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BALL

OFFICIAL STANDARD

Since 1891

Accuracy under adverse conditions

*The English version shall always prevail in case of any discrepancy or inconsistency between different translations.

Owner's Manual

To extend your warranty for an additional year,
please register online within 90 days of purchase at
www.ballwatch.ch

ENGLISH

Contents

1. Congratulations

We congratulate you on your choice of a BALL watch and thank you for your confidence in our company, a Swiss brand among the most highly renowned in the world. From now on, you will wear on your wrist a genuine tribute to the American railroad history. Each BALL watch is completely Swiss-made and has been created to meet the most exacting requirements. The materials we use guarantee the exceptional durability of our watches, even under particularly adverse conditions.

Your new watch has passed stringent controls before it was released for sale. To ensure it operates perfectly, we recommend that you follow the advice given in these instructions (all owner's manuals are also available on our website: www.ballwatch.com - Customer Service).

Thank you for your trust and confidence in us.

Yours faithfully,

BALL Watch Company

2. Brand Spirit

Freedom represents what humans live for: Free will and the chance to pursue their dreams.

The American Railroads brought freedom to the country, the opportunity to travel and explore the new frontiers. The powerful locomotives sparked the spirit of adventure in the American people, while the men of the railroads were the heroes of the machine age. Then BALL Watch Company proudly served the men of the railroads, just as we support the world-class explorers of today.

3. BALL'S TIME

Webster Clay Ball, founder of BALL Watch Company

Webb C. Ball was born in Fredericktown, Ohio on October 6, 1847. In the early years, Mr. Ball was recognized as having an interest in accurate time. When Standard Time was adopted in 1883, Mr. Ball was the first Cleveland jeweler to use the time signals sent from the Naval Observatory in Washington D.C., bringing accurate time to Cleveland. For many years, as people walked past his store, they would pull out their watches and set the time. The phrase, "BALL'S TIME", came to mean the absolute correct time all over Northern Ohio.

Webb C. Ball was instrumental in establishing watch standards and the inspection system that required all watches and clocks used on the railroads to be checked by competent watchmakers. It is important to recognize and applaud Webb C. Ball for inventing the first successful system to be accepted on a broad scale. It was his system that set the standards for the railroads; it was his system that helped establish accuracy and uniformity in timekeeping. It was his system that resulted in railroad time and railroad watches being recognized as STANDARD, whenever accuracy in time was required.

4. Performance

At BALL Watch Company, all watches are made to live up to our motto:

Since 1891, accuracy under adverse conditions

Case:
The case material used in our collections ranges from superior quality, high-grade stainless steel, titanium, gold or metal coated with Diamond-Like Carbon. The automatic watches of the Engineer Hydrocarbon, Engineer Master II and Engineer II series are specially equipped with an antimagnetic soft iron inner jacket.

Crystal:
The crystal is made of anti-glare sapphire.

Shock-resistant:
All BALL watches are constructed to withstand impact test, according to the norm ISO 1413, which is carried out on a machine to simulate the effect of a free fall onto a hard wooden floor from a height of one meter. The Engineer Hydrocarbon series undergoes a more rigorous 7,500Gs impact test, to ensure its impeccable shock resistance.

Movement:
BALL has worked with top Swiss movement manufacturers to build our precise and dependable movements under the most rigorous conditions. BALL watches are then adjusted and modified to BALL Standard.

Illumination:
It is the self-powered micro gas tube (H_3) that gives the watch excellent legibility even in the absolute darkness and under adverse conditions. This light source on all BALL watches does not require batteries or re-exposure, and lasts for a minimum of 10 years. The brightness of H_3 micro gas lights will deteriorate over time, but it can be restored by replacing the affected micro gas lights. For most of the models of the Engineer Hydrocarbon series, the markings on the bezel are filled with luminous paint Super LumiNova.

Water-resistant:
The water resistance of BALL watches ranges from 30m/100ft to 3,000m/9,850ft, depending on the model chosen. The water resistance of a timepiece will be impaired if the crown is not properly screwed-in. The patented crown protection system of the Engineer Hydrocarbon models ensures the crown returns to its proper position.

SPECIFICATIONS	WATER RESISTANT				
None	No	✗	✗	✗	✗
3 ATM	30m	✓	✓ (carefully)	✗	✗
5 ATM	50m	✓	✓	✓ (carefully)	✗
10 ATM	100m	✓	✓	✓	✗
20 ATM and above	200m and above	✓	✓	✓	✓

5. Technologies

5.1 Swiss Night Reading Technology

How to read time from watches in dark environments has been a topic of much research in the watch industry. Applying luminous paints to dial and hands - activated first by radium, then by tritium - has been standard practice since the First World War but did not really satisfy the manufacturers. After a quarter-century in research and development work, BALL Watch Company is proud to present an innovative Swiss laser technology that is considered the best alternative available today. It is the self-powered micro gas tube known as H_3 that gives the watch its excellent dark reading capability in any adverse conditions. They provide superior night reading capability that is much brighter than the current tritium-based luminous paints. H_3 gas tubes do not require batteries nor to be recharged by an external light source, or the use of a press-button, and glow continuously for decade. You can read off the time from the watch quickly and safely in brightest daylight or deepest night without adapting to the ambient light.

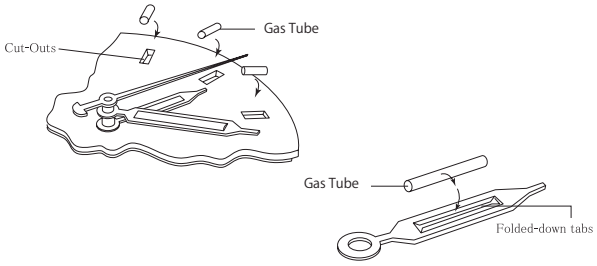


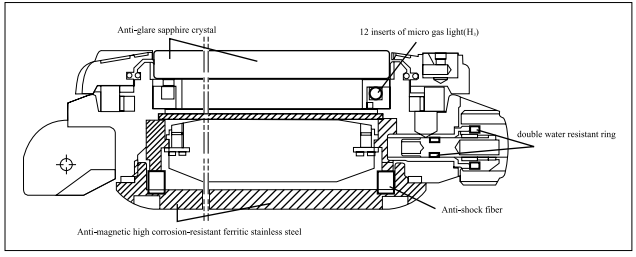
Diagram of gas tube attachment to hands and dial

The H_3 Swiss technology captures tritium safely in a very stable form, as a pure gas sealed in a hollow body of mineral glass. Its exterior walls are coated with a luminescent material, which gives off cold light when activated by electrons emitted by the tritium. Light production is the same as in a TV tube, when the electrons of the cathode ray beam hit the screen. Please note that brightness of the H_3 gas lights will gradually decline over time, but can be restored with the replacement of the affected gas tubes.

