

PEC

Fuel Pumps

ERRORS

[vC2.64a to vC2.64i]

PEC

vC2.64a
to
vC2.64i

Part Number 2A91272

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1 INTRODUCTION

As the Errors are presented in this Manual in numerical order page numbers are not required.

Each error is presented in the same manner as follows:

- **Error Number**

The number that appears in the dollars display when an error occurs;

- **Error Type**

A general indication as to what is causing the error, whether it is software or mechanically related i.e.: Processor Error, Encoder Error;

- **Error Description**

A description of what is indicated by an error;

- **Possible Causes**

The most likely causes are listed which, may have resulted in an error message being displayed. However, it is possible for a particular error to result from causes not listed;

- **Possible Remedial Actions**

There may be other remedial actions besides those listed. Where it is found that a problem persists after the listed actions have been taken, assistance may be sought from PEC Technical Support.

2 HOW TO CONTACT PEC

PEC Fuel Pumps Ltd
2 Station Rd
PO Box 308
Marton
4741
New Zealand

DDI: +64 6 327 0327
Tel: +64 6 327 0060
Fax: +64 6 327 6724
Email: pecsupport@pec.co.nz

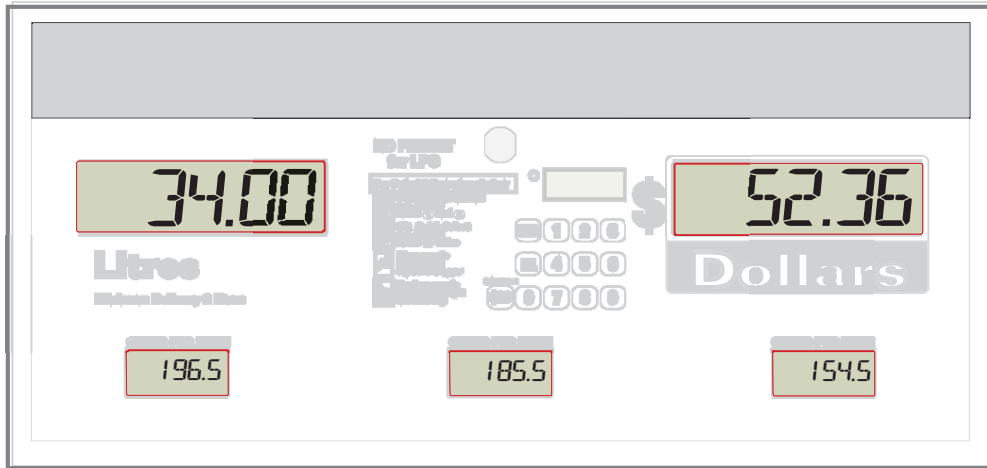
Website: www.pec.co.nz



When contacting PEC always quote the serial number on the product's nameplate.

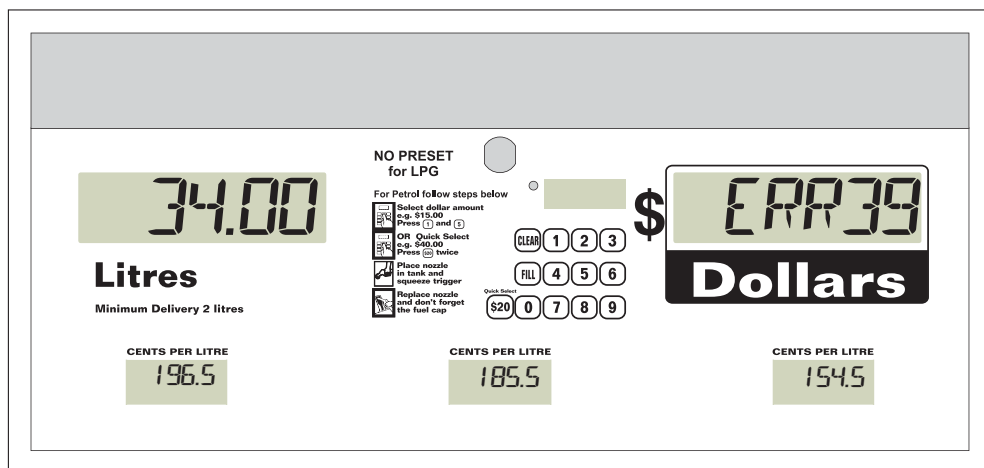
3 THE ERROR DISPLAY

Displays flashing on and off when a nozzle is returned to its holster is an indication that an error has occurred.



Windows emphasised that flash on and off

To learn the code of an error, lift a nozzle from its holster which will cause the display in the Dollars window to change to that shown in the example below.



Typical Error Code showing in the Dollars display window

The characters **ERR** will be followed by an error code: i.e. **ERR39**.

Errors are also written to an error log.

Logged errors may be checked using Function 02 as detailed in the Functions Manual.

4 ERROR "GROUP"

4.1 (01 - 09) Fatal Startup System Errors

These errors are detected before the displays are initialised, and are reported using beep codes. The number of code beeps is always preceded by a single beep. Hence, for Error 2 there will be a single beep followed by two beeps.

Some of these codes can also be dynamically checked during normal operation, in which case they will be reported in the normal way (i.e., they will display the `ERR` message and stop all deliveries).

These errors are fatal errors (processor halted) and require the FDS to be reset by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

4.2 (10 - 29) Fatal Errors

These errors cause the processor to stop. Hence both sides of the FDS are affected. They are displayed but no audible alert is given. The FDS must be reset after one of these errors.

4.3 (30 - 55) Single Pump Number Fatal Errors

These errors do not cause a complete loss of system functionality, as they relate to a single pump number only. They cause the related pump to stop delivery, and its displays to flash. This continues until the nozzle is replaced and any nozzle on that FDS is removed again.

The `ERR` message is then displayed on that pump number and all further processing of the pump ceases.

Note that all other pump numbers can continue unaffected. To use the affected pump again, the FDS must be reset.

4.4 (56 - 59) LPG Errors

With the exception of error 59 these errors do not cause a complete loss of system functionality, as they relate to a single pump number only.

4.5 (60 - 89) Non Fatal System Errors

These errors do not cause any loss of system functionality. They are logged only (for service use). An Error Log may be viewed using Function 02.

4.6 (90 - 99) General Log Only System Errors

These errors are general system errors. They are logged only and do not cause any loss of system functionality. An Error Log may be viewed using Function 02.

5 PROCEDURES

The following are procedures that may need to be performed in association with a number of errors that occur.

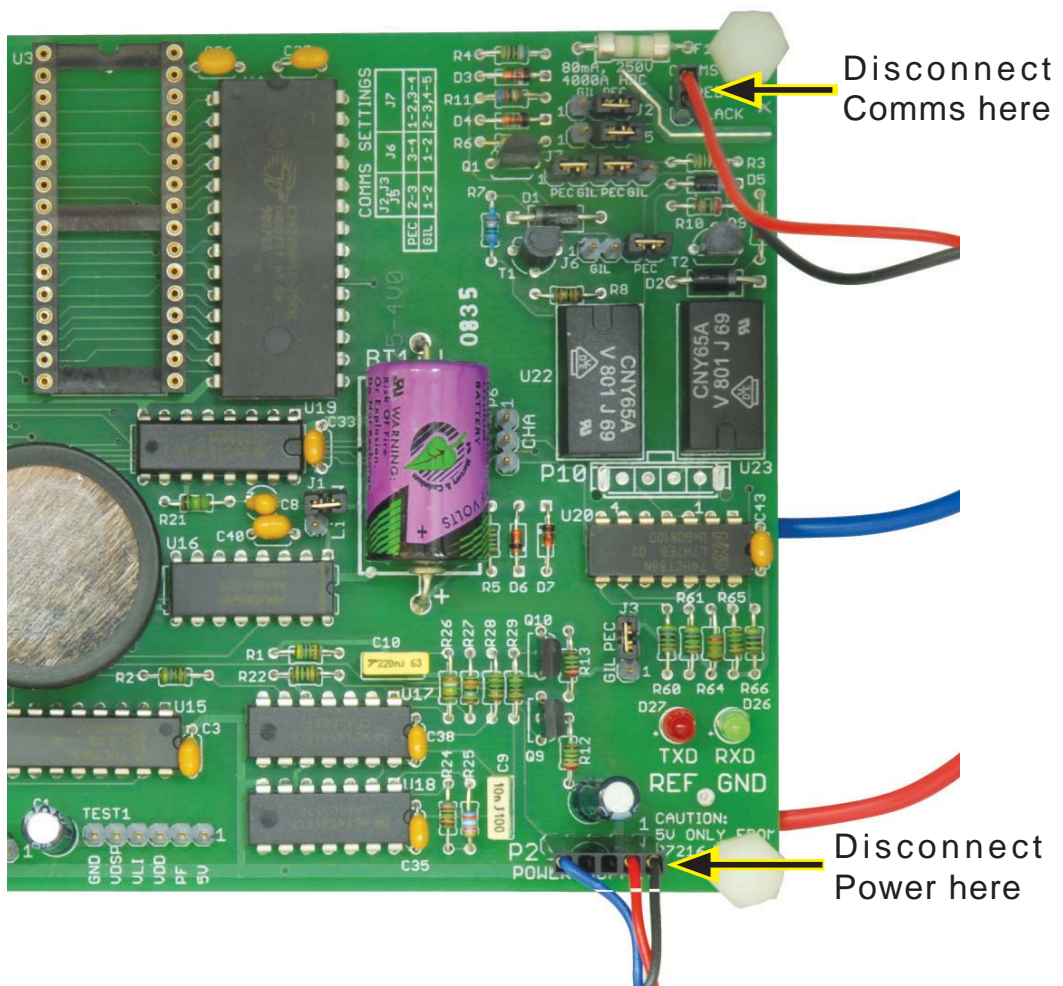
5.1 Resetting an FDS

Reset an FDS by unplugging the power cable from the Processor PCB and plugging it back in after waiting 5 seconds.

5.2 Forcing a RAM clear using a Protocol Change

- (i) unplug the Comms Cable located on the Processor PCB;
- (ii) unplug the Power Cable, also located on the Processor PCB;

COMMS & POWER CONNECTIONS



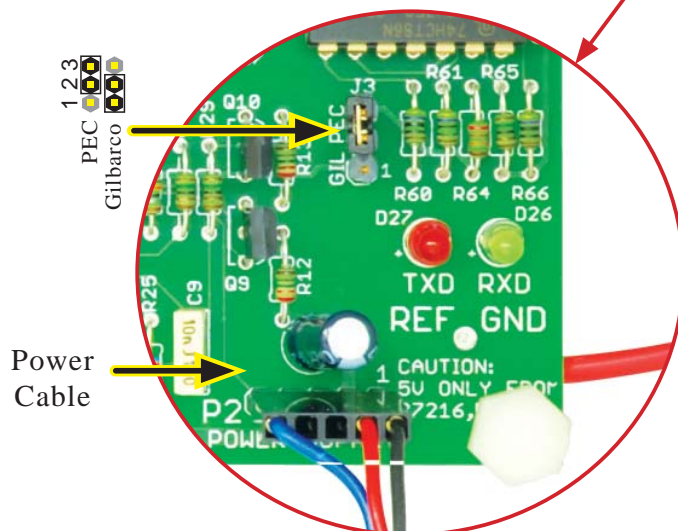
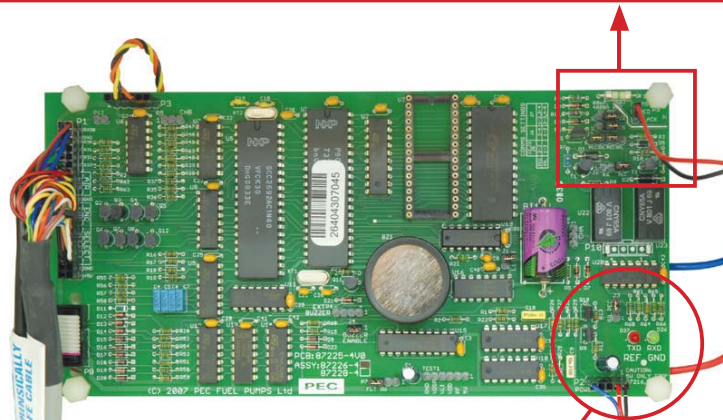
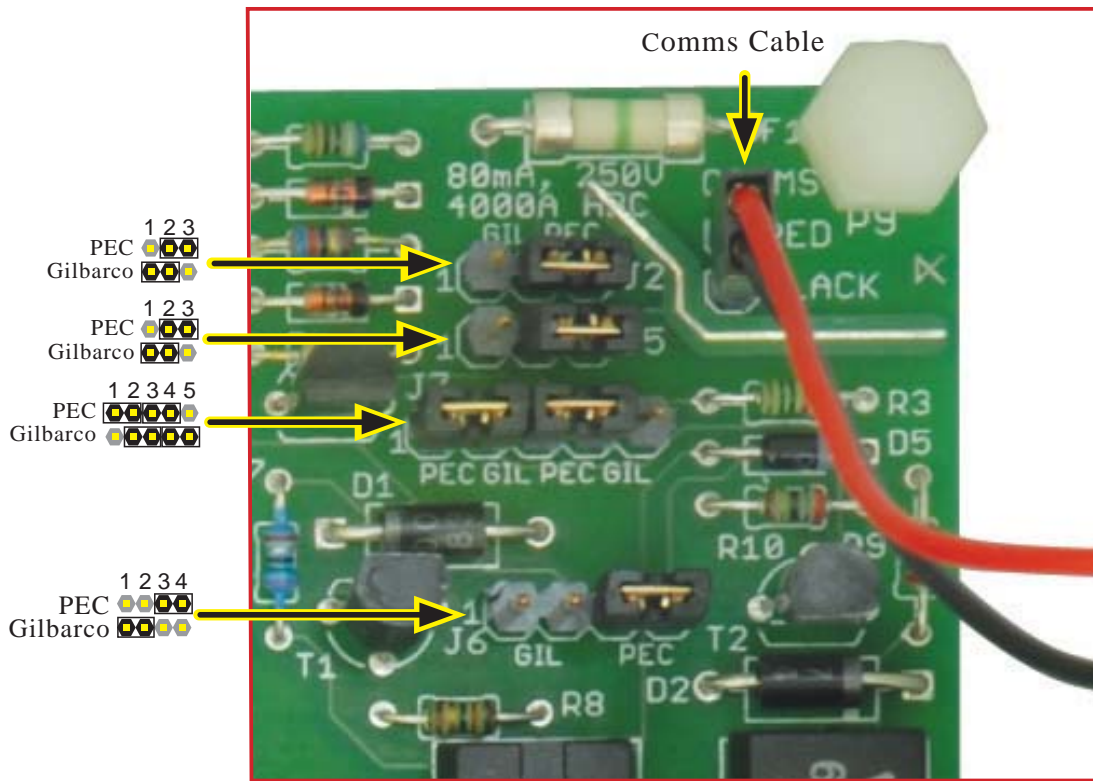
-
- (iii) change the Comms Protocol to clear the RAM. If set to PEC, change to Gilbarco and vice-versa. There are 6 jumper settings;
 - (iv) plug in the Power Cable. The pump will start up and `FUEL OFF` will display in the Dollars window (or `Fn` if still in Functions mode);
 - (v) unplug the Power Cable;
 - (vi) change back to the original Comms Protocol;



An incorrect Comms Protocol setting will blow the soldered fuse requiring the Processor PCB to be replaced.

- (vii) plug in the Comms Cable ensuring that the correct Comms Protocol is selected on the jumpers.
- (viii) plug in the power cable;

COMMS PROTOCOL JUMPER SETTINGS



Processor 2A87226-4 v.0 with 6 Jumper Settings

6 ERROR DETAILS

The following pages describe in detail the errors in numerical order.

DESCRIPTION

A sequential IRAM address check is performed at startup which tests the Processor's four register banks and halts the Processor when an error is found.

Error 1 is generated (1 beep - pause - 1 beep).

POSSIBLE CAUSE(S)

Processor error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;
- (b) if a Function 10 cannot be performed or does not work, force a RAM Clear using a Protocol Change (see Procedures 3.2 for instructions);
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

INTERNAL RAM ERROR**DESCRIPTION**

A sequential IRAM address check is performed at startup which tests all IRAM (excluding the four register banks) and halts the Processor when an error is found.

Error 2 is generated (1 beep - pause - 2 beeps).

POSSIBLE CAUSE(S)

Processor error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;
- (b) if a Function 10 cannot be performed or does not work, force a RAM Clear using a Protocol Change (see Procedures 3.2 for instructions);
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

DESCRIPTION

A checksum error, which may occur either at startup or dynamically during operation, will cause the Processor to halt.

Error 3 is generated (1 beep - pause - 3 beeps).

POSSIBLE CAUSE(S)

Defective EPROM device.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;
- (b) should the error persist, a new software EPROM will need to be installed and the FDS reprogrammed.

EXTERNAL RAM ERROR**DESCRIPTION**

A test of the XRAM is performed both at startup and during operation. In either case the Processor is halted if an error is found.

Error 4 is generated (1 beep - pause - 4 beeps). It is also displayed as Err 4.

POSSIBLE CAUSE(S)

Processor error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;
- (b) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

DESCRIPTION

When the non-volatile setup variables are changed using a diagnostic function a confirmation copy is produced. Upon startup the non-volatile variables are checked against this copy and where differences are detected an Error 5 is generated (1 beep - pause - 5 beeps).

The non-volatile variables are reset to their default values and the system restarts.

Non-volatile variables are also checked during operation resulting in an Error 5 being displayed should differences be detected.

POSSIBLE CAUSE(S)

- (a) defective Processor PCB;
- (b) variables corrupted in memory;
- (c) change of software version resulting in variables being stored in a different part of memory.
- (d) faulty 12v back-up battery (in the event of a power failure);

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Function 10;
- (b) if a Function 10 cannot be performed or does not work, force a RAM Clear using a Protocol Change (see Procedures 3.2 for instructions);
- (c) if the error persists, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

DELIVERY VARIABLES LOST**DESCRIPTION**

A startup check is made of the current/last delivery related variables which are overwritten with each new delivery (dollar and litre values from last delivery). Back-up is by means of a 12v battery.

In the event of a power loss these variables must be present between deliveries. When they are not an Error 6 is reported.

During deliveries these variables are continually changing and are therefore not checked in operation. An Error 6 will only be reported as a series of beeps (1 beep - pause - 6 beeps) upon start-up.

At startup, the variables are checked (for corruption of XRAM during a power loss) against the confirmation copy and where differences are detected an Error 6 is generated (1 beep - pause - 6 beeps).

The non-volatile variables are then reset to their default values and the system restarts.

Error 6 is non-fatal and the system will still start and the displays initialise.

NOTE: It is normal to hear 6 beeps when power is removed directly from the Main Processor PCB as per the recommended method for resetting an FDS.

DESCRIPTION

Upon startup a check is made of the local or remote (Input Processor) DIP Switch setting validity and a check for the presence of the relevant keypads.

Where faults are detected an Error 7 is generated (1 beep - pause - 7 beeps).

This error is a non-fatal error which serves as an audible warning to reconfigure DIP switches or replace keypads and restart the system.

Because Errors 6 and 7 are both non-fatal they can occur together resulting in the sounding of 1 beep - pause - 13 beeps.

POSSIBLE CAUSE(S)

- (a) an invalid DIP Switch setting (e.g both sides set to front);
- (b) permanently pressed keypad;
- (c) missing or faulty keypad;
- (d) display PCB fault;
- (e) faulty DIP Switch Bank;
- (f) faulty cables between displays.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset DIP Switch settings correctly;
- (b) replace keypad;
- (c) perform a Function 10;
- (d) if a Function 10 does not work, force a RAM Clear as described in Procedures 3.2;
- (e) if the error persists, a new display cables and Display PCB may need to be installed and the FDS reprogrammed.

Err 8

NOT USED

PUMP CONTROL STATE ERROR (PUMP A)**DESCRIPTION**

Indicates an attempt to enter an undefined side control state on Pump A.

It causes the processor to stop and the error to be displayed but no audible alert is given.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) if a Function 10 does not work, force a RAM Clear as described in Procedures 3.2;
- (d) if the error persists, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PUMP CONTROL STATE ERROR (PUMP B)

DESCRIPTION

Indicates an attempt to enter an undefined side control state on Pump B.

It causes the processor to stop and the error to be displayed but no audible alert is given.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) if a Function 10 does not work, force a RAM Clear as described in Procedures 3.2;
- (d) if the error persists, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PUMP CONTROL STATE ERROR (PUMP C)

DESCRIPTION

Not applicable to Software Version 2.64.

Err 14

NOT USED

PROCESSOR ERROR - STACK**DESCRIPTION**

The micro-processor stack is continuously checked. Should a stack overflow occur, Error 16 will be displayed.

POSSIBLE CAUSE(S)

Processor error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) if the error persists, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

DESCRIPTION

Indicates that a translation error has occurred when writing to one of the LCD displays.

POSSIBLE CAUSE(S)

Processor error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PROCESSOR ERROR - VARIABLE RANGE**DESCRIPTION**

Indicates that a global software parameter (i.e. pump, grade or price etc.) is not within its normal range.

POSSIBLE CAUSE(S)

- (a) a corruption of the internal RAM which may cause unpredictable results;
- (b) a faulty Main Processor Board.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PROCESSOR ERROR - DOLLAR MATHS

DESCRIPTION

Indicates that an error has occurred in the calculation made at the end of a delivery (price per litre multiplied by litres delivered equals sale dollars).

POSSIBLE CAUSE(S)

- (a) a corruption of the price variable has occurred during the delivery;
- (b) valves are sluggish in closing;
- (c) faulty Encoder.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) if the error persists, one of more of the following will be required:
 - (i) a new diaphragm kit for the valve;
 - (ii) a new Main Processor PCB in which case the FDS will need to be reprogrammed;
 - (iii) a new Encoder will need to be installed.

PROCESSOR ERROR - LITRES MATHS**DESCRIPTION**

Indicates that an error has occurred in the quantity accumulation calculation made at the end of a delivery.

This calculation involves the total number of encoder counts for the delivery time multiplied by the encoder constant, which equals the litres displayed.

POSSIBLE CAUSE(S)

- (a) the Encoder is going too fast resulting in the encoder counts (which are accumulated under interrupt control) not being “consumed” quickly enough by the processor to prevent an overflow;
- (b) noisy Comms on the POS Loop ties up the Processor preventing it from consuming Encoder pulses quickly enough.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) investigate noisy Comms on the POS Loop;
- (d) should the error persist, either a new Encoder will need to be installed or a new Main Processor PCB in which case the FDS will need to be reprogrammed.

DESCRIPTION

A Clock Error indicates that the current time variable (which is used to time tag events) is not incrementing.

POSSIBLE CAUSE(S)

Processor error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PROCESSOR ERROR - MOTOR CONTROL**DESCRIPTION**

Software error indicating that the state of the motor was incorrect.

POSSIBLE CAUSE(S)

An attempt was made to turn a motor on or off when the **software** already shows it in that state. Does not apply when the FDS is in Stack Test.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PROCESSOR ERROR - SOLENOID CONTROL

DESCRIPTION

Software error indicating that the state of the solenoid valve was incorrect.

POSSIBLE CAUSE(S)

- (a) according to the **software**, an attempt has been made to open or close a solenoid valve when it was already in that state;
- (b) according to the **software**, an attempt has been made to open or close a solenoid valve when the corresponding motor was not on. (Does not apply when in Stack Test).

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

PROCESSOR ERROR - POWER FAILURE**DESCRIPTION**

Indicates the system entered its main initialisation procedure which should only happen on power up or as a result of certain diagnostic functions.

However, the Power Fail Flag does not show power failed.

POSSIBLE CAUSE(S)

A total power loss (including the lithium battery) where the Power Fail Procedures malfunction and the X-RAM is corrupted.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) check the Lithium Battery;
- (c) check that the jumper for the Lithium Battery is in place;
- (d) perform a Function 10;
- (e) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

INPUT PROCESSOR TO MAIN FAILURE

DESCRIPTION

Not applicable to Software Version 2.64.

MAIN TO INPUT PROCESSOR FAILURE

DESCRIPTION

Not applicable to Software Version 2.64.

REMOTE PARAMETERS FAILURE

DESCRIPTION

Not applicable to Software Version 2.64.

PROCESSOR ERROR - DISPLAY POINTERS CORRUPTED**DESCRIPTION**

Indicates an error has occurred which could cause incorrect information to be shown on the LCD display.

Results from a constant check which is dynamically made of the display information during operation.

POSSIBLE CAUSE(S)

Internal software error.

SUGGESTED REMEDIAL ACTION(S)

- (a) reset the FDS by unplugging the power cable from the Main Processor PCB and plugging it back in after waiting 5 seconds;
- (b) perform a Function 10;
- (c) should the error persist, a new Main Processor PCB will need to be installed and the FDS reprogrammed.

LPG TEMPERATURE PROBE 1 ERROR**DESCRIPTION**

Not applicable to Software Version 2.64.

LPG TEMPERATURE PROBE 2 ERROR

DESCRIPTION

Not applicable to Software Version 2.64.

GRADE 1 FRONT HOSE AIR SENSED**DESCRIPTION**

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 1 REAR HOSE AIR SENSED

DESCRIPTION

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 2 FRONT HOSE AIR SENSED**DESCRIPTION**

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 2 REAR HOSE AIR SENSED

DESCRIPTION

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 2 FRONT HOSE AIR SENSED**DESCRIPTION**

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 3 REAR HOSE AIR SENSED

DESCRIPTION

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 4 FRONT HOSE AIR SENSED**DESCRIPTION**

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 4 REAR HOSE AIR SENSED

DESCRIPTION

When the Main Processor detects an open circuit on the air sense circuit it is interpreted as air being sensed in the pumping unit .

PEC pumps manufactured prior to May 2007 had Air Sense fitted to diesel pump units in the form of a Vacuum Switch on a venturi system.

Air Sense is not fitted to pumps manufactured since May 2007 because the Tatsuno pump unit successfully removes all air without the need to switch to slow flow. Recertification with NMI concluded that Air Sense is no longer a requirement.

Instead of the Air Sense Switch being connected to the Logic Board, a jumper is now fitted to ensure the circuit is permanently closed.

The recertification is retrospective for all pump manufactured using Tatsuno pump units marked PGS-025 or FP-1001. Therefore it is allowable to disable air sense on any PEC pump with this model of pump unit. This is done by simply unplugging the Air Sense cable from the Logic Board and replacing it with a jumper to permanently close the circuit.

POSSIBLE CAUSE(S)

- (a) air is genuinely sensed for more than a minute, due to the vacuum switch opening. This could be due to air in the supply lines, or perhaps a leak in the air sense system piping;
- (b) the air sense switch or cable is faulty, creating an open circuit (e.g. cable has come unplugged from the Logic Board);
- (c) in pumps without air sense, the jumper could have fallen off the Logic Board and/or air sense may have been accidentally activated with Function 14;
- (d) in pumps fitted with sump float switches, if Function 14 is not set correctly, and the float switch is activated, the pump will report this as an air sense error rather than the FLUID error;

SUGGESTED REMEDIAL ACTION(S)

With Tatsuno pump units marked PGS-025 or FP-1001 disable air sense by unplugging the Air Sense cable from the Logic Board and replacing it with a jumper.

For more information refer to Product Change Notice KN10148 on the PEC website.

GRADE 1 FRONT ENCODER ERROR**DESCRIPTION**

The Grade 1 Front Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts which come complete with cable and plug.

GRADE 1 REAR ENCODER ERROR

DESCRIPTION

The Grade 1 Rear Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts which come complete with cable and plug.

GRADE 2 FRONT ENCODER ERROR**DESCRIPTION**

The Grade 2 Front Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts which come complete with cable and plug.

GRADE 2 REAR ENCODER ERROR

DESCRIPTION

The Grade 2 Rear Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts and come complete with cable and plug.

GRADE 3 FRONT ENCODER ERROR**DESCRIPTION**

The Grade 3 Front Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts which come complete with cable and plug.

GRADE 3 REAR ENCODER ERROR

DESCRIPTION

The Grade 3 Rear Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts and come complete with cable and plug.

GRADE 4 FRONT ENCODER ERROR**DESCRIPTION**

The Grade 4 Front Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts which come complete with cable and plug.

GRADE 4 REAR ENCODER ERROR

DESCRIPTION

The Grade 4 Rear Encoder inputs are out of sequence for more than 1 count in 512. This could be due to the encoder missing a count or the rotation being backwards, etc.

NOTE: While the Error will be correct for the side of the FDS it is on, it may not be accurate for the grade causing the problem.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Encoder has turned backwards;
- (b) a faulty Encoder;
- (c) air in system;
- (d) poor connections due to:
 - (i) corrosion and/or contamination at the pins/connectors on the Logic PCB;
 - (ii) damaged cable connector sockets and pins on the Encoder because of incorrectly disconnecting the cable.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder
- (b) ensure no air leaks are present in the supply lines or pump stack itself.
- (c) ensure check-valves and solenoids are holding closed and not allowing drain-back;
- (d) thoroughly clean suspect connections using contact a cleaner;
- (e) unplug and re-plug the connections several times to ensure contact surfaces give maximum connectivity;
- (f) check all the Encoders on the side where the error has appeared;
- (g) reset the pump system by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;



Encoders are non-serviceable parts. They need to be purchased from PEC as spare parts which come complete with cable and plug.

GRADE 1 FRONT ENCODER TOO FAST**DESCRIPTION**

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 1 Front Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) with LPG, and where the Software Version is prior to 2.64g, this error may be fixed by using Function 100 to reduce the crush-up time to the minimum setting of 1 second. Alternatively upgrade to 2,64g or whatever the current version may be;
- (b) replace the Encoder;
- (c) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 1 REAR ENCODER TOO FAST

DESCRIPTION

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 1 Rear Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) with LPG, and where the Software Version is prior to 2.64g, this error may be fixed by using Function 100 to reduce the crush-up time to the minimum setting of 1 second. Alternatively upgrade to 2,64g or whatever the current version may be;
- (b) replace the Encoder;
- (c) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 2 FRONT ENCODER TOO FAST**DESCRIPTION**

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 2 Front Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder.

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder;
- (b) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 2 REAR ENCODER TOO FAST

DESCRIPTION

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 2 Rear Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder;
- (b) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 3 FRONT ENCODER TOO FAST**DESCRIPTION**

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 3 Front Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder;
- (b) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 3 REAR ENCODER TOO FAST

DESCRIPTION

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 3 Rear Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder;
- (b) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 4 FRONT ENCODER TOO FAST**DESCRIPTION**

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 4 Front Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder;
- (b) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

GRADE 4 REAR ENCODER TOO FAST

DESCRIPTION

Indicates that there was an overflow of either encoder counts or encoder errors detected for the Grade 4 Rear Encoder.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) excessive flow;
- (b) faulty Encoder

SUGGESTED REMEDIAL ACTION(S)

- (a) replace the Encoder;
- (b) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

LPG OVERSPEED**DESCRIPTION**

A flow rate is detected during delivery which exceeds the overspeed trip setting. Applies to Software Versions prior to 2.64g.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) major leakage as in drive-off situations;
- (b) a brief high flow rate at the beginning of a delivery as LPG rushes into an empty vehicle tank.

SUGGESTED REMEDIAL ACTION(S)

- (a) Function 101 is used to determine the flow rate at which LPG delivery is shut down. This provides protection in the event of a hose rupture. If over-speed is detected the solenoid valve and pump motor feed line will shut down for the offending hose.

The default setting for Function 101 is 80 litres per minute. The range by which the overspeed limit can be set is from 50 to 99 litres per minute. To fix the error, Function 101 can be set to the maximum of 99 to increase the flow rate at which error 56 is reported.

The 9000 Series have a physical excess flow valve that will close in the event of a hose rupture etc. So it is safe to set this to a maximum of 99 litres per minute to avoid nuisance occurrence of this error which can happen due to brief high flow rates at the beginning of a delivery into an empty vehicle tank;

- (b) Upgrade to Software Version 2.64g or newer;
- (c) To use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.

LOSS OF ENCODER CONSTANT OR LPG SPECIFIC GRAVITY SETTING

DESCRIPTION

One of the values is not a valid number.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

The encoder constant and the LPG specific gravity are data supplied by the probe. Error 57 will occur if one or both of the following factors exists:

- (a) the Virtual DIPs have been configured for LPG on a non-LPG pump/dispenser;
- (b) open circuit due to loose connections between the probe and the Logic PCB;
- (c) short circuit due to build-up of impurities on the Probe;
- (d) faulty probe.

SUGGESTED REMEDIAL ACTION(S)

- (a) ensure that the probe is properly connected to the Logic PCB;
- (b) use Functions 104, 105 and 107 to see if the values displayed are within the acceptable range.
- (c) clean the Probe of obstructions and impurities as appropriate. Ensure that the Probe is vertically positioned to minimise build-up of impurities;
- (d) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;
- (e) replace the Logic PCB and/or the Probe.

LPG SENSOR FAILURE**DESCRIPTION**

The LPG sensor has stopped providing or is providing incorrect information to the Main Processor.

Only the side of the FDS with the error stops functioning.

POSSIBLE CAUSE(S)

- (a) the Virtual DIPs have been configured for LPG on a non-LPG pump/dispenser and because there is no probe present an Error 58 occurs;
- (b) contamination on the probe (e.g. build up of impurities);
- (c) wiring faults such as loose connections between the probe cable and the Logic Board and/or the cable between the Logic Board and the Main Processor;
- (d) faulty probe.

SUGGESTED REMEDIAL ACTION(S)

- (a) set the Virtual DIPs to the correct settings (on a non-LPG);
- (b) decontaminate the probe;
- (c) closely inspect the wirings. Unplug/re-plug connections several times to ensure that contact surfaces give maximum connectivity;
- (d) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds;
- (e) replace the Probe.



The major PCBs in a H9000 LPG have LED indicators which give useful diagnostic information. For further information refer to the H9000 LPG Servicing Manual, *Section 4.5 LED Indicators*.

DESCRIPTION

During an LPG delivery vapour was sensed in the system for more than the preset time (Function102).

If an error 59 is displayed, this may be confirmed with the light flashing on the LEDs on the Logic PCB. The green and red light flashing together once per second indicate that vapour was detected in the Gas Separator.

POSSIBLE CAUSE

The supply tank could be out of liquid.

SUGGESTED REMEDIAL ACTION(S)

- (a) fill the supply tank;
- (b) adjust the Vapour Alarm using Function 102;
- (c) to use the affected pump number again, reset the FDS by unplugging the power cable from the processor PCB and plugging it back in after waiting 5 seconds.



The major PCBs in a H9000 LPG have LED indicators which give useful diagnostic information. For further information refer to the H9000 LPG Servicing Manual, *Section 4.5 LED Indicators*.

CHANNEL A RECEIVER PARITY ERROR**DESCRIPTION**

Indicates a parity error was detected in one or more of the received message bytes.

Error 60 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER FRAMING ERROR

DESCRIPTION

A Character was received for which no stop bit was detected.

Error 61 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER BREAK ERROR**DESCRIPTION**

A steady low (space) signal has appeared at a receiver, indicating a break condition at the transmitting end, causing this error code. The formal definition is that an all zero character with no stop bit has been received.

Error 62 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER OVERRUN ERROR

DESCRIPTION

Indicates an overflow of the 3 byte FIFO buffer for a receiving channel.

This means that the Processor is not reading the incoming data fast enough to prevent overwriting this stack.

Error 63 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER CHECKSUM ERROR**DESCRIPTION**

This error indicates the message received had a checksum error.

Error 64 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER DATA ERROR

DESCRIPTION

Error 65 indicates the polling message received from the Forecourt Controller is an invalid type, i.e., a new feature has been added to a console which is not yet supported, or the Comms line has been corrupted (in which case a checksum error will probably also occur).

Error 65 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER OVERFLOW ERROR**DESCRIPTION**

The message received was too long for the buffer, causing this error. This may happen if no EOM character or sequence is detected.

Error 66 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A TRANSMITTER OVERFLOW ERROR

DESCRIPTION

The transmitter has tried to send a message which is too long. This means that the transmit buffer's last position was reached, but an EOM character or sequence was not present.

Error 67 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A RECEIVER TIMEOUT ERROR**DESCRIPTION**

Indicates that the receiver is expecting a character from the Forecourt Controller, but has not received one for more than 1 second.

Error 68 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL A TRANSMIT TIMEOUT ERROR

DESCRIPTION

This timeout error indicates that the transmitter is attempting to send a message to the Forecourt Controller, but there has been a delay of more than 1 second since the last character was transmitted.

Error 69 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER PARITY ERROR**DESCRIPTION**

Error 70 indicates a parity error was detected in one or more of the received message bytes.

Error 70 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER FRAMING ERROR

DESCRIPTION

A character was received for which no stop bit was detected.

Error 71 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER BREAK ERROR**DESCRIPTION**

A steady low (space) signal has appeared at a receiver, indicating a break condition at the transmitting end. The formal definition is that an all zero character with no stop bit has been received.

Error 72 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER OVERRUN ERROR

DESCRIPTION

Indicates an overflow of the 3 byte FIFO buffer for a receiving channel. This means that the processor is not reading the incoming data fast enough to prevent overwriting this stack.

Error 73 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER CHECKSUM ERROR**DESCRIPTION**

The message received had a checksum error.

Error 74 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER DATA ERROR

DESCRIPTION

Indicates that the polling message received from the Input Processor is an invalid type (or that the Comms line has been corrupted, in which case a checksum error will probably also occur).

Error 75 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVER OVERFLOW ERROR**DESCRIPTION**

The message received was too long for the buffer. This may happen if no EOM character or sequence is detected.

Error 76 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL TRANSMITTER OVERFLOW ERROR

DESCRIPTION

The transmitter has tried to send a message which is too long. This means that the transmit buffer's last position was reached, but an EOM character or sequence was not present.

Error 77 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B RECEIVE TIMEOUT ERROR**DESCRIPTION**

Indicates that the receiver is expecting a character from the Input Processor, but has not received one for more than 1 second.

Error 78 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

CHANNEL B TRANSMIT TIMEOUT ERROR

DESCRIPTION

Indicates that the transmitter is attempting to send a message to the Input Processor, but there has been a delay of greater than 1 second since the last character was transmitted.

Error 79 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

GRADE 1 FRONT PRESET OVERRUN**DESCRIPTION**

Indicates that the delivery on the Grade 1 front hose did not stop at the preset or allocation limit.

Error 80 is a general system error causing no loss of system functionality.

It is logged for service use only. The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun:

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

DESCRIPTION

Indicates that the delivery on the Grade 1 rear hose did not stop at the preset or allocation limit.

Error 81 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun.

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

GRADE 2 FRONT PRESET OVERRUN**DESCRIPTION**

Indicates that the delivery on the Grade 2 front hose did not stop at the preset or allocation limit.

Error 82 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun.

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

DESCRIPTION

Indicates that the delivery on the Grade 2 rear hose did not stop at the preset or allocation limit.

Error 83 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun.

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

GRADE 3 FRONT PRESET OVERRUN**DESCRIPTION**

Indicates that the delivery on the Grade 3 front hose did not stop at the preset or allocation limit.

Error 84 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun.

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

DESCRIPTION

Indicates that the delivery on the Grade 3 rear hose did not stop at the preset or allocation limit.

Error 85 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun:

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

GRADE 4 FRONT PRESET OVERRUN**DESCRIPTION**

Indicates that the delivery on the Grade 4 front hose did not stop at the preset or allocation limit.

Error 86 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun.

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

DESCRIPTION

Indicates that the delivery on the Grade 4 rear hose did not stop at the preset or allocation limit.

Error 87 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

Note the difference between an Encoder Run-On Error and Preset Overrun.

- (a) an Encoder Run-On is a continued flow after the "end of delivery" state has been reached;
- (b) a Preset Overrun indicates that the end of delivery state was not reached in time to prevent excess fuel being delivered.

LOST REPLY (FORECOURT CONTROLLER)**DESCRIPTION**

Indicates that the Pump is trying to reply to a poll from the Forecourt Controller.

Error 88 is a general system error causing no loss of system functionality.

It is logged for service use only.

The Error Log may be viewed using Function 2.

GRADE 1 FRONT ENCODER RUN ON**DESCRIPTION**

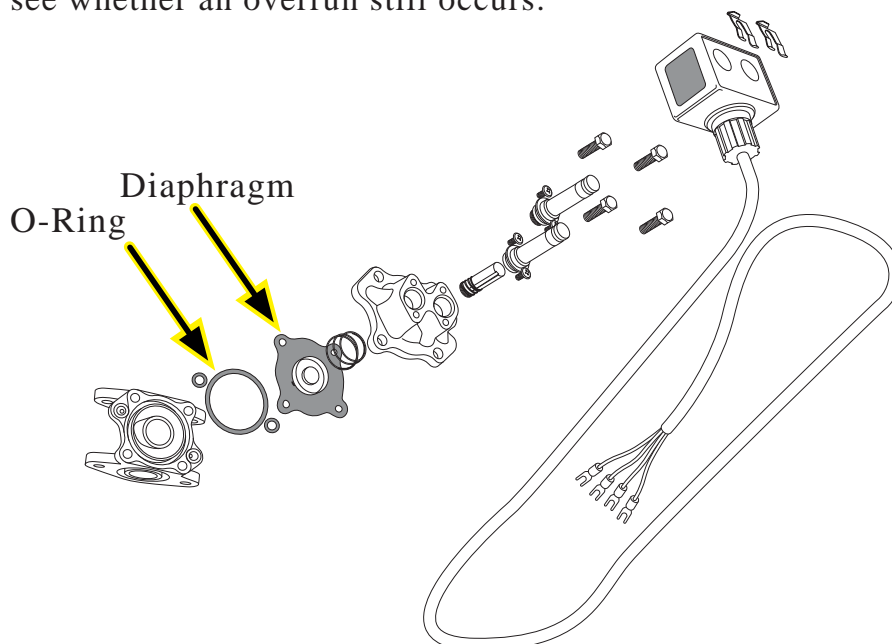
A continued flow at the end of a Prepay or Preset Grade 1 front delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 1 REAR ENCODER RUN ON

DESCRIPTION

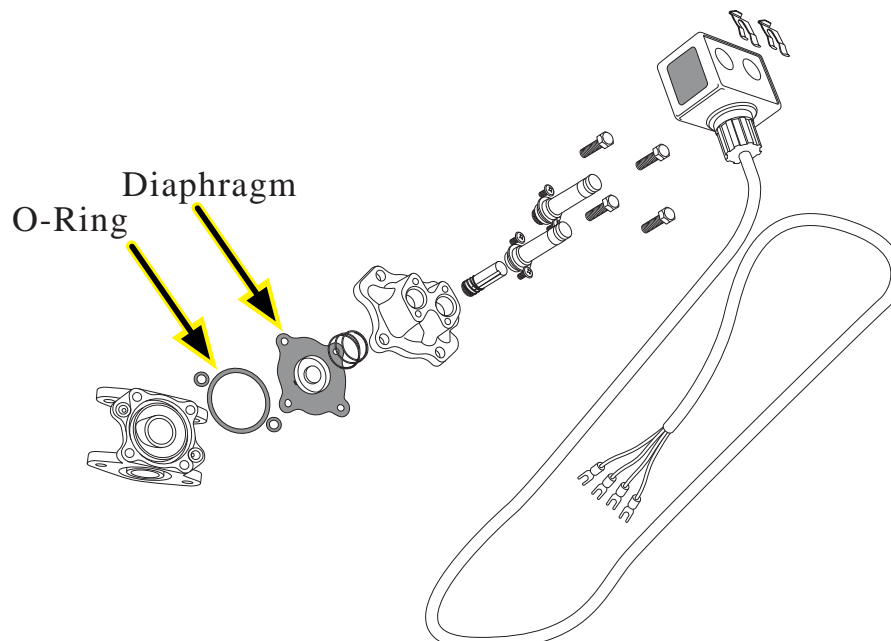
A continued flow at the end of a Prepay or Preset Grade 1 rear delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 2 FRONT ENCODER RUN ON**DESCRIPTION**

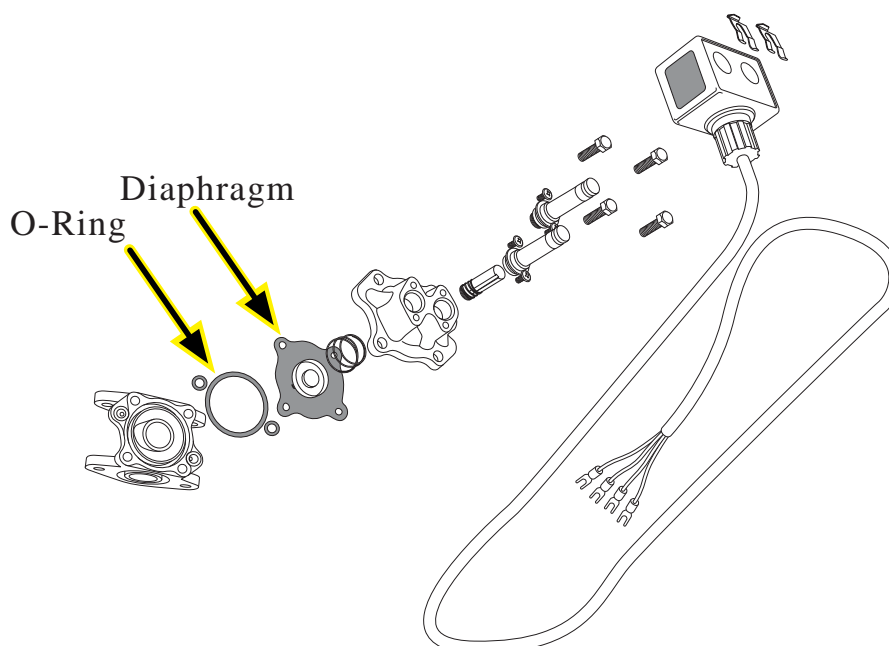
A continued flow at the end of a Prepay or Preset Grade 1 front delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 2 REAR ENCODER RUN ON

DESCRIPTION

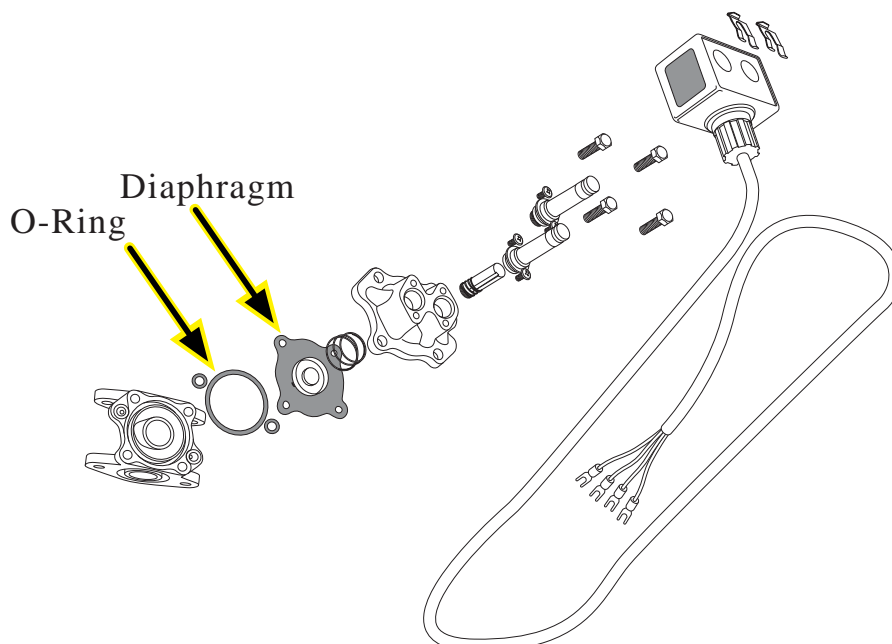
A continued flow at the end of a Prepay or Preset Grade 2 rear delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 3 FRONT ENCODER RUN ON**DESCRIPTION**

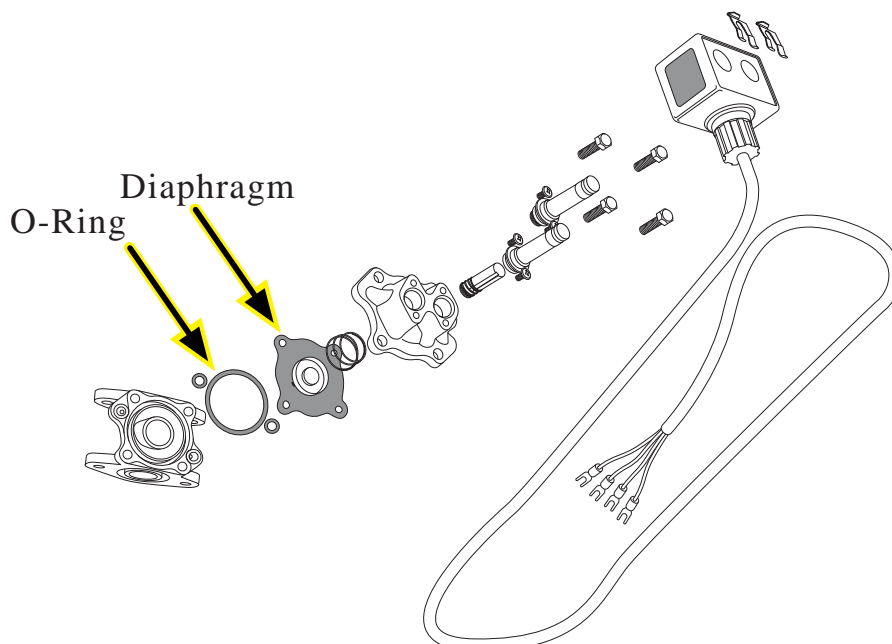
A continued flow at the end of a Prepay or Preset Grade 3 front delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 3 REAR ENCODER RUN ON

DESCRIPTION

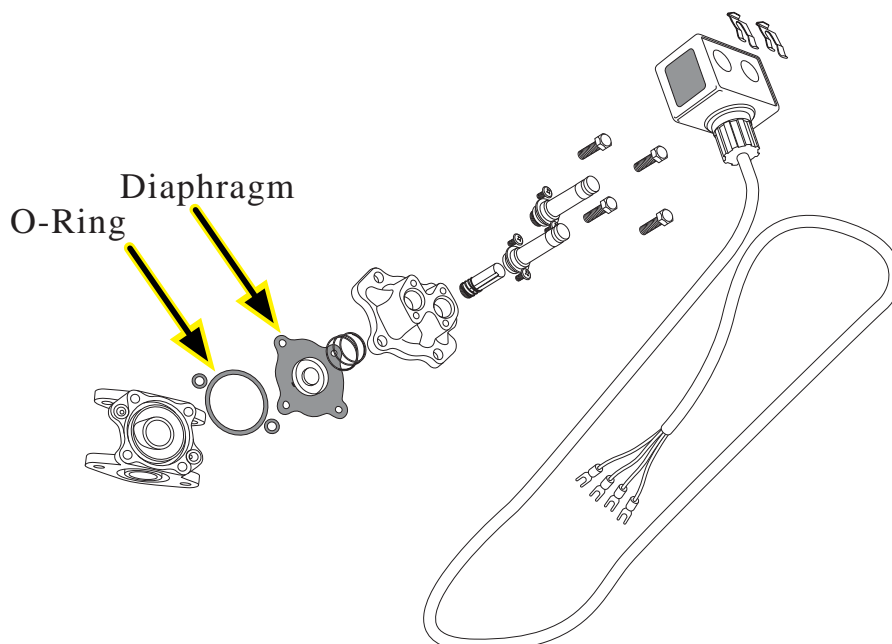
A continued flow at the end of a Prepay or Preset Grade 3 rear delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 4 FRONT ENCODER RUN ON**DESCRIPTION**

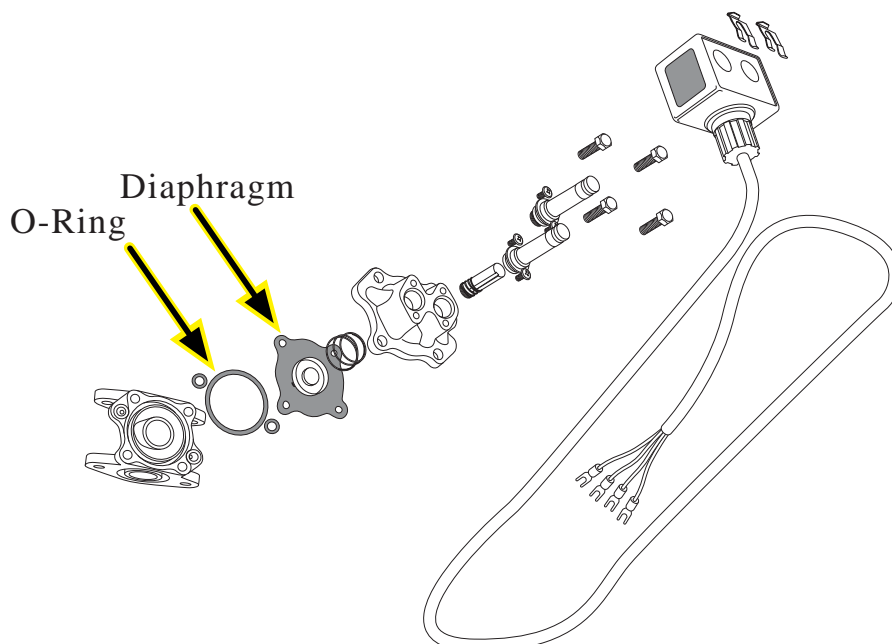
A continued flow at the end of a Prepay or Preset Grade 4 front delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



GRADE 4 REAR ENCODER RUN ON

DESCRIPTION

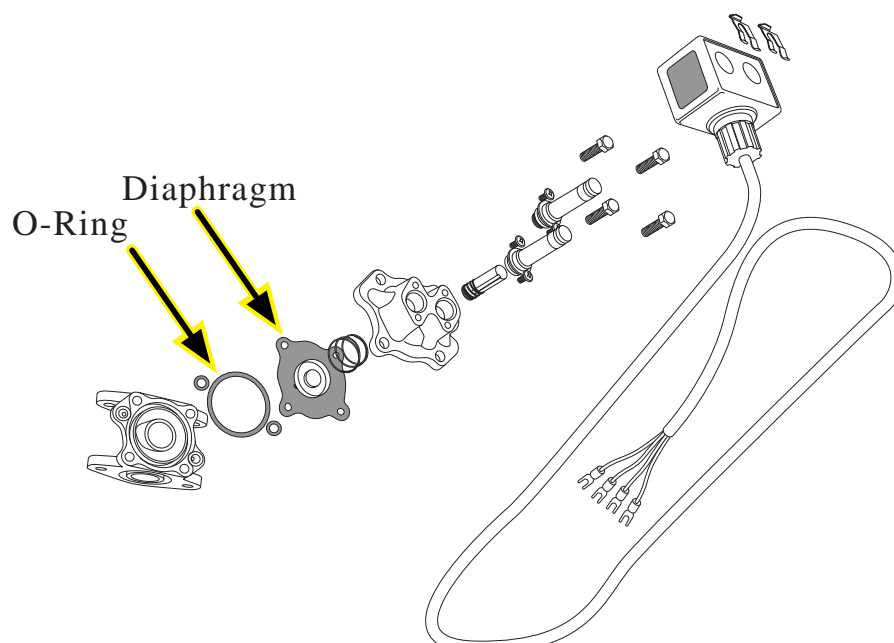
A continued flow at the end of a Prepay or Preset Grade 4 rear delivery has caused the Encoder to keep rotating after the "end of delivery" state had been reached. The error is logged but does not stop the FDS.

POSSIBLE CAUSE(S)

- (a) sluggish closing of the valves due to obstructions or presence of foreign matter;
- (b) leaking valves which in turn might be due to a damaged diaphragm or O-Ring.

SUGGESTED REMEDIAL ACTION(S)

- (a) perform a Stack Test to confirm whether or not the Solenoid Valves are opening and closing correctly;
- (b) check for obstructions or presence of foreign matter (see diagram below) and remove using compressed air;
- (c) check the diaphragm and O-ring for wear and tear and damage. Replace worn or damaged parts;
- (d) after performing (a) and (b), carry out a test delivery of a preset amount and see whether an overrun still occurs.



Err 90

NOT USED

ERROR TITLE BY ERROR NUMBER

(01 - 09) FATAL STARTUP SYSTEM ERRORS

1. **PROCESSOR ERROR**
2. **INTERNAL RAM ERROR**
3. **EPROM ERROR**
4. **EXTERNAL RAM ERROR**
5. **NON-VOLATILE SETUP**
6. **DELIVERY VARIABLES LOST**
7. **KEYPAD ERROR**
8. **NOT USED**
9. **NOT USED**

(10- 29) FATAL ERRORS

10. **PUMP CONTROL STATE ERROR (PUMP A)**
11. **PUMP CONTROL STATE ERROR (PUMP B)**
12. **PUMP CONTROL STATE ERROR (PUMP C) - CEEPEC**
13. **NOT USED**
14. **NOT USED**
15. **NOT USED**
16. **PROCESSOR ERROR – STACK**
17. **PROCESSOR ERROR – DISPLAY**
18. **PROCESSOR ERROR – VARIABLE RANGE**
19. **PROCESSOR ERROR – DOLLAR MATHS**
20. **PROCESSOR ERROR – LITRE MATHS**
21. **PROCESSOR ERROR – CLOCK**
22. **PROCESSOR ERROR – MOTOR CONTROL**
23. **PROCESSOR ERROR – SOLENOID CONTROL**
24. **PROCESSOR ERROR – POWER FAILURE**
25. **INPUT PROCESSOR TO MAIN FAILURE**
26. **MAIN TO INPUT PROCESSOR FAILURE**
27. **REMOTE PARAMETERS FAILURE**
28. **PROCESSOR ERROR - DISPLAY POINTERS CORRUPTED**
29. **NOT USED**

(30 - 59) SINGLE PUMP NUMBER FATAL ERRORS

30. **LPG TEMPERATURE PROBE 1 ERROR (VERSION 2.35 ONLY)**
31. **LPG TEMPERATURE PROBE 2 ERROR (VERSION 2.35 ONLY)**
32. **GRADE 1 FRONT HOSE AIR SENSED**
33. **GRADE 1 REAR HOSE AIR SENSED**
34. **GRADE 2 FRONT HOSE AIR SENSED**

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35. **GRADE 2 REAR HOSE AIR SENSED**
 36. **GRADE 3 FRONT HOSE AIR SENSED**
 37. **GRADE 3 REAR HOSE AIR SENSED**
 38. **GRADE 4 FRONT HOSE AIR SENSED**
 39. **GRADE 4 REAR HOSE AIR SENSED**
 40. **GRADE 1 FRONT ENCODER ERROR**
 41. **GRADE 1 REAR ENCODER ERROR**
 42. **GRADE 2 FRONT ENCODER ERROR**
 43. **GRADE 2 REAR ENCODER ERROR**
 44. **GRADE 3 FRONT ENCODER ERROR**
 45. **GRADE 3 REAR ENCODER ERROR**
 46. **GRADE 4 FRONT ENCODER ERROR**
 47. **GRADE 4 REAR ENCODER ERROR**
 48. **GRADE 1 FRONT ENCODER TOO FAST**
 49. **GRADE 1 REAR ENCODER TOO FAST**
 50. **GRADE 2 FRONT ENCODER TOO FAST**
 51. **GRADE 2 REAR ENCODER TOO FAST**
 52. **GRADE 3 FRONT ENCODER TOO FAST**
 53. **GRADE 3 REAR ENCODER TOO FAST**
 54. **GRADE 4 FRONT ENCODER TOO FAST**
 55. **GRADE 4 REAR ENCODER TOO FAST**
 56. **LPG OVERSPEED**
 57. **LOSS OF ENCODER CONSTANT OR LPG SPECIFIC GRAVITY SETTING**
 58. **LPG SENSOR FAILURE**
 59. **LPG SYSTEM VAPOUR PRESENT**

(60 - 89) NON-FATAL SYSTEM ERRORS

60. **CHANNEL A RECEIVER PARITY ERROR**
61. **CHANNEL A RECEIVER FRAMING ERROR**
62. **CHANNEL A RECEIVER BREAK ERROR**
63. **CHANNEL A RECEIVER OVERRUN ERROR**
64. **CHANNEL A RECEIVER CHECKSUM ERROR**
65. **CHANNEL A RECEIVER DATA ERROR**
66. **CHANNEL A RECEIVER OVERFLOW ERROR**
67. **CHANNEL A TRANSMITTER OVERFLOW ERROR**
68. **CHANNEL A RECEIVER TIMEOUT ERROR**
69. **CHANNEL A TRANSMIT TIMEOUT ERROR**
70. **CHANNEL B RECEIVER PARITY ERROR**
71. **CHANNEL B RECEIVER FRAMING ERROR**
72. **CHANNEL B RECEIVER BREAK ERROR**
73. **CHANNEL B RECEIVER OVERRUN ERROR**
74. **CHANNEL B RECEIVER CHECKSUM ERROR**

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- 75. CHANNEL B RECEIVER DATA ERROR
 - 76. CHANNEL B RECEIVER OVERFLOW ERROR
 - 77. CHANNEL TRANSMITTER OVERFLOW ERROR
 - 78. CHANNEL B RECEIVE TIMEOUT ERROR
 - 79. CHANNEL B TRANSMIT TIMEOUT ERROR
 - 80. GRADE 1 FRONT PRESET OVERRUN
 - 81. GRADE 1 REAR PRESET OVERRUN
 - 82. GRADE 2 FRONT PRESET OVERRUN
 - 83. GRADE 2 REAR PRESET OVERRUN
 - 84. GRADE 3 FRONT PRESET OVERRUN
 - 85. GRADE 3 REAR PRESET OVERRUN
 - 86. GRADE 4 FRONT PRESET OVERRUN
 - 87. GRADE 4 REAR PRESET OVERRUN
 - 88. LOST REPLY (FORECOURT CONTROLLER)
 - 89. NOT USED

(90 - 98) GENERAL LOG ONLY SYSTEM ERRORS

- 90. GRADE 1 FRONT ENCODER RUN ON
- 91. GRADE 1 REAR ENCODER RUN ON
- 92. GRADE 2 FRONT ENCODER RUN ON
- 93. GRADE 2 REAR ENCODER RUN ON
- 94. GRADE 3 FRONT ENCODER RUN ON
- 95. GRADE 3 REAR ENCODER RUN ON
- 96. GRADE 4 FRONT ENCODER RUN ON
- 97. GRADE 4 REAR ENCODER RUN ON
- 98. NOT USED

