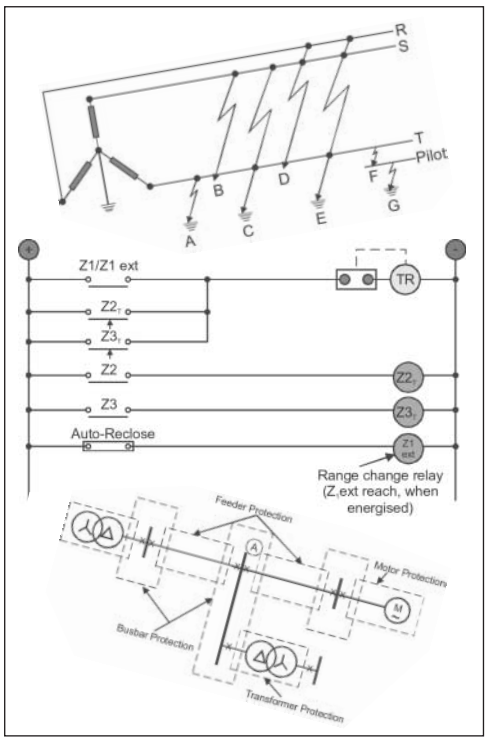
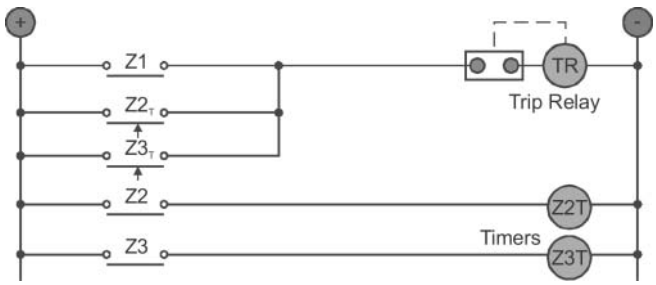
Practical

TROUBLESHOOTING OF ELECTRICAL EQUIPMENT & CONTROL CIRCUITS



YOU WILL LEARN HOW TO:

- **Troubleshoot electrical equipment & control circuits**
- **Diagnose electrical problems “right first time”**
- **Reduce down time**



WHO SHOULD ATTEND:

- **Maintenance Technicians & Supervisors**
- **Plant Electricians**
- **Mechanical Engineers**
- **Production Supervisors**
- **Utilities Maintenance Personnel**
- **Plant Engineers**

IDC TECHNOLOGIES

Technology Training that Works

THE WORKSHOP

Organisational and Personal Impact of the Workshop and its Training Methodology:

There is a large gap between the theory of electron flow, magnetic fields and troubleshooting electrical equipment and control circuits in the plant. On this workshop, we avoid discussions on the theory but rather focus on showing you how to troubleshoot electrical equipment and control circuits.

The course helps individuals and employers. It does this by increasing all delegates knowledge and skills in improving equipment productivity whilst reducing maintenance costs.

Attendance on this course will help all delegates identify, prevent and fix common electrical equipment and control circuits. The focus is "outside the box". The emphasis is on practical issues that go beyond typical electrical theory and focus on providing those that attend with the necessary tool-kit of skills in solving electrical problems, ranging from control circuits to motors and variable speed drives.

This workshop focuses on the main issues of troubleshooting electrical equipment and control circuits of today to enable you to walk onto your plant or facility to troubleshoot and fix problems as quickly as possible.

This is not an advanced workshop but one aimed at the fundamentals of troubleshooting systems. The workshop is very practical in its approach to troubleshooting and the examples you will be shown are applicable to any facility.

PRE-REQUISITES

A basic understanding of electrical theory and problems you have encountered in the past would be helpful but a basic review is undertaken at the beginning of the course.

WORKSHOP OBJECTIVES

When you have completed this workshop you will be able to:

- Diagnose electrical problems "right-first-time"
- Eliminate the expensive trial and error approach
- Reduce unexpected downtime on electrical motors and other equipment
- Improve plant safety
- Learn specific techniques to troubleshoot equipment and control circuits
- Analyse Equipment problems
- Determine causes of equipment failure

PRACTICAL SESSIONS

You will work in teams on simulation software running on PC's on electrical equipment to simulate real problems for at least 40% of the course proceeding through ten practical sessions ranging from the elementary to the more advanced. These will be very close in structure to the motor control circuits in your plant. In addition we will give three case study wiring diagrams with potential problems and expect you to uncover faults when given the symptoms.

THE PROGRAM

DAY ONE

BASIC PRINCIPLES

- Industrial Electricity
- Single and Three Phase Power systems
- Meters used in Troubleshooting
- Clamp on ammeter/megohmmeter

DEVICES, SYMBOLS AND CIRCUITS

- Devices and Symbols
- Language of Control Circuits
- Reading and understanding electrical drawings
- Reading and Understanding Ladderlogic
- Wire and Terminal numbering

BASIC PRINCIPLES IN TROUBLESHOOTING

BASIC PRINCIPLES IN USING A DRAWING AND METER IN TROUBLESHOOTING CIRCUITS

- Circuits
- Equipment

TROUBLESHOOTING AC MOTORS AND MOTOR STARTERS

- Fundamentals of AC Motors
- Types of ac and dc motors used
- Motor terminal identification and connection diagrams
- Identification and construction
- Connecting up a multiple speed motor
- Connection of dual voltage motor
- Motor name plate information
- Operating a motor for forward and reverse operation
- Motor braking methods
- Test equipment to check motor operation
- Why motors fail and how to extend life
- Troubleshooting of motors

DAY TWO

MOTOR CIRCUIT BREAKERS AND SWITCHBOARDS

- Purpose and Duty
- Clearance Times
- Types

TROUBLESHOOTING VARIABLE SPEED DRIVES

- Fundamentals of Variable Speed Drives
- Problems associated with Variable Speed Drives
- Terminology used
- Manufacturer's literature - what they don't tell you
- Minimisation of equipment failure
- Troubleshooting Tricks

TROUBLESHOOTING CONTROL CIRCUITS

- Basic Control Circuits
- Ladderlogic circuits
- Troubleshooting Strategies
- Two-wire control and hands-off/auto
- Overload Protection
- Three-wire control - start/stop
- Jog/inch circuits
- Sequence start and stop
- Automatic sequence starting
- Reversing circuits
- Plug stop and anti-plug circuits
- Two speed Motor control
- Reduced voltage Starting circuits

TROUBLESHOOTING MORE COMPLEX CONTROL CIRCUITS

- Tank fill control
- Duplex Pump control

> ***"Very good. I will recommend this course to my technicians and other plant engineers."***
>
> A.F. Barnard