INSTRUMENTS

BAROMETER

A barometer is an instrument used to measure the pressure of the atmosphere. The use of the barometer is a practical advantage, in the operation of a mine, by showing the change in the atmospheric pressure as they occur. A careful study of these changes in pressure in connection with the gaseous condition of the mine workings, enables a more intelligent arrangement and control of the ventilation , and will often forecast a dangerous gaseous condition existing in the mine, owing to a rapid fall of the barometer.

Regular barometer reading, in connection with mining operations, are important in respect to their indicating the expansive effect produced on a sudden fall of the barometer or decrease of atmospheric pressure, As a result of this, the air and gases confined in a large abandoned area are forced out into the live workings, causing the explosive condition of the mine air to be considerably increased for a time.

MINE WATER GAUGE

A water gauge consists of a glass u tube partially filled with water open at both ends and is graduated in inches and tenths thereof.

A water gauge is used in Mine Ventilation, for the purpose of computing the power on the air. It should, therefore, be placed on the fan drift, in order that it shall take into account the entire resistance of the shaft and mine, which the ventilating fan must overcome. In this position of the water gauge its reading indicates the pressure established by the fan, which is above or below the atmospheric pressure, according as the fan is blowing air into or exhausting air from the mine. The rise of fall of one inch difference in the level of the water column denotes 5.2 lbs. per square feet.

Example: If the water gauge suddenly shows a rise of half an inch, without having increased the speed of the fan, what would you understand from this and what would be your movements?

Assuming the fan is running at the same speed and the water gauge is observed to take a sudden rise of half an inch, it is natural to suppose that the increased gauge is due to a greater mine resistance, which is probably caused by some undue obstruction of the air current. This will call for an immediate investigation to ascertain the cause. It may be that a heavy fall of roof has blocked the airway at some point in the mine; or the obstruction may be caused by the movement of a particularly heavily loaded trip against the air.

The sum of the difference of the two water levels as shown on the scale is the water gauge reading.

THERMOMETER

An instrument for determining temperature, and used to measure temperatures of sealed area and to determine the relative humidity of mine air.

Regular readings of the thermometer taken inside and outside of the mine are important as showing a greater or less capacity of the air for carrying moisture or absorbing moisture from the mine. Hygrometer reading are of greatest value in a dry and dusty mine.

ANEMOMETER

The form of Anemometer generally used in coal mining consists of a metal ring within which is set a rotating propeller of blade. The air current striking the inclined blades rotates the bane, the number of revolutions being recorded on the face of the dial by means of a series of gears. The instrument is employed to measure the velocity of the air current in mine airways as expressed in feet.

