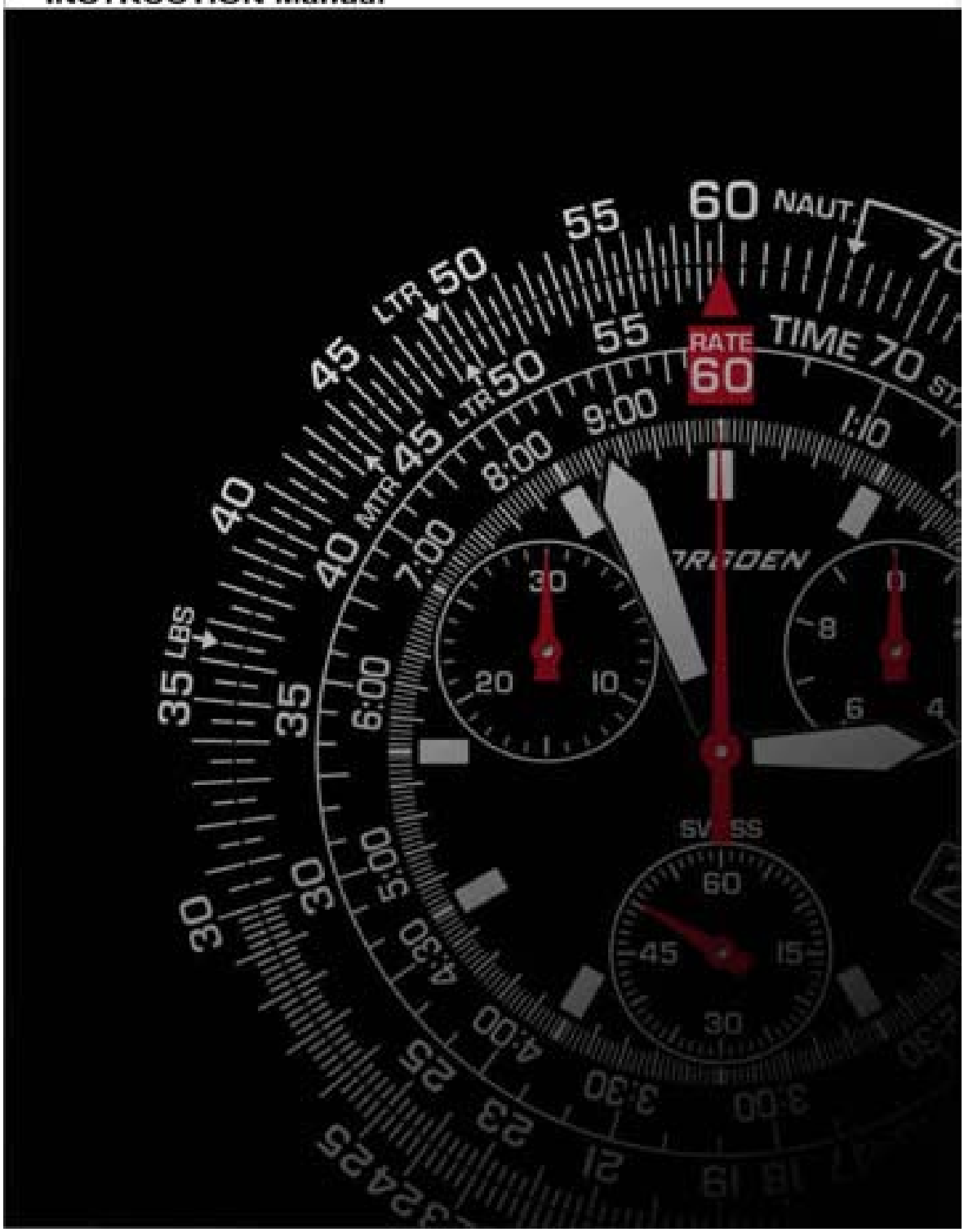
TORGOEN SWISS

PROFESSIONAL PILOT WATCHES

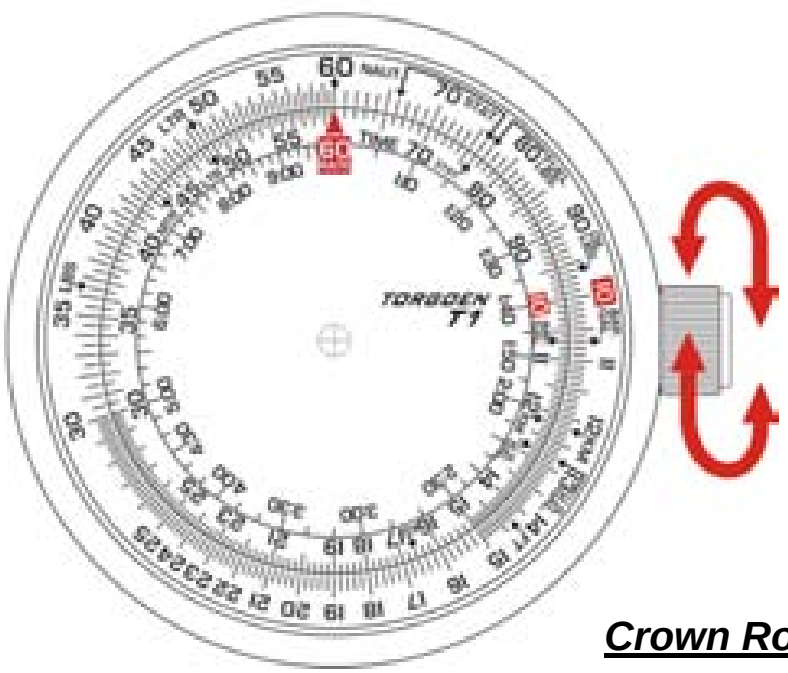
INSTRUCTION Manual



Two Rotation System of Scale

- Ring Rotate System
- Crown Rotate System

Ring Rotate System



Crown Rotate System

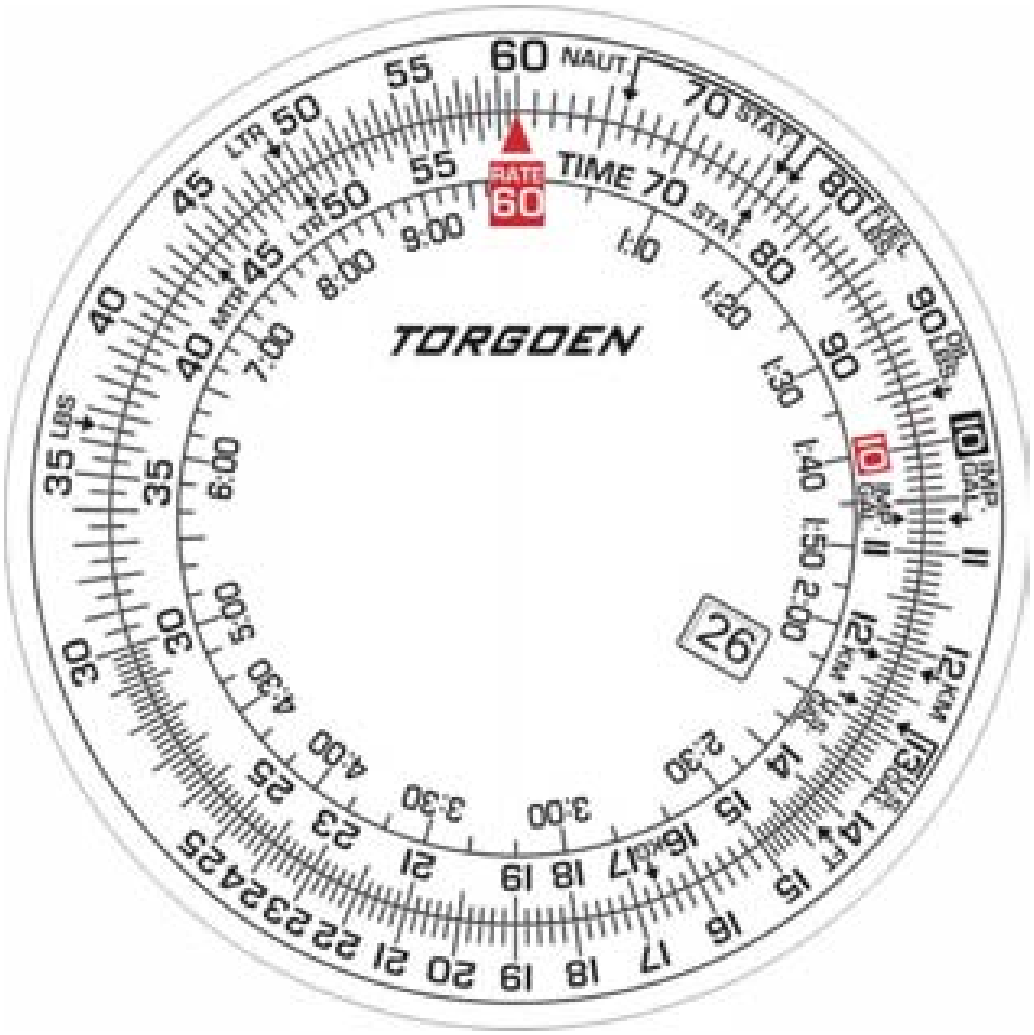


Figure 1

Instructions for Using your flight Computer Watch

Your fight computer can serve as a regular circular slide rule or as a *Flight Computer*. Those features are really simple to use – *so don't be intimidated*.
With just a little practice, some calculations can be performed more quickly than with a held-hand calculator, currency conversions, for example

The terms *Flight Computer* and slide rule are related. The slide rule is a normal calculator able to perform any multiplication or division. Your watch uses the calculation abilities of the slide rule to easily perform problems of **time**, **speed** and **distance**, **fuel consumption** and useful conversions such as statute miles to nautical miles, metric units to English units, or US Dollars to British Pounds.

To get started, rotate the ring until "60" on the outer scale is aligned with the red 60 (or red arrow, depending upon watch model you have) in the middle scale. Note that all numbers in the middle and outer scales match up. Before we explain the details, let's do a calculation – you'll be amazed at how easy it is.

