MIL Illuminated – V6/V8 Engine Management Diagnosis – Flowcharts

MODEL 2003 MY-ON S-TYPE

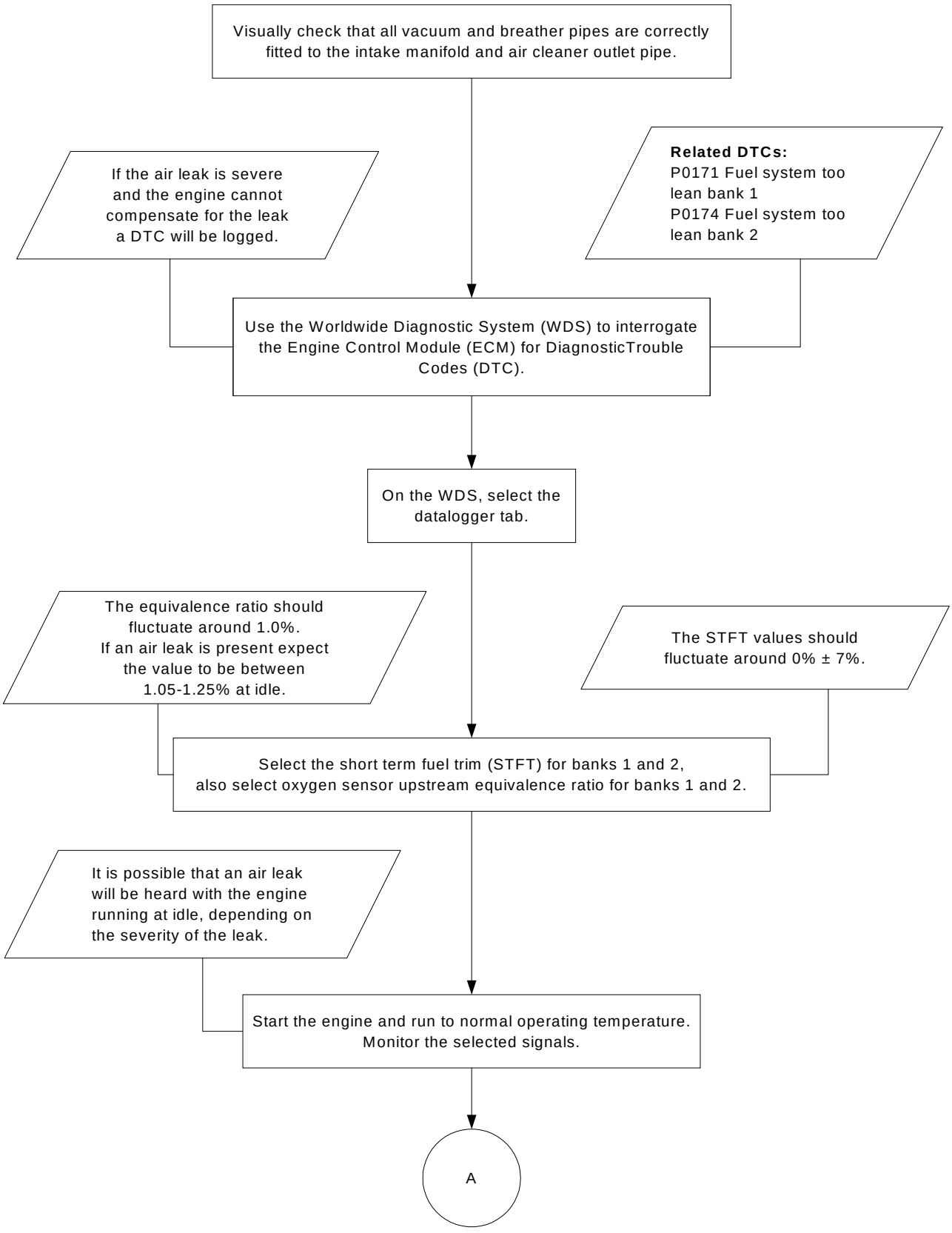
VIN M45255-ON

Issue:

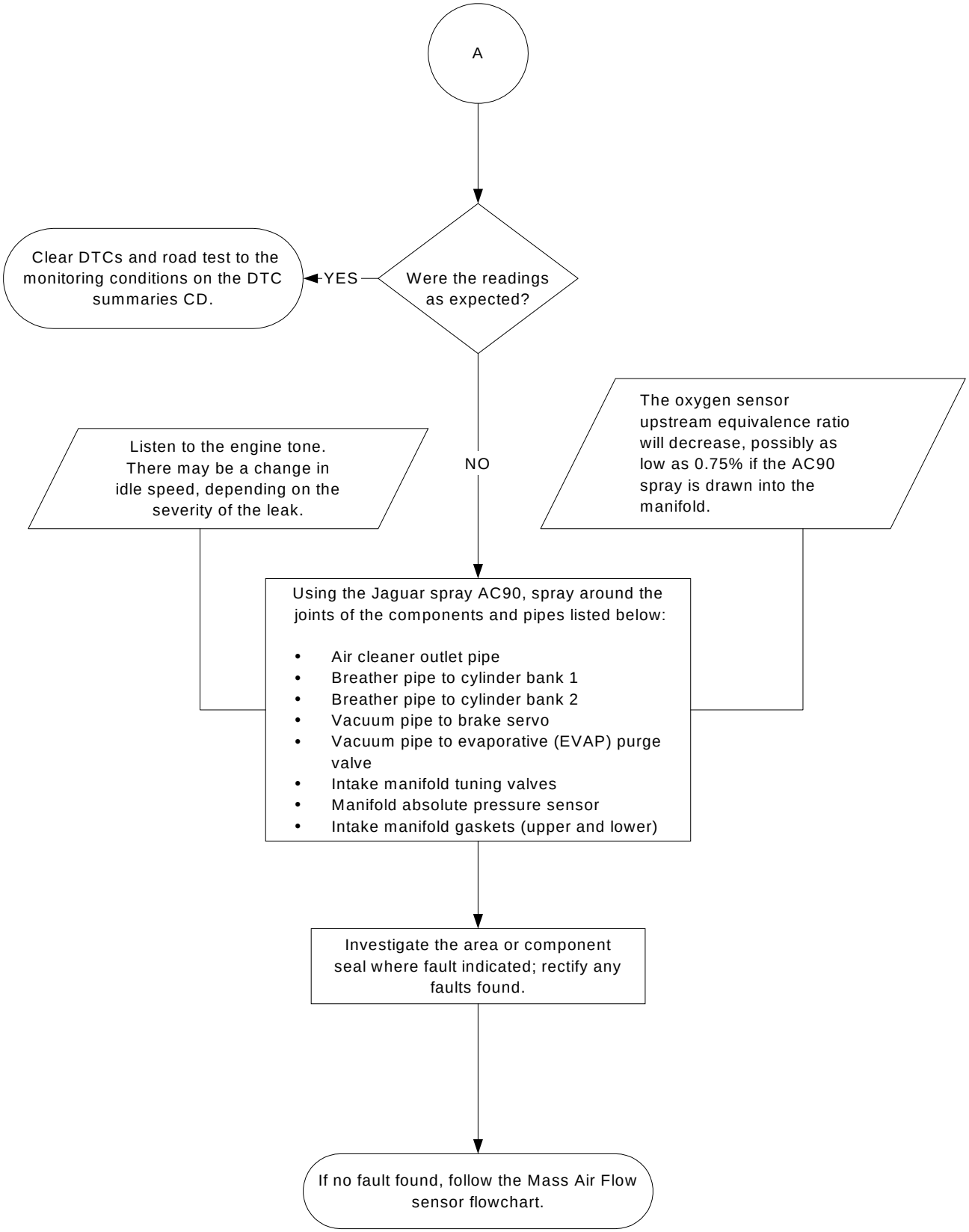
This bulletin provides diagnosis procedures for various components of the engine management system.

ENGINE MANAGEMENT SYSTEM FLOWCHARTS – TABLE OF CONTENTS

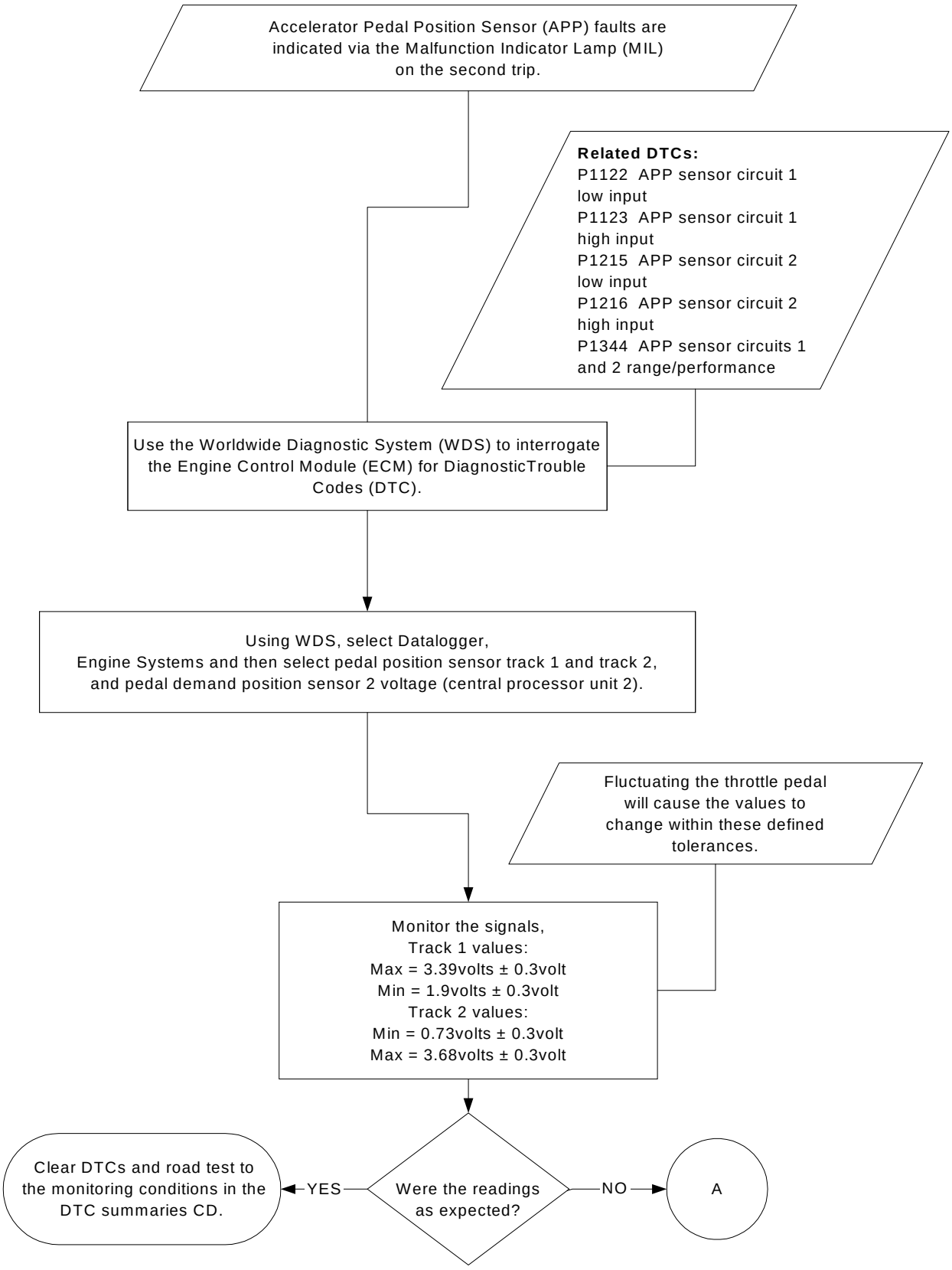
Air Leakage
Flowchart P-1



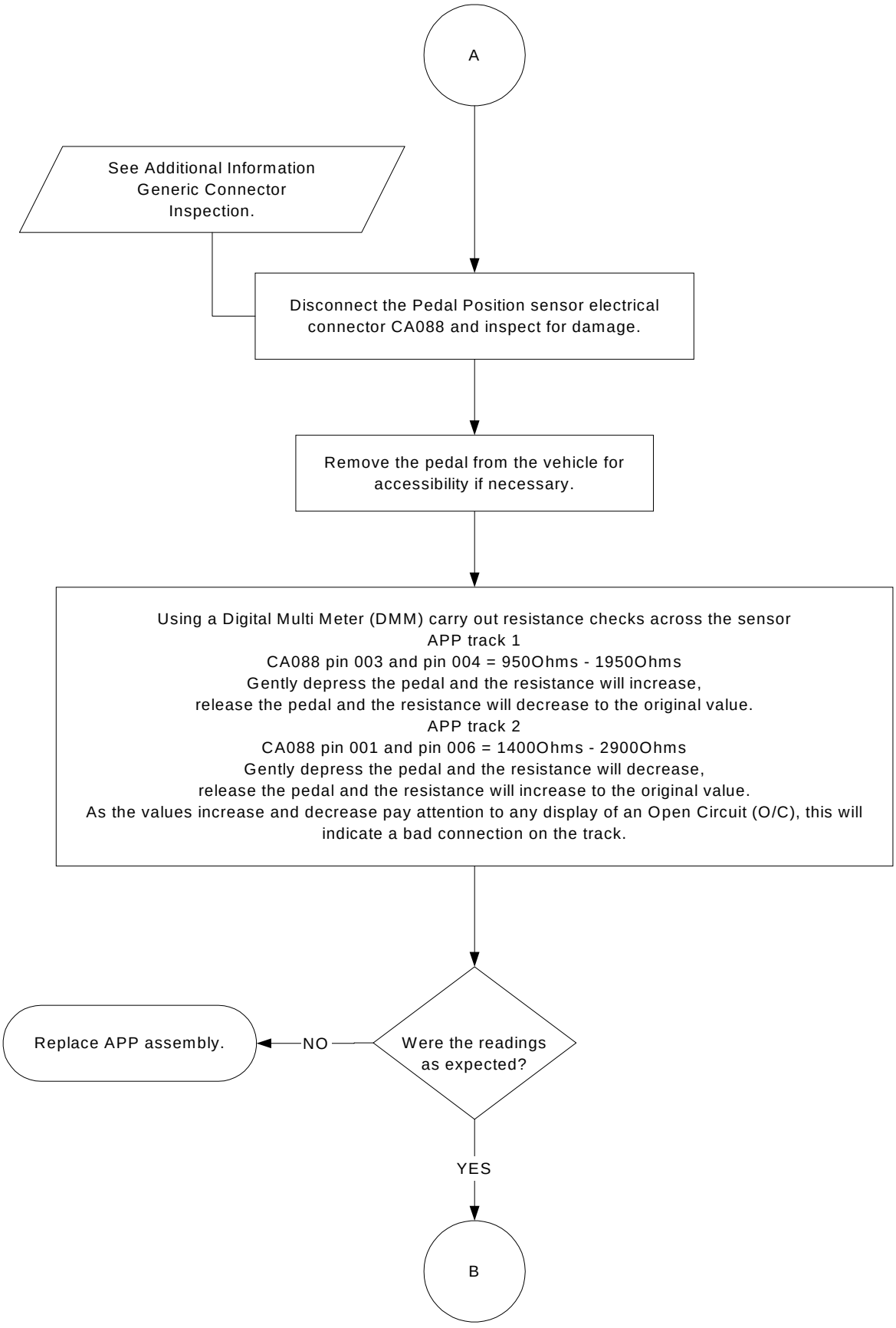
P-1 Cont.


A
Were the readings as expected?
YES
Clear DTCs and road test to the monitoring conditions on the DTC summaries CD.
NO
Listen to the engine tone. There may be a change in idle speed, depending on the severity of the leak.
The oxygen sensor upstream equivalence ratio will decrease, possibly as low as 0.75% if the AC90 spray is drawn into the manifold.
Using the Jaguar spray AC90, spray around the joints of the components and pipes listed below:
• Air cleaner outlet pipe
• Breather pipe to cylinder bank 1
• Breather pipe to cylinder bank 2
• Vacuum pipe to brake servo
• Vacuum pipe to evaporative (EVAP) purge valve
• Intake manifold tuning valves
• Manifold absolute pressure sensor
• Intake manifold gaskets (upper and lower)
Investigate the area or component seal where fault indicated; rectify any faults found.
If no fault found, follow the Mass Air Flow sensor flowchart.

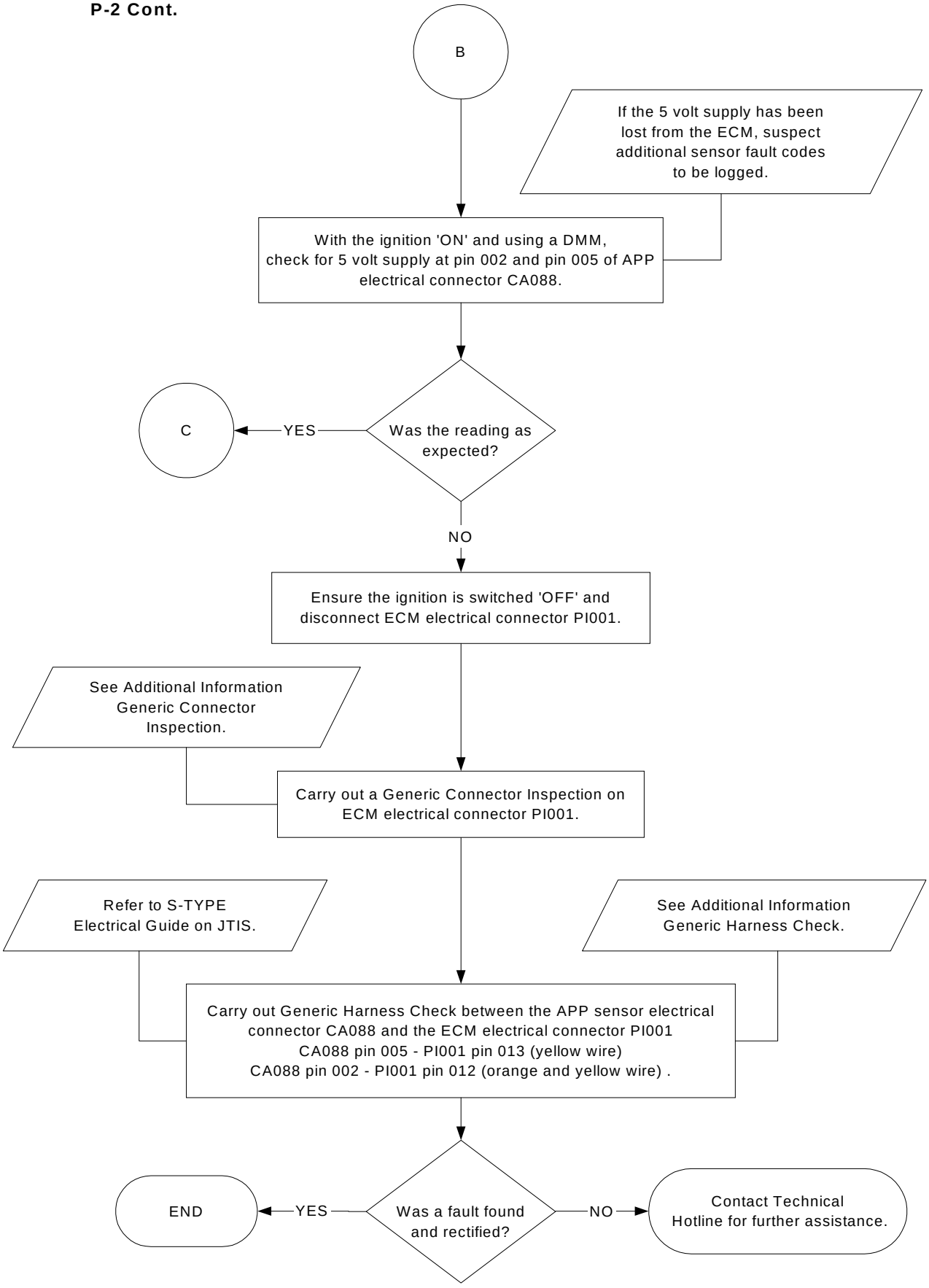
Accelerator Pedal Position Sensor Flowchart P-2



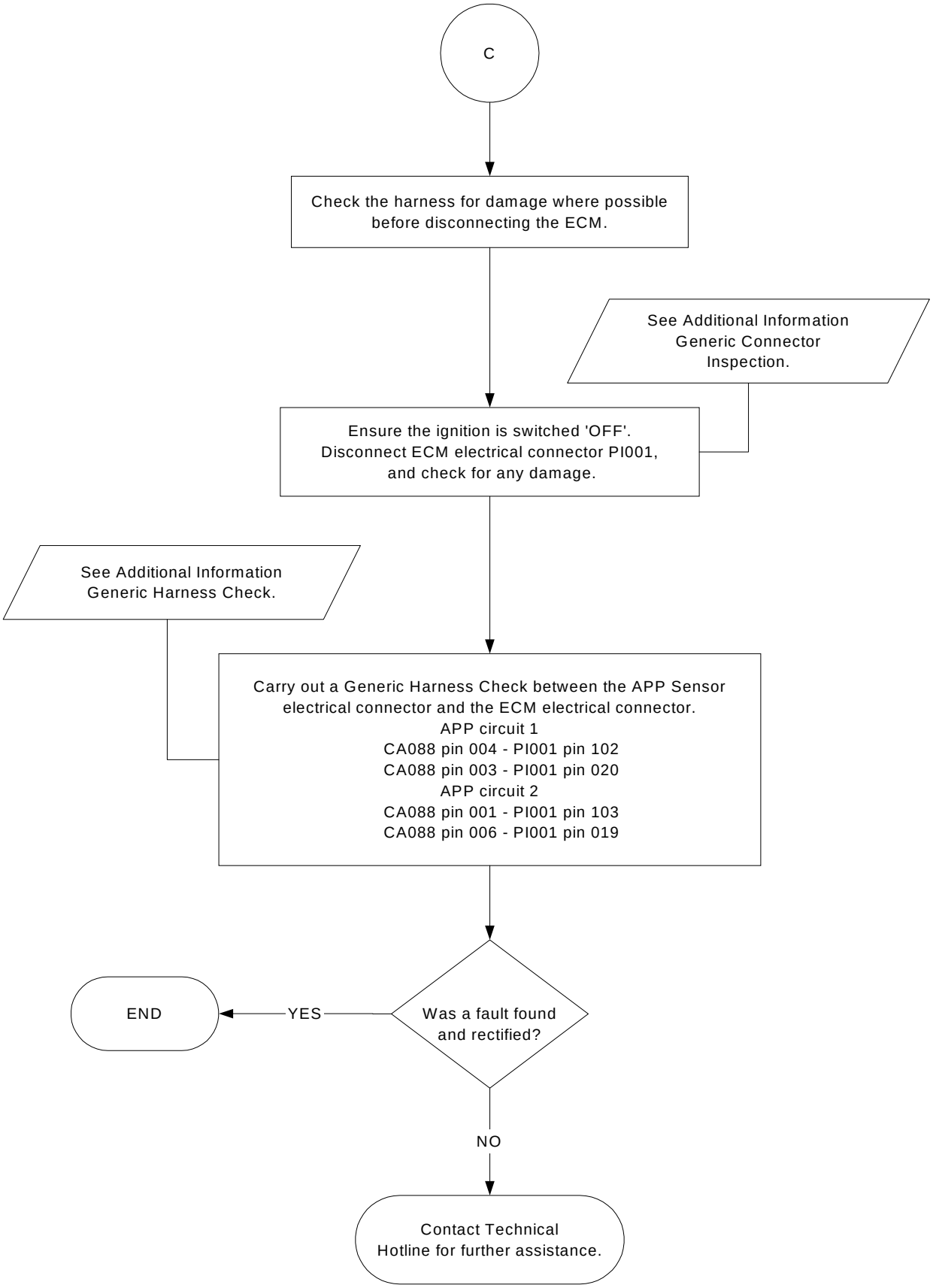
P-2 Cont.


