Australian Government

Bureau of Meteorology

TRAINING CENTRE

Trainee Technical Officer (Observer) Course

1. **Surface Observations - Synoptic**
2. **Basic Meteorology**
3. **Surface Observations – Aerodrome Weather Observer (AWO)**
4. **Climate and Consultancy**
5. **Radar and Upper Air Observations**
6. **Meteorological Information Services**
7. **Radiosonde Observations**
8. **Composite Operations Support**
9. **Field Station Simulation**
10. **Induction and APS training.**
11. **Introduction to Station Administration**
12. **Hydrogen Systems**
13. **On The Job Training**

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

TO (Obs) Training Programme for New Recruits

The Technical Officer (Observer) initial training course consists of approximately 30 weeks of training at BMTC in Melbourne and approximately 6 weeks of on-the-job training at a field station until rated competent. Trainees are recruited from outside the Bureau of Meteorology and have completed a Diploma (or equivalent course), with significant studies in a physical science (ideally including mathematics, physics and computing) and some study or demonstrated interest in electronics.

The Technical Officer (Observer) course has 13 modules.

1. Surface Observations - Synoptic
2. Basic Meteorology
3. Surface Observations – Aerodrome Weather Observer (AWO)
4. Climate and Consultancy
5. Radar and Upper Air Observations
6. Meteorological Information Services
7. Radiosonde Observations
8. Composite Operations Support
9. Field Station Simulation
10. Induction and APS training.
11. Introduction to Station Administration
12. Hydrogen Systems
13. On The Job Training

Course Objective.
At the completion of TO (Obs) training participants will be able to perform the wide range of tasks required of their work level to the competency standards set by the Bureau of Meteorology. They will have been rated competent in both the core and functional competencies required of staff working at the TO2 (Obs) level in the Bureau of Meteorology. To work at the TO2 (Obs) level participants must be rated fully competent in each of the above modules. The BMTC Assessment Policy outlines the standards and requirements that must be achieved.

Assessment.
Assessments are carried out to ensure set competencies have been achieved and may consist of:

- **Exams**
- **Assignments**
- **Simulation**
- **Project work**

For Trainee Technical Officers to graduate from the TO (Observer) course they must:

- Have successfully completed all modules of the TO (Obs) course as demonstrated by the particular assessment methodologies.
- It is also recommended that trainees hold a current drivers licence.
  Note: Inoculations are advised to work in remote locations.

For trainees to advance to Technical Officer 2 (Observer) they must:

- Have graduated from the TO (Observer) course.
- Have been rated competent on the job by a supervising TO (3).

For trainees to be confirmed for ongoing engagement they must:

- Have advanced to Technical Officer 2 (Observer).
- Have satisfied the probationary requirements of the APS.
- Be an Australian citizen.
- Have worked for 18 months in the Bureau of Meteorology.

Module 1.
Surface Observations - Synoptic.
At the completion of this module the participant will know the meteorological principles that underpin surface observational meteorology and be able to carry out synoptic observations. They will be able to read use and understand the siting requirements of Meteorological Instrumentation. They will have the necessary skills to transmit real-time Meteorological messages by various mediums. They will use the Bureau's AIFS communications system to send and quality check observations.

Module 1. - Surface Observations - Synoptic 83 Sessions / 124.5 hours		
• Surface Observations Synop - Principles	M. Shevchenko	15 x 1.5 hr
• Meteorological Instruments Part 1	Luc De Pauw	18 x 1.5 hr
• Meteorological Instruments Part 2	Luc De Pauw	10 x 1.5 hr
• Lawnmowers & Trimmers Induction	Luc De Pauw	1 x 1.5 hr
• Introduction to Sites DB & CMSS	Keon Stevenson	2 x 1.5 hr
• Introduction to MetConsole / Webconsole	Mike Bruhn	2 x 1.5 hr
• Synoptic Code (MDF)	Mike Bruhn	2 x 1.5 hr
• Surface Observations Practical – Synops.	Mike Bruhn	16 x 1.5 hr
• Meteorological Codes & Communication Systems	Mike Bruhn	19 x 1.5 hrs
• Tutorial/Maintenance/Private study	5.5 hours per week	
(Night sessions are required for this module)		
Primary Reference Documents – Surface Observations Handbook, Codes Handbook, Aeronautical Services Handbook, Climatological Practices Handbook, Hydrogen Handbook, Cloud Atlas, Observations Instructions and Circulars.		

Module 2.
Basic Meteorology.
To introduce observer staff of the Bureau of Meteorology to the science of meteorology and forecasting the weather.

Module 2. - Basic Meteorology. 5 days		
• Basic Physical & Dynamic Meteorology	12 x 1 hrs	Various Lecturers
• Basic Synoptic & Mesoscale Meteorology	12 x 1 hrs	Various Lecturers
• Assessed through General Met Exam		
Private study available refer to timetable		
Primary Reference Documents – The Science and Wonders of the Atmosphere, BMTC training notes – Radiation, Winds in the Atmosphere, Thunderstorms, Thermodynamics and Hydrostatics, Cloud Physics, Local and Diurnal Effects.		

Module 3.
Surface Observations - Aviation.
At the completion of this module the participant will have consolidated their synoptic observations skills and be able to use their theoretical and practical knowledge to be able to carry out routine aviation observations. They will consolidate routine checking and instrument maintenance on meteorological instruments including advanced systems currently in service throughout the Bureau network.

Module 3. - Surface Observations - Aviation. 58 Sessions / 87 hours		
• 1. General Meteorology	Mike Bruhn	20 x 1.5 hrs
• 2. Surface observations – Aviation Principles.	Mike Bruhn	16 x 1.5 hrs
• 3. Surface observations – AWR Practical.	Mike Bruhn	18 x 1.5 hrs
• Exams x 2	Mike Bruhn	4 x 1.5 hrs
• Private study available refer to timetable		
(Night sessions are required for this module)		
Primary Reference Documents – Surface Observations Handbook, Codes Handbook, Aeronautical Services Handbook, Climatological Practices Handbook, Hydrogen Handbook, Cloud Atlas, Observations Instructions and Circulars.		

Module 4.
Climate and Consultancy.
At the completion of this module, the participants will have a broad understanding of the climate on earth, both past and present, a knowledge and understanding of the physical processes behind climate and climate change, a familiarity with the Bureau's data base, and the climate services provided by the Bureau, an awareness of current climate issues and their social and economic impact and the statistical background to perform limited analysis under direction.

Module 4. - Climate and Consultancy. 24 Sessions / 36 Hours.		
Observer-Only Subjects		
• Small Scale Climate	Mike Bruhn	6 x 1.5 hrs
• Australian Climate Analysis	Bob Leighton	4 x 1.5 hrs
• Climate Data Base – Eve & Climate Zone Extraction	Keon Stevenson	1 x 1.5 hrs
• Climate DataBase – Theory of Measurement	Ian Dollery	2 x 1.5 hrs
• Meteorology and Agriculture	Dale Grey (DPI)	2 x 1.5 hrs
Meteorologist Subjects – Basic Climatology		
• 1. The Pale Blue Dot	Mick Pope	1 x 1hrs
• 2. Natural Cycles	Mick Pope	1 x 1hrs
• 3. Classifying Climate	Mick Pope	1 x 1hrs
• 4. Regional and local climates	Mick Pope	1 x 1hrs
• 5. Mass Extinctions	Mick Pope	1 x 1hrs
• 6. ENSO	Mick Pope	1 x 1hrs
• 7. Scenarios	Mick Pope	1 x 1hrs
• 8. Assessment Online Quiz – Moodle	Mick Pope	1 x 1hrs
• Private study available refer to timetable		
Primary Reference Documents – The Science and Wonders of the Atmosphere, BMTC training notes – Radiation, Winds in the Atmosphere, Thunderstorms, Thermodynamics and Hydrostatics, Cloud Physics, Local and Diurnal Effects.		

Module 5.
Radar and Upper Air Observations
At the completion of this module the participant will use their theoretical and practical knowledge to be able to carry out basic upper air observations using an optical Theodolite, PC-RADWIN and DigiCORAIII Wind only systems. They will be able to generate hydrogen safely and operate and perform routine checks and maintenance on various Hydrogen systems. Preparation and release of balloon trains will be carried out using manual and remote balloon launching systems.

Module 5. - Radar and Upper Air Observations. 53 Sessions / 79.5 Hours.		
• Upper air principles – Radar, Radiosonde & ATSO.	M. Shevchenko	2 x 1.5 hrs
• Pilot Code	Keon Stevenson	2 x 1.5 hrs
• Upper Wind Systems Optical Theodolite,	Keon Stevenson	11 x 1.5 hrs
• Upper Wind Systems PC-RADWIN	Keon Stevenson	22 x 1.5 hrs
• Upper Wind Systems DC3 Wind	M. Shevchenko	14 x 1.5 hrs
• Upper Wind Systems Wind Profilers	Luc De Pauw	2 x 1.5 hrs
• Private study available refer to timetable		
Primary Reference Documents – Upper Air Observations Handbook, Codes Handbook, Climatological Practices Handbook, Hydrogen Handbook, Observations Instructions and Circulars.		

Module 6.
Meteorological Information Office Services.
At the completion of this module the participants will have developed the skills and knowledge necessary to perform a service role from a Meteorological Information Office.

Module 6. - Meteorological Information Office Services. 16 Sessions / 24 Hours.		
• Role and function of an MIO	Keon Stevenson	0.5 x 1.5 hrs
• MIO Service Standards and Policies	Vernon Carr	1 x 1.5 hrs
• Client services	Jen Vaughan & Emma Lewis	2 x 1.5 hrs
• Hydrological Services	Soori Sooriyakumaran	1 x 1.5 hrs
• Regional Services – VRO Tour (CCS, RFC & ROS)	Ted Williams / Keon Stevenson	2 x 1.5 hrs
• Dealing with the media	Ian Needham	4 x 1.5 hrs
• Products Available on the Web	Keon Stevenson	0.5 x 1.5 hrs
• Legal Issues	Brenda Coutinho	1 x 1.5 hrs
• Overview of Climate Data Services & The Climate Zone	Clinton Rakich	1 x 1.5 hrs
• Presentation Day (Intro to Met Course) – Science Week	Bodo Zeschke / Keon Stevenson	2 x 1.5 hrs
•		
• Private study available refer to timetable		
Primary Reference Documents – Weather Services Handbook, Charging Manual, BoM Annual Report, Service Charter, Various internal references		

Module 7.
Radiosonde Systems.
At the completion of this module the participant will be able to complete radiosonde observations to bureau standard using the main radiosonde systems in use at the Bureau of meteorology.

Module 7. - Radiosonde Systems. 50 Sessions / 75 Hours.		
• TEMP message	M. Shevchenko	2 x 1.5 hrs
• DigiCora III - Radiosonde	M. Shevchenko	24 x 1.5 hrs
• Autosonde	M. Shevchenko	24 x 1.5 hrs
• Private study (5.5 hours per week)		
Primary reference documents – Upper Air Observations Handbook, Codes Handbook, Hydrogen Handbook, Observations Instructions and Circulars, Equipment Handbooks		

Module 8.
Composite Operations Support
On completion of this module the participant will be able to further the goals of the Inspections Program and the Maintenance Program by assisting the Regional Observations and Engineering staff with their duties.

Module 8. – Composite Operations Support 42 Sessions / 63 Hours.		
• Surface Observations Networks overview	Phil Jefferson	1 x 1.5 hrs
• The Bureau's Marine Program	Graeme Ball	1 x 1.5 hrs
• Sites DB	Denis Wiltshire	1 x 1.5 hrs
• Use NetMon to monitor the observational networks.	Lachlan Braden	1 x 1.5 hrs
• NCC Data Quality Control	Ben Rowney	2 x 1.5 hrs
• The Quality Management System and data quality issues	Karen Rowney	2 x 1.5 hrs
• Tsunami Warning Service	Ross Bunn	1 x 1.5 hrs
• Establishing a rainfall station	Keon Stevenson	4 x 1.5 hrs
• Introduction to Electronic Instruments	Ben Gillson	2 x 1.5 hrs
• Safety and Hazards	Ben Gillson	2 x 1.5 hrs
• Data Communications	Ben Gillson	1 x 1.5 hrs
• AWS operation and communication	Ben Gillson	2 x 1.5 hrs
• Autosonde	Ben Gillson	2 x 1.5 hrs
• DigiCora III	Ben Gillson	1 x 1.5 hrs
• Low Risk Four Wheel Driving	DECA	4 x 1.5 hrs
• Work safely at heights	Fire & Safety Australia	4 x 1.5 hrs
• Hazard ID & Risk Assessment	National Safety Council of Australia.	4 x 1.5 hrs
• MSDS & permit to work	Rob Duthie	2 x 1.5 hrs
• EEHA	RMIT–Peter Taylor	4 x 1.5 hrs
• Shut down a field station	Keon Stevenson	0.5 x 1.5 hrs
• Safe driving guidelines	Keon Stevenson	0.5 x 1.5 hrs
•		
• Private study available refer to timetable		
Primary reference documents – Inspection Handbook, Surface Observation Handbook, Obs Spec 2013.1		

Module 9.
Field Station Simulation.
At the completion of this module the participants will have worked a rotating roster, at a simulated station, performing a set observation programme. As well as maintaining the observation programme they are expected to answer all requests for information from clients, ensure instrument maintenance is carried out and that quality control of all observations is performed. This module integrates learning from other modules.

Module 9. – Field Station Simulation. 3 weeks
• Maintain an observing program
• Perform shift work duties alone and as part of a team
• Respond to Information requests
• Routine maintenance of equipment
• Work safely with hydrogen
• Perform AIFS and Comms observer duties
• Manage workloads and work priorities
• Monitor data quality
•
(Full observation programme simulation including night shifts)

Module 10.
Induction & APS Training.
At the completion of this module participants will be competent in the skills required to work effectively in the public sector and in particular the Bureau of Meteorology.

Module 10. - Induction & APS Training. 48 Sessions / 72 Hours.		
• Welcome and Introduction	SIO / SRFO / SRTG	1 x 1.5 hrs
• Admin – Payslips & Superannuation.	Monique Slaverio	1 x 1.5 hrs
• Course description	Keon Stevenson	1 x 1.5 hrs
• Tour of 1010 Latrobe St and 700 Collins St	Keon Stevenson	1 x 1.5 hrs
• Induction to Training Annexe	Keon Stevenson	1 x 1.5 hrs
• Charter and Structure of the Bureau	R. Deslandes	1 x 1.5 hrs
• Computer Systems Admin (and MDT)	Paul Froude / Keon Stevenson	1 x 1.5 hrs
• Introduction to Moodle	Merrin Bennett	1 x 1.5 hrs
• Intranet introduction	Keon Stevenson	1 x 1.5 hrs
• PPE fitout	Keon Stevenson	1 x 1.5 hrs
• Occupational Health and Safety	Zbigniew Nowara	1 x 1.5 hrs
• OH&S Legal Compliance online course	Techniworks	1 x 1.5 hrs
• OH&S Management online course	Techniworks	1 x 1.5 hrs
• APS Induction – Online Onboarding	Techniworks	1 x 1.5 hrs
• APS Val. & Code of Conduct online course	Techniworks	1 x 1.5 hrs
• Workplace Discrimination online course	Techniworks	1 x 1.5 hrs
• APS Values & Code of Conduct in the BoM.	Staff Development & Training Team	1 x 1.5 hrs
• Emotional Intelligence	Staff Development & Training Team	2 x 1.5 hrs
• Library tour	Galina Brejneva	1 x 1.5 hrs
• Reporting of Incidents and Accidents	Luc De Pauw	1 x 1.5 hrs
• Postings discussions x 2	Mike Joyce / David Nottage	4 x 1.5 hrs
• Personnel – allowances and downlifts. Posting Relocation	Amy Hall	2 x 1.5 hrs
• Course Evaluation	Online (Survey Monkey)	2 x 1.5 hrs
• Building personal Resilience	Staff Development & Training Team	2 x 1.5 hrs
• Basic Fire fighting & Haz Chem	MFB	4 x 1.5 hrs
• Strategic Indigenous Awareness work shop	Grant Sarra	4 x 1.5 hrs
• Inoculations	Health Services Australia	2 x 1.5 hrs
• CPSU Introduction	Monica Long	1 x 0.5 hrs
• Salary Packaging	Maxxia	1 x 1.5 hrs
• Superannuation	Tim Foster	1 x 1.5 hrs
• Introduction to Moodle – Latitude	Merrin Bennett	1 x 1.5 hrs
• Probation Reports x 2	Keon Stevenson	4 x 1.5 hrs
• First Aid – Level 2	Emergency First Aid Pty Ltd	8 x 1.5 hrs
•		
• Private study available refer to timetable		
Primary reference documents – BoM and APS policy documents & handouts.		

Module 11.
Introduction to Station Administration.
At the completion of this module the participant will be able to understand and perform basic station administration duties associated with single person stations. They will be introduced to various administrative protocols and procedures.

Module 11. – Introduction to Station Administration. 13 Sessions / 20 Hours.		
• Rosters and Rostering Principles	Mike Joyce	1 x 1.5 hrs
• Leave Pool conditions	Mike Joyce	1 x 1.5 hrs
• Travel / TA Entitlements / paperwork	Amy Hall	1 x 1.5 hrs
• F183 Duty Statement and penalty pay	Keon Stevenson	1 x 1.5 hrs
• Monthly returns of an OIC	Keon Stevenson	1 x 1.5 hrs
• EBS and regional/central administration	Keon Stevenson	1 x 1.5 hrs
• OH&S responsibilities of an OIC and site inductions	Zbigniew Nowara	2 x 1.5 hrs
• Petty Cash / Spending proposals & Financial accountability.	Keon Stevenson	2 x 1.5 hrs
• Bureau houses/leases & contract management	Sandra Mifsud	1 x 1.5 hrs
• Manage contracts at a Field Station	Keon Stevenson	1 x 1.5 hrs
• SAP and stores ordering	Keon Stevenson	2 x 1.5 hrs
• Single Person Station operations	Keon Stevenson	1 x 1.5 hrs
• Private study available refer to timetable		
Primary reference documents –		

Module 12.
Hydrogen Safety and Systems
At the completion of this module the participant will use their theoretical and practical knowledge to safely use and carry out Hydrogen operations, including: Preparation and release of balloon trains will be carried out using manual and remote balloon launching systems.

Module 12. - Hydrogen Safety & Systems. 33 Sessions / 49.5 Hours.		
• Hydrogen Safety and OH&S	Luc De Pauw	10 x 1.5 hrs
• Hydrogen Launch Systems Mechanical RBL	Luc De Pauw	6 x 1.5 hrs
• Hydrogen Launch Systems - ACOM	Luc De Pauw	2 x 1.5 hrs
• Hydrogen Launch Systems - Manpacks	Luc De Pauw	2 x 1.5 hrs
• Hydrogen Launch Systems Electrical RBL	Luc De Pauw	3 x 1.5 hrs
• HOGEN	Luc De Pauw	10 x 1.5 hrs
• Hydrogen Facilities Inspection	Luc De Pauw	2 x 1.5 hrs
•		
• Private study available refer to timetable		
Primary Reference Documents – Upper Air Observations Handbook, Codes Handbook, Climatological Practices Handbook, Hydrogen Handbook, Observations Instructions and Circulars.		

Module 13.
On the Job Training.
At the completion of the on-the-job training module trainees are rated for competency at performing the wide range of tasks of a Technical Officer (Observer) at a field station. The tasks rated against the Technical Officer Observer Grade 2 Field competencies.

Module 13. - On the Job Training. 5 – 6 weeks.
• Mid Course On the Job Training (2 weeks)
• Application of skills - competency rating (Average of 3-4 Weeks, minimum of 2 weeks)
Supervisor carries out competency assessment during the four week dual after the completion of the BMTC component of the Observer Course.

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 1
Surface Observations - Synoptic

- Surface Observations Synop - Principles
- Meteorological Instruments Part 1
- Meteorological Instruments Part 2
- Lawnmowers & Trimmers Induction
- Introduction to Sites DB & CMSS
- Introduction to MetConsole & Webconsole
- Synoptic Code (MDF / DFXX)
- Surface Observations Practical – Synops
- Codes / Aifs Error Correction

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Surface Observations - Principles

Nominal duration	19.5 hours (13 x 1.5 hour sessions)
Module code or number	OBS-SOPRIN
Discipline Code	TO(Obs)
Module purpose	Provide participants with a sound understanding and knowledge of the principles underlying surface observations.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Times of observations, time zones
- Meteors
- Cloud genera and species
- Weather phenomena
- Visibility

Assessment method	This module can be assessed by a variety of methods including written or on-line assignments or a formal written examination.
Conditions of assessment	Participants must pass the assessment to progress.
Learning outcomes	On successful completion of this module, participants will be able to:

Learning outcome 1 Demonstrate a knowledge of standard observation times and variations caused by changes in time zones.

Assessment criteria

1.1 Describe the basis of GMT, UTC and Zulu time and time zones.

1.2 List time related issues to be considered when performing meteorological observations.

1.3 Compute correct observation times for locations in different time zones

Learning outcome 2 Demonstrate an understanding of different meteors, how they are observed and the impact on prevailing weather conditions.

Assessment criteria

2.1 Identify different meteors including

lithometeors

hydrometeors

		photometeors
	2.2	Describe their effect on prevailing weather conditions.
Learning outcome 3	Name and identify all cloud genera and species, their usual height range and their associated weather phenomena.	
Assessment criteria	3.1	Identify and describe the ten basic cloud types
	3.2	Identify and name cloud species using the Latin naming conventions.
	3.3	State the usual height ranges (etages) of all cloud types.
	3.4	State precipitation types likely from each cloud type.
	3.5	Describe the characteristics of each cloud type.
Learning outcome 4	Identify and describe the range of different weather phenomena considered when taking a surface visual observation.	
Assessment criteria	4.1	Identify the range of weather phenomena
	4.2	State the characteristics of all weather phenomena.
	4.3	Describe the meteorological processes occurring for different phenomena.
Learning outcome 5	Define visibility and relate visibility to meteors and weather phenomena.	
Assessment criteria	5.1	Define meteorological visibility.
	5.2	Define runway visual range.
	5.3	Relate visibility with various weather phenomena.
Delivery	Delivery is by off the job training in a classroom environment. Some aspects of this module can be delivered on-line.	
Learning resources	Access to the Bureau of Meteorology intranet Bureau of Meteorology current edition, *Surface Observations Handbook,* Bureau of Meteorology, Melbourne World Meteorological Organisation. *1975, International Cloud Atlas Volume I*, World Meteorological Organisation, Geneva. World Meteorological Organisation. 1987, *International Cloud Atlas Volume II*, World Meteorological Organisation, Geneva. Bureau of Meteorology, *B220 Recording and Encoding Weather Observations*, Bureau of Meteorology, Melbourne.	
Occupational health and safety requirements	A safe environment and information regarding hazards will be provided for participants with regard to: Ergonomic computer workstations,	

MODULE TITLE METEOROLOGICAL INSTRUMENTS 1

Nominal duration 27 hours (18 x 1.5 hour sessions)

Module code or number OBS-INSTRUMENTS1

Discipline Code TO(Obs)

Module purpose To enable participants to use & maintain instruments used in taking meteorological observations.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Instrument Shelter
- Maximum and Minimum thermometer
- Terrestrial Minimum thermometer
- 10, 20, 50 and 100 cm Soil Thermometers
- Class A evaporation pan
- Cup-counter anemometer
- 203 mm rain gauge
- Weekly Barograph
- Campbell-Stokes sunshine recorder
- Tipping Bucket rain gauge
- AWS RTD
- Visibility meter
- Ceilometer
- Barometer (PA11A or PTB220)
- AWS anemometer
- Present weather sensor. (If installed)

Assessment method This module can be assessed using a variety of methods. Some assessment can be performed using written assignments or formal written examinations while the more practical aspects are more suited to a practical demonstration method of assessment.

Conditions of assessment

Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Use/Read & Maintain the following instruments to Bureau of Meteorology specifications. • Dry and Wet Bulb Thermometer • Maximum and Minimum thermometer • Terrestrial Minimum thermometer • 10, 20, 50 and 100 cm Soil Thermometers • Class A evaporation pan • Cup-counter anemometer • 203 mm rain gauge • Campbell-Stokes sunshine recorder • Tipping Bucket rain gauge • AWS RTD • Visibility meter • Ceilometer • Barometer (PA11A or PTB220) • AWS anemometer • Present weather sensor. (If installed)
Assessment criteria	For each instrument listed above: 1.1 Describe principle of operation 1.2 Locate operating standards 1.3 Demonstrate observing procedure. 1.4 Demonstrate quality control checks and calibration adjustments. 1.5 Undertake routine maintenance and fault finding.
Delivery	Some aspects of this course can be delivered in a classroom environment while others can be delivered using distance or on-line methods. Some aspects of this course require practical demonstrations in a face-to-face situation.
Learning resources	Access to the Bureau of Meteorology intranet Bureau of Meteorology current edition, *Surface Observations Handbook*, Bureau of Meteorology, Melbourne A personal computer with MetConsole software installed connected to an operational Automatic Weather Station. An appropriately equipped Instrument Enclosure. An appropriately situated Observing Site free from obstructions with the horizon visible.

Consumable supplies, including standard Bureau of Meteorology stationary such as:

- Sunshine recorder charts
- Wet Bulb muslins
- RTD socks

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- UV solar radiation hazards
- Chemicals used for the Evaporation Pan

MODULE TITLE METEOROLOGICAL INSTRUMENTS 2

Nominal duration 15 hours (10 x 1.5 hour sessions)

Module code or number OBS-INSTRUMENTS2

Discipline Code TO(Obs)

Module purpose To enable participants to understand the siting requirements for instruments used in taking meteorological observations.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Instrument Shelter
- Dry and Wet Bulb Thermometer
- Maximum and Minimum thermometer
- Terrestrial Minimum thermometer
- 10, 20, 50 and 100 cm Soil Thermometers
- Class A evaporation pan
- Cup-counter anemometer
- 203 mm rain gauge
- Campbell-Stokes sunshine recorder
- Tipping Bucket rain gauge
- AWS RTD
- Visibility meter
- Ceilometer
- Barometer (PA11A or PTB220)
- AWS anemometer

Assessment method This module can be assessed using a variety of methods. Some assessment can be performed using written assignments or formal written examinations while the more practical aspects are more suited to a practical demonstration method of assessment.

Conditions of assessment

Learning outcomes

On successful completion of this module, participants will be able to:

Learning outcome 1

Understand the siting requirements for the following meteorological instruments.