5.2 Magnetism

The Greeks first observed the phenomenon of magnetism around 600 B.C. The natural magnet Fe_3O_4, a black ferrous oxide, was discovered in the province of Magnesia in Turkey.

Magnetic fields produced by natural magnets are generally too weak to disturb the accuracy of a mechanical watch. The same is not true, however, of man-made magnetic fields. So where are we at risk to enter magnetic fields in daily life? Near televisions, stereo systems and radios in our living room. In the countless small electric motors used throughout our households. In the doors of cars, refrigerators or cabinets. In the telephone or computer monitor on your office desk. And in locomotives. Even brief contact with these items is enough to magnetize a mechanical watch.



Sectional view of an anti-magnetic BALL watch case

The Engineer Hydrocarbon, Engineer Master II, and Engineer II watches are equipped with superb antimagnetic cases constructed with corrosion-resistant ferric stainless steel materials. Furthermore, the inner workings of the watch are protected by a soft iron inner jacket consisting of a sub-dial, a ring surrounding the movement and a double-bottom. This special alloy, reinforced by the shape of the case, prevents magnetic fields from penetrating as far as the movement and having an adverse effect on its accuracy.

What does the term “antimagnetic” actually mean? The existing standard is defined as follows: If a mechanical watch does not stop when exposed to a magnetic field of 4,800 A/m and subsequently does not deviate by more than 30 seconds per day, it can be called “antimagnetic.” The Engineer Hydrocarbon series certainly surpasses this standard with a protection up to 12,000 A/m while some of the BALL watches go up to a protection of 80,000A/m.

5.3 Chronometer Certificate

All calibers that mention "-C", e.g. RR1101-C

A chronometer is an extremely accurate watch. It takes its name from the Greek words chronos + metron meaning “to measure time”. A BALL chronometer is a highly accurate, mechanical watch whose precision has been tested and verified by the Official Swiss Chronometer Testing Institute (Contrôle Officiel Suisse des Chronomètres, or COSC, in French).

Before issuing the certificate, the COSC conducts elaborate precision tests on each BALL movement using cameras and computers and analyzes the data. The COSC performs seven different tests. Failure to meet the minimum standard in any one of the tests means that a movement is rejected. Here is a brief summary of the testing procedures:

※ *Test 1*

Mean daily rate: After 10 days of tests, the mean daily rate of the movement must be within the range of -4 to +6 seconds per day. The COSC determines the mean daily rate by subtracting the time indicated by the movement 24 hours earlier from the time indicated on the day of observation.

※ *Test 2*

Mean variation in rates: The COSC observes the movement rate in five different positions (two horizontal, three vertical) each day over 10 days for a total of 50 rates. The mean variation in rates can’t be more than 2 seconds.

※ *Test 3*

Greatest variation in rates: The greatest of the five variations in rates in the five positions can’t be more than 5 seconds per day.

※ *Test 4*

Horizontal and vertical difference: The COSC subtracts the average of the rates in the vertical position (on the first and second days) from the average of the rates in the horizontal position (on the ninth and tenth days). The difference must be no more than -6 to +8 seconds.

※ *Test 5*

Greatest deviation in rates: The difference between the greatest daily rate and the mean daily test rate can’t be more than 10 seconds per day.

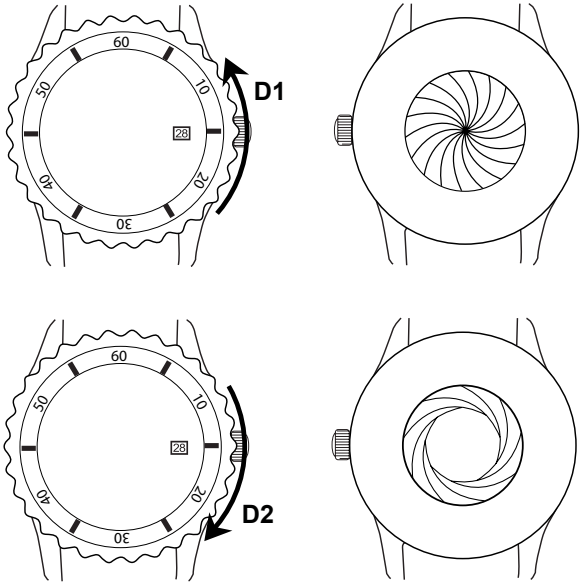
※ *Test 6*

Rate variation due to the temperature: The COSC tests the movement’s rate at 8 degrees Celsius (46 degrees Fahrenheit) and at 38 degrees Celsius (100 degrees Fahrenheit). It subtracts the cold temperature rate from the hot temperature rate and divides by 30. The variation must be no more than 0.6 seconds per day.

※ *Test 7*

Resumption of the rate: This result is obtained by subtracting the average mean daily rate of the first two days of testing from the mean daily rate of the last test day. The resumption of rate can’t be more than 5 seconds.

5.4 A-PROOF® anti-magnetic system



Direction [D1]: To close the diaphragm
Direction [D2]: To open the diaphragm

The patented A-PROOF® System in mu-metal is a magnetic trench box located inside the case that protects a mechanical watch against magnetic fields up to the intensity of 80,000 A/m. Mu-metal is an alloy of nickel, iron, copper and molybdenum with very high magnetic permeability, which enables it to deviate static or low-frequency magnetic field lines.

The bottom of the casing includes a retractable diaphragm that allows the user to look at the movement through the back of the case by maintaining the diaphragm open when the environment is free of magnetic fields that could likely damage the movement. The user can then protect this same movement by closing the diaphragm through a simple rotation of the bezel. A colored indicator is situated next to the crown to inform the user if the diaphragm is either open or closed.

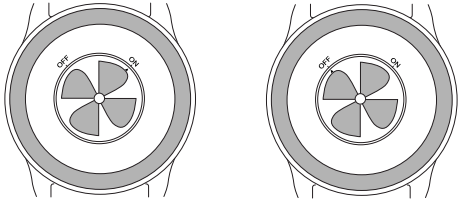
• To close the diaphragm, turn the bezel counterclockwise [D1] until the color of the indicator changes. Make sure not to force the mechanism, it could get damaged. In the fully closed position, the diaphragm locks the mu-metal anti-magnetic protection cage and guarantees the antimagnetic protection described above.

• To open the diaphragm, turn the bezel clockwise [D2] until the color of the indicator changes. In the retracted position, the diaphragm disappears to reveal the movement at work through the transparent case-back of the watch.

5.5 Amortiser® anti-shock system

The Amortiser® anti-shock system protects the mechanical movement against external shocks. This patented innovation consists of a protective and anti-magnetic ring enveloping the mechanical movement to absorb the energy created by side shocks.