A
See Additional Information Generic Connector Inspection.
Disconnect the Pedal Position sensor electrical connector CA088 and inspect for damage.
Remove the pedal from the vehicle for accessibility if necessary.
Using a Digital Multi Meter (DMM) carry out resistance checks across the sensor
APP track 1
CA088 pin 003 and pin 004 = 950Ohms - 1950Ohms
Gently depress the pedal and the resistance will increase,
release the pedal and the resistance will decrease to the original value.
APP track 2
CA088 pin 001 and pin 006 = 1400Ohms - 2900Ohms
Gently depress the pedal and the resistance will decrease,
release the pedal and the resistance will increase to the original value.
As the values increase and decrease pay attention to any display of an Open Circuit (O/C), this will indicate a bad connection on the track.
Were the readings as expected?
NO
Replace APP assembly.
YES
B

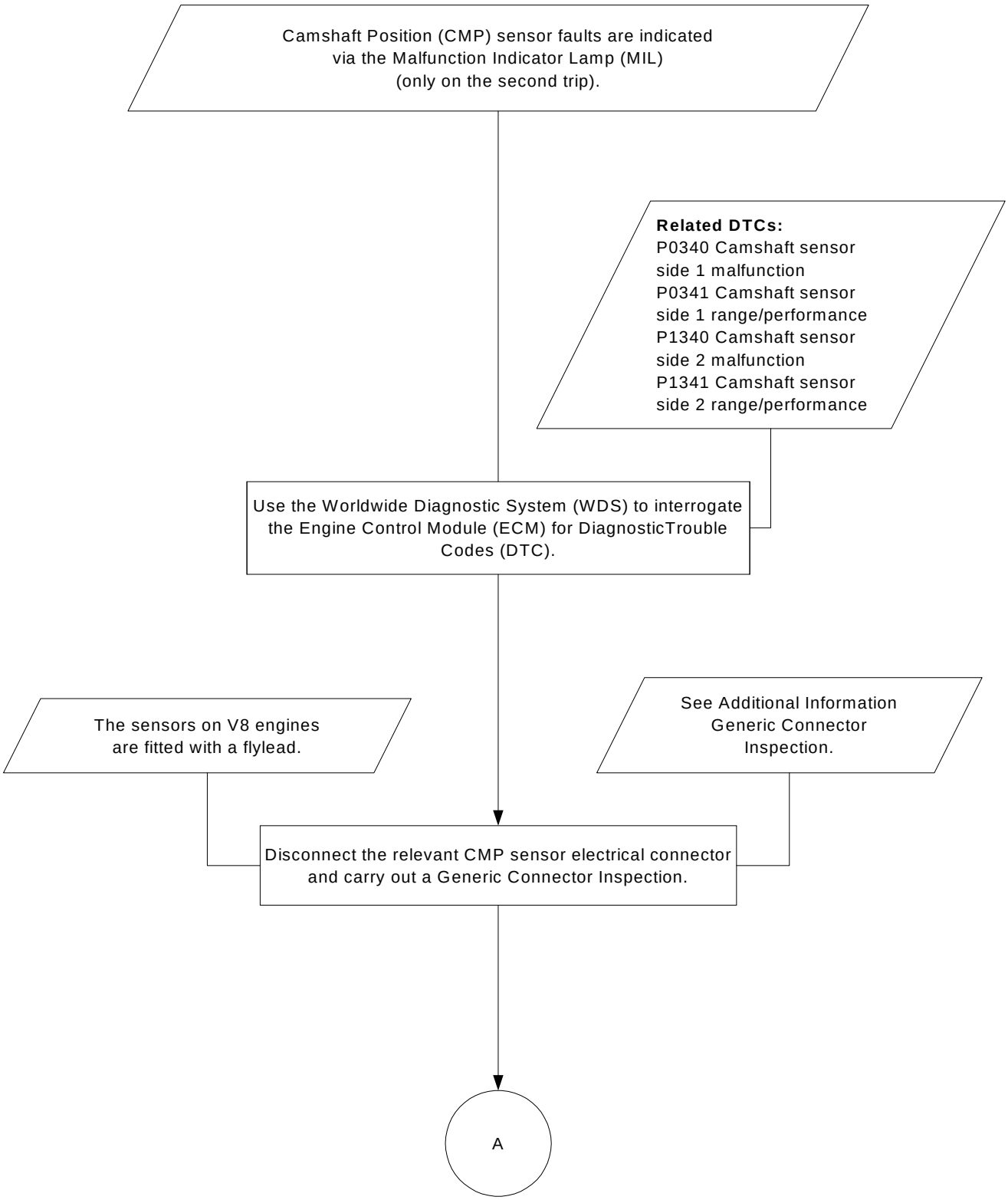
P-2 Cont.


B
If the 5 volt supply has been lost from the ECM, suspect additional sensor fault codes to be logged.
With the ignition 'ON' and using a DMM, check for 5 volt supply at pin 002 and pin 005 of APP electrical connector CA088.
Was the reading as expected?
YES
C
NO
Ensure the ignition is switched 'OFF' and disconnect ECM electrical connector PI001.
See Additional Information Generic Connector Inspection.
Carry out a Generic Connector Inspection on ECM electrical connector PI001.
Refer to S-TYPE Electrical Guide on JTIS.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between the APP sensor electrical connector CA088 and the ECM electrical connector PI001
CA088 pin 005 - PI001 pin 013 (yellow wire)
CA088 pin 002 - PI001 pin 012 (orange and yellow wire) .
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

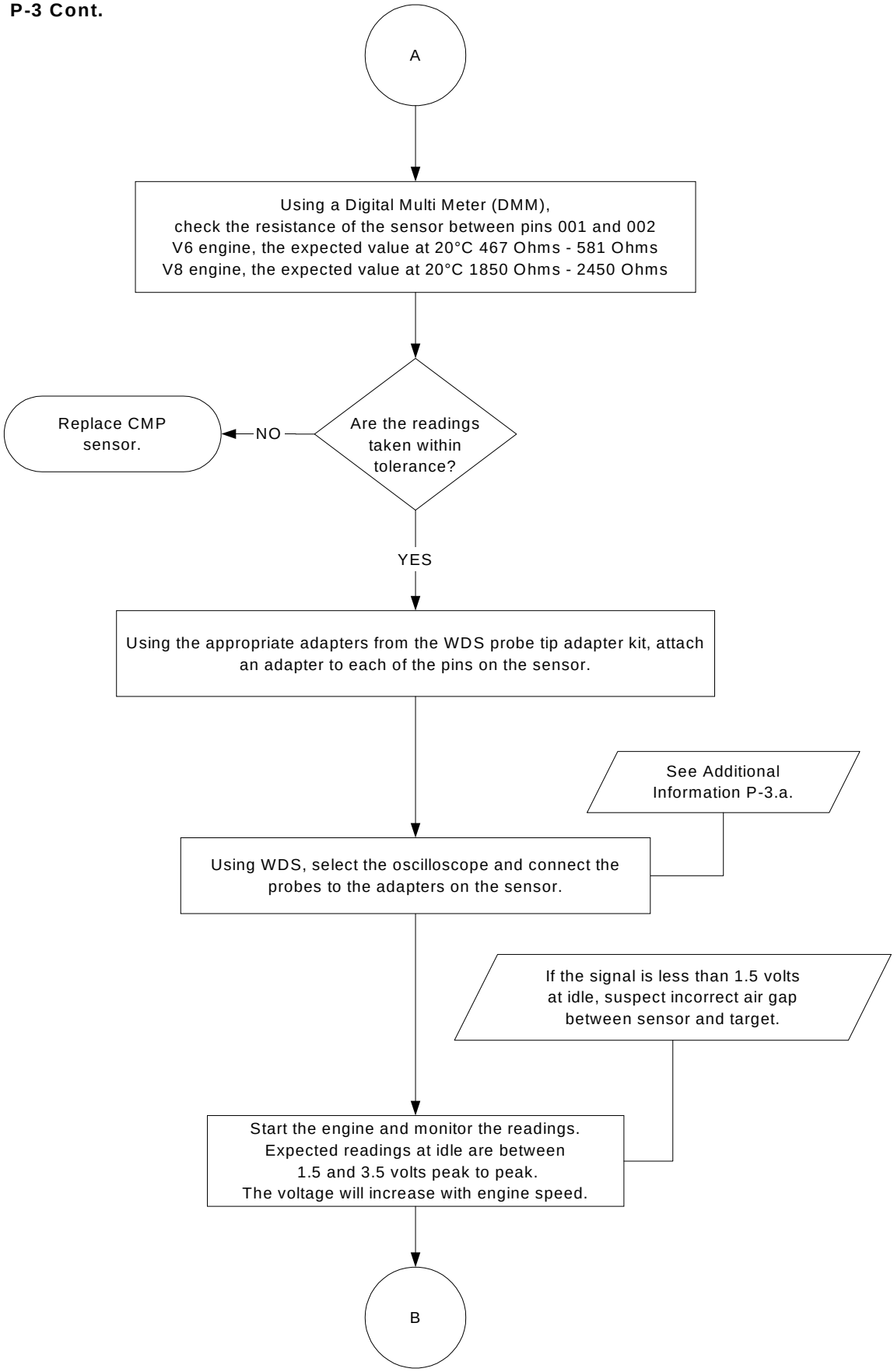
P-2 Cont.


C
Check the harness for damage where possible before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
See Additional Information Generic Harness Check.
Carry out a Generic Harness Check between the APP Sensor electrical connector and the ECM electrical connector.
APP circuit 1
CA088 pin 004 - PI001 pin 102
CA088 pin 003 - PI001 pin 020
APP circuit 2
CA088 pin 001 - PI001 pin 103
CA088 pin 006 - PI001 pin 019
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

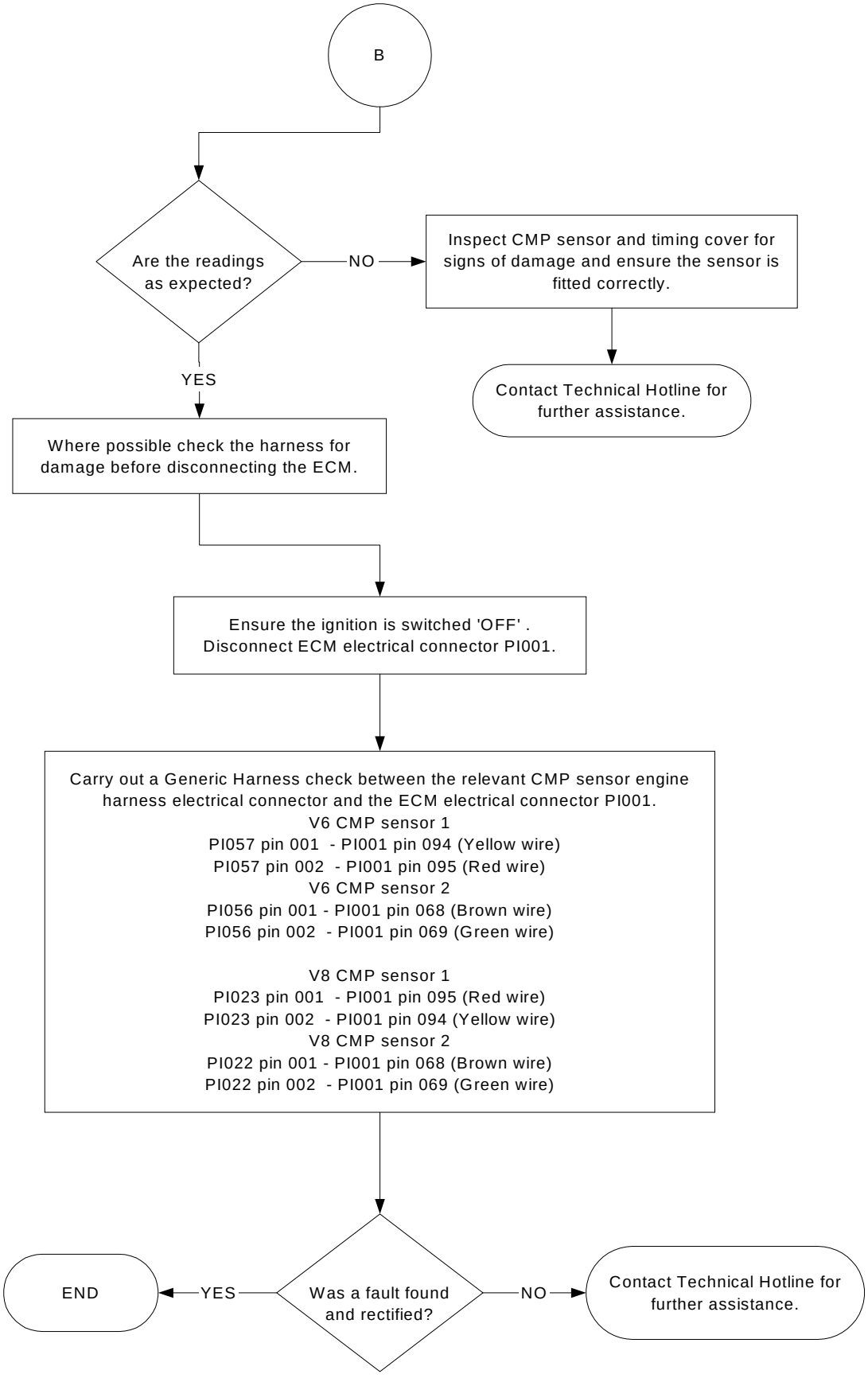
Camshaft Position Sensor
Flowchart P-3



P-3 Cont.


A
Using a Digital Multi Meter (DMM),
check the resistance of the sensor between pins 001 and 002
V6 engine, the expected value at 20°C 467 Ohms - 581 Ohms
V8 engine, the expected value at 20°C 1850 Ohms - 2450 Ohms
Are the readings taken within tolerance?
NO
Replace CMP sensor.
YES
Using the appropriate adapters from the WDS probe tip adapter kit, attach an adapter to each of the pins on the sensor.
See Additional Information P-3.a.
Using WDS, select the oscilloscope and connect the probes to the adapters on the sensor.
If the signal is less than 1.5 volts at idle, suspect incorrect air gap between sensor and target.
Start the engine and monitor the readings.
Expected readings at idle are between 1.5 and 3.5 volts peak to peak.
The voltage will increase with engine speed.
B

P-3 Cont.


B
Are the readings as expected?
NO
Inspect CMP sensor and timing cover for signs of damage and ensure the sensor is fitted correctly.
Contact Technical Hotline for further assistance.
YES
Where possible check the harness for damage before disconnecting the ECM.
Ensure the ignition is switched 'OFF' . Disconnect ECM electrical connector PI001.
Carry out a Generic Harness check between the relevant CMP sensor engine harness electrical connector and the ECM electrical connector PI001.
V6 CMP sensor 1
PI057 pin 001 - PI001 pin 094 (Yellow wire)
PI057 pin 002 - PI001 pin 095 (Red wire)
V6 CMP sensor 2
PI056 pin 001 - PI001 pin 068 (Brown wire)
PI056 pin 002 - PI001 pin 069 (Green wire)
V8 CMP sensor 1
PI023 pin 001 - PI001 pin 095 (Red wire)
PI023 pin 002 - PI001 pin 094 (Yellow wire)
V8 CMP sensor 2
PI022 pin 001 - PI001 pin 068 (Brown wire)
PI022 pin 002 - PI001 pin 069 (Green wire)
END
YES
Was a fault found and rectified?
NO
Contact Technical Hotline for further assistance.

Additional Information P-3a

Oscilloscope set up.

1 Configuration sub tab.
Channel 1
Select: Red probe and black probe-Differential.

2 Channel calculation sub tab.
Select: Maximum voltage.

3 Main oscilloscope display sub tab.
Y-axis select: Scale set to 1 volt/div.
X-axis select: Scale set to 10 ms/div.

4 Select: Full screen.

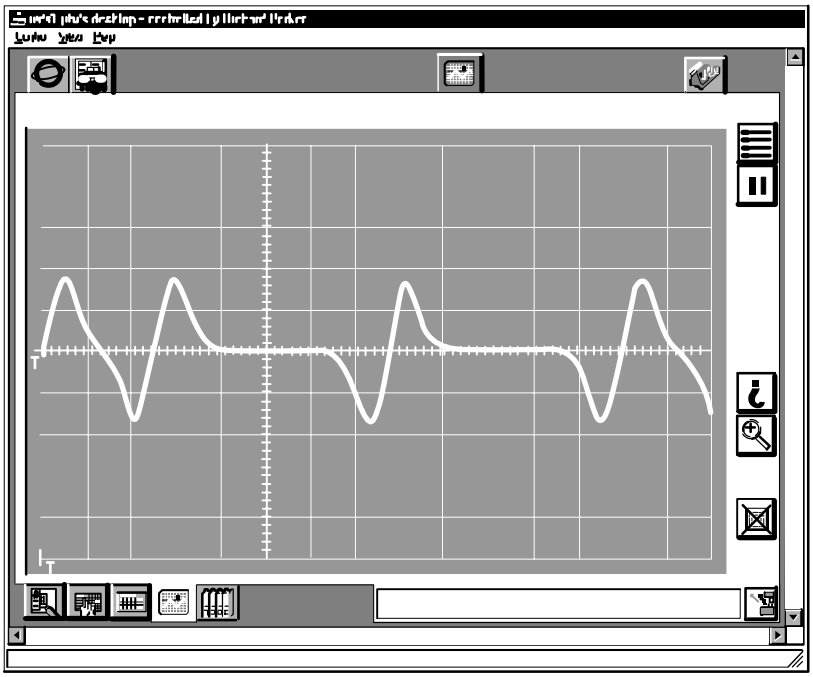


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Illustration 1 Trace of the camshaft position sensor at idle

P-3.a Cont.