- Dry and Wet Bulb Thermometer
- Maximum and Minimum thermometer
- Terrestrial Minimum thermometer
- 10, 20, 50 and 100 cm Soil Thermometers
- Class A evaporation pan
- Cup-counter anemometer
- 203 mm rain gauge
- Campbell-Stokes sunshine recorder
- Tipping Bucket rain gauge
- AWS RTD
- Visibility meter
- Ceilometer
- Barometer (PA11A or PTB220)
- AWS anemometer
- Present weather sensor. (If installed)

Assessment criteria

For each instrument listed above:

1.1 Describe & demonstrate the siting requirements for the following instrumentation.

Delivery

Some aspects of this course can be delivered in a classroom environment while others can be delivered using distance or on-line methods.

Some aspects of this course require practical demonstrations in a face-to-face situation.

Learning resources

Access to the Bureau of Meteorology intranet

Bureau of Meteorology current edition, *Surface Observations Handbook*, Bureau of Meteorology, Melbourne

A personal computer with MetConsole software installed connected to an operational Automatic Weather Station.

An appropriately equipped Instrument Enclosure.

An appropriately situated Observing Site free from obstructions with the horizon visible.

Consumable supplies, including standard Bureau of Meteorology stationary such as:

Sunshine recorder charts

Wet Bulb muslins

RTD socks

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

UV solar radiation hazards

Chemicals used for the Evaporation Pan

MODULE TITLE Lawnmowers & Trimmers Induction

Nominal duration 1.5 hours (1 x 1.5 hour sessions)

Module code or number OBS-LAWN

Discipline Code TO(Obs)

Module purpose To enable participants to operate Lawnmowers & Trimmers.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Complies with WMO Meteorological Technician Level

Standards Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Hazards related to lawnmowers, trimmers, fuel
- Safety and PPE
- Features
- Operating procedures
- Storage
- Basic maintenance

Assessment method Parts of this module can be assessed by written methods such as assignments and examinations, but other parts require the demonstration of practical activities.

Conditions of assessment This module is a designed to give student's familiarity operating lawnmowers and trimmers. These machines are necessary to maintain the instrument enclosure and will need to be used a regular base. They can cause severe injury or even death by inappropriate use.

Learning outcomes On successful completion of this module, participants will be able to use a lawnmower and trimmer in a safe way.

Learning outcome 1 Lawnmower and Trimmer induction.

Assessment criteria Trainees will need to demonstrate they can operate this equipment in a safe and efficient manner.

Delivery The theoretical aspects of this course will be delivered in a classroom environment while the practical aspects will be delivered outdoors on real equipment.
Some aspects of this course require practical demonstrations in a face-to-face situation. Most of it involves hands-on training.

Learning resources Powerpoint presentation.
Equipment at BMTC.
Instructions hand-out.

Occupational health and safety requirements

All trainees are required to wear:
- Safety boots
- Overalls
- Goggles
- Gloves
- Ear protection
- Starting a lawnmower is a physical activity. Correct techniques will be demonstrated.

MODULE TITLE — Introduction to Sites DB & CMSS

Nominal duration	3 hours (2 x 1.5 hour sessions)
Module code or number	OBS-DBCMSS
Discipline Code	TO(Obs)
Module purpose	To enable participants to operate Sites DB & CMSS at a basic level.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Principles of operation • Station Metadata • Unregistered Action • Overview of the Bureau communications network – Weathernet, CMSS and the Global Telecommunications Network. • Data extraction • Message retrieval
Assessment method	Parts of this module can be assessed by written methods such as assignments and examinations, but other parts require the demonstration of practical activities.
Conditions of assessment	This module is a designed to give student's familiarity to SitesDB and CMSS. This will aid in teaching of many other modules within the Observer Course.
Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Become a registered user with a login for SitesDB.
Assessment criteria	1.1 Create a personal login for SitesDB use.
Learning outcome 2	Navigate through SitesDB's various links, retrieve station Metadata and submit an unregistered action.
Assessment criteria	2.1 Familiarization of Sites DB by navigating through all of the links under direction. 2.2 Search for a WMO Station and retrieve the station metadata and station photographs. 2.3 Login and submit an unregistered action.
Learning outcome 3	Navigate through the drop down menus of CMSS and retrieve various messages.

Assessment criteria	3.1	Retrieve various messages applicable to TTO (Obs) i.e. Pilot, Temp, Metar and Speci messages.

Delivery

Some aspects of this course can be delivered in a classroom environment while others can be delivered using distance or on-line methods.

Some aspects of this course require practical demonstrations in a face-to-face situation.

Learning resources

Access to the Bureau of Meteorology intranet

A personal computer

An appropriately equipped Instrument Enclosure.

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- UV solar radiation hazards
- Ergonomic computer workstation

MODULE TITLE	**Introduction to METCONSOLE & WEBCONSOLE**
Nominal duration	3 hours (2 x 1.5 hour sessions)
Module code or number	OBS-METWEB
Discipline Code	TO(Obs)
Module purpose	To enable participants to operate MetConsole & Webconsole applications.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Principles of operation • Dispatch of observations • Monitoring performance of electronic sensors • Data extraction • Message retrieval • Routine maintenance
Assessment method	Parts of this module can be assessed by written methods such as assignments and examinations, but other parts require the demonstration of practical activities.
Conditions of assessment	This module is a pre-requisite for Surface Observations Practical and must be passed to pass the TO(Obs) course
Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Describe how the MetConsole / Webconsole program handles data transmitted from the Automatic Weather Station.
Assessment criteria	1.1 Describe how MetConsole / Webconsole deals with one-minute and ten-minute data strings to compile a Synoptic Weather Report.
Learning outcome 2	Input data into MetConsole / Webconsole and transmit a Surface Synoptic Weather Report.
Assessment criteria	2.1 Jump to the required MetConsole / Webconsole screen when required. 2.2 Pause the MetConsole / Webconsole timer. 2.3 Input data into relevant MetConsole / Webconsole data fields. 2.4 Transmit the message
Learning outcome 3	Extract historical data using MetConsole / Webconsole
Assessment criteria	3.1 Determine the maximum temperature for the previous 24 hours from the Temperature graph of MetConsole / Webconsole 3.2 Determine the maximum wind gust for the previous day from the Wind graph of MetConsole / Webconsole 3.3 Inspect the ceilometers output on the Ceilometer graph of

	MetConsole / Webconsole
	3.4 Inspect the ceilometer and visibility meter output in the one-minute AWS strings on the debug screen of MetConsole / Webconsole
Learning outcome 4	Retrieve a previously transmitted MDF message from the MetConsole / Webconsole database.
Assessment criteria	.
	4.1 Use the Retrieve function of MetConsole / Webconsole to retrieve an old MDF message from the MetConsole database.
Learning outcome 5	Perform minor maintenance for the MetConsole program only.
Assessment criteria	5.1 Correct the system time
	5.2 Cold-boot the MetConsole computer
	5.3 Compact the Metlog.mdb database within Metconsole.
	5.4 Enter maintenance mode to switch off a sensor and then exit maintenance mode.
Delivery	Some aspects of this course can be delivered in a classroom environment while others can be delivered using distance or on-line methods. Some aspects of this course require practical demonstrations in a face-to-face situation.
Learning resources	Access to the Bureau of Meteorology intranet Bureau of Meteorology current edition, *Surface Observations Handbook*, Bureau of Meteorology, Melbourne A personal computer with MetConsole software installed connected to an operational Automatic Weather Station. An appropriately equipped Instrument Enclosure.
Occupational health and safety requirements	A safe environment and information regarding hazards will be provided for participants with regard to: ▪ UV solar radiation hazards ▪ Ergonomic computer workstations

MODULE TITLE Synoptic Code – MDF

Nominal duration	3 hours (2 x 1.5 hour sessions)
Module code or number	OBS-SYNOPCODE
Discipline Code	TO(Obs)
Module purpose	To enable participants to effectively code and decode MDF messages
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology. Conforms with guidelines detailed in the Bureau of Meteorology Codes Handbook, the AIFS operating procedures, and the Bureau of Meteorology Email and Internet Policies. This module is normally delivered in parallel with Surface Observation Practical (Aviation) and Radar. It is a prerequisite for successful completion of the module Surface Observations – Aviation.
Summary of content	Use the Codes Handbook to reference Chapter 11 – Met Data Format.
Assessment method	The participant will demonstrate proficiency at performing to Bureau of Meteorology standards as follows: • Coding and decoding • Retrieval and collation of information from the • Codes Handbook.
Conditions of assessment	Assessment will be performed using assignments, written examinations and practical demonstrations. Demonstration of competency in this module is necessary to complete the TO(Observer) course.
Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Use the Codes Handbook Chapter 11 to decode MDF.
Assessment criteria	1.1 Use the Codes Handbook Chapter 11 to decode an MDF message.
Learning outcome 2	Use CMSS to retrieve data and verify system message is received.
Assessment criteria	2.1 Use CMSS to retrieve a MDF message.
Learning outcome 3	Encode meteorological data into an MDF code.
Assessment criteria	3.1 Encode an MDF message.
Delivery	Delivery is by off the job training in a classroom environment. Some aspects of this module can be delivered on-line.
Learning resources	Bureau of Meteorology current edition, *Codes Handbook,* Bureau of Meteorology, Melbourne
Occupational health and	A safe environment and information regarding hazards

safety requirements	will be provided for participants with regard to:
	Ergonomic computer workstations

MODULE TITLE	**SURFACE OBSERVATIONS - Synoptic (Practical)**
Nominal duration	24 hours (16 x 1.5 hour sessions) Please note that reinforcement occurs in 2 weeks on the job training.
Module code or number	OBS-SYNOP
Discipline Code	TO(Obs)
Module purpose	On completion of this module the participant will be able to perform Surface Observations for Climate and Aviation purposes to a standard approved by the Bureau of Meteorology.
Prerequisites	• Completion of Surface Observations Principles Module, and • Completion of Instruments 1 Module, and • Completion of General Meteorology Module This module can be delivered in parallel with the above-mentioned Modules, but because it uses skills taught in them, completion of this module is not possible until the other modules have been successfully completed.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology and conforms to guidelines detailed in Bureau of Meteorology Surface Observations Handbook, Bureau of Meteorology Codes Handbook, Bureau of Meteorology Climatological Practices Handbook and Bureau of Meteorology Aeronautical Services Handbook.
Summary of content	• Performing a Surface Synoptic Weather Observation. • Recording a Surface Synoptic Weather Observation to Bureau of Meteorology standards using MetConsole software and an A8 Field Book • Recording an Aviation Weather Observation to Bureau of Meteorology standards using MetConsole software and an A37 Register of Weather Reports. • Transmitting a DFXX and AWR message using MetConsole software.
Assessment method	The participant will demonstrate proficiency at performing Observations to Bureau of Meteorology standards of accuracy as follows: • Surface Synoptic and Aviation Weather Reports after 35 hours of training • Surface Synoptic Reports within 30 minutes and Aviation Weather Reports within 25 minutes after 55 hours of training. • Surface Synoptic Reports within 25 minutes and Aviation Weather Reports within 20 minutes after 65 hours of training. • Surface Synoptic Reports within 20 minutes and Aviation Weather Reports within 15 minutes after completion of training.
Conditions of assessment	During assessment participants will require access to: • An appropriately situated Observing Site free from obstructions with the horizon visible.

- A personal computer running MetConsole software connected to an Automatic Weather Station.
- An appropriately equipped Instrument Enclosure
- Bureau of Meteorology Surface Observations Handbooks, Codes Handbooks, Climatological Practices Handbook, Aeronautical Services Handbooks.
- Relevant Bureau of Meteorology stationery such as an A8 Field Book and an A37 Register of Weather Reports.

Learning outcomes

On completion of this module the participant will be able to:

Learning outcome 1

Assess the suitability of instruments to provide data for a Bureau of Meteorology Surface Observation.

Assessment criteria

Apply the Bureau of Meteorology's instrumental standards of accuracy to the elements measured during the performance of a surface observation. These elements include:

- Air pressure
- Temperature
- Relative humidity
- Wind speed
- Wind direction
- Rainfall
- Cloud height

Learning outcome 2

Perform a Bureau of Meteorology Surface Synoptic Weather Observation to Bureau of Meteorology accuracy standards.

Assessment criteria

Observe the elements reported in a Bureau of Meteorology Surface Synoptic Report using both instrumental and non-instrumental means, and apply appropriate Quality Control procedures to the data observed. These elements include:

Air pressure

Station Level Pressure (SLP, or QFE)
Mean Sea Level Pressure (MSL, or QFF)
Pressure Tendency
Diurnal Correction
Diurnally Corrected Tendency

Measured using:

A PA11A digital barometer
An Automatic Weather Station
A barograph.
Conversion tables:
SLP to MSL table

Quality controlled by:

Crosschecking of instruments.
Inspection of the barograph trace

Temperature

Dry Bulb
Wet Bulb
Dew Point
Humidity
Maximum:

since 1100 LST
since 1200 UTC

Minimum:
since 1100 LST
since 0000 UTC

Terrestrial:
Minimum
Reset

Soil Temperatures:
10cm
20cm
50cm
100cm

Measured using:

Liquid-in-glass thermometers,
Automatic Weather Station temperature sensors,
Conversion tables:
Dew Point
Relative Humidity

Soil thermometers
10cm
20cm
50cm
100cm

Quality controlled by:

Cross-checking of instruments
Application of Meteorological Principles learned in General Meteorology Module.

Wind

1 minute
average direction
average speed
maximum gust

10 minute
average direction
average speed
minimum wind speed

10 minute maximum gust:
direction
speed
time of maximum gust

3 hour wind gust
direction
speed
time of maximum gust

24 hour wind gust
direction
speed
time of maximum gust

High wind run

Measured using:

An Automatic Weather Station
Manual estimation using the Beaufort Scale

Quality controlled by:

Application of Meteorological Principles learned in General Meteorology Module.
Comparing instrumental data with manually estimated data.

Weather

Present
Past 1
Past 2
Cloud coverage

Measured using:
- Visual estimation
- Automatic Weather Station instruments:
  - Ceilometer
  - Tipping Bucket Rain gauge
  - Relative Humidity sensor or equivalent
  - Anemometer
  - Temperature sensors

Quality controlled by:
- Cross-checking with observations of:
  - Wind
  - Cloud
  - Rainfall
  - Humidity
  - Visibility
- Application of Meteorological Principles learned in General Meteorology Module and Surface Observations Principle Module.

Visibility

- Horizontal
- Vertical (if appropriate)

Measured using:
- Visual estimation
- Visibility Meter

Quality controlled by:
- Comparing instrumental data with manually estimated data.

Rainfall

- Since last obs
- In last 6 hours
- Since 1100
- 10 minute rain
- Check Gauge

Measured using:
- Automatic Weather Station instruments:
  - Tipping Bucket Reengage
- 203mm rain gauge

Quality controlled by:
- Cross-checking of instruments.
- Manual estimation.

Evaporation

- Adding or Removing water
- Full and Part Measures
- Low Wind Run

Measured using:
- Class A Evaporation Pan
- Measuring Tube for the Class A Evaporation Pan
- Cup Counter Anemometer

Quality controlled by:
- Crosschecking with the 203mm rain gauge.
- Visual observation of the integrity of the Evaporation Pan.

Sunshine

- Hours

Measured using:
- Campbell-Stokes sunshine recorder

Quality controlled by:
- Inspection of the trace.

Phenomena
- Hail
- Snow
- Thunderstorm
- Frost
- Dust Storm
- Mist, Haze, or Smoke
- Fog
- Dew
- Strong Winds
- Gale Winds

Measured using:
- Visual or audible estimation
- Terrestrial Minimum thermometer
- Automatic Weather Station instruments:
  - Tipping Bucket Rain gauge
  - Relative Humidity sensor or equivalent
  - Synchrotac Anemometer
  - Temperature sensors
  - Visibility meter

Quality controlled by:
- Cross-checking with observations of:
  - wind
  - cloud
  - rainfall
  - humidity
  - visibility
- Application of Meteorological Principles learned in General Meteorology Module and Surface Observations Principles Module.

Cloud:
- Amount
- Etage
- Type:
  - Genera (10 types)
  - Code (27 code numbers)
- Height
- Direction of movement

Measured by:
- Visual estimation

Quality controlled by:
- Comparison of estimation with:
  - Ceilometer readings
  - Timed balloon ascents
  - Radiosonde data
  - Atmospheric wind data
  - Other observations of cloud
  - Weather observations
  - Aircraft reports (if available)
- Application of Meteorological Principles learned in General Meteorology Module and Surface Observations Principle Module.

Learning outcome 3 Record and transmit a Bureau of Meteorology Surface Synoptic Observation to Bureau of Meteorology accuracy standards using an A8 Field Book and MetConsole/Webconsole software.

Assessment criteria

3.1 Apply Bureau of Meteorology practices to record observed Surface Synoptic data using MetConsole/Webconsole software.

3.2 Transmit the data in the form of an MDF message within the time required using MetConsole/Webconsole software.

3.3 Record the Surface Synoptic Observation on the A8 Field Book using Bureau of Meteorology prescribed practices.

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

Ergonomic computer workstations,

Electromagnetic radiation hazards

UV solar radiation hazards

Chemicals used for the Evaporation Pan

MODULE TITLE Meteorological Codes and Communication Systems

Nominal duration 28.5 hours (19 x 1.5 hour sessions)

Module code or number OBS-CODES

Discipline Code TO(Obs)

Module purpose To enable participants to effectively:

- Understand the basic international and national network principles of exchanging meteorological information
- Reference the Australian Codes Handbook to identify relevant meteorological codes and their constituents for manual coding/decoding.
- Decode AIREP and AMDAR messages
- Decode AAXX & BBXX messages
- Decode HHZZ (Rainfall) and other marine messages
- Consolidate upper air and synoptic codes
- Navigate the AIFS environment and be familiar with the applications commonly used by observers
- Use AIFS to retrieve messages and apply coding corrections to error messages

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Complies with WMO 258 Meteorological Technician Level

Standards Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.

Conform with guidelines detailed in the Bureau of Meteorology Codes Handbook and the AIFS operating procedures

Summary of content

- Be aware of international and national communication networks used to exchange meteorological information and WMO system of numbering meteorological stations.
- Know the international FM system of naming codes and the relationship between the international manual on codes and the Australian Codes Handbook.
- Use the Codes Handbook to reference meteorological codes used by Observers such as: AAXX Synop, BBXX Ship, Rainfall and Marine codes.
- Use the Codes Handbook and the other sources to reference meteorological codes used by Observers such as AIREP and AMDAR.
- Consolidate knowledge of meteorological codes used by Observers such as FM32 PILOT, METARAWS and SPECIAWS, DFXX and TEMP
- Navigate AIFS applications commonly used by observers.
- Use AIFS to retrieve data and information, input and quality control observations, Decode and Encode Meteorological codes.

Assessment method

The participant will demonstrate proficiency at performing to Bureau of Meteorology standards as follows:

Describing the Bureau of Meteorology national and international communications and station numbering system.

Retrieval and collation of information from the Codes Handbook.

Coding and decoding: AMDAR'S, AIREPS, AAXX, BBXX and HHZZ code forms

Navigation of the AIFS environment; Retrieval, correction and forwarding of messages using AIFS.

Conditions of assessment	Assessment will be performed using assignments, written examinations and practical demonstrations. Demonstration of competency in this module is necessary to complete the TO(Observer) course.
Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Be aware of international and national communication networks used to exchange meteorological information and WMO system of numbering meteorological stations.
Assessment criteria	1.1 Demonstrate knowledge of international and national communications network. 1.2 Describe the WMO system of station numbering and how it relates to Australia. 1.3 Use the Australian station index cataloque to identify Meteorolgoical station numbers.
Learning outcome 2	Know the international FM system of naming codes and use the Australian Codes Handbook to decode meteorological information.
Assessment criteria	2.1 Describe the WMO system of naming FM code forms. 2.2 Use the Codes Handbook to decode symbolic alphanumeric 'code groups' 2.3 Describe the WMO system of assigning code table numbers
Learning outcome 3	Use the Codes Handbook to reference meteorological codes used by Observers such as: AAXX Synop, BBXX Ship, Rainfall and Marine codes
Assessment criteria	3.1 Decode AIREP & AMDAR messages 3.2 Encode and decode AAXX messages. 3.3 Encode and decode BBXX messages. 3.4 Use the Codes handbook to decode various Rainfall and Marine codes such as: HYREP (aust) FM67 HYDRA (HYDATA) FM18 BUOY FM65 WAVEOB (Waverider) FM63 BATHY (SBT SOOP)

Learning outcome 4	Use AIFS applications commonly used by observers.
Assessment criteria	4.1 Navigate AIFS environment demonstrating use of applications like Despatch table Db browser Alerts Prep mode Obs form Manual Data Entry Comms GUI
Learning outcome 5	Use AIFS to retrieve data and information, input and quality control observations, Decode and Encode Meteorological codes.
Assessment criteria	5.1 Use AIFS to retrieve messages 5.2 Use AIFS to correct and resend messages 5.3 Use AIFS to enter rainfall and synoptic observations into CMSS
Delivery	Delivery is by blended learning including on the job training in a classroom environment and online exercise (moodle)
Learning resources	Bureau of Meteorology current edition, *Codes Handbook*, Bureau of Meteorology, Melbourne Air Services Handbook WMO Manual on Codes Various Codes Handbooks
Occupational health and safety requirements	A safe environment and information regarding hazards will be provided for participants with regard to: Ergonomic computer workstations

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 2
Basic Meteorology

- Basic Physical & Dynamic Meteorology
- Basic Synoptic & Mesoscale Meteorology

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

Module Name: Basic Meteorology

Nominal Duration: 30 Hours

Module code: OBS-MET

Module purpose: Provide the students with a sound working knowledge of atmospheric processes so that they can provide clear and concise answers to questions from the public relating to meteorology and be able to decide when and where to direct the client for more detailed information.

Provide knowledge of meteorological factors affecting observations and to utilize this knowledge in ensuring the quality and timeliness of the observational data gathered.

Prerequisites: NIL

Assessment method: Written Examination

Learning Outcomes:

Basic physical and dynamic meteorology

The overall aim of the learning outcomes dealing with basic physical and dynamic meteorology is to ensure an individual shall be able to:

- Explain the basic physical and dynamical processes that take place in the atmosphere.
- Explain the physical principles used in instruments to measure atmospheric parameters.

Learning outcomes – able to:

- *Atmospheric composition and structure.* Describe the composition of the atmosphere and explain its vertical structure.
- *Radiation.* Explain the diurnal, latitudinal and seasonal variations in the radiation reaching the Earth's surface, describe the differences between short- (solar) and long-wave (terrestrial) radiation, describe the processes affecting short- and long-wave radiation (i.e., reflection, scattering and absorption of radiation), outline the heat budget of the Earth's atmosphere, explain the greenhouse effect, explain the role of ozone in affecting ultraviolet radiation, and describe the heat balance at the surface and how it varies with latitude.
- *Atmospheric pressure.* Explain why pressure varies with height, explain the effect of temperature and humidity on the variation of pressure with height, and explain why pressure is often reduced to mean sea level.
- *Atmospheric temperature.* Describe the heating and cooling effect of convection, advection, turbulence and evaporation/condensation, explain the effect of water vapour, cloud and wind on the surface air temperature, explain the diurnal variation in surface air temperature, and describe the main factors that affect the global distribution of surface air temperature.
- *Atmospheric humidity.* Explain why humidity is important, explain the concepts of vapour pressure, saturated vapour pressure, wet-bulb temperature, dew point and relative humidity, and describe the factors that affect the rate of evaporation.
- *Atmospheric stability.* Describe the causes of variations in atmospheric stability, explain the concepts of dry adiabatic lapse rate, saturated adiabatic lapse rate and environmental lapse rate, explain various types of stability (e.g., absolute, conditional, neutral), explain the role of temperature inversions, and describe how stability and instability develop.
- *Wind.* Explain why winds occur, describe the pressure gradient force and Coriolis force, and explain concepts of the geostrophic and gradient winds, describe the effect of friction on the wind, and explain the causes of common local winds caused by topography (e.g., sea/land breezes, foehn winds and katabatic/anabatic winds).
- *Clouds, precipitation and thunderstorms.* Explain why rising motion leads to the formation of clouds, describe the main mechanisms for the formation of clouds, describe the processes that produce precipitation, and describe the triggering processes for thunderstorms and their life cycle.

- *Dew, frost and fog*. Describe the factors affecting visibility, explain the formation of dew and frost, and explain the causes of fog with emphasis on radiation and advection fog.
- *Atmospheric optics and electricity.* Explain the formation of rainbows, haloes, blue skies and lightning.

Basic synoptic and mesoscale meteorology

The overall aim of the learning outcomes dealing with basic synoptic meteorology is to ensure an individual shall be able to:

- Describe the formation, evolution and characteristics of synoptic-scale and mesoscale tropical, mid-latitude and polar weather systems, and analyse weather observations.
- Describe the forecast process and the use made of the associated products and services.

Learning outcomes – able to:

- *Weather at a specific location*. Explain how the weather experienced at a specific location is a combination of effects acting on different time and space scales.
- *Bodies of airs*. Describe and explain the origin, characteristics, movement and modification of bodies of air.
- *Mid-latitude and polar weather systems*. Describe the characteristics of depressions, anticyclones, troughs and ridges and their associated weather, with emphasis on those affecting the region of responsibility, describe the characteristics of warm, cold and occluded fronts and the weather associated with their passage, and describe the relationship between jet streams and weather systems.
- *Main tropical disturbances*. Describe the main tropical disturbances and their associated weather, including the ITCZ, tropical depressions, monsoons and El Niño-Southern Oscillation (ENSO).
- *Mesoscale systems*. Describe the formation and characteristics of important mesoscale features affecting the region of responsibility.
- *Hazardous weather*. Describe the formation and characteristics of hazardous weather systems (e.g., thunderstorms, and tropical cyclones) affecting the region of responsibility, the extent to which they can be forecast, and their impact on society.
- *Surface pressure diagrams*. Identify the main synoptic features on surface pressure diagrams and the associated satellite and radar imagery, and describe the typical weather associated with those features.
- *Upper-air diagrams*. Describe different types of upper-air diagrams, including height charts on constant pressure surfaces, identify the main synoptic features on the diagram and the associated satellite and radar imagery, and describe the typical weather associated with those features.
- *Aerological diagrams*. Describe the physical ideas that form the basis of aerological diagrams and perform basic operations on the diagram.
- *Display and mapping systems*. Discuss the common systems used within Meteorological Services to (a) display and map data and (b) prepare products and services for users, along with the benefits and shortcomings of the systems.
- *Forecast process.* Describe the forecasting process, describe the principles behind numerical weather prediction (NWP), and interpret basic operational NWP output.
- *Key products and services*. Describe the key products and services, including warnings of hazardous weather conditions, based on current and forecast weather information that are provided to the public and other users.
- *Function of National Meteorological Services*. Describe the function of National Meteorological Services in monitoring and forecasting the weather and the role of other service providers.