5.6 Rotor-Locking System



On some models, the Amortiser® system is combined with a rotor-locking system. A switch on the case back enables the rotor to be locked and unlocked as desired. This prevents the impact energy from being transmitted to the movement, while the watch continues to run by drawing on its power reserve. When the rotor-locking system is engaged on the "ON" position, the rotor cannot spin, which protects the movement in case of shock. In this setting, the watch operates like a manually-wound watch.

When the rotor-locking system is disengaged on the "OFF" position, the rotor spins freely and can wind the automatic movement.

5.7 SpringLOCK® Hairspring anti-shock system

All calibers that mention "-SL", e.g. RR1101-SL

In case of shocks, the patented SpringLOCK® system guarantees that a mechanical caliber remains accurate by protecting the balance-spring with a "cage" designed to absorb the energy created when the watch is subjected to external impacts. Such impacts can cause standard mechanical movements to vary by up to approximately 60 seconds a day. The SpringLOCK® system reduces their effect by up to 66%, thus ensuring that the caliber remains accurate.

5.8 SpringSEAL® Regulator anti-shock system

The SpringSEAL® anti-shock system protects the regulator by maintaining it in its original position in case of impact and thus helps maintain the accuracy of the movement. After initial adjustment of the caliber by BALL watchmakers, SpringSEAL® locks and protects the regulator's settings in case of shock impact. It means the timepiece will not require additional adjustment after harsh impact. SpringSEAL® acts as a quality seal of accuracy and protection.

5.9 Shock absorption elastomer ring

The shock absorption ring consists of an elastomer ring to safeguard the movement. It encircles the entire movement and dial, allowing the caliber crown stem, spring and dial to slightly move while absorbing the impacts. External forces have significantly less chance to hinder the movement. For added protection, the ring extends outward and above the dial to protect the sapphire crystal. This ring is made of elastomer, a rubber material which is both flexible and resistant, offering extended lifetime and resistance to UV and sunlight. The unique structure of the system – inspired by architecture, industry and sport equipment – absorbs and releases impacts' energy.

5.10 Patented crown protection system

A special crown protection system was designed and patented for the Engineer Hydrocarbon series to guarantee its exceptional water resistance. A protective plate is placed around the crown, which ensures the crown is screwed back to its original secured position after time adjustment.

To unlock the crown protector, depress the button and rotate the bar counter-clockwise. The crown can then be unscrewed for adjustment or winding.

After fully screwing down the crown, move the crown protector into place by pushing down firmly until it locks.

5.11 DuraLOCK® Patented screwed-in crown

The patented winding crown DuraLOCK® guarantees superior water and shock resistance, even at the most vulnerable area of the case, the crown, which is among the most at risk parts of a watch. When using the crown to set the watch, the case is exposed to dust, water and other elements that can cause permanent damage. The DuraLOCK® patented screwed-in crown was developed in-house by BALL to ensure high-grade security. When the case is locked, the winding stem sealing system ensures the movement remains clean and its waterproof capabilities always intact. The DuraLOCK® also delivers easy and comfortable time setting and hand winding and ultimately avoids damaging the mainspring by over-winding.

5.12 Screwed-in crown with special protection design

This special crown cap delivers robust protection to the crown. It consists of a protective cover that ensures the crown has been properly screwed-in. It absorbs shocks and releases energy for impermeable, high grade security. To access the crown, the protective cap must be unscrewed.

5.13 Rotating bezel

Most of the models within the Engineer Hydrocarbon series feature an unidirectional rotating outer bezel incorporated with luminous paint for night reading. The bezel is painted with 60 minute elapsed time notation. The 60 minute bezel can be used for timing events by setting the zero dot at the current minute.

The bidirectional rotating outer bezels of the Engineer Hydrocarbon GMT models are painted with 24-hour GMT notation. To use the GMT bezel, simply turn the bezel until the local hour matches the GMT hand.

The Engineer Master II Diver models feature the first inner divers' bezel incorporated with H_3 micro gas tubes. The inner bezel rotates to measure duration. In order to ensure optimal water resistance, the crown must be screwed down before diving.

5.14 DLC & TiC Coatings

Diamond-Like Carbon (DLC) and Titanium Carbide (TiC) coatings provide superior scratch resistance and longevity. Metals coated with such material exhibit impressive hardness, low friction, high resistance to wear, and even electrical insulation. Research shows that DLC and TiC coatings dramatically improve the performance and life of any material.

5.15 Mu-Metal & Carbon composite case

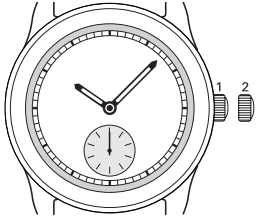
Carbon provides excellent resistance to scratches and impacts, and only weighs about 50% as much as the steel customarily used for watch cases, a significant gain of lightness on the wrist. Mu-metal is an alloy of nickel, iron, copper and molybdenum with very high magnetic permeability, which gives anti-magnetic properties far superior to the soft iron usually employed in watchmaking. The revolutionary structure of the mu-metal and carbon composite case with textured appearance allows for an extremely high protection (80,000A/m) against magnetic fields.

6. Operating Instructions

[Please see Online User Manual in the Customer Service section at www.ballwatch.com for the latest information.]

6.1 Manual Watch

CALIBERS: RR2101, RR2701



Position [1]: Normal / winding position
Position [2]: Time setting

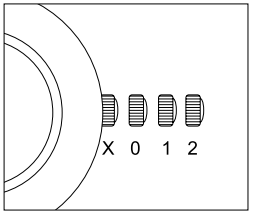
• Winding: A manual watch is wound by turning the crown clockwise when it is in position [1]. The movement is fully wound when the crown comes to a stop. Please do not attempt to force the crown beyond this point. A manual watch should be wound regularly, ideally once a day.

• Time Setting: To set the time, pull out the crown to position [2]. Push the crown back into position [1] when the correct time is reached.

6.2 Automatic Watch

CALIBERS: All, except those specifically listed under "Manual Watch"

Functions of the crown



X = Normal position
0 = Manual winding position
1 = Day/Date adjustment
2 = Setting the time

• Manual Winding: If the watch has not been worn for a long period of time, wind the movement before setting the time. Unscrew the crown to position [0], then turn the crown clockwise 20 to 30 times.

• Time Setting: To set the time, unscrew the crown and pull out to position [2]. (see below remark regarding model with non-screwed-in crown). Push the crown back into position [X] when the correct time is reached. When setting the time, please ensure that the date display is also set correctly. It should advance at midnight. If it advances at noon, you will need to turn the hands forward 12 hours.

• Please note that the Trainmaster One Hundred Twenty (NM2888) and the Trainmaster Flying Scotsman (NM2198) are equipped with a non-screwed-in crown. Therefore, the positions [X] and [0] are one and only position for these models.

• Day/Date Setting: After months with less than 31 days, you need to set the date to the first day of the next month. To do so, unscrew the crown and pull it out to position [1]. Turn the crown to set the date. On watches with Day function, turn the crown in the opposite direction of the date adjustment to set the day.

• In order to prevent damage to the date-switching mechanism, we advise not to manually reset the day and/or date between 8PM and 2AM.

• Always remember to screw down the crown after adjustment in order to ensure water resistance and to prevent possible damage to the movement.

Remarks:
Automatic watches acquire their energy from an oscillating weight that is activated in response to the movements of your wrist. Depending on the model, the power reserve ranges from 38 to 48 hours. Manual winding is only necessary if the watch has not been worn for a long period of time, or if it has stopped.

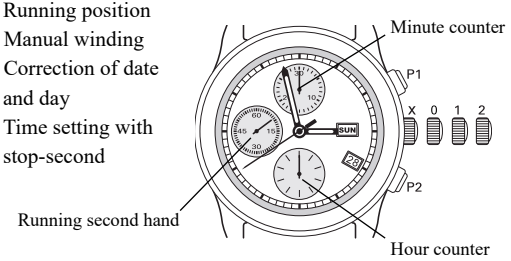
Depending on the type of movement, the accuracy of a mechanical movement may vary one to two minutes per week. Accuracy is strongly influenced by the way the watch is worn.

6.3 Automatic Chronograph

CALIBERS: RR1401, RR1402, RR1405, RR1502

See instructions for "Automatic Watch" above, with the following changes.

Position [X]- Running position
Position [0] - Manual winding
Position [1] - Correction of date and day
Position [2] - Time setting with stop-second



2 push-buttons:
[P1] Push-button at 2 o'clock: Start-stop the chronograph
[P2] Push-button at 4 o'clock: Reset the chronograph

Chronograph function: First ensure that the crown is in position [X] and that the chronograph hands are reset to zero.

• [P1] Upper Start/Stop control push-button. This push-button enables you to start and stop the chronograph function. Pressing once starts the central second hand. As soon as the second hand has revolved once around the dial, the minute hand is set into action. Pressing again stops these hands and a third push sets the chronograph function working again.

• [P2] Lower return-to-zero push-button. After stopping the chronograph by pressing the upper control push-button [P1], press the lower push-button [P2] to reset the counters to zero. This push-button only functions when the counters are stopped.

• Chronograph second hand: Start and stop by pressing the upper push-button [P1] Reset to zero by pressing lower push-button [P2].

• Running second hand: Most of the BALL chronographs feature running seconds in the subdial at 9 o'clock. The Trainmaster Cannonball (CM1052) and the Engineer Hydrocarbon Magnate Chronograph (CM2098) feature running seconds at the unusual 3 o'clock position.

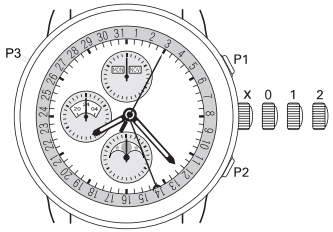
• Minute counter: It indicates the minutes elapsed from the start time by moving forward one unit for each complete revolution of the second hand. Reset to zero by pressing push-button [P2].

• Hour counter: It indicates the hours elapsed from the start time by moving forward one unit for each two complete revolutions of the minute counter. Reset to zero by pressing push-button [P2].

6.4 Automatic Chronograph with Moon Phase Display
CALIBER: RR1406

See above instructions for "Automatic Chronograph" with the following changes.

Position [X]- Running position
Position [0]- Manual winding
Position [1]- Correction of month, day, and moon phase display
Position [2]- Time setting with stop-second



3 push-buttons:
[P1] Push-button at 2 o'clock: Start/stop of chronograph
[P2] Push-button at 4 o'clock: Reset the chronograph
[P3] Pusher at 10 o'clock: Day correction

Chronograph function: First ensure that the crown is in position [X] and that the chronograph hands are reset to zero.

• 24-hour hand: The red hand displays the time in 24-hour military time and day/night in the subdial at 9 o'clock.

• Moon Phase display: Subdial at 6 o'clock indicates the phases of the Moon over a 29 ½ day period. Adjust Moon Phase by turning counterclockwise

at Position [1]. It is recommended to first set the correct date, then start from either full moon or new moon then advance forward the appropriate number of days. In order to prevent any damage to the caliber, the Moon Phase display cannot be corrected between 3AM and 4AM.

• Date display: Subdial at 12 o'clock indicates the day and month, while a hand displays the date on the outer chapter ring. Adjust the date by turning clockwise at Position [2]. Adjust the month by rotating through 31 days until the month changes. Adjust the day by pressing [P3] until the correct day is shown. To prevent damage to the date-switching mechanism, we advise not to manually reset the day and/or the date between 10PM and 2AM.

6.5 Single-button Chronograph

CALIBERS: RR1403, RR1407

See above instructions for "Automatic Chronograph", with the following changes.

• [P1] Upper Start/Stop/Reset control push-button
This push-button enables you to control all chronograph functions. Pressing once starts the central second hand. Pressing a second time stops the hand and a third push resets the chronograph hand to zero again.

6.6 Automatic Chronograph with GMT Display

CALIBER: RR1404

See above instructions for "Automatic Chronograph", with the following changes.

• Date setting: Unscrew the crown and pull it out to position [1] Turn the crown clockwise to set the date. To prevent damage to the date-switching mechanism, we advise not to manually reset the day and/or the date between 8PM and 2AM. Ensure that the date change takes place at midnight and not at noon.

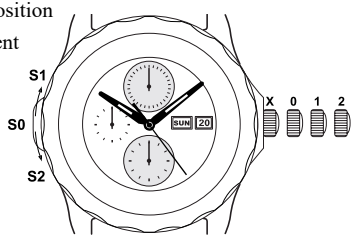
• Set the time of the second time zone: Turn the crown counterclockwise until the correct time for the second time zone appears on the dial. Turn the GMT hand slowly in one-hour increments to avoid damage to the movement.

• Set the local time: In position [2], turn the crown clockwise or counter-clockwise.

6.7 Slide Chronograph

See above instructions for “Automatic Watch” , with the following changes.

Position [X]: Normal position
Position [0]: Manual winding position
Position [1]: Day/Date adjustment
Position [2]: Setting the time



To operate the slide-bar:
[S0] Normal position
[S1] Start/Stop the chronograph
[S2] Reset the chronograph

The patented Slide Chronograph system includes a circular slide bar fitted around the case that allows the trigger, stop and reset of the chronograph in one and the same control integrated in the case at the 9 o’clock position. The intuitive movement required to activate the mechanism consists of making the external control slide along the case.

• To trigger the chronograph, move the slide bar clockwise [S1]. The slide bar then automatically returns to its original position [S0]. A second movement clockwise [S1] stops the chronograph, and a third movement [S1] starts the chronograph again.

• To reset the chronograph, move the slide bar counterclockwise [S2]. This movement only functions when the counters are stopped.

6.8 Chronograph Scales

Pulsemeter: It measures human pulse or respiration rate.

The wearer can find the correct respiration / pulse per minute by recording the time needed for the listed number of pulsations.

Description of operation

Please refer to the above instructions for “Automatic Chronograph” to reset the chronograph counter to zero position.

Trainmaster Pulsemeter (CM1010):
The dial is marked ‘Graduated for 30 pulsations’.

At the beginning of a pulsation/respiration, start the chronograph counter by pressing push-button [P1]. Press again when the 30 pulsations/respirations have been recorded. If after the 30th pulse, the operator stops the chronograph counter at 20 seconds, reading from the stopped second hand on the pulsemeter scale will result in a pulsation rate of 90 beats per minute.

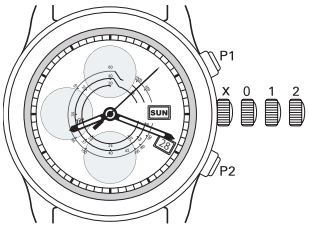
Trainmaster Pulsemeter II (CM3038), Trainmaster Pulsemeter Chronometer (CM1010), Trainmaster Pulsemeter Pro (CM1038) and Trainmaster Doctor’s Chronograph (CM1032):
The dial is marked ‘Graduated for 15 pulsations’.

At the beginning of a pulsation, start the chronograph counter by pressing push button [P1]. Press again when the 15 pulsations/respirations have been recorded. If after the 15 pulses, the operator stops the chronograph counter at 10 seconds, reading from the stopped second hand on the pulsemeter scale will result in a pulsation rate of 90 beats per minute.

Combined with the single-button chronograph to allow for quicker measurement of pulse and respiration rates, the 15-pulse scale also minimizes human error due to reaction time to ensure a more accurate reading.

Tachymeter: It computes speed over a given distance.

The wearer can find the correct speed per hour by recording the time needed to travel a certain distance.



Description of operation

Please refer to the above instructions for "Automatic Chronograph" to reset the chronograph counter to zero position.

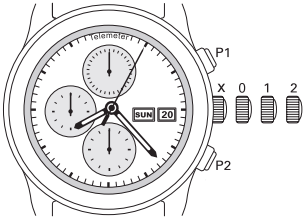
To compute the speed of a vehicule over a certain distance, press the top chronograph button [P1] to start timing. At the end of the fixed distance, press the button again. If the time elapsed is 45 seconds, the second hand should point to the figure 80 on the Tachymeter scale. If the fixed distance is one kilometer then the car is traveling 80 kilometers per hour.

The Fireman Skylab (CM1092), Fireman Storm Chaser (CM2092) and Fireman Storm Chaser DLC (CM2192) have a tachymeter scale on the outer bezel for measurement of elapsed times up to 1 minute.

The inner spiral of the Trainmaster Pulsemeter (CM1010) is a tachymeter scale capable of measuring elapsed time of up to 3 minutes. If for example, the time elapsed is 1 minute 30 seconds, the second hand will point to the figure 40 on the 2nd ring of the Tachymeter scale. Over a distance of 1 mile, the car is thus traveling at 40 miles per hour.

Telemeter: It measures the distance between the observer and a situation that is both visually and audibly observable.

The telemeter scale is based on the speed of sound through air, approximately 340 meters per second. Originally, it has been used to measure the distance to lightning or the distance to artillery fire.



Description of operation

Please refer to the above instructions for "Automatic Chronograph" to reset the chronograph counter to zero position.

The Engineer Master II Telemeter (CM1020), Fireman Storm Chaser (CM2092), Fireman Storm Chaser DLC (CM2192) and Fireman Storm Chaser Pro (CM3090) can measure time accumulated up to 30 minutes with the minute counter beneath the 12 o'clock position. The push- buttons [P1] and [P2] are screw-in type; they have to be unscrewed in order to function.

Start the chronograph by pressing push-button [P1] on the optical signal (e.g. a flash of lightning) and then stop the counter when the audio signal (e.g. thunder) is heard. The distance will be indicated on the telemetric scale in kilometers, pointed by the position of the chronograph second hand.

Compass: It displays the direction based on time and position of the sun.

Fig.1

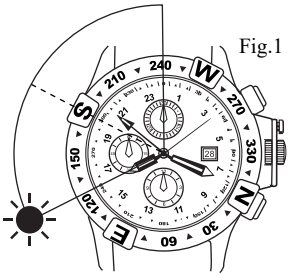
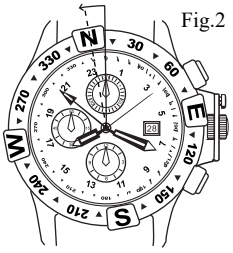


Fig.2



The Engineer Hydrocarbon Spacemaster Orbital (DC2036) and Spacemaster Orbital II (DC3036) can be used as a compass synched to the sun or to store relative position with a separate compass.

First remove the watch from the wrist and turn it until the local hour hand points at the sun. Find the point halfway between the hour hand and 12 o'clock. Turn the outer compass bezel to set South to that point, then all other cardinal points are displayed on the compass bezel. Please note, in the Southern hemisphere, the point between the sun and 12 o'clock will be North instead of South. (see Figure 1).

Adjust the time backward one hour during Daylight Saving Time.

When using to determine relative position, first turn the watch in order for the "N" marking on the inner bezel to face North, then turn the outer compass bezel to the necessary offset (e.g. 10°) from the inner bezel. (See Figure 2)

6.9 Linear Triple Calendar

CALIBERS: RR1403, RR1405

The triple calendar function may be also known as the “Month, Day, Date” feature. The Trainmaster Racer and Trainmaster Doctor’s Chronograph introduce a BALL in-house development, the Linear Triple Calendar function. This feature shows the month, the day and the date in a row at the 3 o’clock position for ease of use.

To set the functions, unscrew the crown and pull it out to position [1].

• Date setting: Turn the crown clockwise until the correct date is reached.

• Day setting: Turn the crown counterclockwise until the correct day is reached.

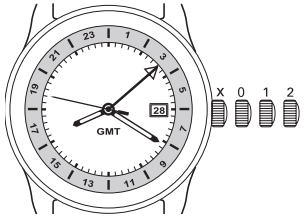
• Month setting: The month function is set in the same manner as the date. By rotating the date through all 31 days, the month wheel will move forward to the next month.

In order to prevent damages to the date-switching mechanism, we advise not to manually reset the Linear Triple Calendar between 8PM and 2AM.

6.10 GMT

CALIBERS: RR1201, RR1202

See above instructions for “Automatic Watch” with the following changes.



• Date Setting: Unscrew the crown and pull it out to position [1]. Turn the crown counterclockwise to set the date. In order to prevent damage to the date-switching mechanism, we advise not to manually reset the date between 8PM and 2AM. Ensure that the date change takes place at midnight and not at noon.

• Set the local time: In position [2], turn the crown forwards or backwards.

