

Technical Description

Electronic Assembly and Testing

Skill 07



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1 Skill Overview

1.1 Skill Name and Category

Electronic Assembly and Testing, ICT

1.2 Number of Competitors

This is an individual Skill Competition with one competitor.

1.3 Competition Time

The total competition time is 5 hours and is divided into the following modules, held on two consecutive days:

- Module A: PCB1 – LED Sequence Controller – 2 hours 30 minutes
- Module B: PCB2 – External Timer for Brushless Stepper Motor – 2 hours 30 minutes

1.4 Description of the Skill

Electronic Assembly and Testing involves interpreting technical documentation, assembling electronic, electromechanical and mechanic components and circuits, and testing, troubleshooting, verifying, and integrating electronic systems.

Competitors are expected to demonstrate a solid understanding of electronics, precision in assembly, and the ability to verify that completed assemblies meet the specified functional requirements. Success depends on technical knowledge, professional working practices, and careful attention to detail throughout the assembly and testing process.

The skill reflects tasks commonly performed by electronics assemblers, electronics technicians, manufacturing technicians, service technicians, and test technicians in industry.

2 Task Assignment Overview

2.1 Task Assignment Description and Familiarisation Session

The Task Assignment is the main competition task used to assess the competitors' skills. It defines what the competitors must complete during the competition and forms the basis for all assessments. The final result is evaluated only on the finished work produced during the official competition time.

A familiarisation session is organised on C-1. During this session, competitors may enter the workshop, see the workspace, check the available tools and materials, and ask questions about procedures or practical arrangements. Competitors are not allowed to practise, start, or rehearse any part of the Task Assignment during this session.

2.2 Task Assignment Structure

The competition consists of two modules:

Module A: PCB1 – LED Sequence Controller

Competition time: 2 hours 30 minutes

Competitors analyse the supplied documentation package and assemble PCB1, an electronic control circuit incorporating a circular LED display and interface connections for subsequent system integration.

Competitors solder and assemble the required components and verify the completed circuit using the specified test equipment and procedures, including power-supply and function-generator connections. Functional testing and measurement results must be recorded on the supplied verification documentation.

PCB1 is assembled, tested, and assessed as a standalone project in Module A. The completed skills and procedures provide the basis for the integration, verification, and troubleshooting activities in Module B.

Module B: PCB2 – External Timer for Brushless Stepper Motor

Competition time: 2 hours 30 minutes

Competitors analyse a second documentation package and assemble PCB2, an external timing controller.

The Bill of Materials (BOM) for PCB2 intentionally includes one or more timing-circuit components with values that differ from those required for Module B. Competitors must determine and implement suitable replacement values to achieve the timing characteristics specified at the start of Module B.

Following verification of PCB2, competitors mechanically assemble and interconnect their completed PCB2 with an Organiser-supplied fully functional PCB1 and brushless stepper motor using various mechanical and electromechanical components.

After integration, competitors troubleshoot and verify the operation of the complete system in accordance with the functional requirements specified at the start of Module B, including demonstration of the required timing and directional control of the brushless stepper motor. Measurement results and engineering changes must be documented using the supplied Verification Procedure and Engineering Change Notice (ECN) forms.

2.3 Task Assignment Technical Requirements

Competitors must be able to apply the following techniques and skills:

- Interpret technical documentation, including circuit schematics, PCB layout drawings, assembly drawings, mechanical assembly drawings, Bills of Materials (BOMs), wiring diagrams, and test procedures
- Assemble electronic and electromechanical assemblies using surface-mount and through-hole technologies
- Install components with correct orientation and polarity
- Perform soldering and rework operations
- Produce solder joints that comply with accepted electronics industry IPC standards
- Remove and replace components using appropriate rework techniques, where applicable
- Apply safe working practices and ESD protection where applicable
- Perform visual inspection of completed assemblies
- Use electronic measuring instruments, including digital multimeters and oscilloscopes, to verify circuit operation
- Test, troubleshoot, and verify electronic assemblies against specified functional requirements
- Analyse circuit operation and determine suitable component modifications
- Complete measurement and verification documentation accurately
- Implement and document engineering changes using the supplied Engineering Change Notice (ECN) procedure
- Integrate electronic, electromechanical and mechanic assemblies into a complete working system

The Task Assignment defines the exact requirements, including assembly, testing, measurement, verification, integration, and documentation requirements, and may include task-specific variations or additional elements.

