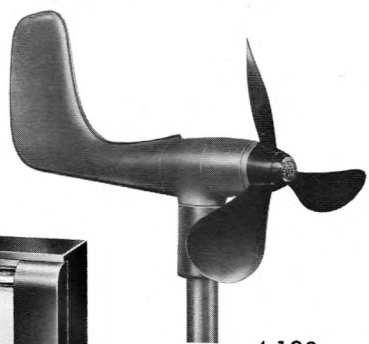
No. 403. ANEMOMETER totalizes miles of wind passing on a mechanical counter. For flanged base stand, add \$9.00. **\$250.00**

No. 403Km. ANEMOMETER, kilometer graduations. **\$281.00**

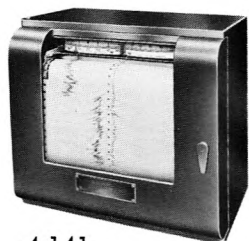
No. 8. EVAPORATION STATION, English graduations, consisting of Nos. 242, 243, 245, 136, and 403. **\$696.00**

No. 8M. EVAPORATION STATION, metric graduations. **\$742.00**

Professional Weather Station

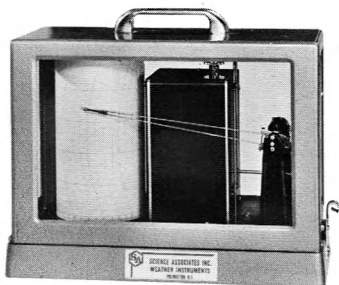


4-120

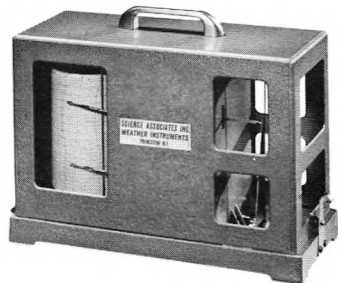


4-141

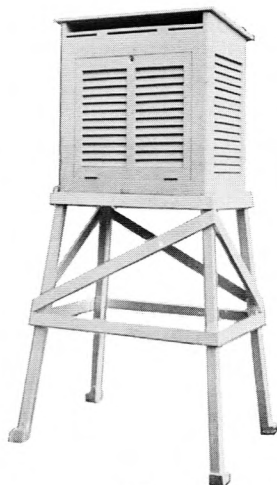
355



255



551



176

No. 6. PROFESSIONAL WEATHER STATION employs quality instruments to make precise measurements of the main meteorological parameters. Graphic recordings are made so that data will be available for later analysis. All instruments meet rigid Weather Bureau specifications for accurate performance over a long period of time.

The Professional Weather Station consists of the Aerovane Wind System (Nos. 4-120 and 4-141), No. 355 Microbarograph, No. 255 Hygrothermograph, No. 551 Recording Rain Gage, and No. 176 Instrument Shelter.

THE AEROVANE has long served a variety of users who require accurate and usable wind data. Its versatility combined with reliability have received recognition from government and military weather services plus a host of industrial and research organizations. It has been employed in hurricane studies to register maximum wind blasts as well as in air pollution studies to detect light air movements.

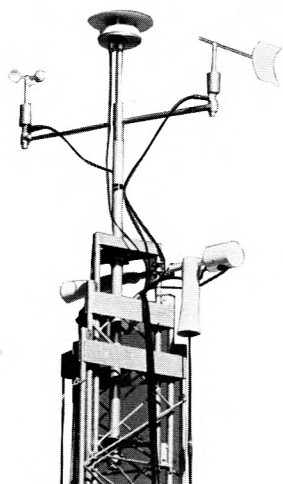
The transmitter contains an anemometer and wind vane in one unit. The spinning rotor activates a generator whose output, which is directly proportional to wind speed, is measured by a dial pointer and/or the pen arm of a recorder. A continuous analog trace of wind speed from 0 to 100 mph is made on one chart section measuring 4.5" wide. A record of gusts and lulls is permanently recorded.

The streamlined wind vane positions a synchomotor which is connected to a matching synchro remotely-located. This activates either a dial pointer and/or a pen arm of a recorder. A continuous record of wind direction from 0° to 360° is made on a parallel channel of the same chart as wind speed.

THE MICROBAROGRAPH provides a facile means of graphically measuring minute variations as well as longtime trends of atmospheric pressure. An inked record is made on a large chart 6 inches high providing 2.5" of chart space for each inch of pressure change. The current pressure trend, so important in forecasting coming weather, can be readily discerned. Readings of a microbarograph may be employed as a pressure standard if compared periodically with a "mercurial" of known accuracy. The microbarograph is located indoors, usually fixed to a rigid shelf or rack where vibration is at a minimum. Standard recording period is 7 days; others available. It is a self-contained instrument with spring-wound clock and requires no outdoor attachments.

THE HYGROTHERMOGRAPH records continuous traces of temperature and relative humidity on individual sections of a large 5" chart. Chart sections are coordinated vertically to assure accurate time comparisons. Instrument is self-contained, employs an 8-day, spring-wound, chart drive. Standard recording period is seven days; other periods available. The hygrothermograph is usually exposed about four feet above ground level in an instrument shelter.

THE RECORDING RAIN GAGE employs the weighing principle to make a cumulative record of precipitation. A catch bucket is mounted on a scale which actuates a pen arm. Trace is made on a 6-inch vertical chart having one inch of chart space for one inch of precipitation. Through employment of a dual traverse pen movement, total capacity is 12 inches without emptying bucket or resetting chart. Liquid equivalent of snow-fall may be measured with use of proper melting chemicals in bucket. Spring-wound chart drive employs an 8-day movement. Standard recording period is 7 days; others available. Rain Gage is usually exposed at ground level as far away from obstructions as possible.



THE selection of the "proper" equipment depends on the survey objectives, techniques of analysis, and funds available. Many instruments listed in this catalog, and others available on request, are applicable to specific problems. Equipment for wind, temperature, temperature-difference, dew point, and relative humidity, including data collection, processing, and telemetering, is referenced here.

Wind

No. 400	Mechanical Weather Station	(p. 65)
No. 4-120	Aerovane	(p. 52)
No. 435	RAIM Micro-met System	(p. 58)
No. 441	Wind Survey System	(p. 55)
No. 458	Wind Diffusion Recording System	(p. 65)
No. 470	All-Purpose Wind Set	(p. 57)
No. 490	Teledyne/Geotech Wind System	(p. 59)
No. 491(1)	Wind Warner	(p. 67)
No. 493	Climet 540° System	(p. 54)

Temperature, Temperature-Difference, Dew Point, Relative Humidity

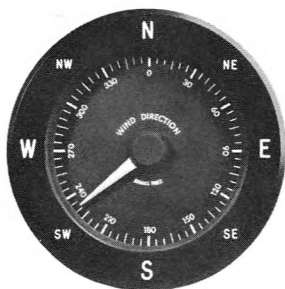
No. 170	Temperature Recorder	(p. 23)
No. 172	Temperature, Temperature-Difference, and Dew Point Recorder	(p. 23)
No. 219	Relative Humidity Transducer	(p. 30)
No. 255	Portable Hygrothermograph	(p. 34)
No. 261(1)	Dew Point and Temperature Recording System	(p. 36)
No. 265	Thermoelectric Dew Point/Temperature System	(p. 38)

Aspirated Solar Radiation Shields and Shelters

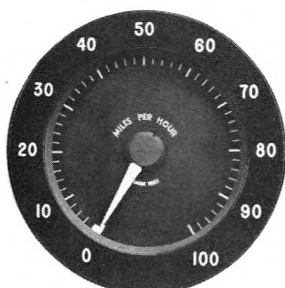
No. 174	Aspirated Solar Radiation Shield	(p. 24)
No. 176	Instrument Shelter	(p. 24)
No. 178	Vane Aspirated Temperature Shield	(p. 25)
No. 179	Aspirated Sensor Enclosure	(p. 25)
No. 181	Motor-Aspirated Temperature Shield	(p. 26)
No. 182	Gill Aspirated Temperature-Radiation Shield	(p. 26)

Data Collection, Processing, and Telemetering (p. 12)

Weatherman Dials



991



992



993



994

- | | |
|---|-----------------------------------|
| ☐ WIND DIRECTION | ☐ TEMPERATURE |
| ☐ WIND SPEED | ☐ HUMIDITY |
| ☐ BAROMETRIC PRESSURE | ☐ RAINFALL |

No. 990(1). WEATHERMAN DIALS AND SENSORS. Re-engineered and redesigned, the system consists of six large 11½" diameter matching dials for wind speed, wind direction, temperature, relative humidity, barometric pressure, and precipitation. All of the sensors, except for pressure, can be remotely located from the indicators. Design changes make it possible to convert sensor signals to linear analog voltages—through the use of an additional Signal Conditioner—and to operate recorders, or computer-related equipment, simultaneously with the display-type indicators.

Wind Speed and Wind Direction are now measured with a standard No. 4-120 Aerovane Transmitter which incorporates a D.C. generator for speed and a Synchro for direction. Two sets of indicators, or one set of indicators and a No. 4-141 recorder, can be operated from one Aerovane Transmitter.

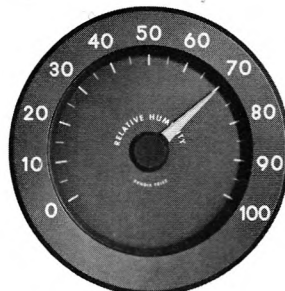
The Weatherman Temperature and Relative Humidity group share a single 115v 60Hz power supply/bridge unit. The thermistor temperature sensor and the hair-operated micro-torque potentiometer of the relative humidity sensor are located in a common shelter, ventilated by a small fan.

An aneroid barometer of the diaphragm type, temperature compensated, is employed to actuate the pointer of the Barometric Pressure Unit.

For the measurement of precipitation, cumulative amounts up to 5" are displayed on a dial with scale graduations to 0.1". A Tipping Bucket Gage, wired to a Controller Unit, actuates the pointer for each 0.01" of rainfall.

The Weatherman is available as a set of six units, or individually. Additional details concerning the indicators, or the Signal Conditioner for interfacing with recorders, available on request.

No. 990(1). WEATHERMAN, complete set of six Indicators, including Sensors, Power Supply, and Controller Unit, but less cable to outdoor equipment. **\$4,772.00**



995



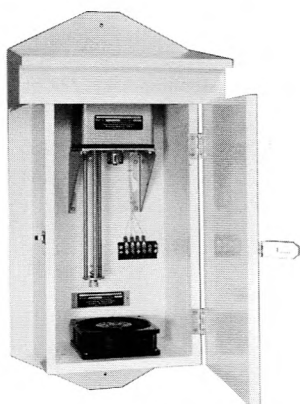
996

Weatherman III

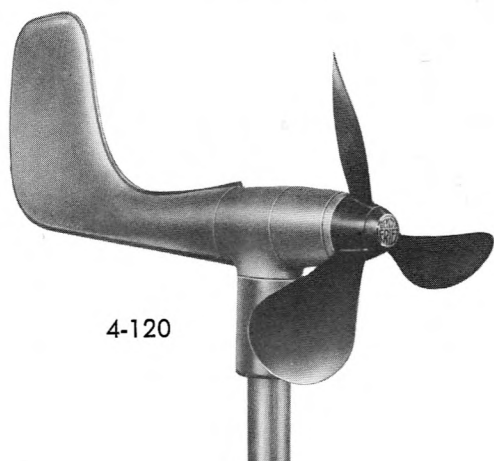


No. 970. WEATHERMAN III. This set of six indicators, 3½" in diameter, with white on black dials for CATV and other display applications, is an offshoot of the well-known 11½" diameter Weatherman Dials. In this grouping the indicators are recess-mounted on a panel, 24"H x 18"W x 4"D.

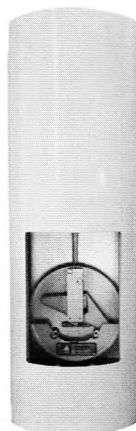
In addition to indicators for wind speed, wind direction, temperature, relative humidity, precipitation, and barometric pressure, system components include: (1) a combination Wind Speed and Direction Transmitter, S. A. 4-120; (2) a Temperature-Humidity Transducer and Shelter; and (3) a Tipping Bucket Raingage, S. A. No. 557. A Transmitter Support, S. A. No. 4-150, may be purchased as optional equipment, as may the cable for wind, temperature, and humidity. Power requirements, 115v. 60HZ. Wt. 47/shpg. 95 lbs. Apply



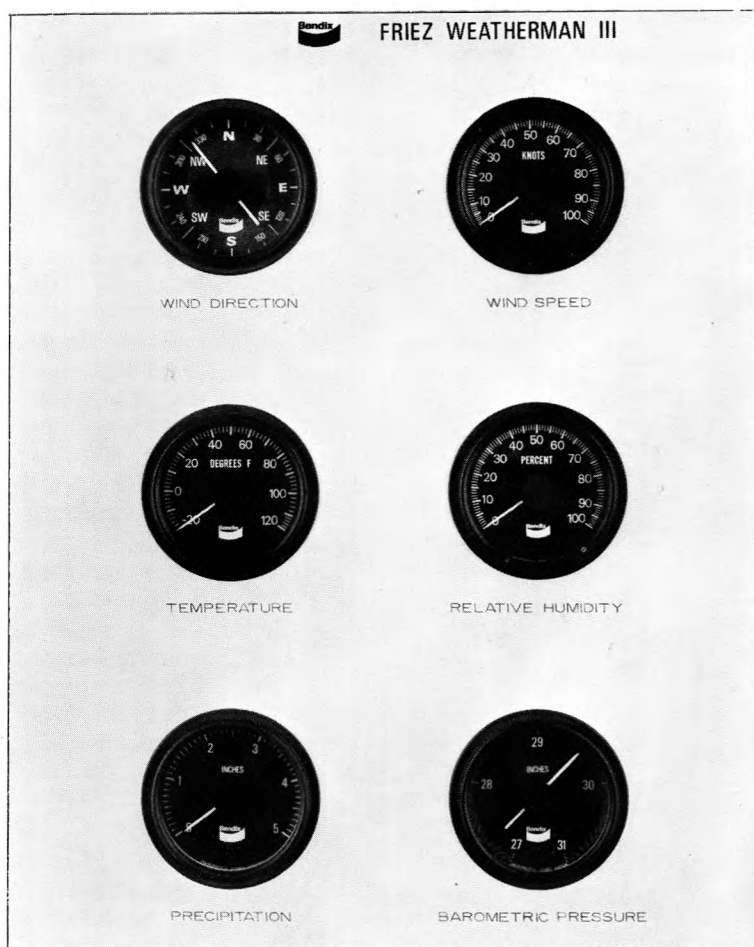
Temp.—R.H.
Transducer & Shelter



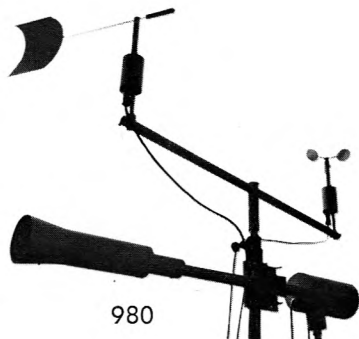
4-120



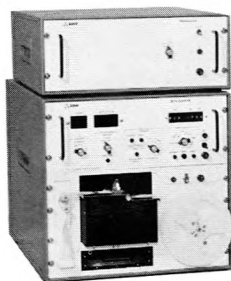
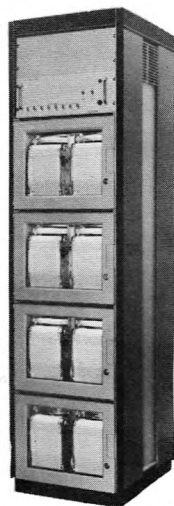
557



Data Collection, Processing, and Telemetry



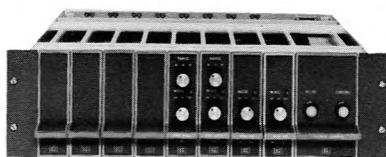
980



980B



981



982

No. 980. WEATHER DATA STATION—ANALOG RECORDING AND DIGITAL TAPE. A data collection system designed to provide, on rectilinear strip chart recorders, information in analog form—with the option of monitoring simultaneously the sensor signals in digital form. Although engineered for meteorological measurements, many atmospheric, air quality, and hydrological sensors can be used if the output is a variable-voltage current, resistance, or frequency.

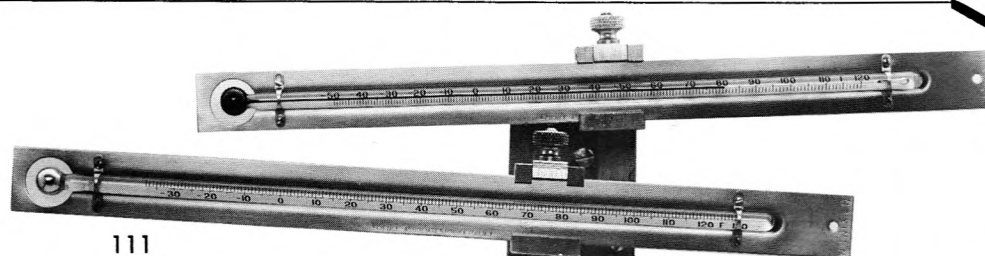
To illustrate, a typical station with six sensors is suggested covering wind speed, wind direction (540°), temperature, relative humidity, pressure, and solar radiation. The output of each is directed to a signal conditioner, part of a Multichannel Analog Translator, where the conversion is made to a dc voltage. This 0/1.0v signal is used as the input to a rectilinear galvanometric-type strip chart recorder, in which two measurements are shown side by side, each channel $4\frac{1}{2}$ " wide. Although the standard Translator is designed with 10 channels, 6 used and 4 unused for future expansion, it is possible to supply as many as 20 channels. In addition to the 0.1v analog signals; the Translator also supplies 0/10mv for each sensor, usable as inputs to a Data Acquisition System.

No. 980A. WEATHER DATA STATION, consists of above mentioned sensors for wind speed, wind direction, temperature, relative humidity, pressure, solar radiation; with a Multichannel Analog Translator, and 3 two-channel rectilinear strip chart recorders, all for panel mounting. Approx. \$8,900.00

No. 980B. DIGITAL DATA COLLECTION SYSTEM, compatible with above, is designed to operate simultaneously, so that sequential samples of data can be obtained at regularly timed intervals, adjustable from one minute to one hour. Outputs are in digital form, raw or processed, on either punched paper tape or computer compatible magnetic tape. Approx. \$8,000.00

No. 981. DATA CENTER. The Friez Data Center has been designed to provide a compact and compatible interface between environmental sensors and digital displays, recorders, printers, telemetering and computing equipment. In the basic unit 10 inputs are accommodated, with up to 20 channels as an option. Individual plug-in signal conditioners are available for each sensor output, which might be in the form of voltage, current, resistance, or synchro position. The front panel controls include a choice of 10 interval scan rates from 10/sec. to 1/hr. selected from the built-in digital clock. The Data Center is flexible, and adaptable to variations in requirements. Power, 115v 60Hz. Dimensions, $17\frac{1}{4}$ "L x 7"H x $11\frac{1}{4}$ "D. Wt. 17/shpg. 25 lbs. Apply

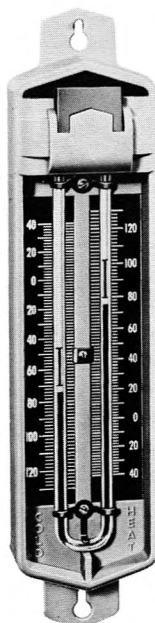
No. 982. SIGNAL PROCESSORS. Modular construction characterizes the Teledyne/Geotech processors, designed for accepting signals from the No. 490 Wind System (p. 59), and from sensors for temperature, pressure, and other meteorological parameters. Module inserts for processors and/or power supplies can be used in field cases, or in a rack mount chassis. Output signals are 0/1ma dc into 6000 ohms and 0/5v dc from less than 150 ohms. Wt./module approx. 2/shpg. 5 lbs. Apply



111



101



110

No. 111. MAXIMUM-MINIMUM THERMOMETERS WITH SUPPORT. U.S.W.B. Spec. No. 450.1016. Consists of three components (Nos. 112, 113, and 114) as pictured above and described below. Wt. 2/shpg. 4 lbs. **\$39.50**

No. 112. MAXIMUM THERMOMETER. Seasoned thermometer tube, mercury-filled, 10½ inches in length, has one-degree graduations etched on stem. Special constriction near the bulb enables maximum reading to be registered. Range: $-38^{\circ}/+130^{\circ}$ F. Thermometer tube attached to stainless steel backing, over-all length 12 inches. Wt. 8 oz./shpg. 3 lbs. (Replacement thermometer \$8.00). **\$9.00**

No. 112C. Same graduated approx. $-34^{\circ}/+54^{\circ}$ C. **\$10.50**

No. 113. MINIMUM THERMOMETER. Seasoned thermometer tube, filled with amber spirits, 10½ inches in length, has one-degree graduations etched on stem. Special floating index registers minimum reading. Range: $-50^{\circ}/+120^{\circ}$ F. Thermometer tube attached to stainless steel backing, over-all length 12 inches. Wt. 8 oz./shpg. 3 lbs. (Replacement thermometer \$8.00). **\$9.00**

No. 113C. Same graduated approx. $-45^{\circ}/+49^{\circ}$ C. **\$10.50**

No. 114. TOWNSEND SUPPORT. U.S.W.B. Spec. 450.0305. Convenient all-metal holder clamps maximum and minimum thermometers in correct position and facilitates resetting. Base measures 2 x 3, height 2¾ inches. Wt. 1/shpg. 3 lbs. **\$23.00**

No. 101. OFFICIAL THERMOMETER. U.S.W.B. Spec. No. 450.1016. Seasoned thermometer tube 10½ inches in length, mercury-filled, has one-degree graduations etched on stem, and numerical figures imprinted every 10 degrees. Range: $-38^{\circ}/+130^{\circ}$ F. Attached to stainless steel backing, over-all length 12 inches. Convenient brass support for easy mounting, \$2.90 extra. Wt. 8 oz./shpg. 3 lbs. **\$8.50**

No. 101C. Same graduated approx. $-38^{\circ}/+55^{\circ}$ C. **\$9.50**

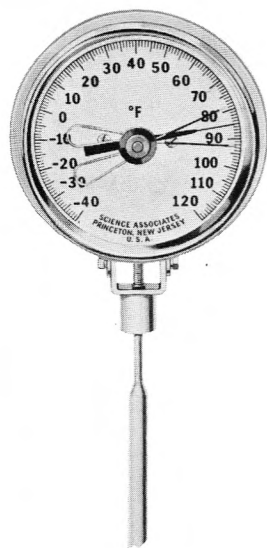
No. 102. OFFICIAL THERMOMETER. Same as No. 101, but tube is filled with easy-reading red spirits. Range: $-50^{\circ}/+110^{\circ}$ F. **\$8.50**

No. 102C. Same graduated approx. $-38^{\circ}/+55^{\circ}$ C. **\$10.00**

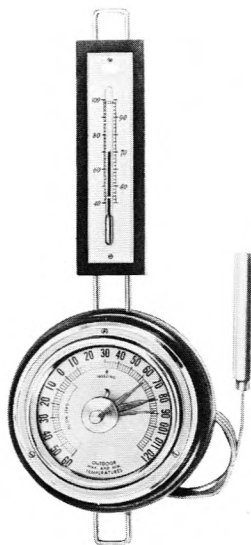
No. 110. MAXIMUM-MINIMUM THERMOMETER. U-shaped thermometer tube of the Six pattern. Magnifying lens tubes, 8 inches in length, have special metal indices for registering highest and lowest readings. These are reset by a small magnet. Range: $-40^{\circ}/+120^{\circ}$ F. Attractive gray plastic case. Enameled brass scales. Over-all length 10½ inches. Complete with magnet and mounting screws. Replacement magnet, \$1.00. Wt. 1/shpg. 3 lbs. **\$11.70**

No. 110C. Same graduated approx. $-40^{\circ}/+54^{\circ}$ C. **\$11.70**

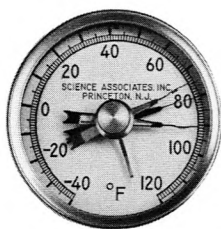
Max.—Min. Dials



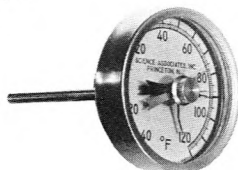
117



118



115-1



142

No. 117. MAXIMUM-MINIMUM DIAL THERMOMETER. U.S.W.B.

Spec. No. 450.1214. Mercury-actuated temperature sensitive bulb with direct drive bourdon spring for registration of current temperature and maximum and minimum on easy-to-read dial. Extremely rugged, portable, and easily reset. Mercury insures sensitivity and supplies sufficient power to move max-min pointers accurately. Temperature bulb is contained in rigid stem of stainless steel which is 10" long and ½" in diameter and is adjustable by means of a double swivel to any angle. Max-min pointer easily reset by turn of center knob. Dial is 3½" in diameter with black graduations on a white face. Range: -40/+120° F. with one-degree graduations. Accuracy ±1° F. Nickel-plated pipe clamp supplied for easy mounting on cross board in shelter. Wt. 3/shpg. 6 lbs. **\$57.00**

No. 115(1). MAXIMUM-MINIMUM THERMOMETER, dial type. A

stainless steel case encloses an easy-to-read dial with maximum and minimum pointers. Employs as a sensitive element a strip of bi-metal wound into a continuous multiple helix. Dial is three inches in diameter, scale six inches in length. Black pointer indicates current temperature; red pointer shows the maximum, green pointer the minimum since last resetting. Easily reset by turning knob on front. A rod, ¼" diameter and 4" long, containing the sensitive element, extends at the rear. Current temperature accurate to 1% of scale, max.-min. within 1½% of scale. Range: -40/+120° F. Easily mounted in instrument shelter by drilling ½" hole in cross board. Wt. 8 oz./shpg. 3 lbs. **\$35.00**

No. 118 INDOOR-OUTDOOR AND MAXIMUM-MINIMUM THERMOMETER.

A combination instrument which gives current outdoor and indoor temperatures at a glance and also maximum and minimum outdoor temperatures since last resetting. Range: -60/+120° F. Five feet of armored tubing connects outdoor temperature sensitive bulb to indoor dial. Max. and min. pointers easily reset by center knob. Separate indoor thermometer has red liquid tube for easy reading. Range: +40/+100° F. Accuracy ±2° F. Complete, ready to install and operate. Size: 12" high, 4½" wide. Wt. 1/shpg. 3 lbs. **\$28.00**

No. 118-20. Same with 20 ft. capillary tubing. **\$51.00**

No. 118-40. Same with 40 ft. capillary tubing. **\$62.00**

No. 118A. Same as above, less indoor thermometer. **\$23.00**

No. 118A-20. Same as above, less indoor thermometer. **\$44.00**

No. 118A-40. Same as above, less indoor thermometer. **\$56.00**

No. 142. REMOTE READING DIAL THERMOMETER. An improved

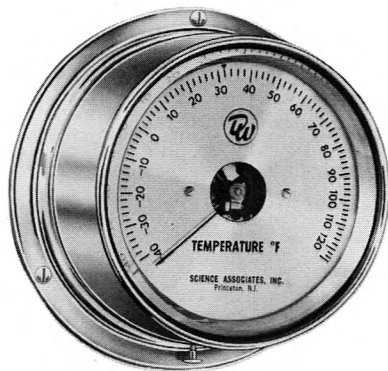
dial thermometer, now supplied with Class 5A, full compensation, and in a selection of models. Outdoor temperature sensitive bulb, approx. 5/16 x 10", connected by mercury-filled capillary tubing, self-compensated for changes in ambient temperature. Indoor indicator case made of phenol condensate. Range: -40°/+110° F., one-degree graduations; white numbers on black background. Wall mounting design with bottom connection and five feet of capillary is standard. Back connection at no extra charge. For flush mounting adapter ring, add \$7.00. Additional capillary up to 100' factory installed: type 316 stainless steel ½" diameter, self-compensated, add \$1.45/ft. Extra charge of \$10.00 for scale in equivalent °C. Wt. 4/shpg. 7 lbs.

No. 142-45. (4½" diameter dial). **\$58.00**

No. 142-60. (6" diameter dial). **\$69.00**

No. 142-85. (8½" diameter dial). **\$80.00**

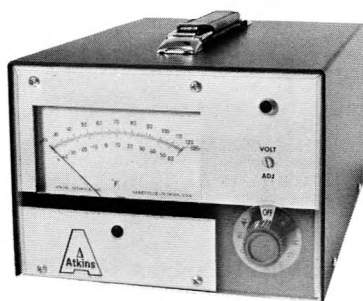
Remote Electrical Thermometers



146

No. 146. REMOTE TEMPERATURE INDICATOR. Accurate to $\pm 2^\circ$ F., easy to install, attractive and easy to read—an electrical thermometer which is one of a set of matching Nassau Weather Dials (S.A. #975). 100' of 3-conductor cable connect nickel wire sensor bulb, installed in radiation shield, to brass case indicator. Numerals are black, on satin buff background, with option for white on black background. Scale calibrated $-40^\circ/+125^\circ$ F. in two-degree divisions, readable to one degree.

Operates on 115v. 60 Hz. with power consumption of 4 watts. Cable supplied with system usable to 100' feet, but greater distances can be accommodated by using cable sizes recommended, e.g. up to 330 feet with #14 wire. Case dimensions: 4" across dial face; 5½" across mounting base. Over-all dimensions of radiation shield, to be located on north-facing exposure: 9" x 4". For case finished in chrome, add \$5.00. Scale in $^\circ$ C. on special order. Wt. 9/shpg. 12 lbs. **\$225.00**



147(1)

No. 147(1). STATION TEMPERATURE MONITOR. A precision, remote reading, and line-powered electric thermometer for measuring air temperatures from -40° to 120° F. has an auxiliary output of 0-60 mv. for the optional use of any high-impedance potentiometric recorder. The Monitor incorporates a bead-size thermistor sensor, which can be located at distances of up to one mile and connected by a simple 2-conductor #18AWG unshielded wire. With 250 ft. of cable the system accuracy is within $\pm 1.5^\circ$ F., slightly less as the cable length increases.

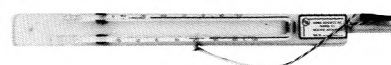
A 1 x 1¼-inch protective shield covers the probe so that it can be exposed on the north side of a building, in the shade, away from sources of radiation. The connecting cable supplied is 50'; for longer lengths add \$5.00 plus 7¢/ft. The indicator, designed as a dual range instrument with selectable scales of $-40/60^\circ$ F. and $20/120^\circ$ F. in 1-deg. divisions, may be used as a table top device, or installed in a panel with angle brackets (\$65.00 extra). Case dimensions: approx. 5½ x 8W x 11½D inches. Power requirements: 105/125v. 50/60Hz.; 220v. on request. Other standard scales in Fahrenheit or Celsius also available on request. Wt. 2/shpg. 4 lbs. **\$261.00**

Special Thermometers



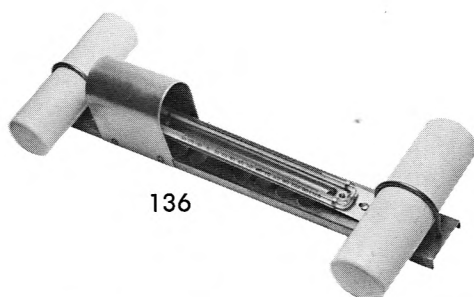
133

No. 133. ORCHARD MINIMUM THERMOMETER. The minimum temperature and the present temperature are easy to read on a thermometer built to an accuracy of $\pm \frac{1}{2}$ deg. over a range of 10° to 100°F. An etched scale of 1-deg. divisions on a magnifying glass tube containing red liquid and a black index contribute to the overall accuracy. The minimum index is reset by pivoting the thermometer at the bulb end, so that the top of thermometer is lowered after each observation. Overall size: 13½". Wt. 5 oz./shpg. 1 lb. **\$6.00**



135

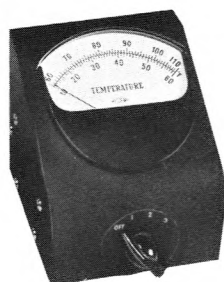
No. 135. ETCHED STEM MAX-MIN THERMOMETER. A glass stem thermometer of the Six pattern, similar to S.A. #110, but fabricated for maximum accuracy with scales etched on U-tube, and with backing designed for mounting horizontally in #183 Thermo-Shelter. Temperature range -40/120°F., 1 deg. div. Supplied with magnet for resetting maximum and minimum indices. Wt. 10 oz./shpg. 1 lb. **\$16.00**



136

No. 136. FLOAT MAXIMUM-MINIMUM THERMOMETER is a Six type with U-shape tube, etched scales graduated -30°/+120° F., and accuracy $\pm 1^\circ$ F. Magnet reset. Provided with a shield, it is mounted horizontally on a float supported by a non-magnetic frame. The thermometer rides approximately one-quarter of an inch below the surface of the water. Wt. 1/shpg. 3 lbs. **\$55.00**

No. 136C. Same graduated -20°/+50° C. **\$60.00**

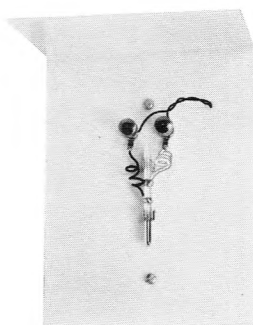


138

No. 138. TEMPERATURE INDICATOR AND FROST ALARM. For use in orchards and gardens—a mercury-in-glass thermometer and thermostat, designed to sound an alarm at a predetermined point, usually 34°F. The sensor is located on a simple but effective radiation shield and support. Some experimentation may be necessary to find a representative location for detecting early indications of frost.

The Indicator Alarm includes a dual scale meter: 10/60°F. and 60/110°F. for the continuous indication of ambient temperature, over distances of up to one mile, with the proper choice of wire. Accuracy of alarm and indication $\pm \frac{1}{2}^\circ$ F. Operates on 100-125v. A.C., but leads from indicator are low voltage. If alarm set-point other than 34°F. is required, please specify with order. Wt. 2/shpg. 5 lbs. **\$88.00**

139



No. 139. FROST ALARM, less indicator. A new, inexpensive sensor and frost alarm, designed for garden or farm. Sensor, accurate to $\frac{1}{4}$ degree F. and factory set to temperature specified up to 36°; operates on low voltage from 110v. A.C. supplied to alarm box. Sensor-thermostat mounts in No. 183 Shelter, or other user-furnished shelter. Spare thermostats \$15.00. For alarm settings above 36°; add \$10.00. Wt. 2/shpg. 5 lbs. **\$50.00**

Soil Thermometers



117S

No. 117S. SOIL MAXIMUM-MINIMUM THERMOMETER. Similar in dial and operation to No. 117, but a 5-foot stainless steel flexible spiral armor capillary tubing replaces rigid stem. Rigid temperature-sensitive bulb is 13" in length and $\frac{5}{16}$ " diameter. Accuracy $\pm 1^\circ\text{F}$. On special order, available with range: $-40/+50^\circ\text{C}$. Additional capillary must be ordered at time of manufacture—\$1.00/ft. Wt. 4/shpg. 7 lbs. **\$85.00**

No. 140. SOIL THERMOMETERS. A stout-stemmed, mercury-in-glass thermometer tube is inclosed in a protective wooden case which is inserted in the soil leaving approximately 12 inches above the ground. The bulb of the thermometer senses soil temperature at the desired level. The upper portion of the wooden case has been cut away exposing a thermometer scale 11 inches in length. Range: approx. $+10^\circ/+120^\circ\text{F}$. Soil thermometers available to depths as recommended by the World Meteorological Organization. (WMO):

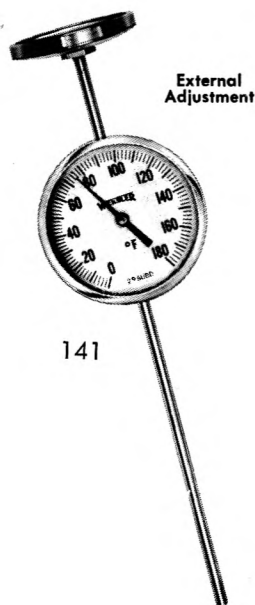
1" — \$28.75	4" — \$32.50	20" — \$51.25
2¼" — \$30.00	8" — \$36.25	40" — \$63.75



140

No. 141. BI-METAL DIAL THERMOMETER. Originally designed for industrial applications, this $1\frac{3}{4}$ " dial thermometer, employing a helix bi-metal coil sensor, is useful in making survey-type soil temperature measurements. It can also be used for water and air temperatures. A welded 18-8 type 304 stainless steel construction is used for the case and the .142" diameter stem. An external hex nut adjustment enables the user to recalibrate to an accuracy of $\pm \frac{1}{2}\%$. Standard range $-40/160^\circ\text{F}$. in 2-degree divisions. Also available $-100/+100^\circ\text{F}$. in 2-degree divisions. Select stem lengths below. Wt. $\frac{3}{4}$ lb./shpg. 1 lb.

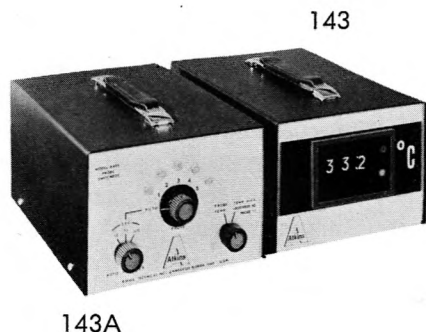
6" — \$ 9.90	15" — \$11.70
8" — \$ 9.90	18" — \$13.90
12" — \$11.70	24" — \$16.60



141

No. 141-C. Same as above, except scales in deg. C. Standard range $-50/100^\circ\text{C}$. in 2-degree divisions. Also available $0/+50^\circ\text{C}$. in $\frac{1}{2}$ -degree division and $0/+100^\circ\text{C}$. in 1-degree division. Prices as above.

Digital Thermometers



No. 143. DIGITAL THERMOMETER SYSTEM. A precision, remote-reading digital thermometer that incorporates a new type of sensor—a silicon-diode semiconductor—that has a strong output signal, 20mv./°F., and that can be located thousands of feet from the Indicator. For data processing requirements a BCD output of 1-2-4-8 is routinely available at terminals on back of chassis. Current temperature is shown to 0.1°F. in lighted digits 0.6" high, for the range of -150/400°F. (on request, -100/199°C.). Accuracy is $\pm 0.5^\circ$, but probes may be trimmed with adjustments provided to improve performance at installations with multiple inputs for absolute values and/or temperature differences. Utility probe supplied measures $\frac{3}{16}$ " diameter x $1\frac{1}{2}$ " long, a stainless steel tube with 6' TFE insulated cable, 2-cond., #18AWG. For longer lengths add \$5.00/probe, plus 25¢/ft. Digital Indicator case size, in inches, approx. $5\frac{1}{2}$ H x 8W x 12D. Wt. 6/shpg. 10 lbs. **\$821.00**

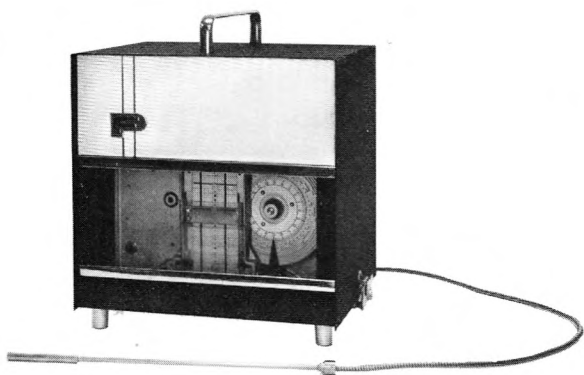
No. 143A. MULTI-PROBE SWITCH BOX for DTS No. 143, Manual Switching. An optional multi-probe switch box which handles inputs from up to five interchangeable silicon-diode probes with manual switching for absolute temperatures or temperature differences, using #1 probe for base reading. Switch box case dimensions are same as No. 143. Probes are in addition to price shown, depending on number of sensors required. Wt. 3/shpg. 5 lbs. **\$249.00**

No. 143B. MULTI-PROBE SWITCH BOX for DTS No. 143, Automatic Switching. As above, with automatic switching. **\$360.00**

Accessories:

#P50-5 Silicon-diode Utility probes, $\frac{3}{16}$ " diameter x $1\frac{1}{2}$ " long, stainless steel tube with 6' length TFE 2-cond. insulated cable, #18AWG. **\$26.00 ea.**

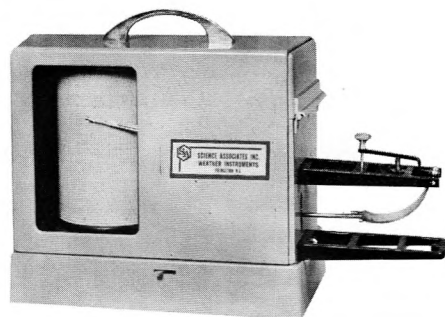
#P80-5 air temperature probes, 1" sq. x $1\frac{1}{4}$ " H, with 6' length TFE cable. **\$38.00 ea.**



No. 165. DIGITAL RECORDING TEMPERATURE GAGE. A battery-operated, digital, recording temperature gage that will operate unattended for 1 year, punching out in binary-decimal code, the current air, water or soil temperature every 15 minutes. The recording interval timer can be changed by a simple cam substitution, to punch out every 5, 6, 15, 30, or 60 minutes. The tape is easily read visually. It can be manually translated with a desk reader, or put into a form for computer techniques.

