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
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.

<table>
<thead>
<tr>
<th>Module 1. - Surface Observations - Synoptic</th>
<th>83 Sessions / 124.5 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Surface Observations Synop - Principles</td>
<td>M. Shevchenko 15 x 1.5 hr</td>
</tr>
<tr>
<td>• Meteorological Instruments Part 1</td>
<td>Luc De Pauw 18 x 1.5 hr</td>
</tr>
<tr>
<td>• Meteorological Instruments Part 2</td>
<td>Luc De Pauw 10 x 1.5 hr</td>
</tr>
<tr>
<td>• Lawnmowers &amp; Trimmers Induction</td>
<td>Luc De Pauw 1 x 1.5 hr</td>
</tr>
<tr>
<td>• Introduction to Sites DB &amp; CMSS</td>
<td>Keon Stevenson 2 x 1.5 hr</td>
</tr>
<tr>
<td>• Introduction to MetConsole / Webconsole</td>
<td>Mike Bruhn 2 x 1.5 hr</td>
</tr>
<tr>
<td>• Synoptic Code (MDF)</td>
<td>Mike Bruhn 2 x 1.5 hr</td>
</tr>
<tr>
<td>• Surface Observations Practical – Synops.</td>
<td>Mike Bruhn 16 x 1.5 hr</td>
</tr>
<tr>
<td>• Meteorological Codes &amp; Communication Systems</td>
<td>Mike Bruhn 19 x 1.5 hrs</td>
</tr>
<tr>
<td>• Tutorial/Maintenance/Private study</td>
<td>5.5 hours per week</td>
</tr>
</tbody>
</table>

(Night sessions are required for this module)


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

<table>
<thead>
<tr>
<th>Module 2. - Basic Meteorology.</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Basic Physical &amp; Dynamic Meteorology</td>
<td>12 x 1 hrs Various Lecturers</td>
</tr>
<tr>
<td>• Basic Synoptic &amp; Mesoscale Meteorology</td>
<td>12 x 1 hrs Various Lecturers</td>
</tr>
</tbody>
</table>

Assessed through General Met Exam

Private study available refer to timetable


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.

<table>
<thead>
<tr>
<th>Module 3. - Surface Observations - Aviation.</th>
<th>58 Sessions / 87 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1. General Meteorology</td>
<td>Mike Bruhn 20 x 1.5 hrs</td>
</tr>
<tr>
<td>• 2. Surface observations – Aviation Principles.</td>
<td>Mike Bruhn 16 x 1.5 hrs</td>
</tr>
<tr>
<td>• 3. Surface observations – AWR Practical.</td>
<td>Mike Bruhn 18 x 1.5 hrs</td>
</tr>
<tr>
<td>• Exams x 2</td>
<td>Mike Bruhn 4 x 1.5 hrs</td>
</tr>
</tbody>
</table>

Private study available refer to timetable

(Night sessions are required for this module)

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.

<table>
<thead>
<tr>
<th>Observer-Only Subjects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Small Scale Climate</td>
<td>Mike Bruhn</td>
</tr>
<tr>
<td>• Australian Climate Analysis</td>
<td>Bob Leighton</td>
</tr>
<tr>
<td>• Climate Data Base – Eve &amp; Climate Zone Extraction</td>
<td>Keon Stevenson</td>
</tr>
<tr>
<td>• Climate Data Base – Theory of Measurement</td>
<td>Ian Dollery</td>
</tr>
<tr>
<td>• Meteorology and Agriculture</td>
<td>Dale Grey (DPI)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meteorologist Subjects – Basic Climatology</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1. The Pale Blue Dot</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 2. Natural Cycles</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 3. Classifying Climate</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 4. Regional and local climates</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 5. Mass Extinctions</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 6. ENSO</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 7. Scenarios</td>
<td>Mick Pope</td>
</tr>
<tr>
<td>• 8. Assessment Online Quiz – Moodle</td>
<td>Mick Pope</td>
</tr>
</tbody>
</table>

| Private study available refer to timetable |  |


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 |
| • Pilot Code           | Keon Stevenson |
| • Upper Wind Systems Optical Theodolite. | Keon Stevenson |
| • Upper Wind Systems PC-RADWIN | Keon Stevenson |
| • Upper Wind Systems DC3 Wind | M. Shevchenko |
| • Upper Wind Systems Wind Profilers | Luc De Pauw |

| Private study available refer to timetable |

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.