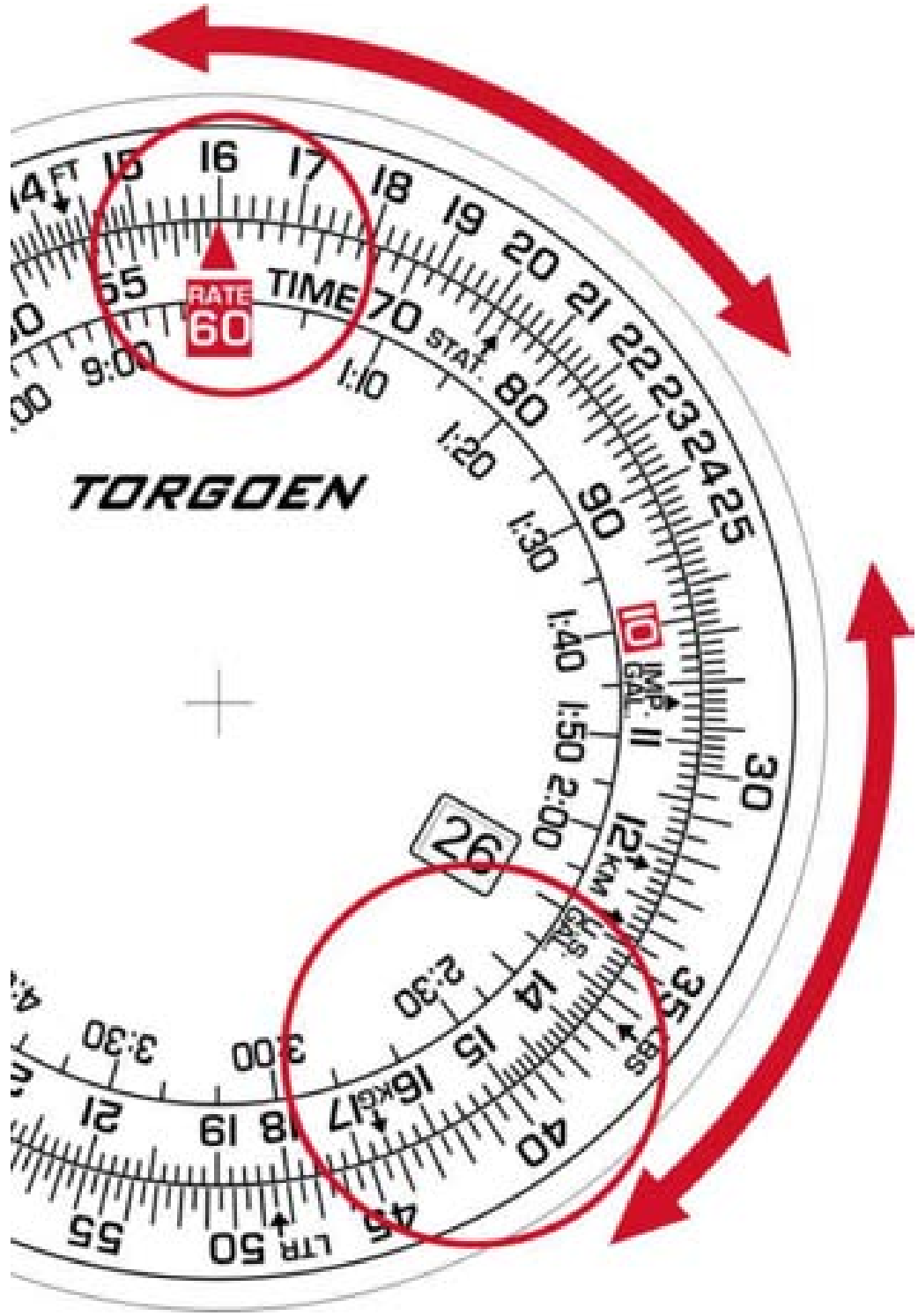


Figure 2

Time En Route

Suppose your plane flies at 160 knots (nautical miles) per hour. Rotate the outer ring so that 16 (representing 160) aligns with the RATE arrow (see fig. 2). Note that on the middle scale, the number 60 is replaced with the RATE ARROW. When 16 (represent 160) on the outer scale is aligned with the RATE ARROW on the middle scale, you have set the RATE (160 knots in 60 minutes) in the *Flight Computer*. Now you can choose a any distance – say 400 knots – and see the time it will take to travel at the RATE you' ve just set: you look at the number 40 (representing 400 knots in this case) on the outer scale. It is aligned with 15 (representing 150 minutes in this case) on the middle scale. So at this RATE of speed, it will take 150 minutes to travel 400 knots. You can choose any other *distance* at the RATE setting and easily find the *time* it will take to travel.

Time, Speed and Distance

The outer scale *in time/speed/distance* problems will always be ***distance*** and ***speed*** (i.e. RATE). The middle scale will always be *time (minutes).* There are 3 types of problems in this section. In two of them the RATE is known and in one of them, the RATE is sought.