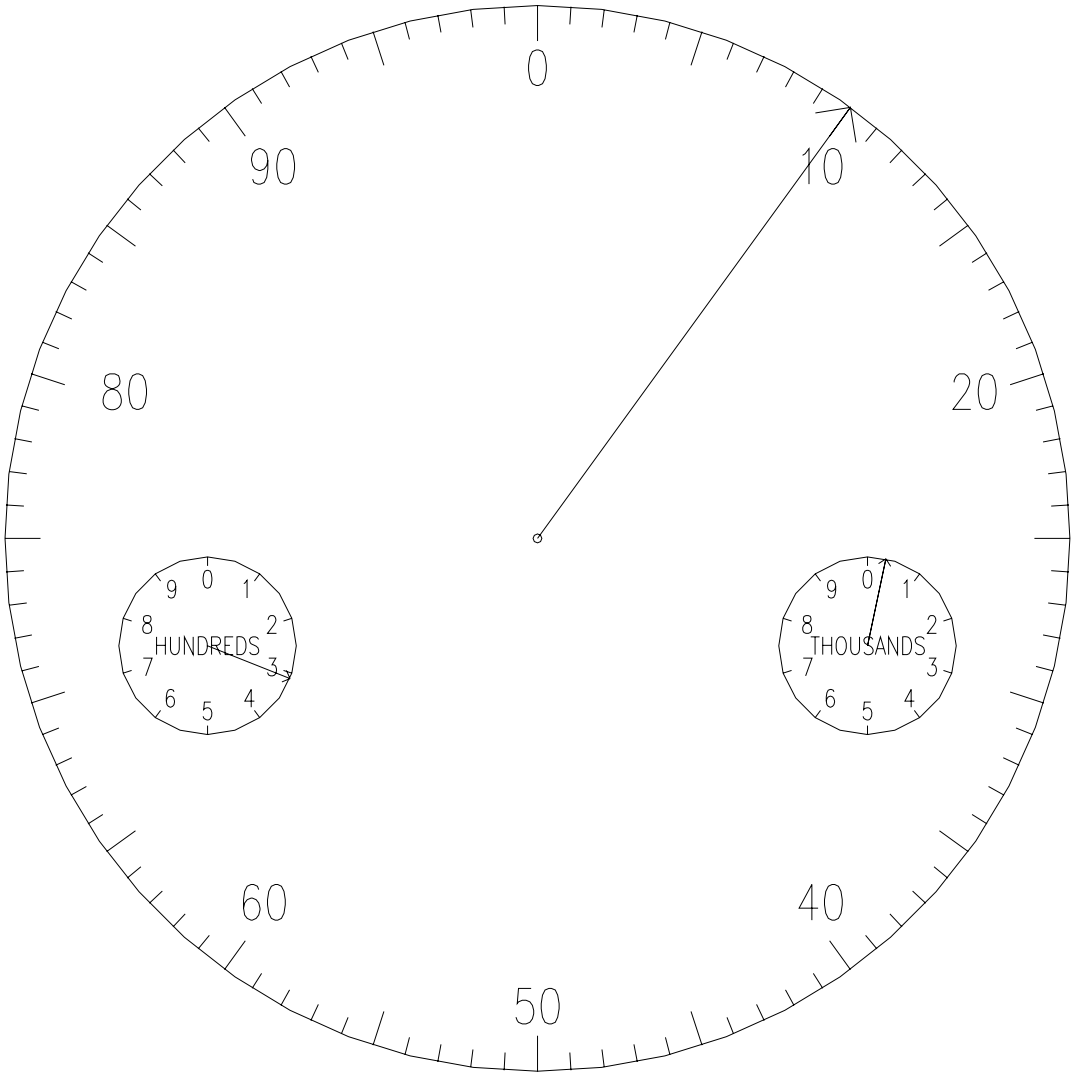
In taking a reading a place is first found where the air ahs a straight course and will not be deflected unequally to either side, and where the area of the airway can be measured.

Hold the anemometer at arm's length in such a way that the blades will turn in a plane at right angles to the air current, using reset lever on anemometer, so all dial hands will be on zero, the brake lever near handle is released and anemometer exposed to the air current for one full minute, moving about so as to obtain an average reading for the enter sectional area of the airway after which the brake is applied. The reading of the anemometer times the area of the airway in square feet gives the quantity of air passing in cubic feet per minute.