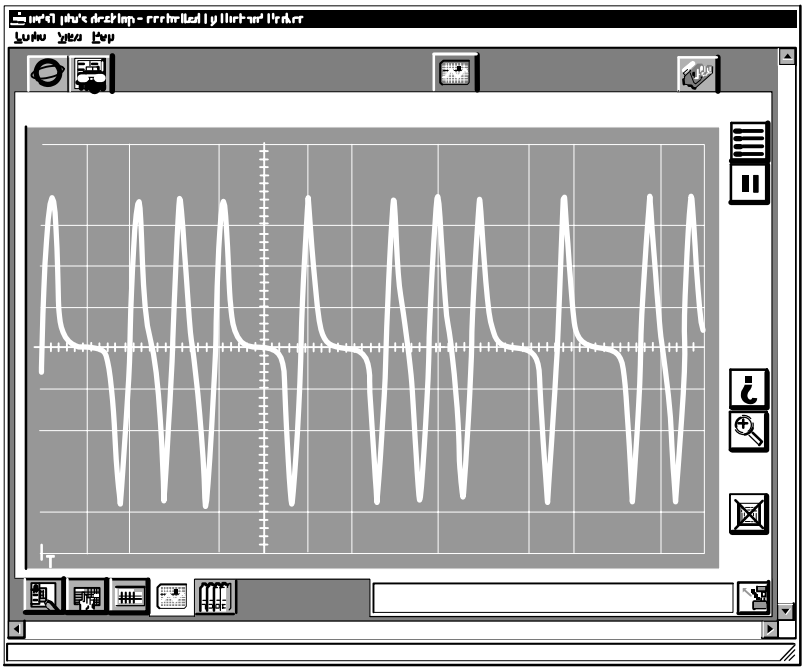

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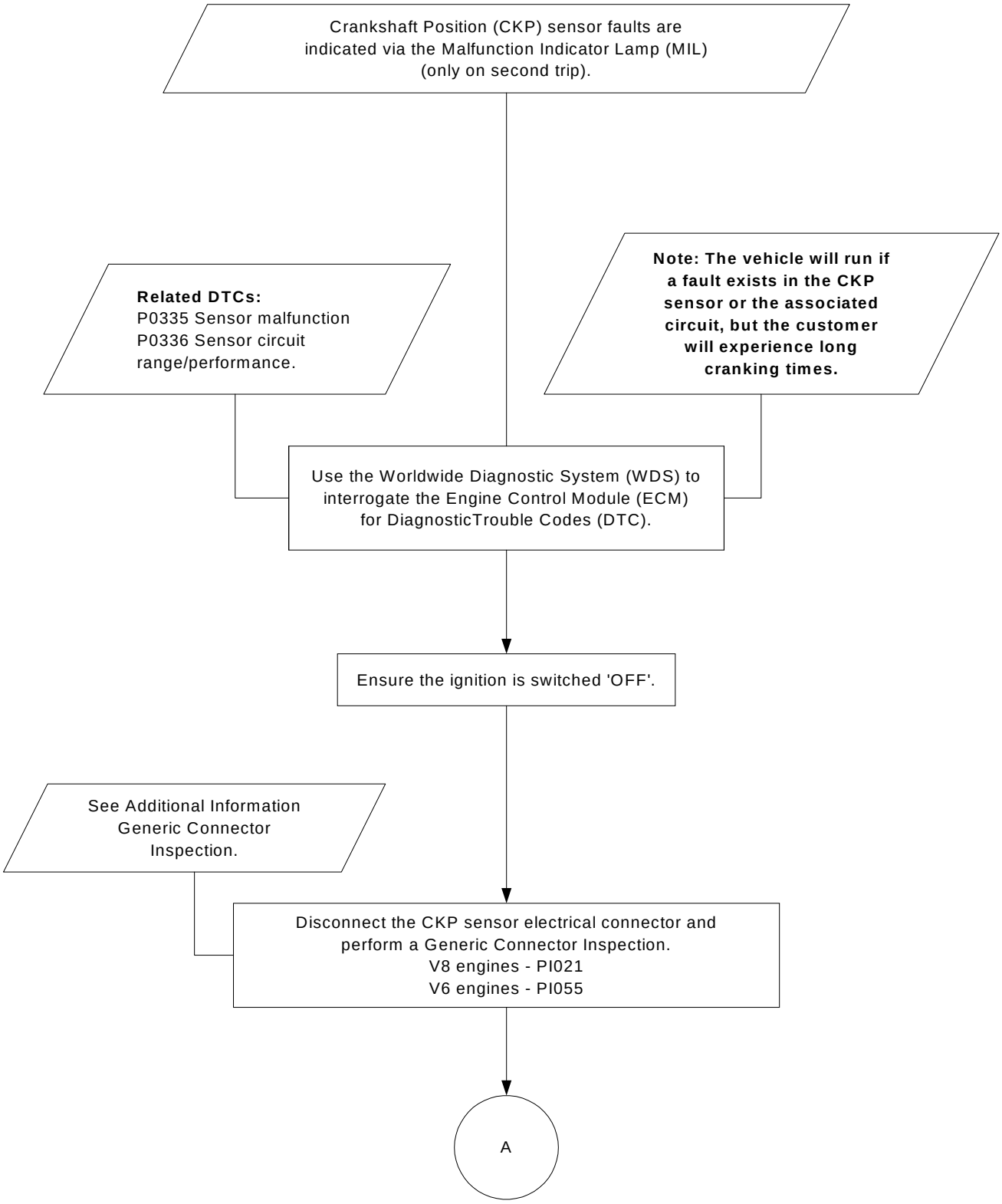
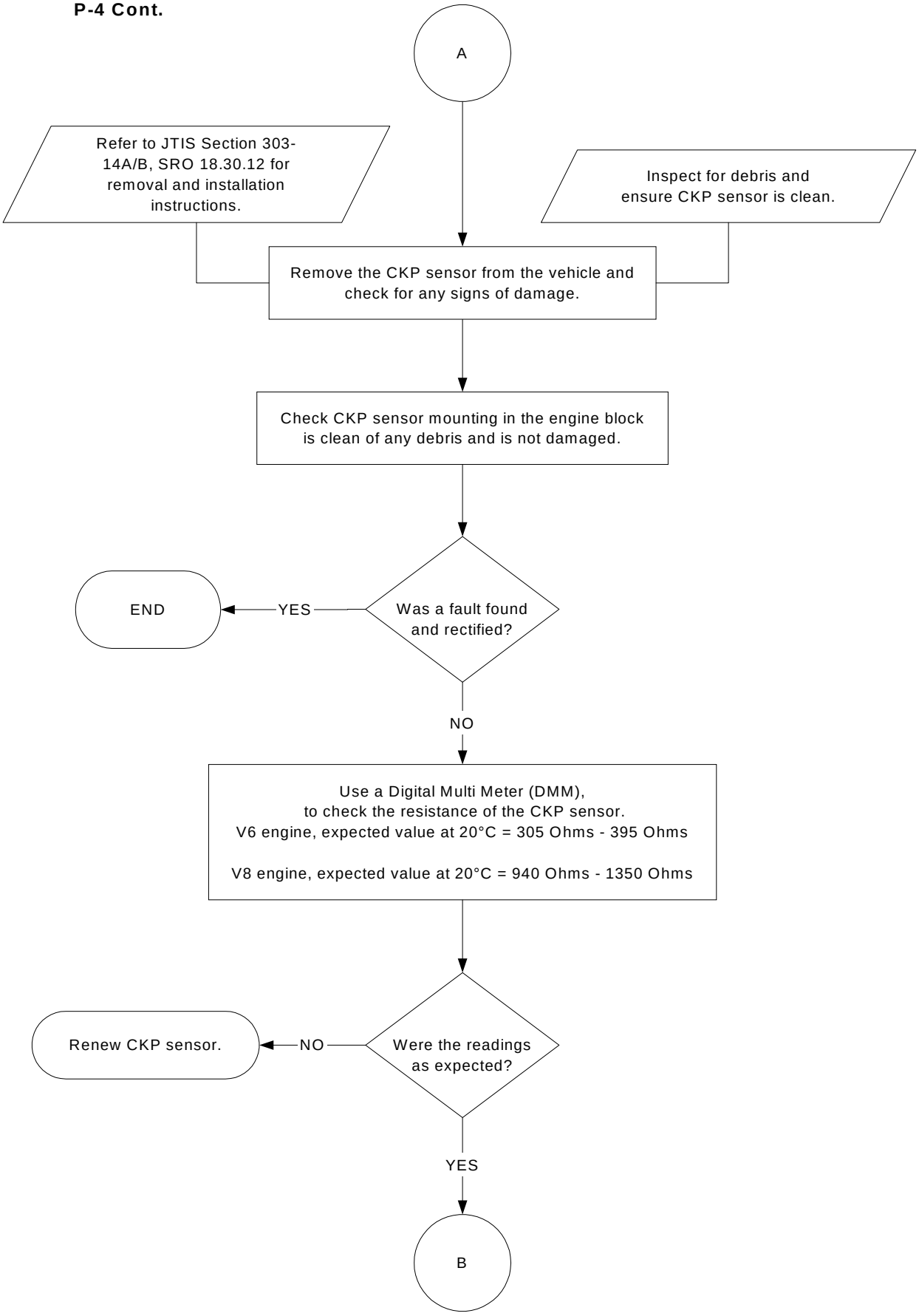
Illustration 2 Trace of camshaft position sensor at 2000 rpm

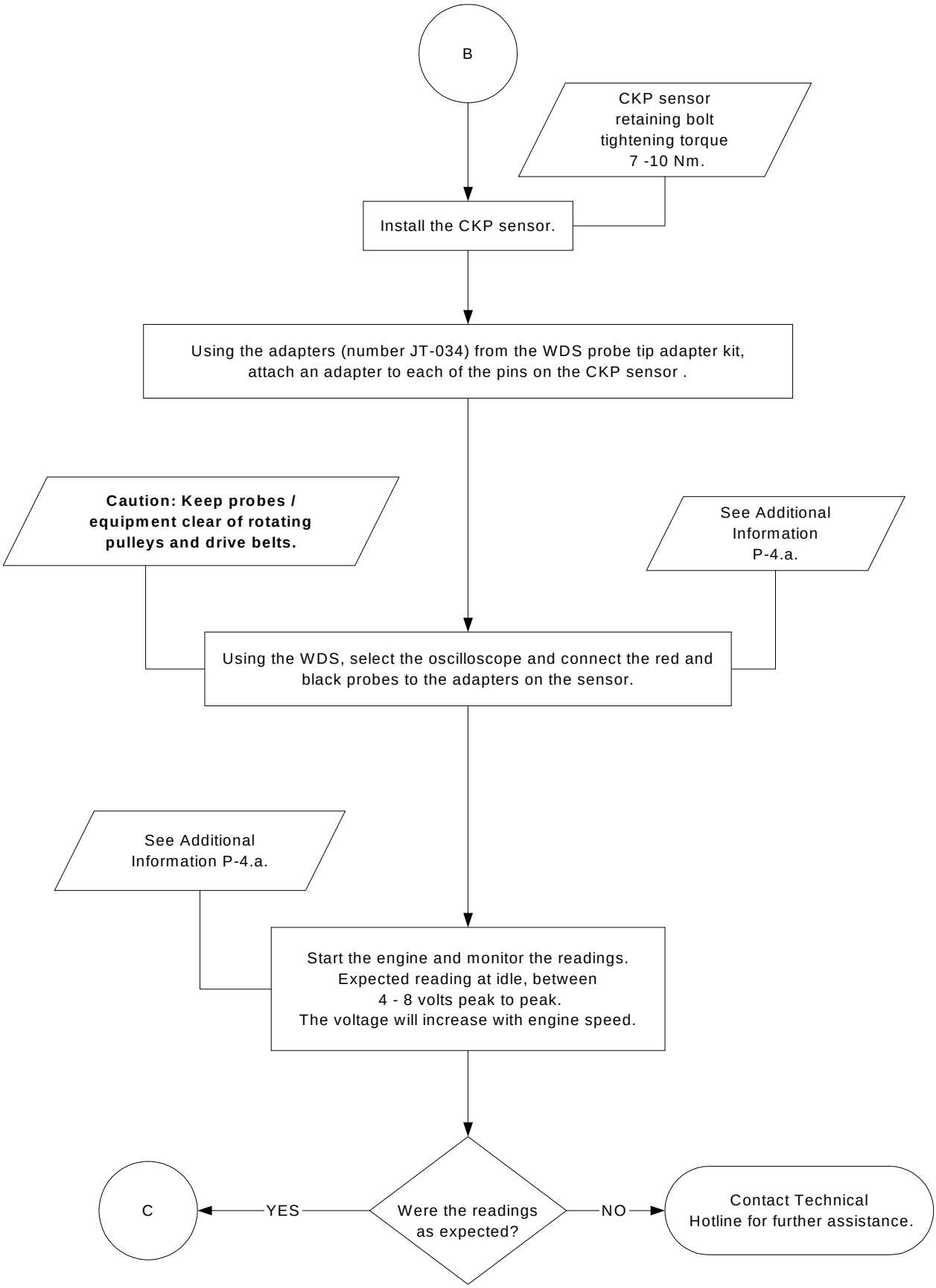
Crankshaft Position Sensor
Flowchart P-4



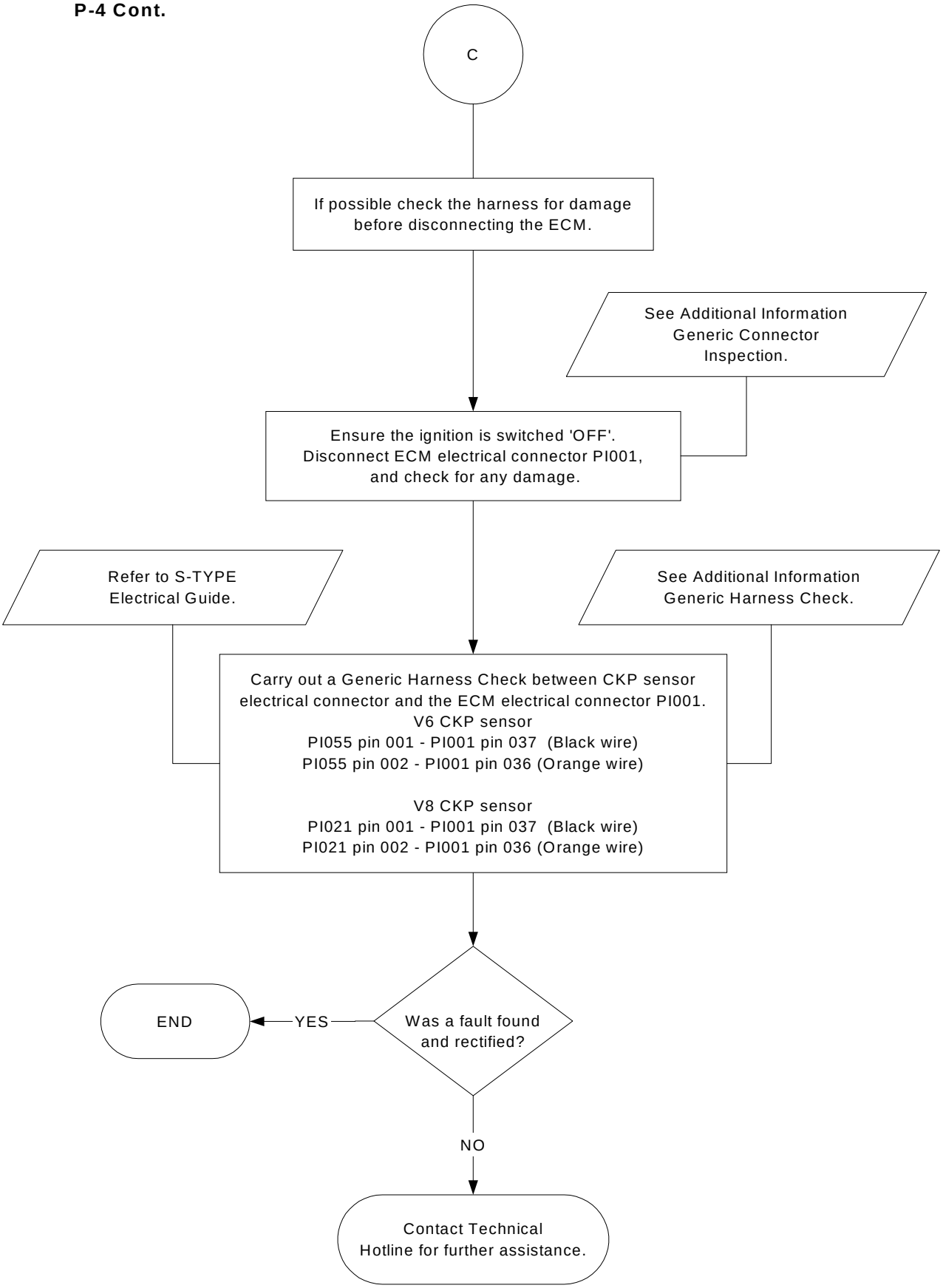
P-4 Cont.


A
Refer to JTIS Section 303-14A/B, SRO 18.30.12 for removal and installation instructions.
Inspect for debris and ensure CKP sensor is clean.
Remove the CKP sensor from the vehicle and check for any signs of damage.
Check CKP sensor mounting in the engine block is clean of any debris and is not damaged.
Was a fault found and rectified?
YES
END
NO
Use a Digital Multi Meter (DMM), to check the resistance of the CKP sensor.
V6 engine, expected value at 20°C = 305 Ohms - 395 Ohms
V8 engine, expected value at 20°C = 940 Ohms - 1350 Ohms
Were the readings as expected?
NO
Renew CKP sensor.
YES
B

P-4 Cont.


B
CKP sensor retaining bolt tightening torque 7 -10 Nm.
Install the CKP sensor.
Using the adapters (number JT-034) from the WDS probe tip adapter kit, attach an adapter to each of the pins on the CKP sensor .
Caution: Keep probes / equipment clear of rotating pulleys and drive belts.
See Additional Information P-4.a.
Using the WDS, select the oscilloscope and connect the red and black probes to the adapters on the sensor.
See Additional Information P-4.a.
Start the engine and monitor the readings. Expected reading at idle, between 4 - 8 volts peak to peak. The voltage will increase with engine speed.
Were the readings as expected?
YES
C
NO
Contact Technical Hotline for further assistance.

P-4 Cont.


C
If possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
Refer to S-TYPE Electrical Guide.
See Additional Information Generic Harness Check.
Carry out a Generic Harness Check between CKP sensor electrical connector and the ECM electrical connector PI001.
V6 CKP sensor
PI055 pin 001 - PI001 pin 037 (Black wire)
PI055 pin 002 - PI001 pin 036 (Orange wire)
V8 CKP sensor
PI021 pin 001 - PI001 pin 037 (Black wire)
PI021 pin 002 - PI001 pin 036 (Orange wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

Additional Information P-4.a

Oscilloscope set up.

1 Configuration sub tab.
Channel 1
Select: Red probe and black probe - Differential.

2 Channel calculation sub tab.
Select: Maximum voltage.

3 Main oscilloscope display sub tab.
Y-axis select: Scale set to 1 V/div.
X-axis select: Scale set to 10 ms/div.

4 Select: Full screen.

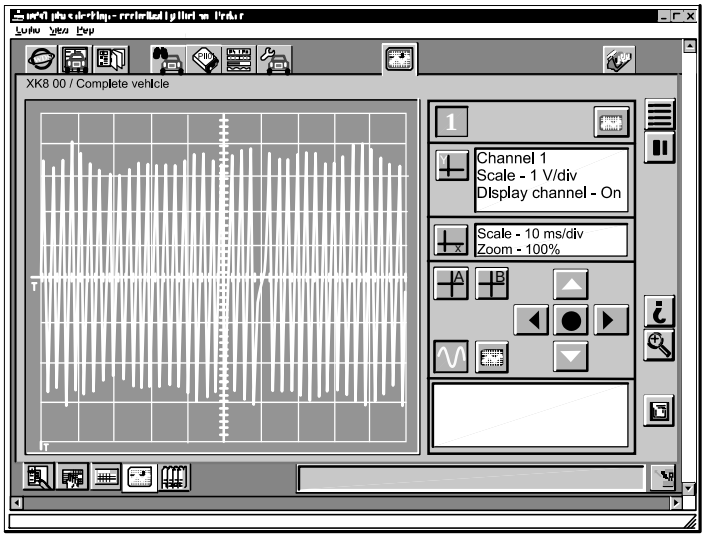


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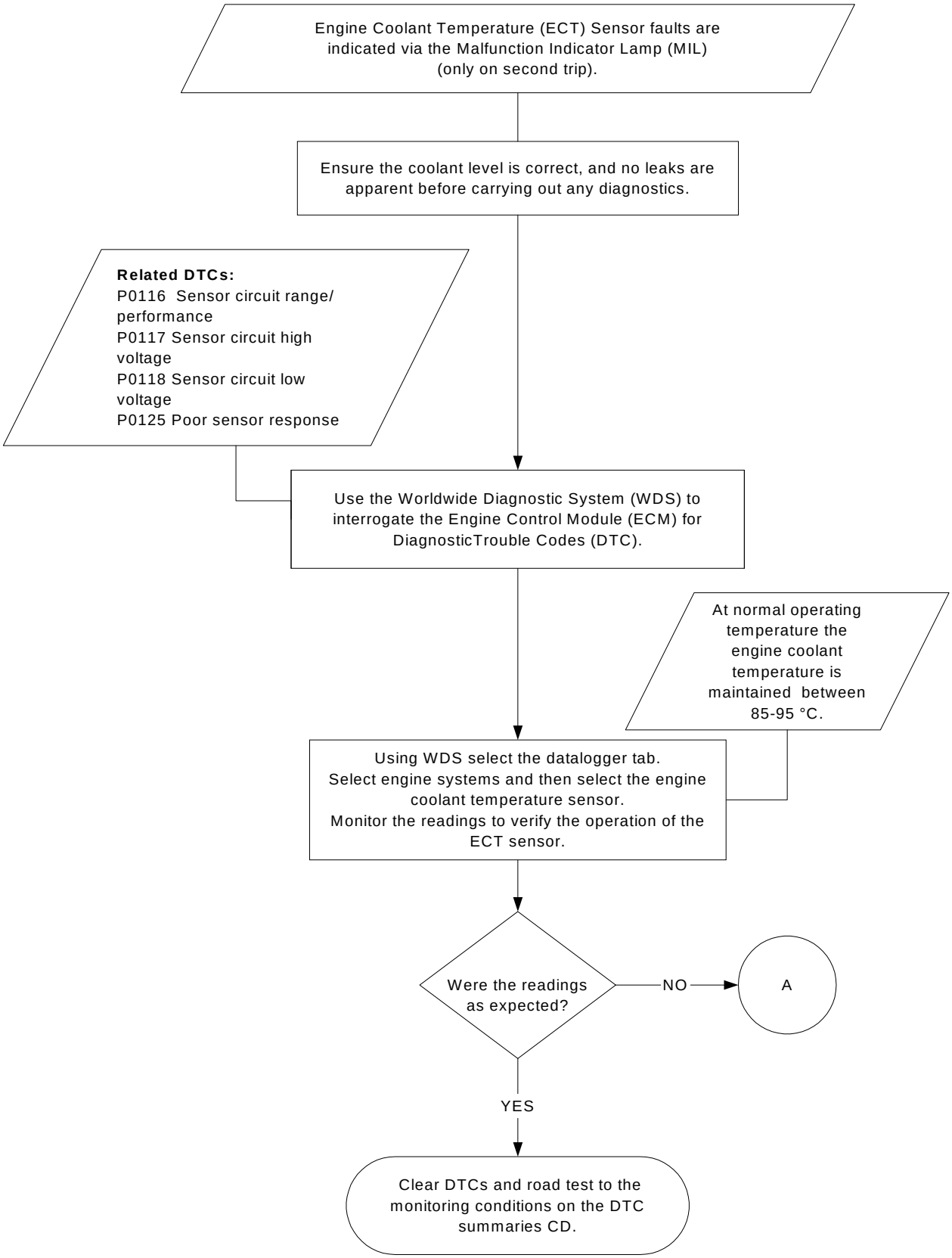
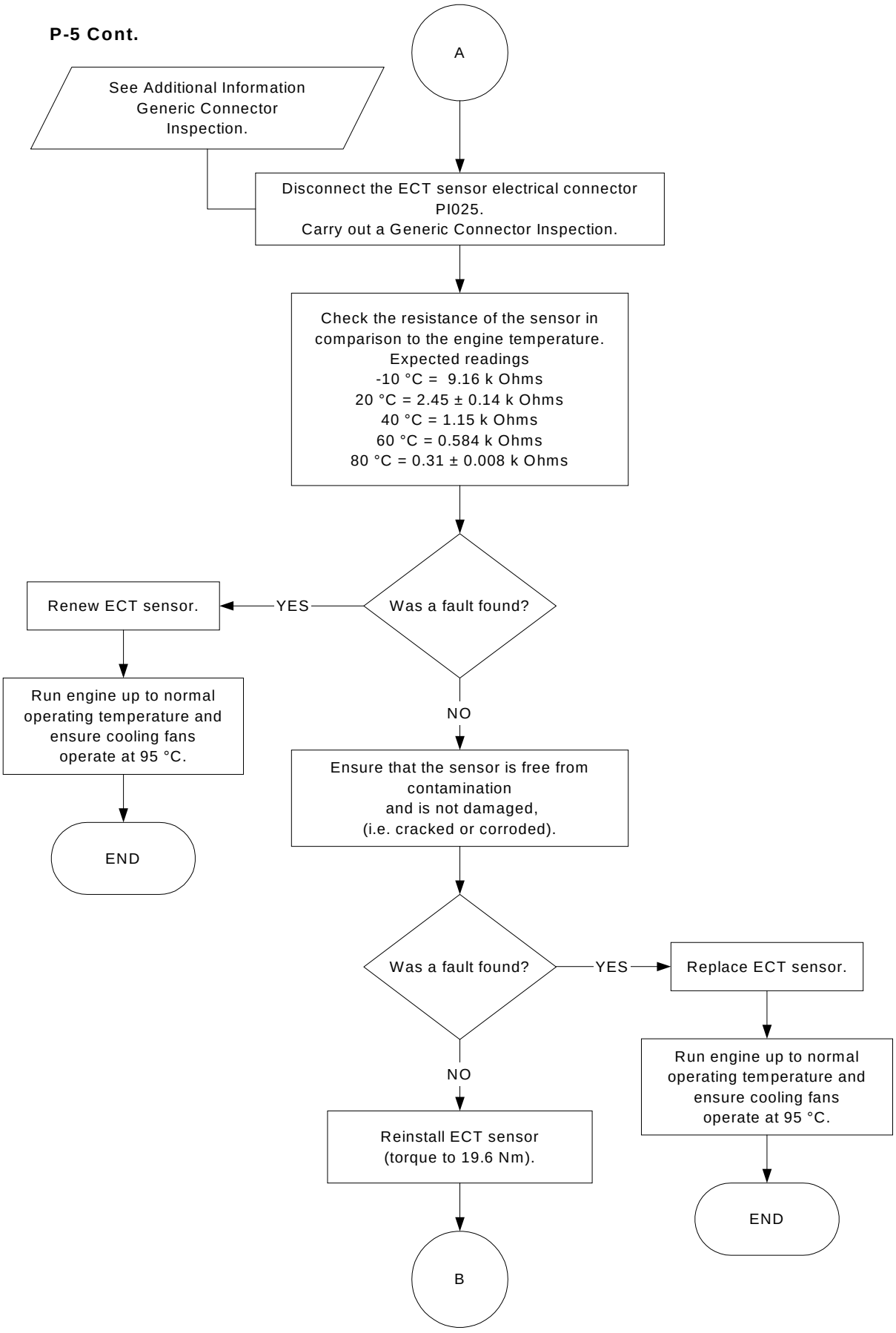
Illustration 3 Trace of the crankshaft position sensor at idle

