

**1. Module details****Module name****Power Supplies - TV and VCR****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 – 40 hours.

**Module code**

NUE104

**Discipline code**

0703230

**2. Module purpose**

This module provides the theoretical and fault finding skills to allow students to locate faults at component level in the power supply of TV receivers and VCRs. Upon completion of this module the student will be able to service, adjust and test performance of power supplies in a safe manner and be able to describe the operation of power supplies given the circuit diagram.

**3. Prerequisites**

NE006 Regulated Power Supplies.

**4. Relationship to competency standards**

This module provides some of the knowledge and skills underpinning competence in the following standards: Metals and Engineering Industry National Competency Standards, Units 18.45A, 18.56A, 18.65A. National Electrotechnology Industry Standards, Units NES205, NES302, NES303, NES305, NES306, NES402, NES403, NES406, NES407.

**5. Content****Transformerless TV power supplies**

regulation requirements  
 bridge rectifiers  
 hot chassis design  
 isolation transformers  
 RFI considerations  
 ripple effects  
 fault finding

**Series regulated TV/VCR power supplies**

operation  
 protection  
 preset controls  
 fault finding

**Switch Mode Power Supply**

block diagram of variable duty cycle type  
 block diagram of variable frequency type  
 principle of series switching regulators  
 principle of shunt switching regulators  
 SOPS switching regulators

synchronised SMPS

**SMPS control circuitry**

protection (overcurrent and overvoltage)  
 kick start circuits  
 slow start circuits  
 variable duty cycle control  
 VCO type control

**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 classroom / laboratory environment.

**7. Learning outcome details**

**Learning outcome 1**

**Describe and identify components providing RFI suppression protection, rectification and filtering in a typical TV power supply.**

**Assessment criteria**

- 1.1 State a common fault which produces excessive 100 Hz ripple.
- 1.2 State a common fault which produces excessive 50 Hz ripple.
- 1.3 Calculate or state the dc voltage expected on the main filter capacitor in a “hot” chassis receiver/monitor with respect to earth.
- 1.4 Diagnose and repair faults in the unregulated section of a power supply.

**Learning outcome 2**

**Describe and demonstrate safe working procedures to test the power supply circuitry of a typical “hot chassis” television receiver.**

**Assessment criteria**

- 2.1 Describe why a “hot chassis” receiver is dangerous to service personnel and test equipment.
- 2.2 Explain why the use of an isolation transformer renders “hot chassis” TV receivers safe.
- 2.3 Use an isolation transformer to work safely on a “hot chassis” receiver.
- 2.4 Describe typical techniques used by manufacturers to provide internal isolation from the AC supply.
- 2.5 Perform suitable tests to ascertain the circuitry sections which are live to mains.

**Learning outcome 3**

**Describe the operation of, and fault find series regulated power supplies as used in typical TV receiver/monitors and VCRs.**

**Assessment criteria**

- 3.1 Using a schematic diagram, locate the overcurrent and overvoltage protection circuitry in a typical receiver/monitor or VCR.
- 3.2 Describe how these protection circuits operate to provide circuit protection.
- 3.3 Describe how a series regulator in a typical TV or VCR maintains a regulated output voltage under varying load and/or input voltage conditions, given the schematic circuit diagram.
- 3.4 Identify and safely locate the major components in the series regulated power supply of a typical television or VCR given the circuit diagram.
- 3.5 Fault find and repair to component level a series regulated power supply in a typical TV or VCR.
- 3.6 Adjust any preset controls correctly in a series regulated power supply.
- 3.7 Test the regulation performance of a repaired power supply using a variac.
- 3.8 Describe the need for a regulated power supply in receivers/monitors and VCRs and list the possible picture effects of poor regulation.

**Learning outcome 4**

**Describe the operating principles of series and shunt type TV/VCR SMPS using block diagrams.**

**Assessment criteria**

- 4.1 Draw the block diagram of a variable duty cycle type TV/VCR SMPS and describe how it regulates.
- 4.2 Draw the block diagram of a variable frequency type TV/VCR SMPS and describe how it regulates.
- 4.3 Draw the simplified primary circuit of a series type TV/VCR SMPS and describe circuit operation.
- 4.4 Draw the simplified primary circuit of a shunt type TV/VCR SMPS and describe circuit operation.
- 4.5 State the advantages and disadvantages of series versus shunt type SMPS.
- 4.6 Describe the basic differences between SOPS and synchronised type SMPS.

**Learning outcome 5**

**Describe the operation of the SMPS control circuits in a TV/VCR.**

**Assessment criteria**

- 5.1 Describe the need for overvoltage and overcurrent protection.
- 5.2 Describe the operating principles of “slow start” and “kick start” circuits.
- 5.3 Describe the need for electrical isolation between output and control circuitry in a shunt type SMPS.
- 5.4 Describe the operation of the circuit of an opto-coupler regulation sense feedback system.
- 5.5 Describe the operation of the “standby” control system in a SMPS.

**Learning outcome 6**

**Describe the circuit operation of typical self-oscillating TV/VCR SMPS circuits using schematic diagrams.**

**Assessment criteria**

- 6.1 Locate the feedback circuit in a self-oscillating SMPS.
- 6.2 Describe how this circuit maintains oscillation.
- 6.3 Locate the output voltage sense circuit in a self-oscillating SMPS.
- 6.4 Describe how this circuit operates to regulate the output voltage.
- 6.5 Locate the primary switching circuit in a self-oscillating SMPS and identify any protection circuitry fitted.
- 6.6 Describe how circuit protection is achieved by the relevant components.
- 6.7 Locate all secondary circuits from the self-oscillating SMPS and state their purpose.

**Learning outcome 7**

**Safely locate and repair faults in a defective SMPS in a typical TV/monitor or VCR.**

**Assessment criteria**

- 7.1 Identify and locate the major components in the SMPS of a typical receiver/monitor or VCR given the schematic circuit diagram.
- 7.2 Measure and record voltages and waveforms under fault and no fault conditions at relevant circuit points.
- 7.3 Adjust any preset controls correctly.
- 7.4 Locate and repair typical faults.
- 7.5 Test the regulation performance of the SMPS using a variac.

## 8. Delivery of the module

### Delivery strategy

Delivery strategies 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. 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.

### Resource requirements

Resources should be sufficient for students to carry out experiments on an individual basis. This will require a range of power supplies and test equipment.

Useful references include:

Ibrahim KF 1994, *Television Receivers*  
Longman Essex, England  
ISBN 0-582-086175

Liff A et al 1993, *Colour and Black and White Television*  
Prentice Hall, Englewood Cliffs  
ISBN 0-13-150012-0

Zarach et al 1985, *Television: Principles and Practice*  
MacMillan, Hampshire

Trundle E 1996, *Newnes Guide to TV and Video Technology*  
Butterworth-Weinermann Oxford  
ISBN 07506 23748

Botto D 1992, *A Basic Guide to Colour TV and VCRs*  
Electronics Australia, Federal Publishing, Alexandria

Humphris R, *Power Supplies for TV & VCR*  
EFIL Australia (03) 9740 6994

### Occupational health and safety requirements

A safe and healthy environment will be provided for students and teachers as well as safe procedures with regard to learning / teaching activities.