English

Enhanced Features and Functions Guide

Enhanced Features and Functions Guide

This booklet contains instructions for using additional functions (mainly on the model with the exterior rotating bezel). Use these instructions in addition to the instructions for standard operation in the main operating manual. Some models have multiple functions. There may be some discrepancy between the illustrations shown and the appearance of your watch, however the method of operation will remain the same.

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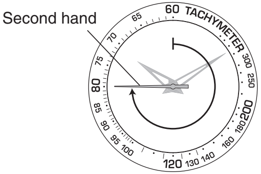
1. How to use the Tachymeter

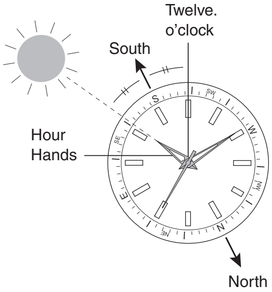
The most common use of a tachymeter is for measuring the approximate speed of a vehicle over a known distance.
e.g.) Based on how many seconds it takes a vehicle to travel 1km or 1 mile (the available measuring range is up to 60 seconds), the average speed within the distance can be calculated.



1) Start the chronograph when the vehicles commences travel.
2) After the vehicle has travelled 1 km/1mile, stop the chronograph.
The approximate average speed within the distance can be determined by observing the present position of the second hand and reading the outer bezel.
Note: The tachymeter indications may appear on dial ring, rather than on the outer bezel (depending on model).
As shown in the illustration, it takes the vehicle 45 seconds to travel 1km so the approximate average speed is 80kph (50 mph).

2. How to use the watch as a Compass
(Northern Hemisphere for instance)

The approximate direction can be determined by comparing the position of the hour hand to the sun. Keep in mind that these determinations are approximate as there is some discrepancy at different latitudes and in different seasons.



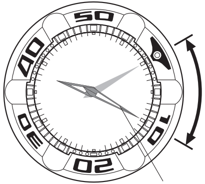
Lay the watch horizontally and align the hour hand of the watch with the direction of the sun. The middle point between the alignment of the sun with the hour hand, and the 12 o'clock position on the dial, approximately indicates South.
Positioning the rotating bezel so that it points south, will then allow you to read other approximate compass directions.

3. How to use the Rotating Bezel to measure time

<To check the elapsed time>

1) Align the zero mark "▼" of the rotating bezel with the position of the minute hand.

2) Then, read the scale above the rotating bezel, to which the minute hand points so as to figure out the elapsed time. As shown in the illustration, the elapsed time is 10 minutes.

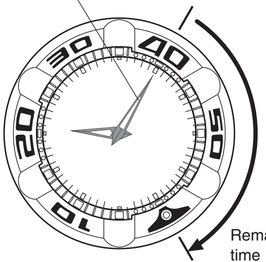


<To check the remaining time>

Set the "▼" mark to the scheduled time.

- You can now see the amount of time that remains until the scheduled point.

Note:	**The rotating bezel of Divers watches conforming to ISO or JIS standards, can only be rotated counterclockwise in order to reduce the risk of error.**



4. How to use the calculator function

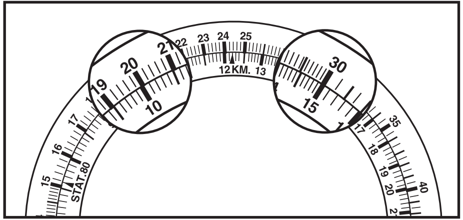
Note: In some models, the inner and outer scales are opposite. Be sure to make the appropriate substitutions to the following instructions.

4-1. Simple Calculations

[How to do multiplication]

Q : 20 × 15

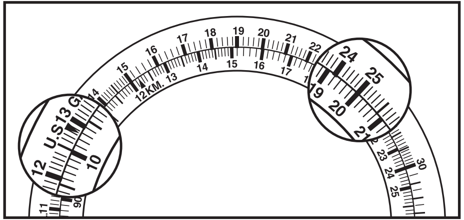
A : Adjust 20 of the outer scale until it points to 10 of the inner scale.
You can read the digit 30 from of the scale of the outer scale corresponding to 15 of the inner scale and adding a unit, you can get the answer 300.



[How to do division]

Q : 250 ÷ 20

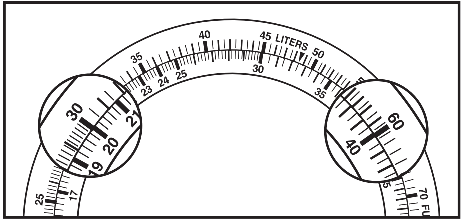
A : Adjust 25 of the outer scale until it points to 20 of the inner scale.
You can read the digit 12.5 from of the scale of the outer scale corresponding to 10 of the inner scale and get the answer 12.5.



