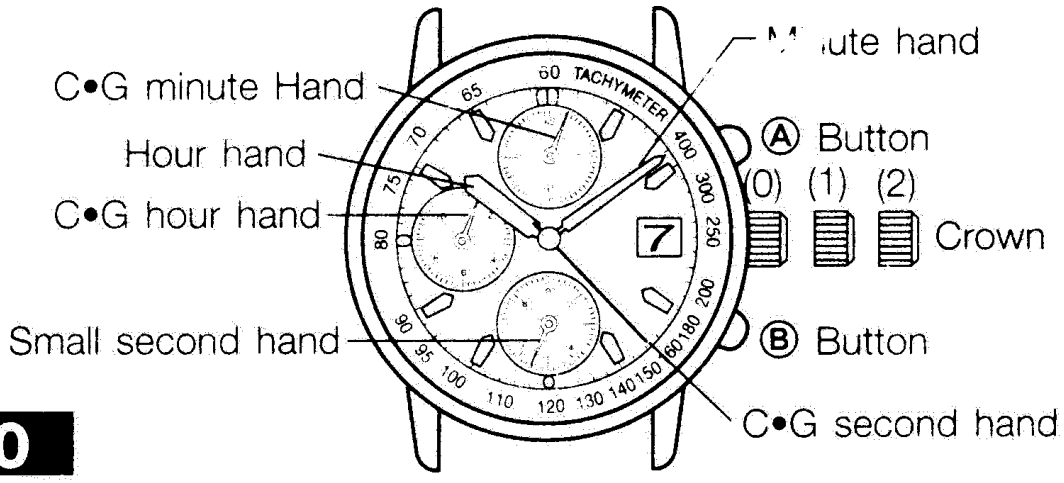
OS10 / OS60
(Miyota Japan Movement)
CHRONOGRAPH

INSTRUCTIONS

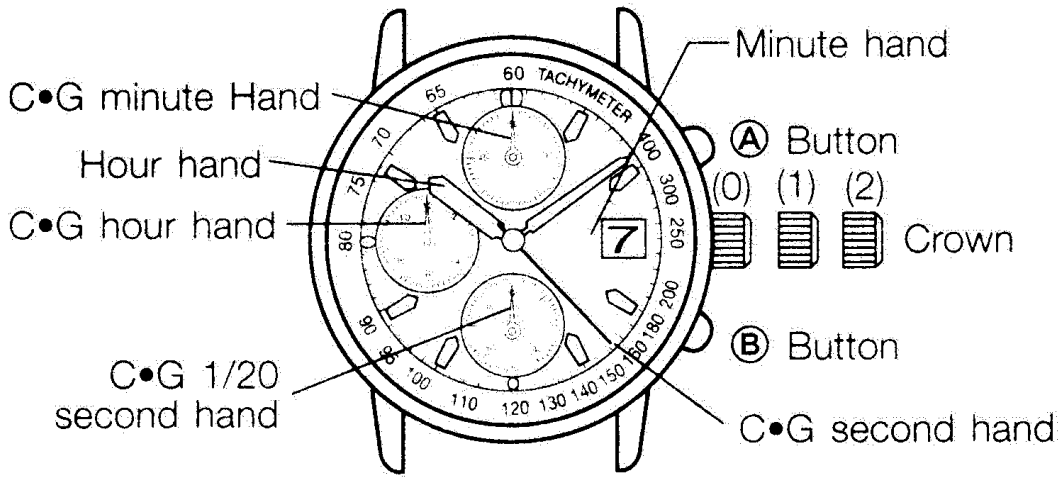
1. MAIN COMPONENTS

* C • G = ChronoGraph

OS10



OS60

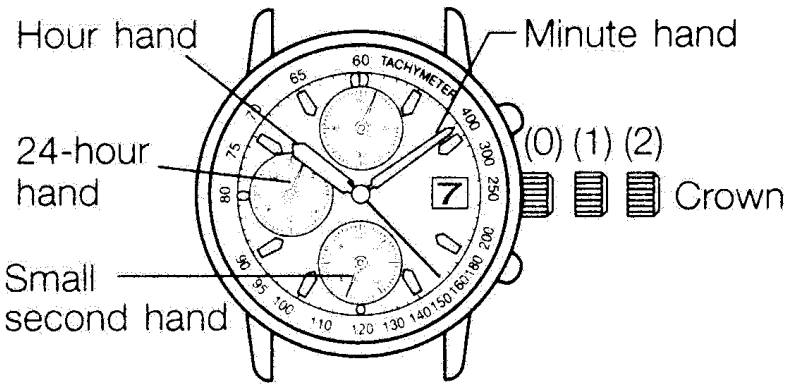


The C•G 1/20 second hand functions as one step movement to confirm normal watch operation when the chronograph is not being used.
When stopped this hand can be re-started by pressing button Ⓑ

English

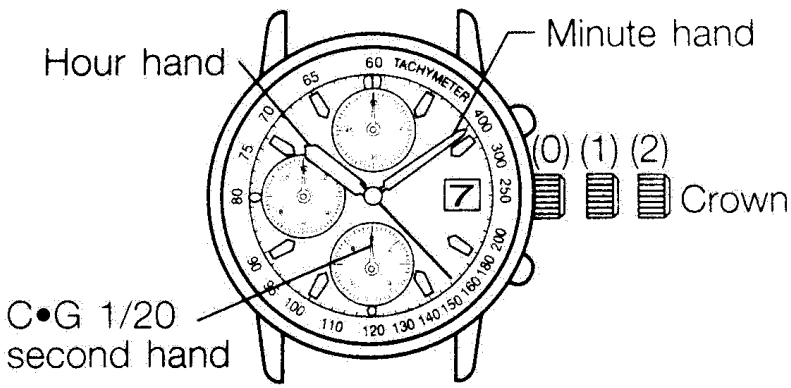
2. SETTING THE WATCH

OS10



1. Wait till small second hand is on "0" sec, then crown to position (2) it stops the small second hand.
2. Turn the crown to set the minute/hour hands to the desired time.
   * The 24-hour hand is synchronized with the hour hand. <OS40>
   Use the 24-hour time display as a reference to confirm a.m. and p.m. setting.
3. To start the small second hand, push the crown back to position (0).
   * Reduction of power consumption: crown at (2) movement stop.

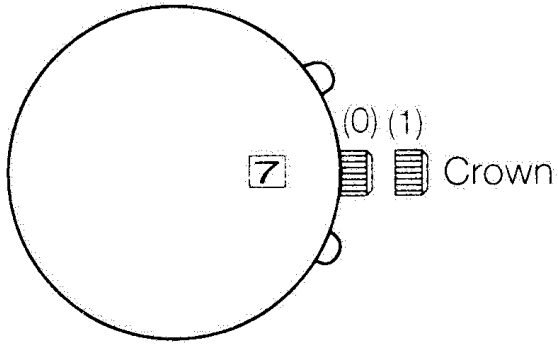
OS60



1. Pull the crown out to position (2).
2. Turn the crown to set the minute/hour hands to the desired time.
3. Push the crown back to position (0).
   * Reduction of power consumption: crown at (2) movement stop.

3. SETTING THE DATE

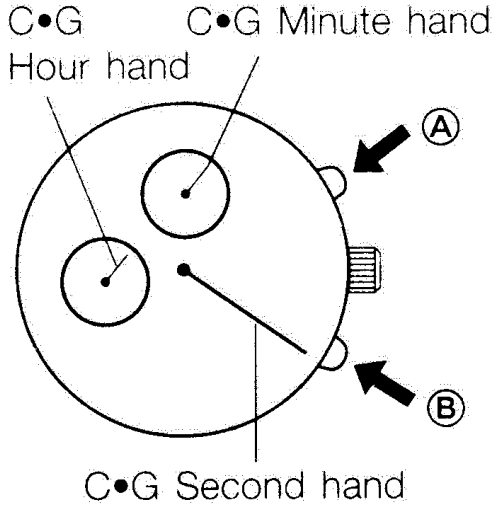
O1S0, OS60



1. Pull out the crown to position (1).
2. Turn the crown until the desired date appears.
   * Do not set the date between 9:00PM and 1:00 AM otherwise, the date may not change properly.
3. The crown back to position (0) after set the date.

4. CHRONOGRAPH OPERATION

OS10



The chronograph can measure up to 12 hours in one second increments.

Standard measurement

START (Ⓐ) → STOP (Ⓐ) → RESET (Ⓑ)

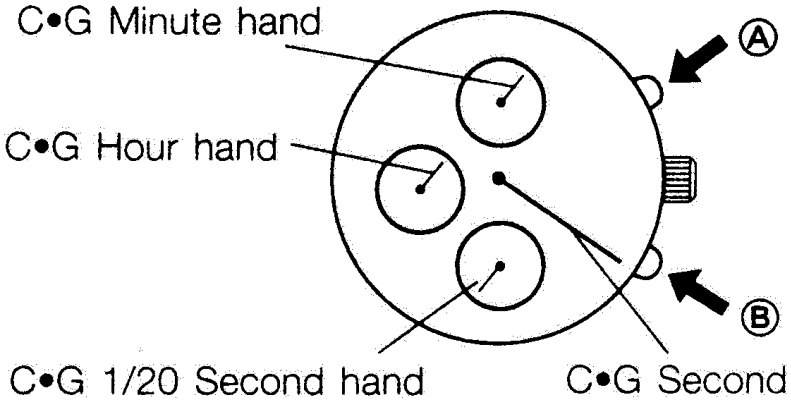
Accumulated elapsed time measurement

START (Ⓐ) → STOP (Ⓐ) → RESTART (Ⓐ) → STOP (Ⓐ) → RESET (Ⓑ)

Can accumulate repeatedly by pressing Ⓐ

English

OS60



The chronograph can measure up to 12 hours in 1/20 (0.05) second increments.

English

Standard measurement

START Ⓐ → STOP Ⓐ → RESET Ⓑ

Accumulated elapsed time measurement

START Ⓐ → STOP Ⓐ → RESTART Ⓐ → STOP Ⓐ → RESET Ⓑ

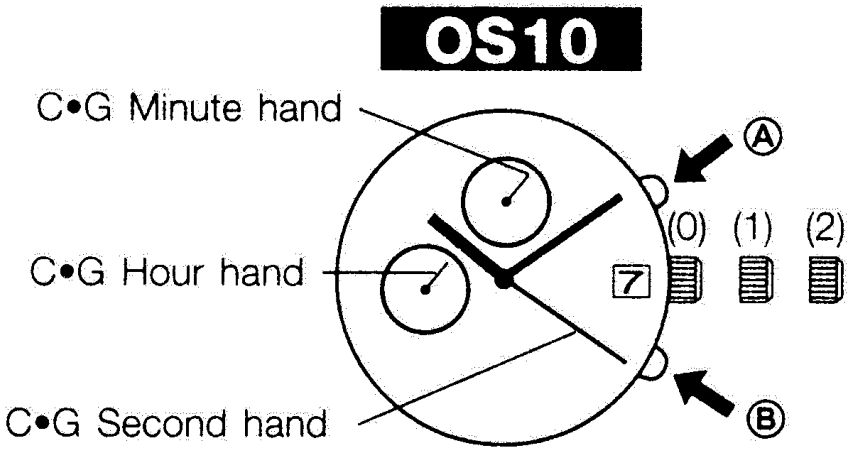
Can accumulate repeatedly by pressing Ⓐ

The C•G 1/20 second hand will still indicate the correct time measurement even when the chronograph is started by pressing button Ⓐ while the C•G 1/20 second hand is functioning as one step movement.

The C•G 1/20 second hand automatically stops at 00 second position 30 seconds after the chronograph is started.
When the chronograph is stopped by the Ⓐ button, the C•G 1/20 second hand indicates the elapsed time.
When the Ⓑ button is pressed again after the chronograph has been reset, the C•G 1/20 second hand start to function as one step movement to confirm watch operation.
* The hour/minute hands indicate the current time even when the chronograph is being used.