<table>
<thead>
<tr>
<th>Module 6. - Meteorological Information Office Services. 16 Sessions / 24 Hours.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Role and function of an MIO                               Keon Stevenson 0.5 x 1.5 hrs</td>
</tr>
<tr>
<td>• MIO Service Standards and Policies                       Vernon Carr 1 x 1.5 hrs</td>
</tr>
<tr>
<td>• Client services                                           Jen Vaughan &amp; Emma Lewis 2 x 1.5 hrs</td>
</tr>
<tr>
<td>• Hydrological Services                                    Soori Sooriyakumaran 1 x 1.5 hrs</td>
</tr>
<tr>
<td>• Regional Services – VRO Tour (CCS, RFC &amp; ROS)             Ted Williams / Keon Stevenson 2 x 1.5 hrs</td>
</tr>
<tr>
<td>• Dealing with the media                                    Ian Needham 4 x 1.5 hrs</td>
</tr>
<tr>
<td>• Products Available on the Web                            Keon Stevenson 0.5 x 1.5 hrs</td>
</tr>
<tr>
<td>• Legal Issues                                              Brenda Coutinho 1 x 1.5 hrs</td>
</tr>
<tr>
<td>• Overview of Climate Data Services &amp; The Climate Zone     Clinton Rakich 1 x 1.5 hrs</td>
</tr>
<tr>
<td>• Presentation Day (Intro to Met Course)                    Bodo Zeschke / Keon Stevenson 2 x 1.5 hrs</td>
</tr>
<tr>
<td>• Private study available refer to timetable</td>
</tr>
</tbody>
</table>


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.

<table>
<thead>
<tr>
<th>Module 7. - Radiosonde Systems. 50 Sessions / 75 Hours.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• TEMP message                                            M. Shevchenko 2 x 1.5 hrs</td>
</tr>
<tr>
<td>• DigiCora III - Radiosonde                               M. Shevchenko 24 x 1.5 hrs</td>
</tr>
<tr>
<td>• Autosonde                                                M. Shevchenko 24 x 1.5 hrs</td>
</tr>
</tbody>
</table>

• Private study (5.5 hours per week)

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.

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


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.

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

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

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


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.
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
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  Complies with WMO Meteorological Technician Level Standards  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 online 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


Occupational health and safety requirements

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

Ergonomic computer workstations,
<table>
<thead>
<tr>
<th>MODULE TITLE</th>
<th>METEOROLOGICAL INSTRUMENTS 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal duration</strong></td>
<td>27 hours (18 x 1.5 hour sessions)</td>
</tr>
<tr>
<td><strong>Module code or number</strong></td>
<td>OBS-INSTRUMENTS1</td>
</tr>
<tr>
<td><strong>Discipline Code</strong></td>
<td>TO(Obs)</td>
</tr>
<tr>
<td><strong>Module purpose</strong></td>
<td>To enable participants to use &amp; maintain instruments used in taking meteorological observations.</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Relationship to skill Standards</strong></td>
<td>Complies with WMO Meteorological Technician Level Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.</td>
</tr>
</tbody>
</table>
| **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


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.
Trainee Observer Course

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


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:

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

Summary of content  
- Principles of operation
- Station Metadata
- Unregistered Action
- 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 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.
<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>3.1 Retrieve various messages applicable to TTO (Obs) i.e. Pilot, Temp, Metar and Speci messages.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delivery</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Learning resources</strong></td>
<td>Access to the Bureau of Meteorology intranet A personal computer An appropriately equipped Instrument Enclosure.</td>
</tr>
<tr>
<td><strong>Occupational health and safety requirements</strong></td>
<td>A safe environment and information regarding hazards will be provided for participants with regard to: UV solar radiation hazards Ergonomic computer workstation</td>
</tr>
</tbody>
</table>
# 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**
Complies with WMO Meteorological Technician Level Standards