The instrument is essentially a filled capillary type thermometer, designed for one of two ranges: 32/92°F. with a maximum capillary length of 100 ft., or -40/59°C. with a maximum capillary length of 3 ft. Select one. Response time is 15 seconds when employing a bulb measuring $6 \times \frac{5}{8}$ inches with 50 ft. of temperature compensated capillary. Dimensions of drip-proof enclosure with window, $12\frac{3}{4} \times 14\frac{1}{2} \times 11\frac{1}{4}$ inches deep. Battery, 7½v. d.c. is furnished by user. Wt. 25/shpg. 45 lbs. **\$755.00**

Thermographs



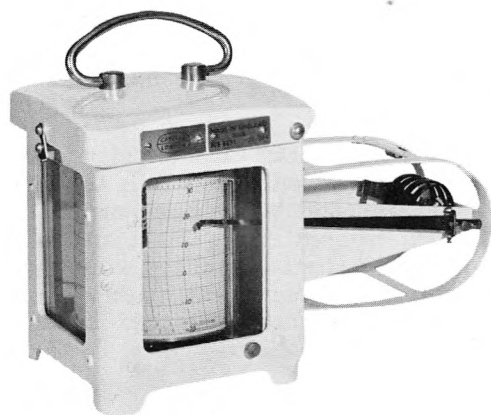
151

No. 151. THERMOGRAPH. U. S. Weather Bureau specification No. 450.1201. The temperature-sensitive element is a polished chrome-plated, liquid-filled, bourdon tube attached by a series of linkages to a recording pen arm. Knurled thumb nut makes field adjustments possible over full operating range of 185 degrees, from -35° to 150° F. Accuracy $\pm 1^{\circ}$ F. Charts measure 4 inches vertically for temperature and $11\frac{1}{2}$ inches horizontally for time. Charts cover spans of $-50/80^{\circ}$ F., $-35/110^{\circ}$ F., $+5/150^{\circ}$ F., or $-37/43^{\circ}$ C.; specify choice. Recording period either one day or seven days, but limited to weekly charts for $-50/80^{\circ}$ F. and $-37/43^{\circ}$ C.; specify one. Housed in all-metal case with glass panels and mounted on aluminum base. Complete with 100 charts, pen and ink. Dimensions: $13\frac{1}{2} \times 9 \times 7\frac{3}{8}$ inches. Wt. 11/shpg. 15 lbs. **\$210.00**

No. 151-31SW. THERMOGRAPH. Same as above except with 31-day spring-wound chart drive. Daily travel approx. $5/16$ ". Supplied with 25 monthly charts. **\$240.00**

No. 151-31BP. THERMOGRAPH. Same as above except battery-powered chart drive, designed to operate over an ambient temperature range of $-35/160^{\circ}$ F. **\$246.00**

Accessories for No. 151, No. 151-31SW and No. 151-31BP: Daily or weekly charts, specify period and range, \$5.00/100. Monthly charts \$5.00/25. Pens \$1.60. Ink \$2.25/1 oz. purple. Change gears, daily or weekly, \$4.75/set. Chart drives: battery-powered (BP) \$86.00; spring-wound (SW) with cylinder \$82.50. Power-pack for No. 151-31 BP \$3.25.



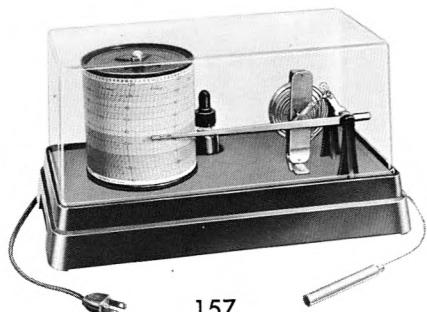
156

No. 156. THERMOGRAPH. A robust, compact, and easily portable recording thermometer that gives accurate measurement at low cost. Conforms to British Standard Spec. 3231: 1960 and to British Meteorological Office requirements for MK III thermograph. Temperature sensitive element is a high quality bimetallic coil whose curvature changes with temperature variations actuate a pen arm. Charts measure $3\frac{1}{2}$ inches vertically for temperature and $11\frac{1}{2}$ inches horizontally for time. Recording mechanism contained in an attractive metal case with three glass panels. Temperature element is exposed at side for free air circulation. Standard range is 0° to 100° F. A special feature enables one to adjust or correct reading by simply turning a set screw. This permits instrument to be adjusted over any 100° F. span from $-50/+250^{\circ}$ F. Interchangeable seven-day or 24-hour recording period; specify one. Supplied with pen, ink, and 100 charts. Size: $10 \times 6 \times 6\frac{1}{2}$ inches. Wt. 7/shpg. 10 lbs. **\$112.00**

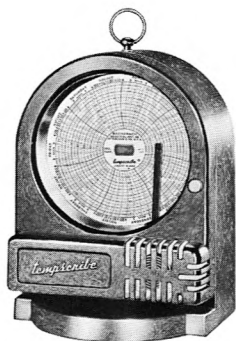
No. 156-31SW. MONTHLY THERMOGRAPH. Same instrument but equipped for 31-day recording period. Spring-wound chart drive requires winding once a month. Daily travel of chart approx. $5/16$ ". Complete with 25 monthly charts, pen, and ink. Excellent for locations where visitations are limited to monthly intervals or for obtaining daily maximums and minimums on monthly basis. **\$125.00**

Accessories for No. 156 and No. 156-31SW: Charts, daily or weekly, \$5.00/100. Monthly charts \$5.00/25. Pens \$1.00 each. Ink \$2.25/1 oz. Change gears, daily or weekly, \$2.00/set. Chart drive assembly: daily or weekly, spring wound, \$35.00; monthly, spring-wound, \$50.00.

Thermographs



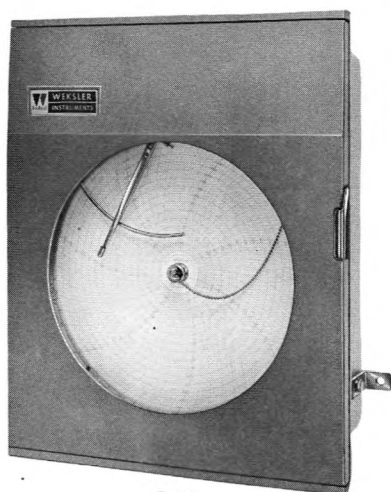
157



152



153



168

No. 157. REMOTE-READING RECORDING THERMOMETER. An eight-foot armored, liquid-filled tubing connects an outdoor temperature-sensitive bulb to an indoor recorder. A bourdon spring actuates the movement of the pen arm. An electrically-driven chart drum revolves once in seven days. Charts are graduated in one-hour segments. Range: $-40/+120^{\circ}\text{F}$. Requires 115v. 60Hz. house current for electric chart drive. Instrument accuracy: $\pm 3^{\circ}$ (-30° to 0°); $\pm 2.5^{\circ}$ (0° to $+120^{\circ}$). Calibrated with bulb and 12" capillary outdoors. Complete with 13 charts, ink, and instructions. Additional charts \$5.00/52. Size: 12 x 6 x 5 1/4 inches. Wt. 6/shpg. 10 lbs. **\$72.00**

No. 157-20. Same with 20 ft. capillary tubing. **\$86.00**

No. 157-40. Same with 40 ft. capillary tubing. **\$92.00**

Accessories for No. 157: Ink \$1.00/bottle. Pens \$1.50. Electric chart drive assembly \$14.00

No. 152. TEMPSCRIBE. This compact thermograph will meet a great variety of requirements for low-cost temperature recording. The Tempscribe employs a bi-metallic coil which has a quick thermal responsiveness. Accuracy $\pm 2^{\circ}\text{F}$. Proper ventilation of the temperature-sensitive element is provided by a special grill. Changes in temperature are transmitted directly to a pen arm which records on a circular chart, four inches in diameter, driven by a spring-wound clock. Recording period is either one or seven days; specify one. Temperature ranges: $-30/+120^{\circ}\text{F}$; $-10/+50^{\circ}\text{F}$; or $+40/+100^{\circ}\text{F}$; specify one. Complete with pen, ink, and 100 charts. Size: 4 1/2 x 5 1/2 x 7 1/2 inches. Charts \$3.40/100. Wt. 3/shpg. 5 lbs. **\$63.00**

No. 153. TEMPSCRIBE, REMOTE-READING TYPE. Recorder has a capillary tubing six feet in length and a temperature sensitive bulb 3/8" in diameter, 3 3/4" in length. This Tempscribe is a Class 3B, gas-filled system for applications where the capillary is not exposed to the direct rays of the sun. Accuracy $\pm 2^{\circ}\text{F}$. Range: $-30/120^{\circ}\text{F}$. Recording period either 24 hours or 7 days; specify one. Additional capillary 50¢/ft. up to 30 ft. Extra charts \$3.40/100. Complete with pen, ink, and 100 charts. Wt. 5/shpg. 8 lbs. **\$90.00**

No. 168. REMOTE-RECORDING THERMOMETER. Circular chart type. Class 5A recording system: mercury actuated and fully compensated for temperature changes in case and along capillary. Distances up to 250 feet can be handled without error. Plain air bulb, approx. 10" x 5/16" fabricated from stainless steel. Capillary with invar wire compensator is 1/8" diameter, also made from stainless steel. Standard range $-30/+120^{\circ}\text{F}$, each division 2° (also available $^{\circ}\text{C}$). Standard chart drive is daily (24 hrs.) hand wound, or electric (110v. 60 Hz.); specify one. For weekly: hand wound or electric, add \$12.50

Supplied with 5 feet of tubing. For additional lengths up to 250 ft., add \$1.60/ft. Specify type of case: flush mounted or wall mounted. Over-all case dimensions for 10" and 12" diameter charts: approx. 18"H x 14"W x 5"D. Preformed capillary type sensing element available on request, add \$30.00. Complete with 100 charts, ink, and instructions. Wt. 25/shpg. 40 lbs.

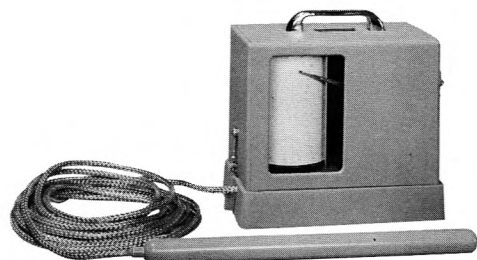
No. 168-10. (10" chart) **\$173.00**

No. 168-12. (12" chart) **\$188.00**

No. 168-31BP. Same as above, with chart drive battery powered, Size D flashlight cell—31 day rotation—chart range $-20/120^{\circ}\text{F}$. (or $^{\circ}\text{C}$). **\$265.00**

Accessories: 10" chart \$4.25/100, 12" chart \$5.00/100. Red Ink \$4.00/8 oz., \$6.00/pt.

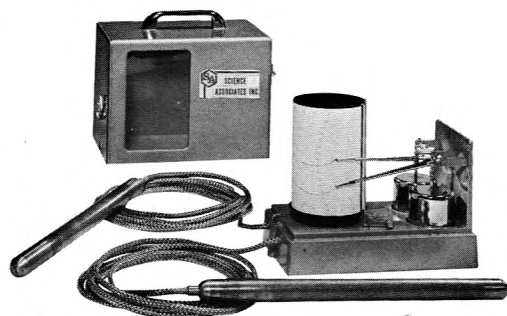
Soil—Air—Water—Thermographs



160

No. 160. DISTANCE THERMOGRAPH. Remote recording thermometer for permanent records of soil, air, or water temperatures. Thermograph mechanism attached to a 10-foot steel flexible capillary. A rigid cylindrical bulb, 12 inches in length, one inch in diameter, comprises the temperature sensitive element at the end of the capillary. Ranges: $-35/110^{\circ}$ F., $+5/150^{\circ}$ F., $-37/43^{\circ}$ C., specify one. Accuracy $\pm 1^{\circ}$ F. Response time 5 minutes. Charts measure five inches vertically for temperature and $11\frac{1}{2}$ inches horizontally for time. Instrument is temperature compensated throughout. On special order, instruments can be manufactured with long capillary at \$1.30/ft. additional. Complete with 100 charts, pen and ink. Size: $5\frac{1}{2} \times 7\frac{3}{4} \times 13\frac{1}{2}$ inches. Additional charts, \$5.00/100. Wt. 12/shpg. 17 lbs. **\$315.00**

No. 161. DUAL THERMOGRAPH. A two-pen instrument combines elements of Nos. 151 and 160 to record ambient air and a remote temperature on the same chart. **\$350.00**



162

No. 162. DUAL DISTANCE THERMOGRAPH. Same as No. 160 with two capillary systems. Recording pens are adjusted to pass close to each other, to achieve a minimum difference in time between the two traces. **\$415.00**

No. 163. SOIL-AIR-WATER DISTANCE THERMOGRAPHS. One-, two, or three-pen systems record simultaneously on a single chart drum. Each system has individual pen and individual portion of chart—each 3.25" high. Separate scales are stacked vertically for easy comparison of readings. Standard chart range: $-35/45^{\circ}$ C. Other ranges on special order. Accuracy $\pm 2\%$ decreasing with length of capillary tubing employed. Standard recording period is weekly (168 hours). On special order, recording periods of one, 14, and 31 days available at extra cost.

Each temperature system has a 12-foot mercury-filled capillary attached to a plain bulb, both lead coated for protection. Additional coated tubing in excess of 12 feet, up to 20 feet can be supplied on special order at \$2.75/ft.

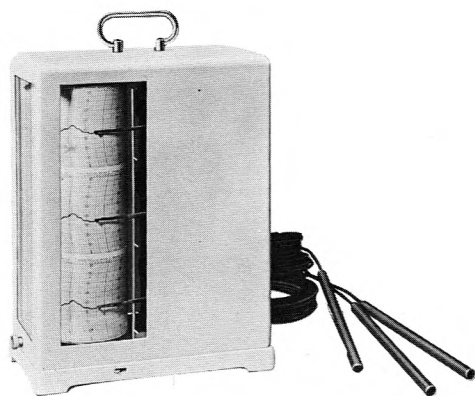
Recording mechanism is housed in a white enameled metal case and mounted on a base plate of cast aluminum alloy. Chart drive is spring-wound, 8-day clock. Supplied with 54 weekly charts, pen and ink. When ordering, specify: (1) number of pens, (2) scale range of chart, (3) recording period, (4) total length of each capillary system. Special orders require 90/120 days for delivery. Size (3-pen model): $11 \times 5\frac{1}{4} \times 13\frac{1}{2}$ inches. Wt. 25/shpg. 30 lbs.

No. 163-1. ONE-PEN DISTANCE THERMOGRAPH. \$235.00

No. 163-2. TWO-PEN DISTANCE THERMOGRAPH. \$345.00

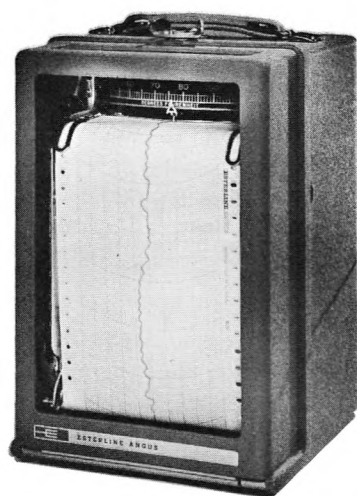
No. 163-3. THREE-PEN DISTANCE THERMOGRAPH. \$505.00

Accessories: Charts for No. 163-3, $-35/45^{\circ}$ C: daily \$15.00/100, weekly \$12.00/54, 31-day \$7.50/15. Change gears, \$5.00/set. Pens, \$6.00/set of 5. Ink, \$2.25/1 oz. 31-day chart drive when ordered with instrument \$55.00; when ordered separately, \$166.00.



163-3

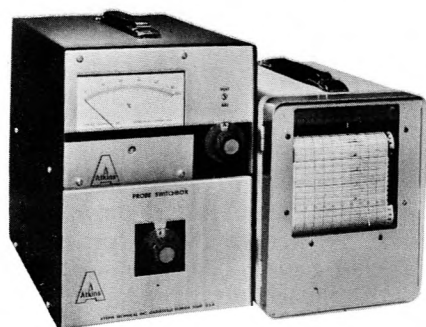
Soil—Air—Water—Thermometers



164(1)A

No. 164(1). SOIL/AIR AND WATER THERMISTOR TEMPERATURE RECORDING SYSTEM. A versatile battery-operated system designed for recording multiple soil/air and water temperatures at locations where there is no commercial power, and at distances of up to one mile between sensor and recorder. A combination Indicator and 24-v. battery-powered Probe-Switch box automatically changes from one probe to the next, sampling six (or ten) locations, at intervals of 30 sec. (or 2 min.)/point. These standard time intervals can be changed on request. Recorded values are identified by their order within each definable cycle. Standard probes used for soil, air, and water are epoxy-encased thermistors, inside a $\frac{1}{8}$ x 1" stainless steel tube, each with 10' of cable. For sensors with longer lengths, add \$5.00 plus 7¢/ft. Special water "sounding" probes are available, as noted under Accessories and Parts. Dimensions of Indicator and Probe-Switch box, in inches: approx. 11H x 8W x 12D. Two standard variations of this system are available.

No. 164(1)A. Above system, overall accuracy $\pm 1.5^{\circ}\text{F.}$, consisting of combination Indicator and Probe-Switch box, ranged for 30/130°F., supplied with six soil/air and water probes, each with 10' cable. Matching galvanometric strip chart recorder furnished has portable case and 8-day spring-wound chart drive; curvilinear chart records two weeks, at 3"/hr. Battery, 24v., storage type, is customer furnished. Wt. 45/shpg. 65 lbs. **\$1,211.00**



164(1)

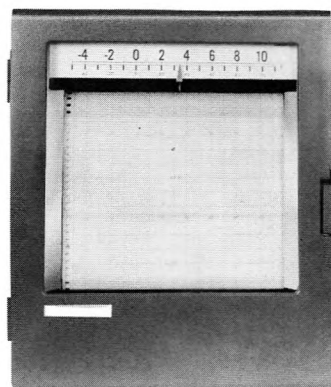
164(1)B

No. 164(1)B. Same basic system as in No. 164(1) consisting of combination Indicator and Probe-Switch box, ranged for 0/100°F., supplied with ten soil/air and water probes and an AC-DC, portable, transistorized potentiometric recorder, powered by eight rechargeable Ni-Cad D cells and one mercury reference cell. Operating time before recharging is approx. 200 hours. Recorder recharges and/or operates on 115v., 60Hz., 4 watts. At 4"/hr., rectilinear and inkless recording charts marked 0/100 over 4", record more than 5 days. Battery, 24v., storage type is customer furnished. Wt. 35/shpg. 55 lbs. **\$1,385.00**

Accessories & Parts:

Indicator and Probe-Switch box for No. 164(1)A	\$505.00
Indicator and Probe-Switch box (less amplifier) for No. 164(1)B	\$375.00
Soil/air and water thermistor probe No. 1-P51X-3, with 10' vinyl cable	\$ 16.00/ea.
Water "sounding" probe—a thermistor in a small weighted brass cage, with 50' vinyl cable marked at 5' intervals	\$ 49.00/ea.
Galvanometric Recorder, 0-1 ma. for No. 164(1)A	\$610.00
Potentiometric Recorder for No. 164(1)B	\$850.00
Chart rolls for galvanometric recorder in No. 164(1)A	\$ 2.50/ea.
Chart rolls for potentiometric recorder in No. 164(1)B, inkless	\$ 4.50/ea.

Strip Chart Temperature Systems



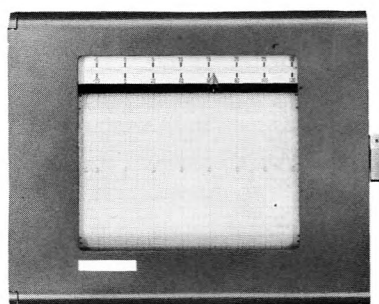
170(1)

No. 170(1). TEMPERATURE RECORDER, medium size with dependable electronic amplifier. Available with one, or two pens for continuous, curve-tracing record. Standard scale and chart range, $-50/110^{\circ}\text{F.}$ in 2 deg. divisions. With chart travel of 1"/hr. single 127 ft. roll lasts 2 months; change gears for 2"/hr. supplied with instrument. Recorder incorporates continuously balanced D.C. Bridge circuit, operating on 120v. 60/50Hz. Supplied complete with three-wire temperature bulb: 0.27" diam., 3" long—nickel wire element with response time of 21 sec. when aspirated at 10 ft./sec.—encased in stainless steel sheath. Recorder pen speed 5 sec. full scale; overall accuracy $\pm 0.25\%$ of span; panel mounting, case dimensions $10\frac{7}{16}"$ wide x $12\frac{1}{16}"$ high x 17" deep. Finish is gray, black optional. Chart No. 170-1, \$4.00/roll. Cable, on request. Aspirated Solar Radiation Shields recommended for meteorological applications: Nos. 174, 180, 181, 182. Retrasmittng slidewire \$37.00 and trimming potentiometer \$27.00 optional. Spare temperature bulb No. SK8452, \$65.00; spare dew point sensor, \$156.00. Wt. 55/shpg. 75 lbs.

No. 170(1)A. Single-pen temperature recorder, one sensor element. \$834.00

No. 170(1)B. Two-pen temperature recorder, with two sensor elements. \$1,529.00

No. 170(1)C. Two-pen recorder, temperature and dew point, with sensor elements. \$1,980.00

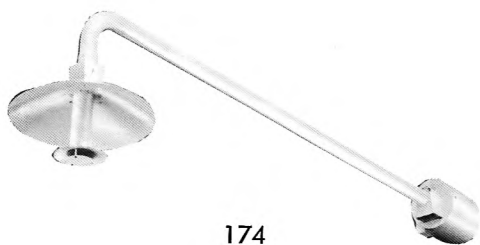


172

No. 172. TEMPERATURE, TEMPERATURE-DIFFERENCE AND DEW POINT RECORDER. Single 4-point strip chart recorder combines the functions of several records. Sequential measurements of temperature-difference, temperature, and dew point are recorded at one of many intervals. A dual scale and chart makes possible recording of ΔT from $-7^{\circ}/+30^{\circ}\text{F.}$ with chart lines for each 0.25° and T and Tdp from $-28^{\circ}/+120^{\circ}\text{F.}$ with chart lines for each degree.

Nickel wire, three-lead temperature sensors encased in thin stainless steel bulbs can be trimmed at the recorder for an absolute temperature accuracy of $\pm 0.3^{\circ}\text{F.}$ and a temperature-difference accuracy of $\pm 0.1^{\circ}\text{F.}$ For distances greater than 500 ft. where millivoltmeter-type recorder and power supply is recommended, or for telemetering requirements, apply. For system with D.C. Bridge type recorder for distances up to 500 ft. with four temperature bulbs and one Dewcel, less cable and less radiation shields. Extra chart rolls, No. 172-C, \$4.50 ea. \$2,775.00

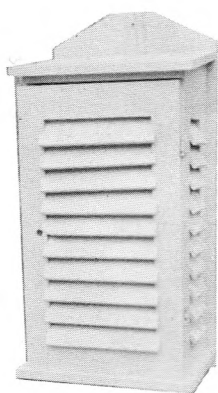
Radiation Shields



174

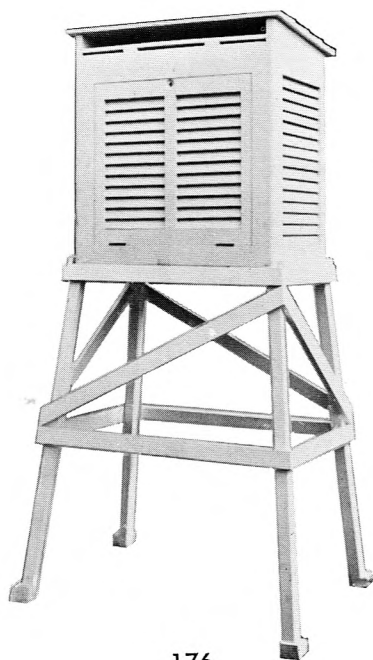
No. 174. ASPIRATED SOLAR RADIATION SHIELD. For maximum accuracy in the measurement of ambient temperature the transfer of heat due to radiation must be minimized. This shield is designed to house and ventilate an electrical-type thermal sensor: resistance bulb, thermistor, or thermocouple. Radiation from the sun and from surrounding objects is excluded by the dome-shaped shield, by an inner and outer shield, and by a surface-oriented baffle. Under maximum solar radiation error is limited to $\pm 0.2^{\circ}$ F. A motor and blower, located at the remote end of the mounting arm, induce a forced ventilation of approximately 10 ft./sec. in the area of the sensor.

This self-contained assembly, measuring 5 ft. from end of motor to the radiation shield, can be supported on fixed structures or portable towers. Outside diameter of pipe measures $1\frac{1}{2}$ ". Dome is 11" diameter. Sensors with maximum dimensions of $6" \times \frac{1}{2}"$ can be accommodated. Special mounting clamps for temperature bulbs at additional charge. Motor operates on 115v., 60 Hz., 75 watts. Requires 3-cond. cable for power. Price shown is for shield without sensor. Wt. 11/shpg. 50 lbs.
\$295.00



175

No. 175. INSTRUMENT SHELTER, small type. Wood construction has louvered front and sides, solid roof, and perforated bottom. Not designed for exposure to direct sunlight: mounting on a north wall or under a 24" x 24" plywood shadow canopy recommended. Holes at top and bottom of solid back for wall or post mounting; six-inch air space behind back should be allowed. Will house a No. 110 Max-min thermometer and/or a No. 201 or No. 215 Hygrometer, but not Nos. 111, 115, or 117. Completely assembled, with lock and key, painted light Navy gray. Over-all height of back: 24"—interior, 16" high, 8" wide, $5\frac{1}{2}"$ deep. Wt. $6\frac{1}{2}$ /shpg. 8 lbs.
\$34.00

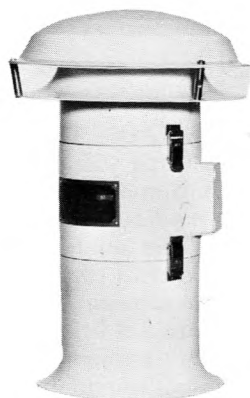


176

No. 176. INSTRUMENT SHELTER, medium size, U. S. Weather Bureau Spec. No. 450.0615, Rev. 8/28/67, known as the cotton-region type, the nation-wide standard for exposure of thermometers. All-wood box has louvered sides, double roof, and slatted bottom with cross board spanning interior for proper mounting of thermometers. Overall dimensions of box treated with synthetic preservative for long life: approx. 33" high, 30" wide, and 20" deep. Interior dimensions $28\frac{1}{4}"$ high, $27\frac{1}{4}"$ wide, and $17\frac{1}{2}"$ deep. Legs made of $2\frac{1}{2}" \times 1\frac{3}{4}"$ wood (alternately, of galvanized metal) support bottom of box about 48" above ground. Supports must be anchored in ground to prevent overturning. Hinged door should face north. Location away from trees and buildings and over grass recommended. If roof location is necessary, supports should rest on 6' x 6' wooden platform to reduce radiation. Complete with lock, key, and instructions. Box shipped assembled, legs knocked-down. Shpg. 90 lbs. by highway truck. (Box, less legs \$105.)
\$130.00

Accessories: No. 176A Psychrometer Fan, manually operated, for mounting in No. 176 Shelter. \$50.00

Radiation Shields



179

No. 178. VANE ASPIRATED TEMPERATURE SHIELD. For remote temperature measurements where power is not available. The large vane maintains the concentric shield elements into the prevailing wind to provide a flow of ambient air over the temperature sensor. Resistance bulb, thermistor, or thermocouple can be mounted on clip located in stationary vertical section, with sensor protruding into wind-ventilated, double-walled horizontal section. Sealed bearings give low threshold and long life to moving shield and vane.

With solar elevation greater than 10 deg., wind speed greater than 1.5 mph, and insulation equal to or less than 1.2 cal/cm²/min., the shield will limit radiation errors to 0.2°F. The operating temperature range is -40°F. to 153°F.

Vane Aspirated Temperature Shield is made of anodized aluminum with highly reflective white enamel. Over-all dimensions: 20" from front opening to end of vane, and 14" from base of pipe fitting to top of vane. Mounts on 1" pipe. Wt. 3/shpg. 8 lbs. **\$150.00**

No. 179. ASPIRATED SENSOR ENCLOSURE. A commercial version of an enclosure produced to meet Air Force specifications in the AN/TMQ-20 Temperature/Dew Point Measuring Set. Modular in design, it is adaptable for use with thermoelectric or conventional sensors.

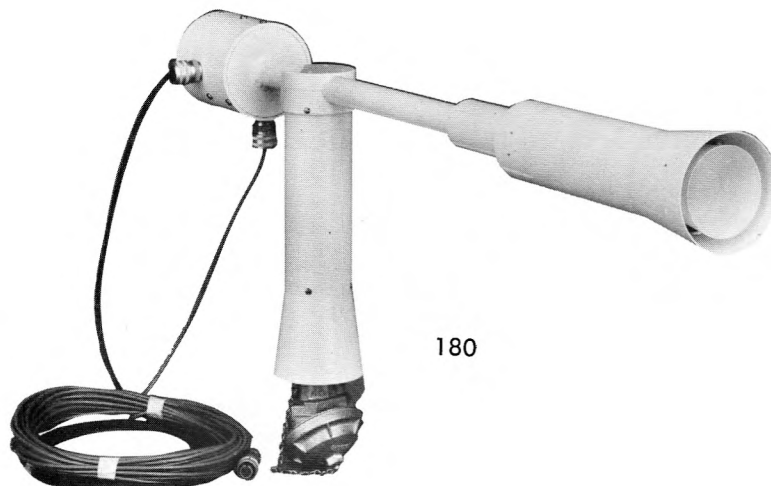
The aspirated sensor enclosure is fabricated from aluminum and finished in a white baked-on epoxy enamel—over-all dimensions: 4" diameter x 12" high. Motor design is for continuous operation in temperature range of -80°/+140°F. Operates on 115v., 50-60Hz. at 14 watts. Draws 60 cfm through stainless steel insect screen and across sensors.

Furnished with a six-inch section of ¾" cadmium-plated steel pipe with ¾" NPT thread for mounting. Electrical connections are made through waterproof receptacle on side. Wt. 7/shpg. 15 lbs. **\$350.00**

No. 180. ASPIRATED AMBIENT TEMPERATURE AND DEW POINT SHIELD. A motor-aspirated shield designed to house a temperature probe and a lithium chloride Dewcel probe. The transfer of air within the double-walled section surrounding the temperature bulb, together with the highly reflective white paint, limits radiation errors to less than 0.2°F. A small detent and vent in the vertical section provide the proper agitation of air for the Dewcel. Overall dimensions of horizontal section 42"; height of vertical section 13"; operating temperature range -40/150°F.; power input 12 watts, 115v. 60Hz. Temperature sensor and Dewcel not included in price. Wt. 12/shpg. 20 lbs. **\$375.00**

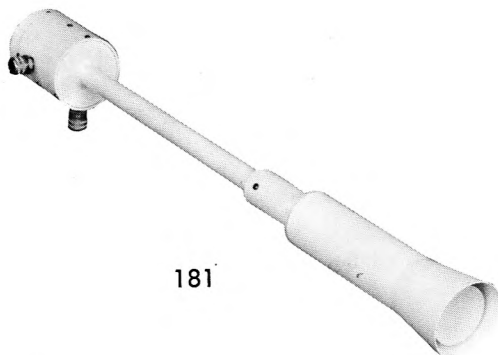


178



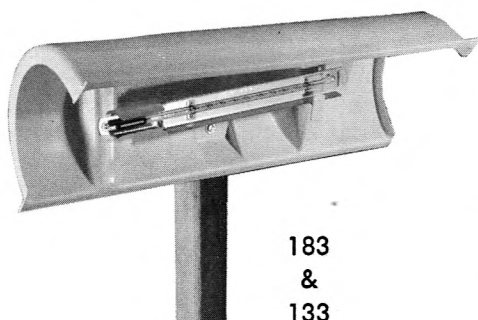
180

Radiation Shields



181

No. 181. MOTOR-ASPIRATED TEMPERATURE SHIELD. Like the Model 180, this radiation shield limits the error in ambient temperature measurements to less than 0.2°F. Three concentric cylinders, a baffle, and an aspirating motor are used to achieve this accuracy. The radiation shield can be oriented horizontally, or vertically, and mounting arrangements for the sensor can be altered to house thermistors, thermocouples, or resistance thermometers. Specifications: dimensions, 40" long, 4" diameter; power, 12 watts at 115v. 60Hz.; operating temperature range -60/150°F. Wt. 8/shpg. 14 lbs. **\$340.00**

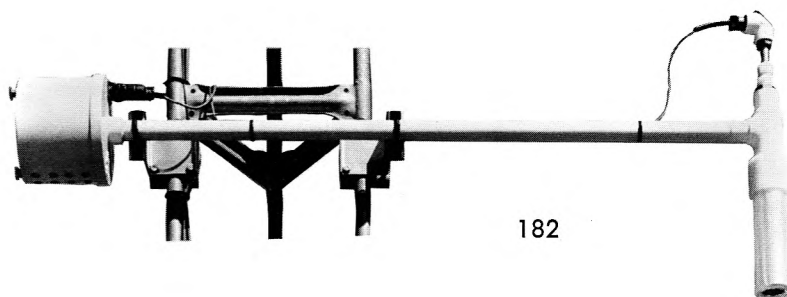


183
&
133

No. 182. GILL ASPIRATED TEMPERATURE-RADIATION SHIELD. A new, but proven design in temperature measuring shields, constructed to provide maximum sensor protection from incoming short-wave radiation, as well as outgoing long-wave radiation, and to provide high heat transfer from the ambient air to the sensor. The shield is a specially constructed double-wall glass tube, silvered on all interior surfaces, then evacuated and sealed—like a heavy duty vacuum bottle with an open bottom. Under maximum solar radiation conditions, the shield will maintain the sensor within 0.05°C. of true ambient temperature. The continuous duty blower, located at the opposite end from the glass shield draws approximately 15 fps of ambient air across the sensor.

A stainless steel protective tube accommodates most sensors up to 3/8" diameter and provides 2-4 minute time constant. Thermocouples, thermistors, or resistance thermometers can also be made to have faster response times without use of protective tube. Blower operates on 115v. 50/60Hz. at 7 watts. Overall length of assembly 46 inches. Shipped with universal type tower mounting brackets; in plywood storage and field carrying case. Wt. 8/shpg. 22 lbs. **\$196.00**

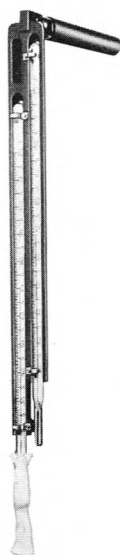
No. 183. THERMO-SHELTER, ORCHARD TYPE. An economical shelter designed for supporting thermometers: minimum thermometers, such as S. A. No. 133 and the special No. 135 for max.-min. temperatures. The Thermo-Shelter, recommended for agricultural applications and as a low-cost shelter for general use, it made from a molded, highly reflective, impact-resistant thermoplastic. It is mounted, facing north, on a user-supplied post at a height that will meet the requirements of the investigation. For free-air temperature, the standard height is 5 feet above ground. Good results have been obtained in comparisons with Cotton Region type shelters. Size: approx. 20" long x 8 1/2" wide. Wt. 1 lb./shpg. 3 lbs. **\$9.50**



182



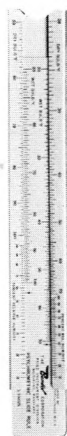
208



210



213



280



281

No. 208. SLING PSYCHROMETER. U. S. Weather Bureau Spec. 450.1016. Two matched thermometers, 9½ inches long, accurate to $\pm 0.3^{\circ}\text{F.}$ above 0°F. and $\pm 0.5^{\circ}$ below 0°F. , mounted on stainless steel backing. Hardwood handle attached through swivel to backing enables instrument to be whirled. Range: $-20/120^{\circ}\text{F.}$ with 1°F. graduations. Over-all length 12 inches. Complete with wick and psychrometric table. Wt. 8 oz./shpg. 3 lbs. Extra wicks \$1.00/doz. **\$9.00**

No. 208A. REPLACEMENT THERMOMETER. Shpg. 2 lbs. **\$3.00**

No. 208B. CARRYING CASE for No. 208. All-metal construction protects thermometers from damage when not in use. Over-all length 14 inches. Shpg. 2 lbs. **\$3.00**

No. 208C. Same as No. 208 with scale approx. $-30/45^{\circ}\text{C.}$ **\$11.00**

No. 210. SLING PSYCHROMETER. An improved model designed for ease and accuracy of reading and safe operation. Two thermometer tubes, nine inches in length, are protectively recessed in a gray enameled metal backing. Range: $20/120^{\circ}\text{F.}$ with 1.0° graduations. Rigid swivel handle folds out of way when not in use. Includes protective carrying case which contains spare wicks, tables, and instructions. Over-all length 12 inches. Extra wicks \$1.00/doz. Wt. 1/shpg. 3 lbs. **\$16.00**

No. 210A. Replacement Thermometer. **\$4.50**

No. 210C. Same as No. 210 with scale $5/50^{\circ}\text{C.}$ **\$16.00**

No. 213. POCKET SLING PSYCHROMETER. Convenient, small, pocket psychrometer. Two 5-inch mercury thermometers with easy-to-read yellow glass back cover range: $30/110^{\circ}\text{F.}$ in 1° graduations. Accuracy 1 division. Mounted on flanged aluminum back, with swivel handle connection for whirling. Attractive aluminum-reinforced leather carrying case $7'' \times 1\frac{3}{4}'' \times \frac{5}{8}''$. Recommended for use with No. 280 Slide Rule. Wt. 8 oz./shpg. 2 lbs. Extra wicks: \$1.00/doz. **\$10.00**

No. 213A. Replacement Thermometer. **\$2.50**

No. 280. RELATIVE HUMIDITY SLIDE RULE. Durable 6'' plastic rule quickly converts temperatures of dry and wet bulbs, over range of $20/100^{\circ}\text{F.}$, into per cent R.H., on scales graduated $10/100\%$. Wt. 2 oz./shpg. 8 oz. **\$1.75**

No. 280C. Same as above, graduated $-7/38^{\circ}\text{C.}$ **\$3.25**

No. 281. PSYCHROMETRIC CALCULATOR. Fabricated to U.S.W.B. specifications. Two circular plastic discs, with an over-all diameter of approx. $11\frac{1}{4}''$, convert wet and dry bulb readings into Relative Humidity and Dew Point. Scales on one side are for high temperature range: $-10/120^{\circ}\text{F.}$ On opposite side, low range: $-60/50^{\circ}\text{F.}$ Temperature graduations to $\frac{1}{2}$ deg., with R.H. to $\frac{1}{2}\%$ from 1 to 50% and 1% from 50 to 100%. For use at 30'' Hg. average station pressure. Wt. 1/shpg. 2 lbs. **\$20.00**

No. 281A. Same as above, fabricated to U. S. Navy specifications (Psychrometric Computer CP-165A/UM). A universal type calculator for use at average station pressures from 23'' to 30'' Hg. Scales for R.H. and Dew Point. **\$20.00**

Humidity & Temperature



215

No. 215. DIAL HYGROMETER. Rapid-responding Durotherm element usable from 32° to 230° F. actuates pointer on large five-inch dial face. Dial is graduated 0/100% relative humidity in increments of 1%. Accuracy 5% R.H. Attractive brass case with 6-inch diameter flange for mounting indoors. Wt. 8 oz./shpg. 3 lbs. **\$17.00**



216

No. 216. DIRECT READING HYGROMETER, LABORATORY TYPE. A convenient, easy-to-read instrument supplies accurate ambient humidity readings. Employs the Serdex animal membrane element with an accuracy of $\pm 1.5\%$ relative humidity from 15/95% at temperatures ranging from 32/130°F. Correction chart will be furnished on request for temperature application below 32°F. Dial has black background, white figures and graduations, and a red pointer. For instrument with flange adapter, designed for panel mounting in a $5\frac{1}{8}'' \times 4\frac{3}{8}''$ cut out, add \$6.00. Wt. 11 oz./shpg. 3 lbs. **\$88.00**

No. 216A. DIRECT READING HYGROMETER-THERMOMETER. Same as above, with additional pointer for temperature and scale reading 0/130°F. Accuracy $\pm 1^\circ\text{F}$. **\$99.00**



217

No. 217. DIRECT READING HUMIDITY-TEMPERATURE INDICATOR. A new instrument, hand-held and battery-operated, for direct reading measurements of Relative Humidity and Temperature—the “MINI-READER.” Although designed for portability, No. 217 can be adapted to fixed installations, desk or panel-mounted. This solid-state device with an operating range of 10/100% R.H. and 20/120°F. has many uses and applications in meteorology, medicine, air conditioning, and industry. Measurements may be made with the “Hygrosensor,” an advanced Dunmore-type sensor, in a storage position within the $5'' \times 4\frac{5}{8}'' \times 2\frac{7}{8}''$ housing, or with the sensor at the end of a 5' lead, external to the indicator. Two 9v. mercury batteries make up the main power supply; a miniature 1.34v. mercury battery is used as an internal reference. Accuracies: $\pm 3\%$ R.H., $\pm 2.5^\circ\text{F}$., with a slight reduction at extremes. Wt. 28 oz./shpg. 4 lbs. **\$172.50**

Accessories:	Spare pistol-grip handle	\$ 5.25
	Telescoping Wand for sensor	10.00
	Extra sensor with 5' Cable	53.25

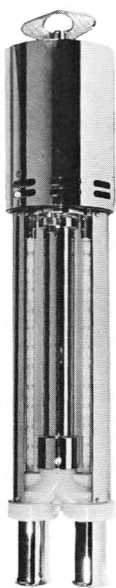
Aspirated Psychrometers



204



206



230

No. 204. PORTABLE THERMISTOR PSYCHROMETER. Miniature thermistor beads, with response time in the order of seconds, are used as sensors in this portable, battery-operated psychrometer, designed for an accuracy of 0.5% R.H. Range of instrument 29.5°/124.5°F.

