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'Man is Not Lost' – an Account of the Mk 11 Navigational Wristwatch

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DURING THE NIGHT of October 22, 1707 four British war ships under the command of Admiral Sir Clowdesley Shovell hit a reef at the Isles of Scilly and sank within minutes. 1647 sailors died, among them Admiral Shovell himself. This tragedy had a simple cause: the impossibility of accurately determining longitude at sea made it difficult to navigate precisely. Following this catastrophe, huge efforts were initiated to resolve the problem, which led to the now well-known story of John Harrison and the development of marine chronometers.

More than 200 years later, in World War II, navigation by the Royal Air Force was not much better than Clowdesley Shovell's. An investigation, conducted in 1941 on the initiative of Lord Cherwell, Scientific Adviser to the Prime Minister, evaluating photographs taken on night raids over a period of 52 days by Bomber Command, revealed that only about a quarter of the number of bombers which claimed to have attacked their targets actually did so. Other investigations, depending on the sorties chosen as a basis, showed that more than 95% of bombs had missed their target by more than five miles. The cause was simple: the lack of precise navigation. This time the result was the Mark 11 navigator's wristwatch, the 'air-chronometer' used for astronavigation purposes. It was the airborne counterpart of the classic marine chronometer.

Early Air Navigation

Before World War II three navigation techniques were used in aviation. Commercial air traffic was navigating by fixed radio beacons. In addition, navigation by sight using prominent landmarks along the calculated route, was still practised. For military aviation over enemy territory, dead reckoning was standard. Dead reckoning calculates the flight distance from speed through the air and flight time, which, together with starting point and direction, should theoretically give the exact position. However the actual progress of the aircraft through the air will rarely be the same as over the earth due to the influence of side, head and tail winds. In addition the compass does not show the correct course when side winds make the aircraft drift from the compass course. Dead reckoning usually gives an inexact position because the actual speed, distance and direction of travel is compromised.

During World War II all parties shut down the radio beacons they had run for civilian use. British radio beams hardly reached

1. The story of this rather strange name is given in the memoirs of R V Jones, WW II the head of British Scientific Intelligence. In Chapter 37, 'Full Stretch' of his book: *Most Secret War – British Scientific Intelligence 1939-1945*, the code name given to this radar project was 'TF', an abbreviation for 'Town Finder'. Jones warned Lord Cherwell that this rather obvious terminology could disclose the purpose of the new device to the enemy. Lord Cherwell demanded another name be provided at short notice. Staff recalled that, when riled by excuses given for slow progress with the system, Lord Cherwell had shouted "It stinks! It stinks!", and 'H₂S', the chemical formula for 'Rotten Egg Gas', was suggested as surreptitious revenge for his outburst. Lord Cherwell immediately asked for an explanation; there was relief when one team member (these were very bright people) came up with: "Home sweet Home". The real explanation subsequently gained currency with aircrew, who, if captured and under interrogation, freely disclosed the term to mislead German Intelligence Officers. As a young man, Dr Philip Woodward worked on the specialized aerials required by aircraft using H₂S.

beyond the western parts of Germany. In addition the German *Verdunkelung* (Blackout) of any light in the cities reduced the possibility of night navigation by sight. As a result dead reckoning was the only navigation technique that could be used by the Royal Air Force. It had been the inaccuracies inevitably connected with dead reckoning that had led Admiral Shovell onto the reefs of the Scilly Isles.

New WWII Technology

Urgent measures were taken to drastically improve the standard of navigation, this time by the Chief of Air Staff. This resulted in 'H₂S', an airborne map painting radar system¹. Code-named, *Gee*, *Rebecca* and *Oboe*, these were three advanced radio beam based systems. Last but not least, there was astronavigation.

Electronic methods were of little value prior to the D-day landings as radio beam based systems had a range of only 300 miles from ground stations in England. H₂S was only usable over land and did not work over water. So Bomber Command pinned its hope on astro-navigation.

Astronavigation

Astronavigation was not completely new to aviation. In principle it was the same technique that sailors had used for 150 years to navigate following the stars and the sun. Two instruments were needed: a sextant and a chronometer. When combined both

NAVIGATOR'S WRIST WATCH, Mk. 11

DESCRIPTION

6. The navigator's wrist watch, Mk. 11, Stores Ref. 6B/346, is a highly accurate timepiece, suitable for astro navigation purposes. The watch incorporates a high-grade, 12 ligne, 36-hour keyless lever movement of Swiss manufacture, mounted in a stainless steel waterproof case and suitably screened against magnetic influences. The movement is fitted with 16 jewels, and the escapement embodies a non-magnetic solid type balance of "Glucydur", with an auto-compensating non-magnetic Bréguet-type hairspring of "Nivarox". The hairspring stud

and curb pins are also of non-magnetic material. The escapement of this watch is capable of great accuracy under all conditions, and the degree of compensation for temperature changes is superior to that which can be achieved with a bi-metallic balance and steel hairspring.