**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
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


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
<table>
<thead>
<tr>
<th>MODULE TITLE</th>
<th>Synoptic Code – MDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal duration</td>
<td>3 hours (2 x 1.5 hour sessions)</td>
</tr>
<tr>
<td>Module code or number</td>
<td>OBS-SYNOPCODE</td>
</tr>
<tr>
<td>Discipline Code</td>
<td>TO(Obs)</td>
</tr>
<tr>
<td>Module purpose</td>
<td>To enable participants to effectively code and decode MDF messages</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>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.</td>
</tr>
<tr>
<td>Relationship to skill</td>
<td>Complies with WMO Meteorological Technician Level Standards</td>
</tr>
<tr>
<td>Standards</td>
<td>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.</td>
</tr>
<tr>
<td>Summary of content</td>
<td>Use the Codes Handbook to reference Chapter 11 – Met Data Format.</td>
</tr>
<tr>
<td>Assessment method</td>
<td>The participant will demonstrate proficiency at performing to Bureau of Meteorology standards as follows:</td>
</tr>
<tr>
<td></td>
<td>- Coding and decoding</td>
</tr>
<tr>
<td></td>
<td>- Retrieval and collation of information from the</td>
</tr>
<tr>
<td></td>
<td>- Codes Handbook.</td>
</tr>
<tr>
<td>Conditions of assessment</td>
<td>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.</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>On successful completion of this module, participants will be able to:</td>
</tr>
<tr>
<td>Learning outcome 1</td>
<td>Use the Codes Handbook Chapter 11 to decode MDF.</td>
</tr>
<tr>
<td>Assessment criteria</td>
<td>1.1 Use the Codes Handbook Chapter 11 to decode an MDF message.</td>
</tr>
<tr>
<td>Learning outcome 2</td>
<td>Use CMSS to retrieve data and verify system message is received.</td>
</tr>
<tr>
<td>Assessment criteria</td>
<td>2.1 Use CMSS to retrieve a MDF message.</td>
</tr>
<tr>
<td>Learning outcome 3</td>
<td>Encode meteorological data into an MDF code.</td>
</tr>
<tr>
<td>Assessment criteria</td>
<td>3.1 Encode an MDF message.</td>
</tr>
<tr>
<td>Delivery</td>
<td>Delivery is by off the job training in a classroom environment. Some aspects of this module can be delivered on-line.</td>
</tr>
<tr>
<td>Occupational health and</td>
<td>A safe environment and information regarding hazards</td>
</tr>
</tbody>
</table>
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

### 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.
Trainee Observer Course

- A personal computer running MetConsole software connected to an Automatic Weather Station.
- An appropriately equipped Instrument Enclosure
- 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
Trainee Observer Course

**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.

<table>
<thead>
<tr>
<th>Occupational health and safety requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>A safe environment and information regarding hazards will be provided for participants with regard to:</td>
</tr>
<tr>
<td>Ergonomic computer workstations,</td>
</tr>
<tr>
<td>Electromagnetic radiation hazards</td>
</tr>
<tr>
<td>UV solar radiation hazards</td>
</tr>
<tr>
<td>Chemicals used for the Evaporation Pan</td>
</tr>
</tbody>
</table>
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.

Summary of content   Conform with guidelines detailed in the Bureau of Meteorology Codes Handbook and the AIFS operating procedures
                      • 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 catalogue to identify Meteorological 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
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
TO(Observer) Course

Module 3
Surface Observations - Aviation

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

Summary of Content:

Descriptive Meteorology Topics

Role of BOM/WMO

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

Composition of the Atmosphere

- 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 (H₂O, CO₂, CH₄)

Atmospheric Pressure and Altimetry

- 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
Trainee Observer Course

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

**Icing**

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

1 hour

**Visibility**

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

1.5 hours

**Tropical systems and associated weather**

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

1 hour

**Tropical cyclones**

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

1 hour

**Meteorological Charts**

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

1 hour

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

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

5 hours

**Volcanic Ash**

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

30 mins

**Sources of Meteorological Warnings and Broadcasts**

- AERIS
- VOLMET
- ATIS
- AWIB

30 mins

**Radar Imagery**

1 hour
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
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
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 Register of Weather Reports
- 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

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 performed 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.