An easy to use measuring device: press one button, start the aspirator motor and read dry bulb; in sequence, press a second button and read wet bulb. Relative Humidity and/or Dew Point values are obtained by reference to the Psychrometric Tables. The motor and fan pull air through the barrel and around the two thermistors. One bead is covered with a thin cotton wick which dips into the water container machined in the transparent block of the pistol. Changes in temperature cause large electrical resistance variations in the semi-conductor beads — an imbalance in the bridge circuit results, and temperature is read directly.

Two scales cover temperature range: 29.5/79.5°F. and 74.5/124.5°F., in 0.5° divisions. Accuracy $\pm 0.5^\circ\text{F}$. Pistol grip probe, with mercury battery installed, weighs 2½ lbs. Supplied complete: probe, indicator, extra wicks, psychrometric tables, instructions, and carrying case. Wt. 6/shpg. 8 lbs. **\$322.00**

Accessories: Spare wicks for wet bulb \$2.00/doz. Extra probes, miniature utility (thermistor in 0.094" x 0.5" stainless steel shield) with 10' length teflon cable, making No. 204 adaptable as general purpose thermometer. \$17.00 each.

No. 204C. Same as above with scales in °C.

\$322.00

No. 206. PSYCHRON. Designed to meet U. S. Weather Bureau Spec. No. 450.8113. The Psychron consists of a pair of matched wet and dry bulb mercury thermometers and a tiny electric fan powered by three standard size D flashlight batteries. Air is drawn through the removable air intake at a rate of more than 15 feet/sec.

The Psychron requires no whirling or special technique to obtain an accurate reading. At the flick of a switch, a steady aspiration is obtained, eliminating the danger of expensive thermometer breakage and human error. The Psychron has a built-in illumination system for use in the dark, and a special thermal shield to avoid radiation effects of sunlight.

Psychron thermometers are graduated: 10/100°F., with 10/110°F. and 30/120°F. optional at \$5.00 extra. Thermometers measure 8½ inches long with etched graduations for each degree. Matched thermometers accurate to 0.2°F. Psychron includes a metal carrying case, a psychrometric slide rule for quick calculations, a 1 oz. water bottle, wicks, and an instruction book with relative humidity, dew point, and vapor pressure tables. Batteries not included. Replacement thermometers \$10.00/pair. Wicks \$2.00/doz. Replacement fan assembly \$2.25. Wt. 3½/shpg. 6 lbs. **\$70.00**

No. 206C. Same as above, except with thermometer scales -15/45° C., and slide rule -7/38° C. **\$70.00**

No. 230. ASSMANN PSYCHROMETER. This psychrometer designed for an accuracy of $\pm 1\%$ R.H. has long been the standard for meteorological and laboratory wet and dry bulb measurements. It is constructed to the specifications of the British Meteorological Office MK 3. Two insulated type thermometers are employed as wet and dry bulbs. Air movement is forced past the bulbs at a rate of about 13 ft./sec. to insure proper ventilation. Radiation shields are included to minimize errors. Thermometer scale length is 6 inches; over-all length is 11 inches. Each instrument is supplied in a sturdy carrying case that holds all accessories securely in place. Range: 20/120°F. in 1° div. Other ranges, including scales in deg. C. available on order \$11.00 ea. Wt. 12/shpg. 16 lbs.

No. 230SW. Spring drive **\$205.00**

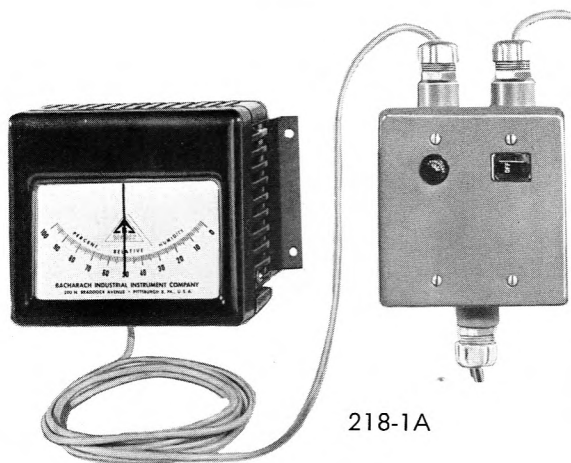
No. 230E. Electric drive, 110v., 60Hz. **\$165.00**

(on request, available for 200/250v. 50 Hz.).

Relative Humidity



218-1



218-1A



219

No. 218-1. NASSAU REMOTE HUMIDITY. A system for measuring and indicating humidity remotely, comprising a Sensor Unit, a Power Pack, and an Indicating Dial. The indicator, a 4" dia. case with a 5½" mounting flange, has black figures on a buffed aluminum background—it is one of a set, Nassau Weather Dials No. 975, matching in appearance for wall or panel installations.

The hygroscopic animal membrane responds to changes in relative humidity. Contraction and expansion moves the core of a differential transformer; the varying voltage is read on the meter scale, 0/100% R.H. Proper exposure of the 6" x 6⅝" x 4⅝" sensor case is important. Shelters Nos. 175 or 176, or a protected location, recommended.

Input to power pack, 4⅝" x 4⅝" x 2⅝", is 115v. 60Hz. System supplied with 100 ft. 4-cond. cable to Sensor, and 10 ft. 2-cond. cable to Indicator. With proper choice of cable, distance up to 9000 ft. accommodated. Accuracy: ±3% R.H. between 15% and 90% R.H. at temperatures from 32° to 130° F. Indicator case in brass, add \$5.00 for chrome finish. Wt. 9/shpg. 15 lbs. **\$375.00**

No. 218-1A. Same telemetering system as above, without indicating dial. Applications include recording and data logging, with sensor indoors or outdoors. Please specify. Signal output is 0.4–0–0.4 volts, with electrical zero at 50% R.H. Sensor impedance approx. 1000 ohms. Wt. 8/shpg. 14 lbs. **\$275.00**

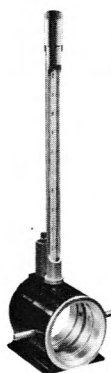
No. 219. RELATIVE HUMIDITY TRANSDUCER. A combination sensor and transmitter designed to supply a signal of 0/5.4v. dc, or a current output of approx. 0/150 ua, proportional to 0/100% R.H., in the range 10/99%, between 40/120°F. Voltage and/or current are available, depending on the selection of padding resistors by the user. This device has been designed to be compatible with the latest types of readout and data reduction equipment.

The Relative Humidity Transducer consists of eight cells—plastic coil forms with bifilar windings of palladium, covered with a coating of lithium chloride and/or lithium bromide—where the per cent of humidity determines the flow of 400Hz voltage across the windings. Model No. 219 is supplied with protective, weatherproof coverings over the cells to minimize damage due to condensation, but installation in a shelter is still essential. At the base of the transducer the circuitry includes an input voltage regulator, a transistor oscillator, a temperature compensating circuit, and the R.H. measuring network. Input requirements are broad: 8 to 32v dc at 30 milliamps. The sensor must operate with a readout device that has a minimum load of 200K ohms where voltage is measured, or a maximum of 1000 ohms where current is measured.

Instructions supplied include wiring diagrams for voltage and/or current outputs. Since all signals are high-level dc, no special cables are required. Any 4 or 5 conductors, 2 input and 2 or 3 output leads, depending on the signal selected, should be adequate for distances in the order of miles. A mating connector is supplied with the Transducer. Dimensions: 2¼ x 2¼ x 5¼ inches. Wt. 10 oz./shpg. 2 lbs. **\$484.00**

No. 219A. RELATIVE HUMIDITY TRANSDUCER. Same as above, except non-weatherproof model. A factory-installed mounting plate, 5-inch diam. circle for duct installations, available at an extra \$17.50. **\$362.00**

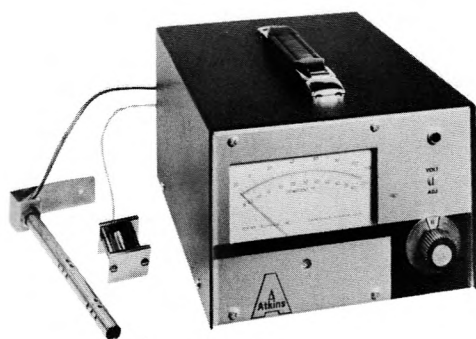
Dew Point



225

No. 225. DEW POINT APPARATUS. A compact, convenient instrument for quickly determining the dew point of a parcel of air. A thermometer passes into an ether chamber in front of which is a compartment to hold a sample of air. Air is drawn into the front chamber and by means of a hand operated aspirator bulb; the temperature in the rear chamber is lowered to the dew point by evaporating ether. Dew formation is easily detected on the mirror surface through the glass. Length of thermometer scale is $2\frac{3}{4}$ inches. Range: $0/90^{\circ}$ F. or $30/120^{\circ}$ F; specify one. Spare thermometers \$11.00. Size $6\frac{3}{4} \times 3 \times 1\frac{3}{4}$ inches. Wt. 7 oz./shpg. 2 lbs. **\$37.50**

No. 225C. Same as above with thermometer scale $-15/35^{\circ}$ C., or $0/50^{\circ}$ C. **\$37.50**

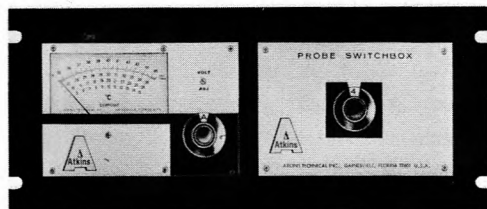


272

No. 272. DEW POINT AND TEMPERATURE MONITOR. A new, low-cost instrument is based on the established dew cell technique, incorporating thermistors as sensors and a miniaturized lithium chloride probe—with an option for recording without changes in the circuitry. Applications include studies in general meteorology, agrometeorology, and ecology, as well as industrial applications.

Both the dew point and temperature probes can be used with 2-cond. #18AWG extension cables to 1000', without affecting accuracy by more than 1%. Over-all accuracy of the dew point reading is $\pm 3^{\circ}$ F., repeatability is $\pm 1^{\circ}$ F. Although 90 minutes warm-up is recommended, the response time of the dew probe is 3 minutes. Accuracy of temperature readings is $\pm 2^{\circ}$ F.; repeatability, $\pm 0.5^{\circ}$ F. Standard scale ranges are $-20/80^{\circ}$ F. for dew point and $-20/120^{\circ}$ F. for temperature. Model No. 272 is supplied with dual inputs: one for dew point, and one for temperature; an output of 0-60 mv. is available for use with recorders having a minimum impedance of 100K ohms. Power requirements: 105/125v. 50/60Hz. Dimensions of indicator case, in inches: 7.7W x 5.4H x 11.5D. Dew point probe is $\frac{7}{16}$ " diameter aluminum shield, $7\frac{1}{2}$ " long. Temperature probe is $1" \times 1" \times 1\frac{1}{4}"$. Cable length of 10' with each probe. Add \$5.00 per probe, plus 7¢/ft. for longer lengths. Supplied complete with probes. Wt. 5/shpg. 10 lbs. **\$483.00**

No. 272A. Same as above, designed for six inputs, three temperatures and three dew points. Add cost of selected probes from "Accessories" to base price. **\$495.00**

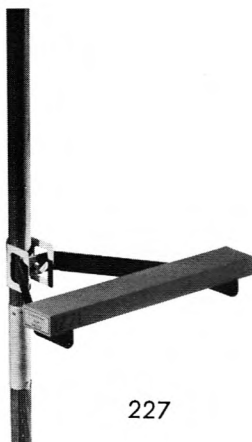


272A

No. 272B. Same as No. 272, except designed for single dew point probe input. Price includes probe. **\$405.00**

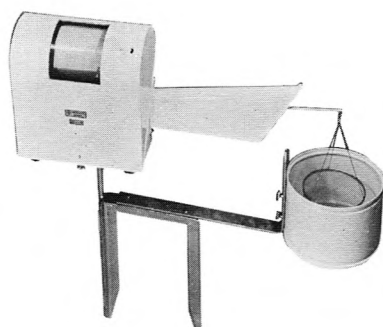
Accessories:	#P88-2 dew point probes	\$60.00 ea.
	#P88-3 air temperature probes	28.00 ea.

Dew



227

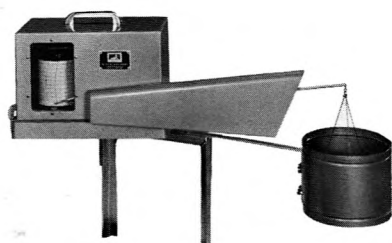
No. 227. DEW GAGE, Duvdevani type. This visual method of observing the amount and type of dew formation employs a specially treated wooden block whose surface is exposed at sunset. Block measures $12\frac{1}{2} \times 2 \times 1$ inches; weighs 5 oz. Dew forms on the surface in characteristic distribution of sizes and forms which are then compared with a special set of calibrated photographs. The conversion from the photograph number most nearly corresponding to dew appearance gives the equivalent of dew formation in grams/100 cm. or in millimeters of dew. A complete dew station consists of a dew block, a wooden support for proper exposure, a daytime protective shield, dew photo album, and a dew register pad. Extra blocks \$12.50 each. Wt. 5/shpg. 8 lbs. **\$45.00**



228

No. 228. RECORDING DEW BALANCE, Hiltner type. A round close-meshed sieve of 100 sq. cm. surface, suspended from a beam, receives deposits of dew. Thus the inclination of the beam is affected by dew formation, and this movement is transmitted to a recording lever. The beam is provided with knife-edge bearings and a temperature compensating dampening oil chamber. The recording lever traces a continuous line on the chart; the maximum amount and time of dew formation can be read from the chart. Changes due to precipitation or evaporation can thus be easily determined and eliminated. Charts measure 11.2×3.2 inches and are graduated 0/5 grams, so that the 100 graduations permit readings to 1/20th gram of dew. Recording period is 7 days. Extra charts, weekly, \$5.00/54. On special order, a 24-hour period can be provided. Dimensions: $10 \times 9 \times 5$ inches. Wt. 13/shpg. 17 lbs. **\$462.00**

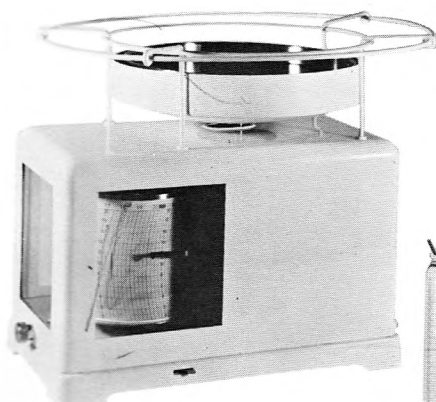
Accessories:	Extra gears, weekly or daily	\$5.00/set.
	Daily charts	\$8.00/100.
	Pens	\$6.00/set of 5.



229

No. 229. DEW BALANCE RECORDER. An instrument similar in design to the Hiltner type, except that the balance beam assembly incorporates ball bearings, a restraining spring, and a fixed piston-rotating cylinder damping unit which operates with a film of Silicone oil, unaffected by most temperature changes. Dew is measured by weight, on a 100 sq.cm. close-meshed nylon sieve, in the range from 0 to 5.0 gms., with a sensitivity of 0.05 gms. A cylindrical wind shield surrounds the dew collector, limiting spurious oscillations. The recording period is weekly, from an 8-day, spring-wound chart drive. Size: 25" long, $10\frac{1}{2}$ " high, 9" deep. Supplied complete with "U"-shaped support that is driven into ground. Also, clock and drum, ink, set of 100 charts, and instructions. Spare charts \$5.00/100. Wt. 25/shpg. 37 lbs. **\$290.00**

Evaporation Soil Moisture



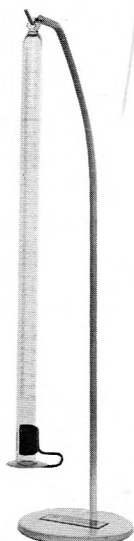
248

No. 248. RECORDING EVAPORATION GAGE. A metal pan with an evaporation surface of 250 sq. cm. rests on a spring-loaded needle bearing. Through a pen arm this records on a chart which makes one revolution in 24 hours. Recording period 7 days. Measuring range: 0/20 mm. water. Case dimensions: 11 x 5 1/2 x 7 3/4 inches. Extra charts \$5.00/54; pens \$6.00/set of 5. Wt. 7/shpg. 11 lbs. **\$373.00**



290(1)A

No. 249. PICHE EVAPORIMETER. A graduated cylindrical tube of glass has one end closed and the other end is covered by a disc of porous paper. When filled with distilled water and hung vertically, the amount evaporated is indicated on a 0/30 ml. scale graduated on the tube. Complete with perforated metal clip, stand, and 200 filter paper discs, B-3 quality, 30 mm diameter. Additional filter paper discs \$1.00/200. Wt. 1/shpg. 3 lbs. **\$12.50**



249

No. 290(1). COLMAN SOIL MOISTURE EQUIPMENT. An improved design of an instrument developed at the California Forest and Range Experiment Station. Soil moisture content is determined by measuring the temperature-corrected resistance of an electrode sandwich cell. Applications include indications of freezing and thawing in soil and snow; also, soil moisture tension.

Many soil moisture cells can be read from one meter. Each sensor is made of two monel metal screens, wrapped in a processed fibreglas binding and encased in perforated stainless steel covers. A small thermistor is included in the assembly that measures 1" x 1 1/2" to complete this two-circuit, three-wire unit. Standard leads, neoprene covered, are 6 ft. long. Add 10¢/ft. for longer lengths.

No. 290(1)A. Soil Moisture Meter, 90 Hz a.c. meter, portable stainless steel case 8 1/2 x 6 3/4 x 5 1/4", batteries and instructions. Wt. 6/shpg. 12 lbs. **\$210.00**

No. 290(1)B. Soil Moisture Cells, with built-in thermistor, 3-cond. leads, 6 ft. long. Wt. 1/6/shpg. 1 lb. **\$8.00**



290(1)B

No. 291. DELMHORST SOIL MOISTURE TESTER. A small, hand-held meter, incorporating a transistorized circuit, for measuring soil moisture. Two standard penlight cells furnish the power for indicating on a 0/200 scale the A.C. resistance of cylindrical gypsum blocks. The readings are easily converted to moisture tension, as low as 0.2 of a tension bar, or into per cent of available moisture. Meter case measures 3" x 5" x 1 1/2". Cylindrical gypsum blocks of an improved design measure 7/8" diam. x 1 1/8" long. Stainless steel concentric electrodes free measurement from soil conductivity; A.C. measurements eliminate error due to polarization. Wt. 1/shpg. 3 lbs.

No. 291A. Delmhorst Soil Moisture Tester **\$100.00**

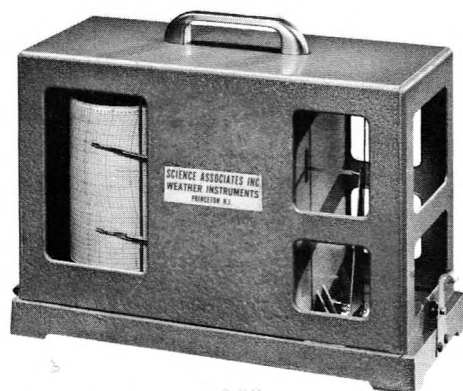
No. 291B. Cylindrical Gypsum Soil Blocks, with 2 lead wires 7' long (for longer leads add 5¢/ft.) **\$24.00/doz.**



291A

291B

Hygrothermographs



255

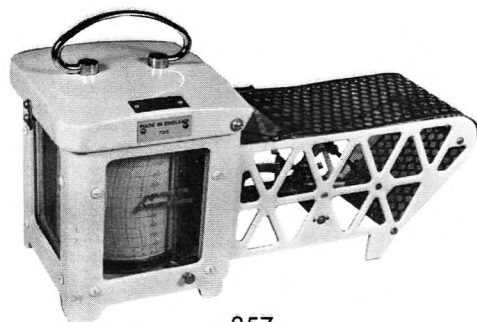
No. 255. HYGROTHERMOGRAPH. U.S.W.B. Spec. No. 450.8202. Makes a dual record of both temperature and humidity on the same curvilinear chart. The temperature-sensitive element is a highly polished, gold or chrome plated, bourdon tube; the humidity element is a multiple strand of specially treated, hygroscopic human hairs. Through a system of linkages these elements operate individual recording pens. Temperature is traced on the upper two-thirds of the five-inch chart; humidity readings occupy the lower third. For outdoor measurements hygrothermograph should be exposed in a standard No. 176 Instrument Shelter. Relative humidity—scale 0/100% with an accuracy of 3% R.H. between 20/80%; 5% at extremes. Temperature range adjustable, covers $-30/110^{\circ}\text{F.}$ with spans of 100°F. Temperature accuracy $\pm 1^{\circ}\text{F.}$ Charts available for $-30/70^{\circ}\text{F.}$; $10/110^{\circ}\text{F.}$; or $-12/43^{\circ}\text{C.}$ —specify one. Charts measure $11\frac{1}{2} \times 4\frac{1}{4}$ inches. Standard recording period 7 days; 1-day period available when specified. Recording mechanism with 8-day spring-wound clock mounted on metal base and inclosed in a hinged case. Available with battery-powered chart drive, weekly or daily, at additional cost. Dimensions: $12\frac{1}{4} \times 5\frac{3}{4} \times 9\frac{3}{4}$ inches. Complete with 100 charts, pen, ink, and instructions. Wt. 12/shpg. 17 lbs. **\$230.00**

No. 255A. Same as No. 255, Bendix design. **\$245.00**

No. 255-31SW. HYGROTHERMOGRAPH. Similar to No. 255 except with 31-day spring-wound chart drive. Daily travel approx. $\frac{5}{16}$ ". Supplied with 25 monthly charts. **\$255.00**

No. 255-31BP. HYGROTHERMOGRAPH. Same as No. 255 except with battery-powered chart drive for 31 days. **\$268.00**

Accessories: Additional charts: No. 255D (1-day) \$5.00/100; No. 255W (7-day) \$5.00/100; No. 255-31 (31-day), universal scale, \$5.00/25. State range desired for all charts, see above. Change gears: 1-day or 7-day, \$4.75/set; 31-day, \$5.00/set. Ink, purple, \$2.25/1 oz. bottle. Pens \$1.60. Hair element \$7.50. Chart drives: spring-wound for 1-day or 7-days \$80.00; battery-powered for 31-days \$86.00. Prices somewhat higher for accessories used with No. 255A.



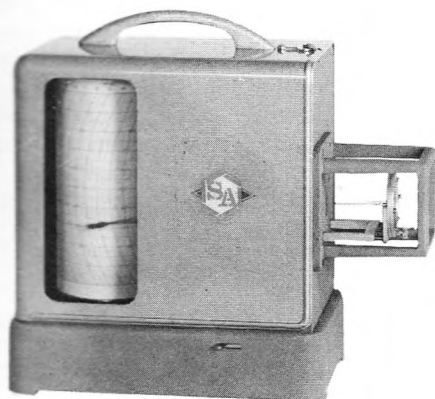
257

No. 257. HYGROTHERMOGRAPH. This compact and low-cost instrument records temperature and relative humidity on a single chart. Pens and arms are of different lengths; they can pass each other separated by $\frac{1}{4}$ " on the time scale. Temperature, measured by a bi-metallic strip, is recorded in purple ink to an accuracy of $\pm 1^{\circ}\text{F.}$ Relative humidity, measured by a human hair element and linearized, is recorded in green ink to $\pm 3\%$ between 20 and 80% R.H. Temperature range may be varied according to seasonal requirements in spans of 100°F. from $-50^{\circ}/180^{\circ}\text{F.}$ by turning adjusting screw. Spring-driven, 8-day chart drive for 7-day recording period; 1-day recording available with change of gears, specify when ordering. Complete with pen, ink, and 100 charts; ready for operation. Size: $14 \times 6 \times 6\frac{1}{2}$ inches. Wt. 7/shpg. 10 lbs. **\$135.00**

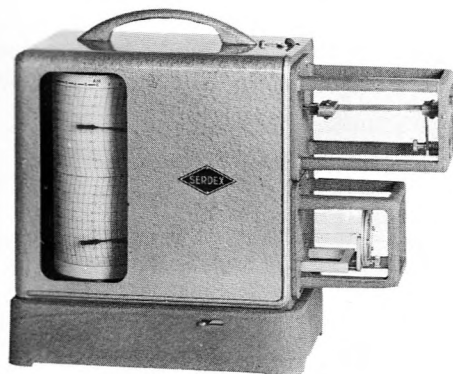
No. 257-31SW. Similar to above except with 31-day chart drive, spring-wound (SW), once-a-month winding, with 25 charts, pen, and ink. **\$155.00**

Accessories for No. 257: Extra charts, daily or weekly—257D, 257W—\$5.00/100; 257M—\$5.00/25. Pens (long for humidity, short for temperature)—\$1.00/each. Ink (purple for temperature, green for humidity)—\$2.25/oz. Chart drive assembly: 8-day movement \$35.00, 31-day movement \$50.00. Change gears, daily or weekly, \$2.00/set. Hair element for humidity \$5.00. Bi-metal temperature element \$2.50.

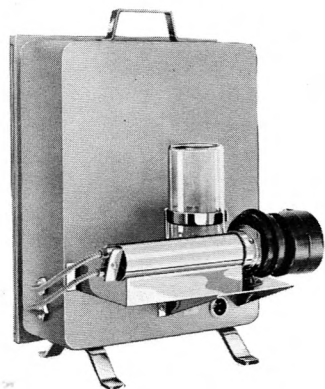
Humidity Recorders



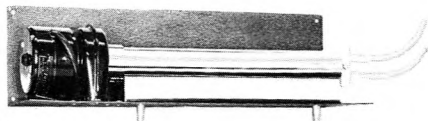
253



254



270-P



270-W (trough)

No. 253. MICROHYGROGRAPH. An instrument which employs the Serdex animal membrane humidity sensitive diaphragm to record relative humidity on an expanded scale: 100 divisions over six inches of chart. Accuracy $\pm 3\%$ R.H. in the range between 15/95% R.H. at temperatures 32/135°F. Correction chart furnished on request for low temperatures below 32°F. Instrument has an operating range -35/135°F. Recording period 24 hours on a 12" horizontal chart. Complete with ink and charts. Dimensions: 12 x 12 x 6". Wt. 10/shpg. 15 lbs. Additional charts \$5.80/100. **\$371.00**

No. 254. HYGROTHERMOGRAPH. A portable case, drum type hygrothermograph with temperature and relative humidity recorded on 3-inch curvilinear chart sections, one above the other. Recording period is 24 hours, or seven days—spring drive—specify one.

Relative humidity measured by Serdex animal membrane to an accuracy of $\pm 3\%$ in the range from 15% to 95% at temperatures from 32° to 130°. Correction chart furnished for temperatures below 32°F. The temperature element is a bi-metal type with an accuracy of $\pm 1^\circ\text{F}$. Charts available: for 24 hour rotation 0/100°F.; for 7-day rotation 0/100°F., or -10/50°C. All charts cover 0/100% R.H. Spare charts \$5.80/100. Dimensions: 12" x 15" x 6". Wt. 11/shpg. 18 lbs. **\$360.00**

No. 270. RECORDING PSYCHROMETER. A two-pen mercury-actuated, capillary-connected, recorder for dry bulb and wet bulb measurements. Relative humidity, dew point, and Temp.-Humidity Index can be determined from tables and/or calculated. The latter is determined from the relationship: $\text{T.H.I.} = 0.4(\text{T}_d + \text{T}_w) + 15$.

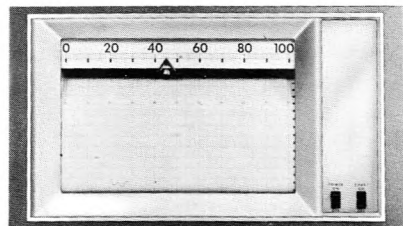
Illustration shows portable case recording psychrometer, case compensated for temperature, 10" circular chart, with bottle feed, A.C. motor-driven fan on water trough. Wall-mounted recorder supplied with detached trough and aspirator. Choice of chart drives available: hand-wound or electric. If continuous water supply is available, recommend water trough with motor-driven fan and bulb housing, less bottle, as in No. 270-W below. Supplied with 100 standard charts 0/150°F., (or °C.) 2° div.

No. 270-P. Portable Case, 10" chart, 2-pen recording psychrometer, water trough, 115v, 60 Hz. motor driven fan, 16 oz. bottle, hand-wound chart drive, daily rotation is standard; electric chart drive at no additional cost. **\$416.00**

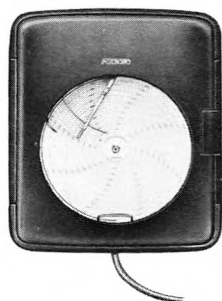
No. 270-W. Wall Mounted Case—as above, with 5ft. lengths of capillary tubing to wet and dry bulbs, continuous water feed trough, 115v. 60 Hz. chart drive, weekly rotation. For daily chart drive deduct \$12.50. **\$409.00**

Accessories: Charts \$4.25/100; red ink \$4.00/8 oz.; blue ink \$6.00/8 oz. Spare wet bulb wicks \$1.50/3; replacement 16 oz. bottle \$3.00. For longer capillary lengths specify: stainless capillary with stainless steel interlocked spiral armor, add \$1.60/ft.

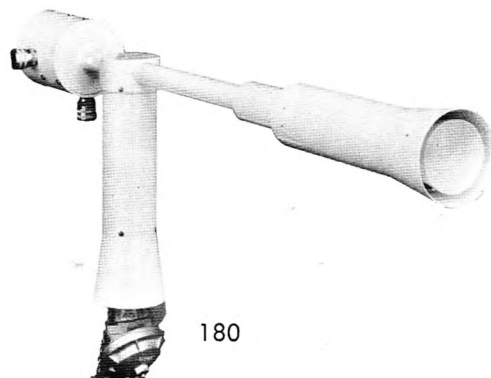
Dew Point and Temperature Systems



261 (1)



262



180

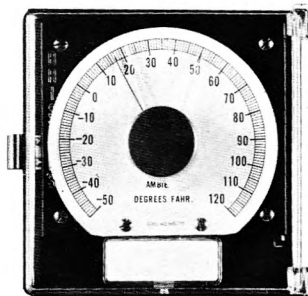
No. 261(1). DEW POINT AND TEMPERATURE RECORDING SYSTEM. New multiprinting strip chart recorder for dew point and ambient air temperatures. Designed for meteorological applications, four contrasting color dots print at intervals of 30 seconds: one for dew point, two for temperature, and one fixed resistance corresponding to a reference temperature of 32°F. Reference point can be converted later.

Measuring circuit is continuously balanced D.C. Bridge with solid state amplifier. Requires 115v 60 Hz. Strip chart is 12¼" wide, calibrated uniformly -50/110°F. over width of 11". Chart length of 120 ft., moving at 3"/hr. lasts 20 days. Dimensions of table top case with tuck-away door: 19" wide, 11 1/16" high, 15 5/8" deep. For rack or panel mounting with gasketed door, deduct \$20.00. Temperature sensors, nickel wire encased in corrosion-proof thin gage stainless steel are 0.27" dia., 3" long. Three lead probes designed to fit Aspirated Solar Radiation Shield No. 174; dew point sensor can be installed in No. 176 Instrument Shelter, or both sensors in No. 180 Aspirated Shield.

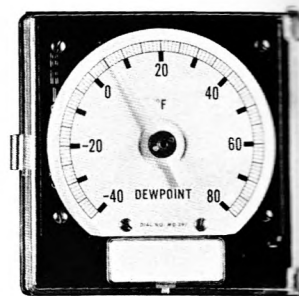
Complete system No. 261(1) includes: four-point recorder of gray finish, Dewcel assembly, two nickel wire temperature bulbs, roll of chart paper and ink. Cable for temperature: three-conductor, 18 gauge, shielded, heavy duty, 35¢/ft. Cable for Dewcel: 5-conductor, 20 gauge, shielded, 45¢/ft. Chart Roll No. 261M, marked -50/110°F., 3"/hr., \$4.25 each. (Recorder available for up to 24 points; printing intervals from 2 to 60 sec.). Wt. 70/shpg. 125 lbs. **\$2,155.00**

No. 262. DEW POINT AND TEMPERATURE SYSTEM, capillary type. Employs Dewcel and temperature bulb with two fully-compensated thermal systems and pens: one for dew point, the other for temperature. Chart calibrated in alternate sectors: dew point (-30/90°F.) temperature (-38/+150°F.). Other ranges available. Each sensor supplied with 10 ft. capillary; additional capillary up to 100' at time of manufacture: \$5.50/5 ft. for each sensor. Wt. 50/shpg. 60 lbs. **\$601.00**

No. 224. HYGROTHERMOMETER. Dew Point and Temperature Indicators. A U. S. Weather Bureau system for indicating temperatures and dew points; can be used for distances in excess of 500 ft. Temperature range: -50/120°F.; dew point: -40/80°F. (Alternate ranges: Temp. -50/150°F.; D.P. -20/80°F.). Relative humidity and vapor pressure readily determined from psychrometric charts. A D.C. Bridge circuit is employed for signal transmission over long distances without loss of accuracy: ½% of scale. Matching indicators measure 5 x 5 1/8 x 2 1/4 inches, and fit a panel cut-out of 4 1/8 inches square. Power requirement 115v. 60 Hz. Resistance-type temperature sensor and Dewcel sensor can be located in a standard instrument shelter, or preferably in No. 180 Thermal Shield, Motor-Aspirated type. Max./min. pointers on dials available, \$95.00/dial extra. Shields and shelters are extra. Wt. 50/shpg. 70 lbs. **\$1,750.00**



224



Thermoelectric Dew Point System

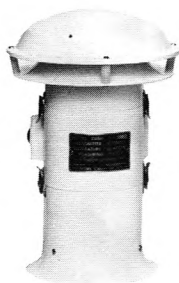
Each instrument described in this group incorporates the same fundamental and self-checking measurement technique: a thermoelectric cooler reduces the temperature of a polished mirror surface to the saturation temperature or dew point. The dew point is detected optically as an abrupt change in the direct light and the scattered light level. A proportional control signal developed from this arrangement permits the mirror to track continuously the dew point, independent of mirror contaminants since particulates cause little optical scattering compared to a dew deposit. The mirror contains a precision resistance thermometer, permitting its temperature to be determined to a high degree of accuracy.



263
263 (A)

No. 263. THERMOELECTRIC DEW POINT HYGROMETER. A general purpose, lightweight, and portable water vapor measuring instrument which utilizes a precision thermistor element for sensing the temperature of the dew point on scales that read $-40/120^{\circ}\text{F.}$ and $-40/50^{\circ}\text{C.}$ The sensor is normally attached to the rear of the $8\frac{5}{8}''\text{W} \times 6\frac{1}{2}''\text{H} \times 12\frac{3}{8}''\text{L}$ case, but it may be removed and located up to 100 ft. To assure representative readings the sensor should be exposed to a flow rate between 0.5 and 5.0 CFH. A 0/50 mv dc non-linear output signal, corresponding to scale readings, is available for use with a high impedance (100K ohms) potentiometric recorder, or for data logging applications. Additional specifications: accuracy $\pm 1.5^{\circ}\text{F.}$; sensitivity $\pm 0.1^{\circ}\text{F.}$; pressure 0-60 psia, depression 80°F. ; response $4^{\circ}\text{F./sec. max.}$; power $115\text{v} \pm 10\%$, 50/70Hz. Wt. 12/shpg. 25 lbs. **\$975.00**

Accessories: Remote mounting Kit—25' sensor extension cable and sensor heat sink bracket, \$110.00; remote sensor extension cable—available in 25' lengths up to 100' max., each 25' length has mating plugs and connector, \$55.00/25'; sample system kit—a neoprene vacuum pump (12-18 psia) and variable area flowmeter with tubing and fittings, \$195.00; DC/AC inverter for battery operation—a 12v dc negative ground input, 120v ac, output 300w, all transistorized, \$195.00; ambient temperature thermistor—1000 ohm thermistor in $4\frac{1}{2}''$ long stainless steel sheath, $\frac{1}{8}$ npt compression fitting, and 10' cable, \$95.00; spare dew point sensor, \$395.00; auxiliary cooling jacket—for increased depression (typically $15\text{-}20^{\circ}\text{F.}$), $\frac{1}{4}$ gpm at 150 psig max., can only be used with remote mounting kit, \$50.00.



179

No. 263A. THERMOELECTRIC DEW POINT or TEMPERATURE SYSTEM. The same basic indicator as in No. 263, with a dew point sensor and an ambient temperature thermistor mounted in a No. 179 Aspirated Sensor Enclosure. A 25' length of cable connects the aspirated enclosure to a junction box which is equipped with a power switch and a dew point/ambient temperature selector switch. For recording or telemetering, one measurement at a time, a single 0/50 mv dc output signal is available from terminals on the indicator box. Wt. 25/shpg. 40 lbs. **\$1,990.00**

Thermoelectric Dew Point System

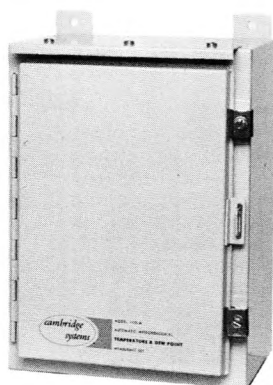


264



No. 264. THERMOELECTRIC DEW POINT/TEMPERATURE INDICATOR. This aerospace-designed system incorporates a compact indicator case/power supply/control amplifier and a miniature motor-aspirated thermally shielded enclosure. The case with a wide scale, taut-band meter calibrated with dual scales, $-100/20^{\circ}\text{F.}$ and $0/120^{\circ}\text{F.}$, measures $9'' \times 8'' \times 12''$. Switching from dew point to temperature is accomplished by turning the knob on the panel. Thermistors, aspirated at a rate of 400 fpm, both for ambient temperature and dew point are located in the $6'' \times 2''$ sensor unit. Interconnecting cable, 15' long with connectors, is also supplied.

Power requirement, 115v ac, 50/1000 Hz, 40 watts; dew point accuracy, $\pm 1^{\circ}\text{F.}$ between $-20/160^{\circ}\text{F.}$, frost point accuracy decreases to $\pm 3^{\circ}\text{F.}$ at -70°F. ; temperature accuracy, $\pm 1^{\circ}\text{F.}$ entire scale. A non-linear 0/50 mv output available for readout into 100k ohms or greater. Wt. 25/shpg. 35 lbs. **\$2,375.00**



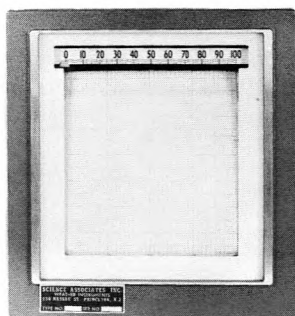
265

179



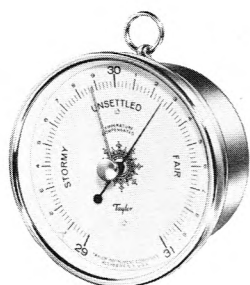
Aspirated
Enclosure

No. 265. METEOROLOGICAL TYPE THERMOELECTRIC DEW POINT AND TEMPERATURE SYSTEM. The most advanced humidity instrumentation available for continuously monitoring environmental atmospheres. This fundamental humidity standard covers a range of $-80/120^{\circ}\text{F.}$, with an accuracy to $\pm 0.5^{\circ}\text{F.}$ Measurements are made with platinum resistance elements, traceable to the National Bureau of Standards. Both sensors, for dew point and temperature, are housed in an aspirated enclosure of modular design, built to MIL specifications. A complete measuring system consists of an aspirated enclosure, approx. $8'' \times 13''$, with sensors; a weathertight and wall-mounted control unit, approx. $16'' \times 12'' \times 8''$, containing the necessary power supplies and signal conditioning equipment; 50' of interconnecting cable with connectors (200' is max.) between aspirator and control unit, and a high-low integral calibration unit. Dual linear 0/50 mv dc outputs are provided for both dew point and temperature, for use with a high impedance, 100k ohms, readout. Specifications: accuracy $\pm 0.5^{\circ}\text{F.}$; response $4^{\circ}\text{F./sec max.}$; sensitivity $\pm 0.1^{\circ}\text{F.}$; aspiration flow rate 60 CFM; power requirements 115v ac $\pm 10\%$, 50/70 Hz, 125w; lightning and surge protection is provided. Wt. 80/shpg. 125 lbs. **\$4,535.00**



265A

No. 265A. RECORDER, DEW POINT/TEMPERATURE. A multi-print wide chart, 0/50 mv potentiometric recorder with scale and chart markings covering $-80/120^{\circ}\text{F.}$, 100 equal divisions over 10". For use with No. 265 System, supplied with 2 points, printing at 6 sec. intervals. Dots appear as continuous lines, red and black, with an identifying number every 24th print. Chart length is 90'; at 2"/hr. lasts about 44 days. Power requirements, 120v 60/50 Hz, 60 va. Panel-mounted case, gray finish, $15''\text{W} \times 12''\text{H} \times 13''\text{D.}$ (For fluorescent illumination add \$30.00). Wt. 45/shpg. 53 lbs. **\$1,450.00**



303

No. 303. WEATHER BAROMETER. Brass case type with magnified pointer movement. Graduations to 0.02"; black numerals on a white five-inch dial over a range of 29/31", for sea level settings up to 10,000 ft. Weather words shown: Stormy, Unsettled, Fair. Adjustable pointer for comparative readings. Over-all diameter 5½ inches; thickness 2½ inches. Has ring for hanging. Wt. 1/shpg. 3 lbs. **\$32.00**

No. 303MM. Same graduated in inches and millimeters without weather words. Not available with millibars. **\$32.00**



306MB

No. 306MB. METEOROLOGICAL BAROMETER. U. S. Weather Bureau type. Contains best quality movement, temperature compensated. Open-face off-white dial has double scale with graduations to 0.02" and to one millibar. Adjustable pointer for comparative readings. Over-all diameter 5½ inches; thickness 2½ inches. Has ring for hanging. For use between sea level and 3,500 feet. Wt. 1¼/shpg. 4 lbs. **\$59.00**

No. 306A. METEOROLOGICAL BAROMETER for medium altitudes. Same movement as No. 306MB, but for use between 2,000 and 6,000 feet. Graduated inches only 23/29", or in inches and millimeters. **\$59.00**

No. 306B. METEOROLOGICAL BAROMETER for high altitudes. Same as No. 306A but for use between 4,900 and 9,500 feet. Graduated in inches only 20/26". **\$59.00**



309

No. 309. NAVY TYPE BAROMETER. Attractive case of heavy spun brass has large flange 6¾ inches in diameter with three grommets for easy mounting to wall or panel. Graduations to 0.02" from 26/31" for use at altitudes from sea level to 3,500 ft. Also available for higher altitudes. Dial contains traditional weather words: Rain, Change, Fair. Wt. 2½/shpg. 5 lbs. **\$68.00**

No. 309MB. NAVY TYPE METEOROLOGICAL BAROMETER with scale graduated in both millibars and inches, but without weather words. For use sea level to 3,500 ft. **\$68.00**



310

No. 310. ANEROID BAROMETER. One of a set of matching Nassau Weather Dials—S. A. No. 975, available in brass or chrome. Temperature-compensated aneroid movement calibrated in millibars and inches for use between sea level and 3,500 ft. Black numbers on buffed aluminum dial (or white on black background) cover range of 920/1067 mbs. in one mb. div., and 27.5/31.5" in .02" div. Adjustable reference pointer easily reset for determining trend of change in atmospheric pressure. Case dimensions: 4" across dial face, 5½" mounting base, 2½" deep. Brass case. For case finished in chrome add \$5.00. Wt. 1½/shpg. 4 lbs. **\$75.00**

Precision Aneroids—Altitude Barometers



313

No. 313. PRECISION MICRO BAROMETER. This aneroid makes use of a unique design in barometry, employing the null or zero-gauging principle that removes frictional parts common to the usual barometer. Fully compensated for temperature. The indicating needle is knife-edged for precision readings. Graduations to 0.001" are etched on nickel bronze dial. Pointer revolves in four concentric scale circles from 24.80" to 31.00". Wall mounting with 8" flange and depth of 4". Portable model in leather carrying case available at same cost. Wt. 5½/shpg. 8 lbs. \$390.00



345

No. 314. PRECISION MICRO ALTIMETER. Similar to above, but graduated in feet from -1,000 to +5,000 feet. Graduations to one foot. Models to 10,000 and 15,000 feet. With leather carrying case. \$390.00

No. 314M. PRECISION MICRO ALTIMETER. As above, but with scale 0 to 5000 meters with one meter interval. \$390.00

No. 345. PRECISION METEOROLOGICAL BAROMETER. A quality barometer that employs the zero-gauging principle to insure precision reading. Double scale graduated from 26/31.2" and from 880/1055mb. with index pointer showing rising (+) or decreasing (-) trend. Graduations to 0.5mb, and 0.01". Polished chrome case with flange 5½" diameter. Dial has 5" diameter, depth 3½". Wt. 36 oz./shpg. lbs. \$330.00



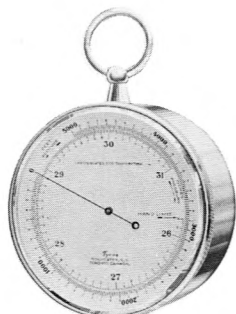
316

No. 316. WATCH ALTITUDE BAROMETER. Polished chrome case contains precision barometer movement compensated for temperature. Dial diameter is 1½ inches. Scale graduated in inches of mercury for use as a barometer and contains an additional revolving scale graduated in feet for use as an altimeter. Each instrument supplied with a test certificate. Furnished with plush-lined carrying case, two inches in diameter.

