

21.2.0 TELEVISION FUNDAMENTALS

21.2.01 INTRODUCTION

This module is designed to equip the trainee with the necessary knowledge, skills and attitudes required to understand the principles of television transmitters and receivers. Trainees undertaking this module unit require prior training in basic electronics. Upon completion of this unit, the trainees should be able to install service and maintain TV transmitters and receiver circuits.

21.2.02 GENERAL OBJECTIVES

- By the end of the module, the trainee should be able to:
- a) understand the principles of tv transmission and reception
 - b) understand the use and application of television.
 - c) observe safety while working with tv transmitters and receivers

21.2.03 MODULE SUMMARY AND TIME ALLOCATION

TELEVISION (TV) FUNDAMENTALS

CODE	Sub Module Unit	Content	Time hrs		
			Th.	Pra.	Total
21.2.1	T.V. Transmitters	<ul style="list-style-type: none"> • Block diagram • Types of T.V. cameras • Principles of T.V. transmission 	12	12	24
21.2.2	T.V. Receiver	<ul style="list-style-type: none"> • Block diagram • Television reception • T.V. circuits 	10	14	24
21.2.3	Colour T.V. Receiver	<ul style="list-style-type: none"> • Functions of block diagram • Colour reception 	6	23	29
Total Time			28	49	77

21.2.6.0 TV TRANSMITTERS

Theory

21.2.1T0 *Specific Objective*

By the end of the sub module unit, the trainee should be able to

- a) explain the function of each block of a TV transmitter
- b) state the types of television cameras
- c) explain the principles of television transmission

Competence

The trainee should have the ability to:

- i) Maintain and repair TV transmitters

Content

21.2.1T1 Basic block diagram

- i) Camera tube
- ii) Scanning and synchronizing circuits
- iii) Video amplifier
- iv) Picture signal transmitter
- v) Audio amplifier
- vi) Sound signal transmitter
- vii) Transmitting antenna

21.2.1T2 Types of TV cameras

- i) Vidicon
- ii) Plumbicon
- iii) Caticon
- iv) Cilicon vidicon

v) Chalnicon

vi) Newvicon

21.2.1T3 Principles of TV transmission

- i) negative transmission
- ii) vestigial sideband transmission
- iii) amplitude modulation
- iv) single-sideband transmission
- v) frequent modulated (FM) sound signal
- vi) pre-emphasis
- vii) satellite television

Practice

21.2.1P0 *Specific Objectives*

By the end of the sub module unit, the trainee should be able to

- a) identify parts of a TV transmitter
- b) measure various parameters of a TV transmitter
- c) maintain and repair TV transmitters

Content

21.2.1P1 Parts of TV transmitter

- i) Camera tube
- ii) Scanning and signs circuits
- iii) Video amplifier
- iv) Picture signal transmitter
- v) Audio amplifier
- vi) Sound signal transmitter
- vii) Transmitting antenna

- 21.2.1P2 Parameters of a TV transmitter
- i) Carrier level
 - ii) Modulation depth
 - iii) Frequency spectrum
 - iv) Sound signal level

- 21.2.1P3 Maintenance and repair
- i) Fault symptoms
 - ii) Tests to locate fault
 - iii) Fault repair
 - iv) Final tests

Suggest Learning

Resources

- i) TV transmitter trainer kits
- ii) Cathode ray oscilloscope
- iii) Multimeter
- iv) Manuals
- v) Spectrum analyzer
- vi) RF power meter

21.2.2 TV RECEIVERS

Theory

- 21.2.2T0 *Specific Objectives*
By the end of the sub module unit, the trainee should be able to
- a) explain the functions of various components of a TV receiver block diagram
 - b) explain the principles of television reception
 - c) describe the operation of various TV receiver circuits

Competence

The trainee should have the ability to diagnose and repair TV receivers

Content

- 21.2.2T1 Block diagram of a TV receiver
- i) Receiving antenna
 - ii) RF amplifier
 - iii) Mixer
 - iv) Local oscillator
 - v) Picture IF amplifier
 - vi) Video detector
 - vii) Video amplifier
 - viii) Sound detector
 - ix) Audio amplifiers
 - x) Sound detector
 - xi) Audio amplifiers
 - xii) Sync separator
 - xiii) Vertical and Horizontal deflection circuits
 - xiv) HV rectifier
 - xv) Picture tube
 - xvi) Loudspeaker
- 21.2.2T2 Television reception
- i) Picture elements
 - ii) Horizontal and vertical scanning
 - iii) Frame
 - iv) Video signal formation
 - v) Motion picture
 - vi) Frame and field frequencies
 - vii) Synchronization
 - viii) Blanking
 - ix) Interlaced scanning
 - x) Picture qualities
- 21.2.2T3 TV circuits