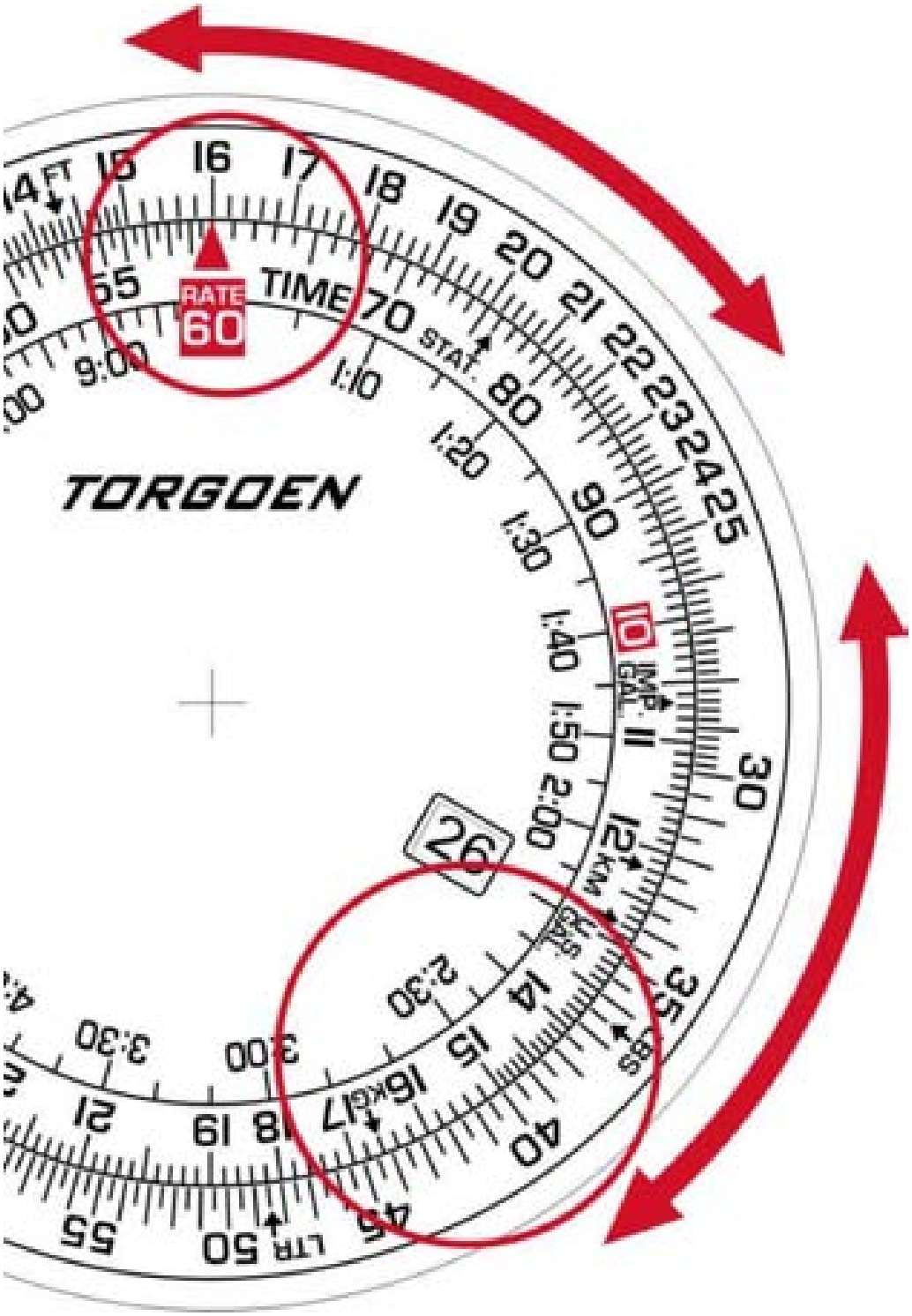


Figure 3

The Hour Scale

Look at the inner scale. This is a conversion of the middle scale from minutes to hours, so for the calculation above, 15 on the middle scale aligns with 2:30 on the inner scale. That means that 150 minutes equals 2 hours, 30 minutes. How easy!

Speed

To find your speed, knowing your distance and time, rotate the outer ring until you align the distance (shown on the outer ring) with the time (in minutes shown on the middle ring or in hours shown on the inner ring). Read the speed against the RATE ARROW.

Distance

To find your distance, when you know *time* and *speed* (the RATE), rotate the outer scale until your *speed* aligns with the RATE ARROW. Find your *distance* on the outer scale against the *time* in hours on the inner scale or in minutes on the middle scale. From the example above, if your *speed* is 160 knots (shown on outer scale) for 60 minutes (shown on the middle scale as the RATE ARROW), the *distance* traveled (shown on the outer scale) will be aligned with the *time* traveled (shown on the middle scale in minutes and on the inner scale in hours). At 160 knots per hour, if you want to know how far you will travel in 15 minutes, find 15 minutes on the inner scale and see that it is aligned with 40 knots on the outer scale. You know that at this speed, you will travel 40 knots in 15 minutes.

Decimal Point

The numbers 10 on both scales are printed in red as well, because you will need to use them to perform regular calculations and conversions that are not marked on the scales such as currencies. You will have to decide whether to read it as 1, 10, 100 or 1000. This depends on the context of the problem you are trying to solve. Assuming it is 10, the calibrations between 10 and 11 are each 0.1. So 2 calibrations after the 10 will be read as 10.2. If the number 10 is 100 units – pounds for instance, 2 calibrations above the 10 will be read as 102 pounds. Look now at the calibrations between the 15 and 16. Note that there are only 5 calibrations between them. It means that 2 calibrations above the 15 will be read as 15.4, 1.54,154, 1,540 or more zeroes after that, all depending on the context of your problem. This should be easy to determine since you would know more or less how fast your plane is flying or how many minutes between two points. You will know if you have to decide between 20 minutes, 2 minutes or 200 minutes.

Fuel Consumption Problems

Fuel consumption calculations are very similar to time/distance/speed problems. The *distance* measurement (in the calculations above) becomes *gallons* here.

Example: Your fuel consumption is 5 gallons per hour at the desired engine power setting. Your usable fuel capacity is 40 gallons. You want to know your ***endurance***.

1. Set the outer scale with 50 (5 gallons) over the RATE ARROW.
2. Find 40 gallons (your useable fuel capacity) on the outer scale.
3. Opposite 40, find 8:00 on the inner scale and 48 (representing 480 minutes) on the middle scale. That's your *endurance*.
4. Ask yourself, "How in the world did I live without this wonderful tool for so long?"