No. 316-9. Range 9,000 ft. with 50 ft. graduations. \$67.00

No. 316-12. Range 12,000 ft. with 100 ft. graduations. \$67.00

No. 316-16. Range 16,000 ft. with 100 ft. graduations. \$67.00



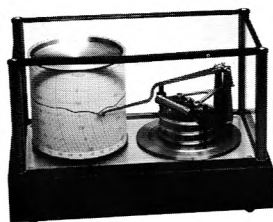
340

No. 340. ENGINEER'S ALTITUDE BAROMETER. Chrome-plated brass case with 3-inch diameter dial graduated in inches of mercury and in feet of altitude, reading to 6,000 feet in 20-foot graduations. Scale can be rotated. Leather case has velvet lining. Wt. 1/shpg. 4 lbs. \$135.00

No. 340-10. Reading to 10,000 feet in 50-foot graduations. \$135.00

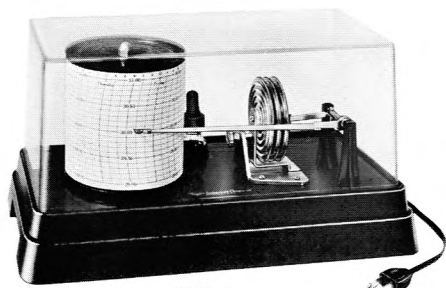
No. 340-15. Reading to 15,000 feet in 50-foot graduations. \$135.00

Barographs



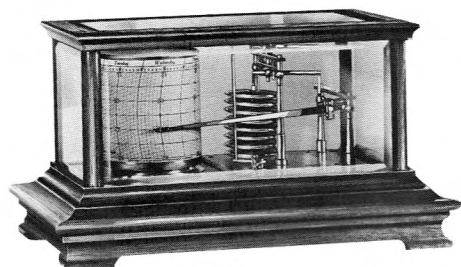
350

No. 350. ELECTRO BAROGRAPH. A compact recording barometer for the amateur meteorologist, with some innovations that make maintenance and operation easy. The chart drum is activated by a readily available 1.5v. battery, easily installed in the base; the three aneroid cells, linkage, and pen arm rotate as a unit in order to change the pen position and the flow of ink to the $2\frac{3}{4} \times 9\frac{1}{2}$ " chart, printed for 28/31" Hg. Complete with instructions, battery, 1 year supply of weekly charts, and ink. Wt. 3/shpg. 5 lbs. **\$94.00**



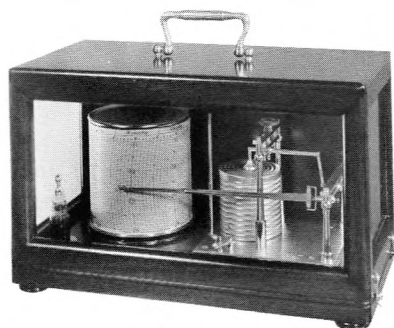
351-1

No. 351-1. ELECTRIC MAGNI-BAROGRAPH. A new aneroid magni-movement comprised of three extra-sensitive cells now permits 50 per cent more pen movement for a given barometric change than in former models. Amateur weathermen now have a low-cost barograph which permits them to follow small changes in barometric tendency. The color-banded chart is graduated 29/31 inches of mercury on a chart measuring 3 inches vertically. Recording period is 7 days. A simple thumbscrew adjustment permits use at any altitude from sea level to 10,000 feet. Attractive black plastic base has a clear plastic cover. An electric chart drive operates from 115v. 60cy. house current. Dimensions: 12 x 6 x $5\frac{1}{4}$ inches. Supplied with 13 weekly charts, ink, and complete instructions. Additional charts, No. 35, \$4.50/52. Wt. 5/shpg. 7 lbs. **\$72.00**



352

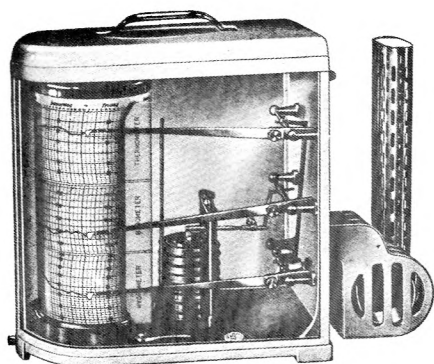
No. 352. DELUXE BAROGRAPH. This attractive recording barometer is ideal for display in the home or office. A multiple diaphragm movement, compensated for temperature, insures sensitivity and precision. The polished mahogany case has top and sides of beveled glass and a convenient drawer for holding charts. Recording period of jeweled-clock movement is seven days. Charts, measuring $3\frac{3}{4}$ inches vertically for pressure and $11\frac{1}{2}$ inches horizontally for time, are graduated 28.00/31.00 inches or 950/1050 millibars; specify one. Complete ready to operate, with ink and 52 charts. Dimensions: $14\frac{1}{2} \times 8\frac{3}{4} \times 8$ inches. Wt. $13\frac{1}{2}$ /shpg. 20 lbs. **\$225.00**



353

No. 353. UTILITY BAROGRAPH. This portable unit contains the same high quality pressure element and accurate recording mechanism as No. 352, but has plain case with solid top and back. Three glass panels at front and sides for maximum visibility. This type is favored for marine installations because entire instrument may be suspended by handle suspension spring to eliminate vibration effects. Size: 12 x 7 x 6 inches. Wt. $10\frac{1}{4}$ /shpg. 15 lbs. **\$203.00**

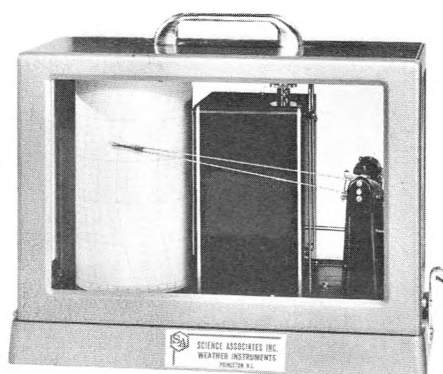
Accessories for Nos. 352 & 353—Weekly charts, inches or millibars \$4.50/52. Pen \$1.50. Ink \$1.00/1 oz. Complete pen arm \$1.50. Chart drive & drum \$37.50.



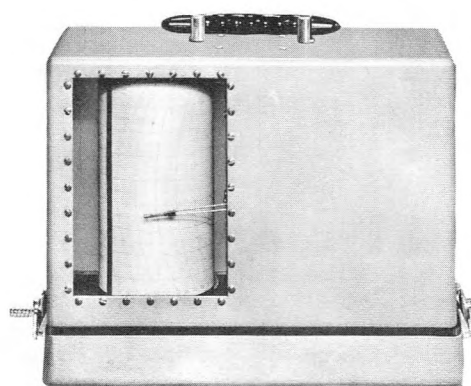
362

No. 362. METEOROGRAPH—baro-thermo-hygrograph. Combined recording of ambient air pressure, temperature, and humidity on the same chart. Separate scales are stacked vertically so that variations in the elements can be coordinated in time. A precision Durotherm hygrometer element (range 30/100%; accuracy $\pm 2\%$), and a highly sensitive bi-metallic thermometer element (range 8/134°F.; accuracy $\pm 2^\circ$; on special order, $-10/100^\circ\text{F}$, available) are mounted outside the case in protected guards. The aneroid is a compensated 8-cell assembly (range 28.5/30.5", accuracy $\pm .04"$). A modern metal case in white has carrying handle and full view glass panel. Recording period is 7 days; daily available on special order. Dimensions: $13\frac{1}{4} \times 5\frac{1}{2} \times 10\frac{1}{2}$ inches. Extra charts \$10.00/50. Ink \$1.00/ $\frac{1}{4}$ oz. Pens \$1.00. Replacement R.H. elements, Durotherm, \$7.50. Wt. 7/shpg. 12 lbs. **\$310.00**

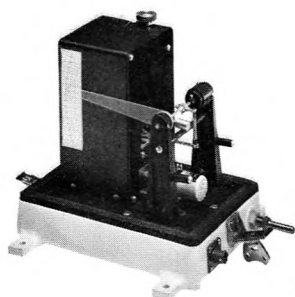
Microbarographs



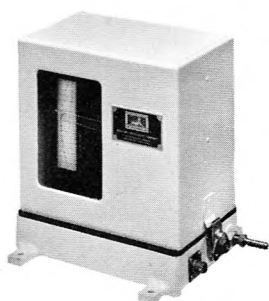
355



355M



355R



355R

No. 355. PRECISION MICROBAROGRAPH. U. S. Weather Bureau Spec. No. 450.7221. A recording barometer which gives greater sensitivity than in former models by employing a mechanical system which eliminates the sources of excessive friction. Greater accuracy is obtained through a precision calibration to 0.005" (0.17mb.) A friction-free and fluid-less adjustable damping device makes the instrument adaptable over a wide range of vibrations. The magnified pressure scale provides 2½ inches of chart for a pressure change of one inch, with full temperature compensation. Charts measure 6¼ inches vertically for pressure and 11¼ inches horizontally for time, and are graduated in either inches, millibars, or millimeters. Spring-driven chart drive located in base of instrument. Standard recording period is weekly, 195 hours; also available for 29 or 108 hour periods. Standard range is 28.5/31.00" or 965/1050 mb. Entire mechanism is housed in attractive, clear-view glass-paneled case with hammertone gray finish. Carrying handle on top of case. Instrument is self-contained, needs no attachments for operation. State elevation when ordering. Complete with pen, ink, and 100 charts. Dimensions: 12¾ x 7 x 9½ inches. Wt. 12/shpg. 18 lbs. **\$375.00**

No. 355-31SW. No. 355 supplied with 31-day chart drive, spring-powered, 25 monthly charts (specify inches or millibars), pen, and ink. **\$405.00**

No. 355-31BP. No. 355 supplied with 31-day chart drive, battery-powered, 25 monthly charts (specify inches or millibars), pen, and ink. **\$413.00**

No. 355A. Similar to No. 355, Bendix design. **\$390.00**

No. 355M. MARINE MICROBAROGRAPH. U.S. Weather Bureau Spec. No. 450.7223, with air-tight case, tube for hose connection outside, and specially balanced anti-backlash chart drive. Wt. 18/shpg. 30 lbs. **\$430.00**

No. 355R. REMOTE MICROBAROGRAPH SENSOR. The mechanism is the same as that of No. 355 except that it has been modified to include a 5K ohms microtorque potentiometer, so that the measurement of atmospheric pressure from 965 to 1050 mbs can be translated into a remote electrical readout. A shortened and sealed case, without the chart drum, but with a reference scale and pointer, a vent for measuring pressures outside of closed areas, and an electrical connector makes this unit adaptable to many applications in meteorology and oceanography. Accuracy ±.5 mb; sensitivity ±.2 mb; dimensions in inches: 11W x 9½H x 8½D. Wt. 9½/shpg. 22 lbs. **\$380.00**

Accessories for Nos. 355 & 355M: Charts \$7.50/100. Change gears \$4.75/set; for 355M, \$10.40 per set. Pens \$1.60. Ink \$2.25/1 oz. 31-days charts \$5.00/25. (Specify No. 355-31 for inches; 355-M-31 for mbs.) Replacement chart drives: battery-powered (BP) \$86.00. (Specify: standard weekly, 195 hrs.; continuous weekly, 168 hrs.; or monthly). Spring-powered (SW) \$80.00.

Barometers



360

No. 360. DIGITAL BAROMETER. An improved version of a proven design for a digital aneroid barometer is reliable, robust, and portable. This device has been recommended by the British Meteorological Office for use on ships. It has also been used in place of mercurial barometers at locations where simplicity of operation and/or portability are important. For permanent installations, the barometer can be taken out of the case and mounted on wall or table.

The instrument consists of a high quality, temperature-compensated, three-stack aneroid capsule by which atmospheric pressure changes are measured, virtually without loading of the sensor, through a manually-operated micrometer screw, a spring-loaded contact arm, a cathode ray indicator, and a five digit counter with anti-backlash gears. The miniature cathode tube, powered by a dry cell inside the case, is used to show when the correct lead screw-capsule relationship is established.

Although the standard, manually-operated instrument is made in two ranges, it is possible to supply servo-operated units, and other ranges, on special order. Over-all dimensions: 7 x 5 x 6 inches. Wt. 4½ lbs., with carrying case, 7¼ shpg. 12 lbs.

No. 360A. DIGITAL BAROMETER, as above, for range 900/1050mbs. with a basic accuracy at 20°C. (68°F.) of ±0.3mb. (the maximum change in indication for a 15°C. change is 0.5mb.). **\$650.00**

No. 360B. DIGITAL BAROMETER, as above, for range of 800/1050mbs. Accuracy at 20°C. (68°F.), ±0.4mb. **\$675.00**

No. 363. BAROMETRIC PRESSURE TRANSDUCER/CONVERTER.

This sensor is designed for applications where atmospheric pressure, measured in inches of mercury absolute, must be converted to a proportional and linear electrical signal for recording, telemetering, and/or computer-compatible applications. The sensor incorporates several stacked diaphragms of NiSpan C alloy which are mechanically linked with invar fittings to a precision 1000 ohms potentiometer (3000 ohms on request). These are constructed with platinum-alloy windings and contacts for long life and noise free operation. The output is a resistance, or resistance ratio; with the Converter, catalog No. 363B, the choice is between voltage or current.

The standard range, 28.0/32.0", is satisfactory for most sea level applications, but some may prefer the alternate 27.0/31.5" range, or one of the four categories defined for the Precision Microbarograph, as outlined in U.S.W.B. Spec. No. 450.7221. For all ranges the performance specifications are the same: Linearity, ±0.3%; Sensitivity, 0.2% (for 3000 ohms potentiometer, 0.12%); Hysteresis, within 0.2%; Repeatability, within 0.2%; Operating Temperature Range, -30/180°F.; Temperature Error, less than 0.0025% of range/deg. F.; Calibration, certified 10 point calibration of pressure vs. resistance ratio output.

A weatherproof housing, approx. 4" wide x 7" high x 4¼" deep, is furnished as a standard enclosure. For indoor applications the sensor can be supplied in a can-type enclosure.

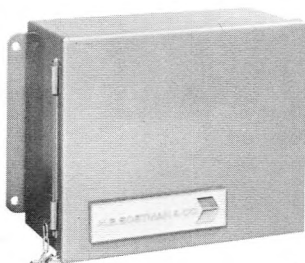
No. 363A(1-6) PRESSURE TRANSDUCER (select range). Wt. 5/ shpg. 7 lbs. **\$385.00**

(1)	27.0/31.5"	Sea Level
(2)	28.0/32.0"	Sea Level
(3)	24.6/31.5"	0' - 3,200'
(4)	21.8/28.5"	2,800' - 6,200'
(5)	19.2/25.7"	5,800' - 9,200'
(6)	16.9/23.0"	8,800' - 12,200'

No. 363B. PRESSURE TRANSDUCER CONVERTER. The power conversion unit for No. 363A, housed in a weatherproof box, is a solid state device that operates on commercial power, 105/130v., 60/50Hz. It is designed with an output of 0/10 mv. (on request, 0-100 mv., or 0-10v.). Wt. 6/shpg. 8 lbs. **\$160.00**



363-A



363-B

Altimeters

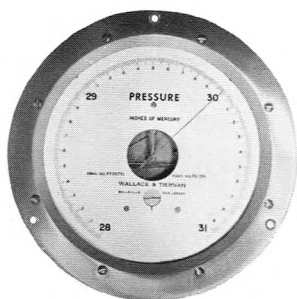


315

No. 315. SENSITIVE ALTIMETER. A portable instrument of precision construction and custom dial calibration is manufactured to Federal Specification GG-A-470. Calibration is according to Smithsonian Meteorological Table 51, 5th Rev. Edition, and traceable to N.B.S. Scales on 6" diameter dial are approx. 30" long, covered by two revolutions of the pointer. A "revolution indicator" identifies the scale to be read. Accuracy is 0.1%; sensitivity, 0.013% of full scale.

The mechanism of the Sensitive Altimeter is shock mounted in a compact 7¼" x 5" anodized aluminum case with a tempered-glass dial cover and a latched metal lid. For storage, or during air shipment, the case is easily made air tight; a desiccant is enclosed to absorb moisture. Altimeters are available in numerous ranges up to 16,000 ft. (or 4,800 meters). Dial graduations vary with the range selected: 4,000 ft., or 1,200 meters (5-ft. div.); 7,000 ft., or 2,100 meters (10-ft. div.); 16,000 ft., or 4,800 meters (20-ft. div.). An instruction book is supplied for operation, maintenance, and surveying methods. A chart is included which gives correction factors for various temperature and relative humidity conditions. The altimeter itself, however, is temperature compensated. Prices vary somewhat with range and scale requirements.

Standard range: -1,000/6,000 ft. with dial calibrated 0-7,000 ft. in 10-ft. graduations, reading to 1 ft. Wt. 5/shpg. 15 lbs. **\$395.00**

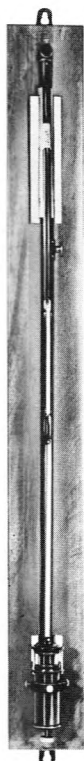


349

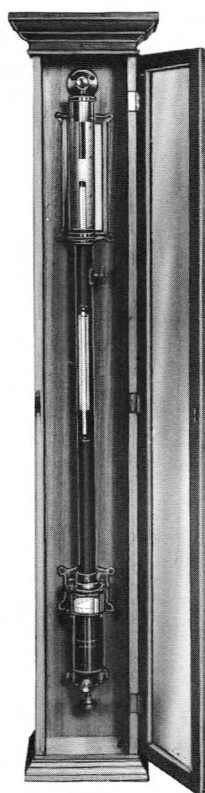
No. 349. ALTIMETER SETTING INDICATOR. A precision aneroid barometer is calibrated to indicate directly, without reference to pressure reduction tables, the local altimeter setting for use in aircraft operations. Each instrument is factory calibrated to read sea level pressure, at a specified airport elevation. The "altimeter setting," readable in units, tenths, and hundredths of an inch over a range 28/31" of Hg., is the figure reported to pilots for the proper setting of an aircraft altimeter. In keeping with standard U.S. practice, the setting is established to have an altimeter indicate the airport elevation at 10 feet above the runway.

Specifications: accuracy 0.3% of full scale; sensitivity 0.02% of full scale; scale length 17" through one revolution; dial diameter 6"; temperature compensation 0.05% of full scale per 10°C. change from 25°C.; flush mounting in panel cutout 7-9/16". Please specify station elevation. Wt. 3¼/shpg. 16 lbs. **\$400.00**

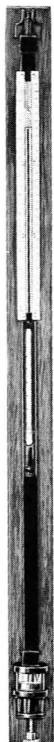
Mercurial Barometers



325-1



335
335-C



334-2

No. 325-1. OBSERVATORY MERCURIAL BAROMETER. A Fortin-pattern barometer for use between sea level and 3000 ft. Glass tube has bore size of 0.25" with double scale 25.5 to 31 inches in 0.1" div. and 646/800 millimeters in 1 mm. div. Vernier readings to 0.01" and 0.1 mm. by a smoothly working rack and pinion movement. Reference adjustment in cistern with knurled thumb screw.

Brass casing over barometer tube, mounted on wood panel, 4½" x 43". White opal glass reflectors make readings easier. Suspension post and centering ring on barometer case provide means for proper vertical mounting. Supplied with instructions and correction tables for temperature and gravity. Wt. 8/shpg. 15 lbs. **\$155.00**

No. 325-1A. Same barometer calibrated in both inches and millibars. **\$190.00**

No. 325-1B. Same as above, for altitudes to 12,000 feet. Scales graduated 16.7/31.0" in 0.1" div. and 425/800 mm. in 1 mm. div. Vernier readings to 0.01" and 0.1 mm. **\$190.00**

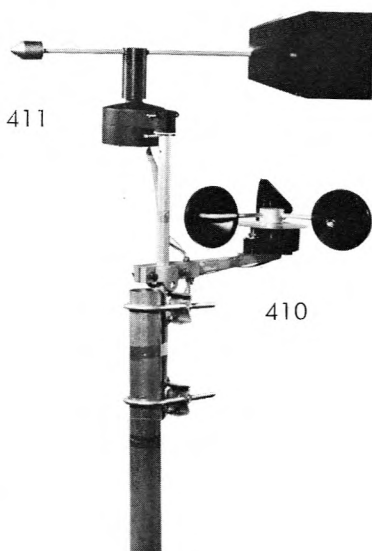
No. 325-1C. Same barometer calibrated in both inches and millibars. **\$240.00**

No. 334-2. SCIENCE LABORATORY BAROMETER. An improved design in Fortin-type barometers combines accuracy, simplicity of construction, and low cost. For use between sea level and 4000 ft. Dual scale range: 25/31 in. and 635/800 mm., readable on vernier to 0.01" and/or 0.1 mm. Attached thermometer calibrated in °F and °C. Mounting brackets supplied with barometer simplify installation and allow for rotating instrument to take advantage of light conditions. Mercury in cistern easily raised to ivory point with knurled adjusting screw. Shipped by REA, complete ready to use, with mounting board, instructions, and correction tables for temperature and gravity. Wt. 7/shpg. 11 lbs. **\$80.00**

No. 335. PRECISION OBSERVATORY BAROMETER. A Fortin-pattern mercurial barometer of high precision, manufactured to U. S. Weather Bureau specification No. 450.7301, readable to 0.002" and/or 0.05 mb. An excellent observatory standard, for elevations from sea level to 4000 ft. Other elevations, or scale in mm., on request. Scale range 25.5/31.5 inches in 0.05" div., and 880/1065 mbs., 1-mb. div. Bore size of 0.6" diam. contributes to accuracy. No corrections required for instrument error or capillarity. Supplied with detailed instructions. Wt. 14/shpg. 25 lbs. **\$450.00**

No. 335B. MOUNTING BOARD. A mahogany board for mounting Barometer No. 335. Supplied with suspension post, centering ring for vertical alignment of barometer, and opal glass reflector. Wt. 5/shpg. 8 lbs. **\$100.00**

No. 335C. MAHOGANY PANELED GLASS CASE. For use with Barometer No. 335. Complete with suspension post, centering ring and screws, opal glass reflectors, lock and key. Dimensions 51 x 9¾ x 7". Wt. 16/shpg. 24 lbs. **\$215.00**



411

410



410



411

No. 409. NASSAU WINDMASTER provides instantaneous remote indications of current wind. It consists of No. 410 Wind Speed and No. 411 Wind Direction described below. Attractive matching dials are 4" in diameter and housed in either brass or chrome cases with flange of 5½" overall mounting diameter. Windmaster is complete with outdoor transmitters, 1' mast adapter and side arm, 100' electric cable, and dual indoor indicators. Requires either 115v 60/50 Hz or 6v battery supply. Brass cases standard. For chrome cases add \$10.00 to base price. Wt. 5/shpg. 11 lbs. **\$265.00**

No. 410. NASSAU WIND SPEED. Three-cup anemometer contains durable ac generator which requires no lubrication. Current is measured on remote dial which has black graduations on buffed aluminum. Dual scale to facilitate reading of low speeds: 0/25 and 0/120 mph. Fingertip switching from HI to LO scale. Self-contained, requires no outside power. Complete ready to install and operate with outdoor speed transmitter, 1' mast adapter, 100' cable, and indoor indicator. Brass case standard. Add \$5.00 to base price for chrome case. (Also available with dial graduated with white figures and letters on a dull black background—specify if wanted). Wt. 2/shpg. 5 lbs. **\$85.00**

No. 410K. NASSAU WIND SPEED. Above anemometer has indicator dial graduated 0/22 and 0/105 knots. Brass case. Add \$5.00 to base price for chrome case. **\$35.00**

No. 411. NASSAU WIND DIRECTION. Sensitive, split-tail vane electrically transmits to remote dial where pointer revolves on full 360° scale. Dial graduated in degrees and to 8 points of compass, black graduations on buffed aluminum. Convenient ON-OFF switch provided for intermittent operation if desired. Regularly employs 115v 60/50hz, but can be easily adapted for 6v battery operation. Complete ready to install and operate with outdoor transmitter, 1' mast adapter, 100' cable, and indoor indicator. Brass case standard; add \$5.00 to base price for chrome case. (also available with dial graduated with white figures and letters on a dull black background—specify if wanted). Wt. 2½/shpg. 6 lbs. **\$180.00**

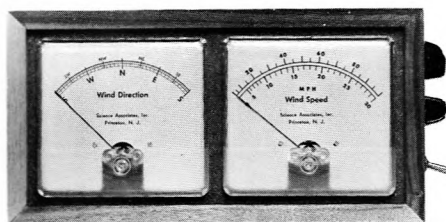
Accessories: Cable, per 60' coil, 2-conductor for speed \$8.00; 5-conductor for direction \$10.00. Generator-cup assembly, \$43.00. Vane transmitter assembly, \$81.00. Vane assembly, less transmitter, \$15.00.

No. 975. NASSAU WEATHER DIALS provide a harmonious public display of weather data. The set of five dials includes No. 409 Windmaster (Nos. 410 and 411) as well as No. 146 Temperature, No. 218-1 Humidity, and No. 310 Barometer in matching cases. Brass case standard. Add \$25.00 to base price for chrome cases. **\$940.00**

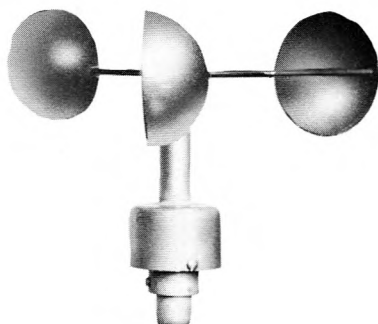
Wind Set



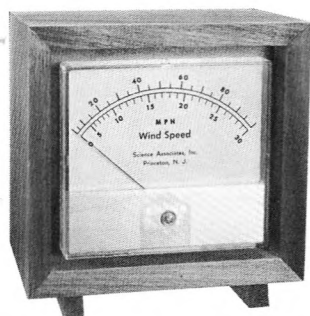
414



414



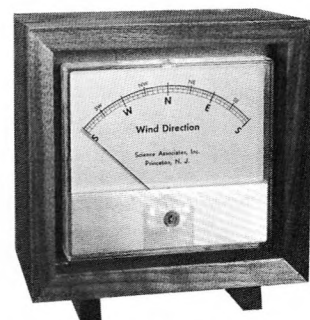
412



412



413



413

No. 414. PRINCETON WIND SET. Combined wind speed and direction indicators and transmitters. Attractive walnut case with clear reading dials. No. 414 is a combination of Nos. 412 and 413 described below. Operates on 1½v. battery; maximum distance with standard cable 2000 ft. from transmitters to indicators. Special factory calibration for distances up to three miles. Complete with transmitters, crossarm for mounting on vertical ½" pipe, 50 ft. of 4-conductor cable, and indicator panel. Case size: 11" x 6" x 3". Wt. 6/shpg. 10 lbs. **\$180.00**

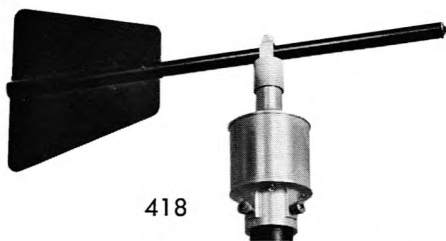
No. 412. WIND SPEED INDICATOR & SENSOR. A rugged, corrosion-proof, generator-type, 3-cup rotor is connected by 2-conductor cable to a large, easily-read dial. Dual graduations provide 0 to 30 mph. and 0 to 100 mph. ranges on a 4" scale; black graduations on a white scale; convenient switch provides LO-HI range selection. Rotor unit is 9" diameter and finished in gray enamel and gleaming chrome, and threaded for mounting with ½" pipe. Dial is housed in an attractive polished walnut case 6" x 6" x 3". No outside power source required. Complete with 50 ft. 2-conductor cable. Wt. 4/shpg. 8 lbs. **\$92.00**

No. 412K. Same calibrated in knots. **\$92.00**

No. 413. WIND DIRECTION INDICATOR & SENSOR. A modernistic, chrome-plated vane transmits full-scale wind direction data to an easily-read dial. Vane is 13" long, with sealed potentiometer. Assembly threaded for mounting with ½" pipe. Indicator housed in attractive walnut case 6" x 6" x 3". Case contains only power source required: a 1½v Burgess 21R battery. ON-OFF switch provided. Complete with 50' 3-conductor cable. Wt. 4/shpg. 8 lbs. **\$92.00**

Accessories & parts: Speed generator \$25.00; Speed rotor \$16.00; Direction potentiometer \$25.00; Direction vane \$16.00; Speed range switch \$4.00; Rotary switch \$5.00; Connecting cable: 50' 2-conductor \$3.00, 50' 3-conductor \$5.00.

Observers Wind System



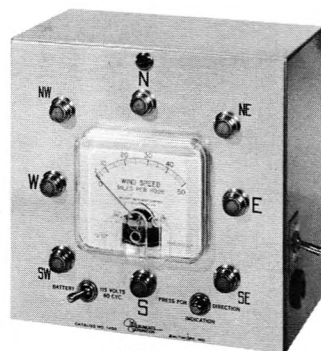
418



417



421



419

No. 420. OBSERVERS WIND SYSTEM. This versatile wind system—low in cost and dependable in operation—serves a wide range of users. It was developed in accordance with Weather Bureau Spec. 450.6156. It is responsive at low speeds and durable at extreme wind forces. The Observers Wind System will operate either from 115v 60Hz, or from a 3v battery supply. It may be set up permanently in a station or taken into the field as a portable unit. Standard system includes Nos. 417, 418, 419, and 50' cable. Support and crossarm are extra. Wt. 8/shpg. 15 lbs. \$310.00

No. 417. WIND SPEED DETECTOR. Wind speed is sensed by a wind-powered ac generator with a linear output. Detector measures 6 $\frac{3}{4}$ " high; mounts on 1" IPS pipe, or 1 $\frac{1}{4}$ " aluminum antenna tubing. Rotor, with starting speed of 2 mph, weighs 1 oz.; it has a diameter of 6 $\frac{1}{2}$ "; individual cup diameter 2 $\frac{1}{2}$ ". Accurate to $\pm 3\%$ of full scale of meter in No. 419 or of separate meter, No. 417A. No outside power source required. Wt. 1 $\frac{1}{2}$ /shpg. 5 lbs. \$105.00

No. 418. WIND DIRECTION DETECTOR employs a lightweight 5 oz. vane, 15" long and 6" high. Direction indication over 360 degrees is accomplished by dual wipers covering 8 contact points. These represent the cardinal and intercardinal points of the compass and are wired to the 8 lamps in No. 419 Indicator. When two adjacent points are energized simultaneously, two lamps will light giving a reading to 16 points of the compass. Accurate to 5 degrees. Vane with housing: 8 $\frac{1}{2}$ " high, 15" long, and 2 $\frac{3}{4}$ " diameter. Same mounting dimensions as above. Wt. 1 $\frac{1}{2}$ /shpg. 4 lbs. \$115.00

No. 419. WIND INDICATOR has circle of eight lamps for wind direction and a 0-50 mph meter for wind speed. Switch for doubling speed range to 100 mph at side. Toggle switch permits operation on either 3v battery supply or 115v 60Hz. Push-button, power-conserving switch for intermittent direction indication. Size 8" x 8" x 5". Wt. 5/shpg. 10 lbs. \$90.00

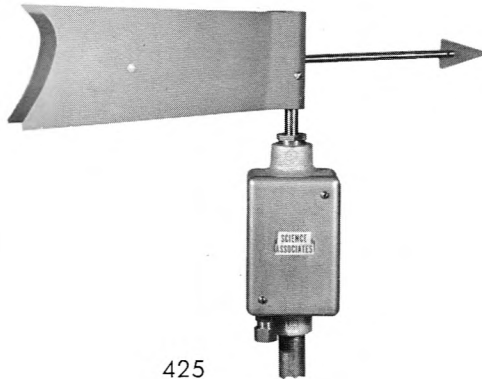
No. 417A. METER. A flush mounting indicator for No. 417 Wind Speed Detector. Has range doubling switch: 0/50 or 0/100 mph full scale. Includes rectifier circuit as part of 200 micro amps. meter. Wt. $\frac{1}{2}$ /shpg. 1 lb. \$42.00

No. 421. SUPPORT. Telescoping-type mast supports instruments on crossarm at 13-foot height. Mounting radius of tripod base is 29 inches. Complete with crossarm and mounting hardware. Wt. 77 lbs./shpg. 90 lbs. \$130.00

No. 422. CROSSARM. For mounting on vertical section of mast of 1" I.P.S. pipe. Span of crossarm is 28 inches. Wt. 15 lbs./shpg. 25 lbs. \$43.00

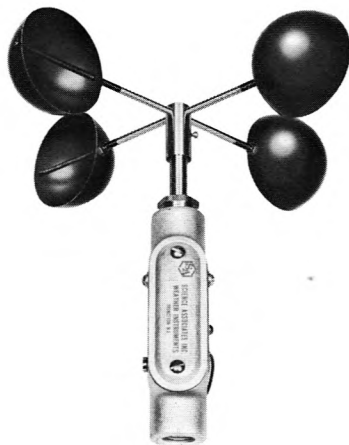
Accessories: Cup assembly for No. 417, \$16.00. Vane assembly for No. 418, \$10.00. Additional cable for No. 420, 11-conductor, \$0.27/ft.

Wind Set for Amateurs



425

No. 450. STEWART WIND SET. Designed to provide at low-cost a wind measuring system that combines dependability and long service with ease of operation and installation. It consists of (1) an electric anemometer, No. 401, (2) an electric wind vane, No. 425, and (3) a remote indicator of the flashing-light type, No. 475. The system includes 60' of 12-conductor cable and a 110 to 6v 60Hz step-down transformer (for intermittent use 6/8v dc are acceptable). The Stewart Wind Set has long been a favorite with amateur observers and educational institutions, as well as with agricultural interests requiring an inexpensive wind measuring system. Wt. 11/shpg. 15 lbs. **\$85.00**



401

No. 401. ELECTRIC ANEMOMETER. Four-cup assembly is attached to metal hub and spindle sleeve which rides on stainless steel ball bearings. Electric contact mechanism makes positive contact for every 1/60th mile of wind passing a station. This permits current to flow to the two yellow lamps of No. 475 Indicator. The number of flashes of the lamp per minute is the speed of the wind in miles per hour. Non-corrosive spindle box is threaded for attachment to 1/2" NPT pipe support. Anemometer is self-lubricating; cleaning recommended every two years. Wt. 2/shpg. 3 lbs. **\$27.50**

No. 425. ELECTRIC WIND VANE. Aluminum spreadtail-vane is attached to brass spindle, which rides on steel ball bearings. Electrical contact mechanism contains a rolling brush which makes positive contact with eight directional points. This permits current to flow to No. 475 Indicator to show existing wind direction. Corrosion-resistant spindle box is threaded for easy attachment to 1/2" NPT pipe support. Self-lubricating, instrument will run indefinitely without oiling. Cleaning every two years recommended. Wt. 2/shpg. 3 lbs. **\$27.50**



475

No. 475. WIND INDICATOR. Recent design changes in the indicator have resulted in an eye-catching array of colorful lights. The center-located blue pilot light is illuminated at all times that the on-off switch is on, except when the anemometer contacts are closed, during which time the twin green speed lights, below center, are on. A count of the green flashes for one minute is a measure of wind speed in MPH. The eight amber direction lights are arranged in a circle with one or two compass points illuminated at all times. Wall mounting, or surface mounting is possible with the 5 1/2" x 7" x 2 1/2" Indicator box. Lamps are 6/8v. Detailed instructions for installation and maintenance supplied. (Price includes step-down transformer and 60' of 12-conductor, 22 gauge cable.) Wt. 3/shpg. 5 lbs. **\$30.00**

Accessories & Parts:

- No. 475C Electric cable, 12 conductor, 22 gauge, water-proof covering. 20c per ft.
- No. 475T Transformer, 110v. primary, 6v. secondary, 60Hz. \$4.75.
- Replacement cup wheel assembly for No. 401 \$12.50.
- Replacement vane assembly for No. 425. \$7.50

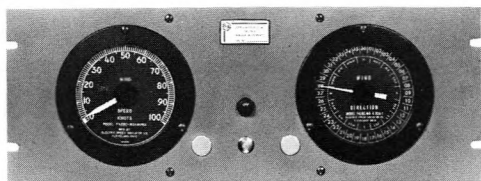
Airport Wind Indicator Set



406-1



429



466

No. 424. AIRPORT WIND INDICATOR SET. A pair of reliable transmitters—No. 406-1 for Wind Speed and No. 429 for Wind Direction—together with two panel-mounted indicators and a power supply No. 466 are the components of the U.S.W.B. F-420C used at airports, weather stations, and industrial sites.

Designed for distances up to 1000 ft. with #14 wire; 2000 ft. with #10. Loop resistance in speed circuit should not exceed 4.6 ohms. Conductors in direction circuit should be the same size as for speed. Power supply of No. 466 wired for use with up to 7 pairs of indicators from one set of transmitters.

Supplied as a set, complete with instructions, and 50' of 7-cond., #20 gauge shielded cable. Wt. 29/shpg. 48 lbs. **\$586.00**

No. 406-1. WIND SPEED TRANSMITTER. A conical-cup, generator-type anemometer is a companion transmitter and designed to the same rigid specifications as No. 429 Wind Direction Transmitter. Mechanical details are as shown for No. 406, but electrical characteristics differ: internal resistance, 40 ohms; output, nominally 4.0v dc open circuit at 100 mph. With the terminals of the generator across a load of 428.6 ohms and the anemometer shaft turning at 300 rpm, the indicated speed is 32.4 ± 1 mph; at 600 rpm, 62.4 ± 1 mph; at 900 rpm, 92.5 ± 1 mph. Response is linear in winds up to 170 mph. Requires 2 conductors. Wt. 5/shpg. 10 lbs. **\$179.00**

No. 429. WIND DIRECTION TRANSMITTER. A split-tail vane of rugged design, U. S. Weather Bureau No. F-420C, with bronze housing. One of a pair of transmitters, fabricated to Weather Bureau Spec. No. 450.6150, employed with Airport Wind Indicator Set No. 424.

