

# HISTORICAL SNAPSHOT

## THE OTHER OPERATION ECLIPSE OF 1945



### The RCAF CAPTURING CELESTIAL BODIES Over MANITOBA



Aircraft on special detachment at RCAF Station Rivers, MB, as camera ships for Operation *Eclipse* included Anson VP s/n 12128, Mitchell II (F-10) s/n 894, and Spitfire X4492 of No 7 (Photographic) Wing. A second Anson VP was apparently also present with cinematic equipment aboard to record the airborne activities of the others. The photographic record also confirms the presence of a second Mitchell II/F-10, which may have had a backup camera ship role. The officers in the second photo appear to be examining the results of a strip recording graph, or some similar chart, after the event. The photo was reportedly taken on 20 August, more than a month after *Eclipse*. Does anybody out there know more?

RCAF OFFICIAL photo via the TERRY HIGGINS collection (top) and DND photo RE-2880-15

MOST STUDENTS OF THE HISTORY OF THE SECOND WORLD WAR WILL RECOGNIZE OPERATION *ECLIPSE* AS A MAY 1945 STRATEGIC MOVE BY HER ERSTWHILE ALLIES TO DETER THE SOVIET UNION'S DESIRE TO OCCUPY MORE OF NORTHWESTERN EUROPE THAN AGREED TO AT YALTA. *Of course, the reality of that multi-pronged operation is much more extensive and nuanced than this simple statement – but that's another story.*

*A much smaller, less well-known Operation Eclipse, executed by a small contingent of RCAF specialists, sponsored by the Canadian Radio Wave Propagation Committee, and planned by Dr. Peter Millman of the Dunlop Observatory, occurred on 9 July 1945. According to NASA Ames Research Center historian Wendy Whiting Dolci, "although the focus of this expedition was not strictly astronomy... it is a good illustration of the technology that was in use [for airborne eclipse observation] during the 1940's."*

*The RCAF managed to score a few "firsts" during Eclipse, which is surprising, given the fact that its own records indicate an inexplicably passive attitude towards the operation.*

*by Terry Higgins*



## The Event

In the 5 November 1945 issue of the well-known magazine, *Life*, the Science section editor noted:

*On July 9 the shadow of the moon flicked across the earth and people in the middle of its path saw a total eclipse of the sun. The central shadow touched the earth at dawn in Valley County, Idaho, sped across Montana, Canada, Greenland, Norway, Sweden, Finland and the USSR at an average speed of 3,000 mph [4,828 km/h]. ... It was the first total eclipse in the US since 1932 and the last before 1954.*

The article – more a captioned photo essay than a scientific/technical narrative – then went on to list the places along its path where both professional and amateur astronomers set up station to witness and record. Although a fair number of observers did have some success in photographing the event here in North America, substantial cloudscapes – the bane of any eclipse observer despite the often beautiful dramatic effect – made for less than optimum results. One particularly elaborate and expensive ground observation site set up at Bredenburg, SK, was rendered completely ineffective due to the heavy cloud cover in the area. At the other end of the spectrum, the RCAF operation produced valuable scientific results. Staged out of RCAF Station Rivers, MB, it was the only 9 July 1945 effort to use aircraft to take the cameras above the clouds.

## Nothing but Clouds Above

Writing of the event in the March 1946 edition of *The Journal of the Royal Astronomical Society of Canada* (RASC), participating scientist Alfred E. Johns provides a lucid narrative of the Bredenburg team's high hopes after a week of rain clouds miraculously cleared on the night before the eclipse was to put on its half minute show. But, on the morning of, dark and ominous cloud reappeared "in the north-east and slowly swept southward.... All the months of planning, all the gathering of equipment, all the weeks of long days and short nights, all the expense, had yielded nothing – absolutely nothing." Back at their hotel eating breakfast by 9:00 am, the miracle resumed with fully clear skies above!

One can almost hear the bittersweet tone in the "Notes" section of his paper, where Johns describes a series of slides projected by S/L Heard, Dunlap Observatory Astronomer and Instructor in Navigation at Rivers, at the RASC 1946 Annual Meeting. Oddly enough, S/L Abrams, the RCAF navigator charged with selecting the Bredenburg site months before, is not mentioned in the list of project personnel at the end of Johns' paper, where all six Army Engineers on the team, plus one of their wives, were! A coherent account of the RCAF effort proved difficult to find elsewhere as well.

