

MICRONIKS

Training center for high reliability soldering

TRAINING PROGRAM

For

Industry

MICRONIKS

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The complete program consists of 5 Modules.

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All the courses are given at **MICRONIKS Training Centre** .The Lab has individual benches equipped with a complete set of hand tools , a **Pace PRC 2000** soldering/desoldering equipment, a **Baush & Lomb** binocular microscope and a **fume extractor** system..

All our courses are in accordance with industrial standards **ANSI-J-STD-001B** and **IPC 610B Class 3**.

Courses can also be given with reference to the former military Standard **MIL-2000A** when requested.

All of our **Instructors** are certified **Class A** by **Pace Inc.** and /or **IPC (J-001B)**.

The courses are given in the two official languages, **French and English**.

Spanish and *sign language (LSQ)* upon request only.

A **Pace certificate** will be issued to students who have successfully completed a module.

CONTENT

Module I	High Reliability Soldering and Desoldering Techniques
Module II	Surface Mounted Components Removal & Installation
Module III	Rework & Repair of PC Boards
Module IV	Rework & Repair of Multi-Layer Boards & Flex Circuits
Module V	Custom Courses

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MODULE I

HIGH RELIABILITY SOLDERING AND DESOLDERING TECHNIQUES 4 days

BASICS

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MODULE 1: HIGH RELIABILITY SOLDERING TECHNIQUES AND DESOLDERING (BASICS) 4 days

Course objective

Familiarize the Electronic Technician with high reliability soldering techniques and skills required by modern electronic.

Knowledge to be acquired

- Correct use and maintenance of tools, equipment and accessories correct assembly of parts to be soldered
- Soldering and desoldering techniques of sub miniature components > knowledge and use of standards health and safety rules

Methodology

Practice is done in the lab on individual workbench various types of circuits will be used for the exercises demonstration is done by the instructor

Course Plan

1. Introduction

- 1.1 Course presentation
- 1.2 Safety rules
- 1.3 Specialized tools, use and maintenance

2. Precision soldering and desoldering techniques

- 2.1 Soldering and soldering process
- 2.2 Basic tools
- 2.3 The soldering iron
- 2.4 The desoldering equipment
- 2.5 fluxes
- 2.6 Solder
 - Composition
 - Types
- 2.7 Review of Standards
 - Military: MIL-STD-2000A
 - Industrial: ANSI/J STD-OO I B
IPC-A-610B

3. Work preparation

- 3.1 Wire stripping and tinning (#20 to 28 gauge)
- 3.2 Installation
- 3.3 Cleaning
- 3.4 Inspection of the finished joint

4. Component removal

- 4.1 Factors influencing component removal

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Heat and Pressure
Thermal Mass
Surface Condition
Thermal Linkage

4.2 The Work piece indicators (WPI)

Heat and Rate Recognition
Color and Brightness Changes
Heat Transfer

4.3 Commonly Used Removal Methods

Heat and Shake
The Wicking Method
Vacuum Pulse Method
Combination Iron-Sucker Method
Heat and Pull Methods
Solder Extraction

5. Practice

- 5.1 Soldering to Turret Terminals
- 5.2 Soldering to Cup Terminals
- 5.3 Soldering to Bifurcated Terminals
- 5.4 Soldering to Hook and Pierced Terminals
- 5.5 Soldering Axial-Lead components to Printed Circuit Boards
- 5.6 Soldering Dual Inline Packs (Dip's) to printed Circuit Boards

6. Evaluation

- 6.1 Evaluation techniques
- 6.2 Respect of Procedures and Standards
- 6.3 Quality and Cleanliness
- 6.4 Cosmetic

7. References

- 7.1 Military Standards: MIL-STD-2000A
- 7.2 Industrial Standards: ANSI-J-STD-001B
IPC A-610B
- 7.3 Pace training Manuals and Videos
- 7.4 IPC Training Videos

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MODULE II

SURFACE MOUNTED COMPONENTS REMOVAL AND INSTALLATION TECHNIQUES 5 days

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MODULE 11: SURFACE MOUNTED COMPONENTS, REMOVAL AND INSTALLATION 5 days

Course Objective

Familiarize the Electronic Technician with the removal and installation of Surface Mounted Components according to Industry and/or Military Standards.

