



FAULT FINDING in ELECTRICAL CONTROL PANELS

COURSE 540: 2 DAYS: Max 8 Candidates

Electrical control panels often have complex circuits that incorporate relays, contactors, PLCs, variable speed drives and safety relays. This course provides candidates with the opportunity to find commonly-occurring faults in complex control panels that incorporate these devices under the supervision of our instructors.

PARTICIPANTS

This course is not an entry-level course. Prior electrical competence is assumed. An eligibility assessment for access to this course is available on request. It is suitable for experienced electrical maintenance personnel or candidates who have completed course 110. We advise that the PLC Fault Finding (No 520) and AC Inverter Drives (No 580) courses should also be attended for candidates without knowledge of these two subject areas before attempting this course.

COURSE PRESENTATION

The course is presented using demonstration rigs that incorporate real industrial motors and fairly complex control panels. Faults are introduced to the systems and participants are required to find them, with help and support from our instructors. Comprehensive course notes are provided.

COURSE OBJECTIVES

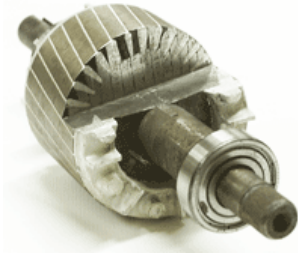
On completion of the course, participants will be able to

- work safely on modern integrated systems
- work safely in electrical control panels
- read and understand complex circuit diagrams
- correctly use multimeters, insulation resistance testers, continuity testers & clamp meters
- find a range of faults on complex control panels that incorporate
 - contactors and relays
 - safety relays
 - variable speed drives
 - programmable logic controllers
 - open circuits in control panel wiring
- apply a systematic and logical approach to fault finding.

Successful completion of the course leads to the award of the Technical Training Solutions Certificate of Competence 540: Fault Finding in Electrical Control Panels.

What do candidates on the Fault Finding in Control Panels course actually do?

The course begins by providing the candidates with a 'refresher' of 3-phase motor operating principles and the faults that 3-phase motors commonly develop. Candidates examine our demonstration motors and practice finding the common faults that motors develop on our motor fault simulator boxes.



A cage induction motor's rotor with the cage machined away to expose the rotor bars - we find this useful for explaining the faults that motors are likely to experience

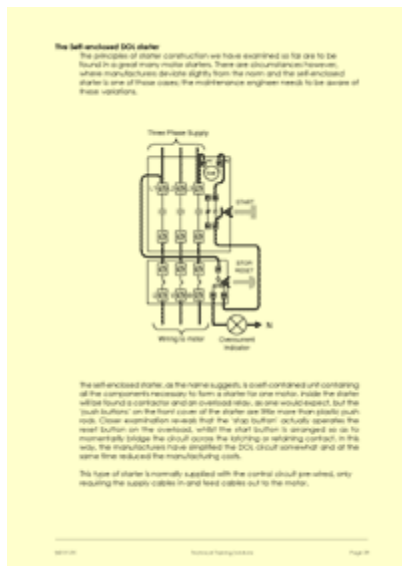


One of the demonstration parts on the course: A small 3-phase motor is used to take note of the measurements that a serviceable motor would exhibit



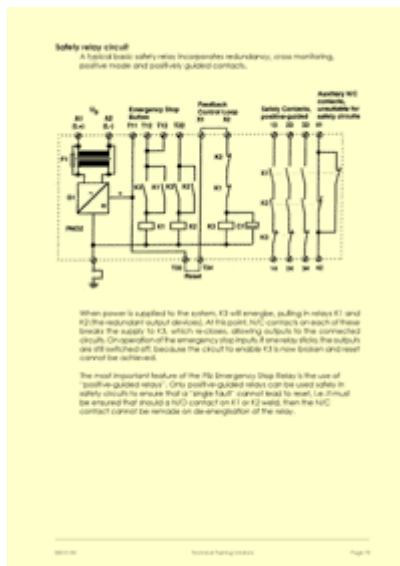
Candidates practice finding the common faults that motors develop on our motor fault simulator boxes

Comprehensive course notes support the course - some example pages follow - showing our coverage of the traditional control panel components and how fault-finding and fault diagnosis should be carried out with these components. Candidates also look at safety relays, analysing how they work and how faults associated with them can be rectified. Throughout the course the emphasis is on adopting a logical approach to fault-finding and we therefore provide circuit diagrams for all of our control panels whilst the candidates practice fault-finding and fault diagnosis.



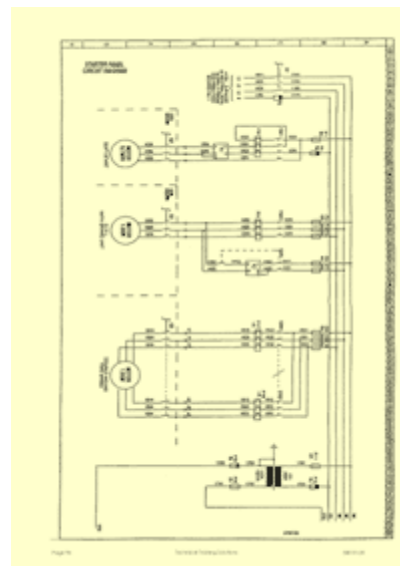
Page 29 of the training course notes:

The course looks in detail at motor starters that employ contactors and candidates are given a 'refresher' on the issues surrounding their use and the faults that they are likely to develop