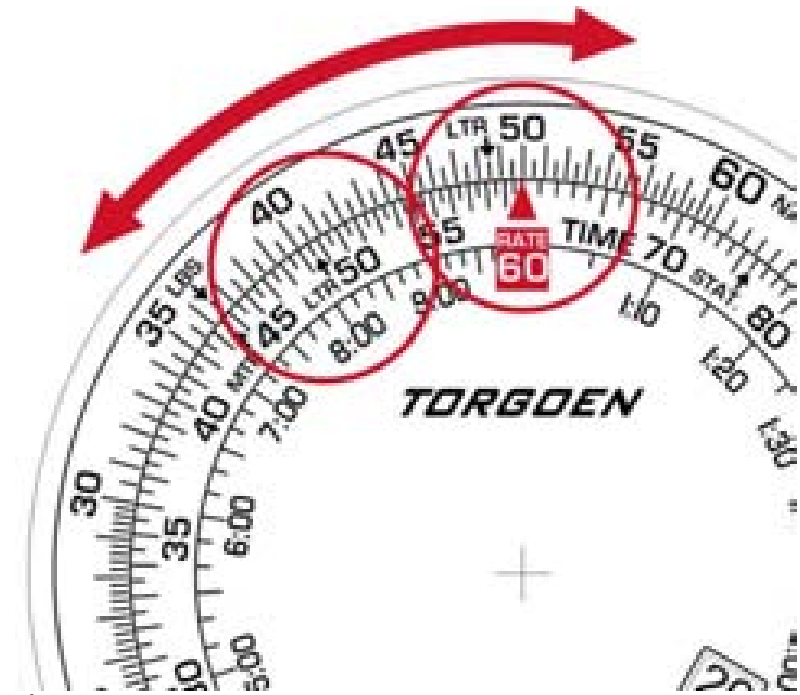


Figure 4

Example: To top your tank after flying 4 hours and 20 minutes you needed 22.6 gallons. What was your fuel-burning rate?

1. Set 22.6 (outer scale) over 4:20 (inner scale or 260 minutes on the middle scale).
2. Find your burning rate above the RATE ARROW, which is 5.2 gallons per hour.

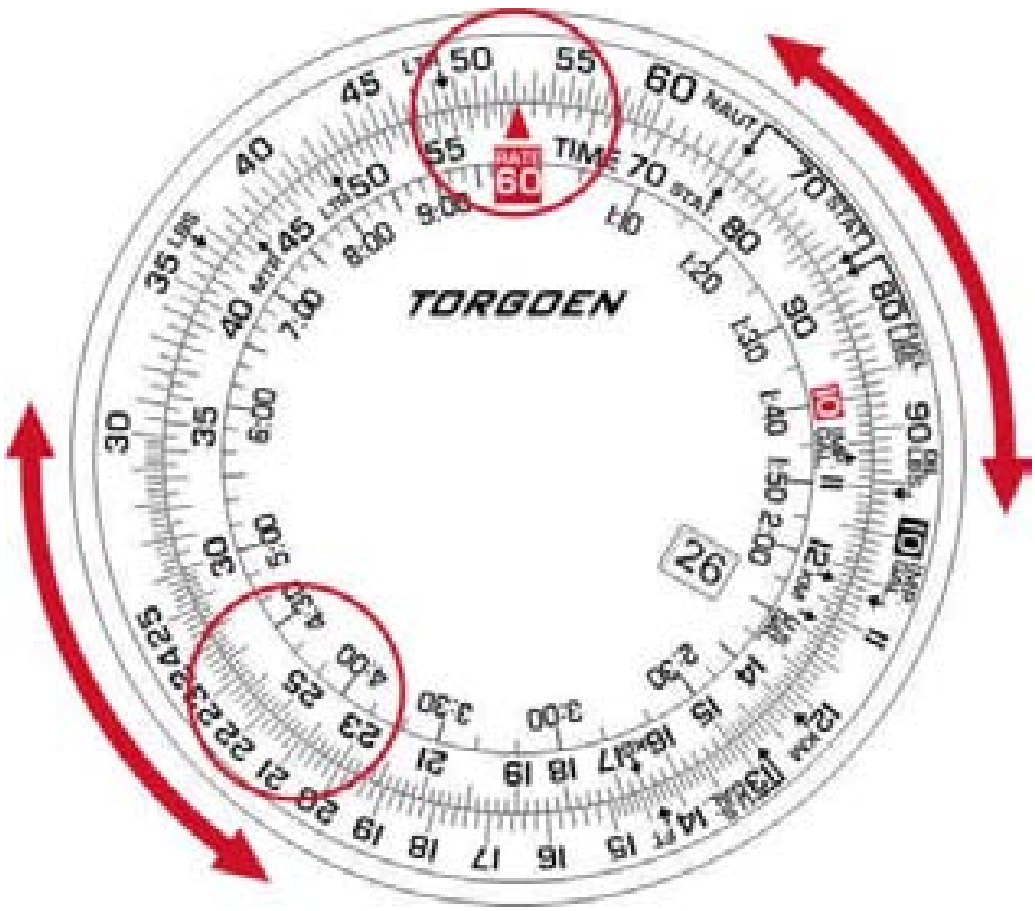


Figure 5

Multiplication and Division

Multiplication Example – 32 x 4 = 128

1. Set 32 on the outer scale opposite **10** in the middle scale.
2. Read the result on the outer scale opposite 40 in the middle scale.