Suggested resources

Gedzelman: Science and Wonders of the Weather.
Selected ad-hoc lecture notes and revision tools.
Bureau of Meteorology Web site
British Met Office Web site
NOAA Web site

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 3
Surface Observations - Aviation

- General Meteorology
- Surface Observations – Aviation Principles
- Surface Observations – Aerodrome Weather Reports Practical

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

Aerodrome Weather Observer (AWO) Course

Module 1
General Meteorology - Aviation

Module Name: General Meteorology

Nominal Duration: 30 hours

Module code: **AWO**

Module purpose: Provide knowledge of meteorological factors affecting observations and to utilize this knowledge in ensuring the quality and timeliness of the observational data gathered.

Prerequisites: Nil. Stand alone course.

Relationship to Skill standards:
Meets or exceeds CASA Day VFR. ICAO Meteorology 010

Learning Outcomes:

On successful completion of this module participants should be able to:

1. Give clear and concise explanation of forecasts and forecast products, meteorological charts, including their scope, as well as questions relating to basic meteorology and climatology.
2. Use principles and empirical tools based on basic meteorology to enhance the observations and quality controls.
3. Explain and interpret physical processes and features of the atmosphere.
4. Describe and interpret Radar imagery to aid local and near real time observations and possible trends in aerodrome observations.
5. Describe and decode Meteorological Observations, Forecasts, Warnings and Charts.

Summary of Content:

Descriptive Meteorology Topics

Role of BOM/WMO **1 hour**

- Components of Met Services
- WAFCs
- TCWCs
- IAVWs
- MWOs

Composition of the Atmosphere **1 hour**

- Vertical Structure of the Atmosphere
- Distribution of the Gasses
- Temperature and wavelength
- Reflection, scattering, absorption and Albedo
- SWR, LWR
- Ozone formation and UV heating
- Surface heating
- LWR and atmospheric interactions
- Effect of Green House gasses (H_2O, CO_2, CH_4)

Atmospheric Pressure and Altimetry **1 hour**

- Causes.
- Vertical pressure changes
- Horizontal pressure changes

- Isobaric patterns
- Principles of Altimetry
- Density altitude

Forces on the wind **1 hour**

- Pg & Coriolis
- Geostrophic wind
- Circulation in the friction layer

Atmospheric Circulation **1 hour**

- Causes of atmospheric circulation
- Hadley cell circulation
- Effects of rotation
- Effects of topography
- General Global Circulation
- Mean Seasonal Synoptic Pressure Patterns

Local Winds **1 hour**

- Land & sea breeze; anabatic and katabatic winds
- Conditions for development, maximum and minimum effects
- Interaction with 'prevailing' winds
- Fohn effects and rain-shadows

Upper winds **1 hour**

- How Winds change through the atmosphere
- Jetstreams

Synoptic Weather Features Air Masses and Fronts **1 hour**

- Fronts
- Lows
- Highs

Vertical Stability of the atmosphere **1.5 hour**

- Concept of equilibrium
- Adiabatic processes
- Lapse rates
- Inversions
  - Radiation
  - Subsidence
  - Nocturnal
  - Frontal
  - Turbulent mixing
- Cloud types and heights
- Vertical extent of cloud TCU CB

Cloud and precipitation processes **1 hour**

- Collision/coalescence
- Ice Bergeron process
- Convection and convergence
- Clouds produced by wide spread ascent, rain and snow
- Orographic clouds

Aeronautical Turbulence **1 hour**

- Classification
- Types
- Affects of turbulence on aircraft

Thunderstorms (TS) **2 hours**

- Life-cycle
- Description of features

- Triggering processes
- Weather associated with TS
- Effect of wind shear on life cycle
- Thunderstorm types

Icing **1 hour**

- Icing and Aircraft Performance
- Icing Types
- Conditions conducive to formation of aircraft icing

Visibility **1.5 hours**

- Fog Formation Processes
- Fog types
- Fog clearance processes
- Conditions for dust and sandstorms

Tropical systems and associated weather **1 hours**

- Equatorial Trough
- The ITCZ
- Heat lows
- Walker circulation
- MJO
- East Pacific warming and El Nino & La Nina
- Trade winds
- Monsoons
- Climatology of the tropics

Tropical cyclones **1 hour**

- Conditions for formation
- Lifecycle
- Structure
- Preferred zones
- Basic movement, tracks
- Associated weather, storm surges

Meteorological Charts **1 hour**

- Synoptic & Prognosis Charts
- Upper wind charts
- Sigwx Progs
- Satellite Imagery

Aeronautical Meteorology Reports (Forecasts and Warnings) **5 hours**

- Metar/Speci
- TAF/TTF/ARFOR/SIGMET
- AREA QNH/Route Forecast
- AIRMET
- AIREP
- SIGMETS
- AERODROME WARNINGS

Volcanic Ash **30 mins**

- Hazards Associated with Volcanic Ash
- Volcanic Activity, warnings, observations and reports

Sources of Meteorological Warnings and Broadcasts **30 mins**

- AERIS
- VOLMET
- ATIS
- AWIB

Radar Imagery **1 hour**

- Interpret radar imagery
- Limitations of radar imagery

Revision, Exam and course review. **4 hours**

Total Course time **30 Hours**

Assessment Strategy:

Assessment Method: The module is assessed by regular revision exercises and short written tests, designed to assess level of knowledge. When and where appropriate oral and practical demonstration of knowledge may be used.
Assess understanding, research and communications skills by individual or group projects, which will entail oral, written and visual presentations of selected topics.

Airservices ATC

RPL is granted to Airservices Personnel as this Module is completed by Airservices Learning Academy.

RAAF ATC

Module 1 for RAAF School of ATC at East Sale is delivered by East Sale MO Meteorologists and the assessment is by means of Examination.

Conditions of Assessment

Participants must demonstrate mastery of each of the Learning Outcomes in an "operational" and classroom setting.

Learning Outcomes details.

Learning Outcome 1

Give clear and concise explanation of forecasts and forecast products and charts, including their scope, as well as questions relating to basic meteorology and climatology.

Assessment Criteria

Demonstrate competence by providing correct answers to written revision exercises and progress test of the content of the topics covered in Observational Meteorology.

Using forecasts and forecast products, such as analysis and prognosis charts, satellite images provide an explanation for the expected weather at selected locations.

Either alone or as a member of a small group research a topic related to Meteorology and produce a short written, oral or visual presentation.

During simulation of field office running provide information about forecasts and weather processes to mock clients, either face-to-face or by telephone.

Learning Outcome 2

Use principles and empirical tools based on basic meteorology to enhance the observations and quality controls.

Assessment Criteria

Demonstrate competence during practical observations by using tools and methods based principles of atmospheric processes estimate or measurement meteorological parameters. Use methods to highlight possible errors in data or its acquisition.

Learning Outcome 3

Explain and interpret physical processes and features of the atmosphere.

Assessment Criteria

Demonstrate competence by applying meteorological theory to determine possible cloud heights, types and probability of convection.

Learning Outcome 4

Describe the Aerodrome Climatology.

Assessment Criteria

Demonstrate competence through listing times of the day and year the Aerodrome encounters aviation significant weather phenomena.

Final Assessment

Final assessment will be via examination with a pass mark of 70%.

Suggested resources

Manual of Aviation of Meteorology
Selected lecture notes and revision tools.
Bureau of Meteorology Web site

BUREAU OF METEOROLOGY
TRAINING CENTRE
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GPO BOX 1289
MELBOURNE,
VICTORIA 3001
AUSTRALIA

Aerodrome Weather Observer (AWO) Course

Module 2
Surface Observations - Aviation

MODULE TITLE	**Aviation Principles**
Nominal duration	30 hours
Discipline Code	(AWO)
Module purpose	To provide participants with the theory and skills to prepare, record and transmit Aerodrome Weather Observations and reports.
Prerequisites	Desirable to have completed Part A of the AWO course.
Relationship to skill Standards	Complies with ICAO Annexe 3 and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	The reasons for Aerodrome Weather Observations · The structure of Aerodrome Weather Observations · Rules for entry in the A37 Register of Weather Reports · Rules for reporting visibility weather and cloud in Aerodrome Weather Observations. · Criteria for the issuance of a SPECI weather report. · Phenomena hazardous to aircraft. · Importance of timeliness with the issue of Aerodrome Weather Observations.
Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.
Conditions of assessment	The assessment of this module will be an open book examination with a nominal time of 2 hours.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	List the users of Aerodrome Weather Observations and explain how each user accesses the data and how the data is used.
Assessment criteria	1.1 List the users of Aerodrome Weather Observations. 1.2 Explain how each user accesses the data from an Aerodrome Weather Observations. 1.3 Describe how the data is used by each user.

Learning outcome 2 List the source reference documents used for the production of Aerodrome Weather Observations.

Assessment criteria

2.1 List the source documents dealing with the regulations regarding Aerodrome Weather Observations

2.2 Locate, monitor and decode aviation related meteorological observations and data on the Web.

Learning outcome 3 Decode a METARAWS or SPECIAWS message and identify differences between METARAWS AUTO and METARAWS messages.

Assessment criteria

3.1 Decode a METAR/SPECIAWS message.

3.2 Identify differences between a METARAWS AUTO message and a METARAWS message with manual input.

Learning outcome 4 Apply prescribed procedures to complete an A37 Register of Weather Reports form or equivalent.

Assessment criteria

4.1 Complete entries in the A37 Register of Weather Reports or equivalent within prescribed procedures.

Learning outcome 5 Determine whether SPECI reports or METAR reports should be issued given a set of meteorological conditions.

Assessment criteria

5.1 Apply Table 6.1 and 6.2 of the Aeronautical Services Handbook to determine the circumstances under which a SPECI weather report should be issued.

5.2 Describe the procedure to end SPECI weather reports following an improvement in the weather..

Learning outcome 6 Report cloud in an Aerodrome Weather Report in the prescribed manner.

Assessment criteria

6.1 Identify and determine which cloud is reported and which cloud is not reported for various cloud combinations in accordance with prescribed practice.

6.2 Recall how to report clouds in an Aerodrome Weather Observation when there are different clouds at the same level.

6.3 Report the clouds in the manner prescribed by Observation Instructions when there are Towering Cumulus and Cumulonimbus clouds at the same level.

Learning outcome 7 Determine what phenomena hazardous to aircraft should be reported in the Remarks section of an Aerodrome Weather Report.

Assessment criteria

7.1 Determine what should be reported in the Remarks Section of an Aerodrome Weather Report when hazardous weather is encountered such as:

- Fog, Fog patches and Fog at a distance
- Thunderstorms, Thunderstorms in the vicinity and distant lightning
- Downbursts, microbursts and wind shear
- Hail and Icing
- Low cloud
- Dust storms and sandstorms
- Thick smoke or haze
- Dust whirls.

Learning outcome 8 Explain why timeliness is important during the issuance of Aerodrome Weather Observations.

Assessment criteria

8.1 Explain why QNH reports must be no older than 15 minutes.

8.2 Explain how a Trend Type Forecast and a Terminal Aerodrome Forecast is dependent on the Aerodrome Weather Report.

8.3 Describe the implications of a lack of timely reporting on the aviation industry.

Learning outcome 9 Define terminology with limited meaning used in Aerodrome Weather Observations.

Assessment criteria

9.1 Define AWO-specific terms such as:

- Runway Visual Range
- Haze
- Smoke
- Mist
- At the aerodrome
- In the vicinity
- Distant thunder
- CAVOK
- Towering Cumulus
- Highest Alternate Minima
- Multiple Minima
- 25NM Minimum Sector Altitude

Learning outcome 10 Define and identify present weather phenomena and codes as used and reported in Aerodrome Weather Observations.

Assessment criteria

10.1 Define AWO present weather terms such as

- All forms of precipitation including frozen precipitation
- Showers
- Thunderstorms
- Mist
- Fog including Shallow Partial and Patches
- Squalls
- Funnel Clouds
- Sand and Dust Storms
- Raised Sand and Dust including blowing and drifting
- Blizzard including whiteout and snow/ice surface and horizon definitions
- Dust Devils

Learning outcome 11 Define meteorological visibility with respect to AWO

Assessment criteria

11.1 Define the following terms as used in Aerodrome Weather Observations and apply in practice

- Minimum Visibility
- Directional Visibility
- Prevailing Visibility
- Maximum Visibility

Delivery	This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hands-on training but also uses paper based and computer based methods.
Learning resources	*Aeronautical Services Handbook*, Bureau of Meteorology, Melbourne, current version *Authorised Observer Course Notes*, Bureau of Meteorology Training Centre, Melbourne, current version Aviation Specific Meteorological Web pages PC connected to an Automatic Weather Station running *MetConsole* software if available.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

Aerodrome Weather Observer (AWO) Course

Module 2
Surface Observations – Aviation
Suggested Time Allocated to Topics

This section details time allocated to the syllabus for Part B of the three part training course for the accreditation of personnel to perform Aerodrome Weather Observations at Australian and Defence Aerodromes for Airservices and RAAF Personnel.

Part 2 Course Structure
The course is conducted over 30 hours with 6.5 hours per day for the first 4 days.

On day five, one hour of revision is followed by a 2 hour examination; break of 1.5 hours while examiner marks the papers and then 1 hour exam and course review.

Practical Observations during the theory.
Practical observations of Visibility, Weather and Cloud will be preformed where it is deemed suitable instead of classroom tuition to explain concepts and weather phenomena.

Topic and Time

The training course will include instruction in the following;

(a) Introduction
The importance of aerodrome weather reports; who uses them and how are they used.
30 Mins

(b) Codes:
Meteorological Aerodrome Weather Reports including TTF:
METAR/SPECIAWS /AUTO
Coding and decoding of elements within the Metar and Speci Code, including automatically generated messages and messages with manual input of Visibility, Weather and Cloud including, TTF.
(Decode exercise)

30 Mins

(c) Recording Observations Using the Register of Weather Reports (A37)
The procedure for entering Aerodrome Weather Observations using prescribed BoM practices onto the A37 and the approved procedure for correcting errors.
(Classroom Exercise) ***1 Hour***

(d) Wind
Interpret, record and disseminate observations of mean surface wind direction, speed and gusts, as applicable using automated authorised BoM AWS anemometers, wind vanes, and where applicable due to equipment failure, estimation of wind speed using the Beaufort scale and wind direction using wind vanes or other suitable means.
(Exercise in wind estimation using Beaufort Scale) ***30 Mins***

(e) Visibility
Using suitable visibility markers, define horizontal surface visibility by day and by night.
Factors causing reductions in visibility. Determine prevailing, minimum and maximum visibility and entering on the A37. When to record and report sector reductions in visibility and when to record and report minimum and prevailing visibility. Discuss limitations of automated visibility equipment, when to accept and when to reject automated outputs.
(practical observations & classroom exercises) ***2 hours***

(f) Runway Visual Range(RVR)
Definition of RVR and when it is reported and included in aviation observations. Only used at Aerodromes with Transmissometers (currently Melbourne Airport Only).
(Decoding observations) ***30 Mins***

(g) Weather
Definitions and descriptions of various weather phenomena as used in Metar/Speci reports, including possible flying conditions. An understanding of the present weather codes and abbreviations and how visibility is affected by the various weather phenomena. Rules for reporting and encoding recent

weather. Significance of relative humidity and visibility in relation to reporting present weather. Recording weather codes on the A37.

(practical observations, classroom exercises) **5 *hours***

(h) Cloud

Procedure for taking and recording observations of cloud on the A37. Estimation of cloud amount(s). Guidance on identifying and recognition of the 10 basic cloud types plus Towering Cumulus. The significance and identification of the sub species; lenticularus and AC cast**el**lanus. Weather phenomena associated with cloud types. Aviation hazards and flying conditions associated with cloud types. Determining the height of cloud bases above the aerodrome using automated equipment, visual estimation, topographical features, aircraft reports and other procedures as deemed suitable. Procedure when sky obscured or no cloud present. Discuss limitations of automated ceilometer equipment and reports.

(practical observations, classroom exercises) ***6 hours***

(i) Vertical Visibility

Procedure for recording and reporting vertical visibility ***15 Mins***

(j) Instrument Siting ***15 Mins***

For BoM Meteorologists, 5 hours

Exposure and maintenance of the automated and liquid in glass thermometers located in the instrument shelter as required. Maintenance of automated rainfall equipment. Procedure for dealing with negative temperatures. For other Organisations an introduction only is delivered.

(k) Pressure

Definition of QFE, QNH and QFF. Importance of disseminating accurate and timely QNH settings to aircraft.

30 Mins

(l) Wind Shear

Procedure for reporting and recording reported wind shear.

30 Mins

(m) Special Weather Reports

Criteria for the reporting of Special Weather Reports (SPECI) at multiple minimum aerodromes based on aircraft performance criteria.

(practical observations where applicable + classroom, exercises)

5.5 Hours

(n) Meteorological Charts and Forecast

Interpretation of actual/forecast surface and upper level charts and other relevant information as deemed appropriate to assist observers in understanding the visibility, weather and cloud patterns likely during their period of meteorological watch.

(classroom discussion at the beginning of each of days 1-4)

30 Mins per day total 2 hours

(o) Hazardous Weather Identification

Identifying weather hazardous to the safe operation of aircraft from visual observations such as, but not limited to, downdrafts originating from convective `activity, wind shear from cloud features such as roll clouds associated with frontal or convective activity.

(visual guide to aviation hazards in classroom)

30 Mins

(p) CAVOK

Criteria for the use of CAVOK

(classroom exercises)

30 Mins

(p) Exam

One hour revision for examination

Two Hour Examination consisting of Question and Answers

One hour exam and course review

4 Hours

Total 30 Hours

Suggested Course Struture:

Day 1

(a)	**Introduction**	***30 Mins***
(b)	**Weather Briefing**	***30 Mins***
(c)	**Codes:**	***30 Mins***
(d)	**Recording Observations on the Register of Weather Reports (A37)**	***1 Hour***
(e)	**Wind**	***30 Mins***
(f)	**Cloud**	***3.5 Hours***

Day 2

(e)	**Weather Briefing**	***30 Mins***
(f)	**Cloud Identification & Formation**	***2.5 Hours***
(g)	**Visibility**	**2** ***Hours***
(h)	**Weather**	***1.5 Hours***

Day 3

(h)	**Weather Briefing**	***30 Mins***
(i)	**Weather**	**3***.5 Hours*
(j)	**Special Weather Reports**	***2.5 Hours***

Day 4

(k)	**Weather Briefing**	***30 Mins***
(l)	**Special Weather reports**	***3 Hours***
(m)	**RVR, Vertical Visibility, Pressure, Wind Shear, Instrument Siting, Hazardous Weather, CAVOK**	***3 Hours***

Day 5

(n)	**Revision**	***1 Hour***
(o)	**Exam**	***2 Hours***
(p)	**Exam and course review**	***1 Hour***

Total time ***30 Hours***

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Aerodrome Weather Observer (AWO) Course

Module 3
AERODROME WEATHER OBSERVATIONS - PRACTICAL

Aviation Practical Observations (METAR/SPECI/ATIS)

Nominal Duration 30 hours

Module purpose On completion of this module the participant will be able to perform Aviation Observations to a standard approved by the Bureau of Meteorology.

Prerequisites

Completion of General Meteorology Module (Module 1 of AWO course or equivalent and completion of Module 2 of AWO course)

Summary of content
Performing Aerodrome (Aviation) Weather Observations.

Recording Aviation Weather Observations to Bureau of Meteorology standards using MetConsole software (if available) and an A37 Register of Weather Reports or equivalent.

Assessment method

At the completion of training an Aviation Weather Observation will be issued and recorded within ICAO standards.

For Airservices and RAAF ATC Personnel, on the job training for a nominal period of 30 hours with an BoM, ATC or RAAF personnel holding a current AWO certificate. A minimum of 4 hours of night time observations are recommended in conditions other than CAVOK.

Conditions of assessment

During assessment participants will require access to:

For Airservices and RAAF Personnel, a suitably equipped Control Tower with Bureau of Meteorology AWS readouts and equipment suitable for the recording and transmitting of ATIS reports. Bureau of Meteorology Assessment report form to be signed and submitted to:
Aerodrome Weather Observer Course Supervisor BMTC. (Bureau of Meteorology Training Centre).
Certificates will be issued by Bureau of Meteorology when Part 3 assessment form is received by Bureau of Meteorology Training Centre.

Learning outcomes
On completion of this module the participant will be able to:

Learning outcome 1
Assess the suitability of readouts of automated instruments to provide data for an Aviation Weather Observation (Metar/Speci/ATIS report or equivalent.

Learning outcome 2
Perform an Aviation Weather Observation within ICAO standards.

Assessment criteria
Observe the elements reported in an Aviation Weather Report using both instrumental and non-instrumental means and apply appropriate Quality Control procedures to the data observed. These elements include:

Visibility
- Minimum
- Direction of Minimum Visibility (if appropriate)
- Maximum (if appropriate)
- Prevailing (if appropriate)

Measured using:
- visual estimation
- Visibility meter
- Quality controlled by:
- comparing instrumental data with manually estimated data.

Weather:
- Present Weathers
- Intensity
- Proximity
- Descriptor
- Phenomena

- Recent Weathers

Measured using:

- Visual estimation
- Automatic Weather Station instruments:
- Ceilometer
- Tipping Bucket Rain gauge
- Relative Humidity sensor or equivalent
- Lightning flash counter
- Anemometer
- Temperature sensors
- Quality controlled by:
- Cross-checking with observations of:
- Wind
- Cloud
- Rainfall
- Humidity
- Visibility
- Application of meteorological principles learned in General Meteorology Module Part 1, Aerodrome Weather Observations Module 2.

Cloud:

- Amount
- Etage
- Type (11 types)
- Height
- Measured by:
- Visual estimation
- Quality controlled by:
- Comparison of estimation with:
- Ceilometer readings where applicable
- Other observations of cloud
- Aircraft reports (if available)
- Application of meteorological principles learned in AWO course Module Part 1 and 2.

Wind

- 1 minute
- average direction
- average speed
- maximum gust
- 10 minute
- average direction
- average speed
- maximum gust
- Measured using:
- An Automatic Weather Station
- Manual estimation using the Beaufort scale.
- Quality controlled by:
- Comparing instrumental data with manually estimated data.
- Application of meteorological principles learned in AWO Course Module 1 & 2.

Temperature

- Air Temperature
- Dew Point Temperature
- Measured using:
- Automatic Weather Station temperature sensors,
- Quality controlled by:
- Application of meteorological principles AWO Course Module 1 & 2.

Air Pressure

- QNH

- Measured using:
- An Automatic Weather Station
- Quality controlled by:
- Crosschecking of instruments.

Rainfall:

- 10 minute rain
- Past hour rain
- Measured using:
- Automatic Weather Station instruments:
- Tipping Bucket Rain gauge
- Quality controlled by:
- Manual estimation.

Learning outcome 3

Record an Aerodrome Weather Observation to the prescribed ICAO standard.

Assessment criteria

3.1 Apply ICAO practices to record observed Aerodrome Weather Report data using prescribed procedures. These practices will include the determination of the type of Aerodrome Weather Report used (METAR or SPECI).

3.2 Transmit the data in the form of an Aerodrome Weather Report/ATIS within the time required.

3.3 Record the Aerodrome Weather Report on an A37 Register of Weather Reports using Bureau of Meteorology prescribed practices or equivalent.

Delivery

This unit provides for delivery by on or off the job training. It lends itself to practical demonstrations and requires simulations of on the job environments using operational equipment if not performed on the job.

Learning resources

Authorised Observer Course Notes, Bureau of Meteorology Training Centre, Melbourne, current version

A personal computer with MetConsole software installed connected to an operational Automatic Weather Station or equivalent equipment. (Desirable)

An appropriately equipped Instrument Enclosure.

An appropriately situated Observing Site free from obstructions with the horizon visible.

For Airservices and RAAF Personnel equipment suitable for the recording and transmission of ATIS or Aerodrome Weather Observations.

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- Ergonomic computer workstations,
- UV solar radiation hazards

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 4
Climate and Consultancy

Observations Training Unit and External Providers

- Small Scale Climate
- Australian Climate Analysis
- Climate Data Base – Eve & Climate Zone Extraction
- Climate DataBase – Theory of Measurement
- Meteorology and Agriculture

Professional Studies – Basic Climatology

- The climate system and its origins
- Local Climate
- Natural Climate Variability
- Anthropogenic Global Warming
- The Longer Term
- Assessment Online Quiz – Moodle

BMTC

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1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Small Scale Climate

Nominal duration	9 hours
Module code or number	OBS-SSC
Discipline Code	TO(Obs)
Module purpose	The purpose of this module is to give the participant an understanding of the effects of geography, society and synoptic events on the local climate and its measurement.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	▪ Microclimate, local climate, mesoclimate macroclimate ▪ The effect of topography ▪ The effect of synoptic events ▪ The effect of urbanisation ▪ The effect of land use ▪ The effect of latitude and altitude ▪ Limitations of measuring equipment
Assessment method	This module can be assessed by classroom question-and answer sessions, quizzes or assignments (both written or on-line).
Conditions of assessment	The assessment of this module will be open-book.
Learning outcomes	**On completion of this module the participant will be able to:**
Learning outcome 1	Define micro, local, meso and macroclimate and describe the features of each one.
Assessment criteria	1.1 Define micro climate and describe its features. 1.2 Define local climate and describe its features. 1.3 Define meso climate and describe its features. 1.4 Define macro climate and describe its features.
Learning outcome 2	Discuss the effect of topography on the measurement of climatic elements.
Assessment criteria	2.1 Discuss the effect of topography on the prevailing wind measured by an anemometer on a 10 metre mast. 2.2 Discuss the effect of topography on the temperature measured in the instrument shelter. 2.3 Discuss the effect of topography on the occurrance of frosts and fogs.
Learning outcome 3	Discuss the effects of synoptic events on the local climate.
Assessment criteria	3.1 Discuss the prevailing wind and how it is related to the position of high and low pressure systems on a synoptic scale. 3.2 Discuss how synoptic features can create thunderstorms and rainfall patterns to create a local climate.