(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 castellanus. 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
For BoM Meteorologists 15 Mins
For other Organisations an introduction only is delivered. 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
Trainee Observer Course

Total 30 Hours
Suggested Course Structure:

### 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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Trainee Observer Course

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**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

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

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
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
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 occurrence 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:

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: 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: Complies with WMO Meteorological Technician Level Standards 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:

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 undesirable 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,
<table>
<thead>
<tr>
<th>MODULE TITLE</th>
<th>Basic Climatology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal duration</td>
<td>8 hours</td>
</tr>
<tr>
<td>Module code or number</td>
<td>OBS-BASCLIMAT</td>
</tr>
<tr>
<td>Discipline Code</td>
<td>TO(Obs)</td>
</tr>
<tr>
<td>Module purpose</td>
<td>The purpose of this module is to give the participant an understanding of basic climatology.</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>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.</td>
</tr>
<tr>
<td>Relationship to skill</td>
<td>Complies with WMO Meteorological Technician Level</td>
</tr>
<tr>
<td>Standards</td>
<td>Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.</td>
</tr>
<tr>
<td>Summary of content</td>
<td>Basic Climatology Concepts.</td>
</tr>
<tr>
<td>Assessment method</td>
<td>This module can be assessed by classroom question-and-answer sessions, quizzes or assignments (both written or on-line).</td>
</tr>
<tr>
<td>Conditions of assessment</td>
<td>The assessment of this module will be open-book.</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>The overall aim of the learning outcomes dealing with basic climatology is to ensure an individual shall be able to:</td>
</tr>
</tbody>
</table>

**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,
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: 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 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


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

*Hydrogen Handbook*, Bureau of Meteorology, Melbourne, 1992

WIND calculations program

**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

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

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:

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Messages are generated and sent after balloon reaches 100 hPa and again after burst.</td>
</tr>
<tr>
<td>4.2</td>
<td>Manual editing is performed correctly if required</td>
</tr>
</tbody>
</table>

**Learning outcome 5**
Switch the DigiCora III® workstation down correctly ensuring datafiles are archived and transmitted as required.

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>.edt and .dc3db files are archived after a sounding.</td>
</tr>
</tbody>
</table>

**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
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
<table>
<thead>
<tr>
<th><strong>MODULE TITLE</strong></th>
<th>Meteorological Information Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal duration</td>
<td>24 hours</td>
</tr>
<tr>
<td>Module code or number</td>
<td>OBS-MIS</td>
</tr>
<tr>
<td>Discipline Code</td>
<td>TO (Obs)</td>
</tr>
<tr>
<td><strong>Module purpose</strong></td>
<td>Provide participants with skills and knowledge necessary to perform a service role from a Meteorological Information Office.</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Relationship to skill BMTC.</strong></td>
<td>Complies with WMO Technician level and is accredited standards by BMTC.</td>
</tr>
<tr>
<td><strong>Summary of content</strong></td>
<td>The Meteorological Information Services course may include any of the following:</td>
</tr>
<tr>
<td></td>
<td>• Role and function of an MIO</td>
</tr>
<tr>
<td></td>
<td>• MIO Service Standards and Policies</td>
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<td></td>
<td>• Client services</td>
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<td></td>
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<td></td>
<td>• Regional Services – VRO Tour (CCS, RFC &amp; ROS)</td>
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<td></td>
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<td></td>
<td>• Legal Issues</td>
</tr>
<tr>
<td></td>
<td>• Overview of Climate Data Services &amp; The Climate Zone</td>
</tr>
<tr>
<td></td>
<td>• Presentation Day (Intro to Met Course) – Science Week</td>
</tr>
<tr>
<td><strong>Delivery</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Assessment method</strong></td>
<td>Field Office Presentations for Trainee TO (Obs) will be presented before an audience as part of the Introduction to Meteorology Course.</td>
</tr>
<tr>
<td><strong>Learning outcomes</strong></td>
<td>On successful completion of this module the participant will be able to:</td>
</tr>
<tr>
<td><strong>Learning Outcome 1</strong></td>
<td>Identify Bureau goals and service standards applied to MIO activities.</td>
</tr>
<tr>
<td>Assessment criteria.</td>
<td>1.1 Discuss the history of the MIO concept and identify Bureau goals in relation to MIO's.</td>
</tr>
<tr>
<td></td>
<td>1.2 Identify key personnel responsible for components of MIO management.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>1.4 Outline the major issues effecting MIO functions</td>
</tr>
</tbody>
</table>
### 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
1. Identify internal and external suppliers and customers.
2. Describe the concept "service" and how it applies to a field station.
3. Discuss the role that service plays in forming perceptions of an organisation.
4. Discuss various strategies that could be adopted to increase client awareness of Bureau products or services available.
5. Demonstrate strategies for dealing with various client types.
6. Discuss promotional strategies to enhance the image of an MIO.
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
1. Describe the purpose and objectives of the Water Division / Hydrological Services program
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
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
1. Use appropriate techniques when dealing with a media interview:
   - Radio
   - Newspaper
   - Television
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.**