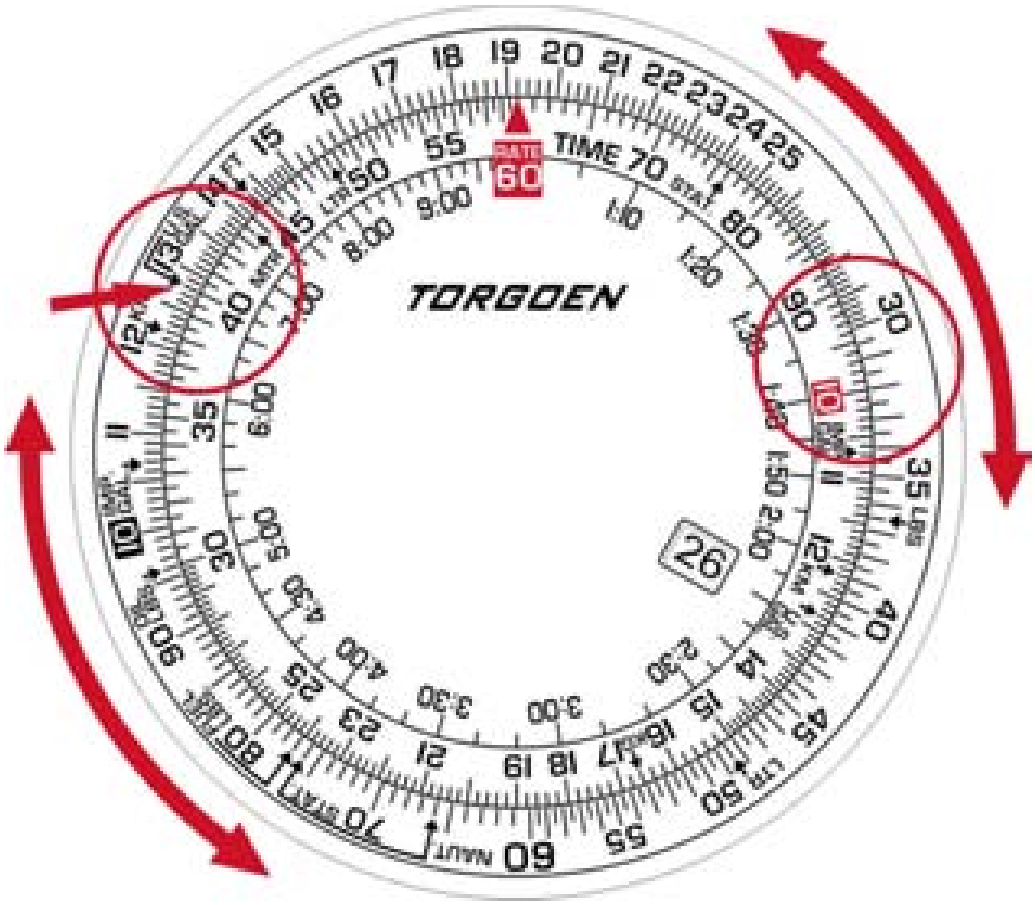


Figure 6

Division Example – 540 : 12 = 45

1. Set 54 on the outer scale over 12 on the middle scale.
2. Read the result on the outer scale opposite the **10** in the middle scale.