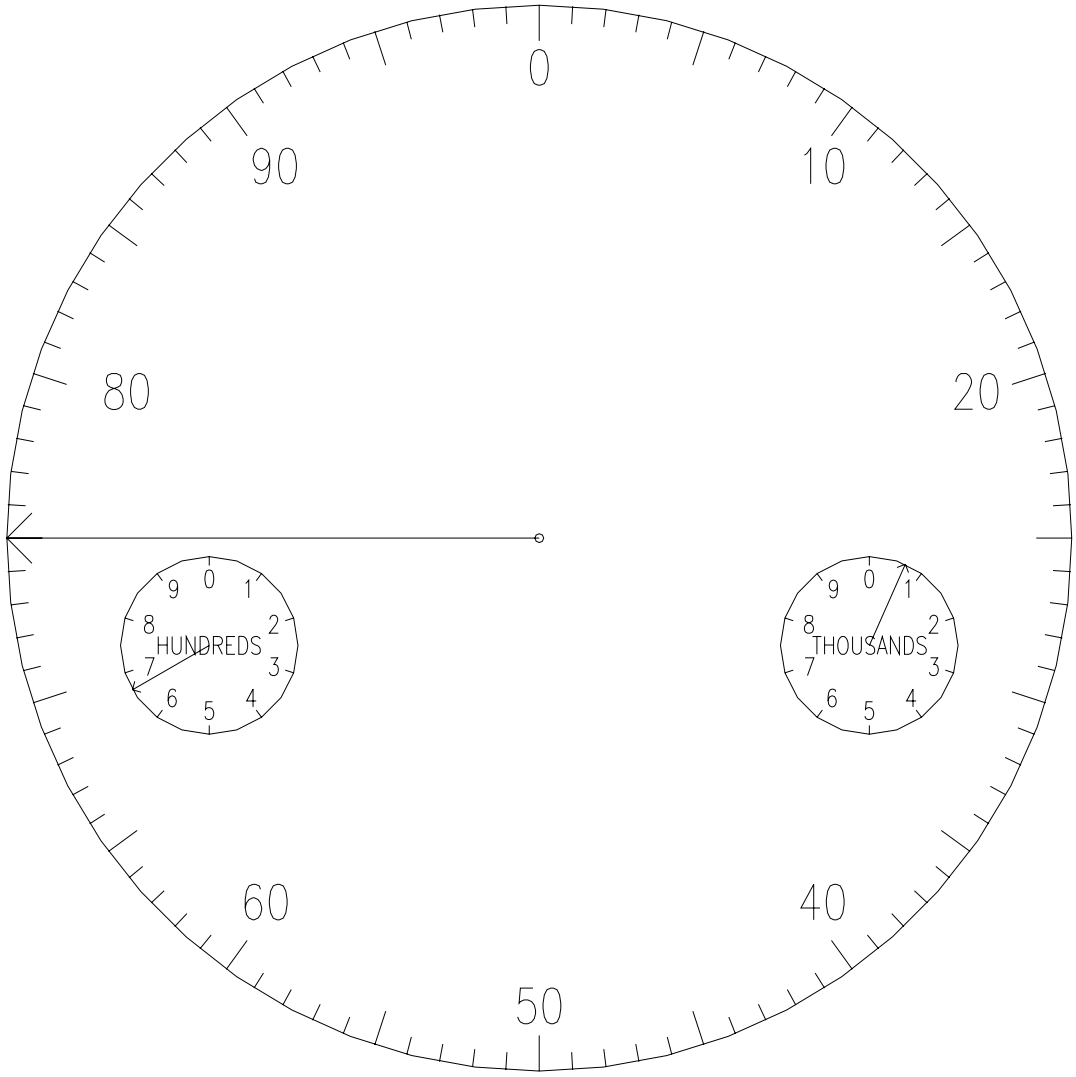
Example Problem: How would you determine the quantity of air passing where the section of the airway is ten feet wide, five feet high, and the air velocity of the anemometer reads 300?

Answer: Calculate the sectional area of the airway, thus: 10 x 5 = 50 sq. ft. the quantity of air passing is 300 x 50 = 15,000 cu. ft. per minute.