**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
Trainee Observer Course

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
TO(Observer) Course

Module 7
Radiosonde Systems

- TEMP Message
- DigiCORA III – Radiosonde
- Autosonde
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

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 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 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


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
Trainee Observer Course

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 DigiCOR3 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 DigiCOR3 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
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
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: 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.


9.3 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 Hazardous 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
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
**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.

**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
Trainee Observer Course

- 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 safe 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
Trainee Observer Course

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.
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 | 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

**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
Trainee Observer Course

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 localities.

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 workshop
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.


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
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
<table>
<thead>
<tr>
<th>MODULE TITLE</th>
<th>Introduction to Station Administration</th>
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<tbody>
<tr>
<td>Nominal duration</td>
<td>25 hours</td>
</tr>
<tr>
<td>Module code or number</td>
<td>OBS-ADMIN</td>
</tr>
<tr>
<td>Discipline Code</td>
<td>TO (Obs)</td>
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<tr>
<td>Module purpose</td>
<td>Provide participants with skills and knowledge necessary skills to perform administrative tasks from a Meteorological office.</td>
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<tr>
<td>Prerequisites</td>
<td>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.</td>
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<tr>
<td>Relationship to skill BMTC</td>
<td>Complies with WMO Technician level and is accredited standards by BMTC.</td>
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<tr>
<td>Summary of content</td>
<td>The Introduction to Station Administration course may include any of the following:</td>
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<tr>
<td></td>
<td>• Rosters and Rostering Principles</td>
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<td>• Leave Pool conditions</td>
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<td></td>
<td>• Manage contracts at a Field Station</td>
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<tr>
<td>Delivery</td>
<td>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.</td>
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</table>
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 at 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 while serving in the Leave Relief Pool.
3.4 Describe the expectations of the Bureau regarding accommodation while serving in the Leave Relief Pool.
<table>
<thead>
<tr>
<th><strong>Learning outcome 4</strong></th>
<th>Describe transport arrangement within the leave Relief pool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment criteria</strong></td>
<td>4.1 Describe the Bureau’s preferred method of travel to take up a Leave Relief Posting.</td>
</tr>
<tr>
<td></td>
<td>4.2 Describe the transport arrangements to and from work for an officer performing a Leave Relief Posting.</td>
</tr>
</tbody>
</table>

**Learning Outcome 5**

Describe the effect of service in the Leave Relief Pool on families.

<table>
<thead>
<tr>
<th><strong>Assessment criteria</strong></th>
<th>5.1 Explain the conditions under which the Bureau will pay for furniture to be uplifted from a home location.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.2 Explain the conditions under which the Bureau will pay for an officer’s family to be uplifted from a home location.</td>
</tr>
</tbody>
</table>

**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.
<table>
<thead>
<tr>
<th>Module Title</th>
<th>Travel / TA Entitlements / paperwork</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal duration</td>
<td>1½ hours</td>
</tr>
<tr>
<td>Module code or number</td>
<td>OBS-TA</td>
</tr>
<tr>
<td>Discipline Code</td>
<td>TO (Obs)</td>
</tr>
<tr>
<td>Module purpose</td>
<td>To allow trainees understand the travel allowances and associated “paperwork” within the Bureau of Meteorology.</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>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.</td>
</tr>
<tr>
<td>Relationship to skill standards</td>
<td>Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.</td>
</tr>
</tbody>
</table>
| 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:

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 penalty 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 Reconciliation Form – to ROS
- Petty Cash Expenditure Control Forms – to ROS
- Spending Proposals – to ROS
- Credit Card Reconciliation – 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.
<table>
<thead>
<tr>
<th>Delivery</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning resources</td>
<td>A computer with Bureau Intranet capability.</td>
</tr>
<tr>
<td>Occupational health and safety requirements</td>
<td>A safe environment will be provided for participants with regard to:</td>
</tr>
<tr>
<td></td>
<td>Ergonomic workstations</td>
</tr>
</tbody>
</table>
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:

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
Trainee Observer Course

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 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.
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 docket
- 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 separate.

