



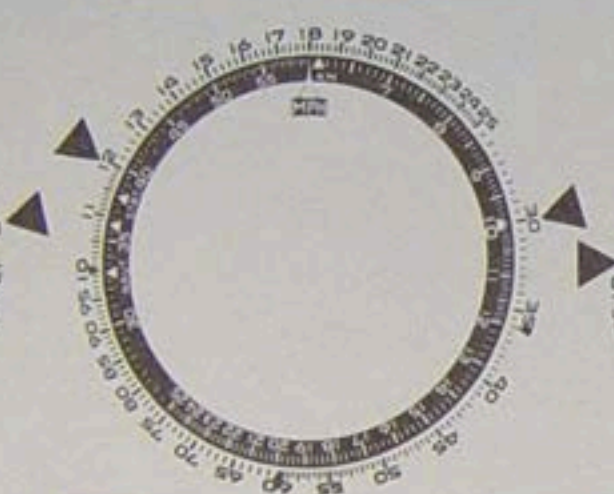
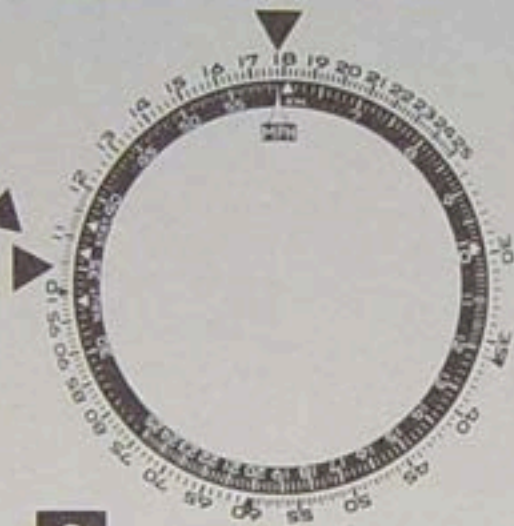
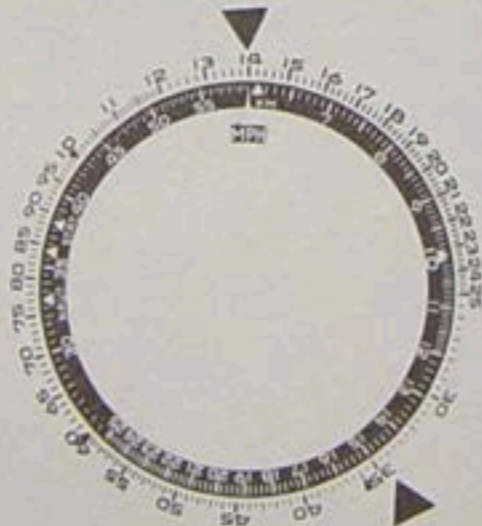
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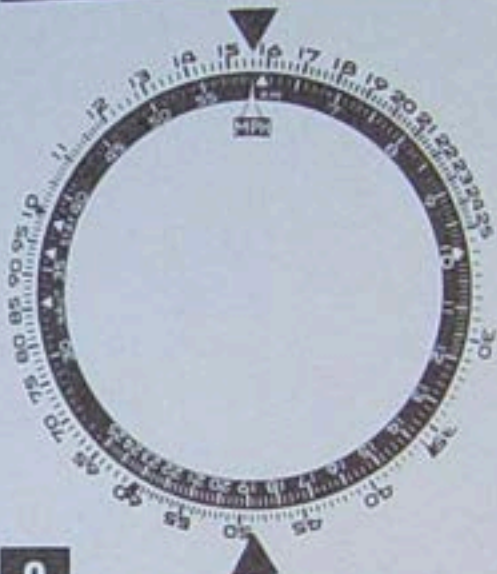
INSTRUCTIONS FOR
THE USE OF THE SLIDE RULE