- i) Video detector
- ii) Video amplifier
- iii) Automatic gain control
- iv) Sync separator
- v) Vertical deflection oscillator
- vi) Horizontal deflection oscillator
- vii) Voltage multiplier
- viii) HV rectifier
- ix) TV picture tube (CRT)
- iv) Sound signal waveform
- v) Video detector output waveform
- vi) Vertical deflection oscillator output waveform
- vii) Horizontal deflection oscillators output waveform
- viii) Power supply voltage

21.2.2P3 Fault diagnosis and repair

- i) No picture, no sound, no raster
- ii) No picture, no sound, raster present
- iii) No sound, picture present
- iv) Picture present, no sync, sound present
- v) No field scan but sound present
- vi) No picture, no raster but sound present
- vii) Distorted field scan
- viii) Vertical bright line on screen
- ix) Horizontal bright line on screen
- x) Brilliant raster
- xi) Blurred picture
- xii) Field flyback lines showing
- xiii) Sound on picture
- xiv) Poor picture definition
- xv) Trapezium shaped scan
- xvi) Uncontrolled and excessive contrast

Practice

21.2.2P0 *Specific Objectives*

By the end of the sub module unit, the train should be able to:

- a) identify parts of a TV receiver
- b) identify types of signals in a TV receiver
- c) diagnose and repair TV receivers

Content

21.2.2P1 Parts of a TV receiver

- i) As listed in the content of TV receiver theory

21.2.2P2 Signal levels and waveforms

- i) Composite video signal
- ii) Picture IF signal frequency
- iii) Sound IF signal frequency

- xvii) Excessive noise
- xviii) Human bends/bars
- xix) Black borders on raster
- xx) Blooming

Suggested Learning

Resources

- i) TV receiver trainer kit
- ii) Cathode ray oscilloscope
- iii) Multimeters
- iv) Manuals
- v) DC power supply
- vi) Connecting leads
- vii) Standard electronic toolkit
- viii) HV meter
- ix) Tuner subber

21.2.3 COLOUR TV RECEIVER

Theory

21.2.3T0 *Specific Objectives*

By the end of the sub module unit, the trainee should be able to:

- a) state the function of block diagram of colour circuits
- b) explain principles of colour reception

Competence

The trainee should have the ability to:

- i) Test colour TV receivers

- ii) Diagnose and repair colour TV receivers

Content

21.2.3T1 Functions of block diagram

- i) Chroma detector
- ii) Chroma bandpass amplifier
- iii) Chroma amplifier
- iv) Colour demodulator
- v) Colour killer
- vi) Colour adders
- vii) Colour guns
- viii) Colour picture tube

21.2.3T2 Colour reception

- i) Primary colours
- ii) Colour addition
- iii) Decoding the picture information
- iv) Colour demodulation
- v) Colour mixing
- vi) Colour picture qualities
- vii) Colour emphasis

Practice

21.2.3P0 *Specific Objectives*

By the end of the sub module unit, the trainee should be able to:

- a) identify parts of the colour TV
- b) diagnose and repair colour TV

Content

21.2.3P1 Colour TV circuits

- i) Chroma detector

- ii) Chroma bandpass amplifier
- iii) Chroma amplifier
- iv) Colour demodulator
- v) Colour killer
- vi) Colour burst
- vii) Colour adders
- viii) Colour guns
- ix) Colour picture tube

21.2.3P2 Diagnosis and repair

- i) No colour balance
- ii) Cyan black image
- iii) Picture appears magenta
- iv) Picture appears green
- v) No brightness and no raster
- vi) No luminance signal
- vii) No colour, weak colour or too much colour
- viii) Change in white balance
- ix) Colour bars drifting through the picture

Suggested Teaching/Learning Resources

- i) Colour TV trainer kit
- ii) Cathode ray oscilloscope
- iii) Colour bar generator
- iv) Manuals
- v) Multimeter
- vi) Standard electronic tool kit
- vii) HV meter
- viii) Tuner subber