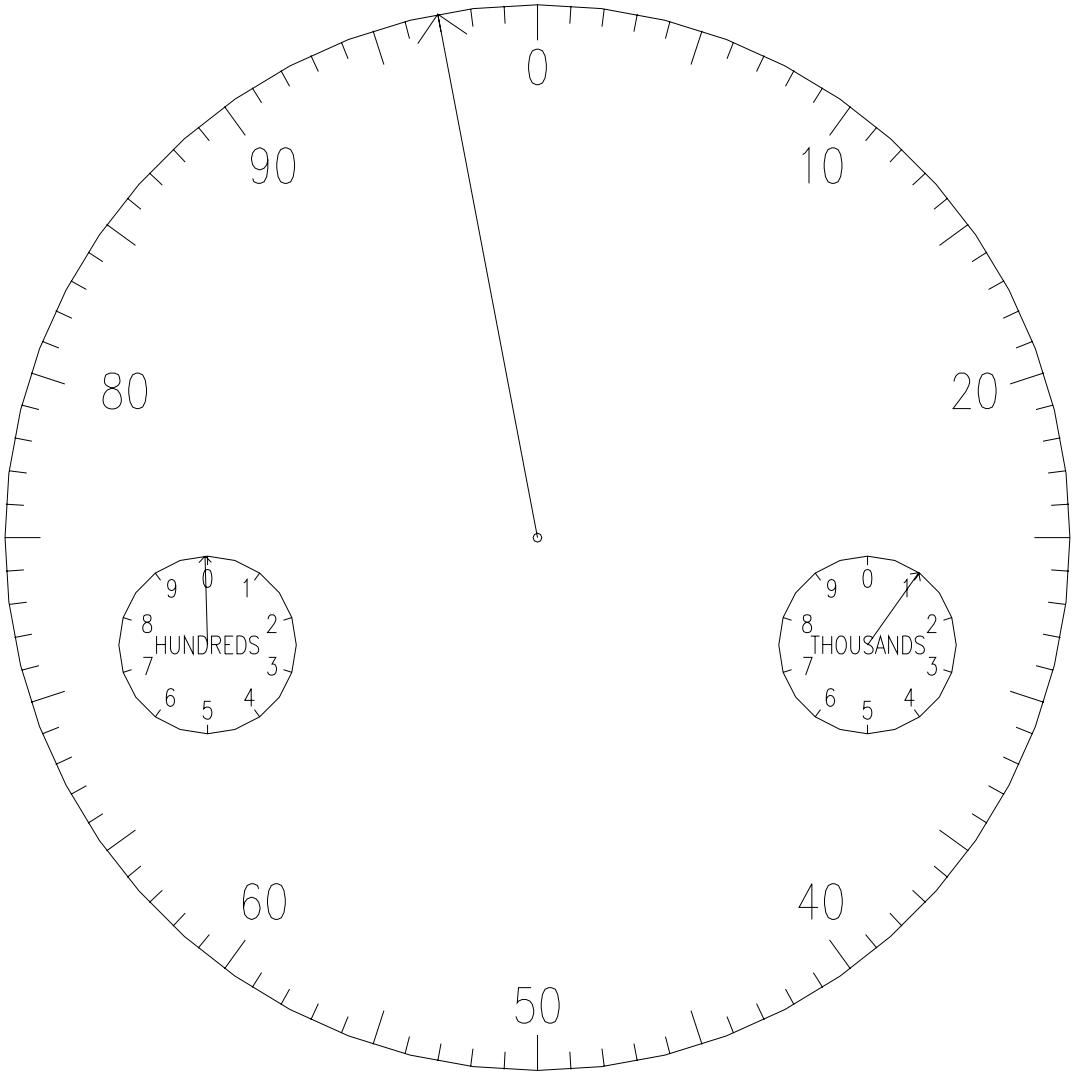
Air reading - 310 (Velocity)



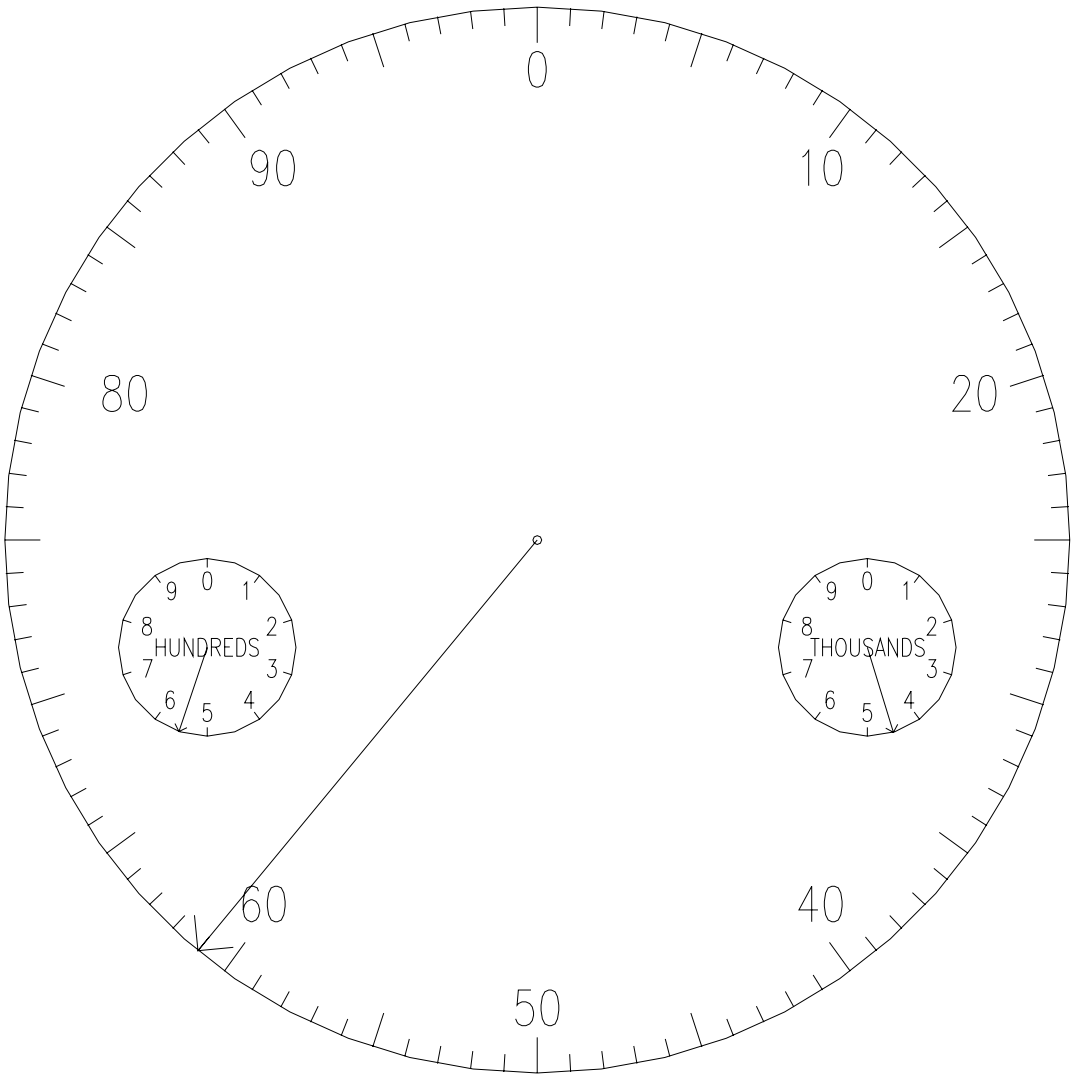
675 (Velocity)