[How to calculate ratios]

Q : 30/20 = 60/A

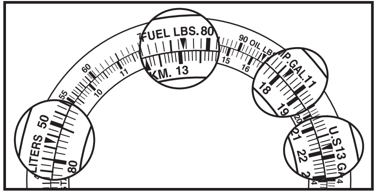
A : Adjust 30 of the outer scale until it points to 20 of the inner scale.
You can read the digit 40 from of the scale of the inner scale corresponding to 60 of the outer scale and on all the positions above the scale, the ratio between “inner and outer” is the ratio between “30 and 20”. Therefore, you can determine the answers of other ratios.



[How to convert volume between different units of measurement]

You can convert fuel between Pounds (lbs), U.S Gallons, Imperial Gallons or Liters.

Q : How much is 13.1 lbs of fuel if it is converted into U.S.Gallons, Imperial Gallons and Liters respectively?
(1 FUEL.LBS is 0.167 U.S.GAL / 0.139 IMP.GAL / 0.632 Liters)

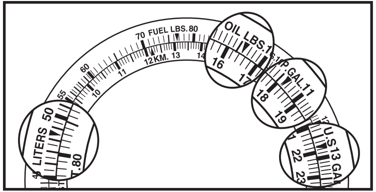


A : Adjust the "▼" of FUEL.LBS. of the outer scale until it points to the digit 13.1, which you want to convert, of the inner scale.
Read the digit corresponding to the "▼" of U.S.GAL of the outer scale.
Adding a unit and you will get the answer which is 2.18 U.S.GAL.
Similarly, read the digit corresponding to the "▼" of IMP.GAL., LITERS, you can get the answers, which are 1.82 IMP.GAL and 8.28 Liters.

[How to convert weight between the different units of measurement]

You can convert between Oil in Pounds to U.S. Gallons, Imperial Gallons or Liters.

Q : How much is 16.4 lbs of oil converted into U.S. Gallons, Imperial Gallons and Liters respectively?
(1 OIL.LBS. is 0.133 U.S.GAL, 0.111 IMP.GAL and 0.503 Liters)



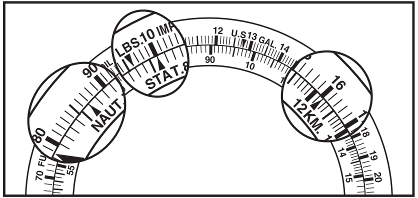
A : Adjust the "▼" of OIL.LBS. of the outer scale until it points to the digit 16.4, which you want to convert, of the inner scale.
Read the digit corresponding to the "▼" of U.S.GAL of the outer scale. Adding a unit and you will get the answer which is 2.18 U.S.GAL.
Similarly, read the digit corresponding to the "▼" of IMP. GAL., LITERS, you can get the answers, which are 1.82 IMP. GAL and 8.25 Liters.

[How to convert distance between the different units of measurement]

You can convert between Kilometers, Nautical Miles and Statute miles.

Q : How many Kilometers and Nautical Miles are equivalent to 1 Statute Mile?

A : Adjust the "▼" of 10 of the outer scale until it points to the "▲" of STAT of the inner scale.
Result: Read 16 of the scale corresponding to the "▲" of KM of the inner scale.
Move the decimal point once, and you will get the answer which is 1.6km.
Similarly, you can get the answer 86.6 NAUT corresponding to the "▲" of NAUT.

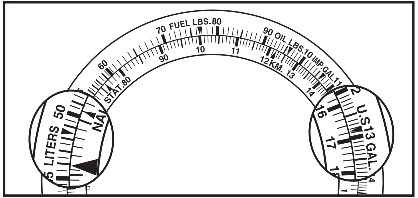


[How to convert fuel between different units of measurement]

You can convert between Liters, US Gallons or Imperial Gallons.

Q : How many Liters are equivalent to 16.8 U.S Gallons?

A : Align the "▼" of U.S. GAL of the outer scale with the digit 16.8, which you want to convert, of the inner scale.
Result: The converted value (about 63.5) corresponding to the "▼" of liter of the outer scale can be determined.
(1 U.S. GAL = 3.78541 Liters)

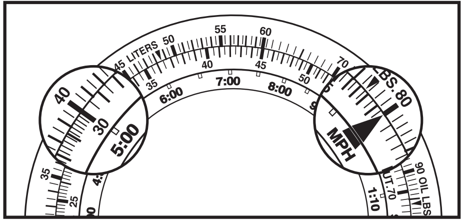


4-2. How to use the motor sports function

[Calculation of time needed to reach a set distance]

Q : How long does it take for a vehicle travelling at a speed of 80km to travel 400km?