• Set the time of the second time zone: Turn the crown clockwise until the correct time zone appears on the dial. Turn the GMT hand in one-hour increments to prevent wear on the movement.

6.11 GMT with Quick Set Mechanism

CALIBERS: RR1203, RR1303

See above instructions for "Automatic Watch" with the following changes.

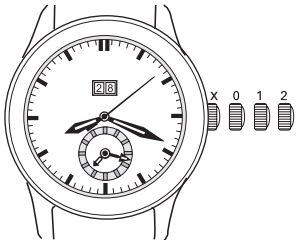
• Day/Date Setting: Unscrew the crown and pull it out to position [1]. Turn the crown to set the day and the date. In order to prevent damage to the date-switching mechanism, we advise not to manually reset the date between 8PM and 2AM. Ensure that the date change takes place at midnight and not at noon.

• Set the local time: In position [2], turn the crown forwards or backwards.

• Set the time of the second time zone: The quick set mechanism consists of 2 pushers. The pusher at 8 o'clock sets the GMT hand one hour earlier, while the pusher at 10 o'clock sets it one hour later. There is a locking mechanism to avoid setting the GMT hand by accident. To engage one of the pushers, turn it for about 60 degrees (in any direction). Then push, set the GMT hand to the desired position and once the setting is done, turn the pusher again to disengage it. Once locked, it is not possible to press the pusher. **Be aware that pushing both pushers at the same time would damage the GMT function and should not be done at any time. While using one pusher, the other should be in locked position and both pushers should be in locked position while adjusting the crown.**

6.12 Dual Time

CALIBERS: RR1301, RR1701



For the Dual Time models, the big date aperture is shown under the 12 o'clock position, while the second time zone indicator is located at 6 o'clock.

See above instructions for "Automatic Watch" with the following changes.

• Date setting: From position [1], turn the crown counterclockwise until the correct date is displayed in the date aperture, then push the crown back to position [0]. It is necessary to correct the date after every month with less than 31 days.

• In order to prevent damage to the date-switching mechanism, we advise not to manually reset the date between 8PM and 2AM.

• Time setting: At position [2], the second hand is stopped. To set the time for the Second Time Zone, turn the crown clockwise until the correct time is shown; both hour and minute hands of local and second time zone will move when the crown is turned clockwise. In order to set the Local Time, then turn the crown counterclockwise. The second time zone hour hand will be locked at the set time, only the minute hand will move to synchronize the time setting of the local time zone.

CALIBER RR1302

For the Dual Time models with caliber RR1302, the date aperture is shown at the 3 o'clock position, the second time zone indicator is located at 12 o'clock while the power reserve is featured at 6 o'clock.

See above instructions for "Automatic Watch" with the following changes.

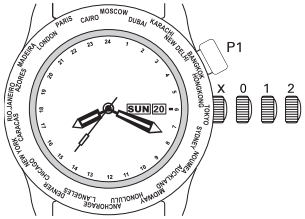
• Date setting: From position [1], turn the crown counterclockwise until the correct date is displayed in the date aperture, then push the crown back to position [0]. It is necessary to correct the date after every month with less than 31 days.

• Time setting: In position [2], turning the crown will affect both the Local Time and the Dual Time. To set the time of the second time zone (Dual Time), push the hidden button located between 10 and 11 o'clock using an unfolded paperclip or similar tool until the correct time is shown. Every push will advance the hand in increments of 1 hour.

6.13 World Time

CALIBERS: RR1501, RR1502

See above instructions for "Automatic Watch" with the following changes.



• In position [1], turn the crown clockwise in order to set the date and counter-clockwise to set the day to D-1. In position [2], turn the crown anti-clockwise until the date changes and stop at midnight.

• Some models allow to turn the city dial and adjust it to the city of choice at 12 o'clock (home or city of departure). DG2022: Use the crown [P1] at two o'clock to adjust the city dial. DG2232: Use the bezel to adjust the city dial.

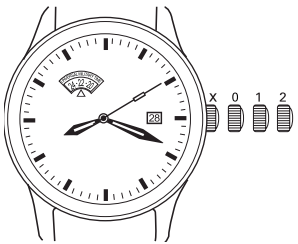
• In position [2], turn the crown anti-clockwise until your home time (displayed on the 24-hour dial) is aligned with the chosen city.

• In position [2], turn the crown clockwise until reaching the full local hour (stop the minute hand at 12 o'clock). (Pay attention to the noon/midnight transition when adjusting)

• In position [2], turn the crown anti-clockwise in order to adjust the minute hand.

Note: Never turn the crown clockwise once the full local hour has been set, otherwise you will need to repeat the procedure. In order to guarantee optimal water resistance, ensure that the crowns are perfectly screwed down before any dive. Please consider daylight saving time around the world when adjusting your World Time function.

6.14 24-Hour Window (UTC or UMT Indication)
CALIBERS: RR1106, RR1202



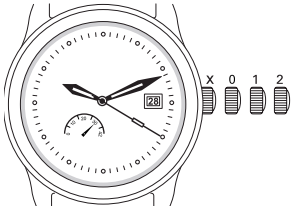
The Trainmaster Cleveland Express Dual Time (GM1020) and Fireman Night Train (NM1092) share a 24-hour indicator at 11 o'clock. This indication is tied to the main time zone and thus shows 24-hour UTC or UMT time.

• Time setting: At position [1], the second hand is stopped. Turn the crown forward to set the local time, ensuring that the 24-hour window properly displays day or night.

6.15 Power Reserve

CALIBERS: RR1701, RR1702, RR2701

The display at bottom of the dial is the power reserve indicator. It shows the remaining power reserve in the watch in hours. If the watch is not worn, or during periods of low activity, the hand of the power reserve indicator will wind down.



The BALL watches with power reserve function feature an indicator that displays the remaining power reserve on a hand. The indicator will turn counterclockwise as the power diminishes. During manual winding or when the watch is worn, the reserve indicator will move clockwise.

The natural movements of your arms wind the watch up automatically and the energy will be stored up as power reserve. Manual winding is only necessary if you stop wearing your watch for several days or if it stopped.

Remarks:

Do not overwind the watch. Manual winding should be stopped when the power reserve indicator reaches the end of the scale. Continued winding could damage the movement.

6.16 Moon Phase

CALIBERS: RR1801, RR1803

The Engineer Master II Moon Phase (NM1082) has been the first moon phase watch illuminated with the stunning H_3 micro gas tubes. The moon phase wheel is activated by a 59-tooth gear, which shows the changes of the Moon's phases as it goes through two of its 29.5-day cycles. The moon phase disc is easily set via Position [1] of the crown. In order to prevent damage to the movement, we advise not to turn the hands counterclockwise while setting the time (Position [2] of the crown) and not to set the moon phase function (Position [1] of the crown) between 3PM and 5PM.