## And Clouds Below

While a few less well-equipped parties on both sides of the border, exemplified by those at Pine River, MB, and Wolseley, SK, did manage observations of some kind, the most significant record of the relatively rare event was produced by the RCAF's Operation *Eclipse*. Details of the bureaucratic machinations that surely must have preceded the 9 July operation by months could not be readily discovered. However, the mission itself seems to have gotten a fair amount of coverage in the astronomy publications realm of the time. It should be noted here that this was in contrast to the fleeting, almost nonexistent documentary record of *Eclipse* in any of the relevant RCAF Operations Record Books (ORBs) examined by this author. The scarcity was even more surprising in light of the number of photographs extant – enough to indicate a substantial public relations treatment may have been in the offing at Rockcliffe, home of the RCAF Photographic Establishment, under which No 7 (P) Wing and its participating flying squadrons, Nos 13 and 14, operated.

The astronomy and more general scientific community focussed their contemporary publication efforts on the subject – eclipse phenomena – while the aviation press of the



Cameras used for the RCAF operation were two Williamson F.52s, four Williamson F.24s, and a single Fairchild K19, as shown here in a display put on, reportedly on 19 July, by the RCAF Photographic Establishment at Rockcliffe. The Anson's typical equipment – a single F.24 (early) or OSC (late) vertical survey installation – was not used for *Eclipse*. Instead, a pair of "side looking" cameras, one F.24 and one F.52 were used. The Mitchell likewise did not use its usual nose-mounted trimetrogon rig on the mission. Instead, a pair of F.24s plus a single F.52 and K19 were arranged on specially-built side-looking mounts in the nose and rear compartment of the larger aircraft. A single, short-lensed F.24 was used in the Spitfire. A cine camera was reported to have been used in a second Anson (possibly VP, s/n 12130?), more to record the mission than the eclipse, but no additional detail on this could be discovered.

DND photo RE-2880-1



the TERRY HIGGINS collection (middle) and DND photo RE-2880-7

Above: Operation *Eclipse* also included a period of training and equipment preparation at Rivers before the actual event on 9 July. Mitchell 891 provides the backdrop for this crew photo, which includes Peter Millman, the tall gentleman standing on the left, an erstwhile wartime RCAF navigation instructor, temporarily back in uniform for the occasion (ostensibly as Operational Research Officer, RCAF Headquarters, Ottawa). Spitfire X4482 and Mitchell 894 are visible in the background.

Left: 894, the Mitchell actually used as camera ship on *Eclipse* day, with a larger contingent of participants in one of the series of photos taken after the fact.



day seems to have largely ignored it. Even a search through the early issues of the RCAF's own *Roundel* magazine came up zilch. While only scant *en passant* reference to the aviation aspects of *Eclipse* could be gleaned from the bulk of period popular and academic scientific publication on the subject, one exception was found in a very comprehensive paper, published in the September 1945 edition of *Sky and Telescope* magazine. Fortunately for us (aviation history types), its author, Dunlap Observatory Astronomer Peter M. Millman, had the rare distinction of being both scientist and RCAF officer. One can speculate that the fact he functioned in both disciplines and spaces (science and military) most probably played a key role in the realization of the RCAF operation.

#### As Told by an Astronomer / Navigator

Millman's paper, which was published in its entirety in the American magazine, provides the following clear overview of the aviation aspect:

*During the week prior to the eclipse, a number of test runs were carried out over the eclipse route, test exposures with all cameras being made through neutral density filters... On eclipse morning it was clear at Rivers before dawn, and all planes took off on schedule shortly before 6 am. The route of the Spitfire, piloted by F/L T.M. Percival, lay due north to a landfall at about 52.5° N, 100.5° W. Fortunately, visibility was good and ground marks could be easily identified. The Spitfire operated between 33,000 and 34,000 feet*

*[10,000 and 10,400 m], the thermometer going off the bottom of the scale at - 60° F [- 50 C]. A timed run south from landfall was carried out successfully, and 14 spectrograms, showing both coronal and chromospheric lines, were secured during the totality.*

*The Anson operated at 17,000 feet [5,200 m] in the region near 51° N, 102° W. It was piloted by S/L G.E. Cherrington and navigated by S/L J.F. Heard (on leave of absence from David Dunlap Observatory). During totality, 16 direct photographs of the corona were made with cameras X [F:52] and Y [F:24].*

