

The TWILIGHT ZONE

An important consideration when planning a VFR cross-country flight during winter is that there are fewer hours of daylight. In winter, there are approximately nine and half hours of daylight available, but this varies around New Zealand. It is not uncommon for the available daylight time to be further reduced by weather. For example, mist or fog can cause delays in the morning, leaving only the afternoon to achieve your flight during the day. In this situation if you do not have night privileges, it's important to know the Evening Civil Twilight for your destination aerodrome and plan to land at least 30 minutes before then; it gets dark quickly, and it is easier to secure your aircraft in daylight.

Daylight Zones

In AIP New Zealand GEN 2.7-1 to 2.7-7, daylight zones and associated tables are provided to assist in working out the Morning Civil Twilight (MCT) and Evening Civil Twilight (ECT) around New Zealand (Figures 1, 2).

A common misconception is that, during winter, the further south in New Zealand, the later the MCT and earlier the ECT. This is correct only for MCT. For example, on the shortest day (21 Jun), MCT is 0707 NZST in Zone 1 and increases to 0757 NZST in Zone 8. This means that dawn is earlier in the northern areas of New Zealand. For ECT, however, the times are 1740 NZST in Zone 1 and only 1741 NZST in Zone 8.

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Zone	JUN 7	JUN 14	JUN 21	JUN 28	JUL 7	JUL 14	JUL 21	JUL 28	AUG 7	AUG 14	AUG 21	AUG 28
1	1901 0540	1905 0539	1907 0540	1907 0542	1907 0546	1905 0551	1902 0555	1857 0600	1849 0607	1842 0613	1835 0618	1826 0624
2	1858 0523	1902 0523	1904 0524	1905 0525	1904 0530	1901 0535	1858 0539	1853 0544	1844 0551	1835 0558	1828 0603	1817 0610
3	1908 0530	1911 0529	1913 0530	1914 0532	1913 0536	1911 0541	1907 0546	1901 0551	1852 0559	1843 0606	1836 0611	1825 0618
4	1917 0526	1921 0525	1923 0526	1924 0528	1922 0533	1919 0538	1915 0542	1909 0549	1900 0557	1851 0603	1841 0610	1829 0617
5	1923 0536	1927 0535	1929 0536	1930 0538	1928 0543	1925 0548	1922 0552	1917 0559	1907 0607	1859 0614	1848 0620	1837 0627
6	1935 0533	1939 0531	1941 0532	1942 0534	1940 0540	1936 0545	1932 0550	1926 0556	1915 0606	1904 0613	1854 0620	1841 0629
7	1944 0535	1948 0534	1950 0535	1951 0537	1949 0542	1945 0547	1941 0553	1935 0601	1923 0611	1913 0619	1903 0627	1850 0635
8	1951 0542	1955 0540	1957 0541	1958 0544	1956 0548	1953 0554	1948 0600	1941 0608	1929 0618	1919 0627	1907 0634	1856 0643

Figure 1. The daylight tables detail the MCT and ECT for each zone (during winter) in Coordinated Universal Time (UTC). The top figure in each cell is MCT, the other figure ECT. New Zealand Standard Time (NZST) is 12 hours ahead of UTC during winter.