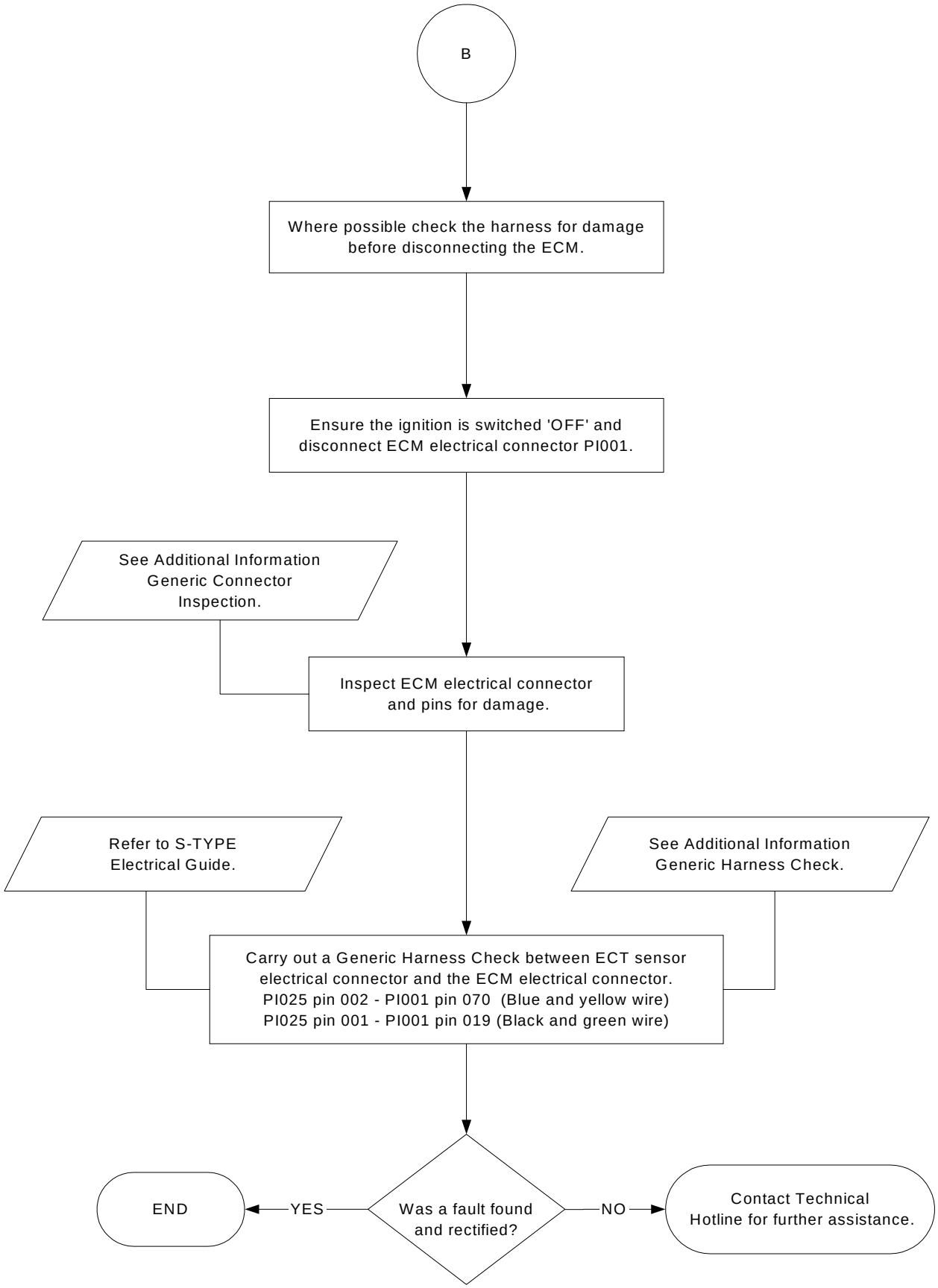
Engine Coolant Temperature Sensor
Flowchart P-5



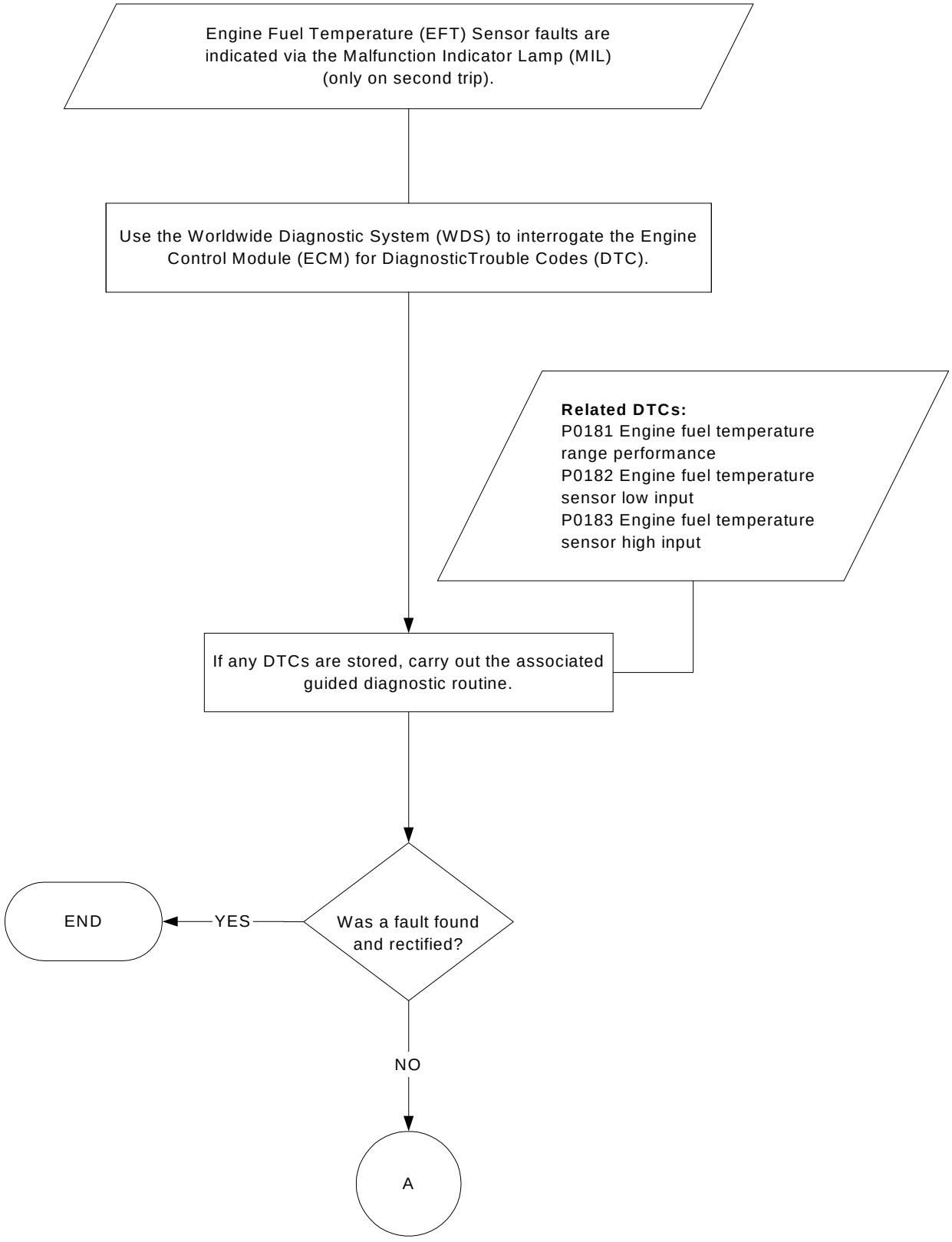
P-5 Cont.


A
See Additional Information
Generic Connector
Inspection.
Disconnect the ECT sensor electrical connector PI025.
Carry out a Generic Connector Inspection.
Check the resistance of the sensor in comparison to the engine temperature.
Expected readings
-10 °C = 9.16 k Ohms
20 °C = 2.45 ± 0.14 k Ohms
40 °C = 1.15 k Ohms
60 °C = 0.584 k Ohms
80 °C = 0.31 ± 0.008 k Ohms
Was a fault found?
YES
Renew ECT sensor.
Run engine up to normal operating temperature and ensure cooling fans operate at 95 °C.
END
NO
Ensure that the sensor is free from contamination and is not damaged, (i.e. cracked or corroded).
Was a fault found?
YES
Replace ECT sensor.
Run engine up to normal operating temperature and ensure cooling fans operate at 95 °C.
END
NO
Reinstall ECT sensor (torque to 19.6 Nm).
B

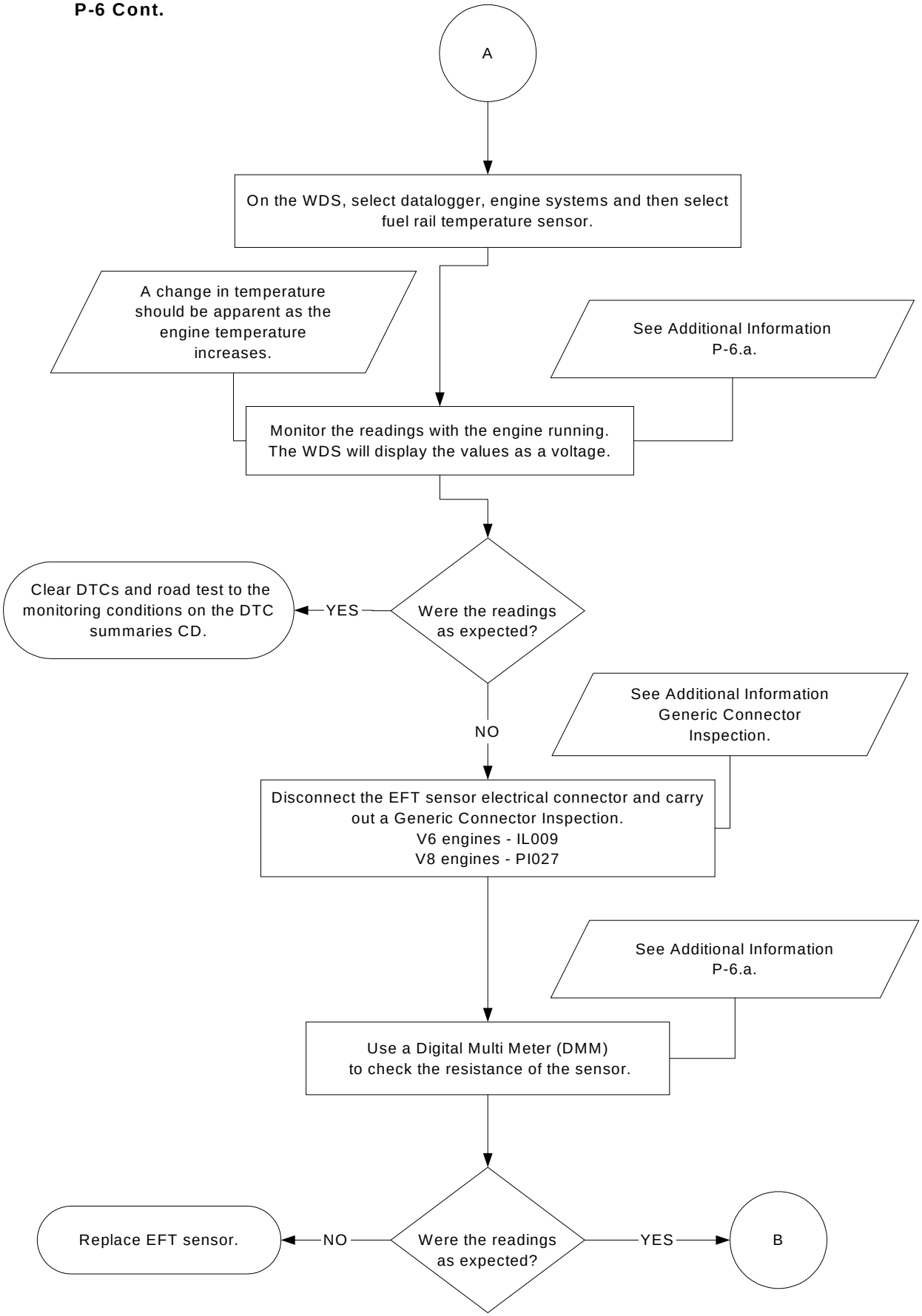
P-5 Cont.


B
Where possible check the harness for damage before disconnecting the ECM.
Ensure the ignition is switched 'OFF' and disconnect ECM electrical connector PI001.
See Additional Information Generic Connector Inspection.
Inspect ECM electrical connector and pins for damage.
Refer to S-TYPE Electrical Guide.
See Additional Information Generic Harness Check.
Carry out a Generic Harness Check between ECT sensor electrical connector and the ECM electrical connector.
PI025 pin 002 - PI001 pin 070 (Blue and yellow wire)
PI025 pin 001 - PI001 pin 019 (Black and green wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

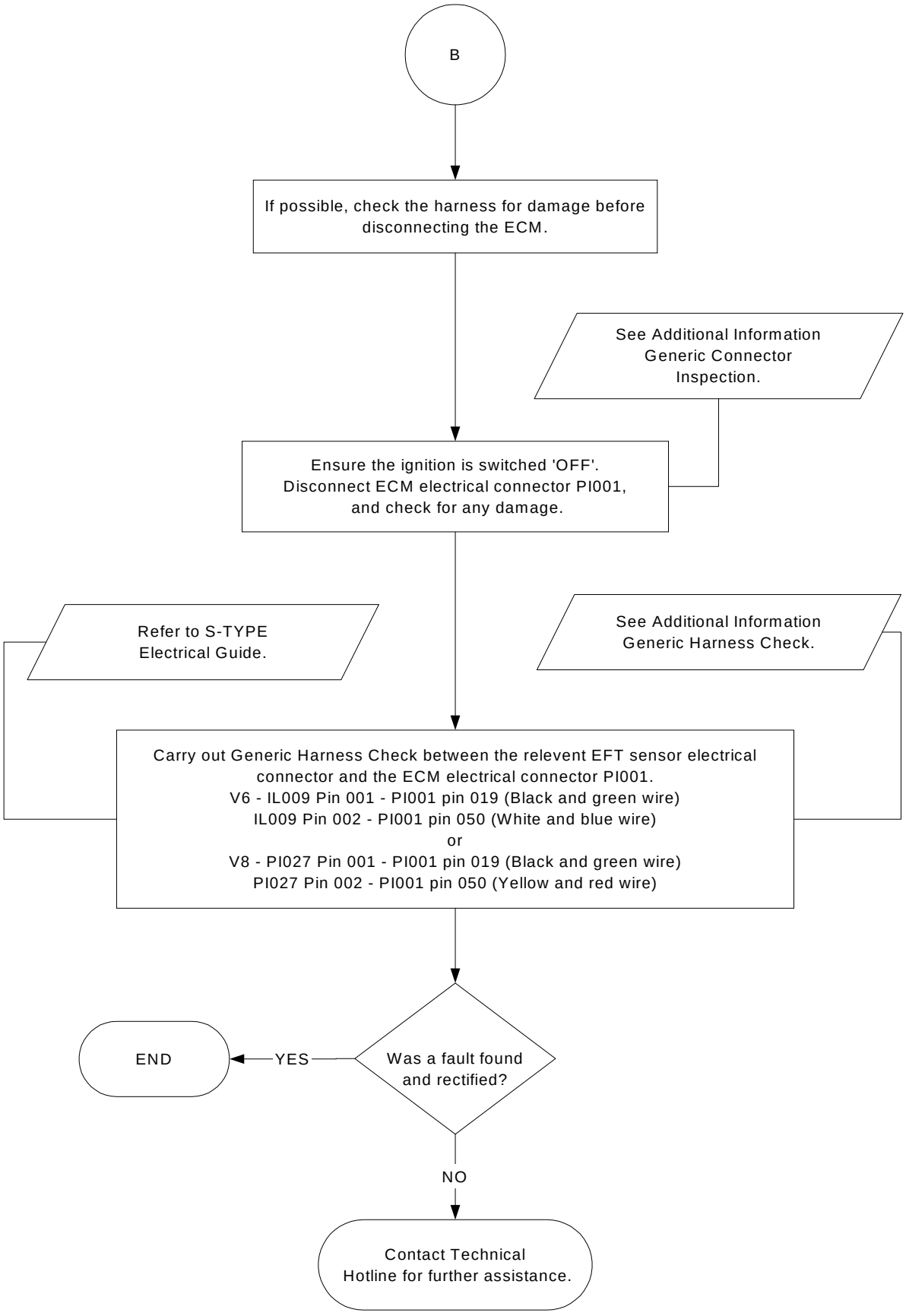
Engine Fuel Temperature Sensor
Flowchart P-6



P-6 Cont.


A
On the WDS, select datalogger, engine systems and then select fuel rail temperature sensor.
A change in temperature should be apparent as the engine temperature increases.
See Additional Information P-6.a.
Monitor the readings with the engine running. The WDS will display the values as a voltage.
Were the readings as expected?
YES
Clear DTCs and road test to the monitoring conditions on the DTC summaries CD.
NO
See Additional Information Generic Connector Inspection.
Disconnect the EFT sensor electrical connector and carry out a Generic Connector Inspection.
V6 engines - IL009
V8 engines - PI027
See Additional Information P-6.a.
Use a Digital Multi Meter (DMM) to check the resistance of the sensor.
Were the readings as expected?
NO
Replace EFT sensor.
YES
B

P-6 Cont.


B
If possible, check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
Refer to S-TYPE Electrical Guide.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between the relevent EFT sensor electrical connector and the ECM electrical connector PI001.
V6 - IL009 Pin 001 - PI001 pin 019 (Black and green wire)
IL009 Pin 002 - PI001 pin 050 (White and blue wire)
or
V8 - PI027 Pin 001 - PI001 pin 019 (Black and green wire)
PI027 Pin 002 - PI001 pin 050 (Yellow and red wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

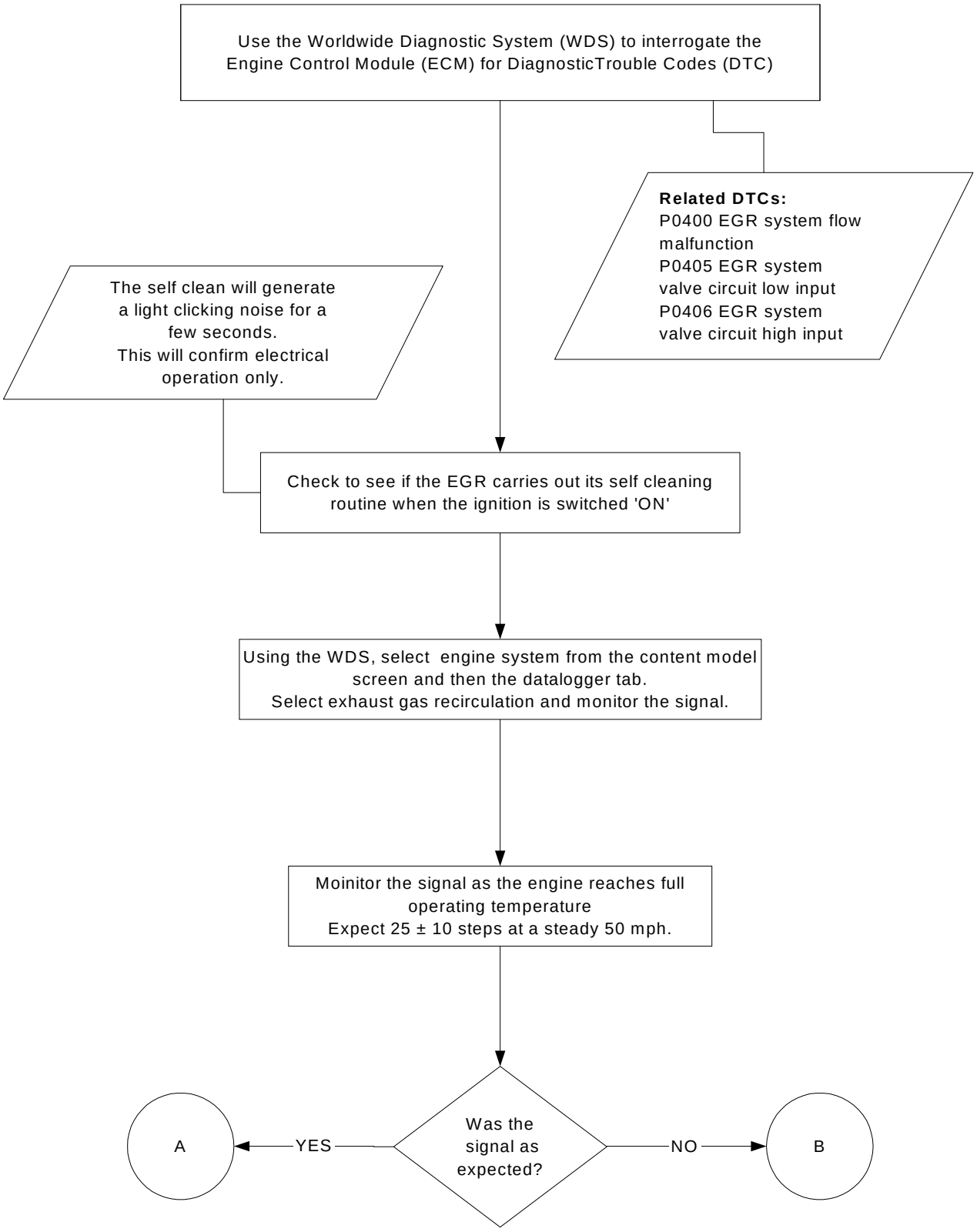
Additional Information P-6.a Engine Fuel Temperature Sensor Characteristics.		
Temperature.	Nominal resistance Using DMM.	WDS Datalogger voltage display.
-10°C (14°F)	160.3 k-ohms ± 8.3 k-ohms	4.15 volts ± 0.04 v
10°C (50°F)	58.9 k-ohms ± 2.9 k-ohms	3.52 volts ± 0.06 v
20°C (68°F)	37.3 k-ohms ± 2.1 k-ohms	3.09 volts ± 0.07 v
30°C (86°F)	24.2 k-ohms ± 1.4 k-ohms	2.62 volts ± 0.07 v
40°C (104°F)	16.1 k-ohms ± 0.9 k-ohms s	2.15 volts ± 0.08 v

Abbreviations:
WDS - Worldwide Diagnostic System.
DMM - Digital Multi Meter.