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 Reconciliation 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 Asset.
- The Asset 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 asset.

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 favours 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 asset.

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.
<table>
<thead>
<tr>
<th><strong>MODULE TITLE</strong></th>
<th>Bureau Houses and Leases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal duration</strong></td>
<td>¾ hours</td>
</tr>
<tr>
<td><strong>Module code or number</strong></td>
<td>OBS-HOUSES</td>
</tr>
<tr>
<td><strong>Discipline Code</strong></td>
<td>TO (Obs)</td>
</tr>
<tr>
<td><strong>Module purpose</strong></td>
<td>To introduce an observer to the obligations and responsibilities of a tenant of a Bureau house and the OIC of a Field Station with Bureau housing.</td>
</tr>
<tr>
<td><strong>Prerequisites</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Relationship to skill Standards</strong></td>
<td>Complies with WMO Meteorological Mid-level Technician level and is accredited by the Commonwealth Bureau of Meteorology.</td>
</tr>
</tbody>
</table>

**Summary of content**
- Bureau house leases
- Bureau supplied housing locations
- Tenant 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:

1. **Learning outcome 1**
   Identify the main components of a Bureau housing tenancy lease.
   **Assessment criteria**
   1.1 List the main components.

2. **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

3. **Learning outcome 3**
   Explain the obligations and responsibilities required of a tenant of a Bureau owned house.
   **Assessment criteria**
   3.1 Explain the responsibilities of a tenant 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.

4. **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
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

<table>
<thead>
<tr>
<th><strong>Nominal duration</strong></th>
<th>1.5 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module code or number</strong></td>
<td>OBS-CONTRACT</td>
</tr>
<tr>
<td><strong>Discipline Code</strong></td>
<td>TO (Obs)</td>
</tr>
</tbody>
</table>

### 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.**
<table>
<thead>
<tr>
<th><strong>MODULE TITLE</strong></th>
<th><strong>SAP and Stores Ordering</strong></th>
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<tbody>
<tr>
<td><strong>Nominal duration</strong></td>
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<td><strong>Module code or number</strong></td>
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<td><strong>Discipline Code</strong></td>
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**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
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
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  Complies with WMO Meteorological Technician Level Standards  Class IV (Condensed BIP-MT) and is accredited by the Commonwealth Bureau of Meteorology.


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
Trainee Observer Course

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)
Consumables such as meteorological balloons and radar targets, etc.

Safety Alarm system

Personal protective equipment

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:

Learning Outcome 1: Discuss the theory of operation of the ACOM and locate operating procedures in the Hydrogen Handbook.

Assessment criteria:

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.
Locate the Bleed/Vent Valves and describe their function.

Locate the One Way Valves and describe their function (refer to Obs Instruction 07/02).

Locate Gas Supply 1 and Gas Supply 2 Gauges and describe their function.

Locate the Flashback Arrestor and describe its function.

Locate the Filling Hose Isolation Valve and describe its function.

Locate the Pressure Relief Valves and describe their function.

Locate the 2 stage Regulator and describe its function.

Locate the 1 Stage Regulator and describe its function.

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
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: Complies with WMO Meteorological Technician Level Standards 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 its 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 its function and use.
1.5 Locate the Water Supply and describe its 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 its function and use.
1.8 Locate the Carrier Tray and describe its 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 Recomence 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 unwind 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 or 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-H2INS

#### 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 Perform 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
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:
      __________________________________________________________________________
      __________________________________________________________________________
      __________________________________________________________________________
      __________________________________________________________________________