Set the Moon Phase display by turning to the nearest Full or New Moon, then moving forward by the appropriate number of days.

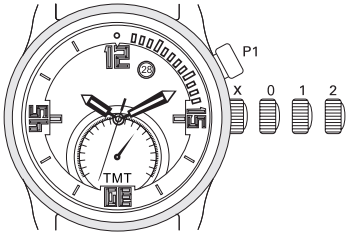
	2023	DATE	2024	DATE	2025	DATE	2026	DATE
Jan	○ ●	7 21	● ○	11 25	○ ●	13 29	○ ●	3 18
Feb	○ ●	5 20	● ○	9 24	○ ●	12 28	○ ●	1 17
Mar	○ ●	7 21	● ○	10 25	○ ●	14 29	○ ●	3 19
Apr	○ ●	6 20	● ○	8 24	○ ●	13 27	○ ●	2 17
May	○ ●	5 19	● ○	8 23	○ ●	12 27	○ ● ○	1 16 31
Jun	○ ●	4 18	● ○	6 22	○ ●	11 25	● ○	15 30
Jul	○ ●	3 17	● ○	6 21	○ ●	10 24	● ○	14 29
Aug	○ ● ○	1 16 31	● ○	4 19	○ ●	9 23	● ○	12 28
Sep	● ○	15 29	● ○	3 18	○ ●	7 21	● ○	11 26
Oct	● ○	14 28	● ○	2 17	○ ●	7 21	● ○	10 26
Nov	● ○	13 27	● ○	1 15	○ ●	5 20	● ○	9 24
Dec	● ○	13 27	● ○ ●	1 15 30	○ ●	5 20	● ○	9 24

● New moon ○ Full moon

All BALL Watch moonphase complications are calibrated for the Northern Hemisphere.

6.17 TMT

CALIBER: RR1601



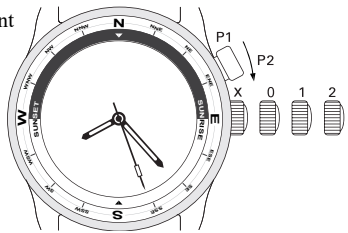
The TMT watches can measure temperature from negative 35°C to positive 45°C (-30°F to 110°F) with the indicator at 6 o'clock. The temperature recorded by the TMT is precise and instantaneous but it records the temperature inside the watchcase, which is inevitably affected by the temperature of the wearer's wrist. To reveal the actual environmental temperature, the watch should be taken off for about 10 minutes until the inside of the watch reaches the ambient temperature. When worn over a wetsuit or parka, the TMT should immediately display ambient temperature without any distortion due to body heat.

The temperature scale in Celsius [°C] degrees can be easily converted into Fahrenheit scale following this simple formula: °F = °C x $^{9}/_{5}$ + 32. The temperature conversion scale can be found on the caseback of the TMT models.

6.18 Sunrise / Sunset

See above instructions for “Automatic Watch” , with the following changes.

Position [X]: Normal position
Position [0]: Manual winding position
Position [1]: Day/Date adjustment
Position [2]: Setting the time



To operate the Sunrise/Sunset:
[P1] Normal position
[P2] Set sunrise or sunset time

The Sunrise/Sunset feature enables the wearer to mark the time of sunrise or sunset on the dial of the watch. The indicators are marked on the internal bezel and show remaining time until impending sunrise or sunset. Only one indicator can be used at a time. To simplify the reading, the inner bezel has a dark coloration on the sunset side in opposition to a lighter coloration on the sunrise side.

• To set sunrise or sunset time, turn the button located at 2 o'clock [P1] clockwise [P2] until reaching the desired time.The inner bezel works as a passive indicator and will not move without the wearer’s intervention. It needs to be adjusted according to the predicted sunrise or sunset time.

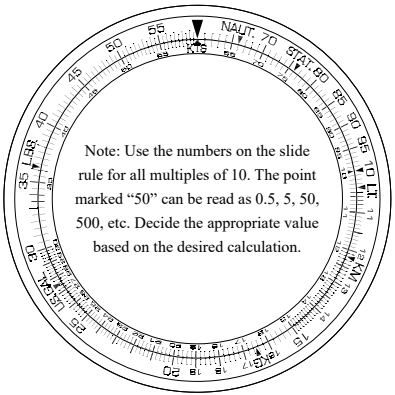
6.19 High / Low Tides Indicator

Tides cause water to move, uncovering and covering parts of the marine depths. The tide indicator allows following the times of high and low tides during a period of 14 days by adjusting the indication with both the outer bezel and the inner bezel. The inner bezel lists the days of the week, while the outer bezel indicates the high and low tides. Together, they point out the times of high and low tides for a period of two weeks.

Assuming today is Monday, with a high tide at 10:30am. To set the indicator, use the crown to place the hands at the time of today’s high tide (10:30am). Turn the outer bezel counter clockwise to move the inner 2-week ring until today’s day (Monday) lines up perfectly with the hour hand. There are two Mondays on the ring, either one will work. Turn the outer bezel clockwise until the triangular mark underneath the wordings “HIGH TIDE” aligns with the small marking below MON, then the indication of the low tide is shown to be at around 4:30pm. On Tuesday, turn the outer bezel clockwise until the “HIGH TIDE” wordings align with the small marking below TUE. This step needs to be repeated daily. By setting today’s high tide indicator, the other markings automatically fall into places. For our example, it means that the high tides on Tuesday will happen at approximately 11am and 11pm.

6.20 Slide Rule

NAUT: Nautical miles
STAT: Terrestrial miles
KM: Kilometers
U.S. GAL: US Gallons
LT: Liters
LBS: Pounds
KG: Kilograms
KTS: Knots



Conversions
The slide rule enables you to easily convert various units.

Converting gallons to liters: To convert the capacity of an aircraft tank from 50 US gallons to liters, line up “U.S. GAL” on the outer bezel with the number 50 on the inner bezel to display the answer in liters next to “LT”: 50 US gallons equals 189 liters.

Converting nautical miles to terrestrial miles or kilometers: To convert a distance of 40 nautical miles, align “NAUT” on the outer rotating bezel with the number 40 on the inner bezel. The measurement in terrestrial miles is shown under “STAT.” The measurement in km is shown under “KM”.
40 nautical miles = 46.5 terrestrial miles = 75 kilometers

Converting kilograms to pounds: To convert 80 kilograms into pounds, turn the outer bezel so “KG” aligns with the number 80 on the inner bezel. The converted value is shown under “LBS”:
80 kilograms equals 176 pounds.

Multiplication
Task: 5 x 6 = ?
Align the number you want to multiply (5) on the rotating outer bezel with the index number (10 with a red arrow) on the inner bezel. This then becomes the multiplier. Look for the number you want to multiply it by (6) on the inner bezel, and you will see the product of the sum displayed on the outer bezel (30).

