

# PROFIBUS DP Diagnostics and Network Monitoring Tools

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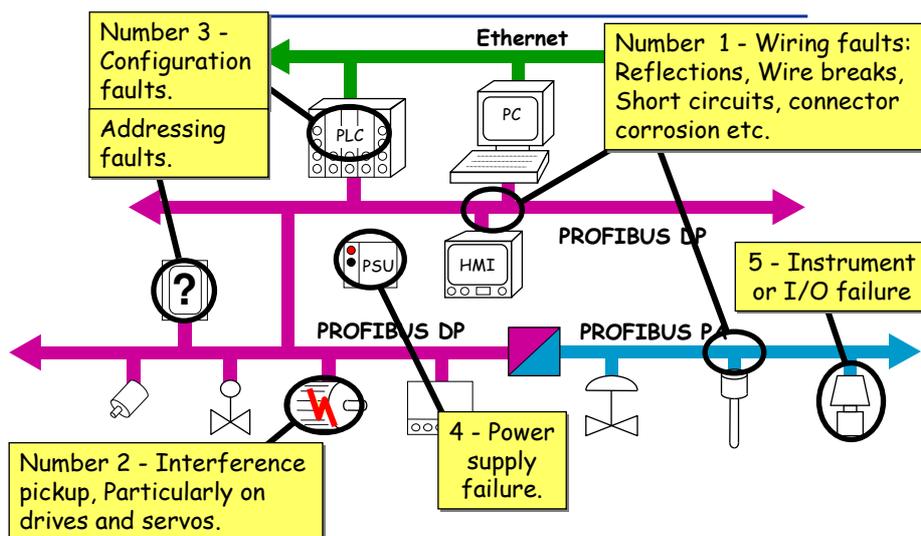


## Outline of Presentation



- Examine the types of problems that commonly occur in PROFIBUS systems.
- Set the scene for diagnostic tools that have been developed over the last 20 years.
- Examine the need for and benefits of network health checking.
- Briefly explore the standardised diagnostics in PROFIBUS systems
- Trevor Martin and myself will then discuss and demonstrate various state of the art fault finding and health checking tools from Softing and Procentec.

- PROFIBUS is a very reliable and cost effective technology.
- It is common to find extensive installations comprising thousands of PROFIBUS devices operating on complex networks which are connected together via industrial Ethernet.
- The reliable operation of these networks is essential to maintaining plant productivity.
- So, what can go wrong?



- These faults can be categorised in several ways:

Communication faults

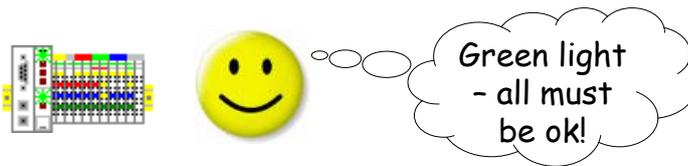


Peripheral faults

- These are "Bus Faults"
- E.g. network wiring errors, interference pickup, reflections etc.
- Communication is disrupted.
- Concerned with the sensor or actuator.
- E.g. sensor wire break, loss of output power, sticking valve etc.
- Devices are still communicating.

- Communication faults can be diagnosed using tools such as:
  - Protocol analysers and diagnostic tools.
  - Waveform visualisation tools such as oscilloscopes etc.
- Communication errors do not always produce loss of control. This is because modern fieldbus technologies are very robust to errors that can corrupt data.

- Quite often users are unaware that their system has communication errors because the robustness of PROFIBUS can hide these faults.



- Only when the rate of data corruption reaches a critical threshold will the fault become visible.

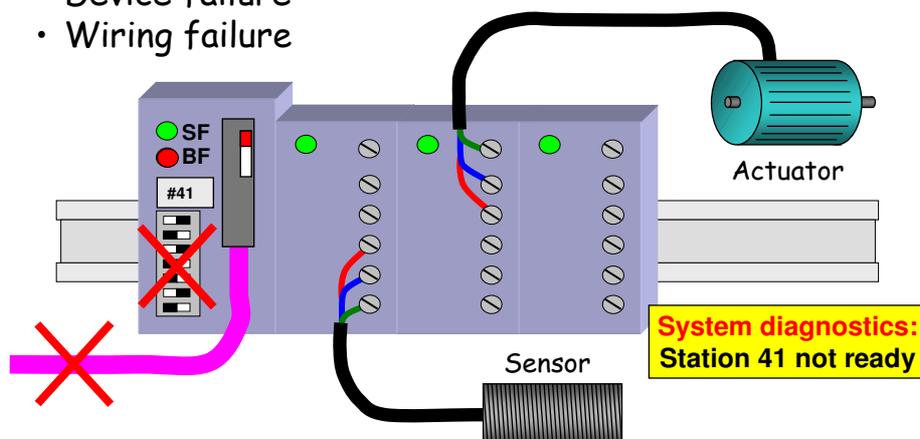
- Because the communication remains operational, peripheral faults can often be located and diagnosed using the communications system itself.
- Tools and techniques that are useful for locating peripheral faults on PROFIBUS systems include:
  - Diagnostic reporting using on-line system diagnostics.
  - Engineering tools, protocol analysers, etc.
- Modern intelligent devices incorporate self diagnostic features that can identify and highlight peripheral faults.
- However, tools are still required to access these extended diagnostics.