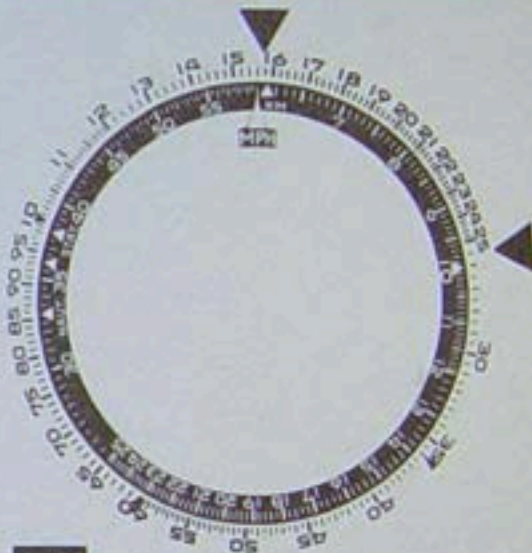
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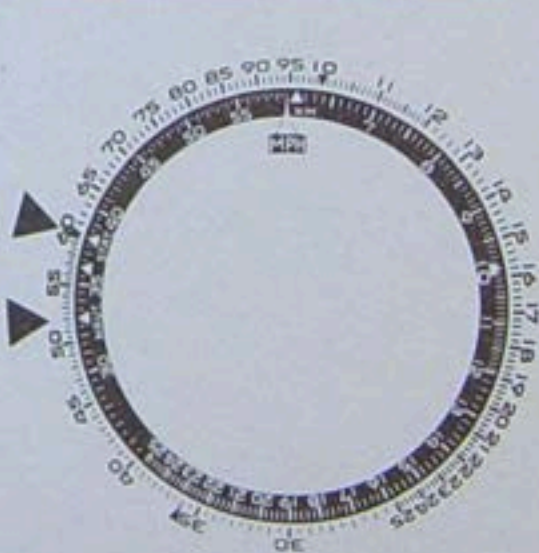
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5



9



10



SLIDE-RULE

The computer portion of the watch will require a little time and patience to master, if the pilot is unfamiliar with standard flight computers. It is actually a circular slide rule and will make accurate computations involving multiplication and division in terms of time, distance, fuel consumption and other normal flight and navigation computations dealing with speed, time and distance.

Inspection of the watch will reveal that there is an outer scale on which will be found numbers running from 10 to 10 (the figure «10» may be 1.0, 10., 100.). On the outer perimeter of the dial of the watch is a second similar scale. Note that the outer scale will always be related to miles, or miles per hour, feet, or feet per minute, gallons, or gallons per hour, or any quantity which varies with time. The inner scale deals with minutes or

hours in all problems involving time. At 60 minutes on the inner scale there is an arrow which is marked «MPH». This is sometimes known as the «ground speed index» or «hour index». This index is used in problems involving any quantity per hour.

To multiply with the Navitimer use the unit index (number «10» in red on the inner scale). Always set the multiplier (the number by which another is multiplied) opposite the unit index on the inner scale and read the answer on the outer scale opposite the multiplicand (number to be multiplied by another) appearing on the inner scale.

Example 1

To multiply 7×12 , set 12 (the multiplier) on outer scale opposite unit index («10») on the inner scale. Opposite 7 (the multiplicand) on the inner scale, read the answer 84 on the mobile dial.

To divide with the Navitimer also use the unit index (red 10). Place the dividend (the quantity to be divided by another number) on the outer scale opposite the divisor (quantity by which another is divided) on the inner scale. Opposite the unit index (numeral «10» on inner scale), read answer on outer scale.

Example 2

Divide 120 by 4. Place 120 on outer scale opposite 4 on the inner scale. Read answer, 30, on outer scale opposite unit index (numeral «10» on inner scale).

3

Calculating ground speed

The mobile outer and fixed inner scales are used for determination of ground speed problems. Two of the following quantities are available for its solution: time, distance, ground speed.

Example 3

Known: Distance and Time.

Required: Ground speed.

A pilot finds by the use of check point that he has travelled 104 miles in 35 minutes. What is the ground speed?