3 Materials and Equipment

3.1 Materials and Equipment Provided by the Competition Organiser

The Organiser provides the materials, tools, and equipment listed below.

Images are for reference only. They do not indicate a specific brand or model unless otherwise stated in the specifications. Quantities are per competitor unless otherwise stated.

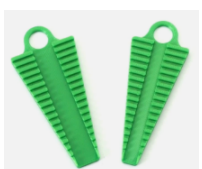
Items will be available at the competitor's workstation or in the designated competition area, as appropriate. Where exact brands, models, or task-specific material details are not specified, these may be confirmed before the competition or defined in the Task Assignment, as appropriate.

No.	Equipment / Material	Picture	Specifications	Quantity
01	AC/DC power supply with power cord and connection leads		PeakTech 6120 or equivalent	1
02	AC/DC multimeter with test leads		AMPROBE AM-500-EUR or equivalent	1
03	Digital oscilloscope with power cord and test leads		OWON XDS2102A or equivalent	1
04	Function generator with power cord and connection leads		OWON AG1011F or equivalent	1
05	Soldering station including soldering iron, safety stand, and tip-cleaning compartment with coiled brass/copper wire wool		Weller WT1 or equivalent	1

No.	Equipment / Material	Picture	Specifications	Quantity
06	Soldering tips		LT A, LT B, and LT K suitable for the soldering iron above, or equivalent tips for an equivalent soldering station	3
07	Soldering stand with magnifying glass			1
08	Pliers			1
09	Tweezers			1
10	IC extractor			1
11	Lead-free solder		0.4 mm and 0.8 mm	Available in the competition area
12	Flux in syringe			1
13	Desoldering braid			1
14	Desoldering pump			1

No.	Equipment / Material	Picture	Specifications	Quantity
				
15	Storage box for BOM components		Components sorted into labelled compartments	1
16	Various THT components, such as resistors and capacitors		Minimum THT component lead pitch: 0.95 mm	As specified in the BOM
17	Various SMD components, such as resistors and LEDs		Minimum SMD component package size: 1206 (Imperial) / 3216 (metric)	As specified in the BOM
18	Pencil			1
19	Blank stationery, stamped			1
20	Verification sheet, stamped			1
21	Calculator			1
22	PCB connectors and connection cables		Listed in Task Assignment	2
23	Silicone mat			1
24	Electromechanical components, such as terminal blocks, pin headers, jumpers, connection wires, spacer sleeves, and screws		According to the BOM	As specified in the BOM
25	IPA for PCB cleaning			Available in the

No.	Equipment / Material	Picture	Specifications	Quantity
				competition area
26	Task light with magnifying glass			1
27	Wire stripper			1
28	Wire cutter			1
29	Screwdriver		Suitable for M3 terminal-block screws	1
30	PH1 Phillips screwdriver			
31	Safety glasses			1
32	Soldering fume absorber			1
33	Soldering tip cleaner			1

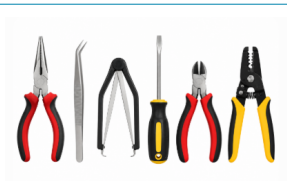
No.	Equipment / Material	Picture	Specifications	Quantity
				
34	PCB cleaning swabs and brush			Available in the competition area
35	Resistor bending tool			1

3.2 Materials and Equipment Supplied by Competitors

Competitors may bring only the materials, tools, and equipment listed below. Personal tools and equipment must fit within a toolbox or tool case suitable for checked luggage, with a maximum total weight of 23 kg, including the toolbox or case. This requirement does not apply to clothing, footwear, personal protective equipment (PPE), or equipment required due to the competitor's condition or special needs and agreed in advance with the Organiser.