7. Means are provided for synchronizing the centre seconds hand with the minute hand, whereby, when the winding button is pulled out for setting the hour and minute hands, the balance is brought to rest. When the button is returned to the normal winding position, the balance is released and the watch will restart immediately. There is no special provision for bringing the seconds hand to the zero position.

Caution . . .

After fully winding the watch, the winding button must be rotated at least half a turn in the opposite direction in order to release the extra tension on the mainspring which may cause banking, since the stiffness of the sealing gland may prevent the winding stem from releasing itself without further assistance. If this precaution is not observed, the watch is liable to gain during the banking period.

8. The dial is of soft iron with a matt black finish, and is marked with white Arabic numerals from 1 to 12. The minute divisions are marked in white, with the exception of the four cardinal graduations, which are luminized. The non-magnetic hour and minute hands are also luminized, and a luminous dot replaces the minute graduation on each side of the graduation at 12 o'clock. The centre seconds hand is of bright non-magnetic metal.



Fig. 2. Navigator's wrist watch, Mk. 11

Page from the RAF Instrument Manual, amendment November 1949.
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The IWC (cal 89) and Jaeger LeCoultre (cal 488/sbr) watches produced to the MoD's Mk 11 specification. On the JLC the hacking feature can be seen, arrow.

latitude and longitude could be calculated. However the marine chronometers that were used on ships did not withstand the vibrations in an aircraft and a marine sextant is only useful if a precise horizon can be seen. This technique could not be used by Bomber Command. Moreover, the procedure for calculating position from the tables of the Air Almanac was so time-consuming that initially astronavigation had no practical relevance.

The Royal Air Force set about developing a sextant usable under wartime conditions. It perfected the bubble sextant, which was based on a principle known since the late 1920s. The RAF succeeded in introducing this new instrument into Bomber and Coastal Command in considerable numbers in the early 1940s. Thereafter the bubble sextant could be used together with a new, simplified calculation method to rapidly determine exact position.

The development of timepieces, which maintained the necessary accuracy under flying conditions turned out to be an underestimated challenge. Some thousand watches of the Mk VII and Mk VIII type had been bought but they had problems under war conditions. The alloy or chrome-plated brass cases did not resist the salty air of the North Sea nor the humid climate of the Asian war theatres.

Since 1944 H₂S had proved to be a valuable bombing and navigation aid, but its map painting radar screen produced magnetic fields, which substantially disturbed the accuracy of this first generation of navigational wristwatches

that lacked any kind of magnetic shielding. The altitude of the sorties had steadily increased, causing a problem with low temperature, which also affected the precision of the watches. Cabin pressurization had been introduced towards the end of WW II and a sudden decrease of pressure, e.g. if the plane was hit by a shell, could force the crystal from a watch that still retained normal pressure inside its case.

The Mk 11 Air Chronometer

With the above requirements in mind specifications were devised for a true 'Air Chronometer'. The result is well known: the legendary Mk 11 which was not available until 1949. Its characteristic features were laid down in its initial



specifications:

- a highly accurate movement with hack-device,
- an inner soft iron cage forming a shield to screen the movement against magnetic interference, the dial being an integral part of this soft iron cage,
- a stainless steel waterproof case with the crystal secured by a screwed ring to prevent it detaching from the case during sudden depressurization, and
- a black dial with luminous markers and hands (the Mk VII and MK. VIII originally had white dials and were not luminous until later re-dialing).

For the RAF astro-navigation remained essential for only 15 years, until the 'Consol system' of military radio beacons, which almost entirely covered the northern hemisphere, was established. Ironically, the name 'Consol' derives from a set of radio beacons set up by the *Luftwaffe* in WW II to provide a cross pattern of beams as a navigational aid for its long range sea reconnaissance aircraft over the Atlantic and the Bay of Biscay.

Much to the surprise of the *Luftwaffe* those radio beacons were never jammed as they were used by the British Coastal Command to hunt German U-Boats.

For the RAF, after introduction of the Consol system astronavigation was only used as a back-up in case of technical failure or jamming.

Consol was not available in the southern hemisphere. Accordingly the Air Forces of Australia, New Zealand and South Africa continued to rely on astro-navigation much longer and continued buying Mk 11 watches for their aircrews. BOAC, the forerunner of BA, bought Mk 11 watches to allow its crews to use astronavigation on intercontinental flights.

Most collectors rack their brains as to what the origin of the term 'Mk 11' was. Originally all clocks designed for mount-



Mk 11 watches were also used by other Allies Air Forces. 'RAAF' denotes Royal Australian Air force and 'RNZAF' the Royal New Zealand Air Force.



Mk 11 used by BOAC.

ing in the instrument panel and which were fully interchangeable with one another because of identical flange dimensions, fixing holes, etc, were classified by the RAF as having the same Mk designation regardless of the manufacturer. The 'Mk' classification was applied to pocket and wristwatches in the late 1930s and different manufacturers met the same specification. In the case of wristwatches this applied to the MK VII (6B/159), Mk VIII (6B/234) and Mk 11 (6B/346). At the end of WWII the RAF switched from Roman to Arabic numerals before, in the late 1950s, abandoning the 'Mk' classification. Later watches like the 6B/542, supplied by OMEGA and SMITHS, were not referred to by a 'Mk' designation.

The Mk 11 was introduced into the Royal Air Force (RAF) and the British Fleet Air Arm in November 1949, and into the Royal Australian Air Force (RAAF) in August 1950. The RAF bought watches from both the INTERNATIONAL WATCH COMPANY (IWC) and JAEGER LECOULTRE (JLC). But after having bought about 2,000 from JLC in 1949 the RAF decided to buy only IWC from 1949 to 1953, when the last RAF orders were placed, totalling

at least 7,400 IWC watches. The RAAF initially bought its Mk 11s from JLC; 420 in 1950 and 600 in 1953. It then changed to IWC in 1957, buying another 600.

Little is known about the number of watches shipped to Air Forces of other Commonwealth countries like the Royal New Zealand Air Force (RNZAF) and South African Air Force (SAAF). Likewise the number of watches bought by civilian airlines is unknown.

Sales Figures

A comparison with the figures from the files of both JLC and IWC is enlightening. Four batches of JLC Mk 11 (Ref 161) have been identified totalling 2,950, with 2920 recorded as sold (against 3020 above). This leaves only the movement numbers of the very first batch of 100 watches as yet unidentified. Research in the files of IWC has been somewhat more difficult, but more than 8,000 individual movement numbers have been identified as military issue Mk 11. Taking into account, that RNZAF, SAAF and BOAC purchased Mk 11 as well, and the RAF had a derivative of the Mk 11, the 10AF/807, as a rough estimate some 600 additional movement numbers await confirmation in IWC records as Mk 11.

Herstmonceux

When the Mk 11 was introduced into the RAF, the Maintenance Units on individual airfields serviced and repaired most of the instruments unaided. This included all 'General Service' watches. In 1949 the RAF transferred service and repair of navigational watches to the Chronometer Workshop of the Royal Greenwich Observatory in Herstmonceux, which had the most experience with high-precision time pieces within the British Armed Forces.

Initially the Chronometer Workshop itself conducted only acceptance tests for newly delivered Mk 11. The decision was made that service and repair of the Mk 11 should not be done by the Chronometer Workshop itself nor outsourced to well-known watchmakers. Instead an unusual arrangement was made: the *Instrument Manual - Navigation Instruments* states that all Mk 11 had to be repaired and maintained by manufacturer only:

"... In the event of a watch having been dropped or otherwise mishandled, it must be returned to Stores and sent to manufacturers for test, as facilities for checking to the requisite standard will not be available at Service units.

Owing to the special features of this watch, arrangements have been made for all repairs to be undertaken by the manufacturers. Under no circumstances must the back of the case be removed at Service units."

In the case of the RAAF, some coordination difficulties occurred when the first watches were shipped to the squadrons because the relevant instrument manual that gave instructions for use and handling was not yet amended. The RAAF depot that was responsible decided to give informal advance information to the squadrons to prevent damage caused by over-eager curiosity, thus giving an interesting insight regarding the language in the RAAF.

"By way of advance information I am sending you a copy of letter No. 29868 [an abridged version of the drafted amendment to the Instrument Manual] which was sent to Areas yesterday on the issue and care of new Mk. XI Wrist Watches G6B/346.

These watches are already on the way to you people and would no doubt arrive before the instructions from the Area, so it was considered best if you received the guff in time to prevent pilots grabbing the new watches or the instrument or other characters from taking the backs off to see how many jewels are incorporated in the movement.

Armed with the attached official letter you will be able to direct the watches into the correct channels and ensure that they are properly cared for until the official area screed arrives."

After becoming acquainted with the Mk 11 in the early fifties, the Chronometer Workshop of the Royal Greenwich Observatory took over servicing and maintenance of the Mk 11 itself, outsourcing some of this task to local watchmakers. This led to the strange situation of a naval institution spending



The Mk VII (6B/159) preceded the Mk 11 and was supplied by many manufacturers. In 1956 all those still in service were recased in stainless steel and fitted with black dials and luminous hands.

more than 80% of its capacity on the maintenance and repair of Royal Air Force watches. In Australia two local service agents did service and maintenance of the Mk 11. After maintenance each watch underwent a 14 days rating in 5 positions and at least two temperatures and further tests to ensure the case was hermetically sealed before being stored in a box that was labelled with the date of the inspection and the results of the test. After 12 months at the latest each watch had to be returned as 'time expired', whether or not it had been issued for active service or just remained in store. Later this interval was extended to 18 months.

The watch had also to be sent back to Herstmonceux if there was deviation outside the specifications. No other watch of the Royal Air Force had such stringent requirements and such tight maintenance cycles.

According to regulations in the *Scales of Royal Air Force Equipment, Appendix Watches – Scale of Personal Issue*, the Mk 11 was reserved for issue to aircrew officially designated as 'navigator' and employed on flying duties (except those attached to maritime reconnaissance squadrons, to whom another watch was issued). In case more Mk 11 were available than necessary to equip the navigators, the Mk 11 could also be issued to officers of the GD Branch, which means officers employed on flying duties. Consequently only the navigator, the captain and the first pilot were equipped with Mk 11 watches.

Pilots not equipped with the Mk 11, air engineers and meteorological observers received navigational wristwatches, Mk.

VII (6B/159) or, from 1953 onwards, navigational wristwatches 6B/542. However, neither the 6B/542 nor the 6B/159 reached the high standards of the Mk 11, although the 6B/542 originally had a magnetic shield and the 6B/159 received an improved case in 1956 when all remaining 6B/159 had been re-cased. All other aircrew received watches classified as 'General Service' e.g. 6B/234.

Military Markings

The meaning of the military markings on watches is often not known to collectors. For the Mk 11 special rules for storage, accounting and marking applied as it was classified as 'Valuable'. In detail three requirements applied:

First each watch had to be marked on dial, case and movement with the symbol of the British Crown: the Broad Arrow (↑). This clearly marked it as government property.

Second, the Store Reference Number had to be placed on the watch. All types of RAF equipment from pencils to teapots were specified by a such a number. The reference number consisted of a combination of numbers and letters, followed by a number after a slash. In case of the Mk 11, the number is 6B/346. The '6B' showed the watch as 'Aircraft Navigation Equipment, Accessories and Unit Servicing Parts'. The '346' was the result of chronological numbering. For example 6B/249 described an 'Air Mileage Unit', 6B/250 stood for a 'Navigational Computer ICAN Calibration' and 6B/251 referred to 'Pencils red and green combined, Navigators use only'.

According to the third rule each watch required an individual serial number. This

comprised a chronological number, followed by the order year after a slash. For example the number 2294/52 referred to the 2294th watch from 1952. Contrary to the assumption of most collectors these markings were not made by the RAF but were stamped by the manufacturer. This explains why the markings of the Mk 11 from IWC and JAEGER-LECOULTRE differ in style. This is also the reason why the first series of Mk 11 shows markings referring to 1948, although the watches were shipped to England no earlier than July 1949. The year given on the back is the year of the relevant order.

The RAAF did not request a broad arrow on the dial, and the initial JLC watches were marked only on the back with the broad arrow, as government property. In addition a 'G' and a dot was added in front of the British Store Reference Number, resulting in a G.6B/346 on the case back and a serial number of up to three digits without reference to a year. The 1953 JLC purchase retained the 'G6B/346' (without the dot), and placed an 'RA' and 'AF' on either side of the broad arrow adding the extension '/53'. In 1957 there was no dot, broad arrow, or 'RAAF', just the extension '/57' (for the year) added to the three digit number.