Knowledge to be acquired

- Correct use of tools, equipments and accessories Work preparation techniques
- Correct parts assembly
- Removal and soldering techniques Compliance with standards
- Health and Safety rules

Methodology

- Practice is done in the lab on individual workbench
- Various types of circuits will be used for the exercises
- Demonstration is done by the instructor

Course plan

1 .Introduction

- 1.1 Course presentation
- 1.2 Safety rules
- 1.3 Tools and equipment presentation and maintenance
- 1.4 Electrostatic protection

2. Soldering techniques

- 2.1 High reliability Soldering, review of basics
- 2.2 Removal and installations - techniques of SMD's
- 2.3 Fluxes
- 2.4 Solder
 - Size
 - Composition
- 2.5 Standards:
 - Military: MIL- STD - 2000A
 - Industrial ANSI/J - STD - 001 B
 - IPC - A - 610B

3. Components

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3.1 General

3.2 Types of Components

SOT (Small outline Transistor)

SOIC (Small Outline Integrated Circuit)

PLCC (Plastic Leaded Chip Carrier)

QPF (Quad Flat Pack)

LCCC (Leadless Ceramic Chip Carrier)

4 Removal and installation

4.1 The various methods

4.2 Work preparation

5. Practice

5.1 Chip Resistors

5.2 MELF

5.3 SOT

5.4 SOIC

5.5 PLCC

5.6 LCCC

5.7 QPF

6. Evaluation

6.1 Technique used

6.2 Respect of procedures and standard

6.3 Quality and Cleanliness

6.4 Cosmetic

7. References

7.1 Military Standards: MIL-STD-2000A

7.2 Industrial Standards: ANSI/J-STD-001B

7.3 PACE Publications & Manuals

7.4 PACE/IPC Videos

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MODULE III

REWORK AND REPAIR OF SINGLE AND DOUBLE SIDED PRINTED CIRCUIT BOARDS 5 days

(REPAIR LEVEL 1)

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MODULE III: REWORK AND REPAIR OF SINGLE AND DOUBLE SIDED PRINTED CIRCUIT BOARDS 5 days

Course objective

Familiarize the Electronic Technician with new rework and repair techniques of low and high density printed circuit boards.

Knowledge to acquire

Correct use of tools, equipment and accessories Boards repair techniques
Correct parts assembly
High reliability soldering and desoldering techniques
Respect of standards
Respect of Health and Safety rules

Course plan

1 .Introduction

- 1.1 Course presentation
- 1.2 Safety rules
- 1.3 Tools and equipment presentation
- 1.4 Electrostatic protection
- 1.5 Review of basic soldering techniques

2. Concepts of repair

- 2.1 Historical Overview
- 2.2 Problems Related to Repair:
 - Skills required for Repair
 - The "Universal Repair" Method
 - The Logical Approach to Repair Training
 - The Repair Process
 - Analysis and Definition of the Problem
 - Defined Procedures of Work
 - Integrated Package of Repair Equipment
 - Quality Assurance Criteria of Acceptability
- 2.3 Standards:
 - Military: MIL - STD - 2000A
 - Collins:

 - Industrial: ANSI-J-STD-001B
IPC-7711 & 7721

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3. Elements of construction

- 3.1 Modules and Assemblies: The Modular Concept
- 3.2 Modular Construction
- 3.3 Sub modules
- 3.4 Circuit Board Elements:
 - Base Material or Substrate
 - Circuitry
 - Plating on Circuitry
- 3.5 Through-Holes in Circuit Boards
- 3.6 Eyelets and Funniest
- 3.7 Circuit Board Configurations:
 - Single-Sided Boards
 - Double-Sided Boards
 - Multi-layer Boards
 - Flexible Circuits
- 3.8 Component Types and Mounting Techniques
- 3.9 Circuit Board Packaging
- 3.10 Coatings

