# Control Loop Troubleshooting Training Course: Fault Diagnosis, Loop Checks, Work Control, Handover

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Paris

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## Programme Summary

Control loop troubleshooting for process units and utilities is the subject of this one-week training course for instrumentation and control managers, maintenance supervisors, operations leads and reliability engineers, taught at managerial level and ending in a loop troubleshooting review for one unit. Poor loops cost output and trip plant, yet faults are often chased without shared evidence. The programme moves from loop records to fault diagnosis, work control, escalation and handover, using prepared loop data from a gas processing unit and a power plant. Mars Training Centre UK delivers this programme on control loop troubleshooting to mixed-organisation cohorts.

## The Business Case

A loop that hunts, sticks or reads wrongly wastes product and pushes operators into manual control. Leaders who can organise diagnosis, control interventions on live loops and hand over repaired loops with proof spend less on repeat faults. The programme works on the measures below.

- Repeat Loop Faults: Fall when causes are traced to sensor, controller or final element and each fix is verified.
- Unplanned Trips: Reduce when bypasses, overrides and proof tests are controlled through one register.
- Shift Handover Quality: Improves when repaired loops carry a record the next shift can rely on.

## Principles and Evidence Base

- IEC 61511: The functional safety standard for safety instrumented systems in the process industry, applied in Sessions 2 and 3 to review bypasses and proof test intervals.
- Feedback control theory: The basis for reading loop behaviour such as oscillation and sluggish response, applied in Session 2 to link symptoms to likely causes.

## Intended Participants

- Instrumentation and control managers who answer for loop health and fault response.
- Maintenance supervisors who assign and release work on live loops.
- Operations leads who decide when a loop stays in manual control.
- Reliability engineers who review repeat faults and support performance.

Typical settings include gas processing, refining, power generation and water treatment.

## Learning Outcomes

1. Participants will be able to evaluate the condition of a control loop from its records, trends and alarms.
2. Participants will be able to diagnose a loop fault to the sensor, controller or final element.
3. Participants will be able to construct an escalation ladder for loop faults by risk and response time.
4. Participants will be able to prioritise bypasses, overrides and proof tests for control through one register.
5. Participants will be able to compare repeat faults to find weak spares, handovers or support routines.
6. Participants will be able to justify a loop troubleshooting review to a unit manager.

## Programme Structure

## Day 1: Control Loop Troubleshooting Foundations and Loop Records

What does a healthy control loop look like, and what records prove it?

- Loop Inventory and Criticality Sheet
- P&ID Loop Reading Guide
- Loop Check Evidence Pack
- Alarm and Trend Baseline
- Instrument Fault Log Template

## Day 2: Fault Diagnosis Across Sensors, Valves and Controllers

How is a poor loop traced to the sensor, controller or final element?

- Fault Tree for a Failing Loop
- Control Valve Fault Signs
- Transmitter Drift Checks
- Controller Tuning Symptom Table
- Safety Instrumented Function Bypass Review

## Day 3: Work Control, Escalation and Safe Intervention

Who may touch a loop, and when must a fault be escalated?

- Permit and Isolation Link
- Bypass and Override Register
- Fault Escalation Ladder
- Proof Test Interval Reading
- Intervention Risk Matrix

## Day 4: Handover, Spares and Support Performance

What must a loop handover contain so the next shift can trust it?

- Shift Handover Note
- Loop Fix Verification Record
- Critical Spares Check
- Repeat Fault Review
- Support Response Scorecard

## Day 5: Control Loop Troubleshooting Review for One Unit

Do the findings join into a review that a unit manager can approve?

- Applying the Session 1 Loop Inventory
- Testing the Session 2 Fault Tree
- Checking the Session 3 Escalation Ladder
- Reviewing the Session 4 Handover Note
- Completing the Loop Troubleshooting Review

## Methodology

The programme is a data workshop built on prepared loop trends, alarm logs and fault records from a gas processing unit and a power plant. Participants read trends, trace faults to a cause, decide who may intervene and write the handover, then defend the review to peers acting as a unit management team.

- Suggested activity: Reading a trend of a hunting loop and naming the likely causes.
- Suggested activity: Placing six loop faults on the escalation ladder.
- Suggested activity: Writing a shift handover note for a repaired control valve loop.

## Capstone Output

Each participant completes a loop troubleshooting review for one unit. It holds the loop inventory, a fault tree, an escalation ladder, a bypass register entry and a handover note. At work it goes to the unit manager for approval and sets the routine for investigating later loop faults.

## Frequently Asked Questions

### Is control loop troubleshooting training suitable for managers who are not control engineers?

Yes. Control loop troubleshooting is taught through prepared trends, records and templates. You need responsibility for instrumentation, maintenance or operations decisions, but no tuning skill.

## Which standard does control loop troubleshooting rest on in this training?

Control loop troubleshooting here rests on IEC 61511 for bypass and proof test control, together with feedback control theory for reading loop behaviour.

## How is the review from control loop troubleshooting training used at work?

You take the loop troubleshooting review to your unit manager, use its escalation ladder to set response rules, and keep its handover note as the shift routine.

## How does control loop troubleshooting differ from a programme on instrument calibration?

Control loop troubleshooting concentrates on tracing and controlling faults in working loops, while a programme on instrument calibration concentrates on checking measurements against references.