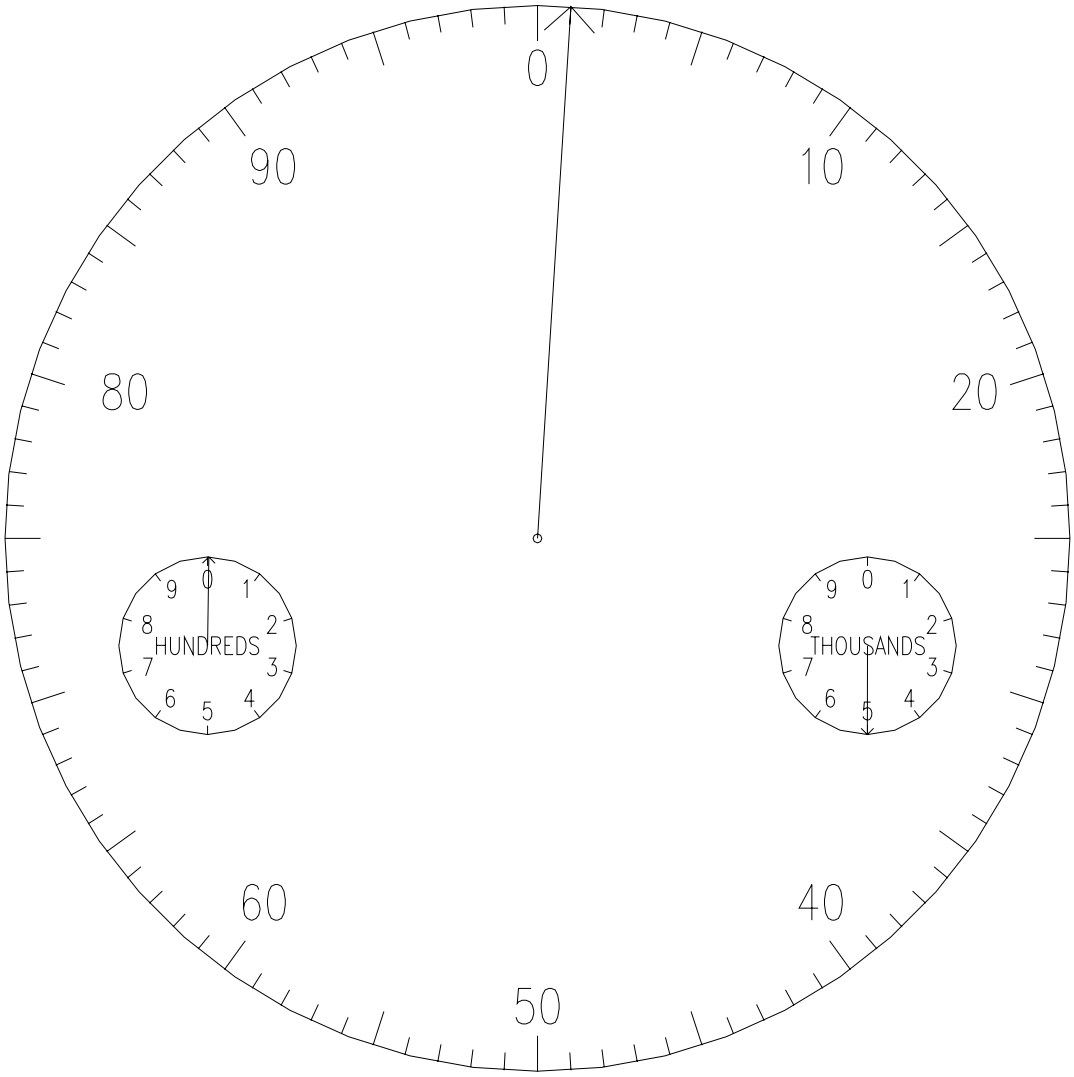
997- (Velocity)



