

Automation of aerodrome observations (METAR/SPECI) — frequently asked questions

Frequently asked questions:

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1. What is a METAR/SPECI?

A METAR is a routine report of meteorological conditions at an aerodrome. A SPECI is a special report of meteorological conditions, issued when one or more elements meet specified criteria significant to aviation. SPECI is also used to identify reports of observations recorded 10 minutes following an improvement in visibility, weather or cloud to above SPECI conditions.

For more information on METAR/SPECI, see www.bom.gov.au/aviation/data/education/metar-speci.pdf

2. What is the difference between an automated and manual METAR/SPECI?

Historically all observations in Australia, including those from key aerodromes, were taken manually by human observers. Over time, the Bureau has transitioned most of these observing sites to an Automated Weather Station (AWS). A basic AWS has meteorological sensors that measure temperature, dew point temperature, wind, air pressure and rainfall amount. At aerodromes, an AWS will commonly have additional advanced meteorological sensors that measure horizontal visibility, present weather and cloud.

The main difference between a manual and automated observation is that a manual observer can provide additional meteorological information in and around the vicinity of the aerodrome, whereas automated observations are typically a point observation (at or above the AWS). Human observations can have limited hours of operation and can be sensitive to human subjectivity, whereas automated observations are continuous and consistent.

For an AWS to estimate cloud cover over a larger volume of airspace, the system utilises an advanced Sky Condition Algorithm (SCA) that constructs a picture of the sky from a single source, the AWS. This is achieved

through a process of averaging and weighting of cloud observations from the cloud sensor (ceilometer) over a 30-minute period.

- The abbreviation AUTO will be included when the METAR/SPECI report contains fully automated observations. Example:

METAR YBRK 120630Z AUTO 15006KT 9999 -SHRA SCT033 SCT051 BKN060 24/14 Q1012 RMK RF00.0/000.0

- When a METAR/SPECI is produced with human input, AUTO will not be present in the message. Example:

METAR YBBN 120630Z 08010KT 9999 FEW032 SCT250 BKN290 26/18 Q1013 RMK RF00.0/000.0

3. Why does the Bureau need to automate METAR/SPECI?

The Bureau works to provide a high quality and responsive aviation meteorological service. Part of this commitment involves the regular review of our products and services, to ensure that we are meeting regulatory and safety obligations as well as the changing needs of the aviation industry, both within Australia and internationally. The Bureau must also consider new and improved technologies to support greater efficiencies and value for the aviation industry in Australia.

Automation of observations at all locations will ensure consistency in the performance of instruments and software. It will also enable the Bureau to focus on continual improvement of algorithms and the adoption of advanced technology.

4. What process did the Bureau undertake to introduce AUTO METAR/SPECI?

In 2018, the Bureau began trialling the use of enhanced automated observation algorithms at select airports as part of the Trial of Automated Observations at Cairns, Canberra, and Coolangatta (Gold Coast) (TAOCCC) project. One of the key objectives of the TAOCCC project was to establish the technical foundation for automating observations at all aerodromes, including the Capital City Airports (CCAs).

As part of the TAOCCC project, the Bureau ceased manual observations at Cairns and Canberra airports in 2019 and successfully implemented new enhanced automated observation algorithms at these aerodromes, as well as at Gold Coast (Coolangatta) and Coffs Harbour airports.

In June 2020, the algorithms were enabled at all Category (Cat) A airports in Australia, but with manual observations retained at CCAs to supplement the automated METAR/SPECI. In October 2020, the algorithms were enabled at all Cat B and Cat C aerodromes.

In December 2020, the Bureau moved to the higher resolution WeatherZone™ Total Lightning Network (WZTLN) for the thunderstorm/lightning information in automated observations, resulting in a marked improvement in the quality of lightning detection and therefore METAR/SPECI reports nationally.

5. How was feedback on the trial of AUTO METAR/SPECI considered and how was the decision to transition to full automation at all airports made?