Learning outcome 4	Discuss the effect of urbanisation on the local climate.	
Assessment criteria	4.1	Discuss how cities act as heat islands.
	4.2	Discuss how city observing sites can report erroneous winds and temperatures due to buildings in the immediate vicinity.
Learning outcome 5	Discuss the effect of land use on the local climate.	
Assessment criteria	5.1	Discuss how perennial cropping can vary the recorded temperatures at a weather station.
	5.2	Discuss how irrigation of pasture can vary the recorded humidity at a weather station.
Learning outcome 6	Discuss the effect of latitude and altitude on the local climate.	
Assessment criteria	5.1	Discuss how latitude can effect a weather station's temperature
	5.2	Discuss how altitude can effect a weather station's temperature and rainfall.

Delivery

This module provides for delivery by off the job training by a number of different modes including face-to-face classroom style lectures or external learning using paper-based or online methods.

Learning resources

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- Ergonomic computer workstations,

MODULE TITLE Australian Climate

Nominal duration	6 hours
Module code or number	OBS-AUSCLIM
Discipline Code	TO(Obs)
Module purpose	The purpose of this module is to give the participant an understanding of the characteristic features of the Australian climate
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	▪ Features of Australian climatology ▪ Preparation of the Seasonal Climate forecast ▪ Trends in Australian climate
Assessment method	This module can be assessed by classroom question-and answer sessions, quizzes or assignments (both written or on-line).
Conditions of assessment	The assessment of this module will be open-book.
Learning outcomes	On completion of training the participant will be able to:
Learning outcome 1	Identify features of the Australian Region climatology
Learning outcome 2	Understand factors considered in the preparation of the seasonal climate forecasts of the Australian Region.
Learning outcome 3	Identify trends in Australian climatology derived from observational data.
Delivery	This module provides for delivery by off the job training by a number of different modes including face-to-face classroom style lectures or external learning using paper-based or online methods.
Learning resources	

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- Ergonomic computer workstations,

MODULE TITLE **Climate Database – Theory of Measurement**

Nominal duration	3 hours
Module code or number	OBS-TOM
Discipline Code	TO(Obs)
Module purpose	The foundation of the Bureau's success depends on the quality of its measurements. To ensure measurement data quality it depends on each and every person involved understanding the Bureau's methods, instruments and measurements. This will enable them to adopt behaviours which will support and not corrupt the measurement chain.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- History and importance of forecasting.
- The WMO and Regional Instrument Centres. What do they do, and why.
- The Bureau's reference measurement standards and their uncertainty.
- The Bureau's field instrumentation and their field uncertainty/tolerances.
- Measurement statistics and sample distributions.
- Measurement weaknesses and characteristics of instruments.
- Definitions for important concepts in metrology "measurement science".
- The performance characteristics of Bureau's field instruments.
- How the Bureau's achieves measurement traceability back to international standards.

Assessment method	This module can be assessed by classroom interaction
Learning outcomes	On completion of training the participant will be able to:
Learning outcome 1	To ensure measurement data quality it depends on each and every person involved understanding the Bureau's methods, instruments and measurements. This will enable them to adopt behaviours which will support and not corrupt the measurement chain.
Delivery	This module provides for delivery by off the job training by a number of different modes including face-to-face classroom style lectures or external learning using paper-based or online methods.

Learning resources

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- Ergonomic computer workstations,

MODULE TITLE	**Climate Database – Eve and Climate Zone extraction**
Nominal duration	1.5 hours
Module code or number	OBS-EVE
Discipline Code	TO(Obs)
Module purpose	Familiarization and understanding of Eve and Climate Zone products for climate data extraction requests.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Eve Database extraction • Climate zone extraction
Assessment method	This module can be assessed by classroom interaction
Learning outcomes	On completion of training the participant will be able to:
Learning outcome 1	Use and interpret services and products available from the Bureau for climate data requests.
Assessment criteria	*1.1* Access limited meteorological information from database packages such as: • Eve • Climate Zone
Delivery	This module provides for delivery by off the job training by a number of different modes including face-to-face classroom style lectures or external learning using paper-based or online methods.
Learning resources	
Occupational health and safety requirements	A safe environment and information regarding hazards will be provided for participants with regard to: • Ergonomic computer workstations,

MODULE TITLE Meteorology and Agriculture

Nominal duration	3 hours
Module code or number	OBS-AG
Discipline Code	TO(Obs)
Module purpose	The purpose of this module is to give the participant an understanding of how a farmer uses meteorological information to plan their activities.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• The effect on farming activities of various meteorological phenomena • How primary producers use various Bureau Climate products.
Assessment method	This module can be assessed by classroom question-and answer sessions, quizzes or assignments (both written or on-line).
Conditions of assessment	The assessment of this module will be open-book.
Learning outcomes	On completion of training the participant will be able to:
Learning outcome 1	Discuss why and how rainfall is important to Primary Production activities.
Assessment criteria	1.1 Discuss the effect rainfall can have on dryland farming, irrigated farming and horticulture. 1.2 Identify the positive effects of the right amount of rainfall at the right time for dryland and irrigated pasture. 1.3 Identify the negative effects of the wrong amount of rainfall at the wrong time for haymaking, cropping and horticulture.
Learning outcome 2	Discuss why and how temperature is important to Primary Production activities and identify ways to mitigate heat and cold problems.
Assessment criteria	2.1 Discuss the effect cold temperatures and frosts can have on cropping, horticulture and animal husbandry. 2.2 Discuss the effect high temperatures can have on cropping, horticulture and animal husbandry. 2.3 Identify methods farmers use to mitigate the undesireable effects of heat and cold
Learning outcome 3	Discuss why and how wind is important to Primary Production activities and identify ways to mitigate wind problems.
Assessment criteria	3.1 Discuss the effect excessive wind speed and wind chill can have on cereal farming, horticulture and animal husbandry. 3.2 Identify ways to mitigate wind damage to the crops in a paddock. 3.3 Identify ways to mitigate wind chill on farming animals when the Bureau issues a sheep weather warning.

Learning outcome 4	Discuss how farmers can vary their practices to continue to operate during periods of below-average rainfall.
Assessment criteria	4.1 Discuss how dryland farmers vary their practices to continue to operate during drought.
	4.2 Discuss how sheep and cattle graziers vary their practices to continue to operate during drought
	4.3 Discuss how a horticulturist can vary their practices to continue to operate during drought.
Learning outcome 5	Discuss how farmers use Climate Products such as the Seasonal Climate Outlook, the ENSO Wrap-Up and the Indian Ocean Dipole to plan their activities.
Assessment criteria	5.1 Discuss how primary producers use the Seasonal Climate Outlook to plan their planting, harvest and animal breeding strategies.
	5.2 Discuss how primary producers use the ENSO Wrap-Up to plan their planting, harvest and animal breeding strategies.
	5.3 Discuss how primary producers use the Indian Ocean Dipole to plan their planting, harvest and animal breeding strategies.
Delivery	This module provides for delivery by off the job training by a number of different modes including face-to-face classroom style lectures or external learning using paper-based or online methods.

Learning resources

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- Ergonomic computer workstations,

MODULE TITLE	**Basic Climatology**
Nominal duration	8 hours
Module code or number	OBS-BASCLIMAT
Discipline Code	TO(Obs)
Module purpose	The purpose of this module is to give the participant an understanding of basic climatology.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill	Complies with WMO Meteorological Technician Level
Standards	Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	Basic Climatology Concepts.
Assessment method	This module can be assessed by classroom question-and answer sessions, quizzes or assignments (both written or on-line).
Conditions of assessment	The assessment of this module will be open-book.
Learning outcomes	The overall aim of the learning outcomes dealing with basic climatology is to ensure an individual shall be able to:
Learning outcome 1	Describe the general circulation of the atmosphere and the processes leading to climate variability and change.
Learning outcome 2	Describe the use made of products and services based on climate information.
Learning outcome 3	Features of the global circulation. Explain the main features of the global circulation of the atmosphere and oceans and their temporal (diurnal, seasonal, annual) variability.
Learning outcome 4	Regional and local climates. Explain the factors that determine regional and local climates.
Learning outcome 5	Classifying and describing climates. Describe the techniques for classifying the climate, including the Köppen method.
Learning outcome 6	Local climate. Describe the climatology and seasonal changes of the region of responsibility and the climatic trend in that region.
Learning outcome 7	Climate variability and climate change. Describe the difference between climate variability and climate change, describe the basic concepts behind the greenhouse effect and the basic science involved in human-induced climate change, and describe the basis for climate predictions.
Learning outcome 8	Seasonal forecasts. Outline the process and scientific basis for making seasonal forecasts.
Learning outcome 9	Climate data. Describe how climate data is captured, collected and quality-

controlled in the meteorological service.

Learning outcome 10	Climate statistics. Describe how climate data is analysed in terms of its distribution (e.g., frequency and cumulative frequency), central tendency and variation.
Learning outcome 11	Key products and services. Describe the key products and services based on climate information that are provided to the public and other users.
Delivery	This module provides for delivery by off the job training by a number of different modes including face-to-face classroom style lectures or external learning using paper-based or online methods.

Learning resources

Occupational health and safety requirements

A safe environment and information regarding hazards will be provided for participants with regard to:

- Ergonomic computer workstations,

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 5
Radar and Upper Air Observations

- Upper Air Principles
- Pilot Code
- Upper Wind Systems – Optical Theodolite
- Upper Wind Systems – PC-RADWIN
- Upper Wind Systems – DigiCORA III Wind Only
- Upper Wind Systems – Wind Profiler

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE UPPER AIR PRINCIPLES

Nominal duration 3 Hours

Module code or number OBS-UAPRIN

Discipline Code TO(Obs)

Module purpose To provide the participant with the theory and principles that underpin the performance of an Upper Air Sounding. This module is a pre-requisite for the Upper Air Prac modules.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Upper Air Observations – An Introduction
- Heights in the atmosphere
- Radiosonde GPS windfinding

Assessment method Assessment of this module could be in the form of written short-answer questions or computer-based quizzes.

Conditions of assessment During assessment participants will have reference to various reference books, calculators, notes and other learning aids as required.

Learning outcomes On completion of this module the participant will be able to:

Learning outcome 1 Understand the Upper Program within the Bureau of Meteorology.

Learning outcome 2 Discuss different methods of establishing height.

Assessment criteria

2.1 Contrast various concepts of height such as

Geometric height

Elevation

Geopotential height

Pressure height

Climatological heights of standard pressure levels.

Learning outcome 3 Describe principle of operation of GPS windfind radiosondes.

Delivery This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but also lends itself to practical demonstrations and simulations using operational equipment.

Learning resources

Codes Handbook (Volumes A and B), Bureau of Meteorology, Melbourne, 1991

Hydrogen Handbook, Bureau of Meteorology, Melbourne, 1992

Radiosondes

Upper Wind Observations Handbook, Bureau of Meteorology, Melbourne, 1967

Upper Air Handbook (Volumes 1, 2 and 3), Bureau of Meteorology, Melbourne, 2001

Windfind radar with PC-RADWIN software

Occupational health and safety requirements	A safe environment will be provided for participants with regard to; · Ergonomic computer workstations · Electromagnetic radiation hazards · Hydrogen hazard zones

MODULE TITLE Pilot Code

Nominal duration	1.5 hours (1 x 1.5 hour sessions)
Module code or number	OBS-PILOT
Discipline Code	TO(Obs)
Module purpose	To enable participants to effectively code and decode Pilot messages
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology. Conforms with guidelines detailed in the Bureau of Meteorology Codes Handbook, the AIFS operating procedures, and the Bureau of Meteorology Email and Internet Policies. This module is normally delivered in parallel with Surface Observation Practical (Aviation) and Radar. It is a prerequisite for successful completion of the module Surface Observations – Aviation..
Summary of content	Use the Codes Handbook to reference the Pilot code.
Assessment method	The participant will demonstrate proficiency at performing to Bureau of Meteorology standards as follows: • Coding and decoding • Retrieval and collation of information from the Codes Handbook.
Conditions of assessment	Assessment will be performed using assignments, written examinations and practical demonstrations. Demonstration of competency in this module is necessary to complete the TO(Observer) course.
Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Use the Codes Handbook to reference the Pilot code.
Assessment criteria	1.1 Use the Codes Handbook to reference the Pilot code.
Learning outcome 2	Use CMSS to retrieve data and verify system message is received.
Assessment criteria	2.1 Use CMSS to retrieve a Pilot message
Learning outcome 3	Encode meteorological data into an Pilot code.
Assessment criteria	3.1 Encode a Pilot message.
Delivery	Delivery is by off the job training in a classroom environment. Some aspects of this module can be delivered on-line.
Learning resources	Bureau of Meteorology current edition, *Codes Handbook,* Bureau of Meteorology, Melbourne
Occupational health and safety requirements	A safe environment and information regarding hazards will be provided for participants with regard to: Ergonomic computer workstations,

MODULE TITLE Upper Wind Systems – Optical Theodolite

Nominal duration	16.5 hours
Module code or number	OBS-THEO
Discipline Code	TO(Obs)
Module purpose	On completion of this module, the participant will be able to perform an Upper Air Observation approaching Bureau of Meteorology accuracy standards using a Pilot Balloon Optical Theodolite
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer. To complete this module participants must be able to: • Safely inflate and release hydrogen filled balloons
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	This module will enable the participant to perform an Upper Air sounding using a Pilot Balloon Optical Theodolite. This involves: • Setting up the Theodolite. • Tracking the balloon and recording readings. • Calculating the resultant winds. • Selecting standard levels for inclusion in the PILOT PPAA and PPCC messages. • Selecting fixed, significant and maximum wind levels for inclusion in the PILOT PPBB and PPDD messages. • Calculate true north
Assessment method	The participant is required to perform an Upper Air Sounding using a Pilot Balloon Optical Theodolite.
Conditions of assessment	Assessment is conducted during the actual performance of an Upper Air Observation using a Pilot Balloon Theodolite in a simulated workplace environment.
Learning outcomes	On successful completion of this module the participant will be able to:
Learning outcome 1	Set up a Pilot Balloon Theodolite.
Assessment criteria	1.1 Demonstrate the correct handling and storage procedures for the Theodolite. 1.2 Mount and level the Theodolite 1.3 Determine Collimation error of Theodolite and apply Bureau of Meteorology performance standards. 1.4 Orient the Theodolite using a marker whose bearing is known.
Learning outcome 2	Track a Pilot Balloon.
Assessment criteria	2.1 Identify the priority of a Pilot Balloon flight in the daily observation schedule. 2.2 Identify the conditions under which a Pilot Balloon Theodolite flight should not be performed. 2.3 Calculate the time of release of a balloon for a given station altitude

	2.4 Acquire balloon and successfully record the first reading
	2.5 Track balloon and record readings at designated time intervals.
Learning outcome 3	Calculate resultant winds using the Wind.exe program.
Assessment criteria	3.1 Correctly make entries onto a F115P
	3.2 Calculate the resultant winds using the WIND program
	3.3 Identify Standard, Fixed and Significant Levels and Maximum Wind Levels
Learning outcome 4	Code and transmit an International Format PILOT message from a theodolite flight.
Assessment criteria	4.1 PILOT messages are coded correctly
	4.2 Messages are transmitted correctly using MetConsole software.
Learning Outcome 5	Describe the method used to perform a radar calibration flight and the method used to determine True North using a pilot balloon theodolite
Assessment criteria	5.1 Describe the method used to perform a radar calibration flight.
	5.2 Describe the method used to determine True North using a Pilot Balloon Theodolite.
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but also lends itself to practical demonstrations and simulations using operational equipment.
Learning resources	*Upper Air Handbook (Volumes 1, 2 and 3)*, Bureau of Meteorology, Melbourne, 2001 Surface Observations Handbook (Volumes A, B and C), Bureau of Meteorology, Melbourne, 1987 *Codes Handbook (Volumes A and B),* Bureau of Meteorology, Melbourne, 1991 *Hydrogen Handbook*, Bureau of Meteorology, Melbourne, 1992 WIND calculations program Personal computer running MetConsole® software
Occupational health and Safety requirements	A safe environment will be provided for participants with regard to; • "Sun Smart" OH&S procedures • ergonomic computer workstations • hydrogen hazard zones

MODULE TITLE PC-RADWIN (Upper Wind Systems)

Nominal duration	33 hours
Module code or number	OBS-RADWIN
Discipline Code	TO(Obs)
Module purpose	On completion of this module, the participant will be able to perform an Upper Air Observation to Bureau of Meteorology accuracy standards using a radar with a PC-RADWIN console.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer. To complete this module participants must be able to: • Safely inflate and release hydrogen filled balloons • Code the International format PILOT message
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Safely switch up a radar using a PC-RADWIN program (version 6.26) and perform pre-flight checks. • Acquire a balloon using the Optical Tracker • Re-acquire the balloon after the radar unlocks. • Select levels for inclusion in the International Format PILOT message. • Code and transmit an International Format PILOT message.
Assessment method	The participant is required to demonstrate the setup of the radar, the acquisition of the target, the re-acquisition of the target after the radar is unlocked, and the coding of a PILOT message from an exercise.
Conditions of assessment	Assessment is conducted during the actual performance of an Upper Air Observation using a radar and a PC-RADWIN console in a simulated workplace environment as well as from a written exercise in a classroom environment.
Learning outcomes	On successful completion of this module the participant will be able to:
Learning outcome 1	Demonstrate safety procedures and identify components of the WF100 radar.
Assessment criteria	1.1 Check radar dish before switching radar on 1.2 Identify components of the radar: Radar transmitter cabinet Wave Guide Main power switch Alternative optical tracker
Learning outcome 2	Switch up a windfind radar and perform pre-flight checks.
Assessment criteria	2.1 Check date/time on PC-RADWIN computer 2.2 Align radar to station permanent echo and apply Bureau of Meteorology tolerances to indicated parameters to determine if radar is serviceable.

2.3 Set up radar for release of balloon according to current weather conditions:

- Attenuator
- Range
- Azimuth
- Elevation
- Gain level
- Acquire gain
- Reset timer

2.4 Set up Optical Tracker for release:

- Correct tracker chosen
- Tracker made active
- Acquire mode selected
- Ensure radar dish responds to tracker

Learning outcome 3 Release and acquire balloon

Assessment criteria

3.1 Timer clock is started at appropriate time

3.2 Target is acquired in a timely manner:

- Within two minutes when balloon is overhead
- Within first minute when balloon is not overhead

3.3 Radar is switched to Auto Track mode.

3.4 Radar successfully tracks balloon and "Full Auto" is selected.

Learning outcome 4 Re-acquire balloon when radar locks off.

Assessment criteria

4.1 Problem is identified

4.2 Correct search techniques are employed

4.3 Target is re-acquired within 8 minutes

Learning outcome 5 Describe or demonstrate techniques to assist the radar track through difficult conditions.

Assessment criteria

5.1 Tracking through clutter (rain clutter or Permanent echoes) using techniques such as:

- Manual (reduced) gain
- Short pulse (if appropriate)
- Rate Freeze
- Manual steering

5.2 Tracking a balloon as it goes overhead

Learning outcome 6 Code and transmit an International Format PILOT message from a radar printout.

Assessment criteria

6.1 Initial readings with unreliable range data are calculated using Wind.exe.

6.2 Levels are selected correctly

6.3 PILOT messages are coded correctly

6.4 Messages are transmitted correctly.

Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but also lends itself to practical demonstrations and simulations using operational equipment.
Learning resources	*Upper Air Handbook (Volumes 1, 2 and 3),* Bureau of Meteorology, Melbourne, 2001 *Codes Handbook (Volumes A and B),* Bureau of Meteorology, Melbourne, 1991 *Hydrogen Handbook*, Bureau of Meteorology, Melbourne, 1992 Personal computer running the DOS-based WIND program Personal computer running MetConsole® software
Occupational health and safety requirements	A Safe environment will be provided for participants with regard to; Ergonomic computer workstations Electromagnetic radiation hazards Hydrogen hazard zones

MODULE TITLE — DigiCora III Wind (Upper Wind Systems)

Nominal duration	21 hours
Module code or number	OBS-DIGIWIND
Discipline Code	TO(Obs)
Module purpose	On completion of this module, the participant will be able to perform an Upper Air Wind Observation to Bureau of Meteorology accuracy standards using a radar and DigiCora III® software.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer. To complete this module participants must be able to: • Safely inflate and release hydrogen filled balloons • Operate a radar using PC-RADWIN software. • Code the International format PILOT message.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Switch up a DigiCora III® workstation to perform a wind-only sounding. • Select Wind Direction and Speed significant levels in accordance with Bureau of Meteorology procedures. • Code an International Format PILOT message and edit it as required before transmission. • Terminate sounding and ensure data is archived and transmitted to respective clients.
Assessment method	The participant is required to perform a wind-only sounding using a radar connected to DigiCora III® equipment.
Conditions of assessment	Assessment is conducted during the actual performance of an Upper Air Observation using a radar and DigiCora III® equipment in a simulated workplace environment as well as from a written exercise in a classroom environment.
Learning outcomes	On successful completion of this module the participant will be able to:
Learning outcome 1	Demonstrate switch-up of a DigiCora III® workstation to perform a wind-only sounding..
Assessment criteria	1.1 Follow correct sequence of steps in switch-up as prescribed in the Draft chapters of the Upper Air Handbook:
Learning outcome 2	Launch balloon and initiate sounding on DigiCora III®
Assessment criteria	2.1 Correct surface values are entered
Learning outcome 3	Analyse sounding in accordance with Bureau of Meteorology standard procedure.
Assessment criteria	Levels are selected in such a manner that: 3.1 Trace is within tolerance 3.2 Major turning points of wind speed and direction are selected

	3.3 Maximum wind speed is selected if required
	3.4 Missing data is handled correctly
	3.5 Spurious data is rejected
Learning outcome 4	Generate, edit and transmit messages in a timely manner:
Assessment criteria	4.1 Messages are generated and sent after balloon reaches 100 hPa and again after burst.
	4.2 Manual editing is performed correctly if required
Learning outcome 5	Switch the DigiCora III® workstation down correctly ensuring datafiles are archived and transmitted as required.
Assessment criteria	5.1 .edt and .dc3db files are archived after a sounding.
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but also lends itself to practical demonstrations and simulations using operational equipment.
Learning resources	*Upper Air Handbook (Volumes 1, 2 and 3),* Bureau of Meteorology, Melbourne, 2001 *Codes Handbook (Volumes A and B),* Bureau of Meteorology, Melbourne, 1991 *Hydrogen Handbook*, Bureau of Meteorology, Melbourne, 1992 A DigiCora III® Upper Air Sounding System with a wind-find radar.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to; • ergonomic computer workstations • electromagnetic radiation hazards. • hydrogen hazard zones

MODULE TITLE — Wind Profilers (Upper Wind Systems)

Nominal duration	3 hours
Module code or number	OBS-WINDPROF
Discipline Code	TO(Obs)
Module purpose	On completion of this module, the participant will be able to describe the various types of Wind Profilers in use in the Bureau of Meteorology, explain their principle of operation and routine (observer) maintenance requirements.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer. • There are no other pre-requisites for this module
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Various types of Wind Profilers in use by the Bureau of Meteorology • Locations of current and proposed Wind Profilers. • Principle of operation of Wind Profilers • Observer maintenance requirements of Wind Profilers.
Assessment method	This module is not assessed, nor is it a pre-requisite for other modules.
Learning outcomes	On successful completion of this module the participant will be able to:
Learning outcome 1	List the location of wind profilers currently in use or proposed by the Bureau of Meteorology
Assessment criteria	1.1 List the locations of Wind profilers currently in use by the Bureau of Meteorology. 1.2 List the locations of Wind Profilers proposed to be installed by the Bureau of Meteorology.
Learning outcome 2	Describe the principle of operation of various types of wind profilers in use by the Bureau of Meteorology.
Assessment criteria	2.1 Describe the principle of operation of Spaced Antenna Wind Profilers. 2.2 Describe the principle of operation of Doppler Beam Steering Wind Profilers.
Learning outcome 3	Understand routine (observer) maintenance of Wind Profilers.
Assessment criteria	3.1 Detail the maintenance duties required to be performed by Observer staff at Wind Profiler locations.
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but also lends itself to practical demonstrations and simulations using operational equipment.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to; ergonomic computer workstations

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 6
Meteorological Information Office

- Role and function of an MIO
- MIO Service Standards and Policies
- Client services
- Hydrological Services
- Regional Services – VRO Tour (CCS, RFC & ROS)
- Dealing with the media
- Products Available on the Web
- Legal Issues
- Overview of Climate Data Services & The Climate Zone
- Presentation Day (Intro to Met Course) – Science Week

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Meteorological Information Services

Nominal duration	24 hours
Module code or number	OBS-MIS
Discipline Code	TO (Obs)
Module purpose	Provide participants with skills and knowledge necessary to perform a service role from a Meteorological Information Office.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill BMTC.	Complies with WMO Technician level and is accredited standards by
Summary of content	The Meteorological Information Services course may include any of the following: • Role and function of an MIO • MIO Service Standards and Policies • Client services • Hydrological Services • Regional Services – VRO Tour (CCS, RFC & ROS) • Dealing with the media • Products Available on the Web • Legal Issues • Overview of Climate Data Services & The Climate Zone • Presentation Day (Intro to Met Course) – Science Week
Delivery	This module provides for delivery by off the job training. It contains theory, that requires face to face learning, but also lends itself to practical demonstrations and simulations.
Assessment method	Field Office Presentations for Trainee TO (Obs) will be presented before an audience as part of the Introduction to Meteorology Course.
Learning outcomes	On successful completion of this module the participant will be able to:
Learning Outcome 1	Identify Bureau goals and service standards applied to MIO activities.
Assessment criteria.	1.1 Discuss the history of the MIO concept and identify Bureau goals in relation to MIO's . 1.2 Identify key personnel responsible for components of MIO management. 1.3 Outline the Service Policy of Meteorological Information Offices including what sort of information can be provided to the public and what sort of information should not be provided to the public by an Observer. 1.4 Outline the major issues effecting MIO functions

Conditions Learning will be conducted in a classroom. The session will run for 1 hour.

Additional Resources. Guest speaker from Services Policy

Learning Outcome 2 Identify internal and external clients of your station and be able to recognise and review their service and quality needs.

Assessment criteria.

2.1 Identify internal and external suppliers and customers.

2.2 Describe the concept "service" and how it applies to a field station.

2.3 Discuss the role that service plays in forming perceptions of an organisation.

2.4 Discuss various strategies that could be adopted to increase client awareness of Bureau products or services available.