- Permanent faults are relatively easy to fix.
  - Because the fault disappears when we've fixed it!
- Intermittent faults can be a nightmare!
  - Because we cannot be sure that we have fixed it.
  - We may seem to have cured the problem, but then it comes back again later!
- Intermittent faults require long-term monitoring to check that the fault is cured.
- Statistical reporting over an extended period can be useful.

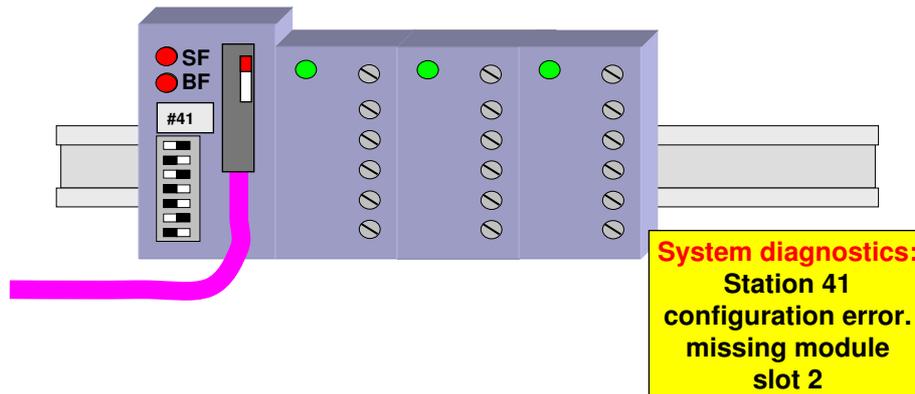
- Health checking is an important part of the commissioning and maintenance strategy for your plant.
- The health check will help to find non-critical and intermittent faults that are not obvious.
- A health check should be carried out immediately after commissioning. We also strongly recommend repeating the health check at intervals.
- How much better to integrate the health checking tools into the network?
  - To give permanent monitoring of system health.
  - Automatically report failures.
  - Give pre-warning of impending failures and performance degradation.

- Every PROFIBUS device provides a block of standard diagnostics, which provides information on the health of the device.
- Standard diagnostics gives information on the device and the state of communications.
- Standard diagnostics are generally useful for diagnosing communication faults.

- Device failure
- Wiring failure



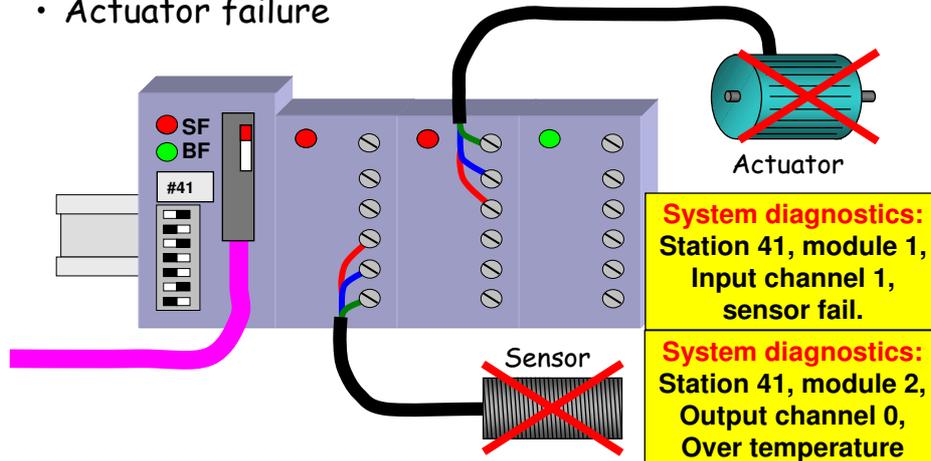
- Configuration error



- Extended diagnostics can provide information on peripheral errors.
- Peripheral diagnostics are an important part of a successful fault finding and maintenance strategy.
- Extended diagnostics are sent together with the standard diagnostics in the same telegram.

## Peripheral faults

- Sensor failure
- Actuator failure



## Peripheral faults

- Wiring failure