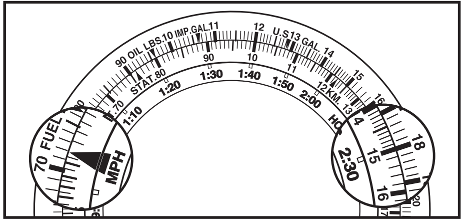
A : Align 80 of the outer scale with the SPEED INDEX“▲” of the inner scale.
Result: 5 Hours (5.00) of the inner scale correspondes to 40 of the outer scale.



[Calculation of speed]

Q : What is the speed of a vehicle travelling a distance of 180km for period 2 hours and 30 minutes?

A : Align 18 of the outer scale with 2:30 of the inner scale.
Result: 72km can be determined by comparing the SPEED INDEX “▲” of the inner scale and corresponding outer scale indications.

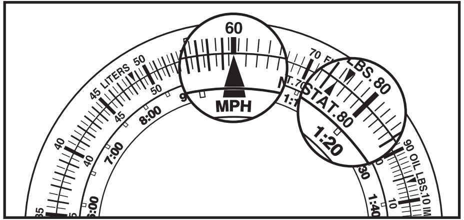


English

[Calculation of driving distance]

Q : Supposing that the speed is 60km/hour, what distance will a vehicle travel in 1 hour and 20 minutes?

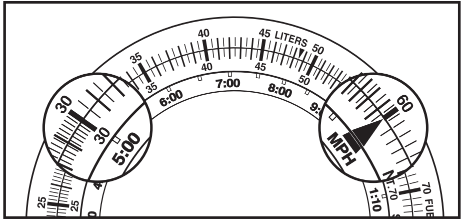
A : Align 60 of the outer scale with the SPEED INDEX “▲” of the inner scale.
Result: 80km corresponding to 1:20 of the inner scale can be figured out.



[Calculation of fuel consumption rate (consumed per hour)]

Q : If the drive time is 5 hours and 30 liters fuel are consumed, what is the fuel consumption rate (liters/hour)?

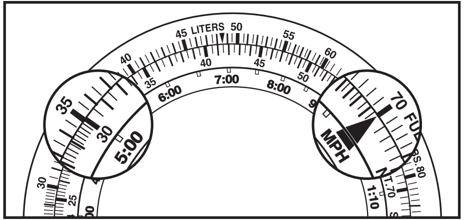
A : Align 30 of the outer scale with 5:00 of the inner scale.
Result: 6 Liters per hour - 60 is indicated on the SPEED INDEX “▲” corresponding to the outer scale.



[Calculation of fuel consumption]

Q : How much fuel is needed for a vehicle to run 5 hours if the fuel consumption rate of that vehicle is 7 liters per hour?

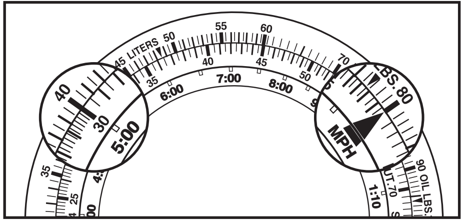
A : Align 70 of the outer scale with the "▲" of SPEED INDEX of the inner scale.
Result: 35 liters - 35 corresponds to 5.



[Calculation of drive time]

Q : How many hours can a vehicle whose fuel consumption rate is 8 liters/hour run using 40 liters of fuel?

A : Align 80 of the outer scale with the SPEED INDEX "▲" of the inner scale.
Result: 5 Hours - 5:00 on the outer scale corresponds to 40 of the inner scale.

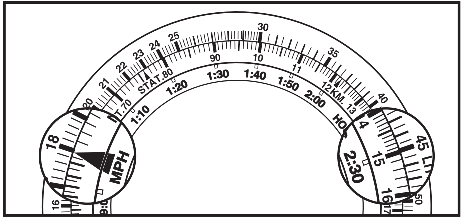


4-3. How to use the aviation function

[Calculation of time needed to travel a set distance]

Q : If the speed of an aircraft is 180 knots, how much time does it take the aircraft to fly 450 nautical miles?