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</thead>
<tbody>
<tr>
<td>ii</td>
<td>Correctly observed visibility, weather, and clouds</td>
<td></td>
<td>Y?</td>
<td>N?</td>
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<td></td>
<td>Comment:</td>
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<td></td>
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<tr>
<td>iii</td>
<td>Entered data correctly into Met Console</td>
<td></td>
<td>Y?</td>
<td>N?</td>
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<td></td>
<td>Comment:</td>
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<tr>
<td>iv</td>
<td>Entered data correctly in A8</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
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<td></td>
<td>Comment:</td>
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<tr>
<td>v.</td>
<td>Is able to complete 9am synop by 9:20am, including sending the MDF and entering all data into the A8 field book</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
<tr>
<td></td>
<td>c. Aerodrome Weather Reports</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>1. Student accurately performs the AWR</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
<tr>
<td></td>
<td>2. Student accurately enters AWR data on A37</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
<tr>
<td></td>
<td>3. Student performs compete AWR (observation, recording and sending) within 5 minutes (non-speci conditions)</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
<tr>
<td>d. Theodolite</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>1. Student was able to correctly set up theodolite.</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
<tr>
<td></td>
<td>2. Student accurately tracked a balloon with theodolite</td>
<td></td>
<td>Y?</td>
<td>N?</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine True North</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level &amp; align Theodolite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track pilot balloon to at least:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 500 hPa by day</td>
<td></td>
<td></td>
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<tr>
<td>Track SOWIND balloon</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Radar**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare balloon train</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch up &amp; pre-flight checks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquire within 1 minute</td>
<td></td>
<td></td>
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<tr>
<td>Track to burst</td>
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<td></td>
</tr>
<tr>
<td>Re-acquire on losing/manually track</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch radar down</td>
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</tr>
</tbody>
</table>

**Wind Computation**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record and compute assumed rate and Sowin soundings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code and send PPAA/BB/CC/DD</td>
<td></td>
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<tr>
<td>Quality control flights for errors</td>
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</tbody>
</table>

**DigiCORA III – RWIND**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare balloon train and ground equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch up radar and DigiCORA III.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure Slevel table loaded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release balloon train and enter surface observation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edit profile</td>
<td></td>
<td></td>
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<tr>
<td>Generate, check and send wind only 100hPa messages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generate, check and send wind end of flight messages</td>
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<td></td>
</tr>
<tr>
<td>Task</td>
<td>Competent</td>
<td>Comment</td>
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<tr>
<td>Terminate sounding in prescribed manner</td>
<td></td>
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<tr>
<td>Perform routine checking procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct a sounding – change levels, resend messages, rebuild EDT file, resend EDT file</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Station References**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Locate:</td>
<td></td>
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<tr>
<td>• Upper Air Obs Handbook</td>
<td></td>
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<tr>
<td>• Codes Handbook</td>
<td></td>
<td></td>
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<tr>
<td>• Surface Obs Handbook</td>
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<tr>
<td>• Hydrogen Handbook</td>
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<tr>
<td>• Observations Instructions and Circulars</td>
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<tr>
<td>• Observational aids and stationary</td>
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<tr>
<td>• Observation documentation on the web – FOG site.</td>
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</tbody>
</table>

**DigiCORA III – PTU**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare balloon train and ground equipment</td>
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<tr>
<td>Perform ground check</td>
<td></td>
<td></td>
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<tr>
<td>Release balloon train and enter surface observation</td>
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<tr>
<td>Edit profile</td>
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</tr>
<tr>
<td>Generate, check and send SOND TEMP 100hPa messages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generate, check and send SOND TEMP END end of flight messages</td>
<td></td>
<td></td>
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<tr>
<td>Terminate sounding in prescribed manner</td>
<td></td>
<td></td>
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<tr>
<td>Perform routine checking procedures</td>
<td></td>
<td></td>
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<tr>
<td>Correct a sounding – change levels, resend messages, rebuild EDT file, resend EDT file</td>
<td></td>
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<tr>
<td>Perform a SOWIN</td>
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</table>

**Hydrogen handling and balloon train procedures**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Demonstrate safety</td>
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</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Prepare balloon train and ground equipment</td>
<td></td>
<td></td>
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<tr>
<td>Power radiosonde and perform ground check</td>
<td></td>
<td></td>
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<tr>
<td>Load radiosonde and balloon train</td>
<td></td>
<td></td>
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<tr>
<td>Edit profile</td>
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<tr>
<td>Generate, check and send SOND TEMP 100hPa messages</td>
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<tr>
<td>Perform after Burst procedures - inspect levels. If necessary, edit levels, resend messages, rebuild EDT file, resend EDT file</td>
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<tr>
<td>Perform routine checking procedures</td>
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<tr>
<td>Schedule adaptive soundings</td>
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**Maintenance, System Checks & House Keeping**