Division
Task: 20 ÷ 5 = ?
Align the numerator (20) on the outer rotating bezel with the divisor (5) on the inner bezel. The product (4) is shown on the outer bezel opposite the index number (10 with a red arrow) on the inner bezel.

Percentage

Task: 25% of 80

To calculate a percentage of any number (e.g. 80), align it with the index number (10 with a red arrow) on the inner bezel. Once the bezels are correctly positioned, the inner bezel shows the percentage and the outer bezel shows the product of the sum. Example: 25% of 80 = 20

Rule of Three

If the exchange rate between the Swiss Franc and the US dollar is 1 CHF = $1.1, align the number 11 on the outer bezel with the index number (10 with a red arrow) on the inner bezel. The inner bezel then shows the amount in Swiss francs and the outer bezel gives the amount in US dollars. This makes it easy to convert any amount between currencies.

Speed

Task: What is the speed of travel to cover 50 nautical miles in 25 minutes?
Align the distance (50) on the outer rotating bezel with the time in minutes (25) on the inner bezel. The relative speed is shown under “KTS”: 120 knots

You can convert other units of measurement in the same way as above, using the same combinations.

Task: What is the speed of travel to cover 50 km in 25 minutes?
Align the distance (50) on the outer rotating bezel with the time in minutes (25) on the inner bezel. The relative speed is shown under “KTS”: 120 km/h

Task: What is the speed of travel to cover 50 terrestrial miles in 25 minutes?
Align the distance (50) on the outer rotating bezel with the time in minutes (25) on the inner bezel. The relative speed is shown under “KTS”: 120 mph

6.21 Local 12-hour hand with quick set mechanism

CALIBER: RR1204

See above instructions for "Automatic Watch" with the following changes.

• Date Setting: Unscrew the crown and pull it out to position [1]. Turn the crown clockwise to set the date. In order to prevent damage to the date-switching mechanism, we advise not to manually reset the date between 8PM and 2AM. Ensure that the date change takes place at midnight and not at noon.

• Set the home time: In position [2], turn the crown clockwise or counterclockwise.

• Set the local time (12hr hand): The quick set mechanism consists of 2 pushers. The pusher at 8 o'clock sets the local time hand one hour earlier, while the pusher at 10 o'clock sets it one hour later. There is a locking mechanism to avoid setting the local time hand by accident. To engage one of the pushers, turn it for about 60 degrees (in any direction). Then push, set the local time hand to the desired position and once the setting is done, turn the pusher again to disengage it. Once locked, it is not possible to press the pusher. We advise not to use the pusher at 8 o'clock to jump back to the previous day in order to avoid any damage on the movement. Be aware that pushing both pushers at the same time would damage the local time function and should not be done at any time. While using one pusher, the other should be in locked position and both pushers should be in locked position while adjusting the crown.

6.22 Quick set local 12-hour hand

CALIBERS: RRM7337, RR1205

See above instructions for "Automatic Watch" with the following changes.

• Date Setting: In position [1], turn the crown. The date changes when the hour hand passes midnight, after two complete turns around the dial.

• Set the home time: In position [2], turn the crown clockwise or counterclockwise.

• Set the local time: In position [1], turn the crown clockwise or anti-clockwise. The hour hand turns in increments of one hour. The local time hand moves independently from the other hands.

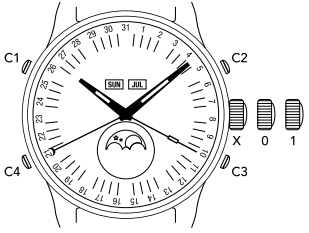
6.23 Complete Calendar with Moon Phase

CALIBER: RR1807

Complete calendar is the term used to describe a watch that indicates the time, day, date and month. The moon phase function displays the changes in the moon's cycle (29.5 days).

Warning: To avoid getting the recessed pushers jammed or damaging the movement, it is primordial to not activate them too rapidly (1 pressure per second is recommended) and to not perform any of the below adjustments between 5PM and 2AM.

Every recessed pusher needs to be operated with a tool that does not scratch steel.



X = Normal position
0 = Manual winding position
1 = Setting the time

• Position the hands outside the area from 5PM to 2AM.

• Set the moon phase function to D-1: Press the recessed pusher [C4] until reaching full or new Moon, then press again as many times as days have passed since the last full or new moon.

• Set the date to D-1: Press the recessed pusher [C3] until the correct date is reached. In order to prevent damage to the date-switching mechanism, we advise not to manually reset the date between 5PM and 2AM. After months with less than 31 days, you need to set the date to the first day of the next month.

• Set the month: Press the recessed pusher [C2] until the correct month is reached. After months with less than 31 days, you need to manually adjust the month.

• Set the day to D-1: Press the recessed pusher [C1] until the correct day is reached.

• In position [1], allow the calendar to jump one day by turning the hour and minute hands.

• In position [1], adjust the time.

7. Caring for your BALL watch

Like a car engine, we recommend that you have your mechanical BALL watch checked, cleaned and lubricated by a BALL authorized service center every three to five years. This regular maintenance will prevent movement wear due to the drying of lubricating oils.

Your BALL watch requires a certain amount of care. A few basic recommendations will help you to ensure its reliability and keep it looking new.

• Magnetic fields: The Engineer Hydrocarbon, Engineer Master II and Engineer II collections are all equipped with soft iron inner antimagnetic case for improved resistance. Nevertheless, please avoid placing your watch on refrigerators or loudspeakers as they generate powerful magnetic fields.

• Shocks: Although your BALL watch has been built to withstand shock according to the highest standard in the industry, extreme impact against this precision instrument should still be avoided. A strong impact on the winding crown or the crystal can impair the water resistance or damage the movement.

• Cleaning: Be sure to rinse your watch regularly with fresh water, especially after it has been in salt water. This will help preserve its appearance and running condition.

• Strap: Our straps are made of finest calf, crocodile or alligator leather and are protected against humidity. To prolong the life of your leather strap, please avoid contact with water and dampness to prevent discoloration and deformation. Should the strap be immersed in salt water, we suggest that you rinse it with fresh water to prevent further damage. Please also avoid contact with greasy substances and cosmetic products, as leather is permeable.

8. Optimum Safety

Man has always been exposed to natural radiation arising from the earth as well as from outer space. The radiation we receive from outer space is called cosmic radiation or cosmic rays. On average, our radiation exposure due to all natural sources amounts to about 2.4 mSv a year - though this figure can vary widely, depending on the geographical location. Even in homes and buildings, there are also radioactive elements in the air.

The wearer of an intact BALL watch is never exposed to any radiation. Even the hypothetical and unlikely accident entailing the simultaneous release of all tritium contained in H_3 gas tubes would present a very minor internal irradiation. In that case, the wearer is exposed to a dose 30,000 times lower than the one due to average background radiation as stated above. It is evident that it does not make sense to speak of a risk at all for such minor exposure.