2.5 Demonstrate strategies for dealing with various client types.

2.6 Discuss promotional strategies to enhance the image of an MIO.

2.7 Review client services from client feedback and information derived from records of services provided.

Conditions Learning will be conducted in a workshop environment.

The session will run for 3 hours with consolidation either on the job or in a workplace simulation.

Assessment method. Active participation in all aspects of the workshop.

Learning Outcome 3. Explain services available and refer clients to a regional *Water Division / Hydrology Branch*.

Assessment criteria

3.1 Describe the purpose and objectives of the Water Division / Hydrological Services program

3.2 Identify the range of products and services delivered from the Hydrology branch that is available for MIO purposes.

Conditions Learning will be conducted in a classroom.

References. www.bom.gov.au

Learning Outcome 4. An understanding of a regional office and its associated functions

Assessment criteria

4.1 Describe the purpose and objectives of the Regional Office including the following sections:

- Climate and Consultancy
- Forecasting Section
- Observations Section
- Engineering Services

Conditions Learning will be conducted via a tour to Victorian Regional Office.

Learning Outcome 5 Demonstrate media interview techniques and identify methods of utilising the media for MIO activities.

Assessment criteria

5.1 Use appropriate techniques when dealing with a media interview:

Radio

Newspaper

Television

5.2 Understand the needs of different media to ensure the correct message is presented.

Time deadlines

Public interest

Human interest

5.3 Identify methods of utilising the media to assist service activities from a meteorological office.

5.4 Demonstrate knowledge of the Bureau policy on dealing with the media:

Making public comment

Press releases

5.5 Demonstrate the use of voice to provide emphasis and pausation to written text.

Conditions Learning will be conducted in a workshop environment using audio and video equipment in a simulated mode.

The sessions will run for 1 day.

Assessment method. Competency at performing tasks.

Additional Resources. Video Camera, blank tape and Monitor

Bureau of Meteorology Media Policy

Learning Outcome 6. Locate information and meteorological products available from the Bureau's Internet site for the purpose of providing information and services to clients.

Assessment criteria

6.1 Demonstrate how to access Bureau products available through the External web including;

BoM home page

Forecasts and Warnings

Observations

Satellite Pictures and Weather Maps

Radar images

Field Stations

Water and the Land

Aviation Products

Educational and Careers websites

Publications

6.2 Identify and access products from the Internal web that enhance service provision at MIOs including:

Field Office websites

Regional Office websites

Latest Observations and forecasts

AIFs Product store

Forecasting Menu

Ensembles

Bureau publications,

Contact information,

Service charter, etc

Conditions Learning will take place in a computer laboratory.

Learning Outcome 7. Apply APS and Bureau policies in the provision of products and services from a Meteorological Information Office. (Copyright, Privacy, Duty of Care etc)

Assessment criteria.

7.1 Recognise the implications and responsibilities embodied in :

- The Service Charter.
- Copyright Legislation
- Interacting with the media
- Duty of care legislation
- Vicarious Liability
- Disclaimers
- Privacy/FOI

Conditions Learning will be conducted in a classroom. The session will run for 2 hours.

Additional Resources. Guest speakers from Legal services

Learning Outcome 8. Use services and products available from *Climate Information Services* to meet client needs.

Assessment criteria.

8.1 Identify climate data products and services provided by *Climate Information Services* section.

8.2. Describe the process necessary to obtain climate data products and list the various mediums available.

8.3 Identify the relationship between Climate Information Services section and regional Climate and Consultancy sections.

8.4 Differentiate between what climate information requests can be satisfied at a Field Station and what climate information requests should be referred to the regional office or head office.

Conditions Learning will be conducted in a classroom.

Additional Resources Guest speakers from Climate Information Services

References. http://www.bom.gov.au/climate/data-services/

Learning Outcome 9 As part of a team present a "station tour" to the Intro to Met Course.

Assessment criteria

9.1 Prepare a presentation using various aids to allow participants better understand the role of an Observer.

The "station tour" will be assessed on:

- Effort
- Knowledge
- Presentation
- Technical consistency
- Teamwork

Aspects that will be assessed include:

- PowerPoint/HTML
- Oral presentation
- Individual project development report that details:
- The individuals role and responsibilities
- Contributions made to group goals
- Tasks completed and results achieved

How information was shared

Problems encountered and resolved

Individual qualities of team members

Assessment Method

OTU staff will assess each student's presentations and provide constructive feedback and remedial training were required.

Resources

- Computer resources
- Internet access to BoM
- Support from supervisor
- Access to BMTC staff as required

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course

Module 7
Radiosonde Systems

- TEMP Message
- DigiCORA III – Radiosonde
- Autosonde

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Temp Message

Nominal duration	3 hours (2 x 1.5 hour sessions)
Module code or number	OBS-TEMP
Discipline Code	TO(Obs)
Module purpose	To enable participants to effectively code and decode FM35 TEMP messages
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill	Complies with WMO Meteorological Technician Level
Standards	Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology. Conforms with guidelines detailed in the Bureau of Meteorology Codes Handbook, the AIFS operating procedures, and the Bureau of Meteorology Email and Internet Policies. This module is normally delivered in parallel with Surface Observation Practical (Aviation) and Radar. It is a prerequisite for successful completion of the module Surface Observations – Aviation..
Summary of content	Use the Codes Handbook to reference the FM35 TEMP code.
Assessment method	The participant will demonstrate proficiency at performing to Bureau of Meteorology standards as follows: ▪ Coding and decoding ▪ Retrieval and collation of information from the Codes Handbook.
Conditions of assessment	Assessment will be performed using assignments, written examinations and practical demonstrations. Demonstration of competency in this module is necessary to complete the TO(Observer) course.
Learning outcomes	On successful completion of this module, participants will be able to:
Learning outcome 1	Use the Codes Handbook to decode an FM35 TEMP code.
Assessment criteria	1.1 Use the Codes Handbook to decode an FM35 TEMP message
Learning outcome 2	Use CMSS to retrieve data and verify system message is received.
Assessment criteria	2.1 Use CMSS to retrieve a TEMP messages
Learning outcome 3	Encode meteorological data into an FM35 TEMP code..
Assessment criteria	3.1 Encode an FM35 TEMP message.
Delivery	Delivery is by off the job training in a classroom environment. Some aspects of this module can be delivered on-line.
Learning resources	Bureau of Meteorology current edition, *Codes Handbook*, Bureau of Meteorology, Melbourne
Occupational health and safety requirements	A safe environment and information regarding hazards will be provided for participants with regard to: Ergonomic computer workstations,

MODULE TITLE DigiCora III (Radiosonde Observations)

Nominal duration 36 hours

Module code or number OBS-DIGISONDE

Discipline Code TO(Obs)

Module purpose On completion of this module the participant will be able to perform radiosonde observations to Bureau of Meteorology standards using Vaisala DigiCora III ® equipment.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

To complete this module participants must be able to:

- Perform a DigiCora III Wind sounding
- Operate the PC-RADWIN program and code an International Format PILOT message (successful completion of the PC-RADWIN module)
- Code the International Format TEMP message

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Switch up a DigiCora III® workstation to perform a radiosonde and radar wind combined sounding.
- Select Pressure, Temperature and Humidity significant levels in accordance with Bureau of Meteorology procedures.
- Code an International Format TEMP message and edit it as required before transmission.
- Terminate sounding and ensure data is archived and transmitted to respective clients.
- Rectify errors in soundings involving:
- Re-transmission of messages
- Re-transmission of data files
- Correction of datafiles (SIMUL)
- Perform a DigiCora III radiosonde-only sounding with a RADWIN wind-only sounding.
- Perform the calculations for a SOWIND sounding using data from a theodolite flight and a radiosonde-only sounding.

Assessment method The participant is required to perform upper-air radiosonde soundings using DigiCora III® equipment, a wind-find radar and theodolite readings.

Conditions of assessment Assessment is conducted during the actual performance of upper-air radiosonde soundings using DigiCora III® equipment in a simulated workplace environment as well as from a written exercise in a classroom environment.

Learning outcomes On completion of this module the participant will be able to:

Learning outcome 1 Demonstrate switch-up of DigiCora III® equipment to perform a radiosonde and radar combined sounding..

Assessment criteria 1.1 Follow correct sequence of steps in switch-up.

Learning outcome 2 Launch radiosonde and initiate sounding on DigiCora III® equipment.

Assessment criteria 2.1 Radiosonde is installed in RBL tray ready for launch in accordance with procedure described in the Hydrogen Handbook

	2.2	Radiosonde is securely attached to a 350g balloon for a manual launch
	2.3	Radiosonde is launched without damage to radiosonde or balloon.
	2.4	After launch surface values are entered correctly.
Learning outcome 3	Analyse sounding in accordance with Bureau of Meteorology standard procedure.	
Assessment criteria	Levels are selected in such a manner that:	
	3.1	Trace is within tolerance.
	3.2	Major turning points of temperature and humidity are selected.
	3.3	Bases and tops of inversions are selected if required.
	3.4	Tropopi are selected if required.
	3.5	Missing data is handled correctly.
	3.6	Spurious data is rejected.
	3.7	Wind direction and speed trace is edited to conform to Bureau of Meteorology standard practice as detailed in the Draft Upper Air Handbook..
Learning outcome 4	Generate, edit and transmit messages in a timely manner:	
Assessment criteria	4.1	Messages are generated and sent after balloon reaches 100 hPa and again after burst.
	4.2	Manual editing is performed correctly if required
Learning outcome 5	Switch the DigiCora III® equipment down correctly ensuring data files are archived and transmitted as required.	
Assessment criteria	5.1	.edt and .dc3db files are archived after a sounding.
	5.2	Entries are made in the Radiosonde Performance Log after completion of sounding.
Learning outcome 6	Rectify common problems with a DigiCora III® sounding.	
Assessment criteria	6.1	Messages from a previous flight are re-transmitted.
	6.2	.edt files from a previous flight are re-transmitted.
	6.3	Corrections to a previous flight are performed and messages and datafiles are re-archived and re-transmitted.
Learning outcome 7	Perform a radiosonde-only DigiCora III® sounding with a wind-only RADWIN sounding.	
Assessment criteria	7.1	Transmit suitable TEMP messages using DigiCora III® software.
	7.2	Code suitable PILOT messages from a PC-RADWIN radar printout.
Learning outcome 8	Perform A SOWIND sounding using Theodolite winds and DigiCora III® radiosonde-only data.	
Assessment criteria	8.1	Extract required radiosonde data from a DigiCora III® radiosonde-only sounding.
	8.2	Use Theodolite readings and the WIND.exe program to calculate winds for a SOWIND sounding.
	8.3	Code suitable PILOT messages for a SOWIND sounding.
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but must also include practical demonstrations and simulations using operational equipment.	
Learning resources	*Upper Air Handbook (Volumes 1, 2 and 3),* Current Edition, Bureau of Meteorology, Melbourne,	
	Draft Upper Air Handbook (web-Based), Current edition, Bureau of Meteorology, Melbourne,	

Codes Handbook (Volumes A and B), Current edition

Bureau of Meteorology, Melbourne, 1991

Hydrogen Handbook, Current Edition, Bureau of Meteorology, Melbourne, 1992

A DigiCora III® Upper Air Sounding System with a wind-find radar running PC-RADWIN software.

Remote Balloon Launcher with associated hydrogen gas supply.

Manual Balloon Filling shed and facilities.

Bureau of Meteorology prescribed stationary and forms.

Occupational health and safety requirements

A safe environment will be provided for participants with regard to;

- ergonomic computer workstations
- electromagnetic radiation hazards.
- hydrogen hazard zones

MODULE TITLE Autosonde

Nominal duration	36 hours
Module code or number	OBS-ATSO
Discipline Code	TO(Obs)
Module purpose	On completion of this module the participant will be able to use the Autosonde to perform Upper Air Soundings to Bureau of Meteorology standards. They will be able to load, schedule, monitor and quality check Autosonde soundings and maintain the Autosonde.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer. To complete this module participants must be able to: • Perform a DigiCora III Radiosonde combined sounding • Code the International Format TEMP message
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Identify major software components of the Autosonde. • Access information from various online and hardcopy references. • Connect and disconnect from the Local PC. • Load and unload a radiosonde • Change various properties of radiosonde trains on the Autosonde trays using Autosonde software. • Monitor and diagnose various Autosonde facilities and errors. • Edit Sounding Schedule and Balloon properties • Perform and quality control an Autosonde sounding. • Perform routine (observer) maintenance on the Autosonde.
Assessment method	The participant is required to perform upper-air Autosonde soundings using the Autosonde.
Conditions of assessment	Assessment is conducted during the actual performance of upper-air Autosonde soundings using Autosonde equipment in a simulated workplace environment as well as from written exercises in a classroom environment and simulated scenarios.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Identify major hardware components of the Autosonde system.
Assessment criteria	1.1 Identify major hardware components of the Autosonde system: UHF Antenna GPS Antenna Balloon Launcher Vessel Hydrogen supply lines

Compressed air system

Logic controller units

Anti-balloon prod and manual water sprinklers

Rotating tray carousel system.

SPS311 Sounding Processing Subsystem

Battery water reservoir

Radiosonde tray connector

Local PC

Remote PC

GC25 Ground Check Set

Gas Flow Rate Meter

UPS Power supply

Mains distribution Box.

Learning outcome 2 Identify major software components of the Autosonde system.

Assessment criteria

2.1 Identify major software components of the Autosonde system:

The User Interface (the UCP)

Service User Interface Module (UIM)

Loading User Interface Module (UIM)

Schema User Interface Module (UIM)

Tray User Interface Module (UIM)

Archive Manager

Status Panes (System Status, Launcher Status, Tray Status)

Autosonde Diary Files

DORIS Browser

Learning outcome 3 Access various reference material relating to Autosonde Operations.

Assessment criteria

3.1 Find a nominated section in the draft Upper Air Handbook Autosonde chapters.

3.2 Find the section relevant to a nominated issue in the Draft Upper Air Handbook Autosonde chapters.

3.3 Access the Autosonde System Documentation on the Remote PC.

3.4 Access Field Operations Group online resources.

Learning outcome 4 Operate the UCP on the Local PC using a Remote Desktop connection from the On-Station Remote PC

Assessment criteria

4.1 Make a Remote Connection to the Local PC using Remote Desktop

4.2 Activate the Autosonde Administration software

4.3 Check the tray status, balloon train details and launch time of a nominated tray.

4.4 Disconnect from the Local PC and terminate the Remote Desktop session as prescribed by the Draft Upper Air Handbook Autosonde chapters.

Learning outcome 5 Load and unload radiosondes,

Assessment criteria

5.1 Start the Loading User Interface

5.2 Prepare a balloon train and radiosonde for loading.

5.3 Perform a Ground Check.

5.4 Load the radiosonde and balloon train.

	5.5	Exit the Loading User Interface
	5.6	Start the Tray User Interface
	5.7	Unload a nominated radiosonde
	5.8	Exit the Tray User Interface.
Learning outcome 6	Manage and change the properties of trays.	
Assessment criteria	6.1	Determine the release time for a nominated radiosonde.
	6.2	Change the tray status from “Waiting” to “Loaded”
	6.3	Change the balloon type for a nominated load.
Learning outcome 7	Monitor system status and use diagnostic tools.	
Assessment criteria	7.1	Use the Remote Monitor software to determine the status of the Local PC
	7.2	Use a Remote Desktop connection from the On-Station Remote PC to the Local PC to determine the temperature in the robotics room of the Autosonde.
	7.3	Describe the elements of the Autosonde Administration software Status Pane.
	7.4	Describe the elements of the DigiCORA3 UCP status pane.
	7.5	Investigate the reason for a nominated warning using the Vaisala Autosonde User Guide or the Draft Upper Air Handbook Autosonde chapters.
	7.6	Describe the difference between an Alarm and a Failure.
	7.7	Access the gas flow meter using the Autosonde Administration software.
	7.8	Determine the ascent rate of a sounding using the Autosonde Diary File.
	7.9	View system diagnostic log files using the DORIS Browser.
Learning outcome 8	Edit Sounding Schedule and Balloon train properties	
Assessment criteria	8.1	Schedule a single automatic release sounding for a nominated time.
	8.2	Apply “Remote Station Release Control” if appropriate.
	8.3	Add a Balloon type with a nominated gas volume entry.
Learning outcome 9	Perform an Autosonde sounding and quality control the data as prescribed in the Draft Upper Air Handbook Autosonde chapters.	
Assessment criteria	9.1	Log onto the Local PC from the On-Station Remote PC using Remote Desktop.
	9.2	Obtain clearance for launch from Air Traffic Control if required, then give permission for balloon release.
	9.3	Attach to sounding.
	9.4	Set up MetGraph for editing.
	9.5	Use editing tools in MetGraph to quality-control the sounding in accordance with the procedures outlined in the Draft Upper Air Handbook DigiCORA III chapters and the Codes Handbook.
	9.6	Manually disconnect from the sounding and then re-connect.
	9.7	Describe the procedure to manually abort the sounding.
	9.8	Generate and send TEMP messages after the balloon has reached 100 hPa.
	9.9	Log off after sounding termination.
	9.10	Check message and data file reception using CMSS and on-line Autosonde FAQ website.

	9.11 Locate the most recent data file.
	9.12 Resend messages and .edt data file.
	9.13 Load a sounding for checking.
	9.14 Recreate an .edt data file from an archived sounding.
	9.15 Create a text listing from an archived sounding.
	9.16 Complete the Radiosonde Performance Log (electronic version)
Learning outcome 10	Perform routine (observer) maintenance and emergency procedures.
Assessment criteria	10.1 Clean Infra-red balloon sensor lens
	10.2 Remove a burst/jammed balloon in accordance with the procedures described in the draft Upper air Handbook Autosonde chapters.
	10.3 Reset the Autosonde using the service/Setup in the Service User Interface Menu.
	10.4 Top up the Battery Water Reservoir.
	10.5 Check the hydrogen gas system for leaks.
	10.6 Identify the conditions for replacement/regeneration of the Molecular Sieve in the ground Check Set..
	10.7 Replace the Molecular Sieve.
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but must also include practical demonstrations and simulations using operational equipment.
Learning resources	*Draft Upper Air Handbook*, Bureau of Meteorology, Melbourne, Current version
	Codes Handbook (Volumes A and B),
	Bureau of Meteorology, Melbourne, Current version
	Autosonde Users Guide, Vaisala, Current version
	An Autosonde with On-station Remote.
	Consumables such as radiosondes, balloons, parachutes, etc.
	Bureau of Meteorology prescribed stationary and forms.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to;
	• ergonomic computer workstations
	• electromagnetic radiation hazards.
	• hydrogen hazard zones

Australian Government
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TRAINING CENTRE

TO(Observer) Course
Module 8

Composite Operations Support

- Surface Observations Networks overview
- The Bureau's Marine Program
- Sites DB
- Use NetMon to monitor the observational networks.
- NCC Data Quality Control
- The Quality Management System and data quality issues
- Tsunami Warning Service
- Establishing a rainfall station

- Introduction to Electronic Instruments
- Safety and Hazards
- Data Communications
- AWS operation and communication
- Autosonde
- DigiCora III

- Low Risk Four Wheel Driving
- Work safely at heights
- Hazard ID & Risk Assessment
- MSDS & permit to work
- EEHA
- Shut down a field station
- Safe driving guidelines

BMTC

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Melbourne VIC 3008

MODULE TITLE	**COMPOSITE OPERATIONS SUPPORT**
Nominal duration	63 Hours
Module code or number	OBS-COS
Discipline Code	TO(Obs)
Module purpose	At the completion of this course, a Bureau of Meteorology Technical Officer will be able to further the goals of the Observations Inspections Program and the Engineering Maintenance Program by assisting the regional Observations and Engineering staff with their duties.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Summary of Content	• Surface Observations Networks overview • The Bureau's Marine Program • Sites DB • Use NetMon to monitor the observational networks. • NCC Data Quality Control • The Quality Management System and data quality issues • Tsunami Warning Service • Establishing a rainfall station • Introduction to Electronic Instruments • Safety and Hazards • Data Communications • AWS operation and communication • Autosonde • DigiCora III • Low Risk Four Wheel Driving • Work safely at heights • Hazard ID & Risk Assessment • MSDS & permit to work • EEHA • Shut down a field station • Safe driving guidelines
Delivery	This module is a stand-alone course for Field Observers or is delivered in parallel with modules of the TO (Obs) course.
Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments, practical work etc.

On completion of this module the participant will be able to:

Learning outcome 1 — Identify various observation networks managed by the Bureau of Meteorology and summarise the Inspections Program.

Assessment criteria

1.1 Describe various land-based surface observation networks managed by the Bureau. These networks include (but are not limited to):

- Rainfall observation network
- Flood warning network
- Evaporation network
- Co-operative synoptic network
- AWS network
- Australian Climate Observations Reference Network – Surface Air Temperature (ACORN-SAT)
- National Benchmark Network for Agro meteorology

1.2 State the frequency of inspections required for each of these networks.

Learning outcome 2 — Identify the areas of activity of the Marine Operations Group.

Assessment criteria

2.1 Describe various marine observation networks managed by the Bureau. These networks include (but are not limited to):

- Australian Voluntary Observing Fleet
- Ship-of-Opportunity Program
- Meteorological drifting buoys
- Moored buoys
- Waverider® buoys
- Profiling floats

2.2 Describe the function of the Port Meteorological Agent Network

Learning outcome 3 — Use Sites DB web browser to check a station's history and make unregistered action entries for instrument maintenance and changes.

Assessment criteria

3.1 Use Sites DB to make various changes to the Oracle database

- Unregistered actions
- View a stations history
- Navigate through the Metadata of Sites DB.

3.2 Familiarization and tour of the Front End Tools Environment.

Learning outcome 4 — Use the NetMon web pages to monitor various Bureau Observations networks and take appropriate action.

Assessment criteria

4.1 Use the NetMon web pages to monitor various Bureau observations networks. These networks can include, but are not limited to:

- the Tsunami gauge network
- the DART buoy network
- the Automatic Weather Station network

4.2 Determine the appropriate action to take when various data outages occur.

4.3 Lodge an unregistered action in SitesDb to advise the appropriate section of data outages.

Learning outcome 5	Describe the Quality Management System operated by the National Climate Centre and identify key data quality issues.
Assessment criteria	5.1 Describe the various types of data quality checks used by the National Climate Centre.
	5.2 Describe how data and meta data is crosschecked to establish quality flags for the information in the Australian Data Archive for Meteorology.
	5.3 Identify key data quality issues for the National Climate Centre in relation to Bureau, Co-op and Rainfall Observers.
Learning outcome 6	Describe the areas of activity of the Tsunami Warning Service and identify various observation networks used by them.
Assessment criteria	6.1 Describe the process of how a Tsunami is identified.
	6.2 Describe the process of how a Tsunami Warning is issued.
	6.3 Identify various components of the observation networks used to identify a Tsunami and describe their operation. These networks include (but are not limited to): • the DART buoy network. • the coastal sea level
Learning outcome 7	Perform all the activities involved in installing a rainfall observation station.
Assessment criteria	7.1 The rainfall gauge installed conforms with the Inspections Handbook.
	7.2 Complete all associated documentation with the installation for ROS Inspectors.
Learning outcome 8	An Introduction to Electronic Instruments
Assessment criteria	8.1 Ohm's law = What is Voltage, what is current, what is resistance. Perform several ohm's law calculations.
	8.2 The difference between AC and DC
	8.3 The basic functions of a multi-meter
	8.4 The basic functions of an oscilloscope
Learning outcome 9	Understanding the types of Safety and Hazards (OH&S) as an Observer
Assessment criteria	9.1 Warning, Caution and Danger tags overview, and the Observer's responsibilities.
	9.2 Testing and tagging of electrical appliances, and the Observer's responsibilities.
	9.3 Screws, threads, mechanical fasteners and associated tools. The safety hazards associated with basic hand tools.
	9.4 Snoop; Different types and the hazards associated with the Bureau type.
	9.5 Discussion of hazards associated with antistatic footwear and mains electricity.
Learning outcome 10	Data Communications in Observing
Assessment criteria	10.1 Explain the basic principles of packet switching networks (LAN and WAN).
	10.2 Use basic network diagnostic tools to help troubleshoot network problems.
	10.3 Outline the principles of operation of a router.

Learning outcome 11 Understand AWS ingestion and communication.

Assessment criteria
11.1 List the sensors that can provide data to an Automatic Weather Station and describe how that data is obtained and communicated to the AWS.: RTDs, barometers, anemometers, visibility meters, ceilometers, tipping bucket rain gauges, present weather sensors, lightning detectors.
11.2 Describe how the Automatic Weather Station communicates meteorological data to the MetConsole computer in the local Met Office real-time displays (e.g. Air Traffic Control towers, Regional Forecasting Centres and the world wide web, Various data streams ingested into ADAM, one minute data, ten minute data, AWS-generated aerodrome weather reports and MDFs.
11.3 Discuss the operation of the AWS using terminology that can be understood by Bureau technical maintenance staff.

Learning outcome 12 Understanding the mechanics and errors of the Autosonde.

Assessment criteria
12.1 Describe the compressed air system within the Autosonde.
12.2 Interpret various cylinder drive alarms and warnings to locate the cylinder responsible.
12.3 Describe the electrical system and logic controller within the Autosonde.
12.4 Describe the gas system within the Autosonde.
12.5 Discuss the operation of the Autosonde using terminology that can be understood by Bureau technical maintenance staff.
12.6 Common issues with Autosondes that observer's may rectify or interrogate.

Learning outcome 13 A full system overview of Digi Cora III and the Radiosonde mechanics.

Assessment criteria
13.1 Describe how radiosonde data is obtained by the DigiCORA III system from an airborne radiosonde.
13.2 Describe how wind data is obtained by the DigiCORA III system from a wind find radar and from a GPS radiosonde.
13.3 Record and check the accuracy of Station details held in the DigiCORA III system Parameters database.
13.4 Perform monthly housekeeping duties on the DigiCORA III computer as described in the Field Operations Group on-line resources.
13.5 Discuss the operation of the DigiCORA III using terminology that can be understood by Bureau technical maintenance staff.

Learning outcome 14 Low Risk Four Wheel Driving

Assessment criteria
14.1 Plan and undertake a 4WD trip safely
14.2 Prepare vehicle for a 4WD trip
14.3 Change a flat tyre on a 4WD vehicle.
14.4 Jump start a 4WD vehicle safely
14.5 Apply correct four wheel drive techniques off road
14.6 Safely operate recovery equipment.

Learning outcome 15 Work safely at heights using ladders in the prescribed manner.