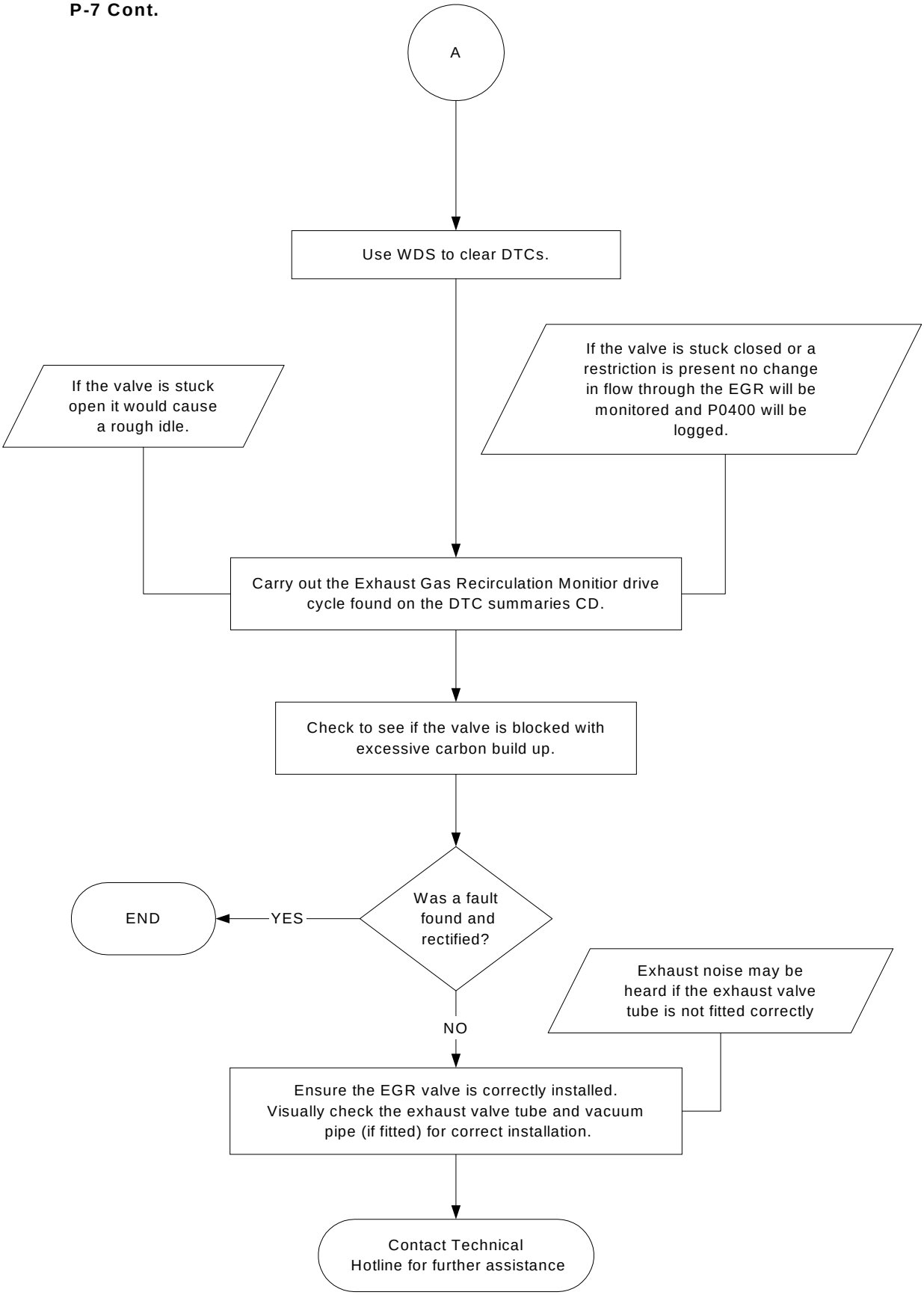
Note: When testing the Engine Fuel Temperature sensor, if the vehicle is cold (approximately workshop temperature 20°C) it is possible to invoke a temperature change by rubbing the rail where the sensor is situated, this will increase the temperature and decrease the resistance.

WARNING: Parts may be hot.

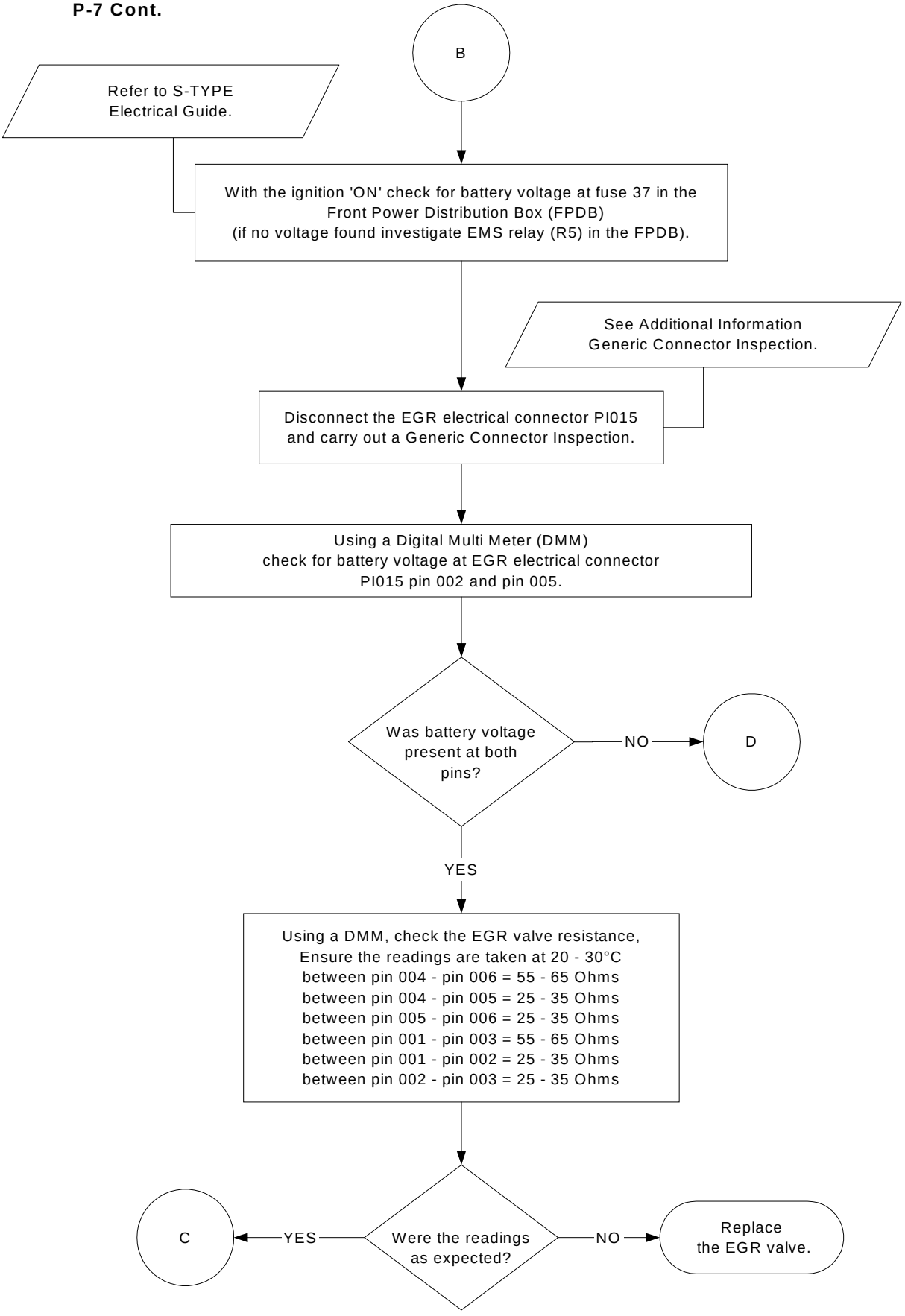
V8 NA & SC Exhaust Gas Recirculation Valve Flowchart P-7



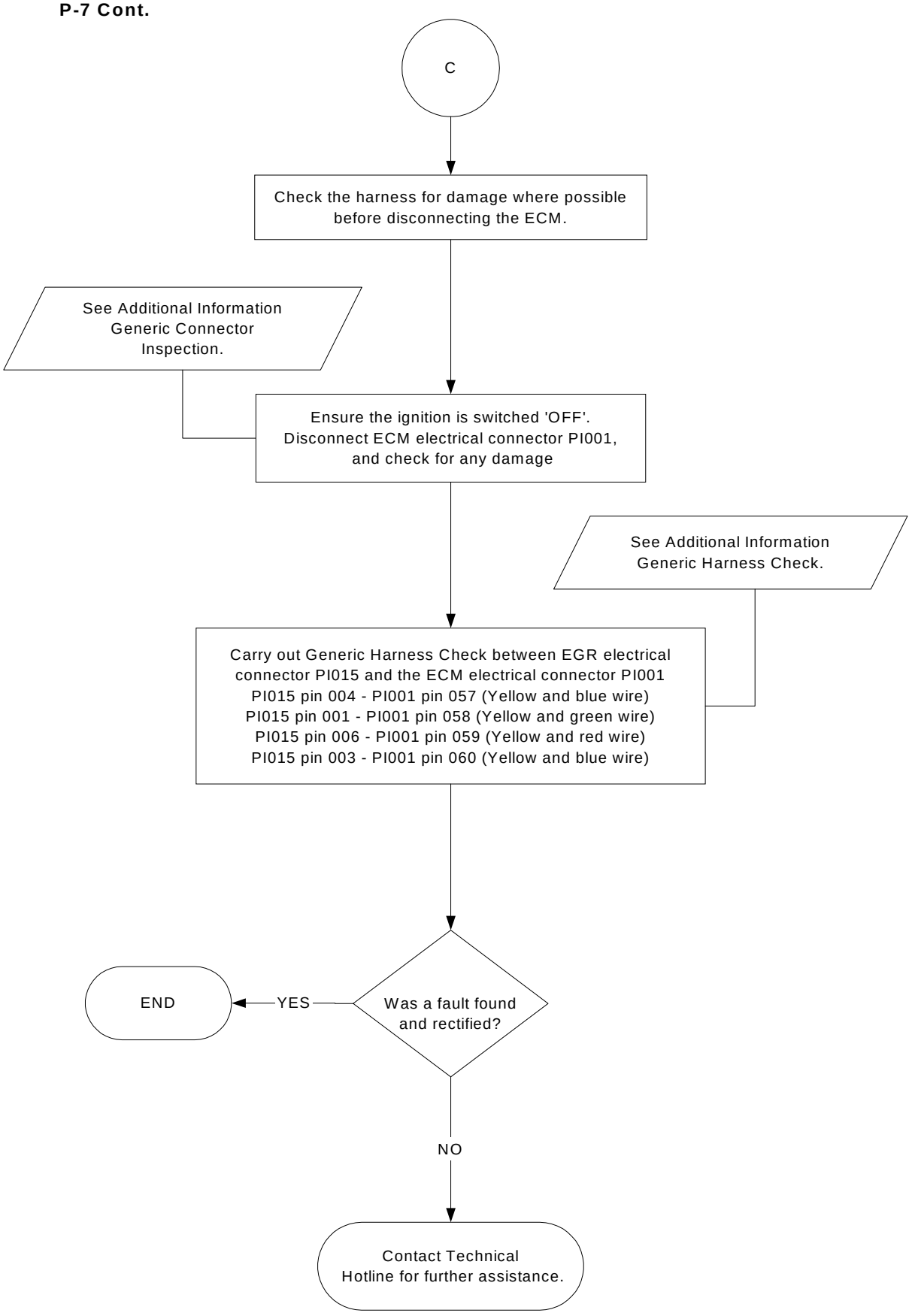
P-7 Cont.


A
Use WDS to clear DTCs.
If the valve is stuck open it would cause a rough idle.
If the valve is stuck closed or a restriction is present no change in flow through the EGR will be monitored and P0400 will be logged.
Carry out the Exhaust Gas Recirculation Monitior drive cycle found on the DTC summaries CD.
Check to see if the valve is blocked with excessive carbon build up.
Was a fault found and rectified?
YES
END
NO
Exhaust noise may be heard if the exhaust valve tube is not fitted correctly
Ensure the EGR valve is correctly installed. Visually check the exhaust valve tube and vacuum pipe (if fitted) for correct installation.
Contact Technical Hotline for further assistance

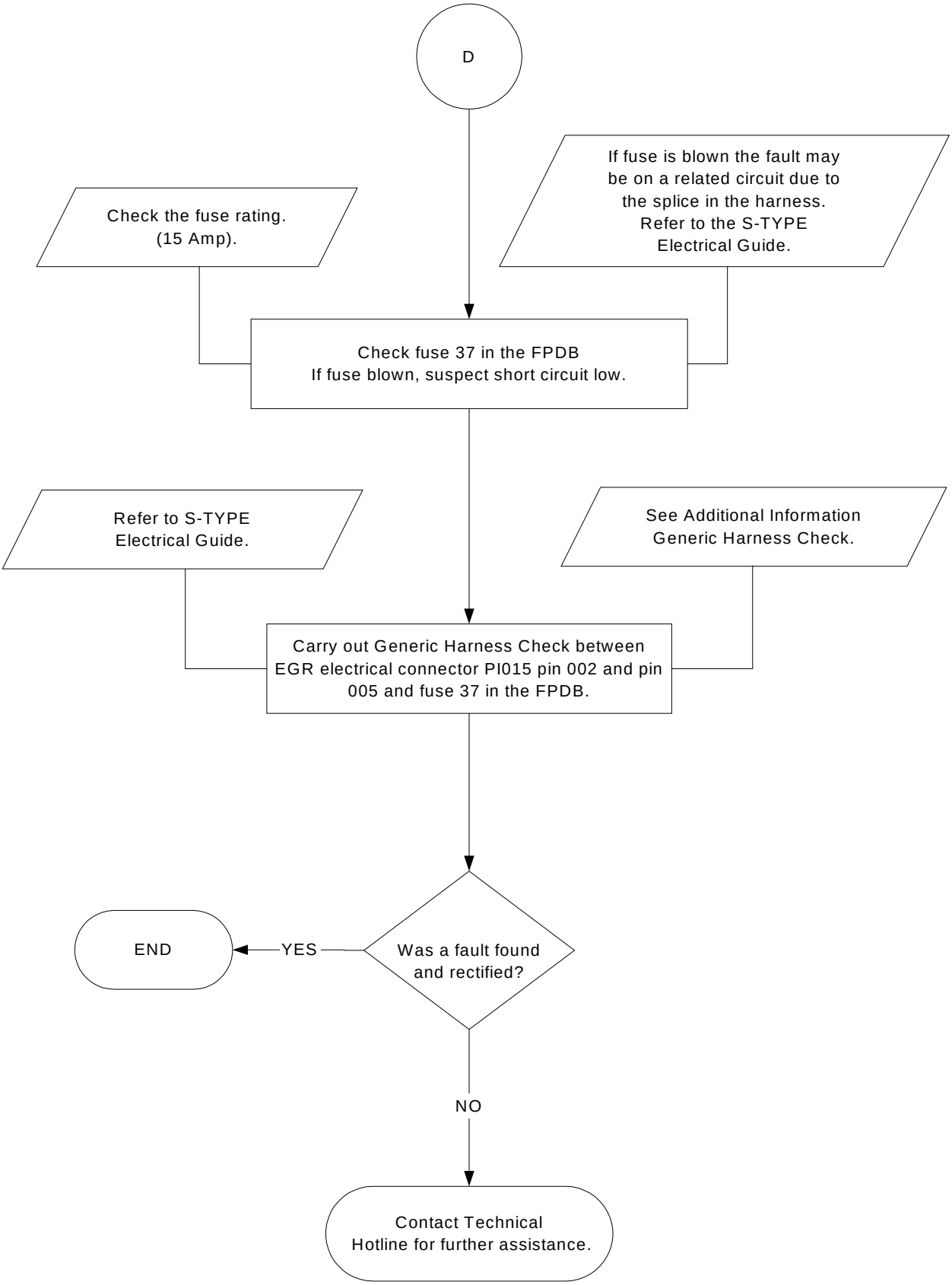
P-7 Cont.


B
Refer to S-TYPE Electrical Guide.
With the ignition 'ON' check for battery voltage at fuse 37 in the Front Power Distribution Box (FPDB) (if no voltage found investigate EMS relay (R5) in the FPDB).
See Additional Information Generic Connector Inspection.
Disconnect the EGR electrical connector PI015 and carry out a Generic Connector Inspection.
Using a Digital Multi Meter (DMM) check for battery voltage at EGR electrical connector PI015 pin 002 and pin 005.
Was battery voltage present at both pins?
NO
D
YES
Using a DMM, check the EGR valve resistance, Ensure the readings are taken at 20 - 30°C
between pin 004 - pin 006 = 55 - 65 Ohms
between pin 004 - pin 005 = 25 - 35 Ohms
between pin 005 - pin 006 = 25 - 35 Ohms
between pin 001 - pin 003 = 55 - 65 Ohms
between pin 001 - pin 002 = 25 - 35 Ohms
between pin 002 - pin 003 = 25 - 35 Ohms
Were the readings as expected?
YES
C
NO
Replace the EGR valve.

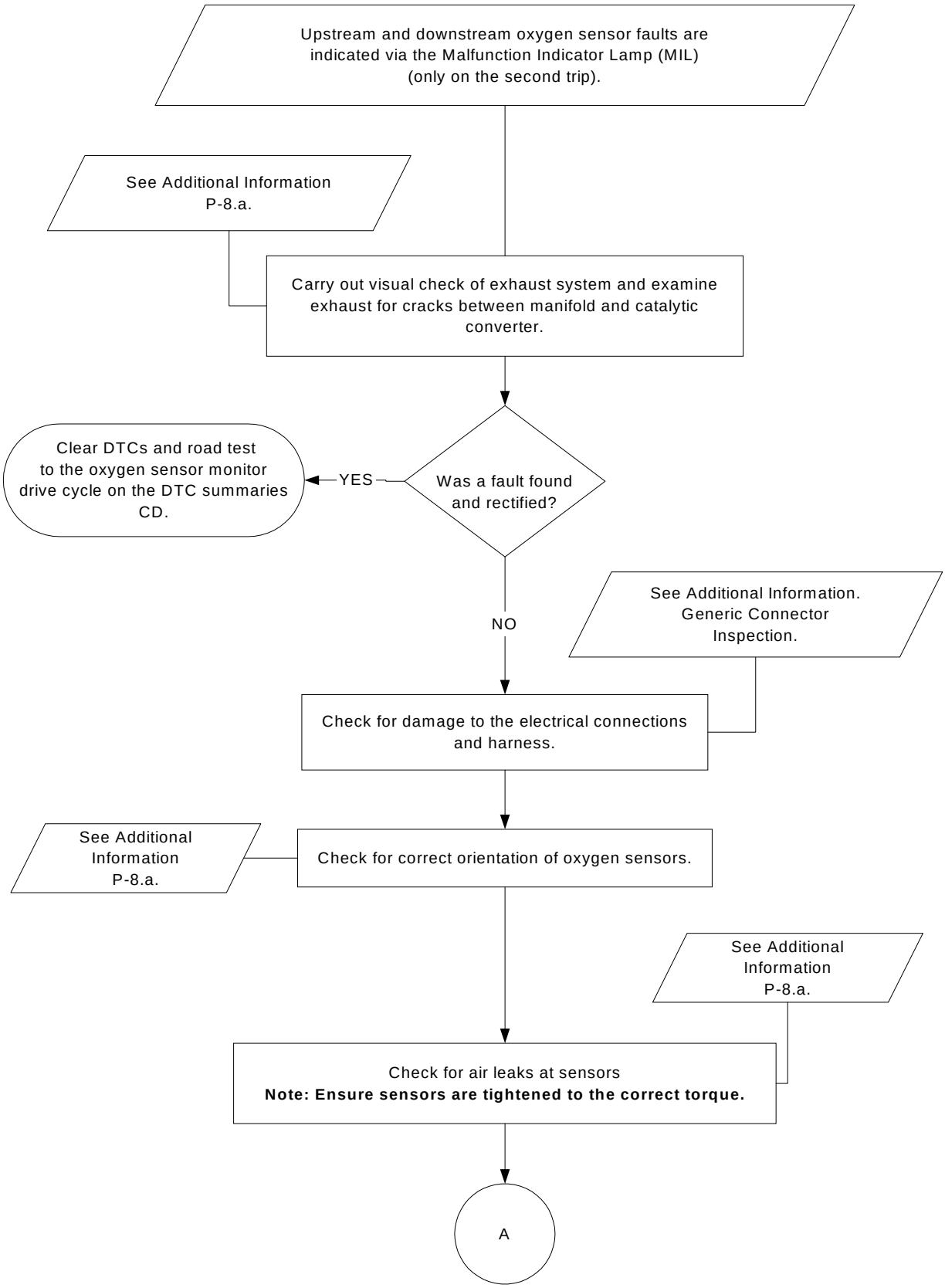
P-7 Cont.