4. Component removal

- 4.1 Factors Influencing Component Removal:
 - Heat and Pressure
 - Thermal Mass
 - Surface Condition
 - Thermal Linkage
 - The Work piece indicators (WPI)
- 4.2 Heat Rate Recognition
- 4.3 Color and Brightness Changes
- 4.4 Heat Transfer
- 4.5 Commonly Used Removal Methods:
 - Heat and Shake
 - The Wicking Method
 - Vacuum Pulse Method
 - Combination Iron-Sucker Method
 - Heat and Pull Methods
 - Solder Extraction

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5. Solder extraction with continuous vacuum

5.1 The Solder Extraction System:

- Using a Solder Extraction Tool
- Selection of the Desoldering Tip
- The Desoldering Operation
- Through-Hole Mounted Components
- Large Thermal Mass Joints
- Use of Auxiliary Heating
- Removing Terminals and Sockets Using Auxiliary Heat
- Unclenching of Leads
- Removal of Components with Swaged (Spaded) Leads
- Planar-Mounted Components
- Touch-Up and Rework Operations

6. Removing conformal coatings

6.1 The Purpose of Conformal Coatings

6.2 Characteristics of Conformal Coatings

6.3 Methods of Removing Conformal Coatings:

- Solvent Method
- Procedure for Solvent Removal
- Thermal Parting Method
- Thermal Parting Procedure
- Miniature Machining Abrasion Method

6.4 Abrasive Removal of Thin Coatings

6.5 Removal of Thick Coatings:

- Hot-Air Jet Method
- Hot-Air Jet Procedure
- Removal of Parylene Coating

6.6 Recoating

7. Repair of damage on printed circuit boards

7.1 Basic Considerations

7.2 Pre-tinning, The Proof of Cleanliness for Soldering

7.3 Conductor Repair:

- Bonding Conductors to the Base
- Wire Repair Methods
- Surface Wire Jumper Repair
- Flat Conductor Repair Method

7.4 Repair of Lifted or Missing Terminals (Pads)

7.5 Removal of Eyelets, Rivets and Terminals

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- 7.6 Repairing a Burned or Missing Section of Circuit Boards
- 7.7 Repair Method Using Epoxy and Powdered Fiberglass
- 7.8 Repair Method Using Circuit Board Plug
- 7.9 Repairing Delaminations of Multi-layer Boards
- 7.10 Edge Connector Repairs:

- Lifted Finger Repair
- Missing or Damaged Finger Repair

8. Refurbishing/replating repaired or worn edge connectors

- 8.1 Preparation of the Work Area
- 8.2 The Gold Plating Procedure
- 8.3 Testing the Plating

9. Preventing electrical damage to sensitive components

- 9.1 MOS Components
- 9.2 Electrical Sources of Overloads
- 9.3 Electromagnetic Sources of Overloads
- 9.4 Electrostatic Sources of Overloads
- 9.5 Preventing Electrostatic Damage during Component Handling
- 9.6 The Static-Free Work Station

10. Evaluation

- 10.1 Techniques used
- 10.2 Respect of Procedures and Standards
- 10.3 Quality and Cleanliness
- 10.4 Cosmetic

11. References

- 11.1 Standards:
 - Military: MIL-STD-2000A
 - Industrial: ANSI/J-STD-001B
IPC-R-700C
- 11.2 PACE Publications and Videos

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MODULE IV

REWORK AND REPAIR OF MULTILAYER BOARDS

AND FLEXIBLE CIRCUITS 5 days

(REPAIR LEVEL 2)

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PREREQUISITE TO MODULE IV 5 days

This is an advanced course that deals with some of the most complex and intricate circuitry now in use. It is essential that you have the required knowledge and skills before undertaking it. Specifically, you should understand and be able to perform high-reliability soldering of both standard and surface mounted components, and be proficient in the rework and repairing of single and double-sided printed circuit boards.

