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Overview of Soldering Assessment Programs



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Objectives

- Provide a mechanism or program to evaluate the soldering and assembly skills of operators or applicants



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Goals

- Provide Customer with the:
 - Ability to sort out applicants who cannot solder
 - Ability to determine the skill levels of the applicants



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Terminal Objectives

- To provide the testing agency with enough information to determine whether or not the applicants understand and can demonstrate the skills of both plated through hole and surface mount soldering



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Enabling Objectives

- Applicants will demonstrate their capability to:
 - Assemble and solder PTH technology products
 - Assemble and solder SMT technology products



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Program Concept

- This is a concept phase program
- The applicants have to be able to read the provided documentation and follow instructions on assembly and soldering requirements



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Program Sequence

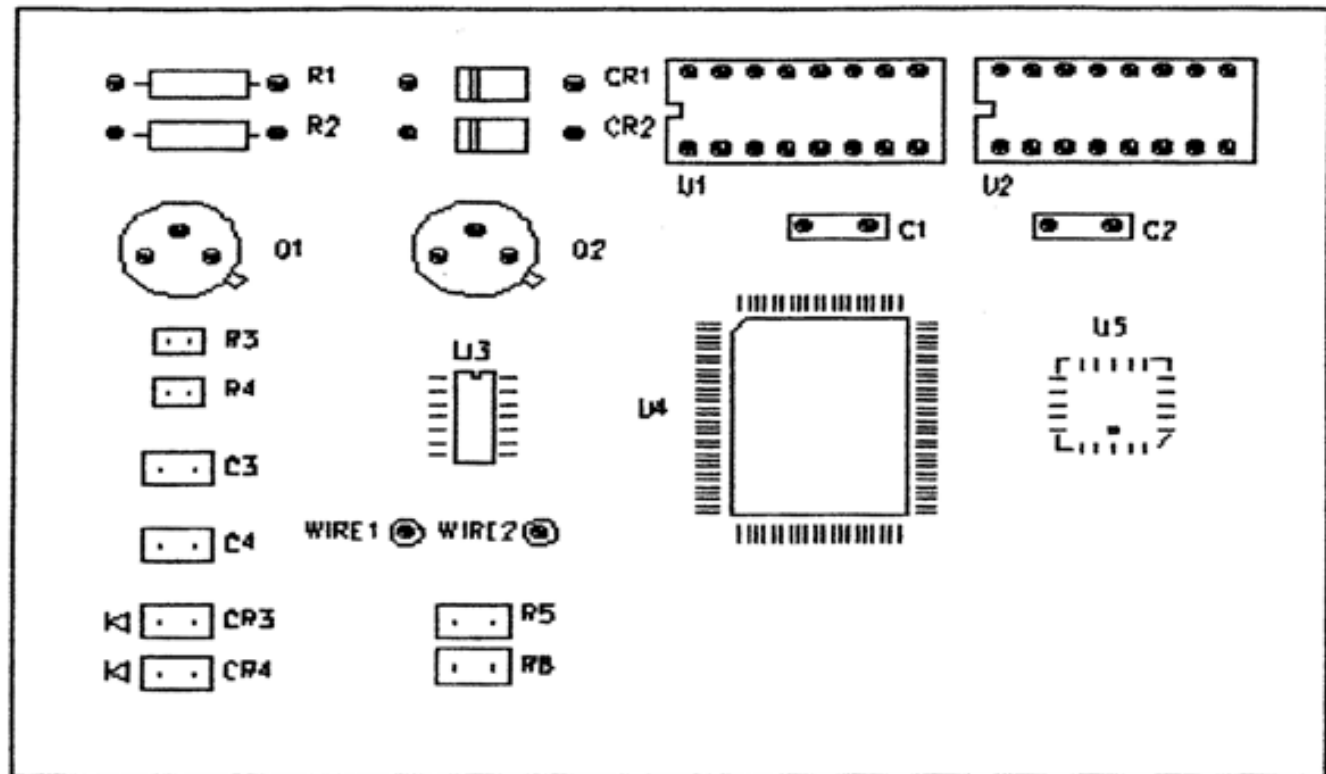
- Based upon the typical assembly process of:
 - plated through holes and
 - surface mount



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Sample Board





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Tools for Workbench

- Tooling Requirements
- The following tools and materials will be needed and should be provided to the participants of this program.
 - One Solder iron, consisting of power unit, iron stand and sponge and solder iron. Example: Hakko, Weller, Pace, Metcal or equivalent
 - Various sizes of solder iron tips, not installed in the solder irons, as this will allow the participants to select the tips based upon the size of the joints to be soldered. Tips supplied should be Conical, Bent Round, Chisel or equivalent
 - A pair of Tweezers
 - Lead bending gauge, single or double sided or equivalent
 - One bottle of water for wetting the sponge. Example Squeegee Bottle Dispenser or equivalent
 - One pair of cutters, example diagonal cutters or equivalent
 - One pair of pliers, example chain nose pliers, needle nose pliers or equivalent
 - One soldering aid, example, Orange sticks, spudgers or equivalent
 - One flux dispensing pen, AIM, Kester, Alpha or equivalent
 - One vise to hold product, example bench top work positioner and appropriate vise head
 - One roll of cored solder, (Low solid content solder)
 - One pair of safety glasses, Eye Protection, example Safety Spectacles or equivalent
 - One ESD Wrist Strap, adjustable
 - One Magnifier, Illuminated magnifier or equivalent
 - One Kit of material to include: (IPC J-STD-001 Operator Proficiency Workmanship Test Board)
 - Prints and drawings
 - Parts lists, build of materials, (BOM)
 - Components
 - Printed Circuit Board