C
Check the harness for damage where possible before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between EGR electrical connector PI015 and the ECM electrical connector PI001
PI015 pin 004 - PI001 pin 057 (Yellow and blue wire)
PI015 pin 001 - PI001 pin 058 (Yellow and green wire)
PI015 pin 006 - PI001 pin 059 (Yellow and red wire)
PI015 pin 003 - PI001 pin 060 (Yellow and blue wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

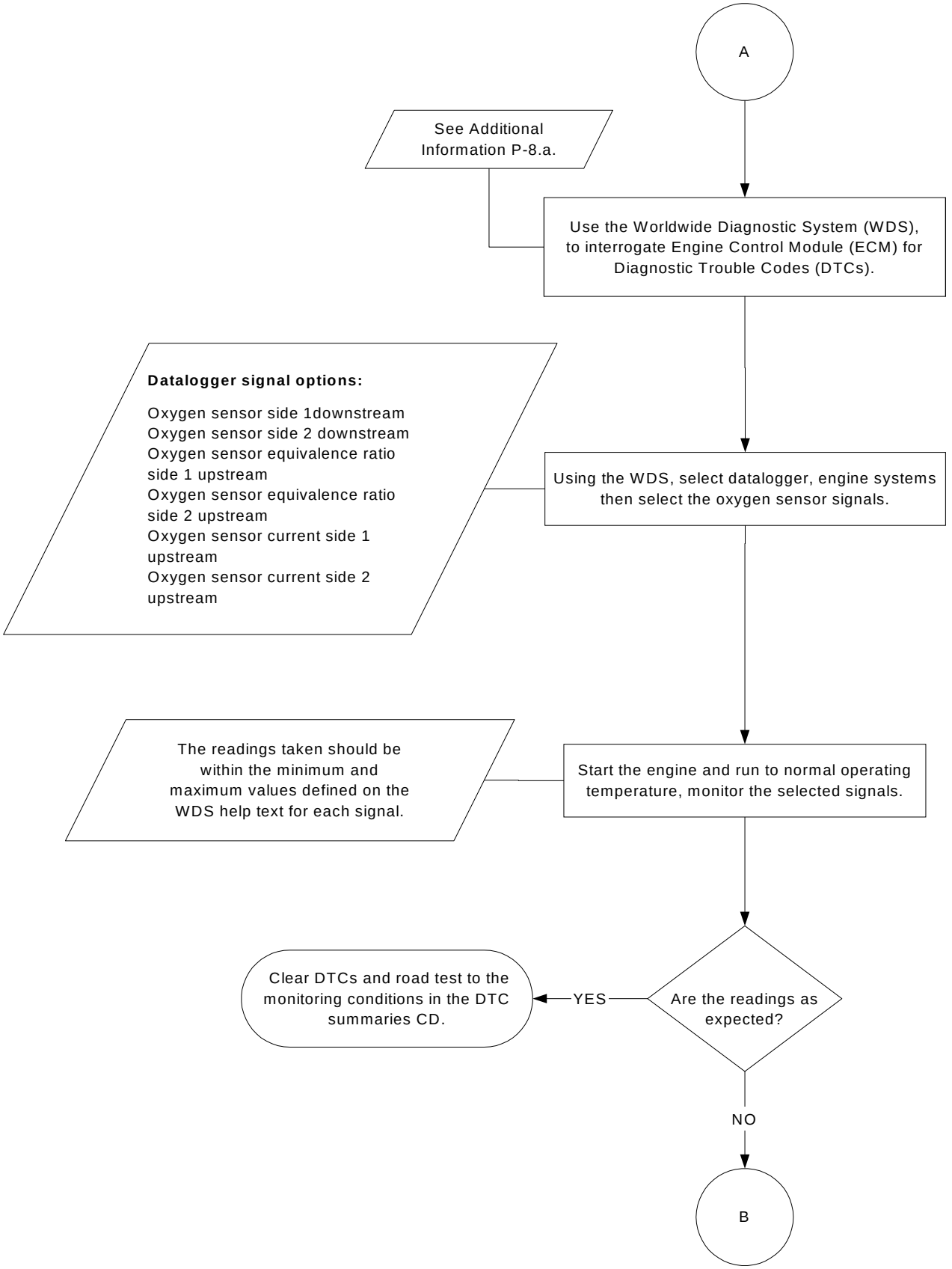
P-7 Cont.


D
If fuse is blown the fault may be on a related circuit due to the splice in the harness. Refer to the S-TYPE Electrical Guide.
Check the fuse rating. (15 Amp).
Check fuse 37 in the FPDB
If fuse blown, suspect short circuit low.
Refer to S-TYPE Electrical Guide.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between EGR electrical connector PI015 pin 002 and pin 005 and fuse 37 in the FPDB.
END
YES
Was a fault found and rectified?
NO
Contact Technical Hotline for further assistance.

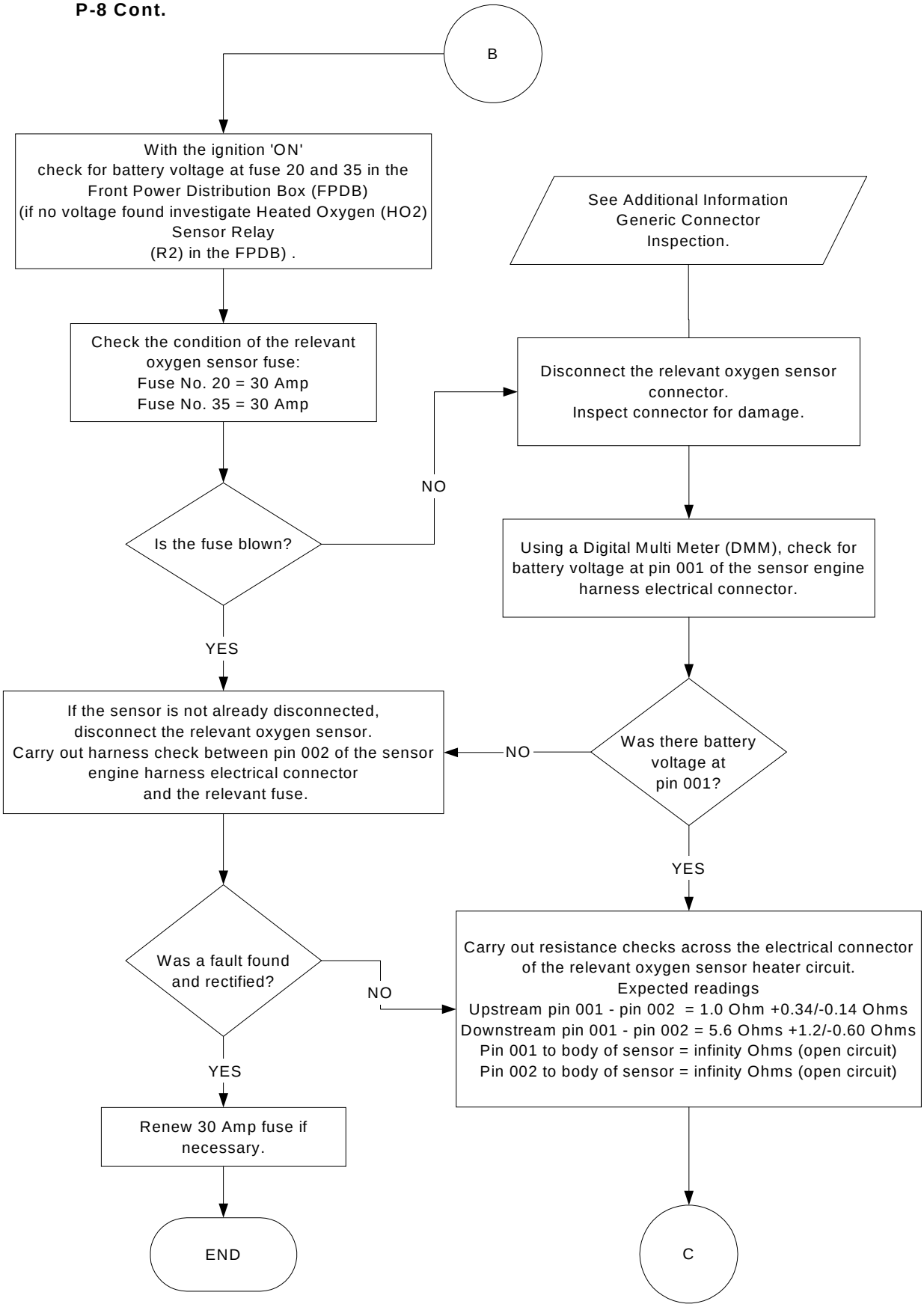
Upstream and Downstream Oxygen Sensor Flowchart P-8



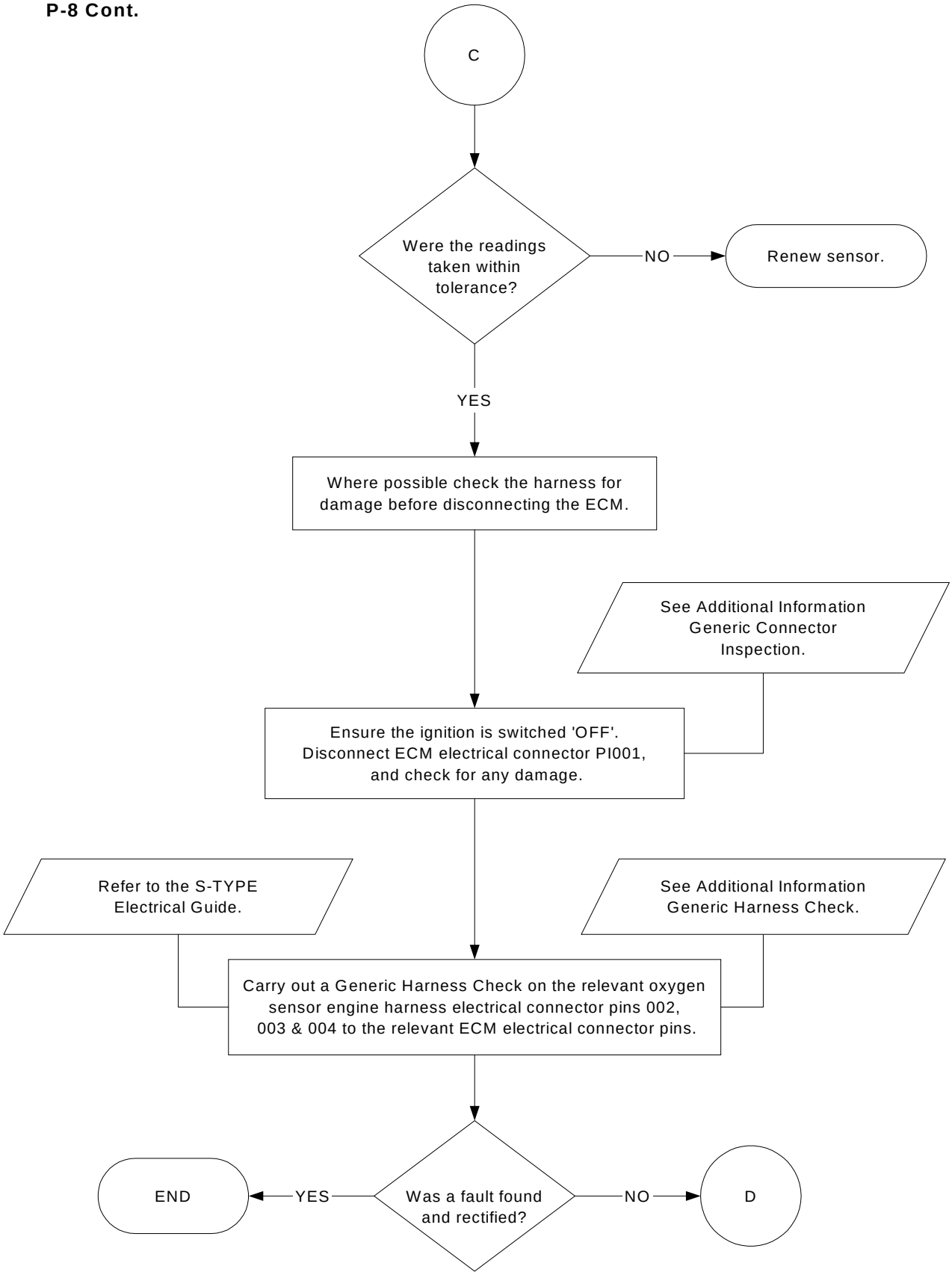
P-8 Cont.


A
See Additional Information P-8.a.
Use the Worldwide Diagnostic System (WDS), to interrogate Engine Control Module (ECM) for Diagnostic Trouble Codes (DTCs).
Datalogger signal options:
Oxygen sensor side 1downstream
Oxygen sensor side 2 downstream
Oxygen sensor equivalence ratio side 1 upstream
Oxygen sensor equivalence ratio side 2 upstream
Oxygen sensor current side 1 upstream
Oxygen sensor current side 2 upstream
Using the WDS, select datalogger, engine systems then select the oxygen sensor signals.
The readings taken should be within the minimum and maximum values defined on the WDS help text for each signal.
Start the engine and run to normal operating temperature, monitor the selected signals.
Clear DTCs and road test to the monitoring conditions in the DTC summaries CD.
YES
Are the readings as expected?
NO
B

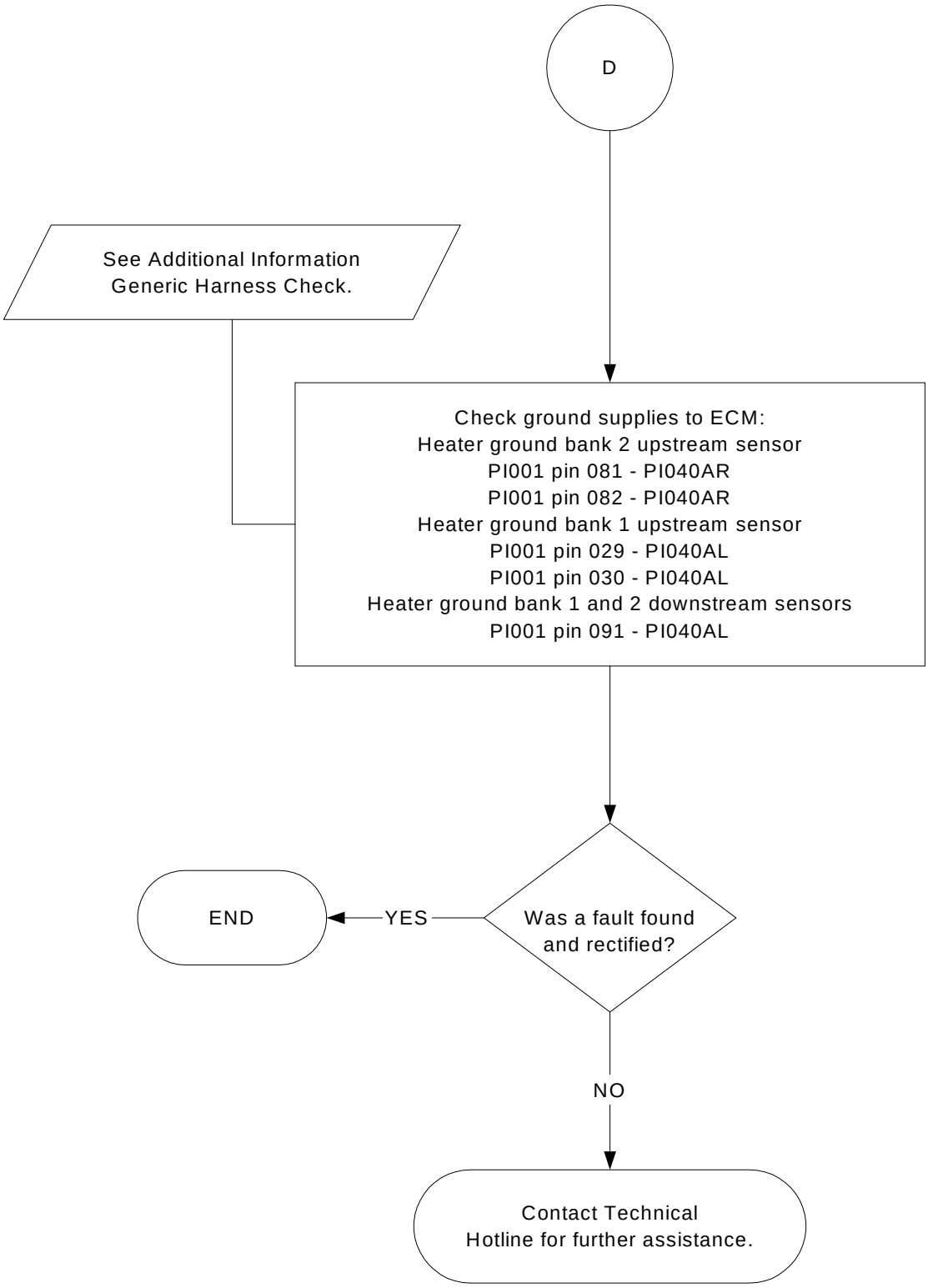
P-8 Cont.


B
With the ignition 'ON'
check for battery voltage at fuse 20 and 35 in the
Front Power Distribution Box (FPDB)
(if no voltage found investigate Heated Oxygen (HO2)
Sensor Relay
(R2) in the FPDB) .
See Additional Information
Generic Connector
Inspection.
Check the condition of the relevant
oxygen sensor fuse:
Fuse No. 20 = 30 Amp
Fuse No. 35 = 30 Amp
Disconnect the relevant oxygen sensor
connector.
Inspect connector for damage.
NO
Is the fuse blown?
Using a Digital Multi Meter (DMM), check for
battery voltage at pin 001 of the sensor engine
harness electrical connector.
YES
If the sensor is not already disconnected,
disconnect the relevant oxygen sensor.
Carry out harness check between pin 002 of the sensor
engine harness electrical connector
and the relevant fuse.
NO
Was there battery
voltage at
pin 001?
YES
Was a fault found
and rectified?
NO
Carry out resistance checks across the electrical connector
of the relevant oxygen sensor heater circuit.
Expected readings
Upstream pin 001 - pin 002 = 1.0 Ohm +0.34/-0.14 Ohms
Downstream pin 001 - pin 002 = 5.6 Ohms +1.2/-0.60 Ohms
Pin 001 to body of sensor = infinity Ohms (open circuit)
Pin 002 to body of sensor = infinity Ohms (open circuit)
YES
Renew 30 Amp fuse if
necessary.
END
C

P-8 Cont.


C
Were the readings taken within tolerance?
NO
Renew sensor.
YES
Where possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
Refer to the S-TYPE Electrical Guide.
See Additional Information Generic Harness Check.
Carry out a Generic Harness Check on the relevant oxygen sensor engine harness electrical connector pins 002, 003 & 004 to the relevant ECM electrical connector pins.
END
YES
Was a fault found and rectified?
NO
D

P-8 Cont.


D
See Additional Information
Generic Harness Check.
Check ground supplies to ECM:
Heater ground bank 2 upstream sensor
PI001 pin 081 - PI040AR
PI001 pin 082 - PI040AR
Heater ground bank 1 upstream sensor
PI001 pin 029 - PI040AL
PI001 pin 030 - PI040AL
Heater ground bank 1 and 2 downstream sensors
PI001 pin 091 - PI040AL
Was a fault found
and rectified?
YES
END
NO
Contact Technical
Hotline for further assistance.

Additional Information P-8.a

Subject - Upstream and downstream oxygen Sensors.

Checks.

- The upstream sensor is designated UHEGO and has a gray connector.
- The downstream sensor is designated HEGO and has a black connector.
- To ensure that the sensors are fitted correctly, the upstream sensor is situated directly above the catalytic converter (Pre- catalytic converter), and the downstream sensor is at the center of the catalytic converter.
- If the sensors are fitted vice versa this will cause catalytic converter monitor diagnostic trouble codes P0420 and P0430 to be logged.
- If the catalytic converter monitor DTCs are logged (P0420/P0430) and the orientation of the sensors is correct, then suspect catalytic converter failure. Remove the catalytic converter and visually check the honeycomb layout.
- Air leaks are possible at the connection of the sensor to the exhaust. Ensure the sensors are tightened to the correct torque.
- Problems may occur due to air leaks within the exhaust system.
- Carry out visual checks for cracks and leaks from the manifold down to the catalytic converter.
- Listen for the exhaust vapor escaping when cold, as it may not be noticeable as the exhaust warms and expands.

Cautions.

Removal. (Always refer to JTIS)

Ensure the connector on the fly lead is disconnected before removal.
Failure to do this may cause the wires to twist and damage or pull out of the sensor.