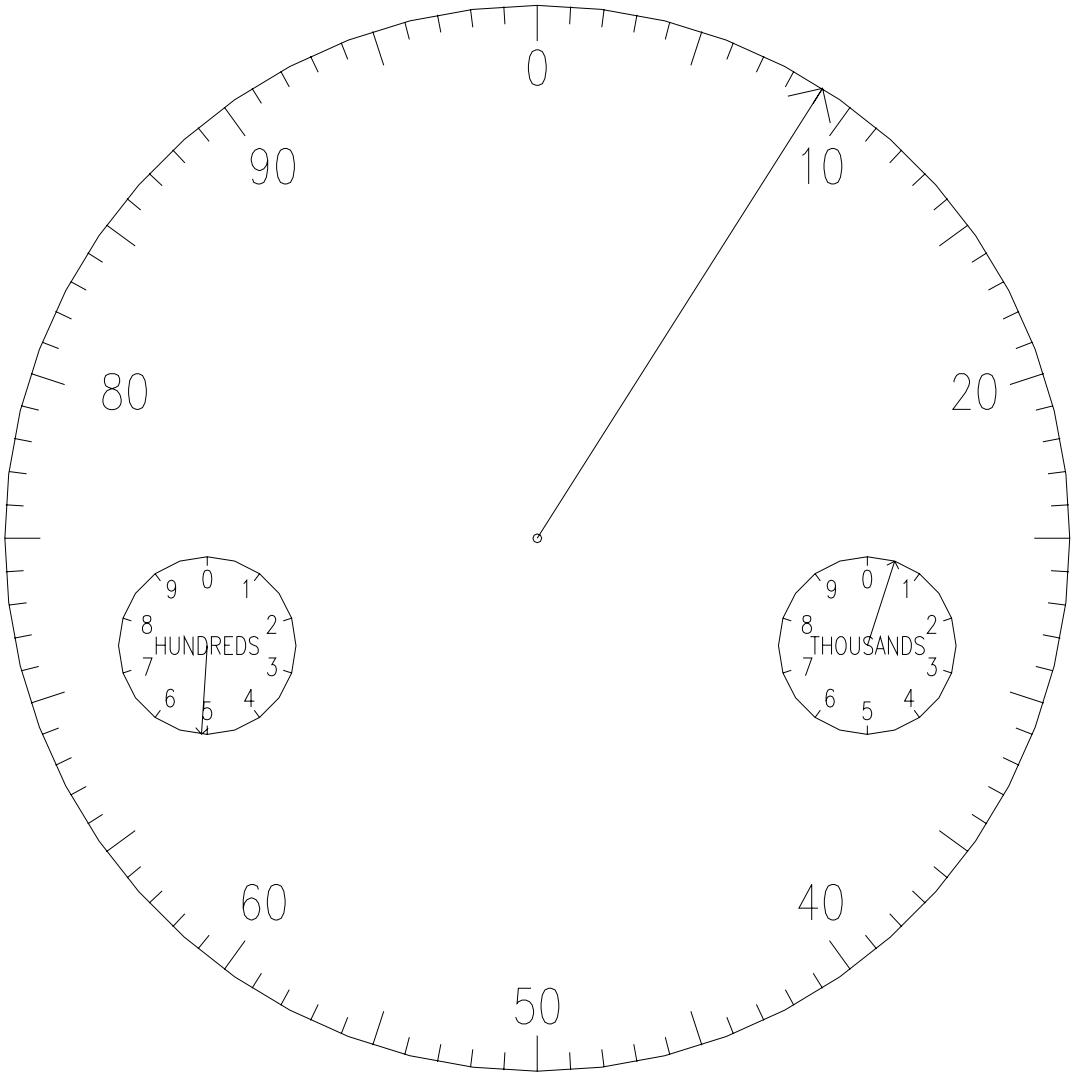
4,561 (Velocity)