<table>
<thead>
<tr>
<th>Task</th>
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<tbody>
<tr>
<td>Surface Observation Instruments</td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Competent</td>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td>Perform comparisons between AWS sensors and:</td>
<td></td>
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<tr>
<td>• Dry/Wet bulb thermometers</td>
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<tr>
<td>• Standard rain gauge</td>
<td></td>
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<tr>
<td>• Wind speed/direction estimations</td>
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<tr>
<td>Maintain and identify faults in:</td>
<td></td>
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<tr>
<td>• Thermometers</td>
<td></td>
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<tr>
<td>• Evaporimeter</td>
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<tr>
<td>• Anemometer and Anemographs</td>
<td></td>
</tr>
<tr>
<td>• TBRG – Data logger</td>
<td></td>
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<tr>
<td>• Sunshine recorder</td>
<td></td>
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<tr>
<td>• AWS and peripherals</td>
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<tr>
<td>• Ceilometer</td>
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<tr>
<td>• Visibility Meter</td>
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<tr>
<td>• Temperature sensors</td>
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<tr>
<td>• Anemometer</td>
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<tr>
<td>• TBRG</td>
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<tr>
<td>• MetConsole</td>
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<td>• Adjust time</td>
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<td>• Compact data base</td>
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<td>• Correctly handle QC issues</td>
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<tr>
<td>Upper Air Sounding Equipment</td>
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<tr>
<td>Task</td>
<td>Competent</td>
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<tr>
<td>Inspect and perform routine maintenance on:</td>
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<tr>
<td>• RBL</td>
<td></td>
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<tr>
<td>• Electrolyser</td>
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<tr>
<td>• HOGEN/Water Treatment Plant</td>
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<tr>
<td>• ACOM</td>
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<tr>
<td>• Hydrogen facilities</td>
<td></td>
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<tr>
<td>• Autosonde</td>
<td></td>
</tr>
<tr>
<td>Perform routine Radar performance checks (Cal flight, Solar track, etc)</td>
<td></td>
</tr>
<tr>
<td>House Keeping</td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Competent</td>
</tr>
<tr>
<td>Manually switch to emergency power and restart radar equipment</td>
<td></td>
</tr>
<tr>
<td>Perform fire alarm tests.</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Synoptic</th>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify all cloud forms; estimate cloud amounts; estimate or determine cloud bases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify weather phenomena</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Estimate meteorological visibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determine pressure tendency and diurnal correction</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter and send observation using MetConsole</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Record observation in A8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perform complete observation in a maximum of 10 minutes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Climate

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read &amp; reset thermometers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform evaporation observation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine sunshine hours &amp; change sunshine card</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read and empty rain gauge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Aerodrome Weather Reports

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify aviation cloud forms; estimate cloud amounts; estimate or determine cloud bases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify aviation weather phenomena</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate aviation visibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enter and send observation using MetConsole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record observation in A37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform complete observation in a timely manner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain a meteorological watch over aerodrome</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Maintain Climate Record

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract previous observations from the CMSS website or ADAM to quality control transmitted data.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Station Reference

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Visibility Diagram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• B220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• WMO Cloud Atlas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Surface Observations Handbook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Climatological Practices Handbook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Observational aids and tables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Observation documentation on the Web – FOG site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Aeronautical Services Handbook on the Web.</td>
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<td></td>
</tr>
</tbody>
</table>

### Special Observations

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Competent</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Perform, monitor and maintain ozone observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform, monitor and maintain solar radiation observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform, monitor and maintain dust, radiation, pollution sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other – specify</td>
<td></td>
<td></td>
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<tr>
<td>Other – specify</td>
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<td></td>
</tr>
</tbody>
</table>

**Client Skills**

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present a corporate image in dealing with clients face to face or on the phone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtain and disseminate local forecasts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtain climate data from the Bureau’s Internet site, Eve, or other sources to meet client requests.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide a range of products and services which meet client needs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Espouse the principles of Social Justice when dealing with staff and clients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain meteorological principles, terms, and procedures to clients.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Station Reference

<table>
<thead>
<tr>
<th>Task</th>
<th>Competent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locate:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Guidelines for Working with the Media – on the intranet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bureau publicity brochures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Weather Services Branch Home page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Weather Services Policy Handbook - on the Web</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Regional office contacts for specific client requests</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Comms Duties (AIFS)

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