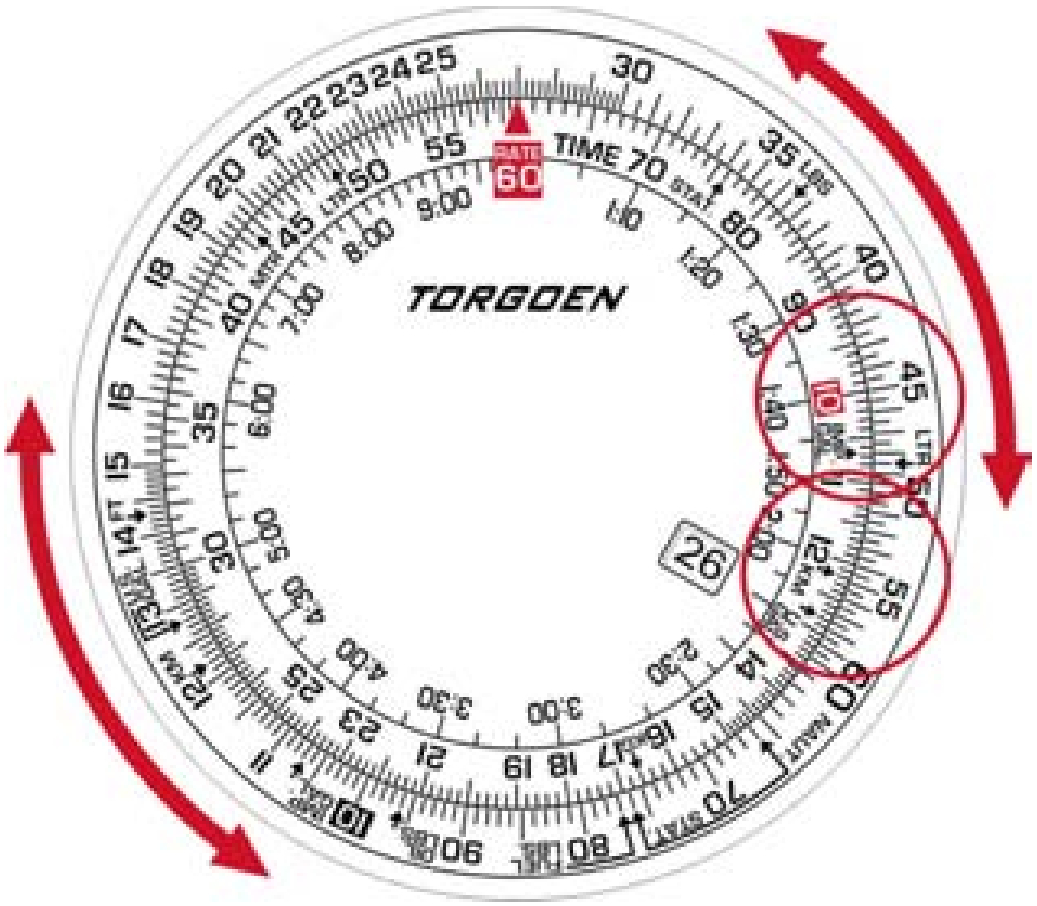


Figure 7

Ratios and conversions

When the numbers on the outer scale and the middle scale match, the ratio between the two scales is 1:1. Now rotate the outer scale so that the number 20 on the outer scale will be above the number **10** Note that all the numbers on the outer scale are positioned against numbers in the middle scale with half their value. The ratio is 2:1. This feature is useful to convert any linear conversion like curries or metric to imperial measurements of length or weight. Simply find how many units of one measurement against one unit of the other. Match up that number, with the number 10 (in red), in that case it should read 1.

Example: If you know that 1 ounce = 28.35 grams, rotate the outer scale until the number 28.35 is above the number **10** (see fig.1). Now all the numbers in the outer scale became grams and all the numbers in the middle scale became ounces. Of course you need to figure out decimal position. You can see that the number 85 is very close above the number 30, so this indicates that 3 ounces are almost 85 grams. In fact 3 ounces are 85.05 grams (28.35 x 3) and you can see that roughly on the scale (see fig.1) but an accuracy of 85 as opposed to 85.05 is 99.94%. 99.94% accuracy in less time than it takes to run it on a hand-held calculator!

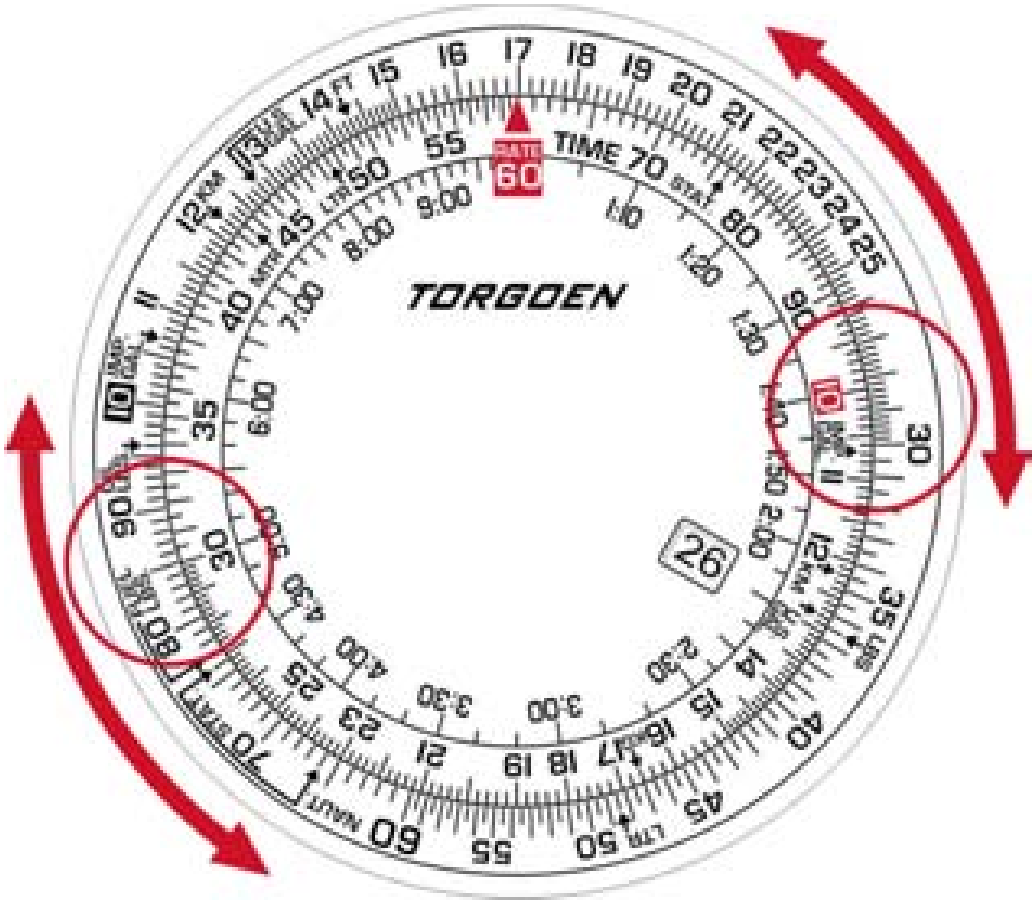


Figure 8

Currency Conversion

Suppose the conversions rate for Swiss Franc is SFR1.60 to $1.00. Rotate the outer scale to match 16 over **10**, the outer scale becomes Swiss Francs and the middle scale becomes US dollars. You can leave the scales like that until the exchange rate changes. If you want to convert SFR 4.00 to dollars you look at the number in the middle scale opposite the 40 on the outer scale. The number is 25. You can deduct that SFR4.00 are $2.50.