Solution: Move the mobile scale until 104 on the mobile scale is set opposite 35 on the fixed scale. Opposite the hour index (the arrow marked «MPH» directly over the hour 12) read 178 miles per hour on the mobile scale.

Example 4

Known: Distance and speed.

Required: Time.

A pilot wants to know how long it will take to go 486 miles at a ground speed of 156 miles per hour.

Solution: On the mobile scale set 156 opposite the hour index on the fixed scale. On the inner scale opposite 486 on the mobile scale read 187 minutes (or 3 hours and 7 minutes).

5**Calculating miles per minute**

This may be read after the speed in miles per hour has been obtained. The speed given in miles per hour on the mobile scale when set opposite the hour index on the fixed scale can be readily converted into miles per minute by reading the number on the mobile scale appearing opposite the figure «10» on the fixed scale. The figure «10» is often referred to as the unit index.

Example 5

In Example 4, the ground speed was 156 miles per hour. With the 156 on the mobile scale set opposite the hour index, what is the speed in miles per minute?

5

Calculating miles per minute

Solution: With 156 miles on the mobile scale set opposite the hour index read the speed in miles per minute, or the figure on the mobile scale which appears above the figure «10» on the fixed scale which is 2.6 miles per minute.

There are times when a pilot may want to know the time required to travel a short distance, such as the distance from the cone of silence to the edge of an airport, or between the inner marker and range station. Since the distance is short, the time required may be less than a minute, in which case the time has more significance when expressed in seconds. In such cases the «second» index is used. This is the figure «36» on the inner scale (there are 3600 seconds in an hour).

6

Calculating gasoline consumption

Two of the following quantities are available for gasoline consumption problems: Total gallons used, time, rate of consumption.

Example 6

Known: Time and rate of consumption. **Required:** Total gallons used.

A pilot wishes to know how many gallons are necessary to fly $3\frac{1}{2}$ hours at an average rate of consumption of $11\frac{1}{2}$ gallons per hour.

Solution: Opposite the «hour index» set 11.5 on the mobile scale.

Then, opposite 210 minutes on inner scale on the mobile scale read 41 gallons.

7

Calculating the rate of climb or descent

Two of the following quantities are available for solution: total altitude of descent, time and rate of descent (or climb).

Example 7

Known: Rate of ascent and total elevation in ascent. **Required:** Time. A pilot climbs to 7400 feet above his starting point at the average rate of 500 feet per minute. How long will this require?

Solution: Set 500 on the mobile scale opposite the «unit index» («10» on the fixed scale). Opposite 7400 on the mobile scale, read answer, 14,8 minutes on the fixed scale.

8

Calculating the distance of climb or descent

Two of the following quantities are available: Distance, time, speed. The method used in examples 4 and 5 should be used.

Example 8

The pilot in example 7 wishes to know how far he will have travelled when his climb is finished. His average true air speed is 120 miles per hour and he is aided by a tail wind of 20 miles per hour.

Solution: Set 140 miles per hour ($120 + 20$) on mobile scale opposite «hour index» on fixed scale. Opposite 14.8 minutes (computed from example 7) on fixed scale read 34.5 miles on mobile scale.

9

Nautical and statute mile conversion

On the fixed scale both nautical (Naut) and statute (Stat) miles are shown, also kilometers (KM) (red mark just to the right of MPH).

The conversion from statute to nautical or nautical to statute miles is read directly on the mobile scale.

Example 9

Known: 60 statute miles.

Required: Nautical miles.

Solution: Set 60 on mobile scale opposite «Stat» on fixed scale. Opposite «Naut» on fixed scale, read 52 nautical miles on mobile scale.

Example 10

Known: 60 statute miles.

Required: Kilometers.

Solution: Set 60 on mobile scale opposite «Stat». Opposite the «KM» mark (= the red mark, just to the right of «MPH» on the fixed scale), read 96.5 kilometers on mobile scale.