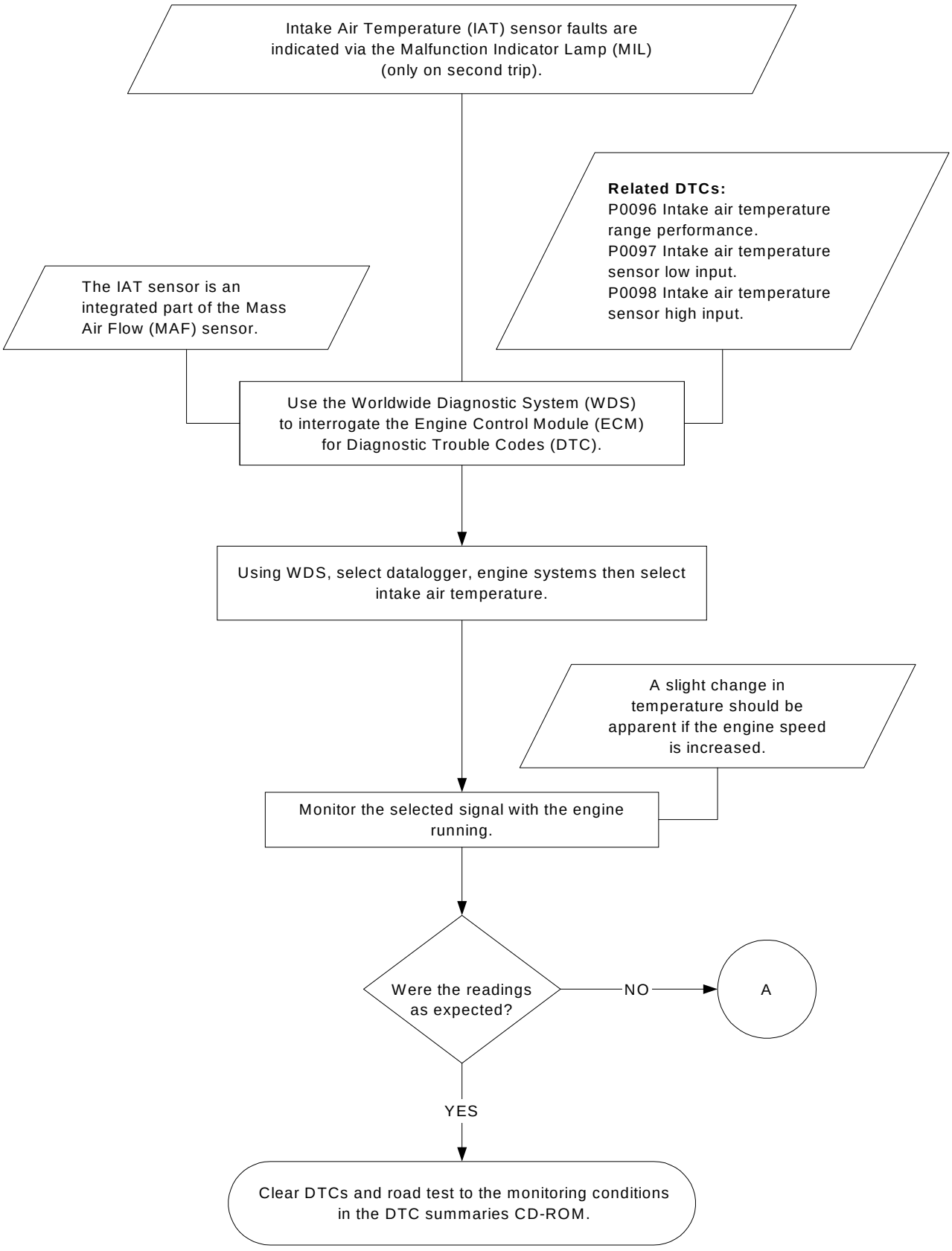
Installation. (Always refer to JTIS)

Over tightening may cause damage to the element within the sensor.
Ensure when fitting the sensor the correct tightening torque is used.
(Torque setting for both sensors 40 Nm +/- 7.2 Nm.)
Ensure the fly lead is routed correctly and is not taut, as this may cause damage with engine movement.

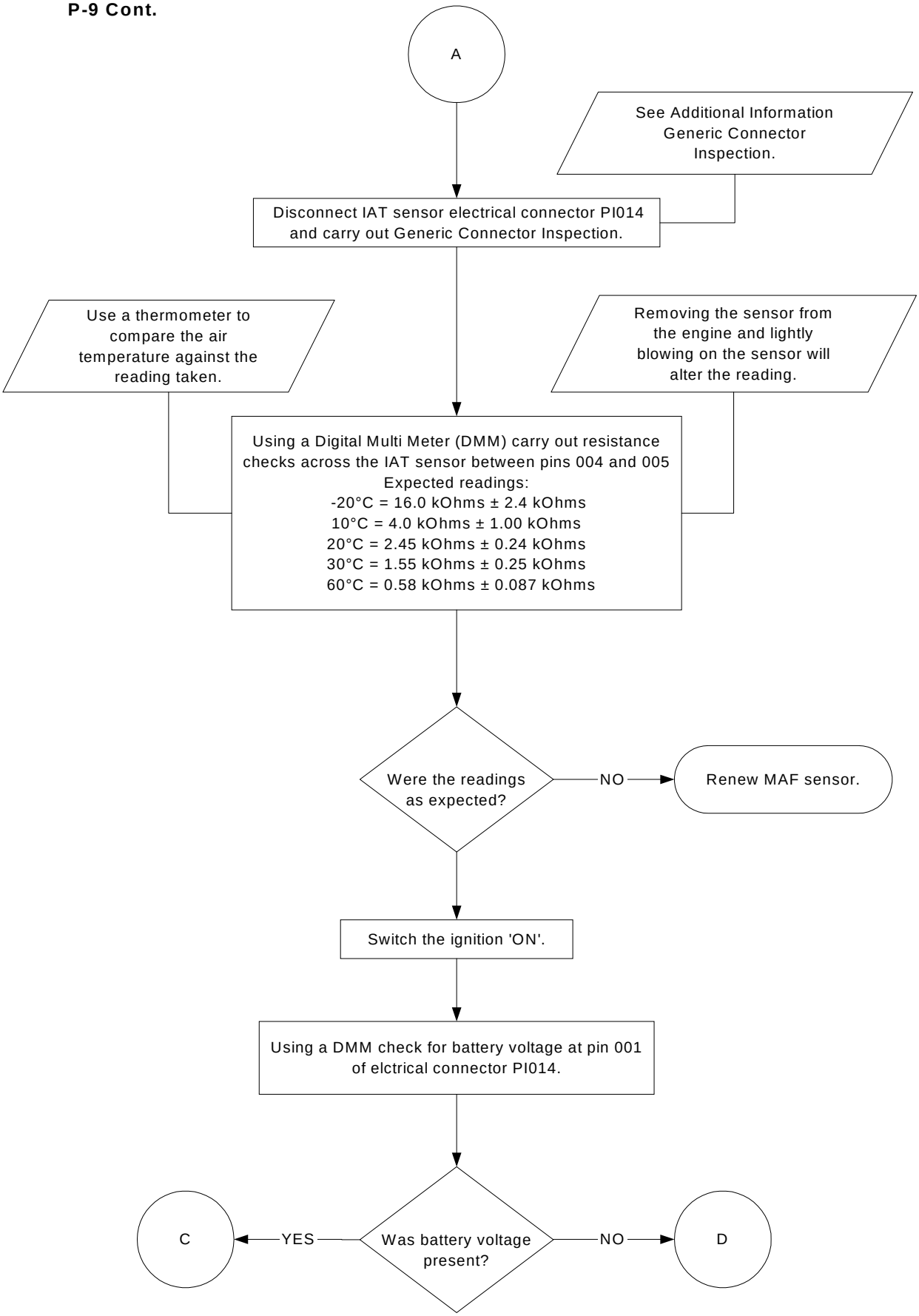
P-8.a Cont.

Additional Information			
Upstream oxygen sensor Diagnostic Trouble Codes		Downstream oxygen sensor Diagnostic Trouble Codes	
DTC	Description	DTC	Description
P0031	Heater control circuit low A	P0037	Heater control circuit low A
P0032	Heater control circuit high A	P0057	Heater control circuit low B
P0051	Heater control circuit low B	P0038	Heater control circuit high A
P0052	Heater control circuit high B	P0058	Heater control circuit high B
P0131	Circuit low voltage A	P0137	Circuit low voltage A
P0132	Circuit high voltage A	P0157	Circuit low voltage B
P0133	Circuit slow response 1A	P0138	Circuit high voltage A
P0151	Circuit low voltage B	P0158	Circuit high voltage B
P0152	Circuit high voltage B	P0140	Circuit no activity A
P0153	Circuit slow response 1B	P0160	Circuit no activity B
P1646	Control module open/shorted A		
P1647	Control module open/shorted B		
Refer to the DTC Summaries CD-ROM for further information.			

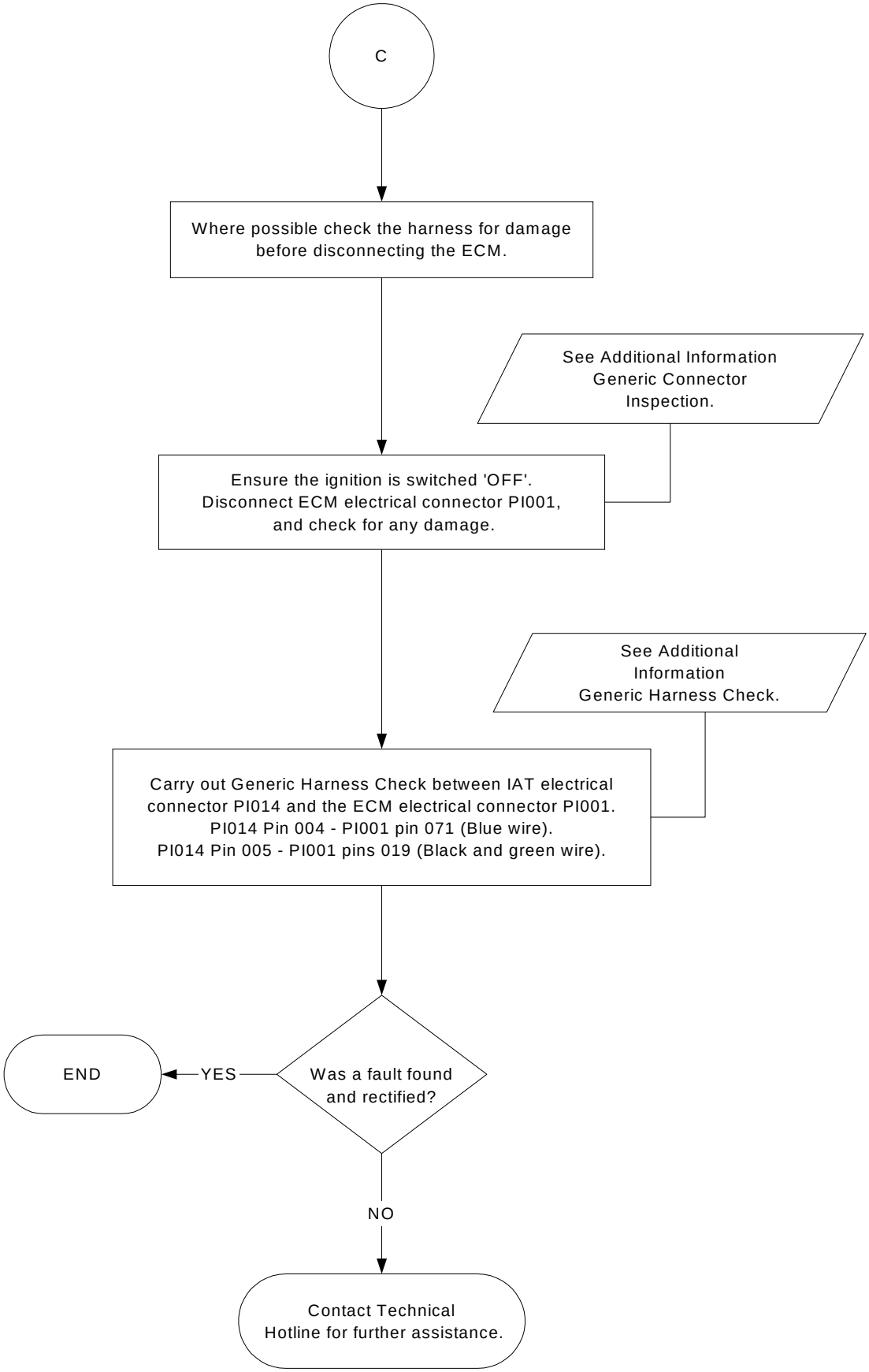
V6/V8 N/A Intake Air Temperature Sensor Flowchart P-9



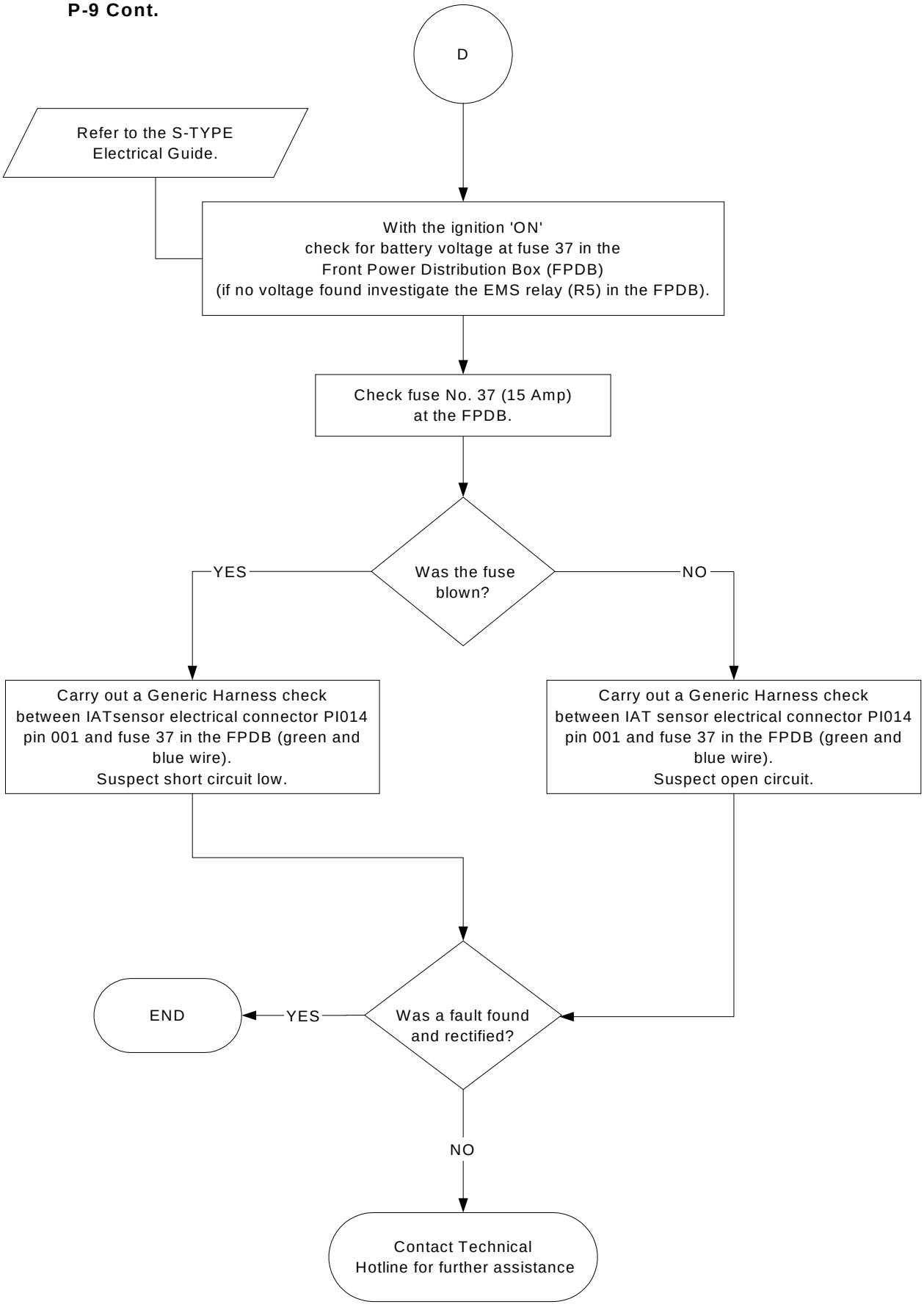
P-9 Cont.


A
See Additional Information Generic Connector Inspection.
Disconnect IAT sensor electrical connector PI014 and carry out Generic Connector Inspection.
Use a thermometer to compare the air temperature against the reading taken.
Removing the sensor from the engine and lightly blowing on the sensor will alter the reading.
Using a Digital Multi Meter (DMM) carry out resistance checks across the IAT sensor between pins 004 and 005
Expected readings:
-20°C = 16.0 kOhms ± 2.4 kOhms
10°C = 4.0 kOhms ± 1.00 kOhms
20°C = 2.45 kOhms ± 0.24 kOhms
30°C = 1.55 kOhms ± 0.25 kOhms
60°C = 0.58 kOhms ± 0.087 kOhms
Were the readings as expected?
NO
Renew MAF sensor.
Switch the ignition 'ON'.
Using a DMM check for battery voltage at pin 001 of elctrical connector PI014.
C
YES
Was battery voltage present?
NO
D

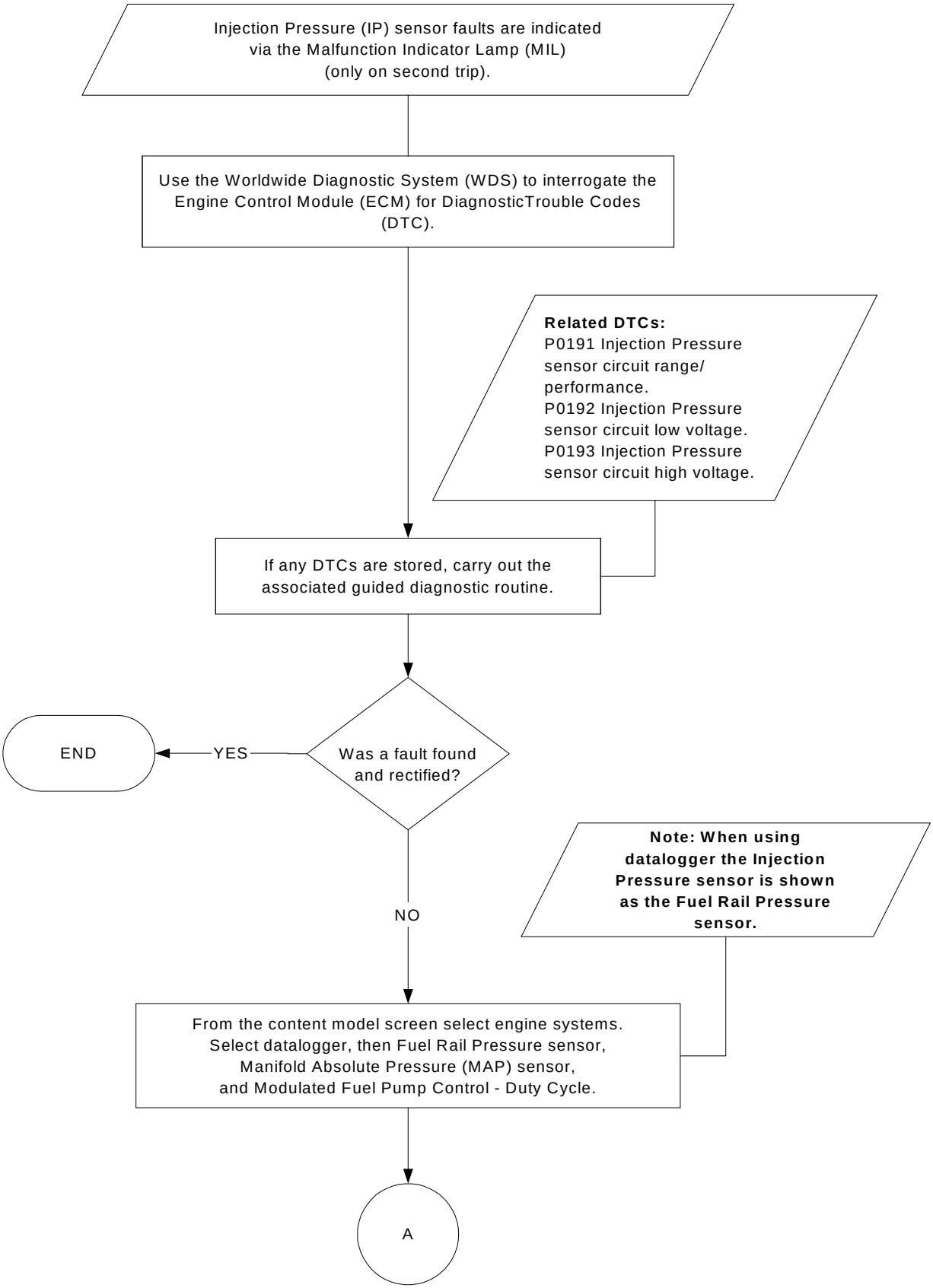
P-9 Cont.


C
Where possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between IAT electrical connector PI014 and the ECM electrical connector PI001.
PI014 Pin 004 - PI001 pin 071 (Blue wire).
PI014 Pin 005 - PI001 pins 019 (Black and green wire).
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

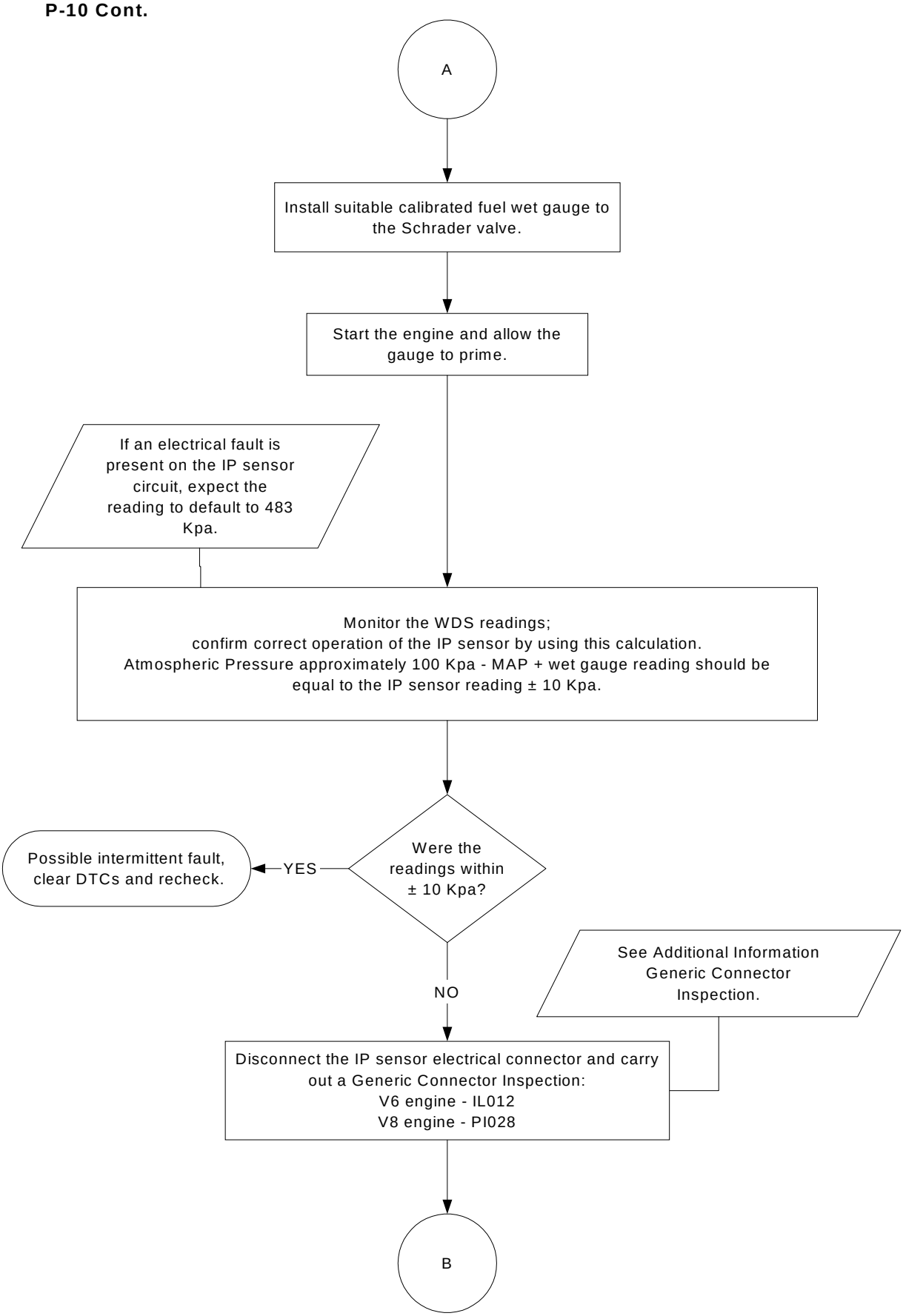
P-9 Cont.


