

<b>1. Module details</b>	
<b>Module name</b>	Electronic Fault Finding
<b>Suggested structured learning time</b>	20 hours
<b>Module code</b>	NUE 154
<b>Discipline code</b>	0703225 Electrotechnology
<b>2. Module purpose</b>	<p>This module will enable students to develop basic skills in fault finding electronic equipment in the Electrotechnology industry. It provides students with the basic skills of communications with respect to customer relations including the principles of analytical questioning and the role this plays in determining the initial fault and or equipment condition. Observation techniques will be emphasised to enable students to deduce possible fault conditions of a typical regulated power supply through visual inspection of the system and circuit board for obvious signs of damage. Students will be equipped with the procedures necessary to ascertain the actual fault through the half split method and use of basic test equipment including the functional testing after repair. Students will have the knowledge to determine the appropriate course of action. This may involve selecting the appropriate repair agency, packaging of damaged equipment, invoicing, and procedures adopted for warranty items.</p>
<b>3. Prerequisite modules</b>	NUE113 Linear and Switched Mode Power Supplies
<b>4. Relationship to competency standards</b>	<p>This module provides some of the skills and knowledge underpinning competence in the following:</p> <p>Australian Standard AS 2243.7 – 1991 Safety in laboratories Part 7: Electrical Aspects.</p>
<b>5. Content</b>	<p><b>Occupational Health Safety and Welfare</b></p> <p><b>Customer relations</b></p> <ul style="list-style-type: none"> <li>• Job acceptance procedure</li> <li>• Principles of analytical questioning</li> </ul> <p><b>Diagnostic Procedure</b></p> <ul style="list-style-type: none"> <li>• Drawing valid conclusions from first observations</li> <li>• Concepts of broad first-line testing</li> </ul>

- Disassembly/reassembly techniques and care

**Fault Location**

- Techniques for isolation to appropriate level:
  - Half-split
  - Module/function isolation
  - Substitution

**Pin-point Fault**

- Use of handbooks, specifications, and fault pathways
- Use of test equipment
- Measurement interpretation, expected versus actual

**Repair or replace?**

- Implications of temporary repairs
- Use of system knowledge and history

**Documentation**

- Recording
- Reporting
- Advising and actioning

**6. Assessment strategy**

**Assessment methods**

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, simulated work place situations, role-playing and assignments. Written and practical tests should consist of a number of item types, such as multiple choice, short answer and problem solving.

**Conditions of assessment**

Assessment shall be under supervision of a qualified assessor and will take place in a simulated or appropriate workplace environment.

**7. Learning outcome details**

**Learning outcome 1**

**Occupational Health, Safety and Welfare requirements.**

**Assessment criteria**

- 1.1 Locate and Identify the Australian Standard (electrical aspects) for safety in laboratories.
- Demonstrate a working knowledge of the content of the Australian Standard (electrical aspects) for safety in laboratories. This will include short answer and multiple-choice questions concerning the responsibility for safety, safety apparel, protective devices, safe operating procedures (SOP) and safe servicing procedures.
- 1.3 Identify the safety officer within your work place.
- According to the OHS &W Act of your state determine that your workplace satisfies the requirements of a safe working environment.

**Learning outcome 2**

**Customer relations and job admittance procedures. Establish an accurate description of the fault situation by appropriate questioning of the client or operator.**

**Assessment criteria**

- 2.1 Describe what is meant by a pro-active re-service policy or job acceptance procedure.
- 2.2 Detail a job acceptance procedure for recording information obtained from the customer. The job acceptance procedure should encompass the policy and consideration for items where the:
- cause of fault is not identified
  - equipment is beyond economic repair
  - equipment is under warrantee.

**Learning outcome 3**

2.3 Demonstrate questioning techniques that communicate effectively and honestly with the client to obtain a description of the history of the equipment and possible cause of fault.

**Diagnostic Procedures: Know the operation of a regulated power supply. Confirm the fault history and symptoms through observation and or application of first-line tests.**

**Assessment criteria**

- 3.1 Use a block diagram to describe the operation of a typical regulated power supply and its location within an electronic system.
- 3.2 List the procedures and precautions used to disassemble/reassemble electronic equipment that is under repair.
- 3.3 Inspect a practical example of a faulty regulated power supply, inside and outside, on and off. State the four senses involved to fully inspect the equipment.
- 3.4 Give typical examples of fault indicators for each sensory method involved in the inspection and customer history.
- 3.5 Observe symptoms and customer history of the fault and demonstrate the ability to draw valid conclusions from these observations.
- 3.6 Identify concepts of broad first-line testing

**Learning outcome 4**

**Fault Location: Recognise essential from non-essential stages of the system and apply appropriate techniques to isolate the fault.**

**Assessment criteria**

- 4.1 Using a schematic diagram, differentiate between essential and non-essential stages of a system.
- 4.2 Identify appropriate diagnostic tests for given symptoms using manufacturers' charts, handbooks, and specification sheets.
- 4.3 Apply systematic tests using a multimeter to identify symptoms.
- 4.4 Use results of systematic tests to identify faulty stage.
- 4.5 Demonstrate bypass techniques to isolate a problem stage.