In construction, No. 429 contains a toroidal coil which is energized by two vane-activated brushes carrying 14v. D.C. that are 180° apart and move around the edge. The movement of the brushes causes varying voltages to develop at the three equally spaced taps. These voltages are picked up on the indicator by three coils mounted around an iron core. A permanent magnet at the center of the core supports the pointer and responds to changes in the magnetic field.

Power requirements for the transmitter are supplied by No. 424 Indicator Panel: 115v 60Hz, stepped down and rectified to approx. 14v dc. At 14v dc, current requirements are 200 milliamps. Direction vane requires 5 conductors.

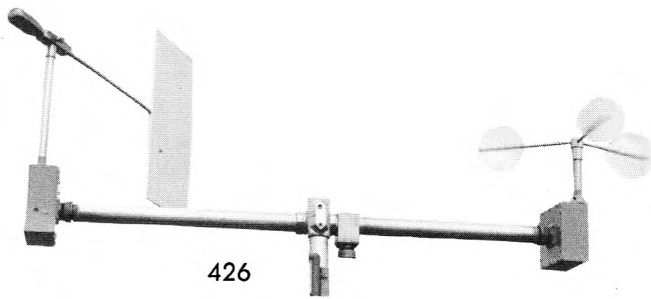
Adapter mounts on unthreaded IPS 1 1/4" pipe. Overall height 12 3/4"; vane moves in 21" diameter. Wt. 8/shpg. 15 lbs. **\$179.00**

No. 466. PANEL-MOUNTED INDICATORS. A maintenance-free panel assembly with easy-to-read dials and pointers is designed to operate with wind speed transmitter #406-1 and direction transmitter #429. Dials measure 4" diam., 5 1/2" overall. Panel is 19" x 7" and 3 3/4" deep. Wind speed covers range 0/100 knots, with dial calibrated 0/100 mph available on request. Range-doubling switch supplied as optional equipment where required. Wind direction shown in degrees of compass and in letters to intercardinal points.

Cup anemometer generator supplies dc power for speed indicator. Power for wind direction is obtained from input of 115v 60Hz which is converted to the required 14v dc in a power supply and distribution system attached to back of panel. Indicators can be supplied with internal lighting, rheostat controlled, as optional feature. Wt. 11/shpg. 14 lbs. **\$228.00**

Accessories: Range-doubling switch, transformer & range lights **\$31.00**
 Internal lighting for indicators, with rheostat **31.00**
 Unmounted Speed Indicator 5 1/2" overall (knots or mph) **120.00**
 Unmounted Direction Indicator 5 1/2" overall **102.00**

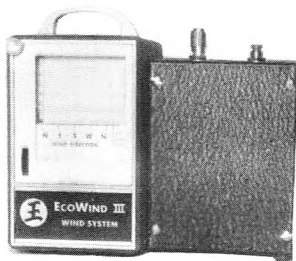
Wind Speed and Direction



426

No. 426. ECO WIND III. A compact, portable, and easy to operate recording system, which has been designed for air pollution study programs, and used extensively. The equipment will operate without attention for periods of up to two weeks.

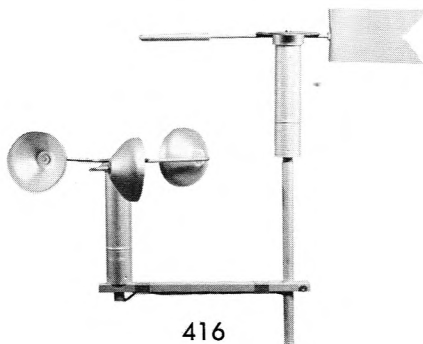
The threshold speed, for both the conical plastic cups, and the light-weight balsa vane, is 0.65 mph. Wind speed is recorded as an integrated output, one pulse mark for each 0.5 mile of air passage. Wind direction is recorded over a scale marked N-E-S-W-N. The inkless chart, 63' long, with an effective width of $2\frac{5}{16}$ ", travels at 2"/hr. At this speed winds of up to 40 mph can be resolved quite easily.



426

A complete EcoWind III consists of a wind direction transmitter, a 3-cup anemometer, a mounting tripod with a working height of 4 meters, 50' of connecting cable, and a combination recorder-control unit. Extra cable, up to 500', \$6.00/50' length. Input power requirements are 115v 60 Hz, $\frac{1}{2}$ amp. Wt. 32/shpg. 40 lbs.

\$725.00

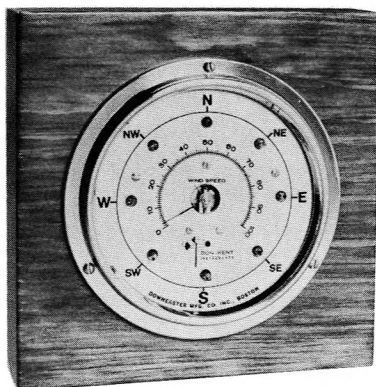


416

No. 416. THE DOWNEASTER WIND DIAL, WITH TRANSMITTERS.

A combination wind speed and wind direction indicator, mounted in a walnut-finished block, 8 x 8 x 2 inches. One, or two, of the eight cardinal points with bright yellow neon lights will be illuminated all the time to show wind direction; the meter in the center of the 6-inch diameter, polished brass dial indicates wind speed over a range of 0-100 mph. The outside transmitters, a three-cup assembly for speed and a split-tail vane for direction, are fully anodized and supplied with 60 feet of connecting cable. Speed operates without external power; direction requires 115v 60Hz. An accessory mast assembly kit is available at an additional \$20.00. Wt. 8/shpg. 12 lbs.

\$179.00

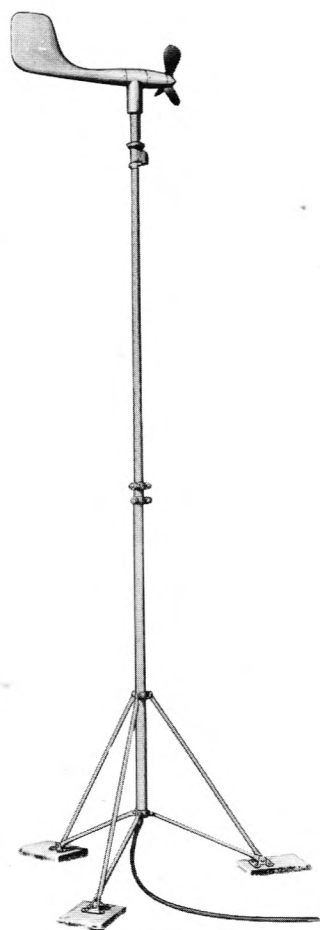


416

Aerovane



4-120



4-150
&
4-120

THE AEROVANE SYSTEM was originally designed for the U. S. Navy and has been adopted by the U. S. Weather Bureau, FAA, and the military services. It is also widely used where the wind factor is important in industry or in protecting public health. The Aerovane may be employed as a recording or an indicating system, or as a combined recording/indicating system, or with "conditioning" equipment for data processing.

No. 4-120. TRANSMITTER. The Aerovane transmitter is a combined anemometer and wind vane in one unit. One transmitter can operate one recorder and one indicator set, or two indicator sets. It can be used with an Indicator/Controller, such as Wind Warner No. 491-1A (p. 67), or with special equipment for data processing such as No. 4-135A (p. 53). A three-bladed, plastic rotor with a starting speed of 2.5 mph drives a magneto which generates a voltage directly proportional to wind speed. With a resistance of 1150 ohms, the output is 9.2v at 87.1 mph (1800 rpm), and linear.

The streamlined vane with "distance constants" of 15' for speed and 34' for direction, houses a synchro whose rotor position is determined by the vane. The entire unit is effectively sealed to exclude moisture and dirt. The transmitter includes a filter to prevent radio interference and is permanently lubricated. A plug-socket arrangement permits demounting without rewiring. No power required for speed; direction synchro takes 115v 60Hz (at 50Hz transmitter-indicator combination must be operated at 95v. For proper chart time, recorder must be operated at 115v 60Hz. (Refer to transformer under Accessories). Where lower starting speeds (less than 2 mph) are required, a special six-bladed rotor is available. The transmitter is 32 inches in length; rotor blades cover a diameter of 15½". Wt. 13/shpg. 35 lbs. **\$445.00**

No. 4-122. For special applications—same as above, except for wind speed only. Direction synchro omitted. Wt. 10/shpg. 30 lbs. **\$360.00**

No. 4-150. TRANSMITTER SUPPORT. The Aerovane support is designed to simplify installation and to make the transmitter easily accessible for maintenance. It is a rust-proof, telescoping, tubular steel shaft 13 feet high, with a 4-ft. diameter tripod base and three hinged mounting plates so arranged that it may be "walked down." Guying is not required for standard installations. Where transmitter is to be mounted on a tower boom or customer-supplied support, a "mast adapter" is available (see Accessories) for mounting on any 1¼" NPT. Support complete, ready to install. Wt. 30/shpg. 55 lbs. **\$100.00**

No. 4-155-18. AEROVANE CABLE. A water-proof, #18 gauge seven-conductor, color-coded cable, made with a polyvinyl chloride plastic jacket. Recommended for distances up to 2,000'. Other gauges, or shielded wire on request. Shpg. wt. 12 lbs./100'. **\$.30/ft.**

Accessories:		
Chart roll, MPH, 3"/hr.		\$3.00 ea.
Chart roll, Knots, 3"/hr.		3.50 ea.
Chart roll, MPH, 1½"/hr.		3.50 ea.
Replacement pen element assembly		7.25 ea.
Ink: red or green		7.85/pt.
Replacement Rotor Assembly (3 blades).		25.00 ea.
Replacement Rotor Assembly (6 blades).		52.00 ea.
Mast adapter #515333-1		15.00 ea.
Speed range-doubling switches, factory installed		
Indicator:	100-200 mph, or 120-240 knots.	\$58.15
Recorder:	100-120 mph, or 120-240 knots.	\$48.35
Transformers:	115/95v 50 Hz, #522318-1	\$135.00
	220/95v 50 Hz, #522318-3	\$135.00
	220/110v 60 Hz, #522318-2	\$135.00

Aerovane



4-141

No. 4-141. AEROVANE RECORDER. The recorder makes a permanent inked record of gusts and lulls in wind speed and variations in wind direction on a continuous single strip-chart. Direction data from 0 to 360° is recorded on the left without overlap on a 540° scale, and speed data from 0/100 mph. or 0/120 knots on the right portion. Range-doubling switch available for speeds to 200 mph. or 240 knots.

The chart, measuring 10 3/4" across, has two recording areas 4 1/2" wide. Each recorder supplied with gears for chart speeds of 1 1/2", 3", and 6" per hour. When operating at a preferred speed of 3"/hr., a single chart roll records over two weeks. Dual chart drive recorders with "rapid speed" mechanism can provide quick change in chart feed from inches/hour to inches/minute. Recorders require 115v 60Hz. When operated at 50Hz, voltage must be decreased to 95v with transformer #522318-1 and 95v 50Hz chart drive motor #522486 must be specified. Internal illumination contributes to ease of chart reading.

The Aerovane Recorder is furnished either for surface or for flush mounting. All recorders have a visible scale at the top with moving pointers. Recording mechanisms are housed in a sturdy cast aluminum case, fitted with clear plastic window, and finished in dull black. Housing measures 14 1/4" high, 15 5/8" wide, and 10 3/16" deep. Wt. 45/shpg. 100 lbs.

No. 4-141-2. RECORDER, standard drive, surface (table) mounting. **\$1,635.00**

No. 4-141-3. RECORDER, dual chart drive, surface (table) mounting. **\$1,765.00**

No. 4-141-5. RECORDER, standard chart drive, flush (panel) mounting. **\$1,700.00**

No. 4-141-7. RECORDER, dual chart drive, flush (panel) mounting. **\$1,830.00**

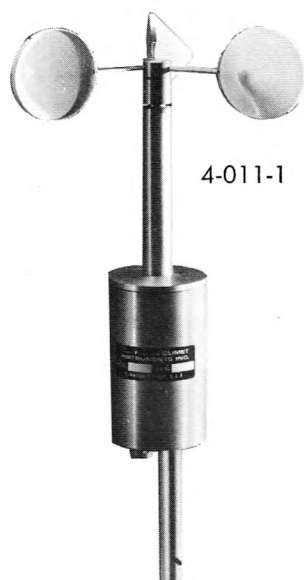


4-135
&
4-135A

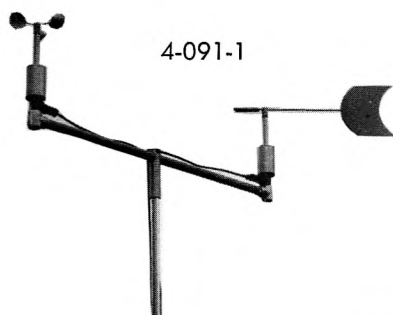
No. 4-135. INDICATOR, WIND DIRECTION & SPEED. This is a redesigned and modern version of No. 4-130, constructed with attractive pull-type end plates, for table top or cabinet mounting. It is one of a number of panels, in modular form, that can be used to assemble FAME, the Friez Air Monitoring Equipment group. When used with Aerovane Transmitter No. 4-120, the No. 4-135 gives a constant visual indication of wind direction and wind speed. Specify 0/100 mph, or 0/120K. Power requirements: 115v 60Hz 12 watts. Dimensions: 17 1/4"L x 7"H x 11 1/4"D. For 19" rack mounting brackets, add \$21.50. Wt. 25/shpg. 40 lbs. **\$550.00**

No. 4-135A. CONVERTER-INDICATOR, WIND DIRECTION & SPEED. The above, in addition to indicators, has electrical outputs available for signal conditioners, data processors, etc. The output for wind direction is obtained from a servo-operated 7.5 ohms potentiometer energized by a regulated 5v dc supply. With the load adjusted to 1000 ohms, 0/3.6v dc are proportional to 0/358°. Wind speed is measured as a linear dc voltage, 10.56v = 100 mph, or 0.1v/mph, 5ma max. Power requirements: 115v 60Hz 30 watts. Wt. 30/shpg. 40 lbs. **\$1,660.00**

CLIMET Wind Recording System



4-011-1



4-091-1

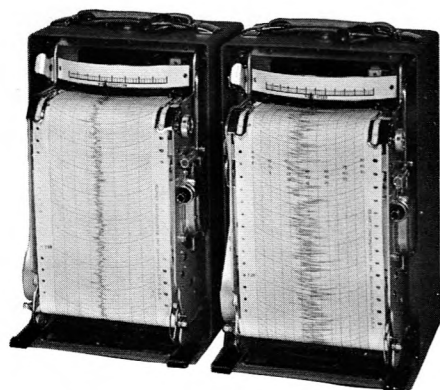


4-012-10



4-025-2

No. 493. CLIMET 540-DEG. WIND SYSTEM. A wind measuring system for research and operational programs combines low threshold, high sensitivity, and accurate performance with an "ambiguous point logic" recording technique that eliminates the hard-to-interpret "cross-over" region of the 0/360° polar wind systems. Recent design improvements have increased this system's versatility. Translators are now available with the standard 0/1 ma for recording, with options for an output to a Sigma Computer, output averaging circuits for speed and direction, and voltage outputs of 0/5v dc maximum for data processing equipment. Specifications: (1) Wind Speed Transmitter threshold, 0.6 mph; accuracy $\pm 1\%$ or ± 0.15 mph; distance constant, 5'. (2) Wind Direction Transmitter, 0/540°; threshold, less than 1 mph; damping ratio 0.4; accuracy $\pm 3^\circ$. (3) Translator—standard ranges 25/50/100 mph; 12v batteries in dc model drain 65 ma, last 4 weeks; ac model operates on 115v 60 Hz; standard outputs for speed and direction 0/1 ma into 1400 ohms with other options as noted. (4) Speed Recorder, portable case, 8-day spring, or 115v. (5) Direction Recorder, as above; scale 0/540°, N-E-S-W-N-E-S. (6) Instrument Mounting Arm—length, 40". (7) Instrument Mast—tripod support, extends to 9'.



4-0520 (Dir.)

4-0520 (Spd.)

No. 493-1. AC/DC PORTABLE SYSTEM, consisting of #4-011-1 Wind Speed Transmitter, conical cup assembly, and 25' of 4-conductor #18 cable; #4-012-10 Wind Direction Transmitter (540°), Vane assembly, and 25' 3-conductor cable; #4-025-9 Translator, weatherproof portable case, AC/DC; #4-091-1 Mounting Arm; #4-092-1 Tripod Mast; #4-0520 Wind Speed Recorder, portable case (specify drive, springwound or 115 v ac); #4-014-95 Wind Speed Chart 25, 50 and 100 mph; #4-0520 Wind Direction Recorder; #4-014-52 Wind Direction Chart, 540°; for 12v dc event pens on recorders, add \$50. each. Wt. 77/shpg. 98 lbs. **\$3,295.00**

No. 493-2. AC-RACK MOUNT SYSTEM, as above for permanent sites with 115v 60 Hz. Translator in #4-025-2 for rack mounting, with optional outputs for Sigma Computer, averaging circuit output, and auxiliary 0/5v dc outputs for data processing. Recorder #4-0524-3 is twin case type, flush mounted, ac chart drive. **\$3,235.00**



4-025-9

Wind Survey System



No. 441. WIND SURVEY SYSTEM. For air pollution surveys and climatological studies, rugged and economical, this system can be operated on two self-contained 12v batteries, or on 110v, 60 Hz.

No. 441-A. WIND SPEED TRANSMITTER is a cup anemometer that produces a contact on a reed switch, at a frequency proportional to the wind. It has a threshold of 1.25 mph, an accuracy of $\pm 2\%$. **\$200.00**

No. 441-B. WIND DIRECTION TRANSMITTER incorporates dual potentiometer for measuring direction to 540° . The ambiguity of the "crossover" point at 360° is eliminated. **\$400.00**

No. 441-C. TRANSLATOR is a portable case AC/DC unit with built-in output averaging circuits for 2 speed ranges and over 540° of direction. Passive filters are used to provide short-term averages of 30 seconds. Longer term averages optionally available. Translator has outputs of 0-1 ma for 1400 ohm recorder, with option for additional outputs of 0/1 v dc for other requirements. **\$440.00**

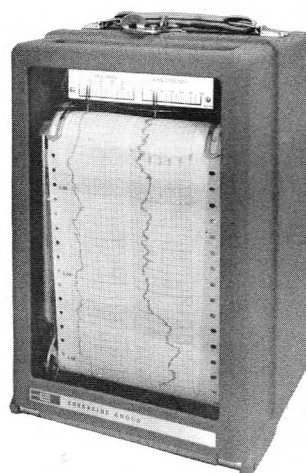
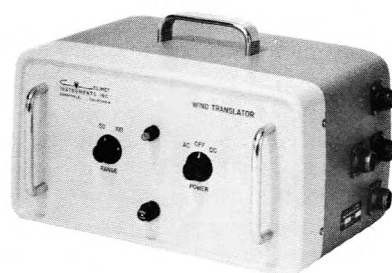
No. 441-D. RECORDER has dual channels, each 2" wide, on a 6" chart that is spring driven at 3" per hour by an 8-day clock. Wind speed is recorded over full scale ranges of 50-100 mph; wind direction to 540° with full scale markings of 0-90-180-270-360-90-180°. The "averaged" data is easy to read and resolve. Specify either No. 441-D-AC which is 110v ac drive or No. 441-D-SW which is 8-day spring drive. **\$900.00**

No. 441-E. Mounting Arm, 40" long. **\$50.00**

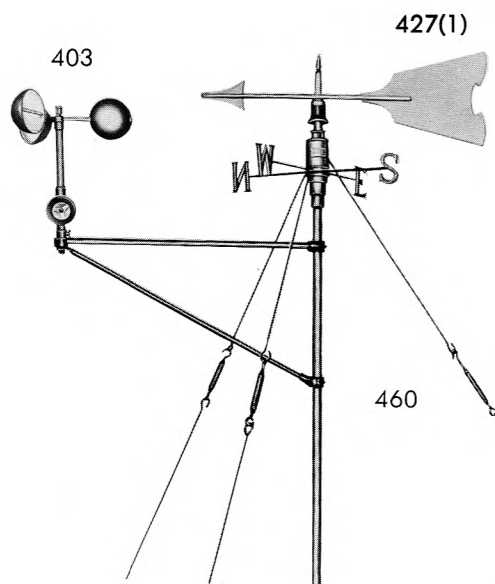
No. 441-F. Mast, 9' high, adjustable. **\$150.00**

No. 441-G. Chart Paper, 103' long, dual channel (6 @ \$2.50) **\$15.00**

No. 441. COMPLETE WIND SURVEY SYSTEM, including instruction manual. Wt. 85/shpg. 100 lbs. **\$2,155.00**



Standard Recording System

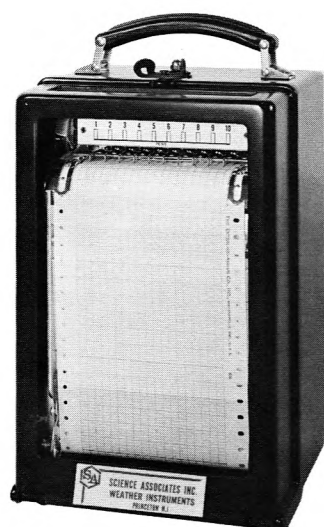


No. 440. STANDARD WIND RECORDING SYSTEM incorporates transmitters of traditional Weather Bureau design with an event recorder to produce a 15-day permanent record of weather occurrences. Eight of the recorder's ten pens combine to mark the existing wind direction to 16 points. One pen records each mile of wind passing from which average wind speed for any period may be determined. A tenth pen may be employed for precipitation if desired. System can be field operated from 6v. storage battery for several days without recharging if No. 445SW spring-wound chart drive is employed. No. 440 Wind System includes No. 403 Anemometer, No. 427 Wind Vane, No. 445E-10 Recorder, and No. 460 Support. Shpg. 200 lbs. **\$1,137.00**

No. 403. ANEMOMETER, electric one-mile contacts. Refer to page 41. **\$250.00**

No. 460. SUPPORT, includes mast, anemometer arm, pintle, guyrods, and base plate, column 13' high: 12' of 1½" pipe, 1' of 1" pipe. Wt. 85/shpg. 100 lbs. **\$116.00**

No. 427(1). WIND DIRECTION TRANSMITTER, electric wind vane of the sealed contact type employs a 36" all-metal, single panel vane finished in attractive silver lacquer. Eight reed switches transmit wind data to 16 points—cam designed to close two switches on intermediate directions thus energizing two pens on recorder simultaneously. Waterproof housing. Operating voltage, 6-12v. D.C. (Four gilded bronze compass points 3½" high available at \$50.00 additional). Wt. 20/shpg. 30 lbs. **\$245.00**



445-10

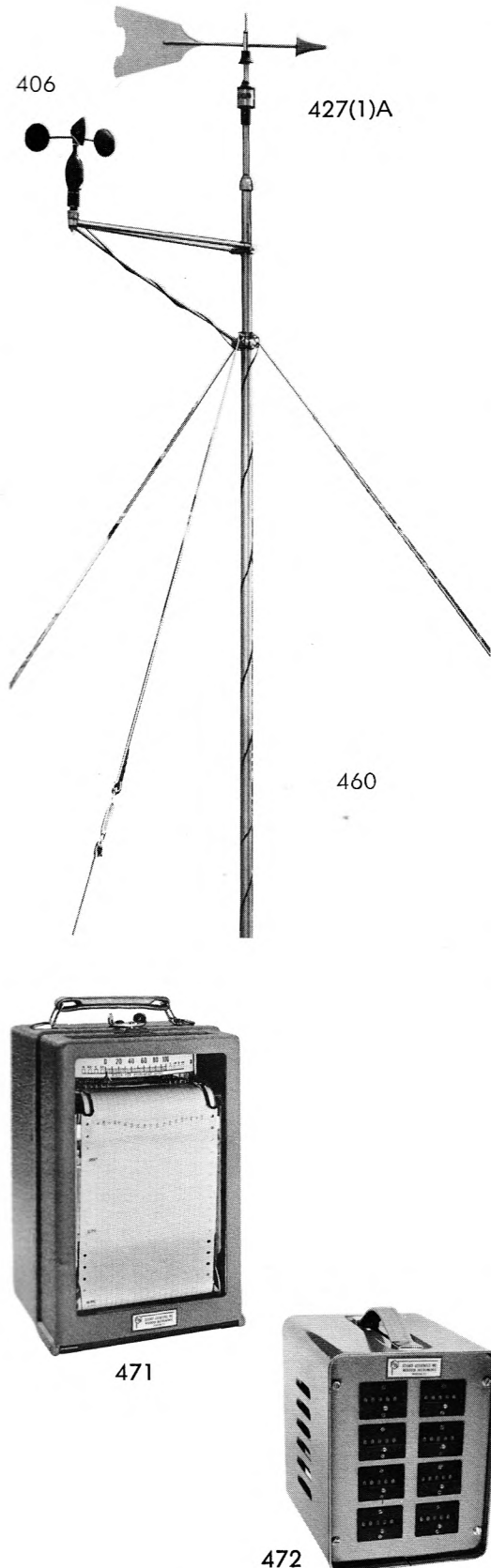
No. 445-10. EVENT RECORDER. An instrument for recording time of occurrence and duration of certain weather events. Recorder is normally equipped with 10 pens. The pens are electrically energized by switches in a No. 427 Wind Direction Transmitter, No. 403 Anemometer and, if desired, by a No. 595 Tipping Bucket Rain Gage. The strip-chart is 6" wide and 90' long. At normal chart speed of 3"/hr. will record for 15 days without change. Each recorder supplied with change gears for alternate chart speeds of 1½, 3, 6, and 12 inches/hr. Transmitters and recorder pens require 6v dc. Synchronous motor chart drive requires 115v 60Hz; hand-wound spring chart drive has 8-day spring. Choice of case style: portable as pictured (14½" high, 8½" wide, 8¾" deep), or for flush mounting add \$30.00. (15½" high, 10½" wide, 8¾" deep.) Complete with pen, ink, and one chart roll. (Recommend attached power supply for fixed installation with commercial power). Wt. 30/shpg. 50 lbs.

No. 445E-10. EVENT RECORDER, portable case, electric chart drive. **\$525.00**

No. 445SW-10. Same with hand-wound spring chart drive, 8-day clock. **\$563.00**

Accessories: Chart Roll #445-10-C, \$2.00. Recorder ink, \$4.40/pt. Event Pens, \$5.00 ea. Power Supply (115v ac to 6v dc) mounts on back of recorder, \$85.00—when factory installed inside of case add \$60.00.

All-Purpose Recording System



No. 470. ALL-PURPOSE WIND RECORDING SYSTEM. For "portable" field requirements, or fixed installations; battery-operated and adaptable to commercial power; analog-event-digital. A unique design in recorders combines the best features of several wind systems to produce easy-to-analyze records. Transmitters are Weather Bureau types which here produce an event type trace for wind direction, once each minute or continuously, and an analog type trace for wind speed. The system requires 12v dc. On spring-wound recorders, rewinding is required at 8-day intervals. At chart speed of 3"/hr., record is continuous for 15 days. No. 470 System includes No. 406, No. 427A, No. 460, and No. 471.

No. 470E. SYSTEM (with No. 471E. elec. recorder) **\$1,384.00**

No. 470SW. SYSTEM (with No. 471SW, spring-wound recorder) **\$1,404.00**

No. 406. WIND SPEED TRANSMITTER. A generator-type cup anemometer which produces a voltage proportional to wind speed, over the range 0/100 mph. Details on p. 60. **\$179.00**

No. 427(1)A. WIND DIRECTION TRANSMITTER. Employs a conventional single panel vane, 36" long. The rotating vane is attached to a vertical shaft which activates a contacting assembly consisting of eight reed switch contacts, with a gap of approximately 2 deg. between each 22½ deg. sector. Only one switch at a time is energized. This produces a chart record that is easily read; digital counter read-outs can be employed to aid in determining frequency distributions. Direction transmitter mounts on 1" IPS pipe. Operates on 12v. dc. Wt. 20/shpg. 30 lbs. **\$245.00**

No. 460. Support (see p. 56) **\$130.00**

No. 471. ANALOG-EVENT RECORDER. Employs a single strip-chart to insure time coordination of speed and direction records. Chart is 6 in. wide, 90 ft. long. A bank of four event pens on each side of chart mark, for a fraction of a second, N, NE, E, SE, S, SW, W, NW, by means of a special built-in contactor, once each minute—this insures clarity of record and permits use of one "Hot Shot" type battery for 6 to 9 months. An auxiliary panel of eight impulse counters (No. 472) can be supplied, and customer wired, to totalize counts, 60/hr., for prevailing direction. The speed pen continually records on the 2¾" wide central section calibrated 0/100 mph, graduated for 2 mph. Peak gusts and lulls can be easily determined from inspection. Synchronous motor chart drive requires 115v 60 Hz; hand-wound spring chart drive has 8-day spring. Attachable power supply for direction vane and pens (115v ac to 12v dc) recommended for fixed installations. See Accessories. Portable case with handle measures: 8 9/16" wide, 14 9/16" high, 9 5/16" deep. Wt. 32/shpg. 47 lbs.

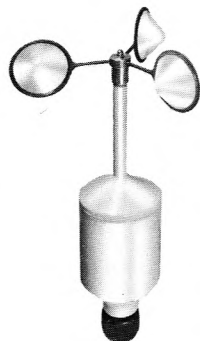
No. 471E. ANALOG-EVENT RECORDER, portable case, elec. chart drive. **\$830.00**

No. 471SW. ANALOG-EVENT RECORDER, portable case, spring chart drive. **\$860.00**

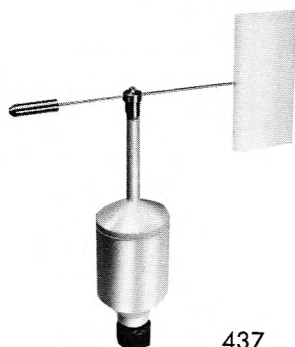
No. 472. WIND DIRECTION DIGITIZER. A group of eight, manual reset, highly-reliable, 5-digit impulse counters, are panel mounted and enclosed in a cabinet. When wired to the "common" and "direction" terminals of Recorder No. 471, recording and counting is simultaneous. Frequency distributions (wind roses) are easily determined. Wt. 5/shpg. 15 lbs. **\$285.00**

Accessories: No. 471BW Chart, \$2.00/roll. Ink, \$4.40/pt. Pens (speed and direction), \$5.00 each. Electric Cable for No. 470 (2-cond. for speed, 9-cond. for direction), \$0.45/ft. Power Supply, attaches to back of No. 470 Recorder (115v 60Hz to 12v dc) \$85.00.

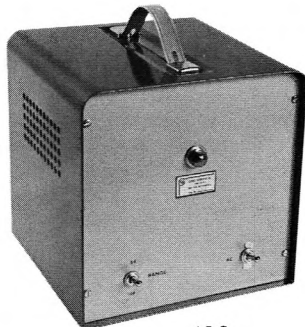
RAIM Wind System



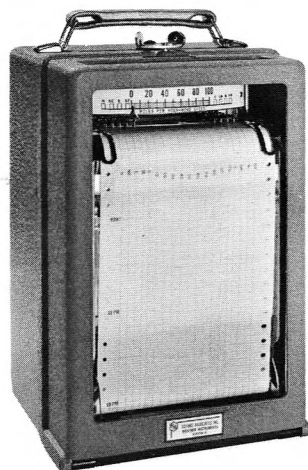
436



437



438



459

No. 435. RAIM MICRO-MET WIND SYSTEM. Sensitivity for research work and durability for operational atmospheric surveys are built into this system. Operates on 115v. a.c. Also available for 12v. d.c. with spring-wound recorder. AC-powered system includes Nos. 436, 437, 459-E, 438-115, and 422. **\$1808.00**

No. 436. MICRO-MET ANEMOMETER. Three-cup, conical shaped, sensing element drives a transistorized 30-slot light chopper. Starting speed 0.7 mph; speed range 0/100 mph; accuracy $\pm 2\%$. Input 12v. d.c., 150ma; output, square wave pulses of -10v. d.c., 1 millisecond duration with frequency proportional to wind speed. Supplied with mounting adaptor, connectors, and 25 ft. cable. Wt. 2/shpg. 5 lbs. **\$250.00**

No. 436-C. Same as No. 436 except single-slot, 15/20 millisecond pulse duration, for counting each rotation. **\$250.00**

No. 437. MICRO-MET WIND VANE. Same housing as No. 436. Vane is a light-weight airfoil, weather protected. Low mass and aerodynamic shape produce good response. Durability determined in hurricane winds. Responds to wind of $\frac{1}{2}$ mph. Wind direction measured to 16 points of compass by 8 photosensitive resistors. Input 12v. d.c., 150ma. Supplied with mounting accessories as above. Wt. 2/shpg. 5 lbs. **\$250.00**

No. 459. MICRO-MET ANALOG-EVENT RECORDER. On one chart, a record in detail of the wind speed analog over ranges of 0/50 and 0/100 mph, with direction shown to 16 compass points by 8 event pens. Chart interpretation made easy by recording direction once each minute, but switch allows for change to continuous recording. Designed to operate with Translator No. 438. Standard chart No. 471BW-0-50 calibrated 0/50 mph and marked for chart travel of 3 in./hr. Wt. 32/shpg. 60 lbs.

No. 459-E. Portable case, 115v. 60 Hz chart drive. **\$790.00**

No. 459-SW. Portable case, 8-day spring drive **\$820.00**

No. 438. MICRO-MET SPEED AND DIRECTION TRANSLATOR. The translator, an integral part of the RAIM system, includes a 12v. d.c. regulated power supply, a digital-to-analog converter for wind speed, two switch-driver modules for wind direction, and a range-doubling switch. Wt. 8/shpg. 14 lbs.

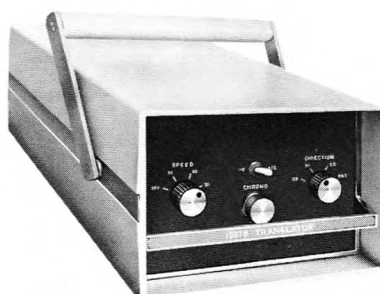
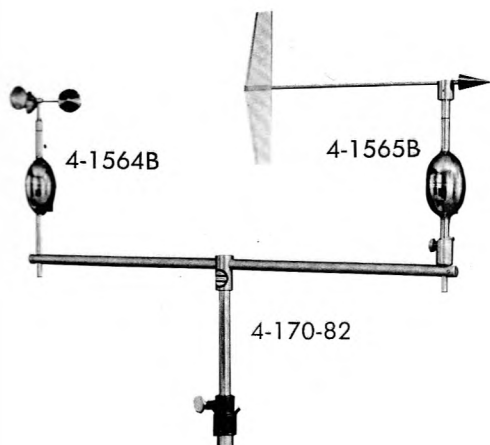
No. 438-115. Translator for use with 115v. a.c. **\$475.00**

No. 438-12. Translator for use with 12v. d.c. **\$450.00**

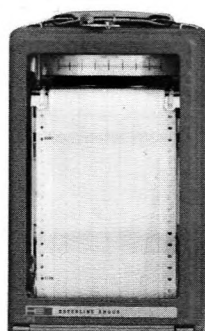
No. 422. MOUNTING CROSSARM **\$43.00**

Accessories: Chart roll \$ 2.00 ea.
Replacement Cup Assembly for No. 436 25.00 ea.
Replacement plastic cup inserts for No. 43675 ea.
Replacement Direction Vane for No. 437 10.00 ea.
Recorder pens: direction/speed 5.00 ea.
Recorder ink 4.40 pt.
Cable: 3-cond. for speed10 ft.
10-cond. for direction20 ft.
Six digit, manual reset counter for No. 436-C \$30.00

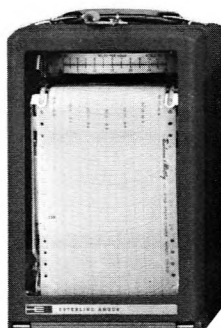
GEOTECH Wind Recording System



4-1567B



4-81C



4-81A

No. 490. TELEDYNE/GEOTECH WIND SYSTEM. This system, originally a product of Beckman and Whitley, has undergone numerous engineering changes and improvements. It is adaptable to a wide range of micrometeorological studies and atmospheric pollution programs involving field installations and permanent sites, recording, telemetering, and data processing. The suggested list of equipment includes an AC/DC Translator with an internal 12v battery that can supply power for approximately 1 week. Signal Processors can be substituted for the Translator, to supply a voltage or current for telemetering or data processing.

The anemometer, which incorporates three plastic cups, has a threshold of 0.6 mph, a distance constant of 5' of air, and a frequency to speed output of 0.7 milliwatts of audio into 600 ohms. It operates on a nominal 12v dc at 30 ma supplied by the Translator.

Wind direction is detected by a vane that has a threshold of 0.7 mph and a damping ratio of 0.4 at a 10° initial angle of attack; the distance constant is 3.7' of air.

The Wind Speed/Wind Direction Translator has selectable full scale ranges of 30/60/90 mph, and a switch for energizing optional event pens in the recorders. The Translator supplies two 0/1 ma signals for use with galvanometric recorders of 1400 ohms each. Standard charts for the recorders are time marked for 3"/hr., last approximately 2 weeks.

No. 4-1564B. Wind Speed Transmitter, plastic cup assembly #4-170-41, and 25' cable #4-M2525 to translator. **\$365.00**

No. 4-1565B. Wind Direction Transmitter, Quick 2 vane assembly #53.2, and 25' cable #4-170-440-11 to translator. **\$400.00**

No. 4-1567B. Wind Speed/Direction Translator, AC/DC, 30/60/90 mph and 0/360° with 15' power cable #M3338 (Alternate Translator #4-1567B-1 covering 0/540° direction available @ \$645.00). **\$550.00**

No. 4-170-70. Nine-foot Instrument Mounting Tripod. **\$125.00**

No. 4-170-82. Instrument Adapter Crossarm, 40" long. **\$50.00**

No. 4-81A. Wind Speed Recorder, portable case, 30/60/90 mph scales, 8-day springwound chart drive is standard, 110v 60Hz drive on request (event pen for chrono. \$45.00 extra). **\$615.00**

No. 4-81C. Wind Direction Recorder, as above, for 0/360°. (Alternate recorder No. 4-81D for 0/540° @ \$595.00). **\$615.00**

Total System with technical manual. \$2,720.60

Optional Equipment:

4-40 Signal Processing Module Assembly: AC/DC power unit (110/220v 50/60Hz with standby battery pack), speed unit 30/60/90 mph, and direction unit 0/540° (both with outputs of 0/1ma and 0/5v dc).