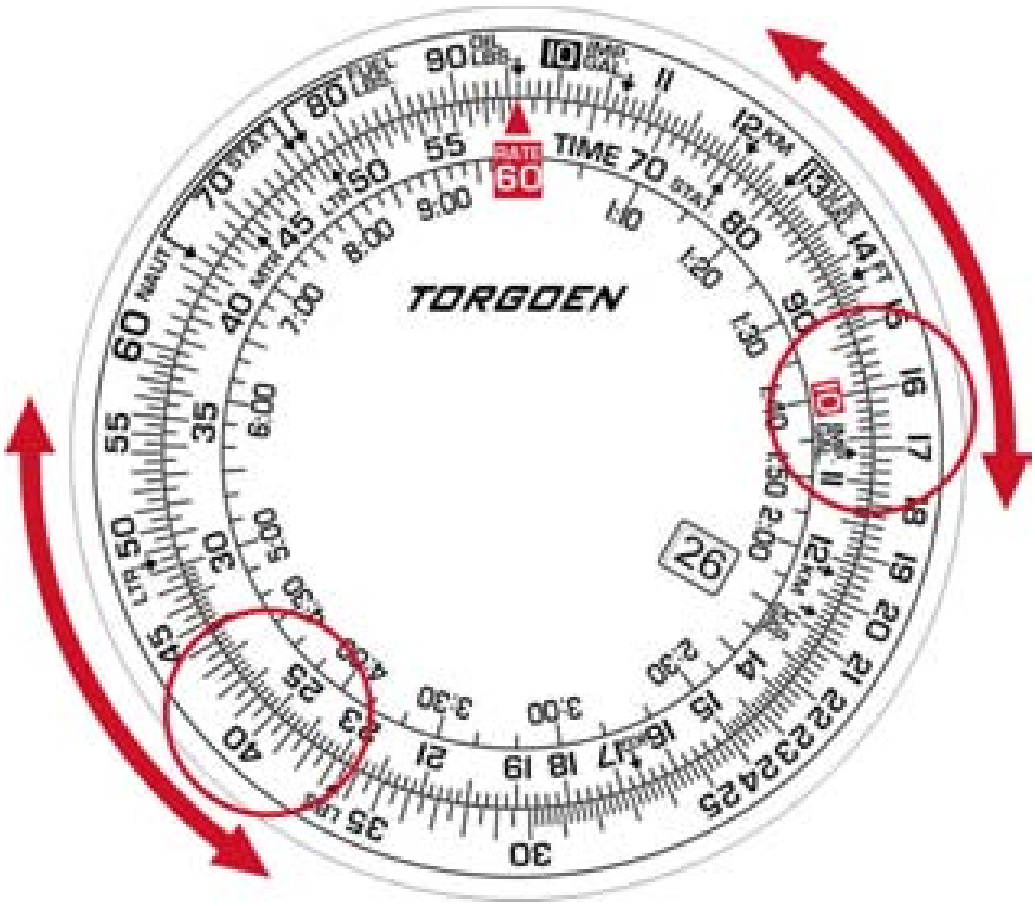


Figure 9

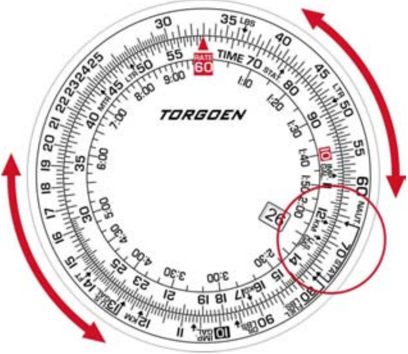


Figure 10

Nautical to Statute Miles

Find the two connected arrows on the outer scale between the numbers 66 and 76. Next to one of them "NAUT" is printed and next to the other "STAT". To convert between them just put the figure you want to convert next to the matching arrow and read the conversion next to the other.

Example: You want to convert 120 nautical miles to statute miles.

1. Rotate the outer scale until the arrow reading "NAUT" is above 120 (in this case, above the figure 12).
2. Read the conversion underneath the arrow reading "STAT" which is about 138.5 statute miles.

Reverse the procedures to convert from statute miles to nautical miles.

Miles to Kilometers

To convert miles to Km, rotate the outer scale until the "STAT" arrow is in aligned with the number of miles you want to convert to Km, Read the corresponding Km value on the middle scale, which is aligned with KM arrow (between the 12 and 13 on the outer scale).
To convert from Km to Miles do the reverse.

Other Conversions

Feet to Meters – match the FT arrow on the scale with the MTR arrow on the middle scale. The outer represents feet and the middle scale represents meters. Match any two numbers opposite each other.

Imperial Gallons to US Gallons

Set the US GAL arrow in the middle scale opposite IMP Gal on the outer scale. The outer scale represents Imperial Gallons and the middle scale represents US Gallons.

Conversion Table

As previously mentioned you can convert any linear values from one unit to another. For your convenience we are providing here a table with some values.

Description	Ratio	Match this number opposite 10 (in red) on the inner scale	Outer scale represents	Middle scale represents
Length				
Centimeter / Inch	2.54	2.54	Centimeters	Inches
Feet / Meter	3.28	3.28	Feet	Meters
Yard / Meter	1.09	1.09	Yards	Meter
Kilometer / Mile	1.61	1.61	Kilometers	Miles
Acre / Hectare	2.47	2.47	Acres	Hectares
Weight				
Gram / Ounce	28.35	28.35	Grams	Ounces
Pound / Kilogram	2.21	2.21	Pounds	Kilograms
Kilogram / US Ton	907	907	Kilograms	US Tons
Volume				
Liter / Imp. Gallon	4.55	4.55	Liters	Imp. Gallons
Liter / US Gallon	3.79	3.79	Liters	US Gallons
US Gallon / Imp Gallon	1.2	1.2	US Gallons	Imp. Gallons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