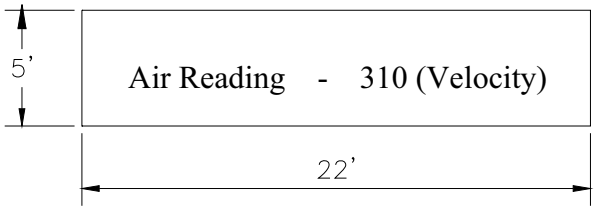
5,001 (Velocity)



509 (Velocity)

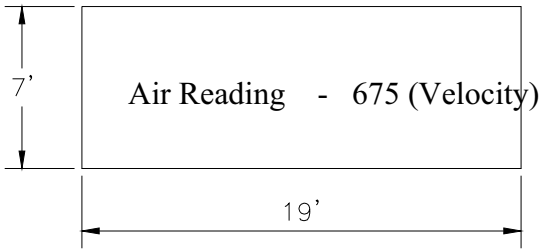


Find The Square Feet



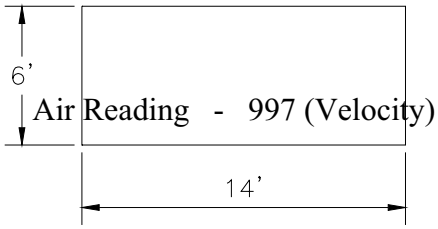
Area = 5 x 22 = 110 Sq. Ft.

Answer: 34,100 Cu. Ft. Per Minute



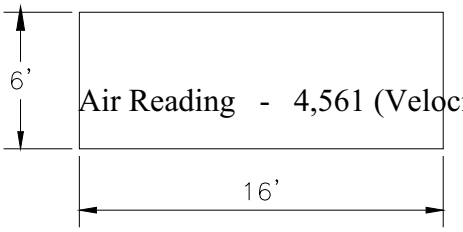
Area = 7 x 19 = 133 Sq. Ft.

Answer: 89,775 Cu. Ft. Per Minute



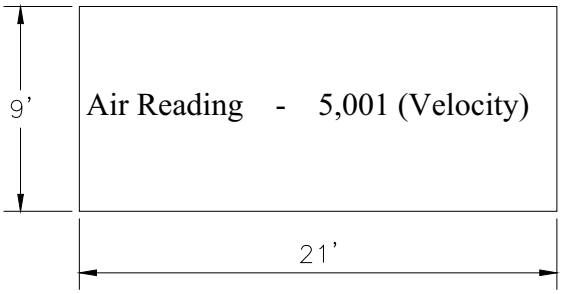
Area = 6 x 14 = 84 Sq. Ft.

Answer: 83,748 Cu. Ft. Per Minute



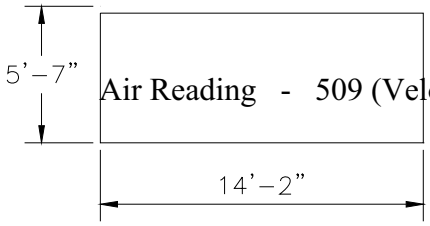
Area = 6 x 16 = 96 Sq. Ft.

Answer: 437,856 Cu. Ft. Per Minute



Area = 9 x 21 = 189 Sq. Ft.

Answer: 945,189 Cu. Ft. Per Minute



Area = 5.583 x 14.167 = 79.09 Sq. Ft.

Answer: 40,259 Cu Ft. Per Minute