Parts and Accessories:

No. 4-170-41 Cup assembly, plastic, aluminum coated, for 4-1564B. **\$1,290.00**
\$55.00

4-17042 Cup assembly, stainless steel, for 4-1564B **80.00**

4-53.4 Quick 2 Vane for 1565B **90.00**

4-145100 Wind Speed Charts, 30/60/90 mph, 3"/hr. **2.50**

4-145101 Wind Speed Charts, 30/60/90 mph, 6"/hr. **2.50**

4-145102 Wind Direction Charts, 0/360°, 3"/hr. **2.50**

4-145103 Wind Direction Charts, 0/360°, 6"/hr. **2.50**

4-145147 Wind Direction Charts, 0/540°, 3"/hr. **3.50**

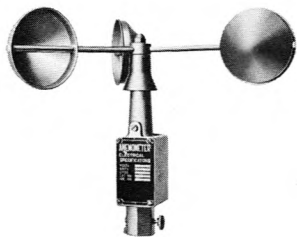
4-145148 Wind Direction Charts, 0/540°, 6"/hr. **3.50**

4-150454 Retrofit Kit, to extend range of Direction Transmitter #4-1565B from 0/360° to 0/540°. **145.00**

Event (chrono) pen, 12v dc standard, mounted in recorder. **45.00**

Flush-mounted recorders, add to base price **\$30.00**

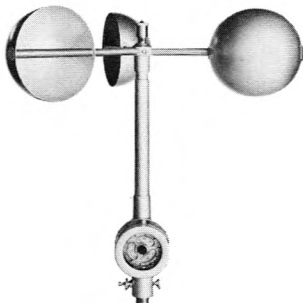
Cup Anemometers



402

No. 402. ANEMOMETER, small airways-type, non-totalizing. U.S.W.B. Spec. #450.6103, Rev. 10/1/64. Three conical cups of 2 $\frac{3}{4}$ " diameter mount on a rotor with a turning diameter of 12 $\frac{1}{2}$ ". Operates on 12v. $\frac{1}{2}$ amp. max. D.C. or A.C. Electric contact closes for each 1/60th-mile of wind. Starting speed 3 mph. Accuracy ± 1.5 mph to 70 mph. Will operate a remote electric counter or a flashing light indicator. Frequent contact closures at standard chart speeds make recording illegible, except when used with customer-furnished stepping relay. Overall height 8 $\frac{1}{4}$ ". Replacement Cup Assembly \$17.55. Wt. 2/shpg. 5 lbs. **\$85.00**

No. 402A. Contact closure for each 1/12th mile of wind. **\$85.00**



403

No. 403. ANEMOMETER, contacting, dial-totalizing type. Rotor with three hemispherical cups of 5" diameter mounts on a spindle enclosed in a housing. Rotor diameter is 17". A contact closes for each full mile of wind passing a station. This registers on a mechanical totalizing dial (circular) mounted on the housing; registers to 999 miles. Also contains binding posts for electrical transmission of contacts to a remote counter or event recorder. For mast mounting, requires No. 403P Pintle—\$8.50 additional; for surface mounting, requires No. 403S Flanged Base Stand—\$9.00 additional. Requires 6v. A.C. or D.C. Overall height 21 inches. Replacement Cup Assembly \$37.00. Wt. 5/shpg. 10 lbs. **\$250.00**

No. 403A. ANEMOMETER. Same mechanism as above but has both one mile and $\frac{1}{60}$ th mile contacts. Will operate a flashing light indicator, electric counter, or an event recorder. **\$265.00**

No. 403Km. Same as No. 403 with contact closure for each kilometer of wind. **\$281.00**



404

No. 404. ANEMOMETER, contacting, counter-totalizing type, fabricated to U. S. Weather Bureau Spec. #450.6104, Rev. 10/1/64. Three conical cups of 4 $\frac{1}{2}$ " diameter mount on a rotor with a turning diameter of 17". A contact closes for each full mile and each 1/60th mile of wind. Starting speed 2 mph. Accuracy ± 1.5 mph to 70 mph. A direct-reading, totalizing, mechanical counter (digital) reading to 10,000 miles is a distinctive feature. Has binding posts for electric transmission to a remote event recorder and a remote flashing light indicator. Maximum power requirements: 12v., $\frac{1}{2}$ amp., A.C. or D.C. Mounts on pintle, #404P, \$8.50 additional. Replacement rotor assem. \$35.00. Replacement counter, \$15.00. Overall height 17 $\frac{1}{2}$ ". Wt. 6/shpg. 10 lbs. **\$212.50**

No. 404K. Contact closure each knot and $\frac{1}{60}$ th knot. **\$212.50**

No. 404Km. Contact closure each kilometer and $\frac{1}{60}$ kilometer. **\$212.50**



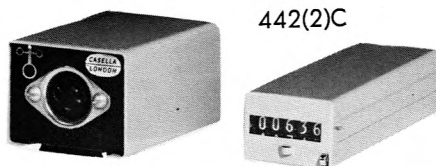
406

No. 406. WIND SPEED TRANSMITTER. A direct current, permanent magnet generator, with cup-wheel starting speed at approximately 2 mph, has output voltage directly proportional to cup-wheel rotation. Output: 5.0v. D.C. open circuit at 100 mph, and linear. Internal resistance is 40 ohms. Conical cups of copper construction have diameter of 4 $\frac{1}{2}$ "; rotor turning diameter 17". Housing made of durable bronze. Mounts on unthreaded IPS 1 $\frac{1}{4}$ " pipe. Usable in winds to 170 mph. Requires no external power source. For use with No. 471 Recorder or No. 491B Wind-Warner. Replacement of standard rotor assembly with copper cups, \$24.00. For transmitter with stainless steel cups, add \$40.00 to base price. Wt. 5/shpg. 10 lbs. **\$179.00**

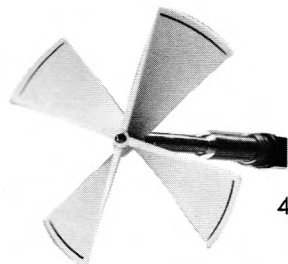
Sensitive Anemometer



442(2)A
442(2)B



442(2)C



452-1



452-2

No. 442(2). SENSITIVE ANEMOMETER. This anemometer again updated to include developments in solid-state circuit techniques, is based on a design by Prof. P. A. Sheppard of England. It has a starting speed of 0.1m/sec. (0.2 mph), a linear calibration, and "near freedom from over-estimation in gusts." A simple amplifier and a five figure non-resetting counter, with a customer-furnished 12v dc 100 ma supply, makes this anemometer usable in programs where commercial power is not available.

The small light aluminum rotor assembly is made as in earlier models, having an 8" diam. with three conical-shaped cups, each 2 1/8" diam., with beaded edges. The main spindle runs in synthetic jewel bearings and fitted to the lower end is a light non-metallic disc with an opaque sector—this prevents the light of a miniature lamp from falling onto a photo cell during one half of each cup rotation. A Schmitt trigger circuit, combined with an amplifier—both mounted in the plastic enclosure at the base—provide constant height pulses irrespective of wind speed, over a wide range of temperatures, $-40^{\circ}/+55^{\circ}\text{C.}$ ($-40^{\circ}/131^{\circ}\text{F.}$). The anemometer is supplied in a 12" x 9" x 4" wooden carrying case. Range: 0.1/15m/sec. (0.2/34 mph).

For proper operation, the voltage supply to the anemometer should not drop below 8v; the 2cond. shielded cable should have a loop resistance of not more than 25 ohms; the distance between anemometer and counter can be up to 1000 ft. Neither the anemometer or amplifier described here can be connected to previous models.

No. 442(2)A. Sensitive Anemometer in carrying case with **individual** calibration chart in m/sec. and ft./sec. Wt. (in case) 4 1/2/shpg. 7 lbs. **\$277.00**

No. 442(2)B. As above, with **standard** calibration chart (mean of over 100 anemometers), with error limited to $\pm 2\frac{1}{4}\%$ max. speed. **\$257.00**

No. 442(2)C. Amplifier, with separate 5-digit counter. Wt. 1/2/shpg. 11 lb. **\$87.00**

Accessories: Replacement cup rotor assembly, \$17.00; 5-digit counter, \$13.00.

No. 452. GILL PROPELLER ANEMOMETER AND INDICATOR. Sensitivity and accuracy are inherent in the design of this air speed measuring equipment, built for use indoors in closed systems, or outdoors in the natural wind. The foamed polystyrene propeller, with a threshold of 0.3/0.5 mph and a distance constant of 3.1 ft., drives a miniature dc tachometer generator. Measurements can be made of forward and reverse air flow over the range 0/50 mph; the response of the propeller, a close approximation of the cosine law, is a function of its orientation to the wind. At 1800 RPM the generator, with an internal resistance of 24 ohms, has a nominal output of 500 mv, equivalent to 21.3 mph. The combination Propeller Anemometer and Indicator consists of Nos. 452-1 and 452-2. Wt. 5/shpg. 7 lbs. **\$257.00**

No. 452-1. GILL PROPELLER ANEMOMETER—overall length 18", diameter of propeller 9"; mounts on 3/4 NPT. Wt. 1/3 lbs. **\$148.00**

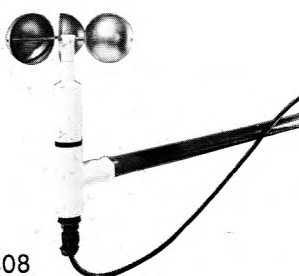
No. 452-2. ANEMOMETER INDICATOR—a two direction, forward and reverse air flow Indicator-Translator, with dual range 25/0/25 and 50/0/50. Unit contains calibration adjustments for ranges and independent adjustment for use with recorder. Supplied with 50' 2-cond. cable, additional lengths \$0.05/ft. Wt. 4/shpg. 5 lbs. **\$109.00**

Cup Anemometers



405

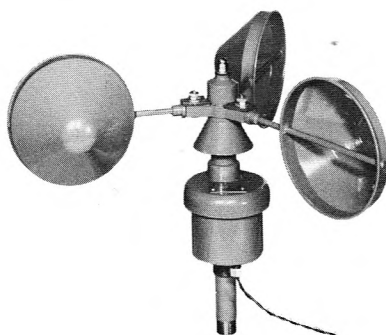
No. 405. CASELLA, CUP COUNTER ANEMOMETER. Made to a British Meteorological Office specification, this instrument indicates on an easy-to-read, sloping, six-digit counter the total "run of wind" to 9999.99 statute miles. Average wind speed is determined by dividing counts by elapsed time. Accuracy of wind speed measured is better than 1 mph from 5 to 90 mph. Brass, copper, stainless steel, and plastics are used to ensure freedom from corrosion and a long-working life. The only maintenance required is annual lubrication of the top spindle bearing, other bearings are self-lubricating. Three conical cups with beaded edges measure 5" (12.7 cm) in diameter; with the detachable arms mounted to the central boss they have a turning radius of 9". The overall height of the anemometer is 12". To facilitate mounting, the base connector is threaded for 1/2" pipe. Wt. 8/shpg. 13 lbs. **\$165.00**



408

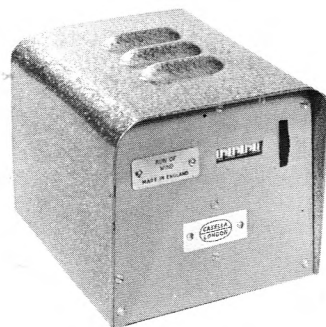
No. 405K. Same as 405, with counter reading in nautical miles, knots. (Also available as No. 405Km, kilometers). **\$175.00**

No. 408. GENERATOR ANEMOMETER, CUP TYPE. An aluminum cup anemometer designed for special studies, compatible with millivolt or galvo analog recorders, tape recorders, and A/D converters. The miniature tachometer generator assembly has a threshold of 1/1.2 mph; a distance constant (63% recovery) of 8.9 ft. With an internal resistance of 71 ohms, the generator has a linear voltage output, approx. 2400 mv at 1800 rpm, or 50 mph. Life expectancy in excess of 750 million revolutions, or 2/4 years of normal operation over 0/100 mph. Mounting bracket for anemometer fits 3/4" NPT. Wt. 1 1/4/shpg. 3 lbs. **\$138.00**



481

No. 481. DIGITAL READ-OUT ANEMOMETER. A conical cup anemometer employs a contacting device which permits remote digital readout at one or more locations. Anemometer rotor measuring 18" in diameter consists of three conical cups, each 5" in diameter. Overall height of cups and housing 12". A unique construction feature permits both cups and rotor arms to be detached from central spindle for easy storage and transportation. Design of anemometer ensures constant contact time with no chance of switch remaining in "on" position. Contact closure each 0.1 mile. Glass reed switch rated at 250v. max., 1.0/3.0 amps, ac or dc. Switch life, 10 million operations. Corrosion-free construction. Upper bearing requires lubrication once each year; others are self-lubricating. Accuracy better than 1 knot between 5/80 knots. Mounts on 1/2" BSP male pipe thread. Read-out in mph or knots; specify one. Wt. 6 1/2/shpg. 10 lbs. **\$135.00**



481-A

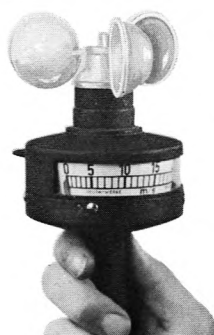
No. 481-A. TOTAL WIND RUN INDICATOR. The counter operates continuously with No. 481 Anemometer so that total number of miles or knots passing a station in a period time may be read off visually at a remote location. Counts up to 9999. If counter is read hourly, the average wind speed for each hour may be quickly determined by reference to a table. Wt. 4/shpg. 7 lbs. **\$75.00**

No. 481-B. POWER SUPPLY. Housed in case matching 481-A. Input 105/250v 50/60Hz; output 12/24v ac in 2v steps. Wt. 8/shpg. 11 lbs. **\$49.00**

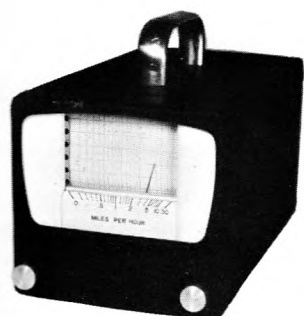
Portable Anemometers



443



444



439



No. 443. HAND-HELD WIND MEASURING SET. A hand-held instrument for indicating wind speed from 0 to 60 knots and direction through 360 degrees. Constructed to meet Specification MIL-W-55153 (Sig C); starting speed 1.0 knot; accuracy 3% of full scale; voltage output at 40 knots is 4.45v. d.c. and near linear; direction accuracy ± 2 deg.; direction sensitivity 5k at 5 deg.

Wind direction is determined by a balanced twin-tail vane and pointer assembly which rotates about a fixed 360 deg. etched direction dial. A trigger assembly in the pistol-grip handle allows the direction vane to rotate, but if the trigger is released, the direction vane is locked in any given position. A two-pole sight is provided on the instrument for proper alignment with any reference point.

Wind speed is measured by a three-scoop rotor, turbine-type, which is enclosed in a protective cage. The bearing-pivoted rotor drives a small dc generator with a wind speed readout in knots. Full scale is 0 to 15 knots, or by pressing the range switch, 0 to 60 knots.

The hand-held instrument measures 18 $\frac{5}{8}$ inches high and 8 $\frac{1}{2}$ inches in diameter at the vane assembly. Each instrument supplied in a sturdy case 22" long x 11 $\frac{1}{16}$ " wide x 7 $\frac{1}{2}$ " high, with spare wind speed rotor and spare direction vane. Additional rotor assemblies at \$72.00 ea.; vane assemblies \$11.25 ea. Wts: Instrument—3 lbs. 8 oz., Case—21 lbs./shpg. 31 lbs. **\$345.00**

No. 444. HAND ANEMOMETER. Convenient wind speed indicator. When held at arm's length, reads wind speed directly in miles per hour. The balanced three-cup rotor employs a magnetic-drag mechanism to transmit readings to the nearly uniform semicircular scale. Cup diameter 1 $\frac{1}{2}$ ", rotor diameter 3". Range 0/60 mph. Metric scale available on special order. Starting speed approx. 2.2 mph (1 m/sec.). Accuracy $\pm 3\%$. Provided with handle and rest, overall height 7 $\frac{1}{2}$ "; packed in a strong wooden carrying case. Replacement Cup Assembly—\$2.75. Anemometer weight 1 lb.; with case 2 $\frac{1}{2}$ lbs./shpg. 5 lbs. **\$79.00**

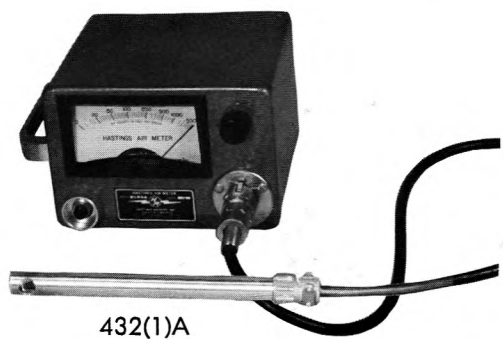
No. 439. MINIATURE AIR VELOCITY INDICATOR/RECORDER. A sensor-recorder combination designed for field research studies dealing with low velocity wind measurements, in the range 0/30 mph. The logarithmic scale on the galvanometric recorder means excellent resolution at low speeds; the omnidirectional probe, a heated thermopile that is temperature compensated, is built for fast response measurements of horizontal (± 30 deg. in vertical plane) air movement.

A single chart roll of pressure sensitive paper, operated at the standard speed of 1"/hr., lasts 31 days. It is 2 $\frac{5}{16}$ " wide with the 1.2 mph marking about midscale, and 30 mph at full scale. The galvanometer pointer is clamped against the paper every 5 sec., making a permanent mark. Although usually supplied with a 12' cable, the 1 $\frac{1}{4}$ " diam. probe on top of a 12 $\frac{1}{2}$ " long tube can be supplied with cable lengths up to 100'. Power requirements to the 4 $\frac{1}{2}$ " x 3 $\frac{1}{16}$ " x 8 $\frac{1}{2}$ " recorder with self-contained circuitry are 115v 60Hz. Spare charts, #25-1-68, 0/30 mph, \$15.00/pkg. of 6. Extra cable lengths: 12' (\$7.00), 50' (\$11.00), 100' (\$17.00). Wt. 7/shpg. 12 lbs. **\$370.00**

Air Meters



431



432(1)A
&
432(1)B



432(1)C



434

No. 431. AIR VELOCITY & TEMPERATURE METER. A portable instrument designed for the measurement of air velocity, air temperature, and surface temperatures—a transistorized, hot wire, constant-resistance type. One probe, connected by 8 ft. of cable, is used for air velocity and temperature; a second probe with 6 ft. of cable is used for surface temperature.

The meter range covers 0-4000 fpm on three scales: 0/1000, 1000/2000, and 2000/4000 fpm. Accuracy on first scale is $\pm 5\%$ of reading plus 10 fpm. From 1000 to 4000 fpm accuracy is $\pm 5\%$ of reading. Range of temperature scale is 20° to 220°F.; accuracy is $\pm 2^\circ\text{F}$.

Air velocity-temperature probe is stainless steel, $\frac{3}{8}$ " diam., and 9" long with removable tip supporting platinum filaments. Spare probe sensor tip supplied with each unit. Front panel jack provided for plug-in to any recorder having input impedance of 2000 ohms or higher, 0/1v full scale. Carrying case is 6½ x 7½ x 11½ inches. Wt. 6/shpg. 10 lbs.

No. 431-1. AIR VELOCITY & TEMPERATURE METER, powered by rechargeable nickel cadmium batteries. **\$575.00**

No. 431-2. Same, powered by 115v. 50-60 Hz. **\$575.00**

No. 432(1). HEATED THERMOPILE AIR METER. An improved model of an earlier air meter—portable, compact, reliable, and rapid-responding which incorporates solid-state circuitry and operates on two Size D batteries. Available in three ranges: 0/100 fpm, 0/5000 fpm, and 0-30 mph—all scales are logarithmic for high resolution at low speeds. Probes designed for varying applications.

A low voltage A.C. bridge circuit has two noble metal thermocouples as sensing elements. The thermocouples are heated by alternating current. A change in air flow causes a change in the temperature of the couples, resulting in a D.C. output to the meter. A third thermocouple between the meter and the two heated elements corrects for ambient temperature changes.

Dimensions of indicator case: 6½" x 3½" x 6", supplied with leather carrying case. For additional lengths of cable to probe add \$7.00/12 ft. Wt. 3/shpg. 6 lbs.

No. 432(1)A. Scale 0/100 fpm with straight probe ¼" x 6", and 2' cable. **\$230.00**

No. 432(1)B. Scale 0/5000 fpm with straight probe ½" x 6", and 2' cable. **\$180.00**

No. 432(1)C. Scale 0-30 mph with omnidirectional probe 1¼" dia. head, on ⅜" dia. stem, 12½" long, and 12' cable **\$210.00**

No. 434. PRECISION AIR METER. For highest accuracy and sensitivity in air velocity measurements, out-of-doors or in the laboratory—a heated thermopile air meter with a choice of scales, a choice of probes, and wired with terminal posts for later use with a recorder of 1000 ohms or more, 2.5mv. full scale. This solid-state precision device, built to the same operating principle as Catalog No. 432-1, requires 115v. 50/60 cycles Hz; internal voltage regulation permits operation from 95 to 130v. at 10 watts.

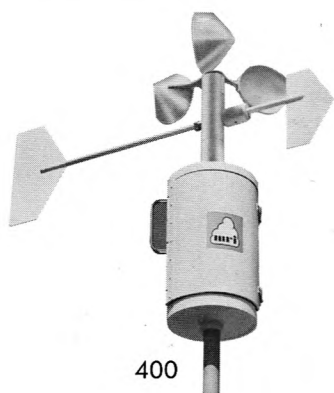
Separate logarithmic scales for low and high ranges on large 7-inch precision meter with knife-edge pointer and mirror scale. Multiple probes can be used with Selector and Balancing Unit at additional cost. Indicator case 14" x 10" x 7". Wt. 8/shpg. 11 lbs.

No. 434A. Scale ranges 0/5 and 5/100 mph with ¼ x 12" directional probe, 12 ft. cable. **\$495.00**

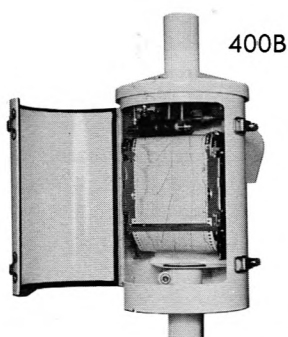
No. 434B. Scale ranges 0/500 and 500/10,000 fpm with omnidirectional probe 1¼" dia. head, ⅜" stem 12½" long, 12 ft. cable. **\$490.00**

Accessories: Spare directional probe \$75.00
Spare horizontally-omnidirectional probe \$60.00
Extension Cable, per 12 ft. length \$ 7.00

Mechanical Weather Station



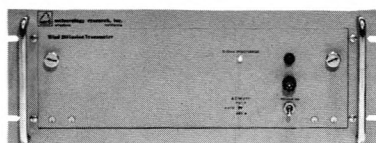
400



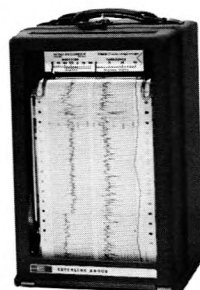
400B



458-A



458-B



458-C

No. 400. MECHANICAL WEATHER STATION. A self-contained and portable weather station for recording wind direction, wind run, and temperature. Alternate model includes rainfall. System supplied with choice of chart drives: a battery-wound spring system (2 size-D cells) and gears to operate at a travel time of 10mm/hr, (approx $\frac{3}{8}$ "/hr) so that one chart roll lasts 65 days; a battery-wound system, operating at 20mm/hr ($\frac{3}{4}$ "/hr) so that one chart roll lasts 32 days; or, a hand-wound spring drive operating for 35 days. All operate attention-free, producing a rectilinear record on inkless paper that is easy to interpret; average wind speed obtained by means of plastic overlay. Each station complete with a rugged, watertight steel storage/transit case, 14 x 14 x 29".

Starting threshold of 4½" diam. conical cups and dynamically balanced vane is less than 0.5 mph. Response distance of cups 8 feet, for 63% recovery. Overshoot of vane less than 12%. Shielded bimetal-coil temperature sensor has selectable and field adjusted dual range: -80 to +60°F. and -20 to +120°F. Accuracy $\pm 3^\circ\text{F}$.

Alternate model mechanical weather station supplied with 8" diam. tipping bucket rain gage. Resolution: .01", with 0.1"/recording cycle.

No. 400A. System with Wind Direction, Wind Run, and Temperature: select chart drive type and chart speed. Wt. 45/shpg. 60 lbs. **\$1,965.00**

No. 400B. System includes above, and rainfall with No. 557 Tipping Bucket Rain Gage (See p. xx for gage and accessories) select chart drive type and chart speed. **\$2,190.00**

Accessories: Chart paper, pressure sensitive, 52' long (specify 10mm/hr., or 20mm/hr.) \$9.50/roll; Tripod Mast, adjustable 5-8', \$35.00.

No. 458. WIND DIFFUSION RECORDING SYSTEM. This instrument system has been designed to provide important diffusion data, especially for applications in air pollution. The cups and vane are identical to those used in No. 400, but the modified housing components provide an electrical link, through a transmuter, to a recorder with two analog channels and one special, cycling-type, event channel. On a single 6" wide chart, information is available for: wind direction in a 540° format; turbulence, expressed as the standard deviation (deg. Sigma) of direction; wind run, in a ten-step cycle equal to a mile of wind flow. Power requirements: 115v 50/60 Hz 10w. System includes items listed below: cup and vane sensor assembly, transmuter, recorder, and 50' of cable. Tripod support is \$35.00 extra. Wt. 60/shpg. 85 lbs.

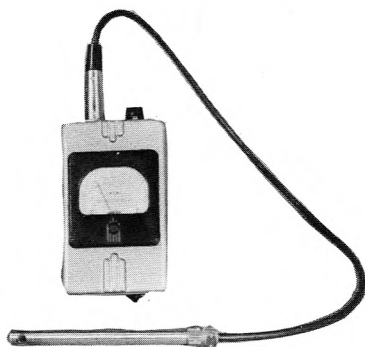
No. 458-A. Cup and vane sensor assembly with 50' cable. **\$590.00**

No. 458-B. Transmuter. **\$1,300.00**

No. 458-C. Recorder, 2-channel, with special event marker for speed—portable case, ac chart drive. **\$1,100.00**

Complete system \$2,990.00

Air Flow & Wind Speed

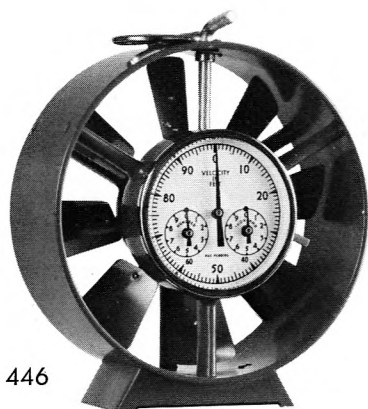


433

No. 433. UTILITY AIR METER. A compact, fast response, ac-operated air meter designed for reliability and low cost, with applications in education, research, and industry. The direct reading scale covers a wide range, 0/6000 fpm; its logarithmic construction provides for excellent readability at low velocities, 5/500 fpm. Accuracy is not affected by ambient temperature changes.

As in other air meters of this type, the "heated thermopile" principle is used. The $\frac{1}{2}$ " diam. x $5\frac{1}{2}$ " long stainless steel probe is supplied with 2' of cable. Power requirements: 90/135v 50/60Hz; 0.11 amps, 1.2 watts. Meter dimensions: $3\frac{3}{8}$ x $5\frac{1}{2}$ x $2\frac{1}{2}$ ". Wt. 24 oz./shpg. 3 lbs. **\$90.00**

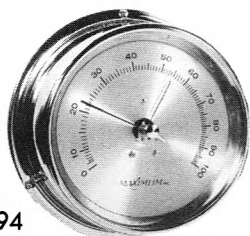
Spare Parts:	Snake probe	\$40.00
	Wooden carrying case	10.00
	Constant output voltage transformer, 60Hz	25.00
	Extension cable, 12'	7.00



446

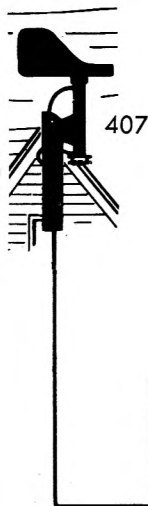
No. 446. AIR METER, Birams anemometer type. Portable meter registers air flow through a duct or opening. Vertical fan spins on horizontal shaft which is attached to totalizing dials. Will register speeds from 200 to 3,000 feet per minute. Three dials total to 10,000 feet. A disconnecter and automatic zero-setting device are provided. Fan has jeweled movement. Diameter four inches. Complete with carrying case and individual correction chart. Wt. 2/shpg. 5 lbs. **\$135.00**

No. 446A. Same, for speeds 1,000 to 10,000 feet per minute. Three dials total to 200,000 feet. **\$180.00**



494

No. 407. WIND SPEED GAGE. A practical, durable, and low cost sensor and indicator assembly for measuring wind speed, using the pitot tube principle employed in industry and aviation. Prevailing winds turn the vane so that wind pressure, dynamic and static, is transmitted through double vinyl plastic tubing, coded for attaching to the indoor indicator. Red fluid moves up and down a sloping scale, calibrated in both MPH and Beaufort Scale designations. Indicator, made of gray Tenite plastic, is approx. $7\frac{1}{2}$ " x 6" x 1". Outdoor vane is 7" wide x 16" high. Complete with instructions, mounting hardware, red fluid, and 50' tubing. Wt. 3/shpg. 5 lbs. **\$25.00**



407

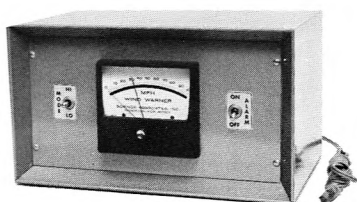
No. 494. MAXIMUM WIND INDICATOR. A new anemometer-indicator combination, similar to some standard instruments because wind speed is displayed continuously, but different in that a second pointer, or gust register, indicates the maximum wind. The gust register is displaced up-scale by increases in wind speed; it can be reset down-scale by turning the knob in the center of the glass-covered dial. A $6\frac{1}{2}$ " diam. brass case is standard (chrome \$10. extra), with a dial calibrated 0/100 mph (knots, on request).

The anemometer, supplied with 60' of 20AWG, 2-cond. cable, is made of molded Lexan plastic. It has been wind tunnel tested to winds of 110 mph, with excellent performance. No external power is required; the rotation of the cup assembly produces an ac voltage, linear with wind speed. Overall system accuracy $\pm 3\%$ of full scale. Wt. 2/shpg. 5 lbs. **\$135.00**

Wind Controllers



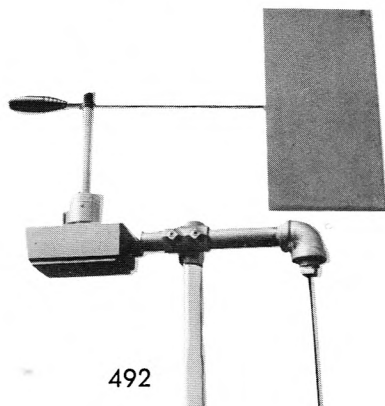
406



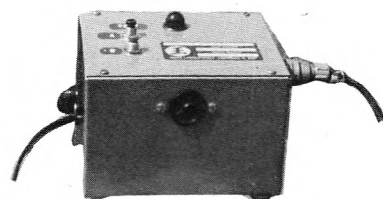
491(1)



4-120



492



492

No. 491-(1). WIND-WARNER. An instrument designed for dual service—to indicate wind speed, as measured by one of two standard anemometers, and to control auxiliary equipment at a pre-selected figure designated in miles per hour. Design improvements over an earlier model include a new meter relay that controls through fiber optics, without contacts and with solid state electronics. The controlled device can be turned on or off, either above or below the manually selected set point. Scale range and control range are 0/100 mph. A 5-sec. thermal time delay relay is used to reduce chatter in the alarm system when the wind speed fluctuates at the control point. Alarm relay rated at 3 amp. Requires 115v ac. Cabinet for table mounting: 13¼ x 7½ x 9 inches. For applications where shock and vibration are expected, specify "taut band meter" and add \$25.00.

No. 491(1)A. WIND-WARNER for use with No. 4-120 Aerovane Transmitter (see p. 41). **\$279.00**

No. 491(1)B. WIND-WARNER for use with No. 406 Cup Anemometer (see p. 50). **\$279.00**

No. 492. WIND DIRECTION CONTROL SYSTEM. Research and industrial organizations often require the selective operation of equipment as related to wind direction. When the power cord on the control box is plugged into a 115v ac receptacle, the system is ready to operate and supply power to any equipment plugged into the box receptacle. It is rated at 10 amp. A switch closure occurs whenever the wind is from the direction selected by the sector ring.

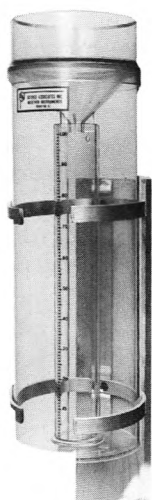
Special characteristics of the system include a light but sturdy, low inertia, dynamically-balanced vane; a vane threshold of 0.45 mph; a choice of control sector angles; and an actuation time delay to eliminate the destructive effects of on-off chatter.

The vane assembly, the sector box with mounting arm, an 8-foot tripod mast assembly, and 50 feet of cable make up the outdoor parts. A component control box, 6 x 5 x 4 inches, which houses the power relay, the time delay device, and two test switches, is located indoors.

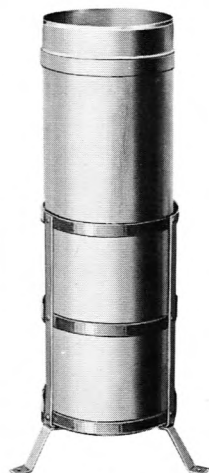
A standard time delay of 10 seconds is supplied with each system. If the application requires another time period, please specify one of the following: 2, 3, 5, 15, or 20 seconds. A choice of one actuation angle should be made at the time of ordering: 30, 45, 60, 75, 90, or 150°. Wt. 25/shpg. 35 lbs. **\$260.00**

Accessories & Parts: Extra Sensor Ring of specified angle, \$30.00. Additional 5-ft. mast extension with clamp, \$7.50. Reset Operations Time Meter on Control Box, \$45.00

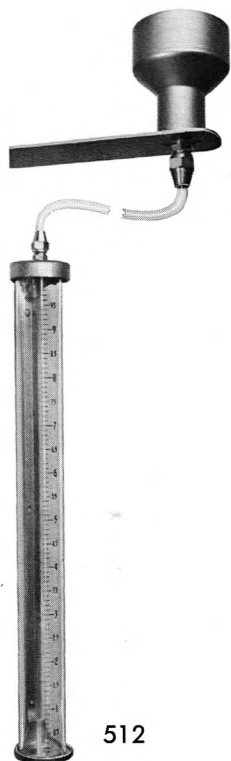
Precipitation



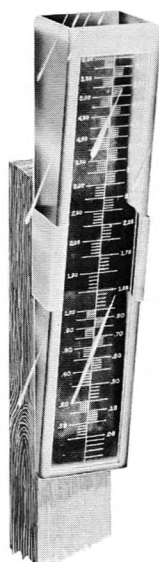
502



503
&
504



512



510

No. 502. CLEAR-VU RAIN GAGE. An accurate, direct-reading gage for both rain and snow measurements. Employs a four-inch diameter funnel. Inner tube capacity is one inch rainfall; overflow gives capacity of 10 inches. Graduations to .01" moulded in bold relief. No measuring stick required. Made of butyrate plastic for long life without discoloration or "checking." Complete with mounting brackets made of stainless steel. Wt. 2/shpg. 5 lbs. **\$18.00**

No. 502M. Same as above, calibrated in metric scale: over-all capacity approx. 280 mm. Inner tube marked in 0.2 mm divisions for total of 25.4 mm. **\$18.00**

No. 503. RAIN AND SNOW GAGE. U. S. Weather Bureau Spec. No. 450.2301. Standard in all meteorological and climatological stations in the United States. Gage consists of four components: 8-inch brass collector and funnel; copper overflow can, 24 inches over-all height; brass inner measuring tube 2.53 inches in diameter and 20 inches deep; and an improved laminated plastic measuring stick with graduations to 0.01 inch. Gage has total rainfall capacity of 20 inches. Tripod not included. Wt. 12/shpg. 17 lbs. **\$75.00**

Accessories:	No. 503A	Measuring Stick	\$ 1.75
	No. 503B	Funnel Collector	\$35.25
	No. 503C	Outer Can	\$34.75
	No. 503D	Inner Brass Tube	\$17.50

No. 504. SUPPORT FOR RAIN GAGE. Steel strip support of galvanized metal rests on tripod to insure correct position and safe exposure for No. 503. Mounting diameter 14½ inches. Wt. 4½/shpg. 7 lbs. **\$8.50**

No. 510. FARM RAIN GAGE. Convenient, direct-reading rain gage for use in above-freezing temperatures. Unit can be exposed on any fence post or similar support. Made of clear plastic with impressed graduations. Expanded scale at bottom shows small amounts of rainfall. Capacity six inches. Over-all length 13 inches. Complete with metal bracket for mounting. Wt. 8 oz./shpg. 2 lbs. **\$4.00**

No. 512. REMOTE VISUAL RAIN GAGE. Quick measurements of rainfall at window or indoor location are possible with this device which is fabricated to U.S. Weather Bureau Spec. No. 450.2112. The instrument consists of a receiver, measuring tube, connecting tubing, and a 24" long bracket. The measuring tube has a capacity of 10" rainfall and is 23" in height. Rainfall is magnified in a 2:1 ratio for more precise readings. The receiver may be fastened directly to the measuring tube, or located at a remote point above it and connected with a plastic tube free of loops or pockets so that no rainfall is trapped. Complete with bracket and 10 feet of plastic tubing. Extra tubing, 15¢/ft. Wt. 6/shpg. 10 lbs. **\$36.50**

Accessories:	512A	Measuring Tube	\$20.00
	512B	Measuring Tube Support	\$ 2.50
	512C	Receiver	\$15.00

Recording Rain Gages



551
&
551A

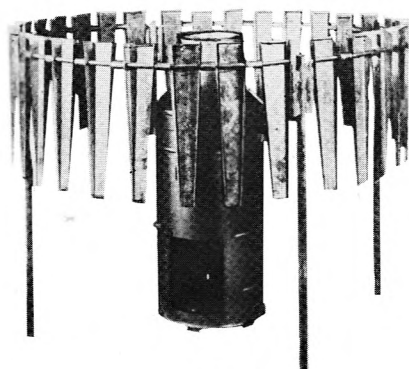
No. 551. RECORDING RAIN AND SNOW GAGE. U.S. Weather Bureau Specs. Nos. 450.2201 and 450.2203. An 8-inch diameter knife-edge collector directs the rainfall catch to a galvanized bucket mounted on a weighing mechanism. The scales activate a pen arm which makes a dual traverse, 6 inches up and 6 down, across an open scale chart attached to a chart drum, rotated by an 8-day, hand-wound clock mechanism. One inch of chart records one inch of rainfall. Expanded scales for total capacity of 20 inches on request.

Charts measure 6 inches vertically for rainfall and 11½ inches horizontally for time. Choice of interchangeable gears to provide recording periods of 6, 12, 24, 48, 96 and 192 hours. Can also be supplied with battery chart drive for 360°, 168-hour (continuous rotation) weekly, or 24-hour daily. Specify time period when ordering, but extra gears available for all periods. Entire recording mechanism is housed in a weather-proof case constructed of non-ferrous, corrosion-resistant alloy. Gage may be used in below-freezing temperatures with proper chemicals to melt frozen precipitation. Complete with pen, ink, and 100 charts. Dimensions: diameter 14½ inches; height 36 inches. Wt. 25/shpg. 40 lbs. **\$340.00**

No. 551-31BP. Same as above, supplied with 31-day chart drive, battery-powered, with 25 thirty-one day charts for travel of approximately ⅝" per day. For battery powered drive, 168 hr. continuous rotation, specify No. 551-168BP. **\$383.00**

Accessories: Charts, daily or weekly, \$5.00/100; No. 551-168, \$7.60/100; monthly for daily travel of approx. 5/16" \$5.00/25. Ink \$2.25/1 oz. bottle. Gears, daily or weekly, \$4.75/set; monthly \$5.00/set. Chart drives: battery-powered for 31-day period or 168 hr. continuous rotation, \$86.00; spring-wound \$80.00. Chart cylinder only \$15.00. Dashpot fluid (silicone base) \$6.00 bottle. Calibration weights with stand for 12" capacity \$42.50. Pen No. 3-LS \$4.00; greater capacity pen No. 18W \$9.25.

No. 551A. ANCHOR BASE for Nos. 551 & 552. Aluminum tripod base permits bolting of rain gage to platform or concrete foundation. Wt. 2/shpg. 4 lbs. **\$8.50**



505-1

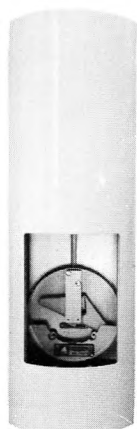
No. 552. REMOTE TRANSMITTING RAIN AND SNOW GAGE.

This design employs the precipitation weighing mechanism of No. 551, but has been modified for the transmission of data to a remote point. Recorder drum and pen arm have been replaced so that the weight of collected precipitation (1" rainfall at 62.5° equals 29 oz. for a collector with 8" diameter) is transferred through a lever and gear system to a low-torque 25,000 ohms precision potentiometer. **\$402.00**

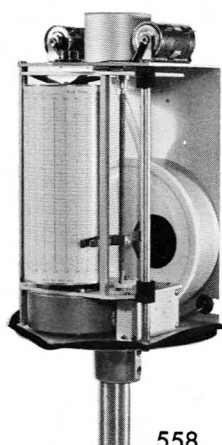
No. 505-1. WINDSHIELD. An improved Alter-type windshield, with post supports; fabricated to U.S.W.B. Spec. No. 450.2151/A, Rev. 6/1/57. Errors in precipitation catch due to distorted air flow over a gage can be minimized by use of the windshield. It consists of 32 free-swinging, but separated metal leaves, suspended on rigid rods, assembled in quadrant sections and supported on four posts. The shield is installed concentric with the gage, and the leaves should be ½" above the level of the collecting orifice. Mounting radius; approx. 23".

The windshield can be used with gages Nos. 503, 551, 552, and 595. Wt. 100/shpg. 115 lbs. **\$89.00**

Precipitation Collectors and Recorders



557



558



558-2



559

No. 557. MRI TIPPING BUCKET GAGE. A rain gage with superior performance characteristics—for use with Mechanical Weather Station No. 400B, or with other impulse recorders and/or indicators. Each tip of the molded epoxy and fiberglass-impregnated bucket mechanism equals .01 inches of rainfall. For rates of rainfall up to 3 in./hr., accuracies are within $\pm 1\%$. Electrical rating: 10 VA D.C. Resistive, maximum current 0.5 amps. (Factory-installed diode supplied when gage is used with Recorder No. 592. Please specify). Over-all height of drawn aluminum tube is 24 inches, with inside diameter 7.86 inches. Depth of funnel inside collector section is more than 8 inches. After measurement in bucket mechanism, rainfall drains out of tube in bottom, onto ground or into accumulator supplied by user. Tipping Bucket Gage supplied with pipe mount for installation on platform, or in concrete support. Wt. 10/shpg. 15 lbs. **\$235.00**

No. 557-1. Same as above, with coupling circuit, batteries, rain chart marker, and instructions—for modification of Mechanical Weather Station No. 400A into No. 400B **\$410.00**

No. 557-2. Same as No. 557, with 115v. A.C. (105 watts) Heater (add \$35.00 for 220v. A.C.) **\$370.00**

No. 557-3. Same as No. 557, with Propane Heater. Average consumption of propane 5/gal. in 32-40 days, providing 500 BTU/hr. **\$525.00**

No. 558. 45-DAY RECORDING RAIN GAGE. An advanced design of No. 557—a completely self-contained tipping bucket rain gage and recorder, capable of operating unattended for 45 days, using two Size D flashlight batteries. Data is recorded in steps, each equals .01", with 10 steps/cycle, on moisture resistant, pressure sensitive paper. Drum turns 10mm/hr., one rotation each day, permitting accurate resolution of rainfall data to rates of 7"/hr. Wt. 15/shpg. 20 lbs. **\$670.00**

No. 558-1. Above with 115v. A.C. (105 watts) Heater. **\$805.00**

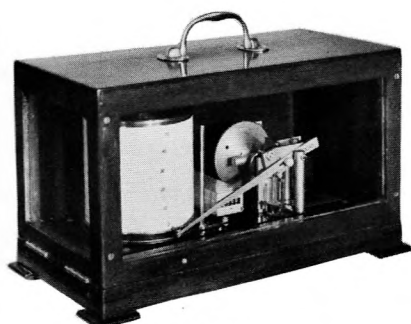
No. 558-2. Same as No. 558 with Propane Heater. **\$960.00**

Parts and Accessories:

Heater Kit, 115v. A.C. (add \$35.00 for 220v.)	\$165.00
Heater Kit, Propane type	\$320.00
Recorder Conversion Kit, making No. 557 into No. 558	\$450.00
Replacement Reed Switch	\$ 10.00
45-day pressure sensitive charts	\$ 24.00/doz.

