



# WALLACE & TIERNAN PRODUCTS, Inc.

Manufacturers of Precision Instruments  
Belleville, 9, New Jersey

Technical Publication 244

## CUSTOM CALIBRATED PRECISION BAROMETER

Years of pure research and development have been rewarded with an ultra-sensitive aneroid barometer of unique simplicity. Designed primarily to serve as a precision standard for the calibration and checking of other pressure sensitive instruments as used in weather bureau stations, the instruments are now finding wide-spread use in standard laboratories, meteorological stations and in the calibrating departments of manufacturing concerns. It will be immediately recognized that the instrument must possess an inherent accuracy and sensitivity approaching that of the finest mercurial standards. All this has been achieved and incorporated in the design to enable taking accurate and instantaneous readings under wide changes of ambient temperature and pressure. Portable and rugged, the barometer has opened new fields of usages where accurate measurement of pressure is important. In providing such inherent accuracy other desirable features have been made available.



*Barometer—mounted in  
standard case*

FEB 16 1944



## Readability

The dial is five inches in diameter and custom calibrated for each particular mechanism to an accuracy of one part in one thousand, thus matching the accuracy of the complete instrument. A knife edge pointer, moving over the scale and mirrored dial, makes virtually two revolutions in traversing the range of the instrument. The mirrored dial eliminates errors due to parallax and makes readings consistent when made by several individuals. There are no external adjustments or manipulations required before taking a reading. The reading is taken directly from the main scale in the shortest possible time. A wide open scale over the entire range of the instrument and approximately 29" long, with 0.5 millibar graduations on 3/64" spacings, permits readings to 0.05 millibars with ease.

## Temperature Compensation

Close control over fabrication and evacuation of the pressure sensation element, together with precise geometry in design of the moving elements, gives a heretofore unknown degree of inherent compensation over wide changes in ambient temperature. Complicated compensating elements and bimetallic strips are eliminated. No deviation greater than 0.005 millibar per degree Fahrenheit

above or below 75° is permitted over the entire pressure range of the instrument.

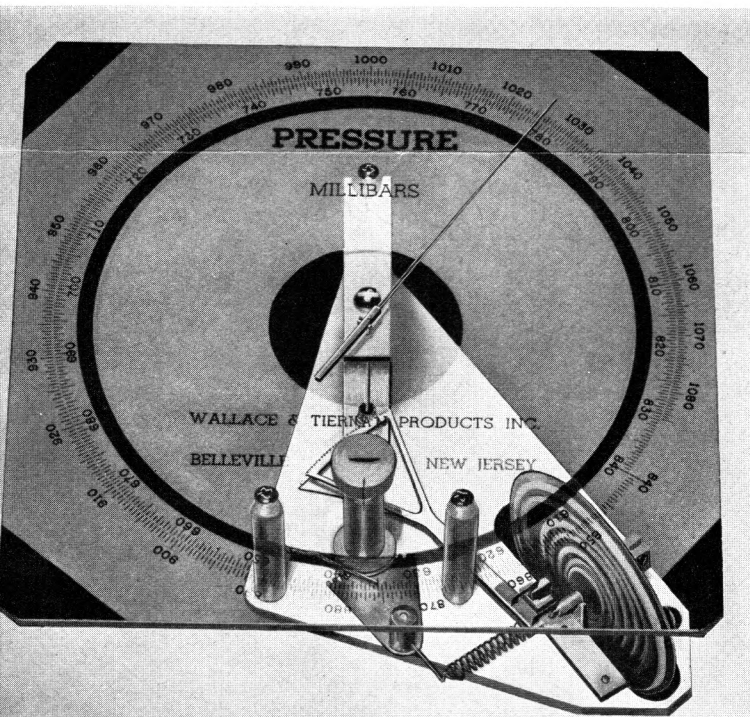
## Sensitivity

A resultant sensitivity of one part in eight thousand indicates the absence of friction between the capsule and the pointer. A new method for transmission and simplification of the motion has been devised. A phalanx section of beryllium copper serves as an elastic hinge pivot on the sector arm. This construction also connects the capsule to the sector arm. Consistent and uniform readings without tapping the instrument are insured through the use of a new method for removing backlash between the sector arm and pinion on the pointer shaft. This anti-backlash device consists of a fine filament wound about a spool on the pointer shaft having the same pitch diameter as the pinion, the free end of the filament being secured to the end of a light spring fastened to the sector arm itself. Thus backlash is removed under all positional relationships between the sector arm and the pinion, and uniform tension is provided between the only moving parts.

## Accuracy

The overall accuracy of the barometer is one part in one thousand. There is a negligible drift over long periods of time and this constantly decreases with the age of the instrument. Proper usage of the instrument results in virtually no hysteresis or inaccuracies due to rapidly varying pressures over a wide range. A zero setting adjustment permits the readjustment of the instrument at any time and place when a master standard of the same or different type is available.

