

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: MEASUREMENTS AND SHOP PRACTICES  
CODE NO.: ELR-114  
PROGRAM: ELECTRICAL/ELECTRONIC TECHNICIAN  
SEMESTER: ONE  
DATE: SEPTEMBER 1992  
PREVIOUS OUTLINE DATED: SEPTEMBER 1991  
AUTHOR: EDWARD SOWKA



NEW: \_\_\_\_\_ REV.:  X

APPROVED:

J.P. Crozitto  
DEAN

92.08.26  
DATE

W. Filipowich  
COORDINATOR

Aug 25, 1992  
DATE

MEASUREMENTS AND SHOP PRACTICES  
COURSE NAME

ELR114  
CODE NO.

TOTAL CREDIT HOURS: 36

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PREREQUISITE(S): NONE

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**PHILOSOPHY/GOALS:**

THIS COURSE WILL PROVIDE THE STUDENT WITH A SOUND UNDERSTANDING OF OPERATING PRINCIPLES, CHARACTERISTICS AND LIMITATIONS OF COMMONLY USED ELECTRONIC TEST EQUIPMENT. IT WILL ALSO INTRODUCE THE STUDENT TO ELECTRONIC SHOP PRACTICES INCLUDING THE CORRECT USE OF COMMON TOOLS. APPROXIMATELY 60% OF CLASS TIME WILL BE SPENT ON LABORATORY EXERCISES TO DEVELOP SKILLS IN THE USE OF THIS EQUIPMENT.

**STUDENT PERFORMANCE OBJECTIVES:**

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1. Accurately identify common electronic components, determine their electrical characteristics, recall and draw their schematic symbols.
2. Recall and understand the the Block Diagram of a Voltmeter, Ammeter, Ohmmeter and Oscilloscope.
3. Demonstrate the correct operation of the following equipment to measure voltage current and resistance;  
Digital Voltmeter  
Analog VOM  
Oscilloscope  
Wheatstone Bridge
4. Identify and understand the use of common tools used in electronic repair.
5. Demonstrate the correct use of these tools to remove/insert electronic components on Printed Circuit Boards and make simple wire connections.
6. Understand Surface Mount Technology and its impact on soldering/desoldering techniques. \*NOTE\* This topic is optional, time permitting.

## COURSE NAME

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## TOPICS TO BE COVERED:

1. ELECTRONIC COMPONENT IDENTIFICATION
2. ELECTRONIC TEST AND MEASURING EQUIPMENT
3. SOLDERING / DESOLDERING TECHNIQUES

## LEARNING ACTIVITIES

## ! REQUIRED RESOURCES

1.0 ELECTRONIC COMPONENT IDENTIFICATION

! -Reference Text: Electrical  
! Fundamentals by D.A. Bell  
! -Instructor Handouts  
! -Video "Electronic Component  
! Recognition"

UPON SUCCESSFUL COMPLETION OF THIS  
BLOCK OF WORK, THE STUDENT WILL BE  
ABLE TO:

- 1.1 Correctly identify common electronic components.
- 1.2 Recall and understand the electrical characteristics of these components.
- 1.3 Recall and draw the schematic symbols of these components.
- 1.4 Recall and apply the Resistor & Capacitor Color Code.

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! LAB ACTIVITY FOR 1.0 :  
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!"ELECTRONIC COMPONENT I.D."  
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2.0 BASIC ELECTRONIC TEST EQUIPMENT

! -Manufacturers' operator  
! manuals

UPON SUCCESSFUL COMPLETION OF THIS  
BLOCK OF WORK, THE STUDENT WILL BE  
ABLE TO:

- 2.1 Recall and understand the Block Diagram of a basic Voltmeter, Ammeter and Ohmmeter.
- 2.2 Correctly operate the following equipment:
  - i) Keithley 169 DMM
  - ii) Simpson 260 VOM
  - iii) Anatek 50-1S DC Power Supply

! -Instructor handouts  
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! LAB ACTIVITIES FOR 2.0 :  
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! "OHMS LAW"  
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! "SERIES CIRCUITS"  
!  
! "PARALLEL CIRCUITS"  
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! "COMBINATION CIRCUITS"  
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MEASUREMENTS AND SHOP PRACTICES

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**LEARNING ACTIVITIES**

**REQUIRED RESOURCES**

2.3	Correctly and accurately measure Voltage, Current and Resistance in Series, Parallel and Series/Parallel Combinational circuits.	AS FOLLOWS:
3.0	<u>OTHER ELECTRONIC TEST EQUIPMENT</u>	-Manufacturers operator manuals
UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:		-Instructor handouts
3.1	Recall and understand the block diagram of a basic oscilloscope.	LAB ACTIVITIES FOR 3.0
3.2	Correctly operate the LBO-1021 oscilloscope to measure Period, Amplitude and Frequency of waveforms.	"OSCILLOSCOPE LAB"
4.0	<u>MEASUREMENT LOADING EFFECT</u>	-Instructor handouts
UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:		LAB ACTIVITIES FOR 4.0
4.1	Define and understand the term "Loading Effect".	"LOADING EFFECT LAB"
4.2	Calculate the ideal and actual values for voltage and current.	
4.3	Interpret voltage and current measurements to determine the degree of loading effect.	
5.0	<u>SOLDERING/DESOLDERING TECHNIQUES</u>	- Instructor Handouts
UPON SUCCESSFUL COMPLETION OF THIS BLOCK OF WORK, THE STUDENT WILL BE ABLE TO:		- Soldering Inspection Video
5.1	Identify and understand the use of common tools and equipment for electronic repair.	
5.2	Correctly use the equipment to remove/insert components on PCB's and make simple wire connections.	
5.3	Understand (SMT) Surface Mount Technology and its impact on Soldering/Desoldering Techniques	