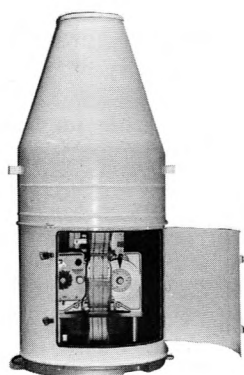
No. 559. PORTABLE EVENT RECORDER. A convenient, easy-to-read recorder for use with a tipping bucket rain gage, contacting anemometer, or any other sensor with a switch closure. This carry-around model in a rugged weather-resistant aluminum case is available for D.C. or A.C. operation. Drum makes one rotation each day for 45 days with events noted in steps, as in No. 558, on 7" x 11" inkless chart. Input resistance 10 ohms, or less. Dwell time between 0.001 and 0.75 sec./switch closure. Power: 2 Eveready E-95 batteries or a synchronous 110v. drive. Specify choice. Size: 10" x 12" x 5½". Wt. 7/shpg. 11 lbs. **\$540.00**

Rainfall Recorders and Controllers



596(1)

No. 596(1). RAINFALL RECORDER AND COUNTER, remote reading for battery operation. An easily-read chart records a stepped trace with pen rising one step for each 0.01" of rainfall transmitted by Nos. 557, or 595 Tipping Bucket Rain Gages. Pen drops to bottom of chart after 1.00" to repeat operation. Built-in counter shows total rainfall at a glance. New portable case designed for fixed station or field use. Operates on 6v. D.C. Weekly period standard; daily available. Rain gage unit not included. Charts \$5.00/100. Replacement Pen \$2.50. Size: 12" x 7" x 6". Wt. 12/shpg. 17 lbs. **\$260.00**



568

No. 568. DIGITAL RECORDING PRECIPITATION GAGE. A weighing type gage for rain and snow, built to U.S.W.B. Spec. #450.2209. Precipitation is recorded on punched tape, at preselected intervals—in a binary-decimal code that can be read visually, translated manually with a desk reader, or converted to computer inputs.

The gage has a capacity of 20", a resolution of 0.1 inches. Recording is controlled by an interval timer which can be altered by changing a cam. These cams are available for printout intervals of 5, 6, 15, 30, and 60 minutes. The 5-minute punch cycle allows for an unattended operating period of 90 days. A new solid-state timer available for an additional \$205.00. The new "rain trace" device is \$150.00 additional. Wt. 78/shpg. 110 lbs.

No. 568-AC. AC operated unit, 117v. AC. **\$1,150.00**

No. 568-DC. DC operated unit, 7½v. battery (Eveready No. 1562 battery \$8.50). **\$1,163.00**

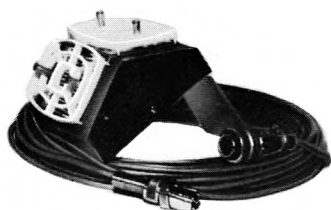


598(2)

No. 598(2). PRECIP-SENSOR. A precipitation sensor and controller, designed to detect the onset and cessation of rain and snow. The detectors are two printed circuit-type grids, measuring approximately 2 x 3 inches, mounted on a sloping-surface sensor head that is thermostatically controlled. Actuation occurs, with a built-in delay of a tenth of a second, when the conductors are bridged by rain or snow.

The sensor head, which supports the two sensor grids, an adjustable thermostat, a heater coil, and an indicator light, measures 2½ x 4¼ x 4½ inches. It is supplied with a mounting bracket for wall or post. A 50-foot length of 4-conductor plastic covered cable is included, to connect the sensor head to a control box. The latter is table mounted; it measures 5¼ x 8¼ x 5¼ inches. Built with solid-state elements, the control box includes a gain control knob for varying sensitivity, an indicator light, a test button for checking performance through a reference resistance and input-output connection terminals. Input power is 115v. 60 Hz; output rated at 2 amp. 115v. AC, non-inductive.

Periodic cleaning of the exposed, low-voltage, grid sensors with a suede brush or cloth is recommended. This will avoid spurious performance, as might be caused by deposits of oil or dust. Plastic cages are supplied for installation over the sensor grids when detecting snow. Wt. 12/shpg. 18 lbs. **\$290.00**



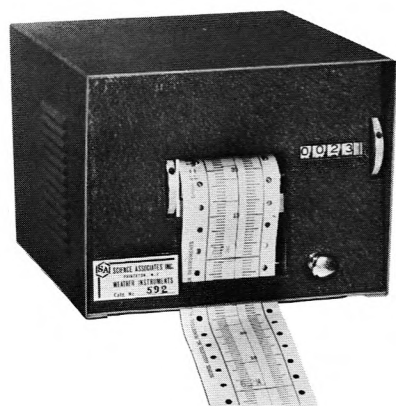
598(2)

Accessories and Parts: Spare printed circuit sensor grids **\$7.50/pair.**
Spare plastic cages for snow **\$3.00/pair.**

Remote Rainfall and Precipitation Controller



595



592



599

No. 590. REMOTE RECORDING AND DIGITAL RAIN GAGE SYSTEM. A remote tipping bucket and a strip chart recorder with a 30-day period make up this system. Each .01" of rainfall is marked on a chart and indicated on a digital counter.

No. 590-8. SYSTEM complete with No. 557 Gage. (p. 70) **\$380.00**

No. 590-12. SYSTEM complete with No. 595 Gage. **\$495.00**

No. 592. RECORDER-INDICATOR. A single channel event recorder and digital indicator operates with a Tipping Bucket Rain Gage (either No. 595 U.S. Weather Bureau type, or No. 557 MRI Gage).

A permanent record of each 0.01" of rainfall is made on an easily-interpreted chart marked for each minute and hour, so that total accumulation, rate, up to 2"/hr., and duration can be determined. At normal chart speed of 4"/hr. a single chart roll of 250 ft. will record for a 30-day period without attention.

Recorder designed with reset-type, built-in digital counter to show cumulative rainfall. Chart drive mechanism requires 115v. A.C. Built-in transformer and silicon diode rectifier supply 6v. D.C. for operation of mercury switch in tipping bucket rain gage. Recorder has flat bottom for table or shelf mounting; slotted hole on back permits wall mounting. Case measures 7 x 5 x 6½ inches. Motor-operated chart rewind attachment, No. 592A, available as an extra; this attaches to bottom of recorder case. Wt. 15/shpg. 20 lbs. **\$145.00**

Accessories: No. 592A Motor-operated rewind attachment for chart paper \$37.00. No. 592C Chart roll (250') and recorder pen \$2.40. Pen only 25¢. Cable, low voltage, 2-conductor, 12¢/ft.

No. 595. TIPPING BUCKET RAIN GAGE. The standard Weather Bureau type in accordance with U.S.W.B. Spec. No. 450.2161, Rev. 10/1/64. A collector ring 12" in diameter funnels rainfall to a small outlet directly over a tipping bucket mechanism. The tipping bucket is divided into two equal compartments, each holding exactly 0.01" of rainfall. When one compartment fills the bucket tips, momentarily closing a mercury-in-glass contact, and empties into the overflow reservoir. The opposite compartment is simultaneously positioned below the nozzle to receive the incoming rainfall. Electrical impulses are transmitted to a recorder or indicator, each impulse representing 0.01" of rainfall. Accuracy: 2% for rainfall rate less than 1"/hr., 4% for rate of 3"/hr., 6% for rate of 6"/hr. Cylinder and measuring stick supplied for check measurements. Normally operated on 6v. D.C. No. 595 will not function satisfactorily in below-freezing weather unless a heating unit is provided. Diameter 12 inches, height 37½ inches. Tripod mounting diameter 24½ inches. For recorder see No. 592 or No. 596(1). Wt. 37/shpg. 50 lbs. **\$350.00**

No. 595-1. Above gage, aluminum construction **\$285.00**

No. 599. AUTOMATIC PRECIPITATION COLLECTOR. A gage that incorporates Precip-Sensor No. 598-2, for special applications involving the collection of precipitation and/or the collection of falling particulate matter. Collection occurs in a 5-gal. polyethylene drum, at such times as the thermostatically controlled sensor indicates the presence of precipitation. A "Reverse Action Switch," available as an option at an additional \$15.00, allows the lid to remain open during dry periods for the accumulation of particulate matter. This instrument is constructed of sturdy steel, aluminum, and stainless steel, with removable legs. A similar design was first used to minimize evaporation loss, by Weather Bureau personnel of the R. A. Taft Sanitary Engineering Center in Cincinnati, Ohio, as early as 1960. A special "Lid Open Switch," which permits user to keep lid open without interference during servicing, is available at \$7.50. Wt. 55/shpg. 95 lbs. **\$450.00**

Snow Gages

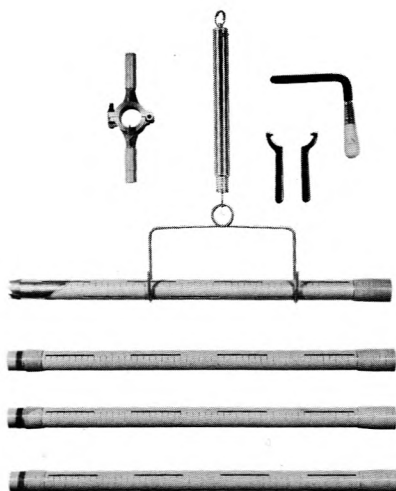
No. 540. SNOW SAMPLER. The standard set is designed for 120-inch snow depth capacity. It consists of four duraluminum tubes, a 12.5 ft. weighing scale with tube cradle, a tube turning and driving wrench, a cleaning tube, and two spanner wrenches.

The sampling tubes are each 30 inches long, graduated in English and metric scales: inner divisions, each $\frac{1}{2}$ " and 2 cm; numbered every 1" and 10 cm. The duralumin is anodic treated. Staggered ports are cut in each tube showing the depth of snow and the length of the snow core.

Graduations on the sensitive spring balance indicate equivalent inches of water. The ratio of depth of water to depth of snow is the snow density.

A snow sample is taken by joining the tubes by the screw couplings, using the spanner wrenches, and forcing the tubes through the snow. This is accomplished by means of the tube turning and driving wrench. The tubes are then withdrawn from the snow and placed horizontally on the cradle of the scale and weighed. The scale is graduated in inches of equivalent liquid precipitation. After weighing, the snow core is removed by inverting the tubes and working the cleaning tool through the tube slots. (When ordering snow sampler with three tubes for 90" capacity price is \$295.00. As in standard set, canvas case is extra.) Pkg. 8" x 8" x 36". Wt. 6/shpg. 22 lbs. **\$370.00**

Parts & Accessories: Case, canvas (pack sack) \$50.00; Cleaning tool \$6.95; Cradle \$3.50; Scale 12.5 ft. (.38 meter) capacity \$75.00; Scale 20.0 (6.1 meters) capacity \$80.00; Thread tube, Alcoa $\frac{1}{2}$ lb. jar \$2.75; Tube, with cutter \$95.00; Tube with two couplings \$65.00; Wrench tube, turning and driving \$60.00; Wrench, spanner (set of two) \$7.00.

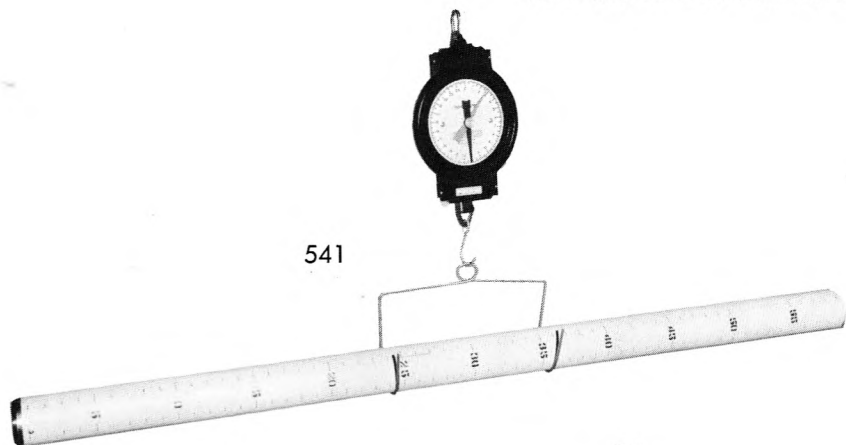


540

No. 541. SNOW DENSITY GAGE. Adirondack type—consisting of a fibreglas tube, 5 feet long, with a stainless steel cutter and temperature compensated spring scale with cradle. The difference in weight between the empty tube and the snow filled tube represents the equivalent water content read on a scale calibrated in inches of water.

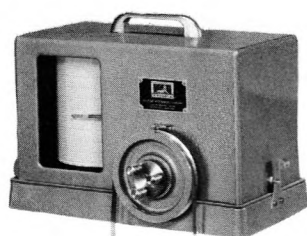
The fibreglas tube measures 3 inches O.D. and 2.8 inches I.D. It is graduated on the outside from 0 to 60 inches in 1-inch divisions with numerals every 5 inches. A stainless steel serrated edge cutter with an I.D. of 2.655 inches is fitted to one end. Wt. 4/shpg. 7 lbs. **\$210.00**

Replacement Parts: Graduated Fibreglas tube, \$47.25; Stainless Steel Serrated Edge-Cutter, \$74.00; Protective Cork, \$2.00; Scale calibrated in inches of water, with cradle, \$102.00.



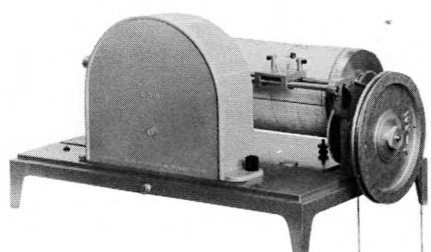
541

Water Level Recorders



575

No. 575. WATER LEVEL RECORDER. This model is known to hydrologists as FW-1. It is a compact portable instrument designed particularly for use in well and ground water studies, irrigation projects, and hydraulic laboratories. A counter-balanced float is attached to a perforated rust-proof metal tape which positions a floatwheel in response to changes in water level. The floatwheel shaft is geared to and drives a heartshaped cam, which in turn moves a pen over a slowly-revolving cylindrical chart driven by a clock mechanism. A curvilinear graph is drawn by the pen showing levels of water versus time. Standard type has ratio of 5 inches of chart to 12 inches water level change, with a built-in cam that causes the pen to reverse direction at top and bottom of chart. Gears also available for 1:12 ratio. Complete with fully jeweled clock, 4-inch float, counterweight, 30 ft. perforated tape (add 29¢/ft. for additional lengths), ink, pen, and one set of 100 charts as specified. Extra charts \$5.00/100. Pen No. 3LS \$4.00. **\$300.00**



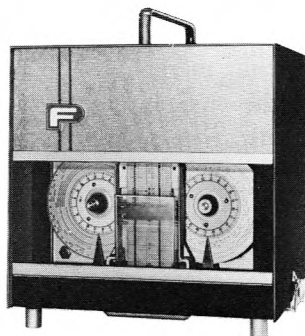
576

No. 576. TYPE F WATER LEVEL RECORDER. An instrument used for recording the fluctuations of liquid surfaces with a choice of chart drives for unattended operating periods up to 32 days. Applications include the measurement of ground water in deep wells, water levels in streams and irrigation ditches, changes in water supply of reservoirs, and levels of liquids in sewerage processing plants and oil production facilities.

The range in stage of this instrument is limited only by the length of the float line. With the standard 5" copper float, the recorder will respond to 0.01' change with the 1:1 scale. By using a spring-driven 8-day clock, the stylus can be made to traverse the 9.6" chart in 1, 2, 4, or 8 days, depending on the choice of gears. A synchronous motor, operating on 115v 60Hz is also available for the same time periods, and in addition for 4, 8, or 12 hours. For a wide range of climatic conditions, the 32-day period is handled with reliability by a weight-driven (18 lb.) Chelsea clock. Gage scales can be supplied in the English or Metric systems for ratios of 1:1, 1:2, 1:5, 1:10. Scales of 1:20 and :24 are extra.

As a standard, the No. 576 is supplied with any 1 gage scale, from 1:1 to 1:10, English or Metric; a metal cover with a window; a $\frac{3}{10}$ /day time scale; a pen with lucite reservoir and 1 oz. of ink; 54 charts, 5" copper float; lead counter-weight; 20' of stainless steel beaded float line with adjustable end holders; and weight-driven Chelsea clock drive. **\$366.00**

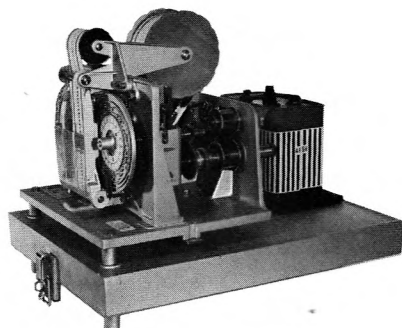
Water Level . . Tide



577

No. 577. DIGITAL RECORDING WATER LEVEL GAGE. An instrument designed to meet the needs of the U.S. Geological Survey—now in use at thousands of locations. Water level is measured by a copper float, suspended on a counter-balanced cable which turns a drum wheel. The angular position of the wheel turns a coded disc and at selected intervals, water level is recorded on punched tape in an easily-read, or machine translated, binary-decimal form. Full range is 100 ft., with a resolution of .01 ft.

The recording interval is controlled by an interval timer, operated on a 7½v. battery. Cams are available for readouts at intervals of 5, 6, 15, 30, or 60 minutes. Select one. For readouts from remote locations, a binary-decimal transmitter can be furnished for telemetering, apply. Price includes digital recorder in standard case with battery-operated timer. Select floats, tapes, etc. from list of accessories. Wt. 25/shpg. 40 lbs. **\$555.00**



578

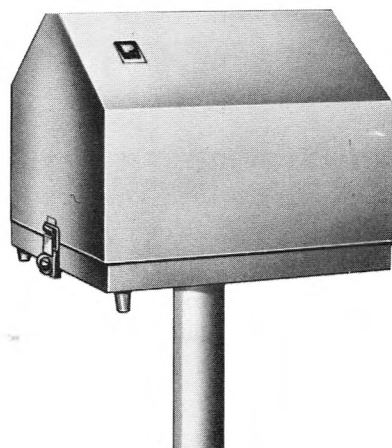
Accessories: Floats, spun copper, 4" or 6" —\$30.00, 10"—\$40.00; Tapes graduated, perforated, 10'—\$8.00, 20'—\$16.00, 30'—\$23.00, Float Counterweight, \$4.00; Tapes, plain, perforated, 40¢/ft.; 50'—\$36.00, 75'—\$57.00, 100'—\$70.00; Tape Connector with rings, \$9.00/pair. Additional cams for time periods shown above, \$4.50 ea. Weatherproof case: \$160.00.

No. 578. DIGITAL RECORDING TIDE GAGE. An instrument similar in operating principle to No. 577—designed to meet the requirements of the U.S. Coast and Geodetic Survey. Readout is on punched tape, with unattended operation for 90 days on the 15 minute interval.

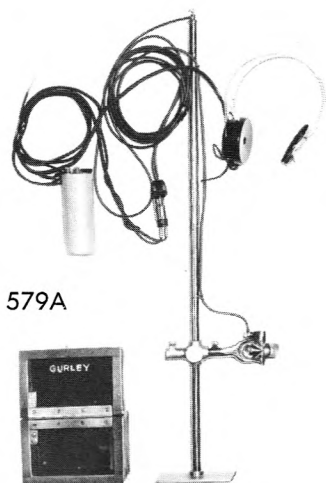
This unit contains a negator spring motor which eliminates the need for a counterweight. A lost-motion coupler permits a constant counter-balance force, while the unit is locked for punch out. A safety brake protects the instrument from damage in the event of cable rupture. A weatherproof case houses the mechanism and the 7½v. battery. The base of the case can be installed on a 4" pipe which is embedded and guyed to the ocean floor. Select copper float and stainless steel cable from accessories.

Range of tide gage is 50 ft., with an accuracy to the nearest .1 ft. Dimensions of case: 17 x 14 x 21 inches. Wt. 45/shpg. 60 lbs. **\$1,115.00**

Accessories: Float, spun copper, 4" diameter \$30.00; stranded cable, type 316, stainless steel 0.21" diameter. \$10/100 ft.



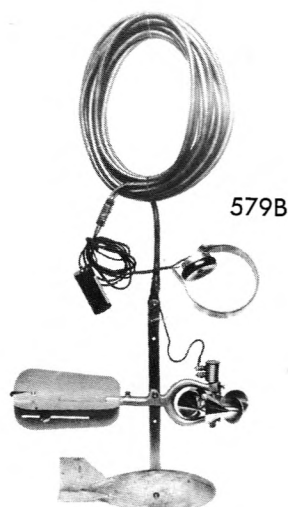
Current Meters



579A

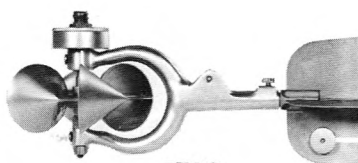
No. 579. WATER CURRENT METERS. In hydrological studies the flow of water is measured in much the same manner as the speed of the wind. The bucket wheel assembly of the current meter is the analog of the cup wheel assembly of the anemometer. Three current meters are listed here, each one with characteristics designed for specific applications.

No. 579A. PYGMY CURRENT METER. This design is specially suited for measurements in shallow streams, flumes, and canals. The bucket wheel of this unit is 2" in diameter; it has a range of .05/3.0 ft./sec. For wading measurements a complete outfit consists of a meter and frame, spare parts, a headset with wire and battery, mahogany carrying case, and a wading rod set. Wt. 8/shpg. 35 lbs., export 65 lbs. **\$320.00**



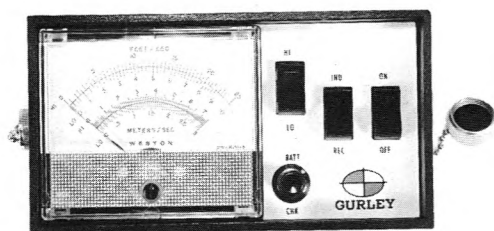
579B

No. 579B. PRICE PATTERN CURRENT METER. Produced to conform with Type AA of the U. S. Geological Survey, this equipment can be suspended from an overhead cableway or bridge, or used from a boat for measuring river, harbor, and ocean currents. The basic meter, supplied with a reference table, can be used to read velocities from 0.1/11 ft./sec., or 0.03/3.39 m./sec. It has two contacts, one for indicating each revolution, the other for every fifth revolution. A mahogany case 9" x 6 $\frac{3}{8}$ " x 4 $\frac{3}{8}$ " holds the meter, spare parts, accessories and headset. A 15' length of steel wire cable supports the meter, a 15 lb. streamlined weight, and 35' of 2-cond. signal cable. This equipment is stored in a 24" canvas equipment bag. Wt. 25/shpg. 55 lbs., export 60 lbs. **\$495.00**

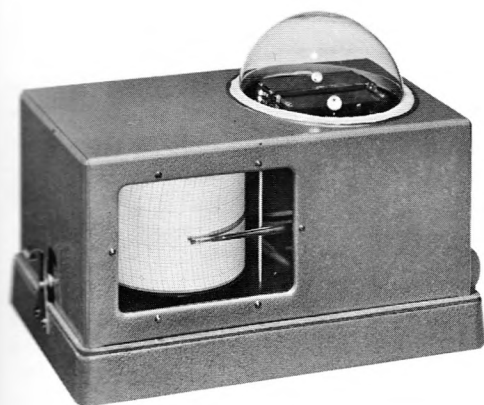


579C

No. 579C. DIRECT READING CURRENT METER. Portable and durable, this meter will indicate, or record, water velocities directly. The rotor housing in the sensing unit contains a six pole permanent magnet and a hermetically sealed, magnetically-operated reed switch. The indicator unit contains low power semi-conductor circuits and a self-contained battery, good for 80 hours usage. Four calibrated scales are on the face of the meter: 0/10, 0/25 ft./sec. and 0/3, 0/7 m./sec. An 'indiate-record' switch provides the option of using a chart recorder for a permanent record. Wt. 25/shpg. 55 lbs., export 60 lbs. **\$850.00**



579C

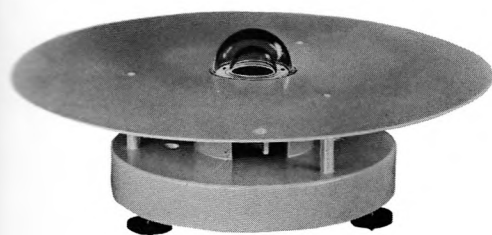


653

No. 653. PYRHELIOGRAPH. For the measurement of solar radiation from sun and sky on a horizontal surface. Recording pyrhelimeter, or actinometer, is portable self-contained, and mechanically operated. The measuring element consists of two bimetallic strips mounted to show pen motion corresponding to a differential temperature, with ambient temperature compensation. A blackened strip is exposed to both the radiant energy of the sun and the ambient temperature, while a chrome plated element is exposed only to ambient temperature. The pyrheliograph dome is pyrex glass with a transmission coefficient of 90% for all wave lengths from 0.36 to 2.0 microns. Ultraviolet cut-off is about 0.28 microns. Range of instrument is 3 calories per square centimeter per minute, over a 3" chart height. Markings are for each 0.1 calorie.

Spring-wound clock drive is mounted on base; no electric power required. Daily or weekly recording period; specify one. Dimensions 13½ x 7 x 9 inches. Complete with 100 charts, ink and pen. Wt. 10/shpg. 23 lbs. **\$285.00**

Accessories: Charts, No. 653W (weekly) and No. 653D (daily)—\$7.50/100. Extra gears, daily or weekly, \$4.75/set. Black coating for sensitive element \$3.00/4 oz. Pens \$1.60. Ink \$2.25/oz.



633

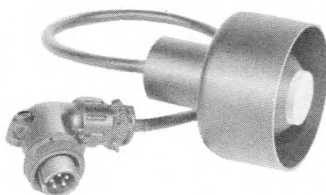
No. 633. SOLARIMETER. Weather-protected thermopile, a pyranometer (180° pyrhelimeter), for the measurement of total sun and sky radiation, Moll-Gorczynski-type. Sensitive surface consists of 14 constantan-manganin thermocouples with a sensitivity of about 7.9 millivolts equivalent to 1 cal./cm²min. and a resistance of about 8 ohms. The unit is covered with double concentric hemispherical glass domes, 2 mm thick, designed to reduce the transfer of heat from the receiving surface to or from the outer dome by convection. Effective wavelength range, 0.3/2.0 microns (3,000/20,000 Angstroms). An easily-removable desiccant cartridge is incorporated in the housing to keep the air under the domes free from moisture. Each unit supplied with data on resistance and EMF equivalent for 1 cal./cm²min. Recorder No. 644 can be used with Solarimeter. Wt. 10/shpg. 14 lbs. **\$260.00**

Replacement parts:

Outer hemispherical glass dome	\$ 42.50
Inner hemispherical glass dome	\$ 33.50
Reflective screens	\$ 25.00
Base with leveling screens	\$ 65.00
Solarimeter, less screen and base	\$195.00

Solar Radiation

620-1



No. 620. PYRANOMETER SYSTEM. A group of YSI instruments are designed for field radiation measurements, as required in many meteorological, agricultural, and hydrological studies. The silicon solar cell Sensor can be monitored with a battery-powered Meter calibrated in Langleys, or for routine use, with a Digital Integrating Device that stores data from one day to the next, on two separate counters.

620-2



No. 620-1. PYRANOMETER SENSOR. A specially modified Scripps probe contains a silicon solar cell mounted to provide a corrected cosine response, within a spectral range of 0.4/1.5 microns. Response time, 10 microseconds; dimensions 3 x 3½". Supplied with a 5' lead. Wt. 1¼/shpg. 2½ lbs. **\$150.00**

No. 620-2. PYRANOMETER METER. Portable, battery-operated, indicating meter can be used simultaneously with any 0-100 mv. recorder having a 50K-ohm input impedance. Scale 0/2 Langleys (1 Langley=1 cal./cm²). Battery life, 6 mos. Size 7½ x 3½ x 5". Wt. 2¾/shpg. 4½ lbs. **\$150.00**

620-3



No. 620-3. PYRANOMETER DIGITAL INTEGRATING DEVICE. Designed with two counters, to accumulate solar radiation in increments of 0.1 Langleys for 24 hours, then switch automatically through a timing mechanism to a second counter, allowing time for reading before cycle is repeated—patterned after the work of Tanner, Kerr, and Thurtell (University of Wisconsin). Accuracy of instrument and probe is 1% from 0/50°C. and 2% outside range to -25°C. or 55°C. A built-in heater keeps instrument above 0°C. in conditions as low as -35°C. Size 10 x 10½ x 4½". Operates on 95/125v. 50/60Hz. (For 230v. 50Hz., add \$30.00). Wt. 6½/shpg. 8 lbs. **\$525.00**

No. 620. PYRANOMETER SYSTEM consisting of Nos. 620-1, 620-2, 620-3, less accessories. **\$825.00**

Accessories: Extra lead for 620-1 probe, up to 25'

\$10.00 plus 40¢/ft.

Probe Mounting Kit	\$ 25.00
Pyranometer Shelter & Radiation Shield	\$125.00
Pipe Fitting Kit	\$ 29.50
Plan Set, for Shelter and Shield	\$ 15.00

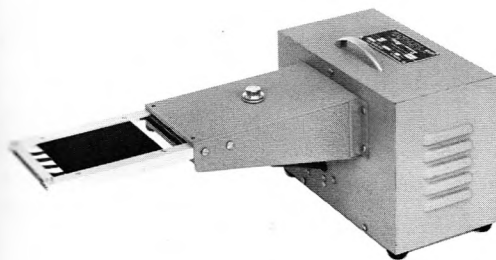
642



No. 642. PLANT GROWTH PHOTOMETER. An instrument designed for the agro-meteorologist, to measure three primary energy bands affecting plant growth: blue (.4/.5μ), red (.6/.7μ), and far red (.7/.8μ). The device reads in microwatts/cm² per nanometer (millimicron) of band width over a four decade range.

This is a 17-transistor, solid state instrument; battery-operated and temperature compensated. The remote sensor assembly, with a separate detector for each energy band, is supplied with 4' of connecting cable. A mahogany carrying case gives maximum portability. Wt. 3 lbs./shpg. 5 lbs. **\$199.00**

Radiometers



630

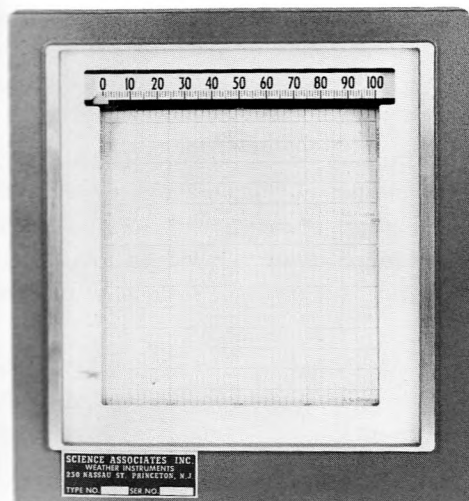
No. 630. THERMAL RADIOMETER. Portable radiometer, based on a design by S. T. Gier and R. V. Dunkle, supplied in four models: for total hemispherical or net exchange measurements. Output of thermopile transducer operates recording potentiometer without intermediate amplification. Response is to all wavelengths and absorptivity is essentially independent of the angle of incidence. New optically-black paint gives superior performance and durability. Small blower eliminates convection effects. Supplied for 110v. 60 Hz, also available for 50 Hz and 12v. D.C. Recorder No. 635 recommended. Wt. 15/shpg. 35 lbs.

No. 630TH-1. THERMAL RADIOMETER, total hemispherical, new design. An improved version of No. 630TH includes built-in thermistor temperature compensating circuit. Corrected readout over range of $-20^{\circ}/+160^{\circ}\text{F.}$ with accuracy of $\pm 3\%$. Sensitivity $2.5\text{mv./cal./cm}^2\text{min.}$ Response time (95%), 12 sec. **\$850.00**

No. 630TH. THERMAL RADIOMETER, total hemispherical model, with imbedded Copper-Constantan reference thermocouple. **\$550.00**

No. 630NE-1. THERMAL RADIOMETER, net exchange, new design. An improved version of No. 630NE with temperature compensation to an accuracy of $\pm 1\%$ over range of -20 to 160°F. **\$850.00**

No. 630NE. THERMAL RADIOMETER, net exchange model, with imbedded Copper-Constantan reference thermocouple. **\$550.00**



635

No. 635. RADIOMETER RECORDER. An electronic, null-balancing D.C. Potentiometer with automatic standardization, designed for recording the output of No. 630 Thermal Radiometers—"total," or "net exchange." Strip chart recorder case, gray finish, measures 12" high, 11" wide, and 12" deep. Chart is 7" wide, 100 equal divisions calibrated over $6\frac{1}{2}"$. Standard chart speed $1"/\text{hr.}$, operates on 120v. 60 Hz (specify if 50 Hz). Wt. 35/shpg. 41 lbs.

No. 635TH-1. Used with total hemisphere radiometer, temperature compensated. Scale reads $0/5\text{mv.}$ **\$775.00**

No. 635TH. For use with total hemisphere radiometer, scale reads $0-20\text{mv.}$ **\$775.00**

No. 635NE-1. Used with net exchange radiometer, temperature compensated. Scale reads $-2/0/+3\text{mv.}$ **\$775.00**

No. 635NE. For use with net exchange radiometer, scale reads $-5/0/+20\text{mv.}$ **\$775.00**

Net Radiation



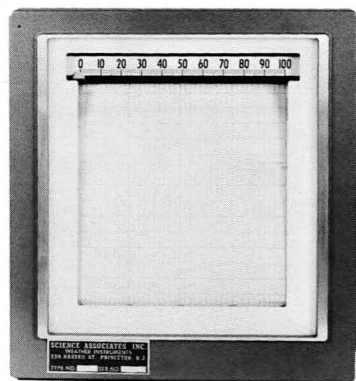
621

No. 621. FRITSCHEN NET RADIOMETER. This miniature net radiometer, shielded and temperature-compensated, is constructed from design improvements developed by Prof. L. J. Fritschen. The instrument is sensitive to wavelengths of solar and terrestrial radiation, from 0.3 to about 60 microns.

Windows made of polyethylene, hemispherically-shaped, protect the sensor from wind and precipitation. (A replacement set is shipped with each instrument). To prevent internal condensation and preserve the shape of the windshields three methods of pressurization are suggested in the Instructions. The transducer consists of a 22-junction manganin-constantan temperature-compensated (10/50°C.) thermopile with a time constant of 12 sec. and a nominal sensitivity of 3.5 mv./cal./cm²min. Optical black lacquer is used for painting the sensor. A thin white stripe across the disc compensates for small errors in absorption differences between the long wave and short wave regions.

This instrument, fabricated with a built-in bubble type level, is 6 cm. in diameter. It can be used to measure net radiation (the difference between the total downward and total upward radiation flux) close to a surface without appreciably altering the radiant balance by shading. Recorder recommended is S. A. No. 625. Wt. 4 oz./shpg. 1 lb. **\$260.00**

Accessories: Pressurization system which includes A.C.-operated pump, regulator, desiccant tube, and connections \$40.00; Factory replacement of windshields, repainting of transducer, and recalibration \$50.00.



625

No. 625. NET RADIOMETER RECORDER WITH INTEGRATOR.

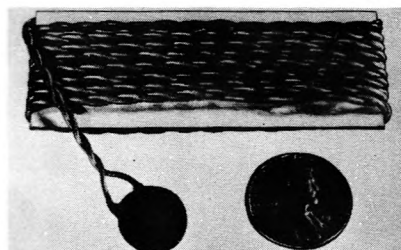
The specifications for this equipment are the same as those developed by U.S.D.A.—for use with the Fritschen Net Radiometer, S. A. No. 621. This is a 7" wide strip chart recorder with a fixed zero, 16.7% upscale, and an adjustable span, from a minimum range of -0.2 to 1.0 mv., to a maximum range of -1.0 to 5.0 mv. The scale is calibrated -0.28 to +1.4 Langleys/min., 84 divisions, each with a value of 0.02 Langleys.

Included with the recorder is a built-in integrator which supplies pulse outputs in the form of contact closures. The count rate is 12,000 counts/hr. Two six-digit electro-mechanical counters with manual reset are supplied for remote mounting. One counter is used to total positive integration; the other for negative integration, with zero output at zero mv.

Recorder is a cast aluminum case, flush mounting, 12" high x 11" wide x 12" deep. Requires 120v. 60Hz. (Specify if 50 Hz). Supplied with chart, 120 divisions equally spaced. Wt. 40 lbs./shpg. 45 lbs. **\$1,540.00**

Accessories: Spare Charts \$4.00 each.

Heat Flux



631-1



631-1M



632-1



632-2

No. 631. HEAT FLOW TRANSDUCER, DISC TYPE. For measuring the flow of heat through soil or other materials—a thin disc with low thermal resistance and made of tellurium-silver alloy with copper-screen coating on both sides. Designed to produce an electrical output proportional to the flow of heat through the transducer. Three sizes are available. The smallest disc, with limited output, is usable with a portable galvanometric indicator; the medium size and large discs can be used with galvanometric or potentiometric strip chart recorders. No. 631-2 is recommended for use in agro-met applications.

No. 631-1. HEAT FLOW DISC has diameter 0.4", thickness 0.60"; output 2.5 microvolts per Btu/ft.² hr.; internal resistance 1-4 ohms, lead length 10 ft. (For use with 631-1. Heat Flow Monitor No. 631-M at \$325.00—a portable low resistance reflecting galvanometer with a sensitivity of 2 microvolts per scale division, coil resistance of 5-10 ohms). Wt. 3 oz./shpg. ½ lb. **\$12.50**

No. 631-2. HEAT FLOW DISC has diameter 2.0", thickness of 0.15", output 250 microvolts per Btu/ft.² hr.; internal resistance 175 ohms. Supplied with 10 ft. of lead wire, with connections and disc made impervious to moisture for use in soil. (For use with 631-2. Heat Flow Recorder No. 631-2R at \$725.00—a portable, AC-DC transistorized potentiometric recorder, adjustable span 10/100 mv., powered by eight rechargeable Ni-Cad D cells with an operating time of approx. 200 hours). Wt. 4 oz./shpg. ½ lb. **\$137.50**

No. 631-3. HEAT FLOW DISC has diameter 4.3", thickness 0.16"; output 714 microvolts per Btu/ft.² hr.; internal resistance 500 ohms, lead length 10 ft. (Can be used with same recorder as above, No. 631-2R). Wt. 5 oz./shpg. ½ lb. **\$154.00**

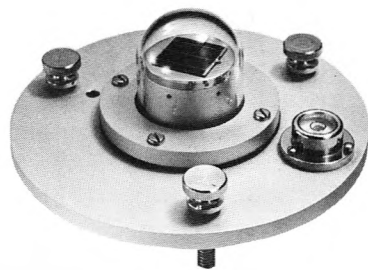
No. 632. SOIL HEAT FLUX SENSOR AND RECORDER. A transducer and recorder combination designed for the measurement of heat flux in the soil. The transducer is small, 6 cm. x 2.8 mm, waterproof, and rugged for extended use. It contains a temperature-compensated manganin-constantan thermopile with a resistance of 200 ohms and a typical output of 8 mv. per cal./cm²min. Each sensor supplied with individual calibration coefficient. The thermal conductivity of the device is similar to most soils: 1 x 10⁻³ cal. cm⁻¹ sec.⁻¹ °C.⁻¹. A 6' length of lead wire, PVC-covered and permanently attached is supplied.

The potentiometric recorder is a portable unit approx. 7"W x 9"H x 10"D, designed to operate for 200 hrs. on rechargeable batteries; alternately from a standard 115v 60 Hz line. For most applications the zero is offset to midscale to read ±5.0 mv., but the span is adjustable from 10 to 100 mv. **\$791.00**

No. 632-1 Heat Flow Transducer (add 10c/ft. for lead lengths over 6'). **\$ 96.00**

No. 632-2 Heat Flow Transducer Recorder. **\$695.00**

Solar Radiation



636-2

No. 636. SOL-A-METER. A low-cost solar radiometer, available in several models—as a pyranometer (for radiation from both sun and sky), or as a pyr heliometer (for direct solar radiation). All models incorporate the silicon photovoltaic cell as a sensor. Spectral response is in the short-wave range 0.35/1.15 microns, peaking at approximately 0.85 microns. Speed of response is less than 1 millisecond; impedance, about 0.1 ohm. Standard temperature compensation covers 40/140°F. for all models, except No. 636-3(1). Each instrument furnished with a calibration certificate showing radiation in cal./cm²min. versus signal strength in millivolts.