*The Mitchell was piloted by S/L J.A. Wiseman, AFC, with the writer as navigator. On the flight northwest a stratocumulus layer was encountered between 7,000 and 9,000 feet [2,100 and 2,700 m], and all sight of the ground was lost 10 minutes after leaving base. It was decided then to use radio navigation and carry out a timed run from radio station CJGX at Yorkton. We entered a thin haze layer at 26,000 feet [7,900 m] and were still in it at 28,000 feet [8,500 m]. Top of the haze seemed to be above 30,000 feet [9,100 m], so it was necessary to come down to 26,000 again which complicated the navigation appreciably, since the final run had been computed for slow speed in climbing altitude [sic, this should probably read "attitude"]. With a strong tail wind, the actual run across the path of the totality was made at a ground speed of about 250 mph [400 km/h]. Temperature was near -40° F [-40 C], and a bit of frost appeared on the window of the nose camera, but was cleared with alcohol. The twin spectrographs and one direct camera were in the rear and their windows were perfectly clear. In the Mitchell, 21 spectrograms and 13 direct photos were obtained with the four cameras (the shutter in A [one of the F:24s] failed on one exposure during totality). As all crew members were fully occupied with the operation of the cameras and aircraft, no detailed visual observations were made.*



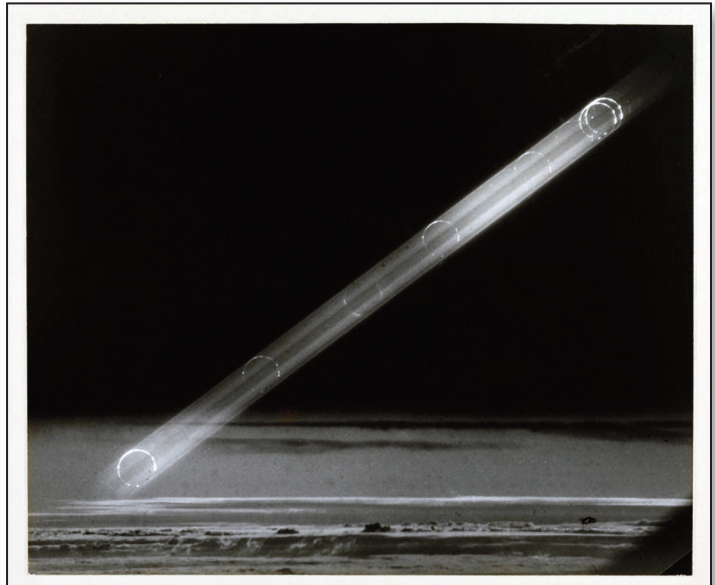
Mitchell 894 is seen at Rivers with its *Eclipse* crew, of which only the names of the pilot, S/L Wiseman, AFC, and navigator, S/L Millman, could be positively determined from available references. Details of the *Eclipse* camera arrangement in this aircraft were given in the Millman paper reproduced in part on this page, but unfortunately this author's copy was incomplete (missing pages that would have provided other details) at the time of writing (November 2018). However, the bulk of one camera, probably the heater-blanket covered K19, can be seen behind a modified port-side glass panel in the nose of 894. This is more clearly visible in the close up photo at the bottom of page 127.

Spitfire Mk.V X4492, piloted by F/L Tom Percival, carried only one camera, a modified F.24 aimed obliquely upward, for this particular mission. Note the special "Eclipse July 9, 1945" inscribed emblem adorning the cowling of the Spitfire. A different emblem, similar in design to that seen in close-up on the Mitchells, but without the No 13 Sqn inscription, was also present on the opposite side in this approximate location.

RCAF OFFICIAL photo via the TERRY HIGGINS collection (top) and DND photo RE-2880-15

Other parts of Millman's story describe the technical details of the cameras and films used, including special optical filter fixtures fitted to the lens barrel of each camera and the specifics of their purpose. The difference between "spectrograph" and photograph are also reviewed. Back on the actual aviation