The pointer is of telescopic construction using duralumin tubing, the end of which is drawn to a knife edge to facilitate readings to 1/10 of a graduation or to 0.05 millibars. The pointer is balanced to give extremely fine position compensation. Overall accuracy is best exemplified by the fact that the instrument will repeat with identical readings when submitted to the same pressure conditions at various times.



*Barometer—showing internal mechanism*



## Portability and Reliability

Rugged construction, compatible with the intended service of such precision instruments, is provided by shock mounting the mechanism within an oak case. A carrying strap is provided for ease of handling in the field. A slide eyelet, mounted in the case, permits wall mounting in the laboratory. A lucite cover closes over the top of the dial. The cover of the case is hinged and is removable by pressing a spring latch. The units will withstand vibrations of from 500 to 1000 cycles per minute under a displacement of approximately 0.315". A padded, rubber-lined, fabric-covered protecting case is available where desired. Fixed mechanical stops are provided to prevent disengagement of the sector arm and pinion. A separate stop is provided to limit the travel of the capsule. Thus the instrument is not easily damaged or thrown out of adjustment as a result of being subjected to extremes of pressure or from usual jars or vibrations.

## Conversion Chart

Inside the cover of the barometer is mounted a sheet on which are printed a conversion chart, a temperature correction curve, and an altitude correction chart. The first chart is used to convert millibar readings to inches of mercury or to feet of altitude in accordance with Smithsonian Meteorological Table No. 51. The temperature correction curve is drawn individually for each instrument. An altitude correction factor, depending on the air temperature and relative humidity, is obtained from the third chart.

### TYPE FA-126

Range: 745 to 1065 millibars

Size: Oak Case, 6" x 6" x 4"

Weight: 2 lbs. 8 oz.

Shipping Weight: 12 lbs. (14"x10"x9")

