

**1. Module details**

**Module name**

**Circuit Development 1**

**Suggested structured learning time**

A learner possessing the prerequisite skills and knowledge should achieve the module purpose in 36 to 40 hours.

**Module code**

NE032.1

**Discipline code**

0703110

**2. Module purpose**

This module helps to develop knowledge and skills to design, install and fault-find electrical power and control circuits that perform a specific function.

Learners will acquire skills in converting wiring diagrams to ladder and circuit diagrams, select appropriate contactors and control circuit devices and connecting these device to perform a stated function.

In addition Learners will be introduced to technique for finding faults in such circuits and gain knowledge in how to prevent particular faults from occurring.

**3. Learning pathway**

**Intended use in the structured learning program**

This module is intended to supplement workplace exposure to electrical installation work. In particular it applies to the design, installation, maintenance, testing, commissioning, fault finding and repair of electrical motor circuits and equipment.

Therefore before undertaking this module a Learner should have a clear understanding and experience of electrical installation in general and how the fundamental principles for safety apply.

**Recommended prerequisites**

For the most effective learning this module should be undertaken only after modules in three phase theory and electrical wiring and equipment have been completed.

**4. Relationship to competency standards**

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from EEQSBA.

This module supports the development of essential capabilities required for electrical licensing.

## 5. Content

1. Conversion of diagrams
  - Wiring diagram to ladder diagram
  - Wiring diagram to power circuit diagram
2. Control device selection
3. Design and connection of basic control circuits
  - stop-start circuit
  - remote stop-start circuit
  - timer-controlled circuit
  - interlocked circuit
  - jogging circuit (non-latching)
  - press safety circuit
4. Sequence of operation of basic control circuits
5. Fault-finding techniques
  - identification of faults
  - repair of faults
  - methods of prevention

## 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, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

### Conditions of assessment

Normally learning and assessment will take place in a formal learning environment.

## 7. Learning outcome details

### Learning outcome 1

Covert wiring diagrams into ladder and circuit diagram drawings.

### Assessment criteria

- 1.1 Given a wiring diagram, trace and draw the control circuit in ladder diagram form.
- 1.2 Given a wiring diagram, trace and draw the power circuit in circuit diagram form.

<b>Learning outcome 2</b>	Select appropriate contractors and control circuit devices to perform specified functions.
<b>Assessment criteria</b>	2.1 Select appropriate control devices for each application
<b>Learning outcome 3</b>	Design and connect basic control circuits.
<b>Assessment criteria</b>	3.1 Design and connect each of the following <ul style="list-style-type: none"><li>• stop-start circuit</li><li>• remote stop-start circuit</li><li>• timer-controlled circuit</li><li>• interlocked circuit</li><li>• jogging circuit (non-latching)</li><li>• press safety circuit</li></ul>
<b>Learning outcome 4</b>	Explain the sequence of operation of basic control circuits.
<b>Assessment criteria</b>	4.1 Describe the operation of the circuit.
<b>Learning outcome 5</b>	Apply fault-finding principles and techniques to a basic control circuit.
<b>Assessment criteria</b>	5.1 Identify the circuit fault and its cause. 5.2 Repair the fault. 5.3 List possible methods of preventing the fault's re-occurrence.
<b>8. Delivery of the module</b>	
<b>Delivery strategy</b>	Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where Learners learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require a learning outcome sequence other than that indicated in the module.
<b>Resource requirements</b>	Resources should be sufficient for Learners to carry out exercises on an individual basis.  Useful references include:  Jenneson, J. R. 1996, <i>Electrical Principles for Electrical Trades</i> , 4 <sup>th</sup> Ed., McGraw Hill, Sydney

Pethebridge, K., and Neeson, I., 2001, *Electrical Wiring Practice*, 6<sup>th</sup> Ed, Vol. 1 & 2., McGraw Hill, Sydney.

Standards Australia, Standards New Zealand:

AS/NZS 3000:2000 *Wiring rules*

AS/NZS 4836 *Safe working practice on low-voltage electrical installations*

HB3:1996 *Electrical and Electronic Drawing Practice for Learners*

Local electricity distributor and authority regulations.

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

**Occupational health and safety requirements**

A safe and healthy environment will be provided for learners and teachers. Safety procedures for the particular learning facilities shall be followed as part of the learning / teaching activity and assessment.

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