5. ADJUSTING THE CHRONOGRAPH

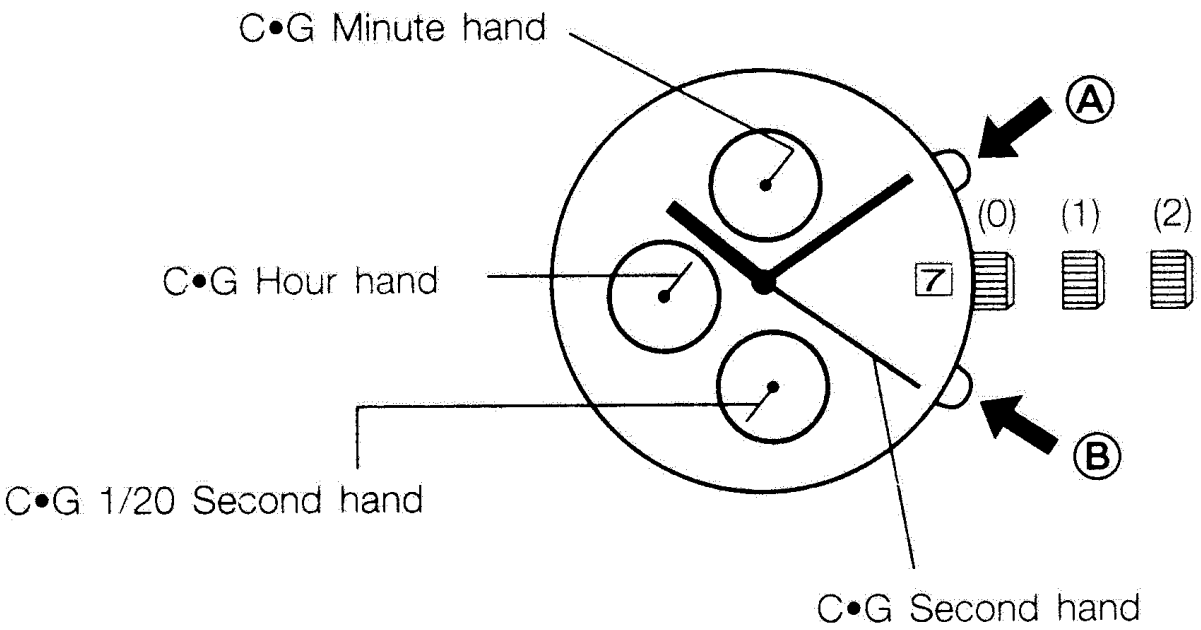
If the chronograph hands do not return to "0" position when the chronograph is reset.



1. Pull out the crown to position (2) and then press button Ⓐ.
   Adjusting the C•G second hand to "0" position.
   * This second hand move quickly if the button Ⓐ is pressed continuously.

2. Press the button Ⓑ to reset minute/hour hands to "0" position.
3. Set the watch to current time.
4. Push the crown back to position (0).

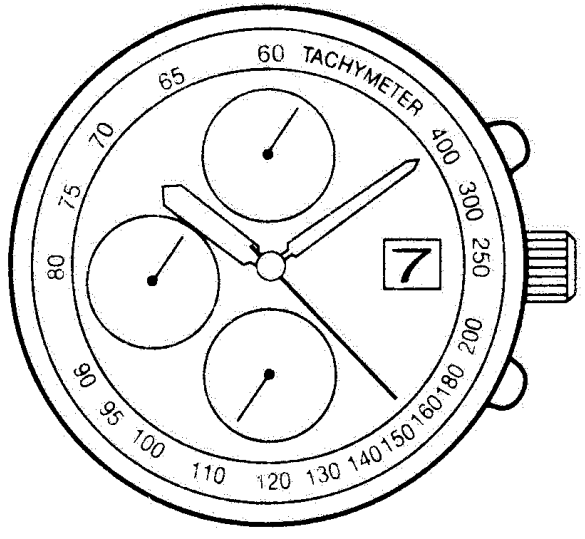
OS60



1. Pull out the crown to position (2) and then press button Ⓐ.
   Adjusting the C•G second hand to "0" position.
   * This second hand move quickly if the button Ⓐ is pressed continuously.

2. Pull out the crown to position (2), and then press button Ⓑ.
   Adjusting the C•G 1/20 second hand at "0" position.
   * This C•G 1/20 second hand moves quickly if the button Ⓑ is pressed continuously.
3. Set the watch to current time.
4. Push the crown back to position "0".
5. Press the button Ⓑ to reset minute/hour hands to "0" position.

6. TACHYMETER



The tachymeter is the device which measures the speed of an automobile.

Knowing is how many seconds the car covers a distance of 1 km, the meter can measure the approximate average speed per hour during a journey (up to the maximum measurable range of tachymeter is 60 seconds.)

If the chronograph is started at the same time as measurement, and stopped after 1 km, the average speed per hour can be determined according to the position of the second hand.

If the car covers the distance of 1 km in 45 seconds, the average hourly speed during the journey will be about 80 km.

7. AFTER CHANGING THE POWER CELL (CAL. OS60)

After changing the power cell, please refer to the "Adjusting the Chronograph "section and set the correct hand position prior to use.

* This operation is required because the chronograph hands may not return to the 0 position when the chronograph is reset after changing the power cell.