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No.	Equipment	Picture	Specification	Quantity
01	Soldering iron and associated accessories		Equivalent to the equipment specified in items 5 and 6 of the Organiser-provided equipment table. Must comply with the competition's safety requirements.	1
02	Safety glasses, magnifiers/head loupes		Must meet applicable safety standards. Artificial intelligence (AI) functionality is not permitted.	1 each

No.	Equipment	Picture	Specification	Quantity
				
03	Pliers, tweezers, IC extractor, flat-blade screwdriver, Phillips screwdriver, wire cutter, and wire stripper		Equivalent replacements for the hand tools provided by the Organiser.	1 set

3.3 Prohibited Materials and Equipment

Competitors may use only the materials, tools, and equipment listed in Sections 3.1 and 3.2, unless otherwise authorised by the Skill Manager or Chief Judge. This restriction does not apply to clothing, footwear, or personal protective equipment (PPE) required in Section 4.1, or to equipment required due to the competitor's condition or special needs and agreed in advance with the Organiser.

All other materials, tools, and equipment are not permitted.

4 Skill-Specific Requirements

4.1 Skill-Specific Requirements

The Skill-Specific Requirements below apply to this Skill Competition and must be followed in addition to the Abilympics Competition Rules. The Skill Manager or Chief Judge may provide additional instructions, as needed, to ensure the competition is conducted safely and fairly.

Topic	Skill-Specific Requirements
Materials and tools provided by the Organiser	Competitors must check all materials, tools, and equipment before the competition begins. If any item is missing, damaged, or defective, competitors must immediately inform the Judges. No replacements will be provided once competition time has commenced, unless authorised by the Judges. If equipment provided by the Organiser fails and the failure is confirmed not to have been caused by the competitor, the Chief Judge may grant additional time.
Use of personal tools	Competitors may bring and use only the personal tools and equipment listed in Section 3.2. No other personal tools or equipment are permitted. This restriction does not apply to equipment required due to the competitor's condition or special needs and agreed in advance with the Organiser.
Personal protective equipment (PPE)	Safety glasses must be worn whenever soldering, desoldering, cutting component leads, operating hand tools, or carrying out any activity where eye protection is required. Safety glasses are provided by the Organiser. Competitors may use their own safety glasses as listed in Section 3.2.
Clothing / Uniform	There is no mandatory uniform. Competitors must wear neat, comfortable clothing suitable for electronics assembly and testing work. Clothing must allow the competitor to work safely and effectively at the workstation. Where possible, clothing should minimise electrostatic charge generation. Clothing, jewellery, or accessories that may create a safety risk or interfere with the competitor's work are not permitted. Clothing must not display large commercial logos or promotional branding. Small, non-distracting brand marks are permitted.
Sideline coaching	Competitors must remain at their workstations or within the designated competition area during competition time, unless authorised to leave by the Judges. Competitors may not communicate with other competitors or members of the public during competition time. Competitors may communicate with Judges, Interpreters, personal assistants, and other authorised persons when required. The role and permitted involvement of a personal assistant must be agreed in

Topic	Skill-Specific Requirements
	advance with the Organiser based on the competitor's condition or special needs.
Use of technology	Competitors may not use personal laptops, tablets, mobile phones, smartwatches, or other personal communication or electronic devices during competition time. Competitors must store such devices away and may access them only during the lunch break or at the end of the competition day. This restriction does not apply to devices required due to the competitor's condition or special needs and agreed in advance with the Organiser. Judges and Interpreters may use devices required for their official duties only as agreed by the Skill Manager and the Chief Judge. The Skill Manager and the Chief Judge may use devices required for competition management and will specify any additional restrictions or permitted device use within the competition area.

5 Assessment Framework

5.1 Assessment Principles

All Abilympics Skill Competitions are marked out of 100 points.

Points are divided between criteria that reflect the required skills and expected outcomes.

Two methods of assessment are used:

- **Measurement:** objective, factual scoring (e.g., size, accuracy).
- **Judgement:** expert evaluation of quality, technique, and artistic choices.

5.2 Assessment Areas

Detailed marking criteria and scoring are provided in the Task Assignment.

Assessment focuses on the following key areas:

Assessment Area	Points
Documentation Interpretation, Analysis and Component Selection	15
Assembly Accuracy and Electromechanical Integration	20
Soldering and Rework Quality	25
Measurement, Verification and Documentation	20
Functional Performance and System Integration	20
Total	100