Assessment criteria
15.1 Carry, erect, climb and safely use extension ladders.
15.2 Inspect and test structures prior to climbing.
15.3 Work safely at heights using

Learning outcome 16	Hazard Identification & risk assessments
Assessment criteria	16.1 Identify Hazards in your current workplace. 16.2 Perform a risk assessment.
Learning outcome 17	MSDS & permit to work
Assessment criteria	17.1 Understand and describe what the purpose of an MSDS. 17.2 Understand the implications and requirements for staff to work in hazardous areas.
Learning outcome 18	Electrical Equipment in Hazardeous Areas (EEHA) Report on the integrity of explosion-protected equipment
Assessment criteria	18.1 Recognize hazardous gas environments 18.2 Warn maintenance contractors of the hazard zone. 18.3 Observe whether or not adequate safety precautions are being followed by the contractor 18.4 Understand the terminology of what makes a particular area a particular zone/class/atmosphere.
Learning outcome 19	Shut down equipment and close down a Bureau Field Station in the event of a necessary evacuation
Assessment criteria	19.1 Outline the procedure to close down a Bureau Field Station in the event of flooding.
Learning outcome 20	Describe the Bureau's Safe Driving Guidelines.
Assessment criteria	20.1 Outline the Bureau's Safe Driving Guidelines
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but must also include practical demonstrations and simulations using operational equipment.
Learning resources	
Occupational health and safety requirements	A safe environment will be provided for participants with regard to; • ergonomic computer workstations • hydrogen hazard zones

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TRAINING CENTRE

TO(Observer) Course

Module 9
Field Station Simulation

- Maintain an observing program
- Perform shift work duties alone and as part of a team
- Respond to Information requests
- Routine maintenance of equipment
- Work safely with hydrogen
- Perform AIFS and Comms observer duties
- Manage workloads and work priorities
- Monitor data quality

BMTC

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MODULE TITLE — Field Station Simulation

Nominal duration	110.25 hours
Module code or number	MTO-FLDSIM
Discipline Code	TO (Obs)
Module purpose	Consolidates skills, knowledge and practices developed over the preceding 28 weeks of the to (Obs) course. The simulated environment is as close to field conditions as possible. It includes an operational roster and an observation and work program representative of a cross section of Bureau of Meteorology field stations.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

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Summary of content

The Field Station Simulation Module includes the following:

- hourly surface synoptic and aviation observations program
- An upper air observations program
- Working in a team environment on a shift work roster rotation
- Full information services role
- Instrument and equipment maintenance and calibration checks
- Maintain a safe workplace especially handling and generating hydrogen safely.
- RFC data quality checks on AIFS
- Manage tasks and priorities and work to meet deadlines.
- Maintain a data quality program.
- Exchanging information during Handover/Takeover
- Record Climate observations into an A9 spreadsheet

Delivery	This module is delivered off the job in a workplace simulation format. It is principally self-directed with trainers monitoring and assessing performance.
Assessment method	Participants are assessed against duties that must be completed to specified standards. They must also perform the work program in a manner that meets expectations in relation to teamwork, timeliness, APS values and safe practices.
Conditions of assessment	During the simulation they will work at a number of field station configurations. Staff will carry out ongoing assessment during the simulation. It is anticipated that during the early stages of the simulation, work flow requirements and standards may not be met however these must be to standard by the end of the period. On request Trainees submit a portfolio of responses to MIO requests for assessment.
Occupational health and safety requirements	Trainees will have been rated competent in OH&S aspects of the job prior to this module. All equipment and systems that trainees will be expected to use will meet OH&S compliance requirements.
Learning Resources	Simulated Field stations that include:

- Upper air system – Radar/Autosonde/Digicora III
- Surface Obs system – Standard instrument enclosure, MetConsole, Advanced AWS sensors
- Field Station PC accessible to Eve, ClimateZone, Sites DB, BoM home page, WWW

- Access to all handbooks, instructions and circulars
- Standard stationary items
- A detailed program of tasks.
- Communications equipment, Telephone, Radio or equivalent.

Learning Outcomes On completion of this module participants will be able to:

Learning Outcome 1. Apply knowledge skills and practices acquired during earlier training to maintain a surface and upper air observations program at a field station.

Assessment criteria.

1.1 Synoptic and aviation observations recorded and sent at designated times.

1.2 Upper air balloons released within the designated time period and soundings edited and data and messages dispatched within appropriate time period.

Learning Outcome 2. Work independently on a shift work roster as part of a team of observers ensuring that the station work program is being completed.

Assessment criteria.

2.1 Handover/takeover briefings are carried out in an informative and efficient way.

2.2 Outstanding work is completed by end of shift and the workplace is set up and tidy for the next person.

2.3 Logbook, diary and Sites DB entries are completed.

Learning Outcome 3. Apply knowledge skills and practices learnt during earlier training to identify and define client needs and deliver meteorological information services to clients.

Assessment criteria.

3.1 Respond to client requests in a timely and appropriate way.

3.2 Portfolio of written responses to meteorological information requests to be submitted for assessment.

Written responses meet BoM style requirements

Sources of data acknowledged

Disclaimers and copyright included

Addressing details correct

Information provided recognises special needs of clients

3.3 BoM Service charter requirements are met.

3.4 Areas of difficulty in service provision identified.

Learning Outcome 4. Independently carry out routine instrument and equipment maintenance and calibration checks and problem solve faults.

Assessment criteria.

4.1 Surface observation instrumentation working within specification.

4.2 Faults identified, diagnosed and action carried out to fix.

4.3 Logbook and Sites DB entries are completed detailing maintenance and calibration checks carried out and actions required.

4.4 Observation equipment working within specification

Learning Outcome 5. Work safely with hydrogen while inflating balloons and generating hydrogen gas. Maintain a save workplace.

Assessment criteria.

5.1 Adherence to safety procedures and use of personal protective equipment.

5.2 Correct ascent rates obtained.

5.3 Sufficient gas being generated to meet usage requirements.

5.4 All maintenance and calibration checks are carried out and logged.

5.5 Workplace tidy, hazards identified and removed, accident and

		incident reports completed as required.
Learning Outcome 6.		Apply knowledge skills and practices acquired during earlier training to maintain Regional Forecasting Centre duties.
Assessment criteria.	6.1	Apply data quality control checks on observational data using AIFS.
	6.2	Use the plotter to print charts required for forecasting.
Learning Outcome 7.		Manage workloads and work priorities in a professional manner.
Assessment criteria.	7.1	Identify work requirements and prioritise tasks. Develop work strategies.
	7.2	Respond to changed conditions when they occur to reorder priorities and meet deadlines.
	7.3	Monitor work outputs to ensure work outcomes are achieved.
	7.4	Adapt work program to attend to new responsibilities while meeting routine work commitments.
Learning Outcome 8.		Maintain a quality control regime for observations, instrumentation and equipment outputs.
Assessment criteria.	8.1	Perform routine QC checks on Surface and Upper air observations.
	8.2	Monitor quality of data outputs from meteorological instruments and AWS sensors.
	8.3	Perform calibration checks on meteorological instruments and equipment as required.
Learning Outcome 9.		Exchange weather, maintenance and QC information during Handover/Takeover to maintain effective station program.
Assessment criteria.	9.1	Brief incoming observer of current weather and any significant events during the shift.
	9.2	Advise incoming observer of any actions set in train regarding equipment maintenance reports.
	9.3	Provide feedback on any QC issues arising from checks carried out during the shift
Learning Outcome 10.		Record synoptic observations data into the A9 spreadsheet.
Assessment criteria.	10.1	Enter Synoptic observations data into the electronic A9.

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TRAINING CENTRE

TO(Observer) Course

Module 10 - Induction

- Welcome and Introduction
- Admin – Payslips & Superannuation.
- Course description
- Tour of 1010 Latrobe St and 700 Collins St
- Induction to Training Annexe
- Charter and Structure of the Bureau
- Computer Systems Admin (and MDT)
- Introduction to Moodle
- Intranet introduction
- PPE fitout
- Occupational Health and Safety
- OH&S Legal Compliance online course
- OH&S Management online course
- APS Induction - Online Onboarding
- APS Val. & Code of Conduct online course
- Workplace Discrimination online course
- APS Values & Code of Conduct in the BoM & EEO.
- Emotional Intelligence
- Library tour
- Reporting of Incidents and Accidents
- Postings discussions
- Personnel – allowances and downlifts.Posting Relocation
- Course Evaluation
- Building personal Resilience
- Basic Fire fighting
- Strategic Indigenous Awareness WS
- Inoculations
- CPSU Introduction
- Salary Packaging
- Superannuation
- Probation Reports x 2

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Induction & APS Training

Nominal duration 72 Hours

Module code or number OBS-IND

Discipline Code TO(Obs)

Module purpose At the completion of this course, a Bureau of Meteorology Technical Officer will be able to further the goals of the Observations Inspections Program and the Engineering Maintenance Program by assisting the regional Observations and Engineering staff with their duties.

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Summary of Content

- Welcome and Introduction
- Admin – Payslips & Superannuation.
- Course description
- Tour of 1010 Latrobe St and 700 Collins St
- Induction to Training Annexe
- Charter and Structure of the Bureau
- Computer Systems Admin (and MDT)
- Introduction to Moodle
- Intranet introduction
- PPE fitout
- Occupational Health and Safety
- OH&S Legal Compliance online course
- OH&S Management online course
- APS Induction - Online Onboarding
- APS Val. & Code of Conduct online course
- Workplace Discrimination online course
- APS Values & Code of Conduct in the BoM & EEO.
- Emotional Intelligence
- Library tour
- Reporting of Incidents and Accidents
- Postings discussions
- Personnel – allowances and downlifts.Posting Relocation
- Course Evaluation
- Building personal Resilience
- Basic Fire fighting
- Strategic Indigenous Awareness WS
- Inoculations
- CPSU Introduction
- Salary Packaging
- Superannuation
- Probation Reports x 2

Delivery This module is delivered in parallel with modules of the TO (Obs) course.

Assessment method Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments, practical work etc.

On completion of this module the participant will be able to:

Learning outcome 1	Welcome & Introduction Introduction to the Observer course, meeting important stakeholders and background information.
Learning outcome 2	Admin – Payslips & Superannuation. Personnel section provides an introduction to understanding your payslip and superannuation options.
Learning outcome 3	Course Description SIO provides an overview of the Observer Training Program.
Learning outcome 4	Tour of 1010 Latrobe St and 700 Collins St. SIO provides a tour of 1010 Latrobe St and 700 Collins St, including evacuation procedures.
Learning outcome 5	Induction to Training Annexe SIO provides a tour of Glenlitta Training Annexe and associated equipment, including evacuation procedures.
Learning outcome 6	Charter and Structure of the Bureau STTR / SRTG provide a detailed overview and structure of the Bureau of Meteorology.
Learning outcome 7	Computer Systems Admin (and MDT) SRTG & SIO provide instruction on setting up email and PC access.
Learning outcome 8	Introduction to Moodle An introduction to the Blended learning system BMTC use for delivering training.
Learning outcome 9	Intranet introduction SIO provides an introduction to the vast intranet the Bureau of Meteorology uses.
Learning outcome 10	PPE fitout SIO / Annexe site coordinator visit local Hard Yakka store for fitting of Personal Protective Equipment.
Learning outcome 11	OH & S The OH & S issues that Observers deal with are explored and explained by the OH & S team.
Learning outcome 12	Online Courses via Techniworks are to be completed by all new staff. The online course provides an awareness and understanding of the APS culture & OHS issues, including: • OH&S Legal Compliance online course • OH&S Management online course • APS Induction - Online Onboarding • APS Val. & Code of Conduct online course • Workplace Discrimination online course • http://web.bom.gov.au/mgt/hrms/index.shtml
Learning outcome 13	The Staff Development & Training team provide workshops to enhance understanding and skills in the following areas. • APS Values & Code of Conduct in the BoM • Emotional Intelligence • Building personal Resilience
Learning outcome 14	Library tour The library team at Head Office provide an overview of the resources available for use.
Learning outcome 15	Reporting of Incidents and Accidents

	An understanding of Incidents and Accidents is delivered along with the appropriate methods of reporting such issues.
Learning outcome 16	Postings discussions SRFO / SIO present both the mid Course on the job training postings and possible final posting positions.
Learning outcome 17	Personnel – allowances and downlifts. BOM personnel section provides detailed information on allowances during movements to final posting localties.
Learning outcome 18	Course Evaluation An entire Observer course evaluation will be delivered to trainees via Survey Monkey for their input.
Learning outcome 19	Basic Fire fighting To enable participants to respond appropriately in the event of a fire emergency at a Field Station
Learning outcome 20	Strategic Indigenous Awareness work shop Place Australian history into an honest perspective – beyond fear, ignorance, denial, guilt or blame.
Learning outcome 21	Inoculations Health Services Australia provides inoculations to trainees for remote postings around Australia.
Learning outcome 22	CPSU Introduction A representative from the Community and Public Section Union provide a introduction to membership benefits and protection whilst in the BOM.
Learning outcome 23	Salary Packaging A representative from Maxxia provide an overview of Salary Packaging options to staff once probation is completed.
Learning outcome 24	Superannuation A representative from APS Superannuation provides a detailed overview of Superannuation options to staff.
Learning outcome 24	Probation Reports x 2 SIO performs 2 Probationary meetings with each trainee Observer. The purpose of having probation as a condition of engagement is to assess a new employee's performance and behaviour during the probationary period. Investing time and resources in the assessment of performance during the period of probation of ongoing employees and longer-term non-ongoing employees can deliver benefits, whether the person's employment is terminated or continued. It may also be useful to have a probation period on shorter non-ongoing engagements depending on the length and nature of the engagement. http://web.bom.gov.au/mgt/hrms/probation.shtml
Delivery	This module provides for delivery by off the job training by a number of different modes including paper-based and computer-based methods. It contains theory but must also include practical demonstrations and simulations using operational equipment.
Learning resources	
Occupational health and safety requirements	A safe environment will be provided for participants with regard to; • ergonomic computer workstations

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course 2011

Module 12
Introduction to Station Administration

- Rosters and Rostering Principles
- Leave Pool conditions
- Travel / TA Entitlements / paperwork
- F183 Duty Statement and penalty pay
- Monthly returns of an OIC
- MetESS and regional/central administration
- OH&S responsibilities of an OIC and site inductions
- Petty Cash / Spending proposals & Financial accountability.
- Bureau houses/leases & contract management
- SAP and stores ordering
- Manage contracts at a Field Station

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Introduction to Station Administration

Nominal duration	25 hours
Module code or number	OBS-ADMIN
Discipline Code	TO (Obs)
Module purpose	Provide participants with skills and knowledge necessary skills to perform administrative tasks from a Meteorological office.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill BMTC.	Complies with WMO Technician level and is accredited standards by
Summary of content	The Introduction to Station Administration course may include any of the following: • Rosters and Rostering Principles • Leave Pool conditions • Travel / TA Entitlements / paperwork • F183 Duty Statement and penalty pay • Monthly returns of an OIC • MetESS and regional/central administration • OH&S responsibilities of an OIC and site inductions • Petty Cash / Spending proposals & Financial accountability. • Bureau houses/leases & contract management • SAP and stores ordering • Manage contracts at a Field Station
Delivery	This module provides for delivery by off the job training. It contains theory that requires face to face learning, but also lends itself to practical demonstrations and simulations.

MODULE TITLE Rosters and Rostering Principles

Nominal duration	1½ hours
Module code or number	OBS-ROST
Discipline Code	TO (Obs)
Module purpose	To introduce an observer to the shiftwork roster that they may be working at a Field Station
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Common Rosters • Rostering Principles • Shiftwork and OH&S
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	List the likely hours of work at various Bureau Field Stations
Assessment criteria	1.1 Identify Single Person stations, 2-person stations, 3 person stations and 7 person stations in the Observations Network. 1.2 List the hours of work for each shift at these stations.
Learning outcome 2	Identify the Rostering Principles in the current Certified Agreement.
Assessment criteria	2.1 Find the Rostering Principles detailed in the current Certified Agreement. 2.2 Compare various station rosters with the Rostering Principles as detailed in the current Certified Agreement.
Learning outcome 3	Discuss the health and safety implications of shiftwork.
Assessment criteria	3.1 Discuss various health implications of shiftwork such as: sleeping during the day body circadian rhythms eating healthily 3.2 Discuss various safety issues associated with shiftwork such as tiredness when working long hours driving to and from work fatigue-related incidents at the workplace.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

MODULE TITLE Conditions in the Leave Relief Pool

Nominal duration	1½ hours
Module code or number	OBS-LR
Discipline Code	TO (Obs)
Module purpose	To introduce an observer to the conditions of service in the Bureau's Leave Relief Pool.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• The Leave Relief Pool Home Posting • How long an officer in the Leave Relief Pool can expect to be away from home • Accommodation and accommodation allowances • Travel and travel allowances • Transport arrangements at a leave relief posting • Families in the leave Relief Pool
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Explain the operation on the Bureau's leave Relief Pool.
Assessment criteria	1.1 Explain the meaning of a "home posting" for a Leave Relief Officer 1.2 Explain the meaning of a "Leave Relief Posting" for a Leave relief Officer
Learning outcome 2	Describe the conditions of the Leave Relief Pool
Assessment criteria	2.1 How long can a Leave Relief Officer expect to stay aty their "home posting" 2.2 How long can a Leave Relief Officer expect to stay at a "Leave Relief Posting" 2.3 How long can a Leave Relief Officer expect to be working shiftwork compared to dayshift 2.4 What are the benefits of the leave Relief Pool? 2.5 What are the problems with the leave Relief pool?
Learning outcome 3	Summarise the allowances payable to leave Relief Officers
Assessment criteria	3.1 Describe the conditions for payment of accommodation allowance while serving in the leave Relief Pool 3.2 Describe the conditions for payment of travel allowance while serving in the Leave Relief Pool. 3.3 Describe the conditions for payment of meals allowance whlle serving in the Leave Relief Pool. 3.4 Describe the expectations of the Bureau regarding accommodation while serving in the Leave Relief Pool.

Learning outcome 4	Describe transport arrangement within the leave Relief pool
Assessment criteria	4.1 Describe the Bureau's preferred method of travel to take up a Leave Relief Posting.
	4.2 Describe the transport arrangements to and from work for an officer performing a Leave Relief Posting.
Learning Outcome 5	Describe the effect of service in the Leave Relief Pool on families.
Assessment criteria	5.1 Explain the conditions under which the Bureau will pay for furniture to be uplifted from a home location.
	5.2 Explain the conditions under which the Bureau will pay for an officer's family to be uplifted from a home location.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

MODULE TITLE — Travel / TA Entitlements / paperwork

Nominal duration	1½ hours
Module code or number	OBS-TA
Discipline Code	TO (Obs)
Module purpose	To allow trainees understand the travel allowances and associated "paperwork" within the Bureau of Meteorology.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Travel Allowances • Review Travel Allowances • Booking flights / accommodation
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Determine the travel allowances that are applicable
Assessment criteria	1.1 Consult the Bureau's Intranet to establish travel allowances available.
Learning outcome 2	Review Travel Allowance
Assessment criteria	2.1 Consult the Bureau's Intranet to establish review travel allowances available.
Learning outcome 3	Determine the methods for booking accommodation.
Assessment criteria	3.1 Consult the current rates for accommodation allowance.
Learning outcome 4	Book flights that are most suitable.
Assessment criteria	4.1 Use the Travel consultant website for booking flights.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

MODULE TITLE F183 Duty Statement and Penalty Pay

Nominal duration	1½ hours
Module code or number	OBS-F183
Discipline Code	TO (Obs)
Module purpose	To introduce the participant to the concept of penalty pay, to calculate penalties and the paperwork required for penalties to be paid.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Penalty rosters • Non-penalty salary • Calculation of penalties
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Determine the roster being worked at a particular Field Station.
Assessment criteria	1.1 Consult the Bureau's Intranet to establish the roster being worked at various Field Stations.
Learning outcome 2	Determine the salary of a TO2 Field Observer
Assessment criteria	2.1 Consult the current Enterprise Agreement to establish the annual pay rate of a TO2 observer. 2.2 Calculate the hourly rate of pay .
Learning outcome 3	Determine which hours of work incur penalties and the rate of the penalty pay.
Assessment criteria	3.1 Consult the current Certified Agreement to establish the various panalty rates of various shifts.
Learning outcome 4	Complete the F183 Statement of Duty for a particular shift at a particular Field Station.
Assessment criteria	4.1 Complete the F183 Statement of Duty in accordance with prescribed procedures.
Learning outcome 5	Calculate the fortnightly penalty pay for that shift.
Assessment criteria	5.1 Apply the penalty rates for the shifts on the F183 to calculate the salary plus penalties for that particular station.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

MODULE TITLE Monthly Returns of an OIC

Nominal duration 1.5 hours

Module code or number OBS-OIC

Discipline Code TO (Obs)

Module purpose To introduce an observer to the Monthly Returns required to be completed at a Bureau Field Station.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Forms used by the Bureau
- Where forms are sent at the end of the month.

Assessment method Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.

Conditions of assessment During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.

Learning outcomes On completion of this module the participant will be able to

Learning outcome 1 Recognise and send routine Monthly Return Forms to the correct destination.

Assessment criteria

1.1 Recognise or complete samples of the following forms:

A8 Field Book – to HO

A37 Register of Weather Reports – to ROS

F68 Rainfall Observations - to HO and ROS

F70 Annual Daily Rainfall – held on station

F146 Major Consumable Stores – to HO

Safety Pager Performance Test – via SitesDb

F115 – Radar/PILOT/SOWIN forms – to HO

F172 Upper Wind Efficiency Report – to ROS

Reg 98 Petty Cash Reconcilliation Form – to ROS

Petty Cash Expenditure Control Forms – to ROS

Spending Proposals – to ROS

Credit Card Reconcilliation – via SAP

TBRG Data logger – to ROS

Barograph charts – after 3 months to ROS

Sunshine charts – after 3 months to ROS

Station Report – to ROS

Hydrogen Facilities Inspection – Annually to ROS

F572 Defective Balloon Log – annually to ROS

F183 Duty Statements – fortnightly to ROS

Claim for Motor Vehicle Allowance – if necessary to ROS

Application for overtime – if necessary to ROS

Application for Meal Allowance – if necessary to ROS

1.2 Determine the correct destination to send the above forms at the end

of the month.

Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations

MODULE TITLE MetESS and Regional/Central Admin

Nominal duration	1½ hours
Module code or number	OBS-METESS
Discipline Code	TO (Obs)
Module purpose	To introduce an observer to the administrative support an Observer working at a Field station might encounter.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• MetESS and how to use it. • Head Office Admin and the things they do. • Regional Admin and the things they do
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Use the MetESS system to access information about their Personnel records
Assessment criteria	1.1 Use MetESS to access their payslip. 1.2 Use MetESS to access details of Bank accounts 1.3 Use MetESS to access details of their Recreation Leave credits 1.4 Use MetESS to access their Current Work Details 1.5 Use MetESS to access their Duty Statement 1.6 Use MetESS to access their Personnel and Payroll contacts.
Learning outcome 2	Recognise when Head Office Admin Section's jurisdiction of a Trainee Observer's Personnel records will cease and when Regional Admin Section's jurisdiction will commence.
Assessment criteria	2.1 State when HO admin will cease to provide admin services for a Trainee. 2.2 State when Regional Admin will commence providing Admin Services for a Trainee.
Learning outcome 3	Explain the function of Central Admin and how it differs to Regional Admin.
Assessment criteria	3.1 Describe the function of Central Admin section. 3.2 Describe the function of Regional Admin section. 3.3 List the ways Central Admin differs from Regional Admin.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

MODULE TITLE OHS Responsibilities of an OIC

Nominal duration 3 hours

Module code or number OBS-OHSOIC

Discipline Code TO (Obs)

Module purpose To introduce an observer to the role of the officer in charge of a Field Station with regard to their Occupational Health and Safety Responsibilities, including site inductions.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- OH&S at a Field Station
- OH&S while working on your own
- OH&S and visiting public
- OH&S and contractors
- OH&S and Bureau Staff

Assessment method Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.

Conditions of assessment During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.

Learning outcomes On completion of this module the participant will be able to:

Learning outcome 1 Identify the responsibilities of an officer working at a Single Person Station with regard to maintaining a safe workplace

Assessment criteria

1.1 List the OH&S responsibilities of the officer in charge of a single person station with regard to:

- Electrical equipment at the Field Station
- Ergonomic workstations at the Field Station
- Maintaining a safe workplace

Learning outcome 2 Identify the OH&S responsibilities of an officer working at a Single Person Station with regard to working on your own.

Assessment criteria

2.1 List the OH&S responsibilities of the officer in charge of a single person station with regard to:

- Using equipment in the prescribed manner
- Personal safety while working on your own
- The Safety Pager Alarm system
- Shiftwork and health
- Single Person stations and mental health

Learning outcome 3 Identify the OH&S responsibilities of an officer working at a Bureau Field Station with regard to the public visiting a Field Station.

Assessment criteria

3.1 List the OH&S responsibilities of an officer at a Bureau Field Station with regard to:

- Visitor registers
- Visitor identification

Visitor induction

Supervising the public while they visit the Met Office

Explaining hazards to the public

Areas where the public are not allowed.

Learning outcome 4	Identify the OH&S responsibilities of an officer working at a Bureau Field Station with regard to contractors who visit the Field Station to perform work.
Assessment criteria	4.1 List the OH&S responsibilities of an officer working at a Bureau Field Station with regard to: Contractor induction Hazards in the workplace The Hazards Dossier Contractors performing work in a hydrogen hazard zone Contractors wearing PPE in hydrogen zones
Learning outcome 5	Identify the OH&S responsibilities of an officer working at a Bureau Field Station with regard to site induction of new officers to the station.
Assessment criteria	5.1 List the OH&S responsibilities of an officer commencing work at a Bureau Field Station with regard to New staff induction process Fire and evacuation procedures The Risk Register The MSDS Register The Dangerous Goods Register The SOP Register Fault Reporting Procedures
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations

MODULE TITLE Petty Cash and Spending Proposals

Nominal duration	1.5 hours
Module code or number	OBS-CASH
Discipline Code	TO (Obs)
Module purpose	To introduce an observer to the role of the officer in charge of a Field Station with regard to the handling of Petty Cash and Spending Proposals.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Financial Accountability regarding Petty Cash • Paperwork and Monthly Returns • Cost strings • Spending Proposals • Filling out a Spending Proposal
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Identify the responsibilities outlined under the Financial Management Act 1997 regarding the spending and safe-keeping of Government Money.
Assessment criteria	1.1 List the responsibilities of the officer in charge of the Petty Cash at a Bureau Field Station. Keep Petty Cash in a safe place Complete a Spending Proposal for every purchase Complete a Handover/Takeover form when leaving the station Reconcile the Petty Cash monthly
Learning outcome 2	Define various financial strings and describe what they are used for.
Assessment criteria	2.1 Define and describe the purpose of various financial strings such as: Internal Order Numbers Cost Centres General Ledger Codes
Learning outcome 3	Stipulate the conditions under which various payment methods would be used.
Assessment criteria	3.1 State when Petty Cash would would be used in preference to Credit Cards or a Purchase Order. 3.2 State when a credit card would be used in preference to Petty Cash or a Purchase Order. 3.3 State when a Purchase Order would be used in preference to a Credit Card or Petty Cash.
Learning outcome 4	List the forms and paperwork required to be completed to manage the Petty Cash.
Assessment criteria	4.1 List the various forms required to be completed to manage the Petty Cash and state the situations under which they are required to be completed.