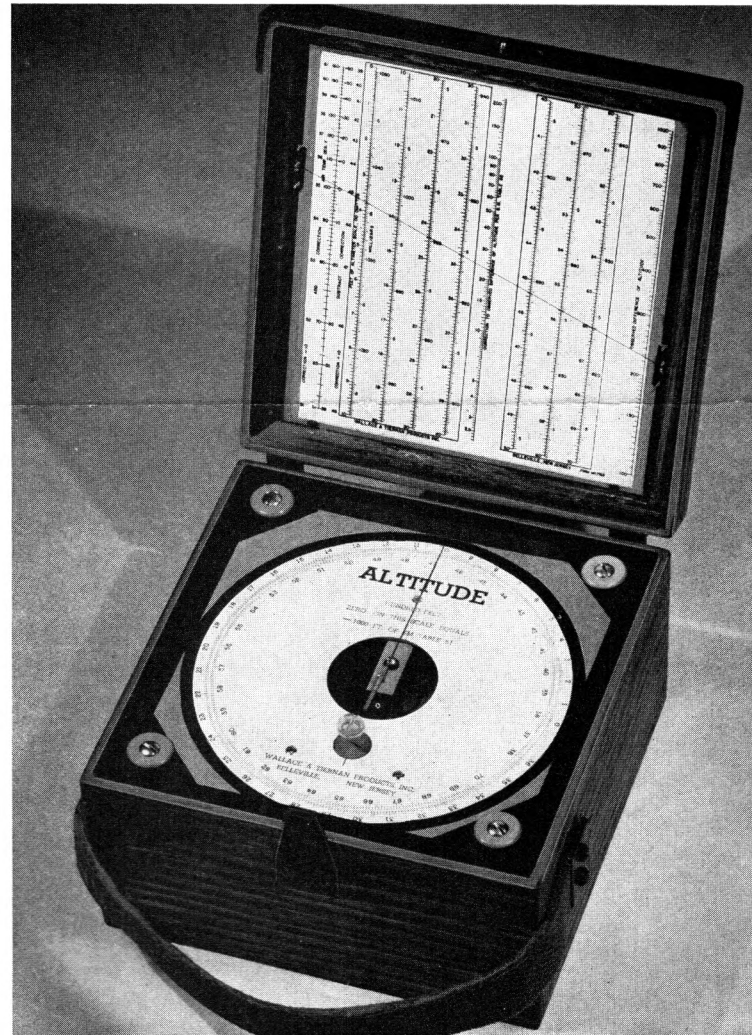
## OTHER PRESSURE SENSITIVE INSTRUMENTS

### Altimeter

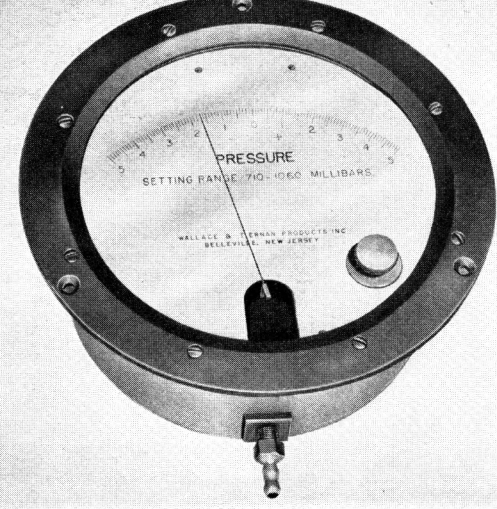
The W&T Altimeter is constructed with the same precision and fine workmanship as the Barometer, and, therefore, possesses equal accuracy and sensitivity. The pressure sensitive capsule is designed to follow the curved line function, which relates pressure and altitude according to Smithsonian Meteorological Table No. 51. Accordingly, the scale of the Altimeter is calibrated in feet altitude. The instrument can be furnished with either a 7,000 ft. or 15,000 ft. range, with 10 ft. and 20 ft. graduations, respectively.

A nomograph is mounted inside the cover, which will determine the correction factor for the difference of altitude between two points using the average of the temperature readings and the observed difference of altitude. The chart also provides a conversion from feet altitude to millibars.

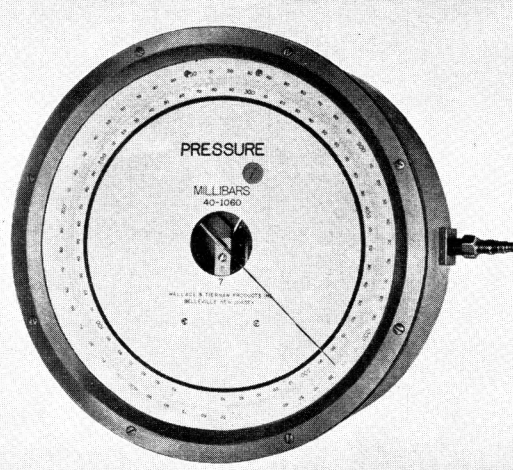
With an instrument of such a high order of precision available for field use, it is anticipated that the system of field altimetry for determining elevations in connection with surveys will become increasingly important.



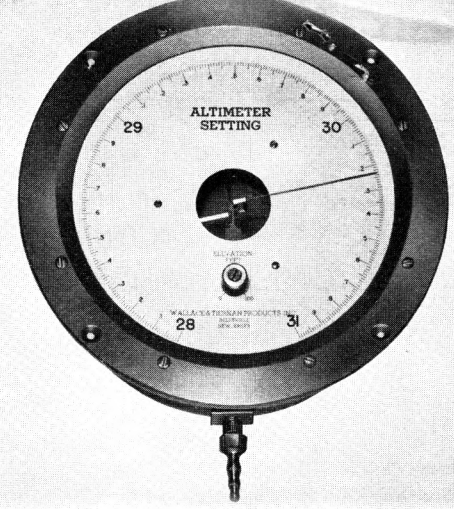
*Standard Altimeter*



*Change of Pressure Indicator*



*Precision Aneroid Manometer*



*Altimeter Setting Indicator*

### **Change of Pressure Indicator**

This instrument is extremely sensitive to pressure changes and can be read to 0.01 millibars. The scale is graduated to read plus or minus five millibars. A micrometer adjusting screw is provided to set the instrument for any pressure between 710 and 1,060 millibars.

### **Altimeter Setting Indicator**

This instrument is designed for installation at an airport to indicate the proper setting of the barometric scale on aircraft altimeters. It is an aneroid barometer covering the range of altimeter setting numbers from 28 to 31 in increments of 0.01. Each Altimeter Setting Indicator is adjusted at the factory for the elevation of the airport at which it will be used. Compensation for difference in elevation between the installed instrument and the landing surface is provided by means of an auxiliary dial which permits an adjustment of plus or minus 100 feet. The use of this direct reading instrument insures maximum accuracy and despatch in furnishing altimeter setting numbers.

### **Precision Aneroid Manometer**

The Aneroid Manometer is a high precision sensitive instrument built to exacting laboratory standards. Each instrument is hand calibrated to cover the range from 40 to 1060 millibars. Through the use of an eight-inch dial and a pointer making two revolutions, a scale length of approximately 49 inches is provided. To achieve extreme accuracy under all conditions, a temperature compensating element is included to supplement the inherent compensation of the mechanism. This Manometer is a master standard ideally suited for calibrating other pressure sensitive instruments, especially radiosonde elements.

### **Precision Mercurial Manometer**

The W&T Mercurial Manometer is equipped with a calibrated dial which, when set to room temperature, provides full temperature compensation over the entire range of the instrument. An adjustable optical system facilitates accurate reading of the position of an indicator float which rests on the surface of the mercury column. The base of the Manometer is provided with adjustment screws to obtain vertical alignment.

*We reserve the right to change, modify or alter specifications herein at any time without notice.*

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