Instructions

for the Revolving E6B Bezel

CHASE-DURER CHRONOGRAPH

INTRODUCTION

The flight computer is based on the principle of the slide rule. The unit of measurement is base 10 logarithms (log_{10}).

The slide rule was in general use for engineering and scientific calculations up until the late 1960's when the hand-held calculator supplanted it. But it has remained in use for certain specialty purposes such as the flight computer.

These instructions cover only the basics of using a slide rule. A more complete description may be found in your public library.

NOTE!
Use the Flight Computer only to estimate fuel usage and travel distance. Do not rely on it for navigation purposes. Its purpose is to allow you to keep track of approximate fuel usage or distance traveled over time and to estimate equivalent kilometers, statute and or nautical miles. Any other use is outside the design parameters of the Flight Computer and is not recommended.

READING THE SCALE

The most important technique to master is reading the scale. The numbered tick marks can represent a range of values. For example, on the face of the watch, the numeral 30 to the left of the letters "NAUT" can represent 30, or 300 or 3000 or 3.0. The nine tick marks between the 30 and 35 each represent 1/10 of the distance between 30 and 35, or 300 and 350, or 3000 and 3500, or 3.0 and 3.5.

So for 3.0 and 3.5 each one of the tick marks represents .05; For 30 and 35, .5; for 300 and 350 , 5; for 3000 and 3500, 50. You can see, therefore , that it is important that you keep track of the range that each interval represents.

DOING CALCULATIONS

When doing calculations, the bezel will represent the time and the face the distance, pounds, gallons, etc.

• *Lets try an example:*

You're in your car on the freeway traveling at 60 miles-per-hour. You've been traveling for 2 1/2 hours. How far have you gone?

• *Solution:*

Move the bezel so that the numeral 10 on the bezel (which represents 1 hour) is directly over the "60" on the face at 12 o'clock (which represents the 60 miles traveled in 1 hour). Directly below the numeral 25 on the bezel you should see the numeral 15 on the face. The 15 represents the significant digits of the answer and we must decide whether there should be no, 1 or 2 zeros after the 15. You can probably guess how many, because 15 miles in 2 1/2 hours is obviously too little and 1500 is obviously too much. So the answer must be 150!

• *Lets try another example:*

Again, you're going down the freeway at 70 miles-per-hour. You've been traveling at that speed for 110 minutes. How far have you traveled?

• *Solution:*

Turn the bezel so that the numeral 60 (which represents 60 minutes) on the bezel is right above the number 7 (which represents 70 miles-per-sixty minutes). Now find the numeral 11 on the bezel and look directly below it on the face. You will note that the 11 is between the numeral 12 and 13 on the face. We must now interpolate (a mathematical term for extrapolating from facts known about the distance between two points) the value.

First we must decide whether the numerals 12 and 13 on the face represent 12 and 13, 120 and 130, 1200 and 1300, etc. It's obvious that 12 is too little and 1200 is too big, but sometimes its not so obvious. So here's another method.

At 70 miles-per-hour (70 miles in 60 minutes), you would have to travel over 14 hours to go further than 1000 miles. 14 hours is 840 minutes. So the answer must have more than 2 and less than four digits. In other words, it must have 3 digits until you get above 14 hours (900 minutes). After using the Flight Computer for a while these mental calculations/estimates will become second nature (i.e. intuitive).

Now that we've done the mental calculation, we know that the answer must have 3 digits. Therefore 12 must represent the number 120 and 13 must represent the number 130.

Since there are four ticks between the 12 and 13, there are five divisions between them. Since they represent the difference between the numbers 120 and 130, which is 10, each tick must represent 2.

Since the numeral 11 on the bezel is above the last tick before the 13 on the face, it represents 4 ticks at 2 each, which is 4X2=8. Therefore the distance traveled in 110 minutes at 70 miles-per-hour is 120 + 8=128 miles.

USING THE FLIGHT COMPUTER

Now that you have a few of the basics down, you can start using Flight Computer to estimate your distance or fuel usage in relation to time.

Simply select the numeral on the bezel that represents the time interval and set the bezel so that number is directly above the numeral on the face represents the number of miles, kilometers, nautical miles or pounds of fuel traveled or used in that time period.

Then, as time passes, you locate the lapsed time on the bezel and look directly below it for the approximate distance traveled, fuel usage, etc.