637

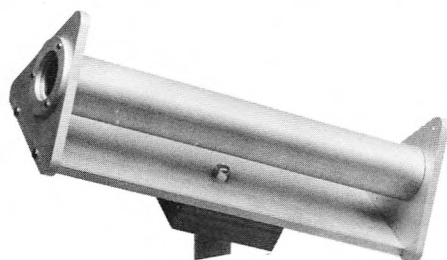
No. 636-2. WEATHERPROOF PYRANOMETER. For sun and sky shortwave radiation, a 2-cm. square silicon cell with pyrex glass dome, sealed desiccant and anodized aluminum base. Range: 0/10 mv. is standard; 0/100 mv. on request. (When supplied with matched meter in case, No. 637, add \$60.; for galvanometric recorder, No. 638, with 115v. 60Hz. chart drive, 1"/hr., add \$145). Wt. 2/shpg. 4 lbs. \$185.00



639

636-3(1)

No. 636-3(1). PYRANOMETER, WEATHERPROOF, INTEGRATING AND INDICATING. A redesigned, self-contained instrument now supplied with an option for recording. Nine silicon photovoltaic cells, mounted under a quartz dome, measure incoming horizontal insolation in the short-wave range to an accuracy of $\pm 5\%$. This unit, requiring no external power, is calibrated to read out in cal./cm²min.: integrated values on an ampere hour meter, and instantaneous figures on a millimeter. All components are mounted in a weatherproof, white aluminum housing equipped with adjustable feet and a bubble type level. A replaceable desiccant cartridge with a visible humidity indicator is easily accessible. (For matching Galvanometric Recorder, No. 639, 12v. D.C. chart drive, 1"/hr., with separate rechargeable battery, add \$350. Same recorder with 115v. 60Hz. chart drive \$250). Wt. 10/shpg. 20 lbs. \$495.00



636-5

No. 636-4. SOLAR RADIOMETER (NET SHORT-WAVE), INTEGRATING AND INDICATING. Similar to above, with sensors facing up to measure incoming radiation; another group facing down to measure outgoing short-wave radiation, giving net integrated values. Wt. 15/shpg. 20 lbs. \$895.00

No. 636-5. PYRHELIOMETER. For measuring direct solar radiation at normal incidence—constructed with 10-inch collimating tube blackened and baffled internally, complying with WMO recommendations for measuring solar radiation. Range: 0/10 mv. (For matched readout meter in case, No. 640, add \$60). Wt. 3/shpg. 4 lbs. \$240.00



636-6

No. 636-6. SOLAR RADIOMETER AND TRANSMITTANCE METER. A compact, rugged, and portable instrument for the quick measurement of solar insolation on either horizontal or vertical surfaces—read directly in Btu/hr./sq. ft. on the lower scale, and percent transmittance of any applicable material read in percent on the upper scale. This convenient instrument will enable the user to measure the heat load falling upon any surface and to determine the effectiveness of shading materials in reducing the solar input. Meter and cell mounted in black anodized case, approximately 6 x 5 x 2.5 inches. Wt. 1½/shpg. 4 lbs. \$155.00

Solar Radiation



615

No. 615. DOME SOLARIMETER. A low cost pyranometer serves Agro-Met investigations and student programs involving measurements in radiant energy. Printed circuit techniques are used to produce an 80-junction thermopile element, bonded to a thin fiberglass substrate, and mounted on a circular molded pedestal. A thin-walled frosted glass dome, sealed with a partial vacuum, is used to give a flat response over the spectral range of 0.3/3.5 microns. Good cosine response is also achieved. This device was developed from earlier work done in England, as described by Prof. J. L. Monteith (*Journal of Scientific Instruments* 36.341.1959). Specifications: Sensitivity approx. 17 mv. per cal./cm²min.; Resistance 90 ohms $\pm 20\%$; Response Time for 66% change 20 sec.; Temperature Coefficient $-0.2\%/deg. C.$; Cosine Response $\pm 2\%$ 0/65 deg. incidence, $\pm 4\%$ 65/80 deg. incidence; Azimuth $\pm 1\%$ over 360°; Diameter 6.5 cm, Height 6 cm. For integrated and printed values from Dome Solarimeter, see No. 618. Wt. 4 oz./shpg. 1 lb. **\$75.00**

No. 615A. DOME SOLARIMETER, UNSEALED UNIT. As above with detachable 12cm x 3cm diameter tubular container for desiccator crystals, screw-fit to base of pedestal. Wt. 10 oz./shpg. 1 lb. **\$85.00**

No. 618. DIGITAL VOLT-TIME INTEGRATOR. A precision solid-state instrument available in modular construction provides for indicating and/or recording the true average value of a continuously varying parameter over intervals that can be from ten minutes or longer: hours, days, and weeks. The device accepts low level signals in the range 0/30mv. from transducers that measure solar radiation (Nos. 615, 633, 636-2, 636-5, 645-48, 646, and 647); also from instruments that measure temperature, wind, pressure, etc., assuming a signal output in millivolts. The time integral is set for a count rate of 100 counts/mv.-hr.; accuracy better than 1% of reading; threshold sensitivity approx. 50uv; negligible long-term drift (i.e. zero adjustment is automatic); input resistance, greater than 1 megohm.



618-4

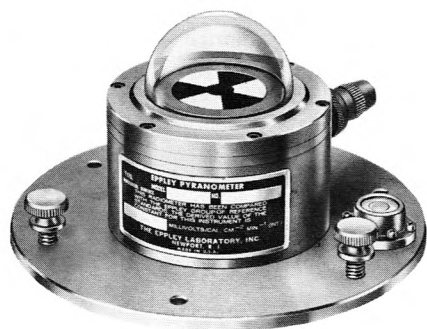
No. 618-1. VOLT-TIME INTEGRATOR with built-in digital counter, external count contact (rated 24v., 0.5 amp. max.) and a 0-1v. (at 1 ma.) analog output, operates on 115v. A.C. or external 10/18v. D.C. with internal back-up nickel cadmium cells. Wt. 2/shpg. 4 lbs. **\$399.00**

No. 618-2. VOLT-TIME INTEGRATOR. Designed for field use, with built-in digital counter, external count contact, with internal manganese-alkaline cells for use up to 6 months. Wt. 5/shpg. 7 lbs. **\$360.00**

No. 618-3. VOLT-TIME INTEGRATOR. As in No. 618-1 above, with Clock and Sodeco Digital Printer, for printout every 15, 30, or 60 minutes. Operates on 115v. A.C., or from 12/24 D.C. auto battery. Wt. 22/shpg. 26 lbs. **\$799.00**

No. 618-4. VOLT-TIME INTEGRATOR. As in No. 618-3 above, with a general purpose voltmeter for instantaneous reading of signal voltage or observing a slow rising integrating-ramp. Wt. 23/shpg. 26 lbs. **\$880.00**

Pyranometers



645-48

No. 645-48. EPPLEY BLACK AND WHITE PYRANOMETER. This instrument for the measurement of global, sun and sky, radiation represents a recent development of the well-known 50- and 10-junction model of the 180° pyrheliometer introduced by Kimball and Hobbs in 1923. As in the earlier model, the detector is a differential thermopile, but now made of 48 plated, copper on constantan-junctions located radially; hot-junction receivers are blackened with a more stable Eppley-Parsons black coating, cold-junction receivers whitened with a non-hygroscopic barium sulphate.

Temperature compensation within $\pm 1.5\%$ over the range $-20/40^\circ\text{C}$. is now built-in, and standard instruments are supplied with precision-ground Schott WG7 optical glass, transparent to wavelengths .28/2.80 microns (280/2800 nanometers). For a greater spectral range, .20/4.50 microns, a quartz dome can be supplied (add \$80.). The hemispherical envelope has a weatherproof seal, but can be removed for instrument repairs. Leveling screws, a circular spirit level, and a plug-in connector terminal are part of the chromed brass case. Sensitivity of the 48-junction type, approx. 7.5 mv. per cal./cm²min.; impedance 300 ohms; linearity $\pm 1\%$ from 0 to 2 cal./cm²min.; response time for 66% change, 3 to 4 sec.; cosine response $\pm 2\%$ from vertical to within 10 deg. of horizontal; orientation, no effect on performance. For recorder, see No. 644. Wt. 4/shpg. 12 lbs. **\$540.00**

No. 645-48A. As above, but lower sensitivity model to match replaced 10-junction pyranometer, approx. 2.5 mv. per cal./cm²min. **\$560.00**

No. 646. EPPLEY PRECISION SPECTRAL PYRANOMETER. Designed for the measurement of sun and sky, totally or in defined wavelength bands, this instrument is an improved and smaller model of a device introduced in 1957. The sensing element, designed to withstand mechanical vibration and shock, is a wire-wound thermopile, mounted in a chromed brass case. Parsons' black lacquer, non-selective to different wavelengths, covers the receiver surface and overall are a pair of concentric hemispheres of Schott glass, removable and replaceable. The inner glass is clear WG7, transparent to wavelengths approx. .285/2.800 microns. For the outer glass there is a choice: WG7, as above, or any of the following, with the centers of lower sharp cut off approximately as noted: yellow GG14, .500 microns; orange OG1, .530 microns; red RG2, .630 microns; dark red RG8, .700 microns.

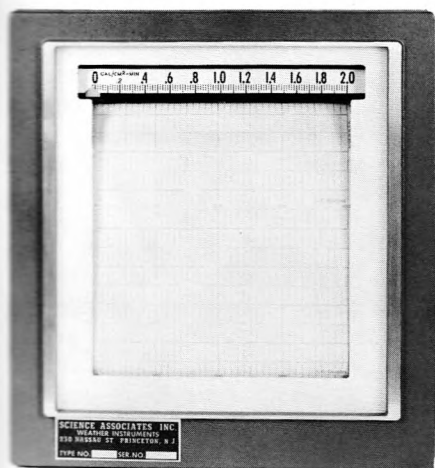
A white enameled guard disc fits above a chromed brass stand with adjustable leveling screws and a bubble type level—a desiccator that can be inspected is also supplied. Instrument characteristics include: Sensitivity, 5 mv. per cal./cm²min.; Impedance, 300 ohms; Temperature Compensation, $\pm 1\%$ from $-20/+40^\circ\text{C}$.; Response, linear up to intensities of 4 cal./cm²min.; Response Time, for 66% change, 1 sec.; Mechanical Vibration, up to 20 g's.

Calibration reference is Eppley primary standard group of Angstrom pyrheliometers reproducing International Pyrheliometric Scale. Extra outer hemispheres of any Schott filters listed above, including mount, \$150.00 each. For potentiometric recorder, see No. 644, but reference "Eppley Precision Spectral Pyranometer." Wt. 5/shpg. 13 lbs. **\$990.00**



646

Pyranometer Recorder. . UV Photometer



644

No. 644. PYRANOMETER RECORDER. A single pen strip chart recorder with scale and chart reading 0/2 cal./cm²min.—the maximum represents the solar constant. This recorder, with circuitry that makes it especially adaptable to pyranometers and pyrhemometers, incorporates a sensitive electronic servo-mechanism operating with an integral null-type d-c potentiometer. The measuring circuit current source is supplied by power from the a-c line, rectified and regulated by a Zener-diode.

In order to accommodate solar radiation sensors of varying makes and with different outputs, (Nos. 645-48, 645-48A, and 615, 633, 636), the full scale span on this recorder is adjustable from 3 to 20 mv., over two ranges: 1.5/5 and 3/10 mv. per cal./cm²min. A manually adjustable Compensator Dial, graduated 0/100, is first calibrated by an external voltage standard, such as a portable-type potentiometer. To match a recorder with a sensor, it is only necessary to set the Dial so that at midscale the output of the sensor is equivalent to 1.0 cal./cm²min.

The recorder case, 12" high x 11" wide x 12" deep, is cast aluminum painted medium gray (or black) and designed for flush mounting in an opening 11-1/32" high x 10-9/16" wide. Operates on 120v. 60 Hz. (specify if 50 Hz.). Supplied with 7" wide chart roll No. 644C, 100 divisions from 0 to 2 cal./cm²min., time marked for 1"/hr., last 42 days. Wt. 35/shpg. 41 lbs. **\$810.00**

Accessories: Spare Charts No. 644C	\$ 4.00/roll
Fluorescent Illumination for Recorder	\$30.00
Strip-Chart Tear-off Device	\$10.00
Transformer, for 220v. 50Hz	\$25.00

No. 644-1. PYRANOMETER RECORDER, WITH INTEGRATOR AND DIGITAL INDICATOR. Same recorder as above, with factory-installed Disc-type integrator and separate manually-reset six-digit counter. **\$1,350.00**

No. 644-2. PYRANOMETER RECORDER WITH PEN TYPE INTEGRATOR. A modified version of No. 644, supplied with a special chart for recording both the variable of solar radiation and a trace readout of counts, representing integrated values. Spare charts No. 644D, \$4.50/roll. **\$1,680.00**



647

No. 647. EPPLEY ULTRAVIOLET RADIOMETER (PHOTOMETER). A rugged, relatively simple detector of sun and sky ultraviolet radiation received on a horizontal surface incorporates a hermetically-sealed selenium barrier-layer, photoelectric cell, covered by an opaque quartz window designed to provide close adherence to the Lambert cosine law. An encapsulated narrow bandpass (interference) filter limits spectral response to .295 to .385 microns (295-385 nanometers), with negligible secondary transmission. Instrument characteristics: Sensitivity, 0.2 mv. per mcal./cm²min.; Impedance, 1000 ohms; Temperature Dependence, -0.1%/1°C. from -40 to +40°C.; Linearity, ±2% from 0 to 0.1 cal./cm²min.; Response Time, milliseconds; Cosine Response, ±2.5% from normalization, 10-90 deg.; Orientation, no effect on performance; Mechanical Vibration, up to 20 g's. For potentiometer recorder, specify No. 644, but reference "for use with No. 647". Wt. 7/shpg. 14 lbs. **\$1,150.00**

No. 647A. Same as above, interchangeable filter model. **\$1,300.00**

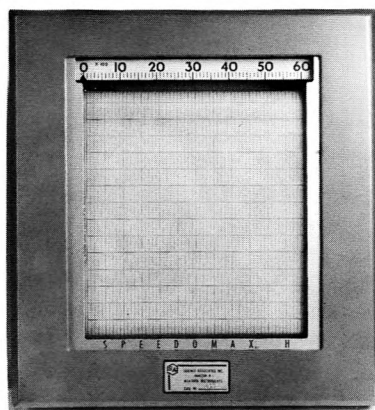
Daylight & Sunshine Recorders



654

No. 654. DAYLIGHT ILLUMINOMETER SENSOR. The intensity of daylight illumination on a horizontal surface is measured with a selenium cell that is hermetically sealed, designed to have a spectral response close to that of the human eye, and mounted to minimize errors caused by the altitude of the sun. A stainless steel case 4 $\frac{1}{4}$ " in diameter houses the linear output 0-100 microamperes cell; this is fabricated with a translucent opal glass window on top for measuring daylight over the entire sky. The case also contains a shutter adjustment, factory set, for varying the electrical output of the cell in relation to light intensity.

A ball joint, with screw adjustments, between the sensor case and a terminal box is provided for mounting and leveling. The overall height of the assembly is 13". All components are designed to operate over a temperature range from -40° to +120° F. Recorder No. 655, calibrated for light values of 0-6,000 foot-candles, is recommended for use with the Daylight Illuminometer Sensor. Wt. 8/shpg. 14 lbs. \$460.00



655

No. 655. DAYLIGHT ILLUMINATION RECORDER. Many recorders used with daylight illumination sensors are designed with logarithmic scales. These are still available, but costly, and limited in current usage. Recorder No. 655 is supplied with a scale of 60 uniform divisions, equivalent to a range of 0 to 6,000 foot-candles.

The linear response of the sensor and the recorder offer advantages in the areas of data analysis, and data transmission for computer techniques. A choice of integrators is available at additional cost; a retransmitting slidewire can also be made available. If required, it is possible to change the range of the sensor-recorder combination to 12,000 or 3,000 foot-candles by substituting a 10- or 40-ohm resistor for the 20-ohm bias resistor in the Model 654 Illuminometer.

Recorder is a single point, continuous line strip chart D.C. potentiometer with a regulated Zener-diode circuit. Case is gray-painted, die-cast aluminum, flush mounted, 12" high x 11" wide x 12" deep. Requires 120v. 60 Hz.; (specify if 50 Hz.) Chart speed 1"/hr. Chart width 7 $\frac{1}{4}$ ", calibrated over 6 $\frac{1}{2}$ " with 60 divisions. Span step-response is one second, full scale to balance. Wt. 35/shpg. 41 lbs. \$775.00

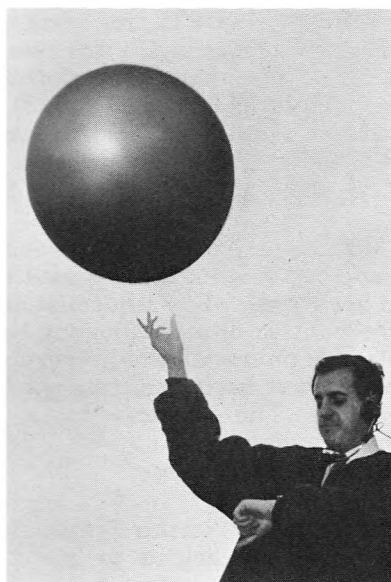
Accessories: Charts, 1"/hr., 60 uniform divisions, \$4.50/roll. Retransmitting slidewire, factory installed, specify 2,000, 1,000, or 400 ohms, \$75.00; Integrator Disc type, with digital readout, factory installed, \$538.00.



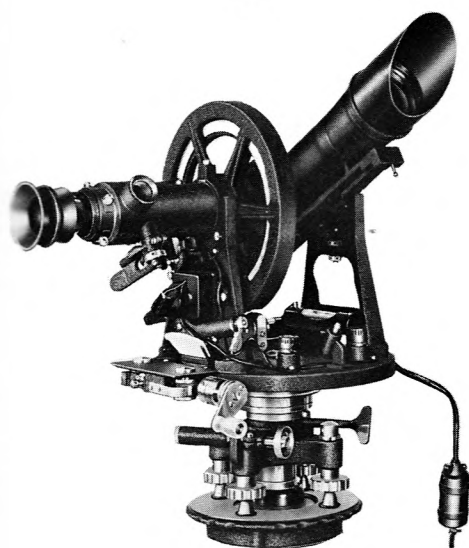
651

No. 651. SUNSHINE DURATION RECORDER, Campbell-Stokes type. This instrument, manufactured by Casella of London, was adopted as a world standard by the World Meteorological Organization in 1964, defined as the "Interim Reference Sunshine Record" for all countries. A clear glass ball is mounted on an adjustable support and base. Sun's rays are focused on a specially prepared chart graph, and a burned line is made when radiation is sufficiently strong. Length of burned line is easily translated into hours and minutes of sunshine duration. When ordering for North or South latitude specify type: A for 0/40°, B for 25/45°, C for 45/65°. State latitude of observation site, North or South. Complete with a year's supply of seasonal charts. Size: 9 x 8 $\frac{1}{2}$ x 8 inches. Charts, year's supply, No. 651N for Northern Hemisphere or No. 651S for Southern Hemisphere—\$20.00. Wt. 12/shpg. 16 lbs. \$266.00

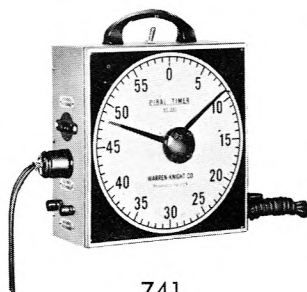
Winds Aloft & Cloud Height



742



740



741

No. 740. PILOT BALLOON THEODOLITE. An improved version, U. S. Weather Bureau pattern, of a precision theodolite used for observing and measuring the angles of elevation and azimuth of pilot balloons. Observations are made by first spotting the free-lift balloon through the gunsight, then viewing through the wide-angle 4-power finder telescope, and finally tracking on the cross hairs through the 21-power main telescope. The same eyepiece combines the latter two functions, and the eyepiece is always in a horizontal position. Movement of the elevation and azimuth scales, read to 1/10 deg., is by a positive engage-disengage type worm drive.

Accessories: Inflation kit and weights, for Ceiling, 30 gm., and 100 gm. balloons \$63.40.

No. 740-84. A battery box mounted on top plate of instrument holds 2 Size D flashlight batteries for illumination of 3v. bulbs on cross hair and coordinate scales. This model is supplied with an attached magnetic compass to permit easy orientation. A power cord, permanently attached, makes possible the use of external 3v. source, instead of batteries, such as from No. 741 Timer. Wt. 30/shpg. 70 lbs.

\$1,375.00

No. 740-85. In place of built-in battery box, the illumination system (6.3v.) in this theodolite terminates in a power cord with a twist-lock connector—for use with No. 741 Timer, or to another 6.3v. power source. Magnetic compass not included. Wt. 30/shpg. 70 lbs.

\$1,315.00

Accessories: Theodolite Heater, thermostatically controlled, built into instrument for easy operation at extreme cold temperatures. Furnished with 10' grounded line cord and adapter for 110v. 250w. \$54.00. Tripod Support (Spare) \$70.00.

No. 741. PILOT BALLOON TIMER. The position of a pilot balloon is observed continuously, but noted once each minute. This U.S.W.B. pattern timer is designed with an audible 2 sec. "warning" every 50 sec., and a ¼ sec. "record" every minute. Timer measures 8¼" x ¾" x 3"; it is supplied with on-off switch, carrying handle, provisions for wall or table mounting, and mating receptacles for power and signal cords. Power requirements: 90/130v. 60Hz. Wt. 3/shpg. 8 lbs.

No. 741-30. Output is 3v. A.C. for use with No. 740-84.

\$120.00

No. 741-60. Output is 6.3v. A.C. for use with No. 740-85.

\$120.00

No. 742. METEOROLOGICAL BALLOONS.

No. 742-10. Ceiling Balloon—for ascertaining cloud height by timing to point of disappearance. Available in red, white, or black; specify one. Free lift with helium, 45 or 75 gms. Inflated diameter: 17". Manufactured to Specs ML-157-A, ML-158-A. Wt. 10 gms.

\$41.00/100

No. 742-30. Pilot Balloon—tracked by theodolite to determine wind speed and direction at various attitudes. Available in red, white, or black. specify one. Free lift with helium, 139 gms. Inflated diameter, 27". Manufactured to Specs ML-50-A, ML-51-A, ML-64-A, ML-156-A. Wt. 30 gms.

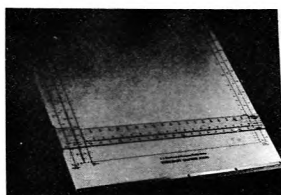
\$18.00/40

No. 742-100. Pilot Balloon—same as above except for use up to 50,000+ feet. Free lift with helium, 503 gms. Inflated diameter, 40". Made to Specs ML-159-A, ML-160-A, ML-161-A. Wt. 100 gms.

\$19.00/20

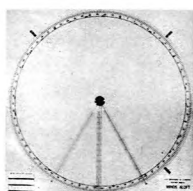
Winds Aloft & Cloud Height

739



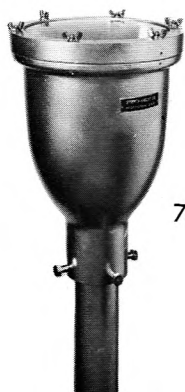
No. 739. GRAPHING BOARD, WINDS ALOFT, for determining direction and speed of upper air winds from Rawin & Pibal runs. The latest revisions are incorporated in this graphing board, built to U.S.W.B. Spec No. 450.6661-C, dated 12/18/69, amended 3/7/70. This is a board with a parallel bar, a special parallel bar holding assembly, and a laminated base chart. Curved Earth Charts, for use with above are available at \$40.00 extra. Wt. 15/shpg. 25 lbs. **\$248.00**

743



No. 743. PLOTTING BOARD, WINDS ALOFT. The winds-aloft plotting board, U.S. Weather Bureau Spec. No. 450.6651, is used to plot upper-air wind direction and speed as determined by sequential observations made with a theodolite on the position of a free-floating balloon. The board consists of a circular, rotatable protractor attached to a square plywood board covered with a printed sheet having suitable wind-speed scales, distance scales, and parallel lines. The protractor has a frosted surface so that balloon positions can be indicated with a pencil. Separate wind speed scales furnished with shipment. Wt. 15/shpg. 25 lbs. **\$189.00**

744



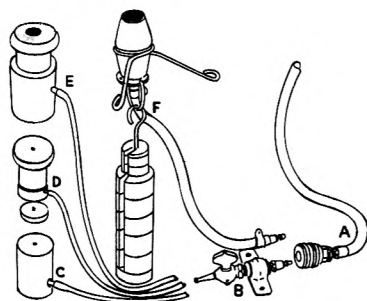
No. 744. CEILING LIGHT PROJECTOR. U. S. Weather Bureau pattern. A small compact device for measuring cloud heights to about 3000', which incorporates a 6v 100w, sealed-beam lamp powered from a built-in step-down transformer that operates on 120v. 50/60Hz. (Apply for 240v requirements).

The projector is supplied ready for mounting on a user-furnished 2" support pipe; a ball seat, machined in the projector base rests on top of the support. By using the test level furnished, and adjusting the four leveling (aiming) screws, the device can be positioned to project a vertical beam of light. All studs, screws, and wing nuts are of stainless steel. The sturdy housing is cast aluminum, 9" diam. -13" overall. A neoprene gasketed cover makes lamp replacements easy. Since the lamp used has a limited life, approx. 50 hrs., a three-minute limit switch is furnished for connecting to the power line. Supplied complete, with lamp installed, one spare lamp, time switch, test level, and instructions for installation and operation. Extra sealed-beam lamps, \$9.50 ea. Wt. 18/shpg. 25 lbs. **\$175.00**

745



No. 745. SIGHT CLINOMETER. U. S. Weather Bureau pattern. An instrument used to measure the angle of elevation between a viewer and reflected light from the base of a cloud. This information, together with a knowledge of the base line between the observer and the ceiling light projector, is used to determine cloud height, using simple trigonometric tables supplied with the device. The clinometer consists of a shaped-metal sighting tube with cross wires, a quadrant scale graduated 0/90°, and a pendant arm clamped in position by a knob-operated clutch. A sturdy hardwood carrying case is supplied with the Sight Clinometer, complete with instructions. Wt. 2/shpg. 6 lbs. **\$145.00**

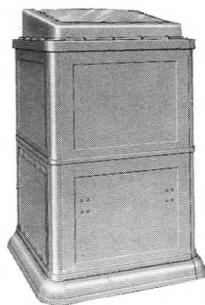


746

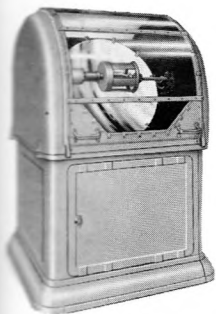
No. 746. BALLOON INFLATION KIT. Designed to meet U. S. Weather Bureau requirements. Six parts make a complete kit, but these can be furnished separately, depending on the types of balloons which are to be inflated. Complete kit, parts A/F **\$163.00**

746-A	Required for all balloons	\$15.00
746-B	" " ceiling and pilot balloons	7.00
746-C	" " 10 gm (ceiling) balloon only	12.00
746-D	" " 30 gm (pilot) balloons	17.00
746-E	" " 100 gm (pilot) balloons	30.00
746-F	" " all radiosonde balloons	82.00

Ceiling and Visibility



747A



747B



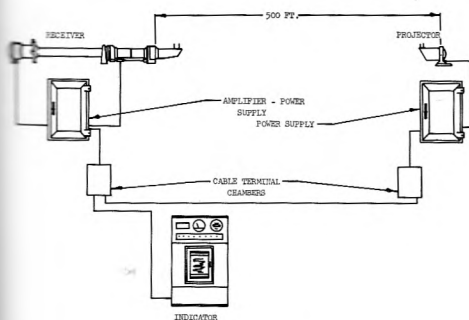
747C

No. 747. ROTATING BEAM CEILOMETER SYSTEM. This group of instruments, used by the USWB and the FAA, provides accurate cloud base readings automatically every six seconds, 24 hours a day. The system operates on the triangulation principle; it consists of three major components: projector, detector, and indicator. A separation of 300/1000' is required between the projector and detector, up to ten miles can be the distance from the measuring site to the indicator.

In principle, a beam of modulated light in the projector is rotated continuously through a vertical plane. The light reflected from a cloud base is measured by the detector whose field of view is vertical straight up and whose circuitry is designed to discriminate between the modulated light and background light. The signal received at the detector is transmitted to the indicator, which is synchronized with the vertical rotation of the projector, to indicate actual cloud height in feet.

With 115v 60Hz at the projector and detector sites, the only wiring required is a 2-cond. telephone line between the indicator and the detector, and a similar pair of wires between the indicator and the projector. Equipment for use with 230v 50Hz, or other voltages, can be supplied on special order.

No. 747A. RBC Projector, 115v 60Hz, 1,125 watts Wt. 750/shpg. 987 lbs., export 1,210 lbs.	}	\$20,000.00
No. 747B. RBC Detector, 115v 60Hz, 1,000 watts Wt. 650/shpg. 872 lbs., export 1,030 lbs.		
No. 747C. RBC Indicator, 115v 60Hz, 250 watts Wt. 250/shpg. 332 lbs., export 465 lbs.		\$ 5,000.00



748

No. 748. TRANSMISSOMETER. Fabricated to specifications of U.S.W.B. Type NBS and Armed Forces Model AN/GMQ-10, the transmissometer continuously measures the optical transmissivity, the visibility, of the atmosphere along any selected path between two fixed points, usually 500' apart. The equipment will provide a local indication of measurements made at a remote location. In the vicinity of its installation, the transmissometer will provide a measure of visibility, to an accuracy of $\pm 5\%$, over distances ranging from $\frac{1}{2}$ to 20 times the length of its baseline during the day; from the baseline to 20 times that distance at night.

A complete transmissometer consists of (1) Projector, (2) Projector Power Supply, (3) Receiver, (4) Receiver Amplifier-Power Supply, (5) Indicator, and (6) Recorder. Standard equipment operates on 115v 60Hz. Power requirements: items (1) & (2), 0.875 kva; items (3) & (4), 1.125 kva; items (5) & (6), 0.450 kva. **approx. \$9,500**

No. 801. INTEGRATING NEPHELOMETER. A reduction in visibility is one of the most common and most apparent effects of air pollution. This instrument, based on the work of Ahlquist and Charlson of the University of Washington, provides a means of determining the visual quality of air through the measurement of the extinction coefficient due to scatter. From the scattering coefficient "b," defined as "the reciprocal of the distance in which 63% of the light is lost from a light beam," the output voltage can be calibrated in terms of visibility or mass concentration of particles. When equipped with an intake heater, the instrument will separate smog from fog.

In operation, this instrument, for ground or airborne use, continuously samples air drawn through a chamber where it is illuminated by a pulsed flash lamp. The scattered light is detected by a photomultiplier tube, converted to a voltage, averaged, and compared with a reference voltage from another phototube looking at the flash lamp. Three linear sensitivity ranges are selectable; Freon 12 is used as a primary calibration standard; a built-in calibrator serves as a secondary standard in the field.

The Integrating Nephelometer consists of (1) an optical assembly, (2) sampling and purge air pumps, (3) the signal conditioning electronics, and (4) interconnecting cables and tubing. Power requirements are 105/125v ac, 60Hz, 1 amp, 125 watts maximum. The signal output is 0/5v dc at less than 10 ohms impedance. A 7" x 19" rack mounted panel houses the signal conditioning electronics. Wt. 41/shpg. 72 lbs.

\$4,475.00

No. 801A. Same as above, with servo recorder, also rack mounted—a complete system in one convenient cabinet, 20½"W x 17"H x 19"D, housing the electronics, air pumps, and recorder. Wt. 78/shpg. 110 lbs.

\$5,285.00

Accessories: Nos. 8-450 Nephelometer recorder \$595.00
8-450-1 Chart paper (100' roll) 8.00
50 days/1" hr.

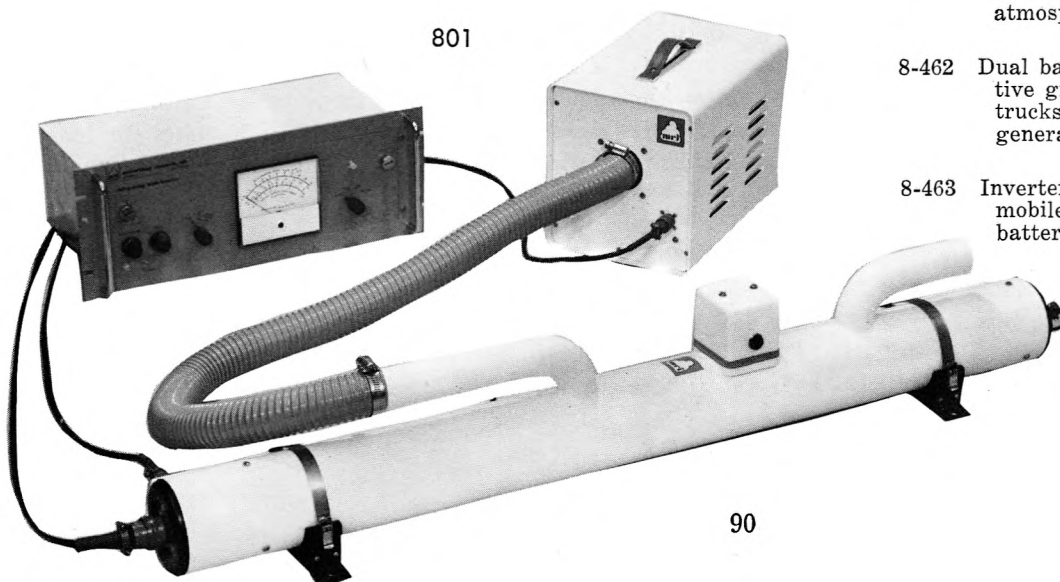
8-461 Air sample heater, used above 70% R.H. to separate pollution from atmospheric moisture. 150.00

8-462 Dual battery isolator, used with negative ground, 12v system, cars and trucks with common alternators or generators. 40.00

8-463 Inverter, 300 watts, solid state, for mobile operation with 12 and 24v dc batteries. 385.00

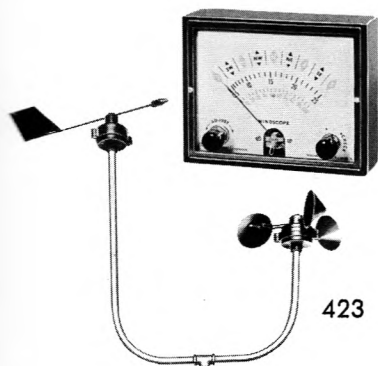


801A



801

Wind . . Weather Station . . Instrument Mast



423

No. 423. WINDSCOPE. An attractive and popular indoor wind indicating unit, mounted in a mahogany case, 6½" x 5", which shows wind speed or direction by a 2-position knob. The outdoor sensors, a direction vane and a speed unit, both corrosion resistant, are connected to the indoor indicator by 60 ft. of lead-in wire. No outside power source is required, a battery powers the Windscope. Complete with instructions. Additional lengths of wire: 10¢/ft.; min. 25', max. 2000'. Wt. 5/shpg. 9 lbs.

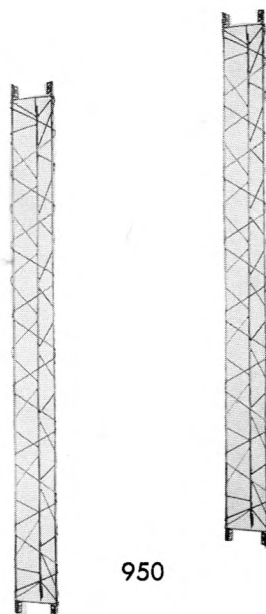
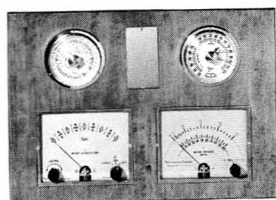
\$117.00



976

No. 976. WEATHERSCOPE WEATHER STATION. A 17" x 12" walnut panel, ready for mounting, supports separate indicators for wind speed and wind direction. They are connected to outdoor sensors with 60' of lead-in wire. The maximum-minimum outdoor temperature dial is supplied with 20' of capillary tubing; the aneroid barometer is self-contained. No outside power is required; a battery is furnished with the Weatherscope. Additional lengths of wire: 10¢/ft.; min. 25', max. 2000'. Wt. 10/shpg. 16 lbs.

\$225.00



950

No. 950. LIGHTWEIGHT INSTRUMENT MAST. A strong, easy-to-climb mast that is assembled from 10' sections and is adaptable to many requirements for the proper exposure of meteorological instruments. Each 10' section of triangular shaped tower with serpentine bracing, double welded, is 6½" on a side; the vertical sections and bracing are made of steel, hot-dip galvanized after fabrication. Each section weighs 20 lbs.; a maximum of six sections is recommended, but this depends on the instruments installed and the guying employed. For most applications guying is recommended every 20'; the minimum anchor distances for a 60' tower are 30' from the base. Price shown is for a 20' tower: two 10' sections, a base plate with hinge, a top plate and bearing support for mounting a customer furnished 2" diam. pipe mast, and 3 guy ropes made of ¼" manila with spliced thimbles on one end. Other accessories are available; additional 10' sections are \$20.00 each. Wt. 60/shpg. 65 lbs.

\$92.00



In the selection of instruments for an airport, the function of the station defines the choice, but in many cases the specifications of the F.A.A. and/or the U.S.W.B. are paramount. The listings below are not all inclusive; if instruments are required that are not shown, please let us know.

F.A.A./U.S.W.B.—Approved Equipment

Wind

Nos. 424	Airport Wind Indicator Set	(p. 50)
4-120		
4-135	Aerovane System	(p. 52)
4-141		

Temperature, Dew Point, Relative Humidity

Nos. 176	Instrument Shelter	(p. 24)
176A	Psychrometer Fan	(p. 24)
111	Max-Min Thermometers with Support	(p. 13)
101	Official Thermometer	(p. 13)
208	Sling Psychrometer	(p. 27)
224	Hygrothermometer	(p. 36)
255	Hygrothermograph	(p. 34)
281	Psychrometer Calculator	(p. 27)

Atmospheric Pressure

Nos. 349	Altimeter Setting Indicator	(p. 44)
355	Precision Microbarograph	(p. 42)

Cloud Height & Visibility

Nos. 742	Meteorological Balloons	(p. 87)
744	Ceiling Light Projector	(p. 88)
745	Sight Clinometer	(p. 88)
746	Balloon Inflation Kit	(p. 88)
747	Rotating Beam Ceilometer	(p. 89)
748	Transmissometer	(p. 89)

Other Equipment for Use at Airports

Wind

Nos. 409	Nassau Windmaster	(p. 46)
425	Observers Wind System	(p. 48)
975	Nassau Weather Dials	(p. 2)

Temperature, Dew Point, Relative Humidity

Nos. 147(1)	Station Temperature Monitor	(p. 15)
257	Hygrothermograph	(p. 34)
272	Dew Point and Temperature Monitor	(p. 31)
280	Relative Humidity Slide Rule	(p. 27)

Atmospheric Pressure

Nos. 325-1	Observatory Mercurial Barometer	(p. 45)
345	Precision Meteorological Barometer	(p. 40)
360	Digital Barometer	(p. 43)

American Meteorological Society



The
Award for Outstanding Services
to
Meteorology by a Corporation
is conferred upon
Science Associates, Inc.



for its valuable services to the atmospheric sciences as
professional consultants on instrumentation to Gov-
ernment, education, industry, and the public.

American Meteorological Society

January 1969


President



Ordering Information

PRICES, TERMS, Etc.

1. WHEN ORDERING—

Please state quantity, catalog model number, name of instrument, and price. When applicable, variations from standard instruments should be noted: chart scale, recording period, type of chart drive, lead length, etc. If a quotation has been received, please reference "quotation number" noted in correspondence.

2. PRICES—

List prices, subject to change without notice, are for domestic and Canadian sales, F.O.B. Princeton, N. J. No order will be processed without customer approval of an increase. Prices are in U. S. Dollars. For sales abroad prices will be furnished for specific items on request.

3. TERMS—

1% 10 days, net 30 days to domestic accounts with approved credit for orders over \$25.00; all others, net 30 days. Shipping costs cannot be discounted. Rated firms and institutions billed on receipt of purchase order. Individuals should accompany order with payment in full; N. J. residents add 5% sales tax. For sales abroad, we require a guaranteed Irrevocable Letter of Credit, established with a New York City bank, for a minimum period of one year from the date of issue, negotiable upon receipt of the merchandise by the carrier.

4. SHIPPING—

Acknowledgements giving shipping dates will be mailed on orders that cannot be completed within two weeks. Most items are from stock, with shipments made within ten days after receipt of an order. Non-standard equipment, or instruments not immediately available, may require longer. Shipments are made by United Parcel Service, Parcel Post, or highway truck, depending on size and destination; with insurance coverage for items over \$10.00. Air shipments on request.

5. EXPORT SERVICE—

Shipments of meteorological instruments abroad are handled expeditiously by air carriers. Customers are billed for the cost of special packing, handling, insurance, etc. Service is out of New York City, through an export agency; we prefer that the purchaser select and designate an exporter of his own choice.

6. WARRANTIES—

All equipment sold by Science Associates carries the same warranty as that of the manufacturer.

7. DAMAGED MATERIAL—

Packages should be opened for inspection upon receipt and damages reported immediately to the carrier. A request for inspection of the material and the filing of a claim with the carrier should follow promptly. Advise Science Associates of damages in writing within one week; we will try to assist. Do not return any instruments until advised of shipping address for repairs or replacement. Returns, when authorized, are to be made in adequate packing, prepaid and insured.

8. REPAIRS—

Customers should not send instruments for repairs without first informing Science Associates. After approval, a brief letter of explanation, with identifying references, such as the purchase order number and date, should accompany each shipment. If the instrument is under warranty and examination discloses the defects are due to improper handling, or improper use, charges will be made for repairs, as they would if the instrument was out of warranty.

9. SERVICE—

The choice of instruments for a particular application depends on technical specifications and funds available. We can assist you in selecting the proper instrument; we can also assist you in selecting a group of instruments, or in putting together a system which will meet your need. Your inquiries are invited.

Donald C. Nelson