Appearance of the Mk 11

The appearance of the Mk 11 for the period of its military use did not depend on the manufacturer or the individual user but was specified in detail by the RAF. These specifications changed over time to further improve the watch. These changes were listed in the 'Mods-list'. Some of these changes were minor; like



Examples of the military markings on Mk 11 watches. The arrow denotes Government Property, 6B/346 refers to a watch meeting the Mk specifications. The lower number is a serial number followed by the two digit year in which the order was placed with the manufacturer.



Dial variations on the Mk 11: a, the original RAF dial used between 1949 and 1952. Often referred to by collectors as 'White 12'. b. RAF design between 1952 and 1963, the 'No T'; c. RAF dial post 1963, the 'Encircled T', referring to the Tritium activated luminous dial. This example has the 'Hooked 7' and is quite rare but its precise period is unknown; d, the so called 'white dial', all examples we have seen are brass, depriving the movement of the MoD specified magnetic shielding.

replacement gaskets, while others were substantial changes, e.g. dial design. The modifications were effected during next service and thus within 12 to 18 months all changes were implemented.

Dials

Most obvious were the modifications of the Mk 11 dial (see page 10, January *HJ*). While its first version, introduced in 1949, had all numbers from 1 to 12 printed on the dial, it also had 4 rectangular luminous markers at 3, 6, 9 and 12. The 12 was additionally marked by 2 dots next to the rectangle. The hands were long and narrow. But the original dial proved to be difficult to read under unfavourable light conditions, so in 1952 the design was changed "to improve clarity of presentation" to the dial known today: the luminous triangle at 12 o'clock replaced the figure '12' and a shorter, thicker, hour hand was introduced.

Later the Ministry of Defence (MoD) became aware of the potential health danger of the Radium-based luminous compound and this led to the introduction of Tritium-based luminous material. From 1963 the use of Tritium is indicated by T on the dial², almost invariably the T is surrounded by a circle. The encircled T appeared only on RAF dial versions as the RAAF and RNZAF did not request it.

Bracelet and Strap

Special requirements applied to straps. They should be long enough to allow

2. **John Griffiths**, Curator of Prescot Museum, who serviced these watches as a watchmaker at Herstmonceux, recalls that these were original dials modified by WATCH DIALS OF BURFORD in Oxfordshire. They were not marked 'International Watch Co'. The authors of this article are not aware of any such dials.



The woven nylon NATO strap (left). The watch held in the looped section. The stainless BONKLIP bracelet. The stainless steel 'Bonkclip' bracelet is shown open and closed.

wearing the watch over a flying suit and also normally on the wrist.

Originally all Mk 11 came on a stainless steel BONKLIP bracelet (6B/2763). Due to its patented construction, it could be closed at different positions that allowed it to be fixed at variable lengths. BONKLIP bracelets were fixed permanently to the lugs so they could not detach accidentally from the watch.

The *Vocabulary of Royal Air Force Equipment* has the surprising comment: "To be fitted only by The Royal Greenwich Observatory", which meant that the watch had to be sent to Herstmonceux for a simple change of the bracelet.

In 1954 a nylon strap (6B/2617) was

introduced to replace the BONKLIP. Those nylon straps were designed as a two-loop system that prevented the watch slipping off accidentally. As the band was very long, its length could be varied easily: When wearing directly on the wrist the longer part was just flipped and put back under the flap. But obviously the BONKLIPS had their advantages, as they were re-introduced in 1956, allowing the BONKLIP and the nylon strap to be used alternatively. Unlike the 6B/159 a leather band was never issued for the Mk 11³.

Decommissioning

The JAEGER LECOULTRE Mk 11 went out of service before 1963 as no JLC Mk 11 is known with the T (encircled or not) on its

dial. Presumably they were used as war reserve and just not maintained anymore. This might have been due its lack of shock protection and less favourable serviceability.

The RAF decommissioned the IWC Mk 11 in 1981, but its successor had already been introduced in 1973 and since 1973 the Mk 11 had been issued only as 'navigator's watch secondary type'. The RAAF downgraded the Mk 11 in 1971 from its status as 'navigational wristwatch' to 'General Service'. In 1984 the Ministry of Defence sold the RAF Mk 11, together with a number of other mechanical watches, in surplus stock auctions.

Other Variants

Besides the military dial versions, non-military versions exist. Among them are the so-called 'white dials'. These differ considerably from the MoD specifications, which required black dials. The white dials did not provide the legibility required by the MoD, lacking the four luminous batons, having a white seconds hand which was difficult to see against white dial and not having the short thick hour hand which could be clearly distinguished from the minute hand.