*text continued on page 130*



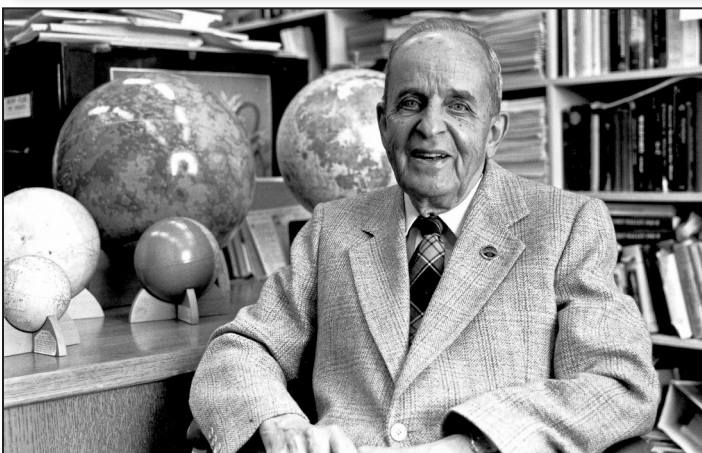
Results: These three photographs were those presented in projected slide form by S/L Heard at the Annual Meeting of the RASC mentioned in the text. That on the left above was described as a “flash spectrum at beginning of totality” photographed from the Spitfire at 33,000 feet near Lake Winnipegosis, MB. At right, above, is the “spectrum of totally eclipsed sun” photographed from Mitchell 894 at 26,000 feet near Yorkton, SK. That on the left illustrates the “corona near mid-totality” in a photo from one of Anson 12128’s cameras 15,000 feet (4,600 m), also near Yorkton.

RASC / RCAF photos



This relatively early-service picture of Mitchell 891 is interesting for several reasons. First off, it is only one of two photos of this particular RCAF survey Mitchell that this author has seen within which the aircraft retains its original USAAF F-10 nose. The official caption indicates that it was taken “over the Yukon near Selkirk... from 893 on 14 July 1944.” The presence of the original nose indicates that the nose cross-section changing Canadian-specific conversion of this aircraft’s trimetrogon camera installation, reportedly produced at No 6 RD, did not take place immediately after 891 was TOS No 7 Wing in the spring of 1944. The other point of interest is the unusual finish on the wings. An *Aeroplane Spotter* account of *Eclipse* noted that the Mitchell had “a broad orange band painted on the upper surface of the wings” to aid the Spitfire pilot maintain visual contact with it. This makes one wonder if perhaps all four of the RCAF photo survey Mitchells had this novel feature from early days, or if the two machines at Rivers were specially refinished for the mission, in which case the official caption for this photo may be incorrect. Whatever the case, the stark contrast of the photo suggests a darker colour – most probably black – borders the orange on each wing.

DND photo RE-1741-5



Dr. Peter MacKenzie Millman (1906-1990), seen here during his busy retirement in the 1980s, was the initiator of RCAF Operation *Eclipse*. According to Donald J.C. Phillipson and Nathan Baker in *The Canadian Encyclopedia*, Millman was also “one of the 20<sup>th</sup> century’s leading experts on meteors... and “has been called ‘the father of Canadian meteoritics’. He was an astronomer at the University of Toronto (specifically its David Dunlap Observatory) from 1933 to 1941. During the Second World War, he served in the Royal Canadian Air Force. After nine years at the Dominion Observatory in Ottawa, Millman transferred to the National Research Council (NRC) in 1955 as head of upper-atmosphere research. In 1986, he was awarded the title of researcher emeritus at the NRC.” Thanks to Millman’s initiative, the RCAF went on record as the first organization to record an eclipse on film using aircraft at such high altitudes. One of the Spitfire photos is on record as having been taken at 34,000 feet (10,300 m). Further details on Millman’s life can be found at <https://www.thecanadianencyclopedia.ca/en/article/peter-mackenzie-millman>


NRC photo





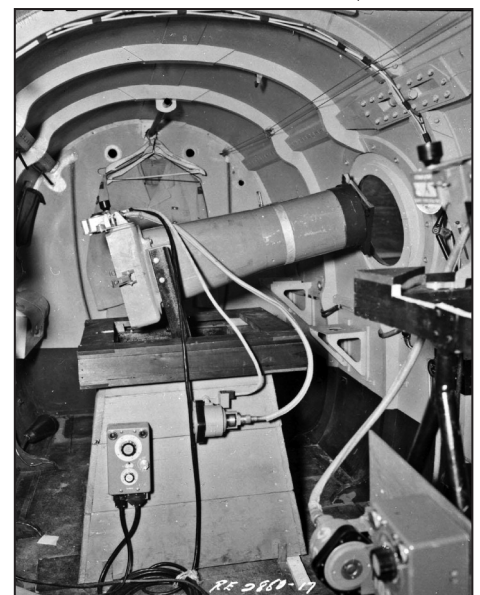
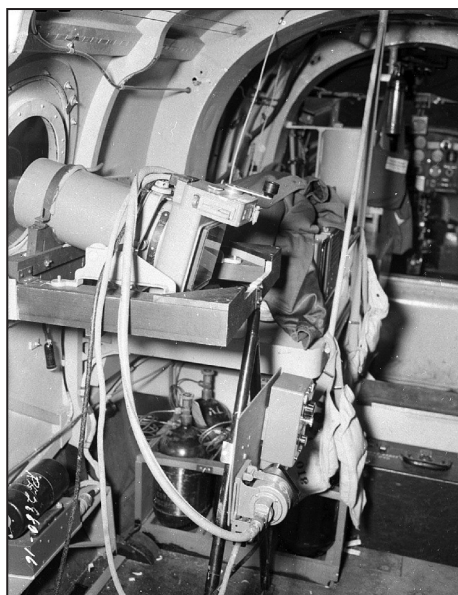
side of things, the methods of aiming the cameras – or more to the point, aiming the aircraft so that the cameras were pointed in the right direction during the 33-38 seconds of totality – were also outlined.

Interestingly, both Anson and Mitchell navigators were dually qualified Observatory astronomers and RCAF navigators but it is not known if Heard played as big a part in organizing Operation *Eclipse* as Millman did. If he did, nothing found to date informs us of his involvement.

The No 13 Sqn Mitchells and No 14 Sqn Ansons present at Rivers were both in western Canada on Photo Survey Detachment assignments. Millman had coordinated everything so that they were stationed at Rivers – home of the Central Navigation School where both he and Heard had instructed as navigators (full time, part time, who knows?). The Spitfire, on strength with the parent unit of both squadrons, No 7 Wing headquartered at RCAF Station Rockcliffe, ON, was flown in for the operation. One of the things that made ORB-level research so confusing for this exercise was the fact that all aircraft were, in fact on the books with the Wing, and not the squadrons. However, No 13 operated the Wing's Mitchells at the time while No 14 operated the Ansons, while Percival was a No 13 Sqn pilot. Post *Eclipse*, all actors and aircraft appear to have gone back to their prior jobs with the possible exception of a series of photos – some of which are used here – taken in a later session (or two?) by the RCAF to mark the occasion. Some of these are reported to have been taken on 20 August, while others cite 19 July. However, these dates may be when they were made available. This seems more likely. The next RCAF Op *Eclipse* nine years in the future would prove almost equally as elusive from a purely aviation history point of view. 

In its regular "Spitfire Notebook" column, the 7 September 1946 edition of *The Aeroplane Spotter* magazine erroneously gives the number of images made by the Spitfire as 49 (Millman gives a more believable 14) and does not even mention the Anson. This is but one example of the press of the day getting some detail or another of the operation not quite right. The detail given for Spitfire X4492, however, was spot on, noting its history as a former RAF reconnaissance "Spitfire Type F" – essentially a Mk.V modified for recce work. It had entered RAF service with No 1 Photographic Reconnaissance Unit (PRU) on 29 November 1940, and was modified with a Merlin 45 installed by Rolls-Royce at Hucknall in April of 1941, before being returned to service at Benson. It was operated by the PRU from that base until 9 February 1942, after which it was crated for shipment to Canada. The short piece also notes that "F/L Carr [later, BrigGen William Carr], one of the pilots of No 13 Sqn" had also flown this very Spitfire on operations when he was at Benson on overseas deployment. X4492 was one of three ex-RAF Spitfires shipped to Canada as a research aircraft, needed to flight test a new type of 36 inch telephoto lens made in Canada and to assess the performance of various types of strip cameras here. *Eclipse* was far beyond its regular duty as a test and development aircraft. Note the filter-covered lens-end of the F.24 visible through the plate glass modified hatch installed in the rear fuselage in this photo from the *Eclipse* series.

DND photo RE-2880-6



In keeping with Millman's meticulous planning, each camera used during *Eclipse* was assigned a letter which was also keyed to the film onboard. This photo shows cameras Y (an F.24, left) and X (an F.52, right) installed in Anson 12128, inclined and aimed to port. The F.24 is installed forward of the F.52 and it appears that the aircraft had to sacrifice much of its wireless equipment to accommodate the special set-up. Both cameras are without film magazines in these official documentary photos, but filters have been installed on their lens barrels.

DND photos RE-2880-16 and RE-2880-17