<b>Learning outcome 5</b>	<b>Identify faulty component(s).</b>
<b>Assessment criteria</b>	<p>5.1 List the components used in a regulated power supply and give examples of common faults and fault symptoms for each component type.</p> <p>5.2 Adopt passive checks and observations to locate the faulty component.</p> <p>5.3 Identify appropriate diagnostic tests for given symptoms using manufacturers' charts, handbooks, and specification sheets.</p> <p>5.4 Use AC and DC measurements and compare against expected results to locate the faulty component (s).</p>
<b>Learning outcome 6</b>	<b>Assess the relative cost-effectiveness of repairing or replacing faulty equipment.</b>
<b>Assessment criteria</b>	<p>6.1 List the factors, which can affect the decision whether to carry out repairs or replace equipment.</p> <p>6.2 List the advantages and disadvantages of short-term makeshift repairs.</p> <p>6.3 Identify safety issues associated with repairing faulty equipment.</p>
<b>Learning outcome 7</b>	<b>Describe total fault condition to follow-on staff both verbally and by written report.</b>
<b>Assessment criteria</b>	<p>7.1 Given a case study, present a brief written report of the service history and action taken for the repair of a faulted regulated power supply.</p> <p>7.2 Given a case study, present a brief oral report of the repairs and costing of a regulated power supply upon returning to the customer.</p>
<b>8. Delivery of the module</b>	
<b>Delivery strategy</b>	<p>Delivery strategy must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective way to achieve this is by the integration of theory and practice where students learn by experimentation and through research and laboratory reports.</p> <p>It is recommended that learning and assessment be facilitated in a holistic manner, which may require a learning outcome sequence other than that indicated in the module</p>

**Recommended  
resource requirements**

Minimum teacher qualifications:

**Certificate IV Assessment & Workplace Training**

Trade qualifications in the electrical/electronic discipline and a demonstrated high level of competency in electronic fault finding. This would normally be achieved by relevant workplace experience in this field.

**References**

Bohlman, K.J., 1987, *Electronics Servicing Volume 1: Electronic Systems*, Dickson Price Publishers Ltd.

Floyd, T.L., 1998, *Electronic Devices*, 5<sup>th</sup> Edition, Prentice-Hall, Englewood Cliffs, NY

Ibrahim, K.F., 1994, *Electronic Systems Techniques*, 2<sup>nd</sup> Edition, Longman Scientific, London

Ibrahim, K.F., *Further Principles and systems for Radio and TV Mechanics*, 2<sup>nd</sup> Edition  
(Logical Fault finding techniques)

Australian Standard AS 2243.7 – 1991  
Safety in laboratories Part 7: Electrical Aspects.

*Electrical and electronic Safety*, Videorecording, 1989, Safety Care, Australia, Sydney

*Improving service, Module 5, Serving People*, Videorecording, 1988, Seven Dimensions, Middle Park, Vic. Written and Produced by Eve Ash and Pater Quarry.

*Improving service, Module 6, Selling Our Service*, Videorecording, 1988, Seven Dimensions, Middle Park, Vic. Written and Produced by Eve Ash and Pater Quarry.

*Improving service, Module 7, Unhappy Customer*, Videorecording, 1988, Seven Dimensions, Middle Park, Vic. Written and Produced by Eve Ash and Pater Quarry.

*Servicing for Profit not Pain*, Article, 1993, from the TESA newsletter.

(Television Electronic Services Association)

<http://www.tesa.org.au>

Only portions of these modules would be applicable to the electronic service industry. Each module has a workbook and video and gives general skills involved in communications with customers. It is not expected that the students would use these videos. From these modules the facilitator may choose to utilise some of the activities and focus on overall skills acquisition in presenting customer relations exercises and examples for the student.

**Occupational health  
and safety  
requirements**

**User Guides**

Where this module is used in an approved Traineeship or Apprenticeship program students should be advised to obtain, where available, respective EEQSBA<sup>1</sup> *User Guides* (these outline in detail what training and work performance the student is required to undertake for the program).

A safe healthy environment should be provided for students and teachers.

Safety procedures concerning the servicing of electrical equipment should be followed with regard to all teaching and learning activities.

---

<sup>1</sup> EEQSBA - ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd