ENGINEERING BULLETIN

Ref Document No.	EB16005	Issue No.	1
Subject	Data Logger for FLP1 Throttle Watchdog System		
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Purpose – Advise COALTRAM® owners/operators of the recommended data logger for use with the FLP1 Throttle Watchdog System.

Applicability – All in service COALTRAM® model CT108, CT10, CT10LP and CT13 fitted with the FLP1 Throttle Watchdog System.

Background

The PPK FLP1 Throttle Watchdog system was implemented as a result of a random failure within a MONEx ECUEx that resulted in an uncommanded engine response. The Watchdog system monitors the entire COALTRAM® throttle pedal function, from the foot pedal to the Caterpillar ECM, and forces the COALTRAM® engine to idle if any fault is detected. A fault-tree-analysis was conducted on the Watchdog system, yielding an 8x improvement in failure rate as compared to the existing MONEx throttle pedal.

The Watchdog system is a stand-alone system that operates independently of the MONEx engine management system, and does not log any other data relating to MONEx or the COALTRAM® machine.

PPK has been asked to perform a number of investigations into 'trips' or suspected 'trips' of FLP1 Throttle Watchdog systems. In each case, PPK has accessed the machine after the fact, and was unable to replicate the fault exactly as reported by the coal mine. Furthermore, the Watchdog system has no detailed data loggings for the rest of the machine to conclusively determine the exact sequence of events. As a result, the investigations can be inconclusive, and rely on the most probable chain of events, rather than the actual chain of events.

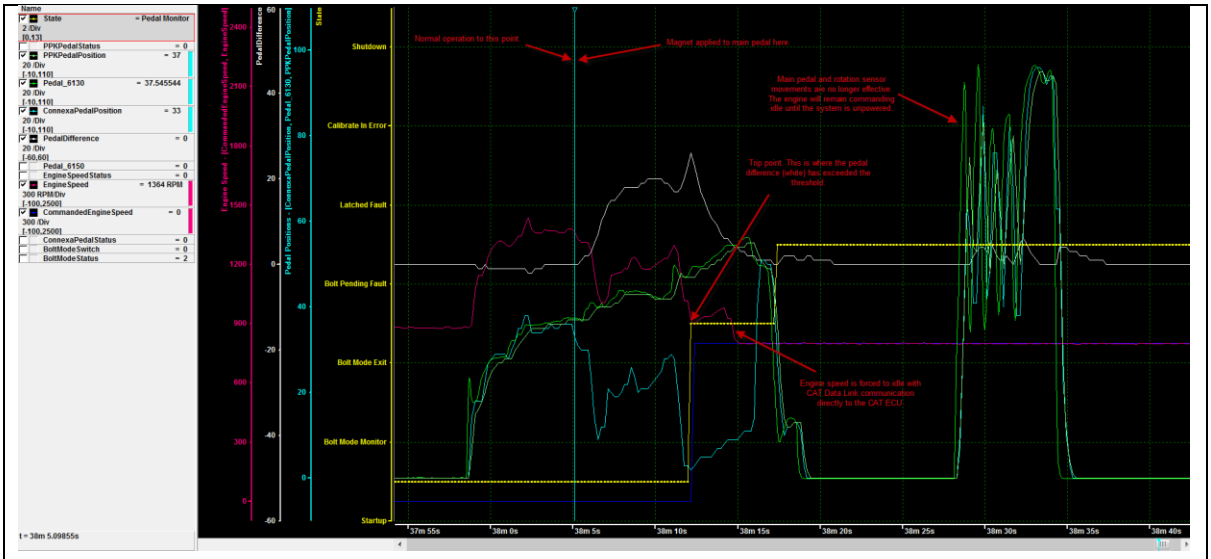
Investigations/Findings

Key Findings

Off-the-shelf CAN based data loggers are commercially available for industrial applications. These are known to PPK to be robust, reliable, and suitable for underground coal mine applications.

PPK has successfully trialed the use of a Kvaser Memorator Pro data logger on an FLP1 Watchdog system, both in a workshop environment and underground. This data logger can be configured to monitor the function of the FLP1 Watchdog, as well as the Caterpillar engine ECM. This data, together with the MONEx LRS event logs, provides a complete factual picture of the exact sequence of events during a FLP1 Watchdog 'trip' or fault.

The image below shows an example of the data loggings captured, initially during normal operation, and then during a simulated MONEx throttle pedal fault (high-res images are available on request):



The data loggings provide an exact record of the chain of events that occurred, with the following benefits:

- The data loggings provide assurance for both the end user and PPK that the FLP1 Watchdog system is operating correctly and as intended;
- The data loggings will facilitate any future investigations by speeding up the investigation to get the machine back into service in a more timely manner;
- The data loggings will eliminate any ambiguities or inconclusive outcomes in future investigations; and
- In the event that a fault is identified in the design of the FLP1 Watchdog system, the data loggings will enable PPK to quickly determine and rectify the fault.

Installation

The Kvaser Memorator Pro data logger fits well within the existing flameproof enclosure of the FLP1 Watchdog system. There is an internal battery within the data logger that must be removed by PPK in order to maintain the hazardous area safety integrity of the FLP1 Watchdogs system. Furthermore PPK is required to install and configure the data logger to capture all of the relevant machine data. There are no other impacts on either the function or hazardous area protection of the FLP1 Watchdog.

Recommendations

PPK recommends that a Kvaser Memorator Pro data logger is installed in all existing and new FLP1 Watchdog systems. New systems will be installed in PPK's workshops. Existing FLP1 Watchdog systems can be upgraded either on site or at a PPK workshop by authorised PPK service technicians.

The data logger upgrade kit is available for purchase from PPK under the following part number: **5520010336**.

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