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Expectations of Exercises

Suggested Times To Complete Exercises

- **Exercise 1**
- Dedit the PTH components and preform, install in board, clinch and cut leads and inspect, **15 min**
- **Exercise 2**
- Solder PTH components in the board and inspect, **15 mi**
- **Exercise 3**
- Dedit SMT Chip and 50 mil pitch components, position and solder to board. Inspect board, **25 min**
- **Exercise 4**
- Position 25 mil pitch component and solder and inspect for workmanship, **20 min**

Approximate time to assemble and solder printed circuit board 75 min



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Program Exercise

- The following exercises are used to demonstrate the student's skill levels and whether or not the individuals can perform to the process requirements prior to being assigned to manufacturing department



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Exercise #1

- Participants will demonstrate the capability to read assembly drawings and assemble components into printed circuit boards



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Exercise 1 - Through-Hole Component Installation:

- Preform and install (10) through-hole components listed on parts list. Install in locations shown on print
- Clinch and cut the leads

Stop. Return the assembly to the Administrator for inspection before soldering



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Exercise #2

- Participants will solder the pre-assembled components to the printed circuit board



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Exercise 2 - Plated Through-Hole Soldering:

- Prepare the soldering iron for the soldering operations
- Solder the components that have been installed
- Use liquid flux as needed.
- Inspect the solder joints

Stop. Return the assembly to the Administrator for inspection



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Exercise #3

- Participants will demonstrate the capability to assemble and solder surface mount components onto a printed circuit board, (i.e., chip components and 50 mil pitch components).



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Exercise #3 Part 1

- Prepare the soldering iron for the soldering operations
 - Position one chip component into its location and solder it in place using the appropriate soldering iron
 - Use liquid flux as needed
 - Cleaning of the assembly is not required
 - Inspect the solder joints
 - Process to the next chip components until instructed by the Administrator to do otherwise
- Stop.** Return the assembly to the Administrator for inspection.



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Exercise #3 Part 2

Prepare the soldering iron for the soldering operations.

- Position one Multileaded component into its location and solder it in place using the appropriate soldering iron
- Use liquid flux as needed
- Cleaning of the assembly is not required
- Inspect the solder joints
- Process to the next Multileaded components until instructed by the Administrator to do otherwise



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Exercise #4

25 mil Pitch Component Assembly and Soldering:

- Prepare the soldering iron for the soldering operations.
- From information on documentation position one component into its location and solder it in place using the appropriate soldering iron from step 1.
- Use liquid flux as needed.
- Cleaning of the assembly is not required.
- Inspect the solder joints.



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Individual Assessment

Soldering Test Assessment Form

Candidate Name: _____ Date: _____

Location _____ Administrator: _____

Instruction

Administrator explain to the candidates the following:

	Yes	No
• Purpose of the test		
• Time frame/schedule		
• They may ask questions at any time during the test		
• Where the administrator will be during the test		
• General feedback will be given at the completion of the test		
• The test is being used as a screening device for job		
• Any other logistics or rules at the facility		



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Individual Assessment

Section I: Plated Through Hole Product Assembly

- Rate the candidate on the following aspects of Part One of this section



	Unacceptable	Acceptable	Excellent
1. Time spent up to but not including soldering			
2. Apparent comprehension of prints and instructions			
3. Skill in use of hand tools			
4. Components in correct location			
5. Polarized components correctly oriented			
6. Component preforming			
7. Clinch and cut			

- Candidate proceeds to Part Two (soldering portion) of Section I? Yes: No:
- Rate the candidate on the following aspects of Part Two of Section I



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Final Assessment and Grading

Exer 1, PTH Comp Installation

Time spent up to but not including soldering	3
Apparent comprehension of prints and instructions	4
Skill in use of hand tools	4
Components in correct location	5
Polarized components correctly oriented	5
Component preforming	5
Clinch and cut	3

Exercise 2, PTH Soldering

Preparation and handling of soldering iron	5
Selection of appropriate solder iron tip	4
Selection of solder	1
Use of flux	1
Quality consistency of soldered connections	5
Flow through of solder in plated through holes	5
Amount of solder on each joint	4
Overall solder joint appearance	4
Crystallization of flux residue (is not burned)	2



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Thank You



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Further Information

For questions regarding this webinar, please contact Leo Lambert at leo@eptac.com

For information on any of EPTAC's or IPC's Certification Courses, please visit our website at <http://www.eptac.com>