Electronics

Competition Brief

entry requirements	
Who can enter?	These categories are open to all young technicians born on or after 1 January 1987 for a chance to compete in Calgary 2009 or born on or after 1 January 1989 for a chance to compete in London 2011 **The competition can be entered at two levels:** **Advanced:** technicians must be working towards an NVQ 3 or ONC and must have an awareness of the IPC-610-00D Electronics Assembly Standard. **Higher:** technicians must have an NVQ 3 or HNC and working towards an HND and must have an awareness of the IPC-610-00D Electronics Assembly Standard.
How many competitors can enter?	The competition is for individuals. Up to two competitors per organisation per level can enter the competition.
What's involved in the competition?	The competition covers three stages: **Stage one:** Competitors must submit a theory test by 16th May 2008 **Stage two:** Successful competitors are invited to attend one of two heats. **Stage three:** Highest scoring competitors across the heats are invited to compete in the Electronics UK final
How do I get involved? **Step 1** **Step 2**	Register for this competition at **www.worldskillsuk.org** by 25th April 08 **Heats:** Wigan College 7th July 2008 Oaklands College 4th July 2008 **UK Final:** Venue TBC 25th - 26th September

Enter online by 25th April 2008

contact details

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competition description

The technician's work role covers assembly, fault finding, testing, design and software programming in electronics.

Stage one: Theory test, technicians have to have a good theory knowledge that covers:

Fundamental electronics principles
- Basics of AC and DC technology.
- Two ports LRC network, resistive networks with up to three meshes.
- RC oscillators.

Components in electronics
- Properties, behaviour, characteristics and application (elementary circuits) of mechanically, electrically and physically adjustable components i.e. capacitors, resistors, Coils, transformers and.
- Diodes: rectifying diodes, switch diodes, zener diodes, capacitive diodes, PIN diodes
- Trigger components, diac, triac, thyristor and Uni. -junction transistors.

Multistage and special amplifier circuits
- Basic amplifier circuits (AC, DC and power amplifiers)
- Differential amplifiers/operational amplifiers
- Ideal operational amplifier: (infinite input resistance, zero output resistance and infinite open loop gain) Basic circuits with operational amplifier, analogue adder and sub-tractor, differentiator, comparator, impedance transducer.
- Real operational amplifier: Offset voltage and offset current, compensation, common mode gain and rejection, temperature drift, frequency response.

Generators and Pulse Shapers
- Generators for sine wave voltage: RC, quartz, LC oscillators; wien bridge generator, phase generator
- Pulse shaper: Schmitt trigger, differentiator, and integrator.

Digital Electronics
- Basic logic gates including level switching function, function table, pulse, diagram, circuit symbols

- Properties of basic gates AND, OR, NOT, NAND, NOR, EXCLUSIVE OR EXCLUSIVE NOR
- Substituting basic NAND or NOR gates for basic gates.
- Creating switching functions from given circuits and vice versa.
- Making function table from circuit diagrams and switching functions
- Simplifying switching networks using Karnaugh diagram or mathematical techniques.
- Flip-flops, RS Flip-flop, D Flip-flop, JK Master slave Flip-flop (especially counter circuits, shift register and frequency divider).
- Memory circuits, selection, addressing and memory decoding volume.

The theory test will be sent out to all those who register by 2nd May 2008

Stage two: One day heat will encompass two of the following 4 tasks:

Hardware Design Project
In this project the competitor needs to create a solution defined in the assignment to meet the properties in a given environment in hardware using a breadboard to prove the design. Once the design as had been proven each competitor will have to design a PCB.

Fault Finding and Repair project.
The competitor is expected to locate, test and replace faulty electronic components on a printed circuit board, surface mount board or mixed technology board. All surface mount components to have no more than 20 pins. The competitor will be able to document fault finding method/procedure with results.

Measuring and testing project.
The competitors are expected to work with conventional measuring and testing equipment to test, set, adjust and measure electronic components, modules and equipment that are based in DC, AC, digital and analogue electronics. They are further expected to record and analyse measured results.

Assembly Project
The competitors will be asked to assemble a project from a kit of parts. The standard to be reached is determined by IPC-A-610 issue D (International acceptability of electronic assemblies).

Assembly of PC boards may include conventional and surface mount Components. Wiring and mechanical assembly may also be included.

Stage three: Two day UK final competition will encompass all of the above tasks and the following task.

Marking and assessment

The prepared competition will include an explanation of the marking criteria and process. This will be given to competitors.

The allocation of marks should reflect the relative significance of each task to the work role. The following percentages will therefore be applied:

Design	25
Fault Finding	25
Measurement	25
Assembly Project	25

Assessment will be through

- Observation to IPC-610 standard
- Inspection and testing of completed tasks

Each competition task will be assessed and marked independently of every other task.

Each task will be assessed and marked in accordance with the general and specific competition rules.

A panel of at least 3 judges will be drawn from industry and College. The judges' decisions will be moderated and quality assured before being confirmed.

rules

The competition:

- will be largely practical
- will be for individuals

Each competition will comprise a small selection of the above tasks to suit the stage and level of the competition.

At both regional and national stages the competition should sample performance in assembly, faultfinding, testing, design and software programming in electronics.

In line with the above guidance, regional competitions lasting one day (6 hours) should aim to sample 50% of the technician's work role.

National competitions lasting 2 days (12 hours) should sample 75% of the technician's work role, more intensively than at the regional stage, and with additional tasks as indicated above.

The competition will be provided in the format advised. This will include

- The description of the test projects
- The marking criteria
- The material and equipment list

The competition must be conducted in accordance with the general and specific competition rules.

Enter online by 25th April 2008