CONVERTING BASIS UNITS

The Flight Computer is provided with red arrows on the face for converting to and from nautical mile, statute mile and kilometers. The Red arrow above the "A" in "STAT" on the face is for statute miles. The red arrow above the "U" in "NAUT" on the face is for nautical miles. The red arrow above the "H" in MPH is for kilometers.

To convert, for example, 13 KM. to statute and nautical, move the bezel so that the numeral 13 on the bezel is directly above the red arrow (above/right of the "H" in "MPH") on the face. The statute miles in 13 KM. is found on the bezel directly above the red arrow above the "A" in "STAT" on the face, which is the numeral 8.1. Thus 8.1 statute miles equals 13 KM. If you look directly above the red arrow above the "U" in "NAUT" you will see the numeral 7.05. This is the number of nautical miles in 8.1 statute miles and 13 KM.

OTHER CONVERSIONS

You can also do other conversion calculations on the Flight Computer. You can, for example, convert pounds of aviation gasoline, kerosene, or JP-4 to gallons. You can also convert from gallons to pounds.

Simply move the bezel so that the 10 is over the numeral on the face that represents the number of pounds in 1 gallon of that type of liquid (see table following), find the number of gallons you're converting on the bezel and look directly below that at the corresponding number on the face. That is the number of pounds!

CONVERSION TABLE

1 GALLON OF =	POUNDS
alcohol	6.55
aviation gasoline	6.00
garbage	4.01
gasoline (auto)	6.14
jet fuel (JP-4)	6.50
kerosene	6.67
oil (lubricating)	7.59
oil (petroleum)	7.35

ONE (1) =	
barrel (U.S. oil)	5.62 cu. ft.
barrel (U.S. oil)	42 gal. U.S.
foot	30.48 cm
foot	.167 fathoms
foot	.305 meters
kilometer	3280.84 ft.
kilometer	.621 stat miles
kilometer	.540 naut miles
kilometer	1093.6 yards

ONE (1) =	
knots	51.44 cm/sec
knot	1.69 ft/sec
knot	.514 m/sec
knot	1.15 stat mi/hr
meter	.547 fathoms
meter	3.28 feet
nautical mile	1012.7 fathoms
nautical mile	6076.12 feet
nautical mile	1.85 kilometers
nautical mile	1852 meters
nautical mile	1.15 stat miles
nautical mile	1 minute of lat.
nautical mile	1 minute of Great Circle

TACHYMETER SCALE

Some Chase-Durer wristwatches include a ring or scale labeled TACHYMETER. Its use and operation is described herewith.

What It Does

The TACHYMETER scale can be used to compute many things but its primary purpose is to compute a speed after noting how long it takes to travel a fixed distance (e.g., one mile or one kilometer). The dial is a logarithmic scale which computes the function:

TACHYMETER DIAL = 3600 / Elapsed Time in Seconds

The scale is valid for all elapsed times from 7.2 seconds to 60 seconds. If the duration of the event is outside its range, then the answer on the dial is invalid.

How to Use It

For example, suppose you wanted to measure the average Speed a racecar was travelling. After starting the chronometer function when the car passes the starting line, and stopping it after the car travels exactly one mile, you note that the chronometer hand is pointing at the 4 o'clock position (i.e., 20 seconds have elapsed).

Looking beyond the 4 to the Tachymeter dial reveals the chronometer hand pointing to 180. This means the average speed of the car would be 180 MPH.

Let's say, instead of the race car speed, you are measuring something much slower like sailboat speed. In this case, you need to use a shorter distance because the elapsed time must fall within the 7.2-60 second range. For this example, let's say it took 36 seconds for your sailboat to travel 1/10 of a nautical mile. Reading the Tachymeter dial gives a speed of 100 knots. But, since we only traveled 1/10 of a nautical mile, the actual answer is 1/10 of that or 10 knots.

Now let's say you wanted to measure the speed of a very, very fast airplane: after traveling 10 kilometers, you noted that 10 seconds had elapsed. The Tachymeter dial gives an answer of 360 but we traveled 10 kilometers. Therefore, the answer is 10 x 360, or 3600 km/hour.

There is really nothing magic about using the Tachymeter dial to measure speed. You can also use it to measure other things like gas consumption. Suppose it took 50 seconds to burn up a gallon of gasoline. Reading the Tachymeter dial shows that you are burning 72 gallons of gasoline per hour.