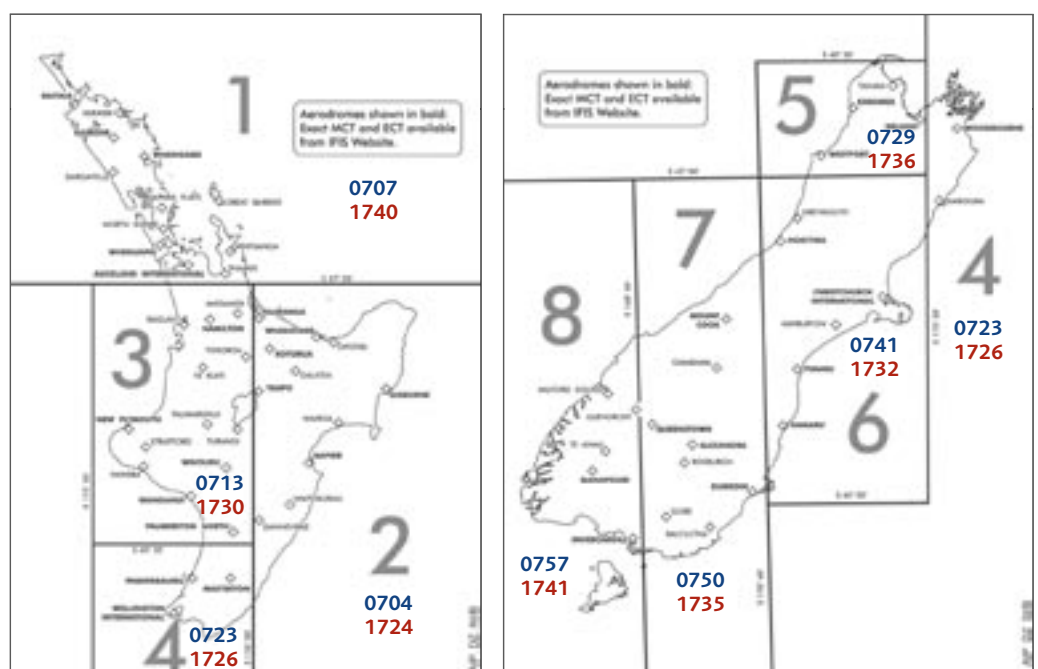


Figure 2. New Zealand has been divided into eight daylight zones for the purpose of simplifying the planning of VFR flights around the country. In our illustration of the daylight zones, we have superimposed MCT (in blue) and ECT (in red) in local time for 21 June.

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ECT varies longitudinally; western areas of New Zealand have a later ECT than eastern areas. For example, on the shortest day, ECT is 1724 NZST in Zone 2 and increases to 1741 NZST in Zone 8. This means that dusk is earlier in the eastern areas of New Zealand.

If you are planning a cross-country flight in the afternoon, then take careful note of the ECT of the daylight zone that your destination aerodrome is in. Remember that if you do not have a night rating, or you are not current to fly at night (refer to Civil Aviation Rules, Part 61 *Pilot Licences and Ratings*), then your flight is required to be completed during the **day**, ie between MCT and ECT (see Civil Aviation Rules, Part 1, *Definitions*). It is, therefore, prudent to check the exact ECT for your destination aerodrome, as it is slightly different for each aerodrome inside the same zone. For example, Gisborne and Taupo aerodromes are located within Zone 2, but ECT at Taupo occurs eight minutes after that at Gisborne.

To check the exact MCT or ECT at most New Zealand aerodromes, visit the IFIS web site, www.ifis.airways.co.nz.

In-Flight Considerations

During winter, the sun throughout the day is lower in the sky (in technical terms a lower solar azimuth). This can produce a variety of lighting conditions resulting from topography and cloud cover. For example, when flying in the mountains, deep



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shadows can occur in the valleys, making it difficult to see – especially in the early morning or late afternoon.

If you are flying in the late afternoon, in clear skies, you may not realise how dark it is getting on the ground, as it is lighter at altitude. This difference is exaggerated when flying around mountainous topography, as it provides further shading. For example, a pilot can be lured into a false sense of security when flying southwest along the West Coast of the South Island.

Figure 3. Lighting conditions at Forest Field aerodrome during June 2005



The photos on the left show the lighting conditions at Forest Field aerodrome 30 minutes before ECT. The photos on the right were taken at ECT.

Figure 4. Lighting conditions at Queenstown



As ECT approaches, the sky ahead and to the west is light (assuming limited or nil cloud cover), especially at higher altitudes. This provides a pilot with confidence that lighting will not be an issue. If, however, the destination is east of the Southern Alps (for example through Haast Pass to Queenstown or Wanaka), the pilot may find the lighting considerably different – it can be dark and intimidating for a landing on the valley floor. If cloud cover exists in these circumstances, the lighting conditions even 30 minutes before ECT can be quite dark in the valleys east of the Southern Alps.

The lower position of the sun can cause sun strike in the early morning and late afternoon. This can make it difficult, or impossible (especially if the windscreen is dirty), to judge the approach and landing on a runway which faces into the sun.

Cloudy days appear to get darker earlier than clear days. Figure 3 shows the difference in lighting in the late afternoon between a clear day and a cloudy day at Forest Field aerodrome (Canterbury Plains). The photo on the bottom left shows that on a cloudy day it is already beginning to get gloomy. In this situation, if the aerodrome had lighting it could be worthwhile having it switched on to assist you in navigating to the aerodrome.

During winter it gets dark quickly. Figure 4 shows a time series of photos at Queenstown aerodrome with the Remarkables Range in the background, counting down to ECT from 60 minutes before. At 45 minutes, sunlight breaks through the cloud, and the lighting conditions change on the Remarkables Range. Note the large change in lighting between 30 minutes before ECT and at ECT.

Conclusion

If you are planning a cross-country flight in the afternoon, then take careful note of the ECT for your destination aerodrome. You can check ECT by referring to the daylight tables in *AIP New Zealand GEN 2.7 - 1* or by visiting the IFIS web site, www.ifis.airways.co.nz. Remember that ECT occurs at an earlier time in eastern areas of New Zealand than western areas. Be aware that lighting conditions during a winter day (particularly late in the day) will vary significantly with topography and overhead sky conditions. These variables are why it is advisable to plan to arrive at your destination half an hour **before ECT**, to allow for flight delays and also to allow you to secure your aircraft in daylight. ■

This series of photos was taken at Queenstown aerodrome on 6 June 2005.