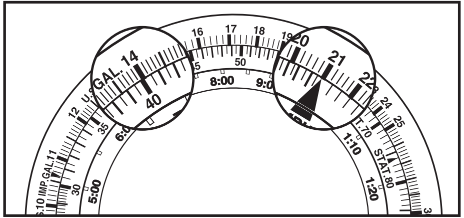
A : Align 18 of the outer scale with the SPEED INDEX "▲" of the inner scale.
Result: 2 hours and 30 minutes - 2:30 of the inner scale corresponds to 45 of the outer scale.



[Calculation of flight distance]

Q : If the speed is 210 knots and the flight time is 40 minutes, how many nautical miles will an aircraft travel?

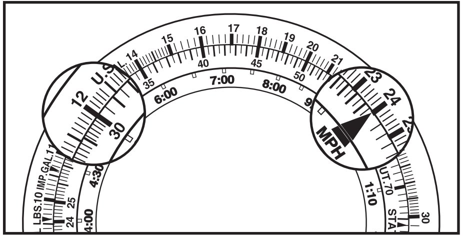
A : Align 21 of the outer scale with the SPEED INDEX "▲" of the inner scale.
Result: 140 Nautical Miles – 14 on the outer scale corresponds to 40 of the inner scale.



[Calculation of fuel consumption rate (consumption per hour)]

Q : If the flight time is 30 minutes and 120 gallons fuel is consumed, what is the fuel consumption rate?

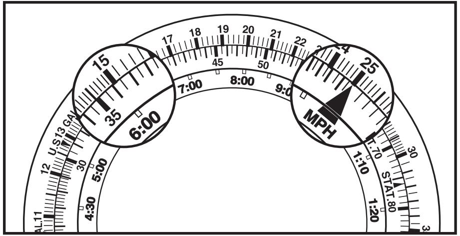
A : Align 12 of the outer scale with 30 of the inner scale.
Result: 240 gallons per hour - 24 corresponding to the SPEED INDEX “▲”.



[Calculation of fuel consumption]

Q : If the fuel consumption rate of an aircraft is 250 gallons/hour, how many gallons of fuel are needed to fly 6 hours?

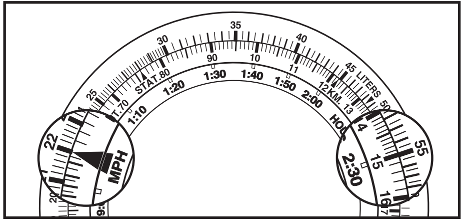
A : Align 25 of the outer scale with the “▲” of SPEED INDEX of the inner scale.
Result: 1,500 gallons - 15 corresponds to 6:00.



[Calculation of the flight time]

Q : If an aircraft consumes 220 gallons per hour, how many hours can it fly when consuming 550 gallons fuel?

A : Align 22 of the outer scale with the "▲" of SPEED INDEX of the inner scale.
Result: Two hours and thirty minutes - 2:30 corresponds to 55 of the outer scale.



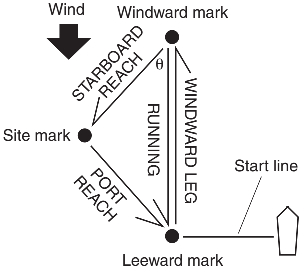
5. How to use the Yachting function

Many yacht races are set in triangular course layouts such as the one described on the next page, where the winner is the boat that navigates the designated course around the marks in the fastest time.
Direction: Navigational bearings are most often given in terms of degrees.
North: 0° East: 90° South: 180° West: 270°

Starboard is the right hand side of a yacht when looking forwards and is always green, Port is the left hand side of a yacht when looking forwards and is always red.

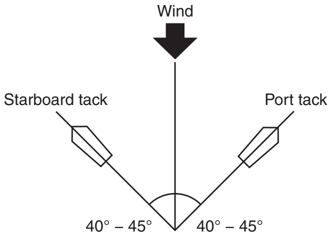
<Using the rotating bezel to determine Wind Direction>

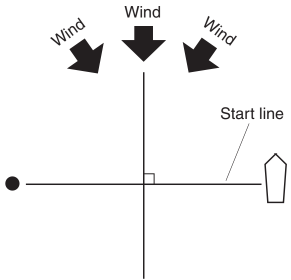
- Before a race, determine the direction of the wind from the direction and position of the windward mark. Line up the number representing the wind direction (in degrees) on the bezel with the triangle "▲" mark at 12 o'clock.
  Ex : northeasterly wind 45°.
- The course bearing from the windward mark to the Wing mark (starboard reach) is read off the bezel, in degrees, at the green triangle "▲" on the bottom left side of the dial.
- The course bearing from the Wing mark to the leeward mark (port reach is read off the bezel, in degrees, at the red "▲" on the bottom right.