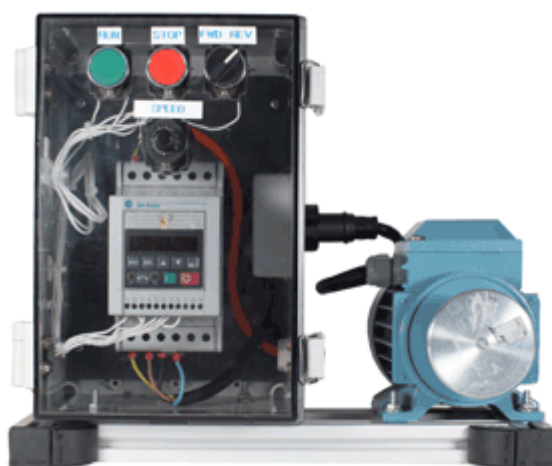
Page 73 of the training course notes:

The important issues surrounding the use of safety relays in modern control panels are discussed and candidates learn about the typical faults that they develop, how to reset them etc



Page 96 of training course notes: This is the circuit diagram for one of our control panels which the candidates perform fault-finding exercises on

Candidates on the Fault Finding in Electrical Control Panels course look at the various methods by which motors are commonly started and controlled, including speed control by variable frequency inverter drives.

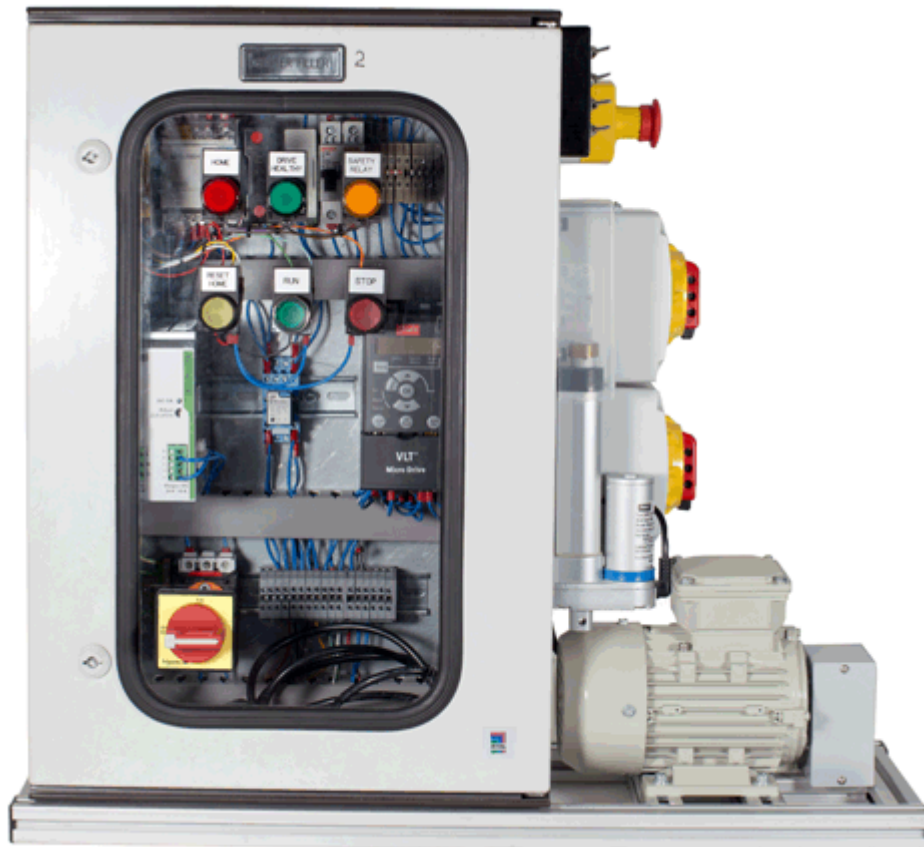


One of the inverter drives used on the course

The faults that motor controllers commonly develop are then explored along with the methods used to correctly diagnose them. These typical faults include:

- burnt-out contactor coils
- overload relay faults
- auxiliary contact failure
- inverter faults, (diode, capacitor, anti-surge, etc).

Candidates practice finding these faults on our industrial motor control panels, using logical methods. Using root cause analysis, candidates are encouraged to determine the most effective intervention which will prevent the fault from re-occurring in the future.



One of the motor control panels that candidates on the course use

Candidates gain valuable experience working on complex industrial control panels. Each panel incorporates a safety relay, a plc and an inverter drive unit working together in an integrated system. The faults that these types of systems can develop are analysed and by reference to the circuit diagrams and application of their fault-finding skills, candidates practice finding these faults and diagnosing them correctly, using logical methods.



One of the integrated control panels used on the training course

The legal and safety issues associated with live working are, of course explored fully, so that candidates on the course fully understand the importance of using approved test leads, justifying their work, etc. The course also explores some of the more complex phenomena associated with fault-finding and effective diagnosis on integrated systems, for example reflected waves, induced motor bearing currents etc.

If you would like to see some of the equipment used on the Fault Finding in Control Panels course for yourself, then please call us to arrange a visit to our offices in Kent. Alternatively, we can visit you anywhere in the British Isles.



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Registered Office: Norwich House, Waterside Court, Neptune Close, Rochester ME2 4NZ
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CONTACT US

Tel: 01634 731470
Email: tech.training@zen.co.uk