		Reg 98
		Reg 60
		Spending Proposals
		Handover/Takeover form for Petty Cash
		F02 Receipt Payment form
Learning outcome 5	Complete a suite of forms given a number of receipts simulating purchases at a Bureau Field Station.	
Assessment criteria	5.1	Complete the following Petty Cash Forms:
		Reg 98
		Reg 60
		Spending Proposals
		Handover/Takeover form for Petty Cash
		F02 Receipt Payment form
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.	
Learning resources	A computer with Bureau Intranet capability.	
Occupational health and safety requirements	A safe environment will be provided for participants with regard to:	
		Ergonomic workstations.

MODULE TITLE Financial Accountability

Nominal duration 1½ hours

Module code or number OBS-FA

Discipline Code TO (Obs)

Module purpose To introduce an observer to the requirement for financial accountability when handling Government money.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Collecting Money for the CPM
- Managing Petty Cash
- Managing a Government Credit Card
- Paying contractors
- Disposal of Assets
- Cabcharge dockets
- Fraud

Assessment method Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.

Conditions of assessment During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.

Learning outcomes On completion of this module the participant will be able to:

Learning outcome 1 Collect money on behalf of the Collector of Public Monies by following the guidelines laid down in the Financial Management Act 1994 and the Bureau's Chief Executive's Instructions.

Assessment criteria

1.1 List the things a Bureau Field officer must do when accepting monies from the public on behalf of the Collector of Public Monies:

Issue a receipt to the customer

Keep money secure

Maintain a record of receipts

Bank the money into a Bureau account

Send receipts to the Regional Administrative Officer every month

Don't mix private money and Government money.

Learning outcome 2 Manage Petty Cash at a Field Station by following the guidelines laid down in the Financial Management Act 1994 and the Bureau's Chief Executive's Instructions.

Assessment criteria

2.1 State the conditions under which Petty Cash can be spent.

For purchases less than $200-00

For items necessary for the Bureau

2.2 State the requirements for keeping Petty Cash at the office.

Keep Petty Cash secure

Keep private money and Petty Cash seperate.

2.3 State the administrative paperwork required to manage petty cash

Fill in a Spending Proposal for each Petty Cash purchase.

Fill in a Petty Cash Disbursements (Form 16) each month.

Fill in a Petty Cash Reconcilliation Form every month

Fill in a Petty Cash Handover/Takeover Form when handing over Petty Cash

Send receipts to the Regional Administrative Officer every month.

Learning outcome 3 Manage an Australian Government Credit Card by following the guidelines laid down in the Financial Management Act 1994 and the Bureau's Chief Executive's Instructions.

Assessment criteria

3.1 List the conditions of use of an Australian Government Credit Card

Used for non-petty purchases up to $2,000.

Only used for items required by the Commonwealth.

Keep the Credit Card secure.

Abide by the Government Purchasing Guidelines

Do not exceed your spending limit.

Do not gain from the use of your card.

Do not use for travel purchases

Do not use for cash advances

Do not use for flowers purchases

Do not use to purchase fuel for vehicle.

3.2 State the administrative paperwork required to manage Credit Card transactions.

Submit all tax receipts and tax invoices to the Regional Administrative Officer monthly

Reconcile your Credit Card monthly.

Fill in a Spending Proposal for each purchase.

Pay off your card (through SAP) every month.

Learning outcome 4 Manage the payment of contractors and tradespeople.

Assessment criteria

4.1 List the paperwork requirements of a payment made by Local Purchase Order book.

The White copy goes to the contractor

The Yellow Copy goes to the Regional Administrative Officer

The Pink copy remains in the LPO book.

Learning outcome 5 Dispose of an asset in the prescribed manner.

Assessment criteria

5.1 List the conditions under which a Bureau Officer may dispose of an Assett.

The Assett is unserviceable and unfixable or obsolete.

Fill in a Disposal of Assets Form.

The Bureau Officer cannot gain an advantage from the disposal of the assett.

Learning outcome 6 Manage Cabcharge dockets in the prescribed manner.

Assessment criteria

6.1 List the conditions under which a Bureau Officer may hold and use Cabcharge dockets.

Cabcharge dockets must only be used for official purposes.

Cabcharge dockets must be kept securely.

Learning outcome 7 Be aware of fraud and how to report it.

Assessment criteria

4.1 List various examples of fraud in the workplace.

- Improper use of Bureau facilities
- Misuse of credit, fuel and cabcharge cards
- Theft
- Hacking or interfering with Bureau equipment
- Bribery and corruption or abuse of office
- Falsifying records
- Making false claims (TA, sick leave, overtime, etc.)
- Special favourse contrary to fair competition
- Improperly providing information to others

4.2 Report fraud in the prescribed manner.

- Note your observations
- Report your concerns to your supervisor or EXF or ADF
- Inform only those who need to know.
- Fill in a Disposal of Assets Form.
- The Bureau Officer cannot gain an advantage from the disposal of the assett.

Delivery This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.

Learning resources A computer with Bureau Intranet capability.

Occupational health and safety requirements A safe environment will be provided for participants with regard to:

- Ergonomic workstations.

MODULE TITLE Bureau Houses and Leases

Nominal duration	¾ hours
Module code or number	OBS-HOUSES
Discipline Code	TO (Obs)
Module purpose	To introduce an observer to the obligations and responsibilities of a tennant of a Bureau house and the OIC of a Field Station with Bureau housing.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Bureau house leases • Bureau supplied housing locations • Tennant responsibility • Rental rates in the NFOP • OIC responsibility
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Identify the main components of a Bureau housing tenancy lease.
Assessment criteria	1.1 List the main components.
Learning outcome 2	Recall Bureau Field Offices where housing is provided by the Bureau and state the rental rates paid by Bureau officers.
Assessment criteria	2.1 List Field Stations at which Bureau housing is provided
Learning outcome 3	Explain the obligations and responsibilities required of a tennant of a Bureau owned house.
Assessment criteria	3.1 Explain the responsibilities of a tennant of Bureau housing, including: house maintenance garden maintenance telephone connection and bills electricity connection and bills gas connection and bills water connection and bills modifications to the property sub-leasing the property..
Learning outcome 4	Detail the obligations and responsibilities required of the officer in charge of a Field Station where Bureau housing is provided.
Assessment criteria	4.1 Explain the obligations and responsibilities required of the officer in charge of a Field Station where Bureau housing is provided. house maintenance housing inspections and paperwork required

tennancy agreements and leases

Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations.

MODULE TITLE — Manage contracts at a Field Station

Nominal duration 1.5 hours

Module code or number OBS-CONTRACT

Discipline Code TO (Obs)

Module purpose To introduce an observer to the role of the officer in charge of a Field Station with regard to the supervision of maintenance contracts at a Bureau Field Station.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

Relationship to skill Standards Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- Supervision of Bureau contracts
- Airconditioning contracts
- Cleaning contracts
- Lawnmowing contracts
- Tradespeople contracts

Assessment method Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.

Conditions of assessment During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.

Learning outcomes On completion of this module the participant will be able to:

Learning outcome 1 Identify the OIC responsibilities and tasks involved with the supervision of work contracts awarded by the Bureau.

Assessment criteria
1.1 List the OIC responsibilities.

Learning outcome 2 Identify the OIC responsibilities regarding the supervision of work outlined in a contract to service the airconditioners at a Bureau Field Station.

Assessment criteria
2.1 Identify the OIC responsibilities regarding the supervision of work outlined in a contract to service the airconditioners at a Bureau Field Station.

Learning outcome 3 Identify the OIC responsibilities regarding the supervision of work outlined in a contract to clean a Bureau Field Station.

Assessment criteria
3.1 Identify the OIC responsibilities regarding the supervision of work outlined in a contract to clean a Bureau Field Station..

Learning outcome 4 Identify the OIC responsibilities regarding the supervision of work outlined in a contract to provide gardening services at a Bureau Field Station.

Assessment criteria
4.1 Identify the OIC responsibilities regarding the supervision of work outlined in a contract to provide gardening services at a Bureau Field Station.

Learning outcome 5 Identify the OIC responsibilities regarding the supervision of work performed by various contractors and tradespeople at a Bureau Field Station.

Assessment criteria
5.1 Identify the OIC responsibilities regarding the supervision of work performed at a Bureau Field Station by various contractors and tradespeople such as:

plumbers

builders

electricians

etc.

Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to:

Ergonomic workstations.

MODULE TITLE SAP and Stores Ordering

Nominal duration	3 hours
Module code or number	OBS-SAP
Discipline Code	TO (Obs)
Module purpose	To introduce an observer to the process of ordering stores from SAP.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Search for stores • Monitor Stores usage • Order stores
Assessment method	Assessment of this module can be performed using class discussions, oral questions and answers or a written assignment.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to
Learning outcome 1	Use SAP to search for stores
Assessment criteria	1.1 Log onto SAP 1.2 Search for a particular stores item
Learning outcome 2	Use SAP to monitor stores usage
Assessment criteria	2.1 Determine the number of a particular stores item used by a particular station during the past 12 months
Learning outcome 3	Use SAP to order stores
Assessment criteria	3.1 Order a particular stores item from SAP.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Ergonomic workstations

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course 2011

Module 13
Hydrogen Safety & Systems

- Hydrogen Safety and OH&S
- Hydrogen Launch Systems Mechanical RBL
- Hydrogen Launch Systems - ACOM
- Hydrogen Launch Systems - Manpacks
- Hydrogen Launch Systems Electrical RBL
- HOGEN
- Hydrogen Facilities Inspection

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

MODULE TITLE Hydrogen Safety and OHS

Nominal duration	15 hours
Module code or number	OBS-H2OHS
Discipline Code	TO(Obs)
Module purpose	To enable participants to work safely while preparing balloons using hydrogen gas and while working in the training environment.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology. Conforms to Commonwealth Government and Bureau of Meteorology Occupational Health and Safety Policies.
Summary of content	• Dangers of Hydrogen • Hydrogen facilities overview • Personal Protective Equipment • Safety practices while filling and releasing hydrogen filled balloons • Emergency procedures • Safety Pager operation and maintenance • Reporting incidents • OH&S Responsibilities
Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.
Conditions of assessment	During assessment participants will have reference to Bureau of Meteorology Hydrogen Handbook.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Define the properties of hydrogen relevant to its use in the Bureau of Meteorology.
Assessment criteria	1.1 List the dangerous properties of hydrogen including: Flammability limits (ratio mixed with air) Explosive limits (ratio mixed with air) Easy ignitability Odourless Colourless

Asphyxiation hazard

Energy content

Flame characteristics (visibility and temperature)

1.2 Identify likely ignition sources for a hydrogen explosion including

Electrical spark

Static spark

Open flame

Pressure wave

1.3 List precautions that need to be taken to avoid ignition of hydrogen in normal use including

Exclusion of naked flame

Exclusion of electrical devices

Exclusion of nylon clothing

Exclusion of personnel from hydrogen zone

Fill balloons slowly

Open and close hydrogen valves slowly

Wet balloon and shed before inflation (or use ion spray in Antarctica)

Earth yourself before approaching balloon

Inflate balloons just prior to release.

Wear Personal Protective Equipment

Learning outcome 2 Identify the hydrogen facilities at the Glenlitta Avenue Field Training Annexe.

Assessment criteria

2.1 Define the Hydrogen Safety Zone

2.2 Identify the hydrogen storage facilities.

2.3 Identify the balloon filling facilities

2.4 Identify various features in hydrogen facilities that minimise the risk of a hydrogen explosion as detailed in the Hydrogen Handbook and including:

Water sprays (or ion spray in Antarctica)

Earthing

Intrinsically safe electrical equipment

Clear area

Learning outcome 3 Use appropriate personal protective equipment.

Assessment criteria

3.1 List personal protective equipment required when using hydrogen.

3.2 Summarise the circumstances under which personal protective equipment should be worn.

3.3 Demonstrate personal responsibilities in using personal protective equipment.

Learning outcome 4 Follow prescribed procedures to fill and release meteorological balloons.

Assessment criteria

4.1 Demonstrate the steps involved in safely filling a hydrogen-filled meteorological balloon using a Stuart Electrolyser or a HOGEN and a balloon filling shed..

4.2 Demonstrate the inflation of a hydrogen-filled meteorological

balloon using commercial gas supplies (G cylinders).

4.3 Demonstrate the steps involved with changing a regulator on a G cylinder.

4.4 Demonstrate the steps involved in releasing a hydrogen-filled meteorological balloon.

Conditions of assessment: Learning will take place in a classroom and a balloon filling shed.

Assessment method: Practical demonstration of balloon filling and release.

Learning outcome 5: List the procedures prescribed by the Hydrogen Handbook to deal with emergencies encountered during balloon filling.

Assessment criteria

5.1 Describe the procedure to be followed in the event of a burst balloon.

5.2 Describe the procedure to be followed in the event of a balloon leaking on the filler.

5.3 Describe the procedure to be followed in the event of a fire within the Hydrogen Safety Zone.

Learning outcome 6: Operate and maintain the Safety Alarm System.

Assessment criteria

6.1 Demonstrate operation and use of the Safety Alarm.

6.2 Demonstrate or describe the daily and monthly checks of the Safety Alarm System.

Learning outcome 7: Take emergency action in the event of a hydrogen explosion.

Assessment criteria

7.1 List the steps prescribed by the Bureau of Meteorology Hydrogen Handbook to provide first aid to hydrogen burns to the skin.

7.2 Locate emergency equipment including

- First aid cabinet
- Drench shower
- Emergency contacts
- Fire extinguishers/hose
- First aid room

Learning outcome 8: Report incidents and accidents in a manner conforming to Bureau of Meteorology prescribed procedure.

Assessment criteria

8.1 Differentiate between incidents and accidents

8.2 Describe the reporting procedure for incidents and accidents.

Learning outcome 9: Fulfill Occupational Health and Safety responsibilities in the workplace regarding hydrogen.

Assessment criteria

9.1 Identify the responsibilities of visitors to the station.

9.2 Detail the responsibilities of personnel handling hydrogen.

9.3 Identify the responsibilities of the Officer in Charge

9.4 Identify the responsibilities of the Regional Observations Manager.

9.5 Identify the responsibilities of the Safety and Health Officer.

Delivery: This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hand-on training but also uses paper based and computer based methods.

Learning resources

Hydrogen Handbook, Bureau of Meteorology, Melbourne, current version

Upper Air Handbook (Volume 1), Bureau of Meteorology, Melbourne, current version

Burns and Scalds, St John Ambulance Australia, Melbourne, 2002

Balloon filling shed with hydrogen supply (HOGEN or Stuart Electrolyser

and commercial G cylinders)

Consumables such as meteorological balloons and radar targets, etc.

Safety Alarm system

Personal protective equipment

Occupational health and safety requirements

A safe environment will be provided for participants with regard to:

Hydrogen (explosive gas) hazards

Personal protective equipment

MODULE TITLE Hydrogen Launch Systems – Mechanical RBL

Nominal duration	9 hours
Module code or number	OBS-MRBL
Discipline Code	TO(Obs)
Module purpose	To enable the participant to use and maintain the Mechanical Remote Balloon Launcher.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• OH&S considerations when using the RBL • RBL components and layout • RBL balloon and tray preparation • Emergency procedures • Changing a gas supply • Pre-balloon flight and daily maintenance • Weekly maintenance • Monthly maintenance • Three-monthly maintenance • Annual Hydrogen Inspection
Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Recognise Hydrogen Hazard zones, use personal protective equipment and operate high pressure gas equipment.
Assessment criteria	1.1 Describe Explosive Atmosphere hazard zones. 1.2 List the types of equipment permitted in Explosive Atmosphere hazard zones. 1.3 Use Personal Protective Equipment correctly: Anti-flash coat Goggles Gloves Anti-static boots or shoe grounding straps Cotton overalls (if required) 1.4 Describe how gas valves should be turned on and off.
Learning outcome 2	Locate and describe Remote Balloon Launcher components and layout.
Assessment criteria	2.1 Locate the hydrogen supply. 2.2 Locate the Auto Change-over manifold (if applicable) and describe it's function. 2.3 Locate the Gas Control Panel and describe it's function. 2.4 Locate the Electrical Control Panel and describe it's function. 2.5 Locate the Ambient air supply and describe its function.

	2.6	Locate the water sprayers and describe their function.
	2.7	Locate the RBL curtains and describe their function.
	2.8	Locate the warning beacons and describe their function.
	2.9	Locate the Piercing rod and its storage location.
	2.10	Locate the bung material and describe its function.
	2.11	Locate the nozzle and inserter and describe their function.
	2.12	Locate the Balloon Neck Stretcher and describe its function
	2.13	Locate the target string templates and describe their function.
	2.14	Locate the String unwinder inhibitor and describe its function.
Learning outcome 3	Demonstrate a balloon inflation and release in accordance with prescribed procedures.	
Assessment criteria	3.1	Operate the Electrical Control Panel in accordance with prescribed procedures detailed in the Hydrogen Handbook.
	3.2	Prepare the balloon and train in accordance with instructions contained in the Hydrogen Handbook and Observations Instruction 07/17.
	3.3	All Personal Protective Equipment is worn.
	3.4	Check RBL hydrogen hazard zone is clear of people.
	3.5	Fit String Unwinder Inhibitor to radiosonde.
	3.6	Fit balloon and train to the filler table.
	3.7	Operate the water sprays if required as prescribed in Observation Instruction 07/14.
	3.8	Operate the gas control panel to inflate the balloon.
	3.9	Obtain clearance from Air Traffic Control if required
	3.10	Locate the balloon release switches and release the balloon
	3.11	Check the gas supply.
Learning outcome 4	Describe or demonstrate the procedures to follow for a fouled balloon or major gas leak.	
Assessment criteria	4.1	Shut down the gas supply.
	4.2	Rupture the balloon using the method prescribed in the Hydrogen Handbook.
	4.3	Recall emergency procedures for a major gas leak as detailed in Observation Instruction 07/02.
Learning outcome 5	Accept a simulated hydrogen gas delivery and demonstrate the gas changing procedure.	
Assessment criteria	5.1	Discuss or demonstrate the procedure to de-pressurise the hydrogen supply line.
	5.2	Demonstrate the procedure to disconnect the gas supply.
	5.3	Check new gas supply for damage and leaks.
	5.4	Connect new gas supply.
	5.5	Operate Auto Change Over Manifold in the prescribed manner.
Learning outcome 6	Perform pre-balloon flight checks and daily maintenance.	
Assessment criteria	6.1	Check the condition of the O ring on the nozzle.
	6.2	Check the nozzle for burrs on the balloon end.
	6.3	Ensure the balloon neck expander and the nozzle inserter are in operable condition.
	6.4	Check the gas supply pressure before fill.

	6.5 Ensure warning beacons operate during the fill.
	6.6 If performing a radiosonde sounding ensure the ambient air fan is operating.
	6.7 Ensure the water sprayers are operating.
Learning outcome 7	Perform weekly maintenance on the Remote Balloon Launcher.
Assessment criteria	7.1 Check the control panel gas supply valve for leaks.
	7.2 Check the operation of the ambient air system.
	7.3 Check the condition of the curtains and clean if necessary.
	7.4 Check the operation of the door locks
	7.5 Check the condition of the balloon inflation table and lubricate the nozzle fitting.
Learning outcome 8	Perform monthly maintenance on the Remote Balloon Launcher.
Assessment criteria	8.1 Locate the monthly maintenance in the Hydrogen Handbook and discuss the monthly maintenance required for the: Ambient Air Enclosure Warning beacons Curtain ropes String unwinder inhibitor Emergency balloon prod. Electrical and gas control panels.
Learning outcome 9	Perform three-month maintenance on the Remote Balloon Launcher.
Assessment criteria	9.1 Locate the monthly maintenance in the Hydrogen Handbook and discuss the monthly maintenance required for the: Earth points Hydrogen hose
Learning outcome 10	Locate the Annual Hydrogen Inspection Form (F611) and explain it's purpose.
Assessment criteria	10.1 Locate the annual hydrogen inspection form (F611)
	10.2 Explain the purpose of an annual hydrogen inspection
Delivery	This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hand-on training but could also use paper based and computer based methods.
Learning resources	*Hydrogen Handbook*, Bureau of Meteorology, Melbourne, current version Mechanical Remote Balloon Launcher with hydrogen supply. Electrical Remote Balloon Launcher with hydrogen supply. Auto Change Over Manifold.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Hydrogen hazard zones Explosion hazards

MODULE TITLE Hydrogen Systems – ACOM

Nominal duration	3 hours
Module code or number	OBS-ACOM
Discipline Code	TO(Obs)
Module purpose	To enable the participant to use and maintain the Auto Change Over Manifold.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Theory of operation • Hazardous zones, PPE and use of high pressure valves • ACOM system and layout • Changing a gas supply • Risk assessments and maintenance checks
Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.
Learning outcomes	On completion of this module the participant will be able to:
Learning Outcome 1	Discuss the theory of operation of the ACOM and locate operating procedures in the Hydrogen Handbook.
Assessment criteria	1.1 Completion of written assignment located at http://bmtc.bom.gov.au/sio/Field%20Courses/Hydrogen%20Systems/Auto%20Change-Over%20Manifold/ManPack/QUIZ_Hydrogen_Safey%20ACOM.pdf
Learning outcome 2	Recognise Hydrogen Hazard zones, use personal protective equipment and operate high pressure gas equipment.
Assessment criteria	2.1 Describe Explosive Atmosphere hazard zones. 2.2 List the types of equipment permitted in Explosive Atmosphere hazard zones. 2.3 Use Personal Protective Equipment correctly: Anti-flash coat Goggles Gloves Anti-static boots or shoe grounding straps Cotton overalls (if required) 2.4 Describe how gas valves should be turned on and off.
Learning outcome 3	Locate and describe Auto Change Over Manifold components and layout.
Assessment criteria	3.1 Locate the hydrogen supply. 3.2 Locate the supply change-over lever and describe it's function.

	3.3	List 4 safety features of the Auto Change Over Manifold.
	3.4	Locate the Bleed/Vent Valves and describe their function.
	3.5	Locate the One Way Valves and describe their function (refer to Obs Instruction 07/02).
	3.6	Locate Gas Supply 1 and Gas Supply 2 Gauges and describe their function.
	3.7	Locate the Flashback Arrestor and describe its function.
	3.8	Locate the Filling Hose Isolation Valve and describe its function.
	3.9	Locate the Pressure Relief Valves and describe their function..
	3.10	Locate the 2 stage Regulator and describe its function.
	3.11	Locate the 1 Stage Regulator and describe its function.
	3.12	Describe the operation of the Auto Change Over Manifold.
Learning outcome 4	Demonstrate changing the gas supply	
Assessment criteria	4.1	Operate the Supply Change-Over lever.
	4.2	Depressurise the hydrogen supply line
	4.3	Disconnect the gas supply
	4.4	Discuss the procedure for handling hydrogen leaks (Obs Instruction 07/02)
	4.5	Connect a new gas supply
	4.6	Check the supply pressure
Learning outcome 5	Make risk assessments and carry out maintenance checks.	
Assessment criteria	5.1	Check ACOM joints for leaks.
	5.2	Inspect earthing cable.
	5.3	Visually inspect ACOM system for damage or leaks.

Delivery	This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hand-on training but could also use paper based and computer based methods.
Learning resources	*Hydrogen Handbook*, Bureau of Meteorology, Melbourne, current version Auto Change Over Manifold connected to a hydrogen gas supply.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Hydrogen hazard zones

MODULE TITLE **Hydrogen Systems – Manpacks**

Nominal duration	3 hours
Module code or number	OBS-MANP
Discipline Code	TO(Obs)
Module purpose	To enable the participant to use and Manpack gas supplies safely.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Hazardous zones, PPE and use of high pressure valves • Manpack system and layout • Gas deliveries and changing a gas supply • Risk assessments and maintenance checks • Annual Hydrogen Inspection
Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Recognise Hydrogen Hazard zones, use personal protective equipment and operate high pressure gas equipment.
Assessment criteria	1.1 Describe Explosive Atmosphere hazard zones. 1.2 List the types of equipment permitted in Explosive Atmosphere hazard zones. 1.3 Use Personal Protective Equipment correctly: Anti-flash coat Goggles Gloves Anti-static boots or shoe grounding straps Cotton overalls (if required) 1.4 Describe how gas valves should be turned on and off.
Learning outcome 2	Locate and describe Manpack components and layout.
Assessment criteria	2.1 Locate the hydrogen supply. 2.2 Locate the Auto Change Over Manifold and describe it's function. 2.3 Locate the Gas Control Panel and describe its function.
Learning outcome 3	Demonstrate gas delivery checks and changing the gas supply
Assessment criteria	3.1 Operate the Auto Change Over Manifold Gas Supply selection lever. 3.2 Depressurise the hydrogen supply line 3.3 Disconnect the gas supply 3.4 Discuss the procedure for handling hydrogen leaks (Obs Instruction

	07/02)
	3.5 Perform damage and leak checks during a gas delivery.
	3.6 Connect a new gas supply
	3.7 Check the supply pressure
Learning outcome 4	Make risk assessments and carry out maintenance checks.
Assessment criteria	4.1 Visually inspect earthing cable.
	4.3 Visually inspect hydrogen hose for damage or leaks.
Learning outcome 5	Perform an Annual Hydrogen Inspection and explain it's purpose.
Assessment criteria	5.1 Locate the annual hydrogen inspection form (F611)
	5.2 Explain the purpose of an annual hydrogen inspection
Delivery	This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hand-on training but could also use paper based and computer based methods.
Learning resources	*Hydrogen Handbook*, Bureau of Meteorology, Melbourne, current version
	Auto Change Over Manifold connected to a common manifold hydrogen gas supply.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to:
	Hydrogen hazard zones

MODULE TITLE Hydrogen Launch Systems – Electrical RBL

Nominal duration 4½ hours

Module code or number OBS-ERBL

Discipline Code TO(Obs)

Module purpose To enable the participant to use and maintain the Electrical Remote Balloon Launcher.