- When sailing from the windward mark to the leeward mark, the small, triangle "▲" at the 6 o'clock position on the dial becomes the reference point for determining course bearings.

Note : The above example is only valid for times when the θ angle is 45°. At 60°, use the values lying above the red and green triangles; at 30°, use the values lying below the two triangles.
Using the rotating bezel to determine the favored position on the start line.





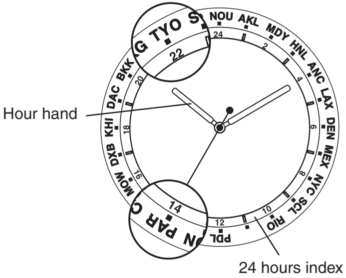
Most present-day yachts are capable of sailing at 45° to the wind.
To be in a position of being able to read the Wind Shift at the start of a race, make several runs before the race matching your course as close as possible to the red (or green) bars on the left (or right) upper portion of the watch face.
By using the rotating bezel in the following way you can determine the angle between the start/finish line and the direction from which the wind is blowing.

The start /finish line is set at right angles to the direction of the wind, but because the wind is always shifting direction, it is a rare occasion when a true 90° angle is achieved.
In view of this condition, line up the white triangle at the 12 o'clock position on the watch with the direction from which the wind is blowing.
Sail from one end of the start/finish line to the other, using the white lines marked (at 3 or 9 o'clock) on the watch to site your destination.
If the course steered falls on the plus (+) side of the white line, you are on a favorable heading to start the race when you cross the start/finish line.
If the course steered falls to the minus (-) side of the white line on the watch, you know it is favorable to cross the start/finish line on a heading from the opposite direction.

6. World Time

The rotating bezel (or dial ring), may feature the names of major city around the world in the sequence of time difference. The approximate time of all the major cities can be determined by using the rotating bezel.

Example: Perhaps you want to know the time of Paris while in Tokyo.
(The time is set according to the time in Tokyo.)



For example: the present time is 10:09 p.m.
(Tokyo time)

1) Read and change the present time (hour) into 24-hour format. (10 o'clock p.m. → 22 o'clock)

2) Adjust the city name (Tokyo=TYO) above the rotating bezel to 22 o'clock of 24-hour-scale.

3) You can determine the time of Paris (= PAR) is 14 o'clock (2:00 p.m.) by reading the 24-hour scale corresponding to the position of the city name displayed above the rotating bezel.
The time difference between major cities is in hours only, the minutes remain the same.
You can find out the time of other cities in the same way, however be sure to account for daylight savings time as this cannot be calculated using the bezel or dial ring.

Notes:
1. Different city names may be used in different models.
2. A 24 hour scale is not used in some models. In this case, the circumference of the time scale on the dial is considered as 24 hours.

English

7. Terms for units indicated on slide rules and their explanations

Category	Unit indicated on slide rule	Description
Distance units	NAUT.	Short for "nautical mile" *1
		1 NAUT.=1.852km (approx. 6,076 feet)
	STAT.	Short for "statute mile"
		1STAT.=1.609km (5,280 feet)
	KM.	Short for "kilometer"
		1km = 3,280 feet
	FT.	Short for "feet" *2
Fuel units	LITERS	1liter = 0.264 U.S. gallon
		= 0.22 IMP. gallon
	U.S.GAL	Short for "U.S. gallon"
		1U.S. gallon = 0.883 IMP. gallon *3
	IMP.GAL	Short for "imperial gallon" *4
		1IMP. gallon = 1.2 U.S. gallon

Category	Unit indicated on slide rule	Description
Weight units	KG.	Short for "kilogram." 1kg = 2.22pound
	LBS.	Short for "pound." 1pound = 0.45kg
	FUEL LBS.	Short for "fuel pound"
		1FUEL pound = 0.167U.S. gallon
		= 0.139 IMP. gallon
	OIL LBS.	Short for "oil pound"
		1OIL pound = 0.133 U.S. gallon
		= 0.139 IMP. gallon

*1 : Nautical miles = Maritime distances, seaborne distances
This is the unit normally used by ships and aircraft.
*2 : 1 foot = one-third of a yard, 12 inches or approximately 30.48cm
*3 : 1 U.S. gallon = 3.785 liters
*4 : 1 imperial gallon = 4.546 liter