The Bureau has firmly established consultative processes with representatives of the Australian aviation industry. A key consultation forum is the biannual Aviation Industry Services Working Group (AISWG). The purpose of this group is to discuss and endorse the meteorological services provided by the Bureau to the aviation sector, as well as initiatives aimed at supporting the aviation industry. The AISWG consists of representatives from the Bureau, airlines, other aviation organisations, aviation industry representative bodies, and relevant government representatives.

The outcomes of the trial of AUTO METAR/SPECI were presented at the AISWG in 2021, and the AISWG members endorsed the decision to transition to full automation at all airports.

6. Which aerodromes will be impacted by the transition to AUTO METAR/SPECI?

Automated capabilities, including new algorithms, were rolled out nationally to all aerodromes during 2020 and 2021. METAR/SPECI services at approximately 250 Australian aerodromes are already fully automated.

Manual observations continue to supplement automated observations at YPAD, YBBN, YPDN, YMHB, YMML, YPPH and YSSY but will transition to complete automation by 2027 as part of the Automation of Capital City Airports (ACCA) project.

7. What are the key benefits and limitations of AUTO METAR/SPECI?

Key benefits

- AUTO METAR/SPECI provide an accurate, highly reliable, real-time and continuous measurement of meteorological parameters using advanced algorithms
- Increased data availability and reliability through the installation of modern and fit-for-purpose automated observation systems and supporting infrastructure (i.e., aviation weather cameras, additional AWS and/or sensors)
- Improved automated lightning detection
- Improved data consistency through the application of uniform measurement standards and methods across the national observations network
- Performance of instrumentation and software is consistent, and the Bureau's focus remains on continual improvement of algorithms and adoption of improved technologies
- Compliant with ICAO Standards and Recommended Practices.

Key limitations

- Observations are from a single point of reference directly above the AWS, rather than by a manual observer making a wider assessment of conditions
- Sensors and algorithm are not able to determine partial fog (PRFG), fog patches (BCFG) and/or shallow fog (MIFG), and will report only as fog (FG)
- Will not report CAVOK in its messaging
- Will not report smoke (FU) but may report this as nosig, haze (HZ) or mist (BR) depending on the measured visibility and relative humidity.

8. Will the automation of METAR/SPECI impact other aviation weather products or services?

Aviation products and services will not be impacted by the transition to AUTO METAR/SPECI. Aviation products and services will benefit from the new observation systems and new technologies introduced to support the automation of aerodrome observations.

9. Will the transition to AUTO METAR/SPECI impact aviation safety?

No. The Trial of Automated Observations at Cairns, Canberra, and Coolangatta (Gold Coast) (TAOCCC) project, conducted in 2018, provided an opportunity for the Bureau and users to assess and identify any potential safety issues.

In July 2019, Airservices Australia (Airservices) completed a Safety Case Assessment and Reporting Determination (SCARD) for the implementation of AUTO METAR/SPECI algorithm for Cat A aerodromes. The SCARD assists users to evaluate the proposed changes to determine operational safety assessment and reporting requirements.

In February 2021, following the successful trial of fully automated observations at Cairns, Canberra and Gold Coast airports, the aviation industry endorsed the Bureau’s proposal to automate the remaining capital city airports.

The aviation industry will continue to be notified of any significant changes to capital city aerodrome observations via an Aeronautical Information Circular (AIC).

The Bureau continues to encourage all aviation customers to contact the Bureau, on the details provided below, to share any safety concerns regarding the transition to automated observations.

Contact Information

For further information on the transition to automated METAR/SPECI at all aerodromes, including capital city airports, please:

- Visit: www.bom.gov.au/aviation/Aerodrome
- Send any further questions to: webav@bom.gov.au

Further aviation educational resources produced by the Bureau of Meteorology can be found at www.bom.gov.au/aviation/knowledge-centre.

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