Prerequisites A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.

This course is a shortened version of the full Electrical Remote Balloon Launcher course because a lot of the same outcomes are covered by the Mechanical Remote Balloon Launcher course.

This course therefore requires successful completion of the Mechanical Remote Balloon Launcher Course as a pre-requisite.

In addition, this course requires successful completion of Hydrogen Safety from Module 1 as a pre-requisite.

Relationship to skill Standards Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.

Summary of content

- RBL components and layout
- RBL balloon and tray preparation
- Use of the Emergency Stop button.
- Changing a gas supply
- Pre-balloon flight and daily maintenance
- Weekly maintenance
- Monthly maintenance
- Three-monthly maintenance

Assessment method Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.

Learning outcomes **On completion of this module the participant will be able to:**

Learning outcome 1 Locate and describe Electrical Remote Balloon Launcher components and layout.

Assessment criteria

1.1 Locate the Electrical Control Unit and describe it's function and use.

1.2 Locate the Yellow Warning Beacons and describe their function.

1.3 Describe the function of the Siren and state the conditions under which it will be automatically activated.

1.4 Locate the Ambient Air Supply and describe it's function and use.

1.5 Locate the Water Supply and describe it's function and use.

1.6 Locate the Hydrogen Supply and describe how to select Supply 1 or Supply 2.

1.7 Locate the Emergency Stop Button and describe it's function and use.

1.8 Locate the Carrier Tray and describe it's function and use.

	1.9	Locate the String Unwinder Inhibitor and describe its function and use.
Learning outcome 2	Demonstrate a balloon inflation and release in accordance with prescribed procedures.	
Assessment criteria	2.1	Prepare the balloon and train in accordance with instructions contained in the Hydrogen Handbook and Observations Instruction 07/17.
	2.2	All Personal Protective Equipment is worn correctly.
	2.3	Check the operation of the sprinklers by using the emergency Stop button.
	2.4	Fit the balloon and train to the Carrier Tray
	2.5	Fit the string unwinder inhibitor to the radiosonde (if applicable)
	2.6	Fit the carrier tray to the RBL table (checking operation of the Ambient Air Supply if required).
	2.7	Check RBL hydrogen hazard zone clear of all personnel.
	2.8	Operate Electrical Control Panel to fill balloon.
	2.9	Obtain release permission from Air Traffic Control if required.
	2.10	Describe the location and operation of the balloon release buttons.
	2.11	Check gas supply pressure after fill.
Learning outcome 3	Describe or demonstrate the procedures to follow for a fouled balloon or major gas leak when they are different to those of the Mechanical RBL.	
Assessment criteria	3.1	Operate the Emergency Stop Button
	3.2	Describe the method of balloon piercing prescribed in the Hydrogen Handbook.
	3.3	Recall emergency procedures for a major gas leak as detailed in Observation Instruction 07/02.
Learning outcome 4	Change gas supplies when required.	
Assessment criteria	4.1	Discuss or demonstrate the procedure to de-pressurise the hydrogen supply line.
	4.2	Demonstrate the procedure to disconnect the gas supply.
	4.3	Check new gas supply for damage and leaks.
	4.4	Connect new gas supply.
	4.5	Recommence fill.
Learning outcome 5	Perform pre-balloon flight checks and daily maintenance when they are different to those of the Mechanical RBL..	
Assessment criteria	5.1	Operate the Emergency Stop button before loading the balloon train to ensure the water sprays are working.
Learning outcome 6	Perform weekly maintenance on the Remote Balloon Launcher when they are different to the Weekly Maintenance of the Mechanical RBL.	
Assessment criteria	7.1	Check the control panel gas supply valve for leaks.
	7.2	Check the operation of the ambient air system.
	7.3	Check the condition of the curtains and clean if necessary.
	7.4	Check the operation of the door locks

7.5 Check the condition of the balloon inflation table and lubricate the nozzle fitting.

Learning outcome 8 Perform monthly maintenance on the Remote Balloon Launcher.

Assessment criteria

8.1 Locate the monthly maintenance in the Hydrogen Handbook and discuss the monthly maintenance required for the:

- Ambient Air Enclosure
- Warning beacons
- Curtain ropes
- String unwinder inhibitor
- Emergency balloon prod.
- Electrical and gas control panels.

Learning outcome 9 Perform three-month maintenance on the Remote Balloon Launcher.

Assessment criteria

9.1 Locate the monthly maintenance in the Hydrogen Handbook and discuss the monthly maintenance required for the:

- Earth points
- Hydrogen hose

Learning outcome 10 Locate the Annual Hydrogen Inspection Form (F611) and explain it's purpose.

Assessment criteria

10.1 Locate the annual hydrogen inspection form (F611)

10.2 Explain the purpose of an annual hydrogen inspection

Delivery This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hand-on training but could also use paper based and computer based methods.

Learning resources *Hydrogen Handbook*, Bureau of Meteorology, Melbourne, current version

Mechanical Remote Balloon Launcher with hydrogen supply.

Electrical Remote Balloon Launcher with hydrogen supply.

Auto Change Over Manifold.

Occupational health and safety requirements A safe environment will be provided for participants with regard to:

Hydrogen hazard zones
Explosion hazards

MODULE TITLE HOGEN

Nominal duration	15 hours
Module code or number	OBS-HOGEN
Discipline Code	TO(Obs)
Module purpose	To enable participants to use the HOGEN hydrogen generator and Water Treatment Plant to generate hydrogen.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology. Conforms to Commonwealth Government and Bureau of Meteorology Occupational Health and Safety Policies.

Summary of content

- HOGEN overview
- Operating the HOGEN
- Emergency shutdown of the HOGEN
- Investigating common faults.
- Cleaning and filter replacement
- High pressure gas store.
- Water Treatment Plant overview
- Operating the Water Treatment Plant
- Water Treatment Plant fault investigation
- Water Treatment Plant daily maintenance
- Water Treatment Plant monthly maintenance

Assessment method	Demonstrate understanding of concepts by formal methods of knowledge testing such as written test, class discussion, assignments etc and by practical demonstration of prescribed procedures.
Conditions of assessment	During assessment participants will have reference to Bureau of Meteorology Hydrogen Handbook.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Locate and describe the function of various components of the HOGEN hydrogen generator.
Assessment criteria	1.1 Locate the following components of the HOGEN hydrogen generator: Water supply input Solid filters Hydrogen lines Oxygen lines Electrical system

Mains Power Switch

Emergency shutdown switch

Start-up and shut-down buttons

HOGEN control panel

Operating parameters

1.2 Describe the function of the following components of the HOGEN hydrogen generator:

Water supply input

Solid filters

Hydrogen lines

Oxygen lines

Electrical system

Mains Power Switch

Emergency shutdown switch

Start-up and shut-down buttons

HOGEN control panel

Operating parameters

Learning outcome 2 Demonstrate start-up and shut-down procedures as prescribed in the HOGEN operators manual:

Assessment criteria

2.1 Demonstrate operation of the Electrical Control Panel to start up the HOGEN.

2.2 Demonstrate or describe the action required when various warning indicators are displayed.

2.3 Manually start up the HOGEN.

2.4 Manually shut down the HOGEN

2.5 Explain the significance of "E-00" on the control panel display.

2.6 Switch the HOGEN to idle mode.

Learning outcome 3 Demonstrate emergency procedures to be followed in the event of an alarm trigger.

Assessment criteria

3.1 Demonstrate an Emergency HOGEN plant shutdown.

Learning outcome 4 Discuss, demonstrate of briefly describe fault finding procedures:

Assessment criteria

4.1 Discuss, demonstrate or briefly describe the HOGEN error codes

4.2 Demonstrate, discuss or briefly describe the hydrogen leak detection system.

Learning outcome 5 Locate maintenance tasks in the handbook and perform prescribed observer maintenance on the HOGEN.

Assessment criteria

5.1 Locate maintenance tasks in the handbook.

5.2 Describe HOGEN cleaning

5.3 Describe or demonstrate air purge intake filter replacement.

Learning outcome 6 Describe responsibilities of the observer in relation to the Hydrogen High Pressure Store.

Assessment criteria

6.1 Describe the safety requirements.

6.2 Demonstrate the wearing of all required Personal Protective Equipment

6.3 Demonstrate or describe responsible operation of the Hydrogen high pressure store.

Learning outcome 7 Locate and describe the function of various components of the Water Treatment Plant.

Assessment criteria

7.1 Locate the following components of the Water Treatment Plant:

- Water supply input
- Solid filters
- Reverse Osmosis Filter
- Demineralise Filter
- Water Product Storage Container
- Water Storage Vent Filter
- Reject Pressure Adjustment Valve
- Loop Pressure Adjustment Valve
- Ultraviolet Sterilizer
- Front Panel Pressure Gauges
- Front Panel Pressure Gauge Sensors
- Main Control Switch
- Main Electrical Control Panel and Alarm System

7.2 Describe the function of the following components of the Water Treatment Plant::

- Water supply input
- Solid filters
- Reverse Osmosis Filter
- Demineralise Filter
- Water Product Storage Container
- Water Storage Vent Filter
- Reject Pressure Adjustment Valve
- Loop Pressure Adjustment Valve
- Ultraviolet Sterilizer
- Front Panel Pressure Gauges
- Front Panel Pressure Gauge Sensors
- Main Control Switch
- Main Electrical Control Panel and Alarm System

Learning outcome 8 Demonstrate start-up and shut-down procedures as prescribed in the Water Treatment Plant operators manual:

Assessment criteria

8.1 Demonstrate operation of the Electrical Control Panel to start up the Water Treatment Plant.

8.2 Demonstrate Loop Pressure adjustment

8.3 Demonstrate Reject Pressure adjustment

8.4 Demonstrate feed stage startup procedures

8.5 Describe shutdown procedures if the plant is to be off for more than 24 hours.

8.6 Demonstrate feed stage filling.

Learning outcome 9 Demonstrate emergency procedures to be followed in the event of an alarm trigger.

Assessment criteria

9.1 Demonstrate an Emergency Water Treatment Plant shutdown.

Learning outcome 10	Discuss, demonstrate of briefly describe Water Treatment Plant fault finding procedures:
Assessment criteria	10.1 Discuss, demonstrate or briefly describe the symptoms of a Low Pressure Fault.
	10.2 Demonstrate, discuss or briefly describe the symptoms of a Low Purity Fault.
	10.3 Demonstrate, discuss or briefly describe the symptoms of water leaks in various locations.
Learning outcome 11	Locate daily maintenance tasks in the handbook and perform prescribed daily maintenance on the Water Treatment Plant.
Assessment criteria	11.1 Locate Daily Maintenance tasks in the handbook.
	11.2 Monitor and record the performance of the Pressure Gauge.
	11.3 Monitor and record the performance of the UV sterilizer
	11.4 Log any unusual or unexpected alarms in Appendix A (Log Sheet)
Learning outcome 12	Locate monthly maintenance tasks in the handbook and perform prescribed monthly maintenance on the Water Treatment Plant.
Assessment criteria	11.1 Locate Monthly Maintenance tasks in the handbook.
	11.2 Describe the procedure to clean the water treatment plant
	11.3 Replace the Vent Filter
	11.4 Record monthly maintenance task details on the Water Treatment Plant log sheet.
Delivery	This module provides for delivery by off the job training by a number of different modes including practical demonstrations and simulations using operational equipment. It contains hand-on training but also uses paper based and computer based methods.
Learning resources	*Hydrogen Handbook*, Bureau of Meteorology, Melbourne, current version
	Operating HOGEN with Water Treatment Plant.
	Personal protective equipment
Occupational health and safety requirements	A safe environment will be provided for participants with regard to:
	Hydrogen (explosive gas) hazards
	Personal protective equipment

MODULE TITLE Hydrogen Facilities Inspection

Nominal duration	3 hours
Module code or number	OBS-H2INSP
Discipline Code	TO(Obs)
Module purpose	To introduce an observer to the role of the officer in charge of a Field Station with regard to their Occupational Health and Safety Responsibilities.
Prerequisites	A diploma or equivalent with studies (at least to first year level) in a physical science with some mathematics; or field experience as an Observer.
Relationship to skill Standards	Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.
Summary of content	• Annual Hydrogen Facilities Inspection
Assessment method	Assessment of this module can be performed during an actual inspection of the hydrogen facilities at a Field Station or a Training Centre.
Conditions of assessment	During assessment participants will have reference to printed material, class notes, electronic material and other sources of information.
Learning outcomes	On completion of this module the participant will be able to:
Learning outcome 1	Perform an annual Hydrogen Facilities Inspection as prescribed in the Hydrogen Handbook.
Assessment criteria	1.1 Perfom a Hydrogen Facilities Inspection as prescribed in the Hydrogen Handbook. 1.2 Complete an F611 in the prescribed manner.
Delivery	This module provides for delivery by off the job training by a number of different modes including classroom discussion, role playing, online learning as well as printed form. It can be presented live or externally.
Learning resources	A computer with Bureau Intranet capability.
Occupational health and safety requirements	A safe environment will be provided for participants with regard to: Explosive Atmosphere Hazard Zones

Australian Government
Bureau of Meteorology

TRAINING CENTRE

TO(Observer) Course 2011

Module 14
On the job training

- Mid Course On the Job Training (2 weeks)
- Application of skills - competency rating
- (Average of 3-4 Weeks, minimum of 2 weeks)

BMTC

6th Floor
1010 La Trobe St
Melbourne VIC 3008

Observer Trainee Mid - Course placement Assessment sheet

Dates _____

Name of Trainee _____

Station Placement _____

Station OIC _____

Assessment

1. Punctuality Early ___ On time ___ Late ___
2. Dress Tidy ___ Untidy ___
   i. Dresses appropriately to represent BoM? Y? N?
   ii. Footwear – Suitable or Unsuitable (Eg sandals or thongs)
3. Attitude
   a. Enthusiastic Y? N? Comment_____
   b. Keen to learn Y? N? Comment_____
   c. Mildly interested Y? N? Comment_____
   d. Barely interested Y? N? Comment_____
   e. Totally disinterested Y? N? Comment_____
4. Communication skills? (Please comment)
   _____
   _____
   _____
5. Team work skills? (Please comment)
   _____
   _____
   _____
6. Competencies
   a. Hydrogen safety
      i. Had PPE with them? Y? N?
      ii. PPE used according to Hydrogen Safety guidelines when dealing with Hydrogen
      Y? N?
      iii. Worked safely whilst preparing a balloon using Hydrogen Y? N?
      iv. Student used the following Hydrogen equipment (where applicable) safely and competently under supervision.
         1. ACOM Y? N?
            N/A
         2. Mechanical RBL Y? N?
            N/A
         3. Electric RBL Y? N?
            N/A
         4. Manpacks Y? N?
            N/A
   b. Surface Observation
      i. Correctly read and maintained all instruments Y? N?
      Comment:
      _____
      _____
      _____
      _____
      _____

ii Correctly observed visibility, weather, and clouds Y? N?
Comment:
_____
_____
_____
_____
_____

iii Entered data correctly into Met Console Y? N?
Comment:
_____
_____
_____
_____
_____

iv Entered data correctly in A8 Y?
N?
Comment:
_____
_____
_____
_____
_____

v. Is able to complete 9am synop by 9:20am, including sending the MDF and entering all data into the A8 field book Y?
N?

c. Aerodrome Weather Reports
1. Student accurately performs the AWR Y? N?
2. Student accurately enters AWR data on A37 Y? N?
3. Student performs compete AWR (observation, recording and sending) within 5 minutes (non-speci conditions) Y?
N?

d. Theodolite
1. Student was able to correctly set up theodolite. Y? N?
2. Student accurately tracked a balloon with theodolite . Y? N?

OIC Additional comments: Please add any relevant comments below
_____
_____
_____
_____
_____

OIC Signature_____

Trainee Comments if relevant
_____
_____
_____
_____
_____

Trainee Signature_____

Competencies for Trainee Technical Officers (Observer)

Purpose.

1. To notify Regional Observations Managers and Station Senior Observers of procedures for rating the competence of Trainee Technical Officer (Observers) for progression to Technical Officer Grade 2.

Background.

2 The On-The-Job Training module of the TO(obs) course is designed to :

a) Allow the Trainee to consolidate skills learned during the TO(obs) course,
b) Practice all the duties of a TO2 Observer in a Field Station environment under one-on-one supervision and instruction of an experienced observer,
c) Eventually demonstrate their ability to perform all the duties of a TO2 observer to the standard of competency required.

3. The time taken for the trainee to hone their observing skills and demonstrate their competency to perform the tasks set out below should be no less than two weeks (except in very unusual circumstances requiring the agreement of SRFO and SIO).

4. Four weeks has been allocated for the Trainee to demonstrate their competency, although if it appears the Trainee will take longer than this, approval should be sought from SIO. Ongoing assessment and feedback to the trainee will allow them to reach the required competency quickly. Feedback relating to on-the-job performance should continue as a standard management practice beyond the rating period.

5. The trainee must ***demonstrate*** correct procedures and practices for each task before being rated competent at that task.

6. The Senior Observer is responsible for assessing and rating the competency of Trainee Technical Officers (Observer).

7. Trainees cease their on-the-job training once they are rated as competent and are then available for working on an operational roster.

Action.

8. The Senior Observer is to carry out the following:

- Provide ongoing assessment and feedback to the trainee.
- When the trainee is ready, carry out the task assessments using the Competency Task Rating Sheet attached.
  - A tick (✓) is used to indicate competence and a cross (✗) for not-yet-competent.
  - Tasks not normally performed at the station are to be indicated as N/A (Not Applicable).
  - Not-yet-competent ratings must include assessor's comments regarding suggested remedial action and estimated time needed to reach competency where possible.
  - All comments are welcome and will help with the 2012 Technical Officer (Observer) Course.
  - List and assess specific tasks performed at your station that are not on the competency form.
- Allow the trainee to add comments to the task competency rating. Attach additional sheets with comments if allocated space is insufficient.
- When all required tasks have been assessed, complete the attached Competency Assessment Statement.
- Both the trainee and the assessor must sign the Assessment Statement.
- Where competency assessment is undertaken at more than one location and/or by more than one Senior Observer, each Senior Observer and trainee should complete an Assessment Statement.
- Please email scanned copies to sio@bom.gov.au. Forward the originals marked 'staff in confidence' to SIO at BMTC. Forward paper copies similarly marked 'staff in confidence' to ROM.
- Arrange for the trainee to take up duties at the A/TO2 level until the promotion is gazetted. Gazettal of promotions will take place about 4 weeks after SIO has received the completed rating form or forms.

Keon Stevenson - SIO
Observations Training Unit
Bureau of Meteorology Training Centre
Ph 03 9669 4197
Email SIO@bom.gov.au

Competency Task Rating Sheet for Trainee TO (Obs)

Upper Air Soundings

Theodolite		
Task	**Competent**	**Comment**
Determine True North		
Level & align Theodolite		
Track pilot balloon to at least: • 500 hPa by day		
Track SOWIND balloon		

Radar		
Task	**Competent**	**Comment**
Prepare balloon train		
Switch up & pre-flight checks		
Acquire within 1 minute		
Track to burst		
Re-acquire on losing/manually track		
Switch radar down		

Wind Computation		
Task	**Competent**	**Comment**
Record and compute assumed rate and Sowin soundings.		
Code and send PPAA/BB/CC/DD		
Quality control flights for errors		

DigiCORA III – RWIND		
Task	**Competent**	**Comment**
Prepare balloon train and ground equipment		
Switch up radar and DigiCORA III.		
Ensure Slevel table loaded		
Release balloon train and enter surface observation		
Edit profile		
Generate, check and send wind only 100hPa messages		
Generate, check and send wind end of flight messages		

Terminate sounding in prescribed manner		
Perform routine checking procedures		
Correct a sounding – change levels, resend messages, rebuild EDT file, resend EDT file		

Station References		
Task	Competent	Comment
Locate: • Upper Air Obs Handbook • Codes Handbook • Surface Obs Handbook • Hydrogen Handbook • Observations Instructions and Circulars • Observational aids and stationary • Observation documentation on the web – FOG site.		

DigiCORA III – PTU		
Task	**Competent**	**Comment**
Prepare balloon train and ground equipment		
Perform ground check		
Release balloon train and enter surface observation		
Edit profile		
Generate, check and send SOND TEMP 100hPa messages		
Generate, check and send SOND TEMP END end of flight messages		
Terminate sounding in prescribed manner		
Perform routine checking procedures		
Correct a sounding – change levels, resend messages, rebuild EDT file, resend EDT file		
Perform a SOWIN		

Hydrogen handling and balloon train procedures		
Task	**Competent**	**Comment**
Demonstrate safety		

procedures and use of safety equipment		
Use and maintain the Safety Pager Alarm		
Generate hydrogen gas using a Stuart Electrolyser or HOGEN;		
Perform routine Stuart Electrolyser or HOGEN checks (ROM's request).		
Prepare balloon train and inflate using: • Commercial gas • Stuart Electrolyser/HOGEN • RBL		
Operate ACOM system and carry out routine checks		
Disconnect exhausted gas supply – 'G' Cylinder or Manpack		
Connect new supply of gas - 'G' Cylinder or Manpack		
Release balloon train: • Manually • RBL		
Achieve ascent rate 280-320 m/m		

AUTOSONDE		
Task	**Competent**	**Comment**
Prepare balloon train and ground equipment		
Power radiosonde and perform ground check		
Load radiosonde and balloon train		
Edit profile		
Generate, check and send SOND TEMP 100hPa messages		
Perform after Burst procedures - inspect levels. If necessary, edit levels, resend messages, rebuild EDT file, resend EDT file		
Perform routine checking procedures		
Schedule adaptive soundings		

Maintenance, System Checks & House Keeping

Surface Observation Instruments	

Task	Competent	Comment
Perform comparisons between AWS sensors and:		
• Dry/Wet bulb thermometers		
• Standard rain gauge		
• Wind speed/direction estimations		
Maintain and identify faults in:		
• Thermometers		
• Evaporimeter		
• Anemometer and Anemographs		
• TBRG – Data logger		
• Sunshine recorder		
• AWS and peripherals		
Ceilometer		
Visibility Meter		
Temperature sensors		
Anemometer		
TBRG		
• MetConsole		
Adjust time		
Compact data base		
Correctly handle QC issues		

Upper Air Sounding Equipment

Task	Competent	Comment
Inspect and perform routine maintenance on:		
• RBL		
• Electrolyser		If applicable
• HOGEN/Water Treatment Plant		
• ACOM		
• Hydrogen facilities		
• Autosonde		
Perform routine Radar performance checks (Cal flight, Solar track, etc)		

House Keeping

Task	Competent	Comment
Manually switch to emergency power and restart radar equipment		
Perform fire alarm tests.		

Station specific only.		
Delete oldest month's radar files off hard disk		
Move last months DC3DB, .EDT and .TXT files to their respective folders		

Surface Observations

Synoptic		
Task	**Competent**	**Comment**
Identify all cloud forms; estimate cloud amounts; estimate or determine cloud bases		
Identify weather phenomena		
Estimate meteorological visibility		
Determine pressure tendency and diurnal correction		
Enter and send observation using MetConsole		
Record observation in A8		
Perform complete observation in a maximum of 10 minutes		

Climate		
Task	**Competent**	**Comment**
Read & reset thermometers		
Perform evaporation observation		
Determine sunshine hours & change sunshine card		
Read and empty rain gauge		

Aerodrome Weather Reports		
Task	**Competent**	**Comment**
Identify aviation cloud forms; estimate cloud amounts; estimate or determine cloud bases		
Identify aviation weather phenomena		
Estimate aviation visibility		
Enter and send observation using MetConsole		
Record observation in A37		
Perform complete observation in a timely manner		
Maintain a meteorological watch over aerodrome		

Maintain Climate Record		
Task	**Competent**	**Comment**
Extract previous observations from the CMSS website or ADAM to quality control transmitted data.		

Station Reference		
Task	**Competent**	**Comment**
Locate:		
• Visibility Diagram		
• B220		
• WMO Cloud Atlas		
• Surface Observations Handbook		
• Climatological Practices Handbook		
• Observational aids and tables		
• Observation documentation on the Web – FOG site.		
• Aeronautical Services Handbook on the Web.		

Special Observations	

Task	Competent	Comment
Perform, monitor and maintain ozone observations		
Perform, monitor and maintain solar radiation observations		
Perform, monitor and maintain dust, radiation, pollution sample observations		
Other – specify		
Other – specify		

Client Skills

Task	Competent	Comment
Present a corporate image in dealing with clients face to face or on the phone		
Obtain and disseminate local forecasts		
Obtain climate data from the Bureau's Internet site, Eve, or other sources to meet client requests.		
Provide a range of products and services which meet client needs		
Espouse the principles of Social Justice when dealing with staff and clients		
Explain meteorological principles, terms, and procedures to clients.		

Station Reference		
Task	**Competent**	**Comment**
Locate: • Guidelines for Working with the Media – on the intranet • Bureau publicity brochures • Weather Services Branch Home page • Weather Services Policy Handbook - on the Web • Regional office contacts for specific client requests		

Comms Duties (AIFS)

Task	**Competent**	**Comment**
Monitor weather and system alerts using Alerts GUI.		
Monitor and correct messages using the Communication GUI.		
List and sort stations and view their properties using the Station Dictionary.		
View observations and indices via the Map Tool GUI.		
View tabulated observations and data on the Db Browser GUI.		
Using Dispatch GUI check times and products sent to clients.		
Enter Rain and River details using the Manual Data Entry GUI.		
View, prepare and send messages using the Prep GUI.		

Competency Assessment.

Trainee Name ……..

Station ……...

Assessor Name …….

Please circle on-the-job training being assessed –
AIFS duties
Aviation surface observations
Synoptic surface observations
Upper air (wind) observations
Upper air (radiosonde) observations

Assessor comments:

_____
_____
_____
_____
_____
_____

Trainee's Comments:

_____
_____
_____
_____
_____
_____
_____

The Trainee Officer above is rated as *competent / not yet competent* * in the areas indicated on the Task Competency rating Sheet and *is / is not recommended to work at the TO2 level for those aspects assessed. (* Cross-out words that are not applicable)**

_____ _____
Assessor Date

_____ _____
Trainee Date