The label 'International Watch Co.', slightly inexact in printing, is written in two lines and the Broad Arrow is missing. The same dial exists also in black, although in smaller numbers. To our knowledge, all of these dials are made of brass and thus do not provide the magnetic shielding required by the MoD specification. These dials are not original dials, but were produced later on.

From different sources it is known that in 1984, when the MoD sold its Mk 11 watches, some batches were sold without dials. The dealer who bought most of those watches had dials made to replace the missing ones and chose black and white versions to provide variety.

IWC also sold genuine civilian Mk 11 watches. Two batches of 500 pieces each have been identified from 1973 and 1983 and are easy to distinguish from the military ones by the 7-digit case-number stamped on the case back. Furthermore civilian navigation wristwatches of BOAC

3. Researchers are commonly plagued by inconsistencies between the recollection of people involved and documentary evidence. **J G** says that the RAF were aware of the problem of nylon melting into the skin exacerbating injury in a fire and that he saw Mk 11 watches fitted with long leather straps in store. His colleagues at the time, **Robin Thatcher** (now a horological restorer) and **Burt West**, say long leather straps were in store but neither recall seeing any Mk 11 watches fitted with them. NATO straps are available from LBS in Essex, tel: 020 8551 4499.

are known. These have no military markings, but are marked 'B.O.A.C. PROPERTY' and the serial number of the movement is given on the case back (see January p.11).

In addition, civilian versions exist from the fifties that show neither IWC case numbers nor military markings; although IWC has never commented on the existence of such watches. Civilian versions of the JAEGER LECOULTRE Mk 11 do not exist.

Fakes

To produce and sell fakes will become more difficult in future. Fakes of the JAEGER LECOULTRE Mk 11 are extremely rare, as the calibre used in the JLC Mk 11 was only used for these military watches. The movement cannot therefore be taken from a less expensive civilian watch and good watchmaking skills are needed to produce JLC fakes. The well-known method of upgrading a civilian IWC calibre 89 movement by engraving the broad arrow on the centre bridge will come to an end because the movement numbers of the military Mk 11 are nearly all known and a previously undiscovered number can easily be checked, when a certificate of authenticity is applied for. With the knowledge of numerous details concerning cases and movements, fakes and watches assembled from original parts can easily be distinguished from authentic watches.

Man is not Lost

Our title 'Man is not Lost' needs to be explained. This is the last sentence in the Royal Air Force *Manual of Air Navigation* (1941 edition). This book describes astro navigation in detail for the first time in an easy and practicable form for aircrew. It started the period of astro navigation for military and intercontinental flights; the



time of the Mk. 11, the first watch of British Armed Forces designed especially for astro navigation and therefore the legitimate airborne equivalent of the marine chronometer.

Acknowledgments

We owe thanks to IWC and JLC for their contributions, and especially to **Juergen King**, head of the IWC Museum, who literally spent days in the IWC archives determining any inconsistencies with IWC records, researching our clues and identifying more than 8,000 individual Mk 11 movement numbers. We further owe thanks to **Craig Pearce** of New Zealand, who helped open up the complex RAF and RAAF archives. Last not least it is a duty we bear happily to acknowledge the help and contributions provided by the Royal Observatory, the Royal Air Force Museum, the Royal Australian Air Force Museum, the Royal New Zealand Air Force Museum, and the Public Record Office and National Archives of Australia.

Editor's Note: I am grateful to both **John Griffiths** and **Robin Thatcher**, former watch-makers at Herstmonceux, for their comments.

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Cover:

In a two part article commencing on page 9, the navigational problems faced by the RAF during World War Two, especially during night raids, are outlined. Astronavigation depended on the aeronautical equivalents of the sextant and the marine chronometer. Reliable timepieces for use in aircraft were not in fact available until 1949 when both Jaeger-LeCoultre and the International Watch Co produced wristwatches meeting the RAF Mk 11 specifications.

Our covers show examples from both Swiss manufacturers. On the front cover an 'RAF Navigational Computer Mk III 6B/250', one of the devices needed for aerial navigation, is in the background and on the back cover is a contemporary advertisement. Matters of detail are all important to collectors. The JLC on the back is RAAF issue of 1953 on a NATO strap but its hands are in the 1948 style. Its IWC partner has a 'Bonklip' bracelet and post 1963 dial and hands (1952 dial on front cover). These examples differ in minor dial markings. Case markings are also a matter of interest and these will be dealt with next month in the final part of the article.

Official timepiece of the R.A.F. & R.N.Z.A.F.

INTERNATIONAL

WATCHES