The repair of multi-layer printed circuit boards is a most challenging activity since many of the procedures involved require extreme precision from the operator. Much of the work must be done under a microscope and in a field so small that one slip can cause extensive and perhaps irreversible damage.

This course will provide you with the in-depth knowledge, detailed techniques and procedures, and strict quality control criteria that are required. Success in applying them, however, ultimately depends on you. The status of master craftsperson in this field is not obtained without practice, patience, and a full understanding of the concepts presented throughout the following chapters.

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MODULE IV: REWORK AND REPAIR OF MULTI-LAYER CIRCUIT BOARDS AND FLEXIBLE CIRCUITS 5 days

Course objective

Familiarize the Electronic Technician with techniques of excavation and repair of internal conductors and plated through-hole of multi-layer and flexible circuits.

Knowledge to acquire

- Correct use of tools, equipment and accessories
- Excavating techniques
- Soldering techniques of internal conductors
- Respect of standards
- Respect of Health and Safety working rules

Course plan

1. Introduction

- 1.1 Course presentation
- 1.2 Security rules
- 1.3 Equipment and tool presentation and maintenance
- 1.4 Review of basic high reliability soldering

2. Repair techniques

- 2.1 Review of basics

3. Design and production of multi-layer boards

- 3.1 Historical Review
- 3.2 Design of Multi-layer Boards:
 - Laminated Multi-layer Boards
- 3.3 Fabrication and Production:
 - Substrate materials
 - Printing and Etching Inner Layers
 - Drilling and Plating

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4. Damage to multi-layer boards

- 4.1 Damage due to Improper Repair Activities
- 4.2 Manufacturing Defects and Damage
- 4.3 Operational Defects
- 4.4 Fault location:
 - Shorts between Conducting Layers
 - Open Circuits in Conductors

5. Repair of multi-layer boards, Level 1

- 5.1 Setting Up for Repair
- 5.2 Removing Soldered Components:
 - Standard Extraction Technique
 - Use of Auxiliary Heating
- 5.3 Conductor Repair:
 - Excavation
 - Conductor Replacement
 - Substrate Re-Building
 - Use of Conductive Epoxy
 - Repair of Shorts

6. Repair of multi-layer boards, Level 2

- 6.1 Plated Through Hole Repair
- 6.2 Repairing Internal Damage:
 - Jumper Connections
 - Eyelet Replacement

7. Design and construction of flexible printed circuits

- 7.1 Introduction
- 7.2 Classification of Various Flexible Printed Boards
- 7.3 Fabrication and Production
- 7.4 Thermoplastics and Thermosets
- 7.5 Base Dielectric Materials
- 7.6 Bonding Techniques

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8. Repairing flexible printed wiring

- 8.1 Soldering and Desoldering during the Repair Process
- 8.2 Conductor Repair
- 8.3 Laminate Repair
- 8.4 Lifted or Damaged Land Repair

9. Evaluation

- 9.1 Techniques used
- 9.2 Respect of Procedures and Standards
- 9.3 Quality and Cleanliness
- 9.4 Cosmetic

10. References

- 10.1 Standards:
 - Military: MIL-STD-2000A
 - Industrial: ANSI/J-STD-001B
IPC-R-700C
- 10.2 PACE Publications and Videos

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MODULE V

CUSTOM COURSES

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MODULE V: CUSTOM COURSES

Course objective

- ◆ Familiarize the Electronic Technician with various high reliability soldering techniques encountered in his daily tasks and according to the company standards.

Knowledge to be acquired

- Correct use and maintenance of tools, equipment and accessories correct assembly of parts to be soldered
- Soldering and desoldering techniques of sub miniature components > knowledge and use of standards health and safety rules

Methodology

Practice is done in the lab on individual workbench various types of circuits will be used for the exercises demonstration is done by the instructor

Course Plan

Determined by the customer

1. Introduction