D
Refer to the S-TYPE Electrical Guide.
With the ignition 'ON' check for battery voltage at fuse 37 in the Front Power Distribution Box (FPDB) (if no voltage found investigate the EMS relay (R5) in the FPDB).
Check fuse No. 37 (15 Amp) at the FPDB.
Was the fuse blown?
YES
NO
Carry out a Generic Harness check between IATsensor electrical connector PI014 pin 001 and fuse 37 in the FPDB (green and blue wire). Suspect short circuit low.
Carry out a Generic Harness check between IAT sensor electrical connector PI014 pin 001 and fuse 37 in the FPDB (green and blue wire). Suspect open circuit.
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance

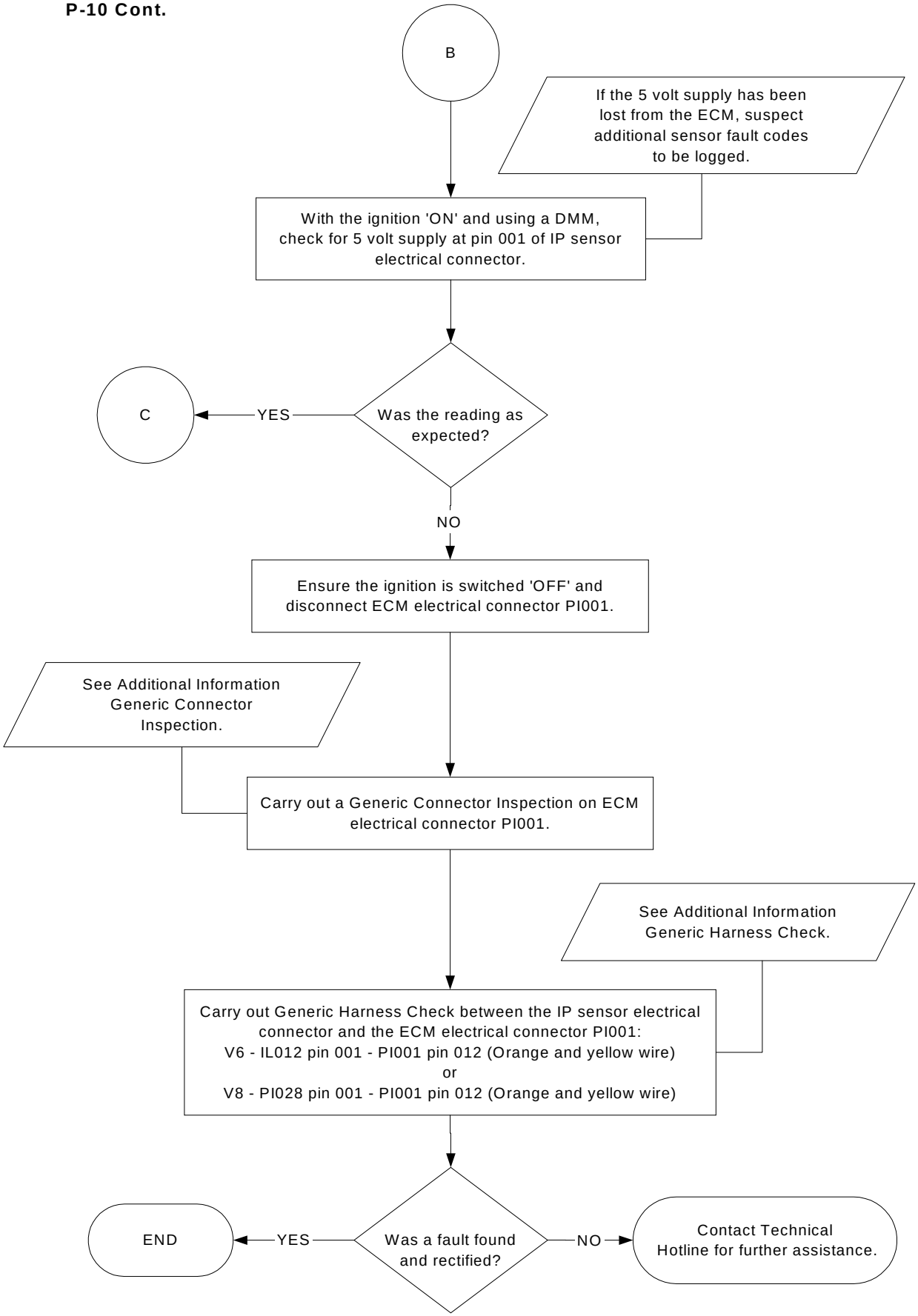
Injection Pressure Sensor
Flowchart P-10



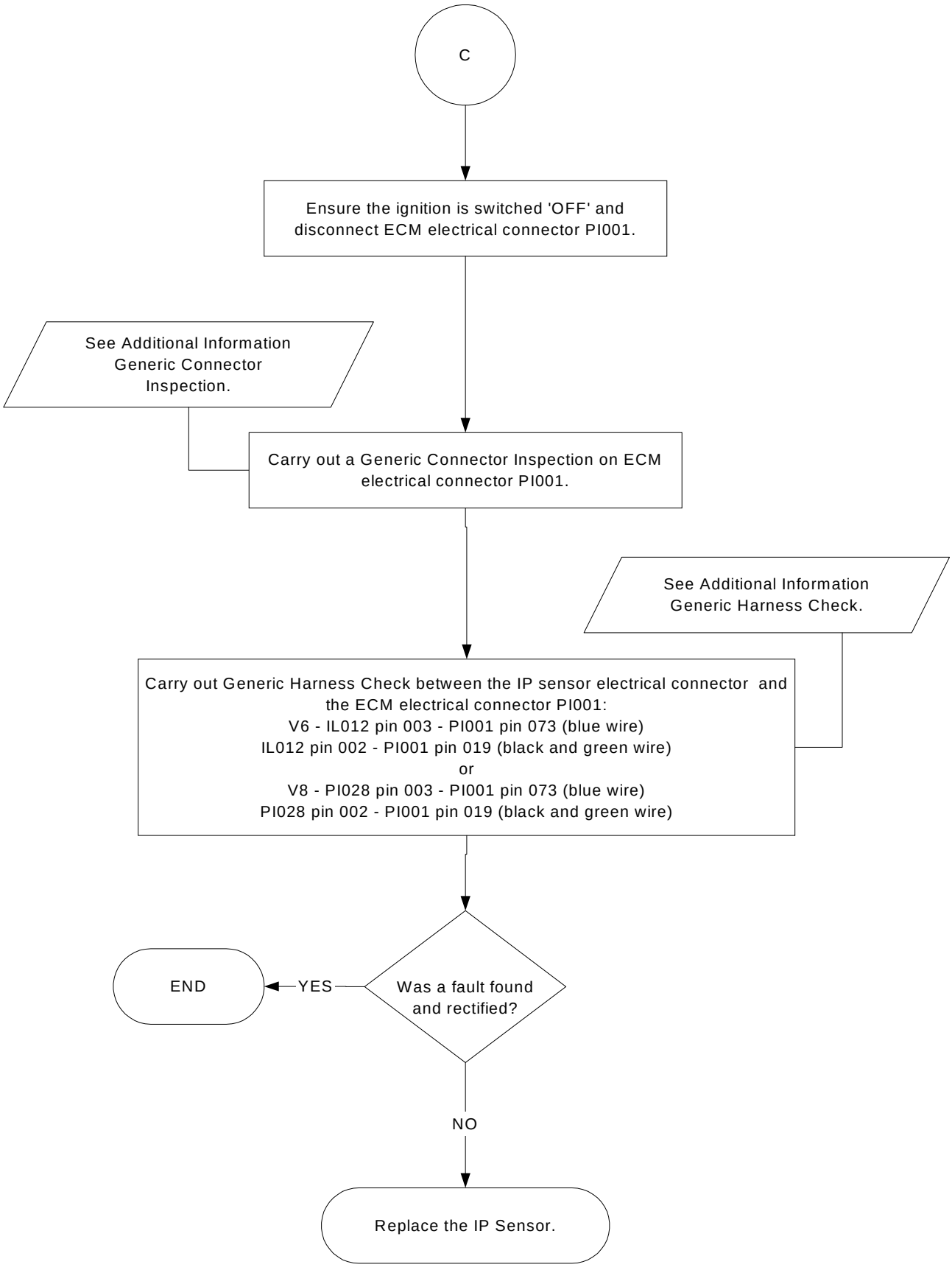
P-10 Cont.


A
Install suitable calibrated fuel wet gauge to the Schrader valve.
Start the engine and allow the gauge to prime.
If an electrical fault is present on the IP sensor circuit, expect the reading to default to 483 Kpa.
Monitor the WDS readings;
confirm correct operation of the IP sensor by using this calculation.
Atmospheric Pressure approximately 100 Kpa - MAP + wet gauge reading should be equal to the IP sensor reading ± 10 Kpa.
Were the readings within ± 10 Kpa?
YES
Possible intermittent fault, clear DTCs and recheck.
NO
See Additional Information Generic Connector Inspection.
Disconnect the IP sensor electrical connector and carry out a Generic Connector Inspection:
V6 engine - IL012
V8 engine - PI028
B

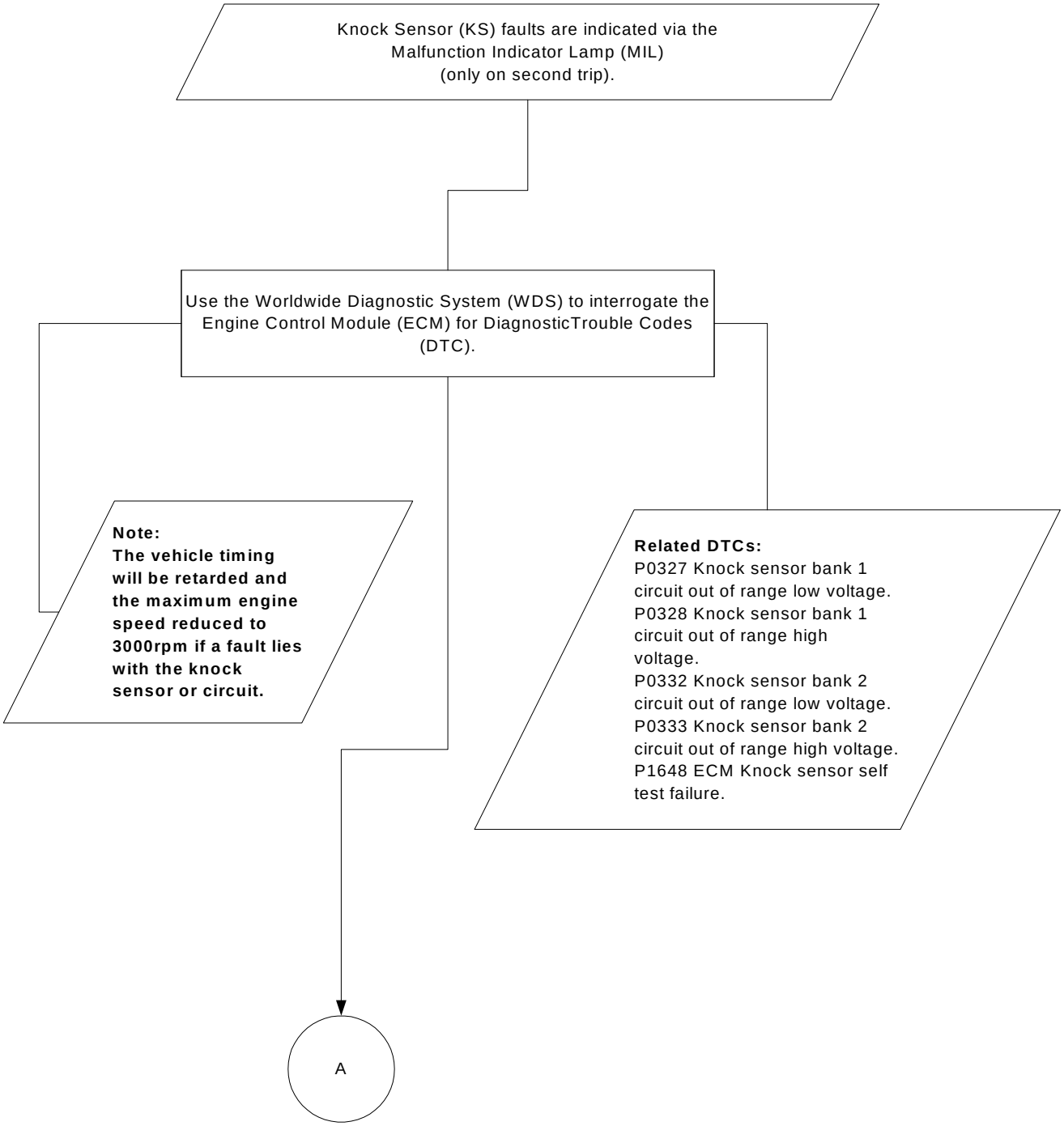
P-10 Cont.


B
If the 5 volt supply has been lost from the ECM, suspect additional sensor fault codes to be logged.
With the ignition 'ON' and using a DMM, check for 5 volt supply at pin 001 of IP sensor electrical connector.
Was the reading as expected?
YES
C
NO
Ensure the ignition is switched 'OFF' and disconnect ECM electrical connector PI001.
See Additional Information Generic Connector Inspection.
Carry out a Generic Connector Inspection on ECM electrical connector PI001.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between the IP sensor electrical connector and the ECM electrical connector PI001:
V6 - IL012 pin 001 - PI001 pin 012 (Orange and yellow wire)
or
V8 - PI028 pin 001 - PI001 pin 012 (Orange and yellow wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

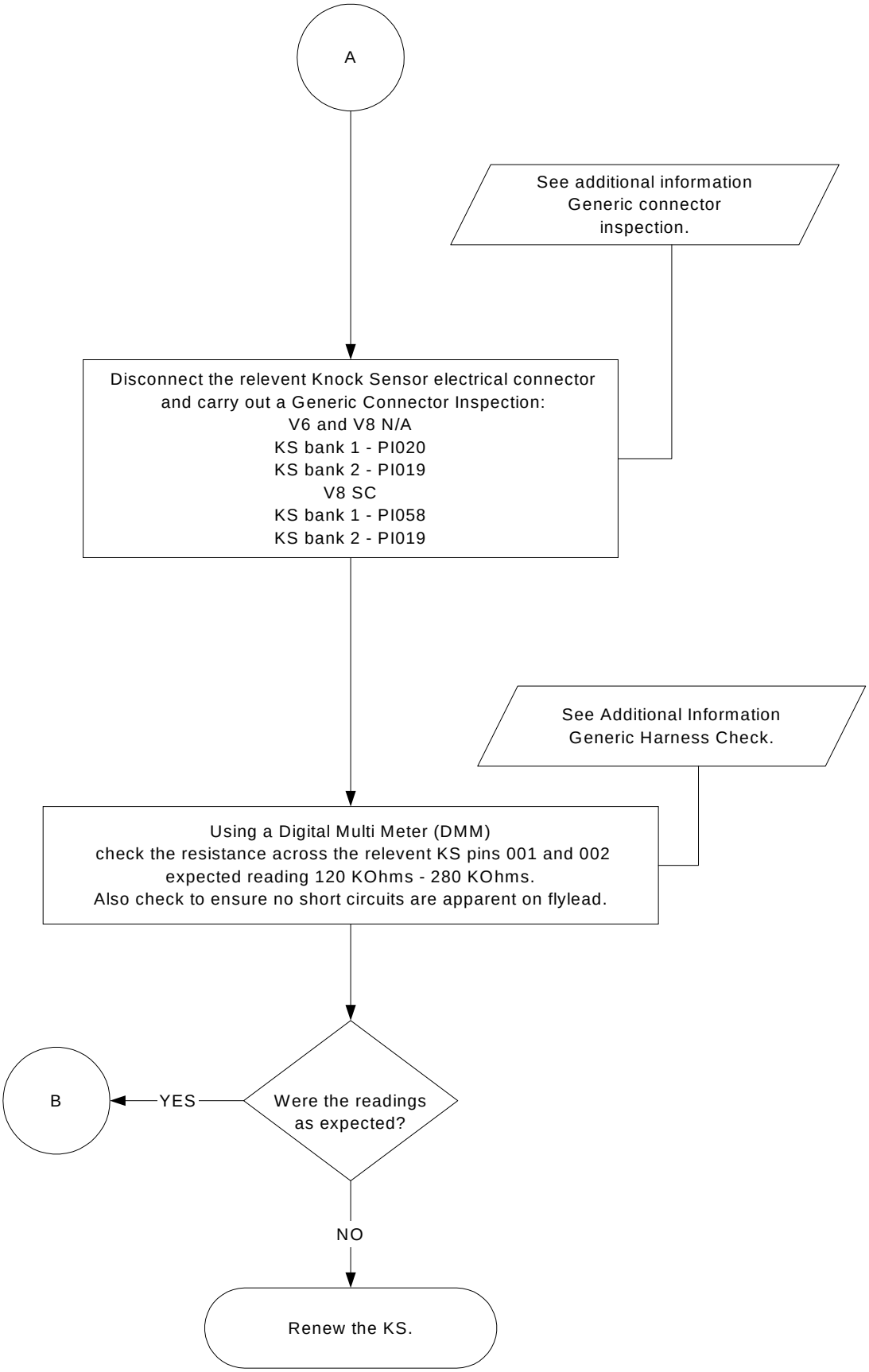
P-10 Cont.


C
Ensure the ignition is switched 'OFF' and disconnect ECM electrical connector PI001.
See Additional Information Generic Connector Inspection.
Carry out a Generic Connector Inspection on ECM electrical connector PI001.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between the IP sensor electrical connector and the ECM electrical connector PI001:
V6 - IL012 pin 003 - PI001 pin 073 (blue wire)
IL012 pin 002 - PI001 pin 019 (black and green wire)
or
V8 - PI028 pin 003 - PI001 pin 073 (blue wire)
PI028 pin 002 - PI001 pin 019 (black and green wire)
Was a fault found and rectified?
YES
END
NO
Replace the IP Sensor.

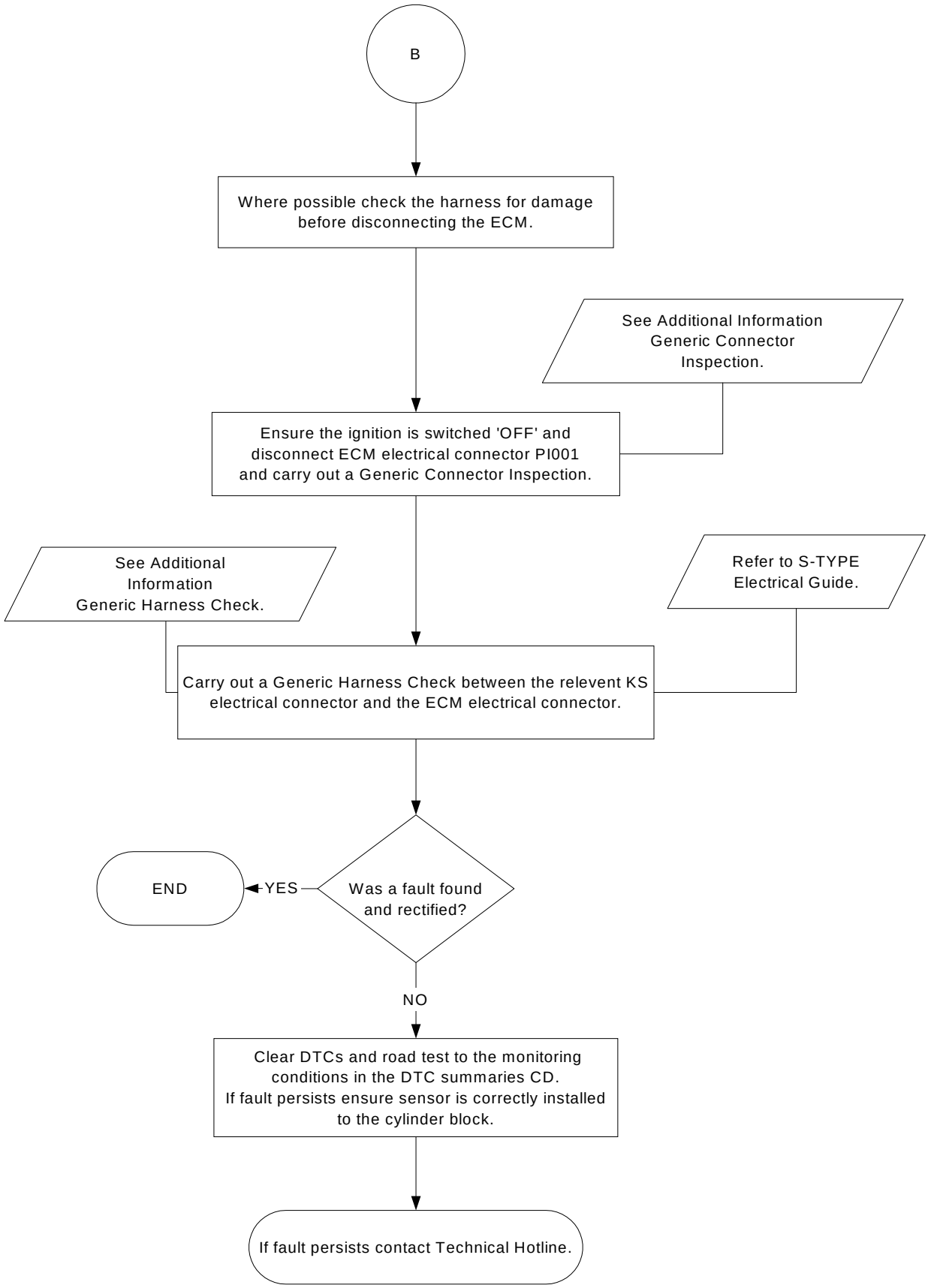
Knock Sensor
Flowchart P-11



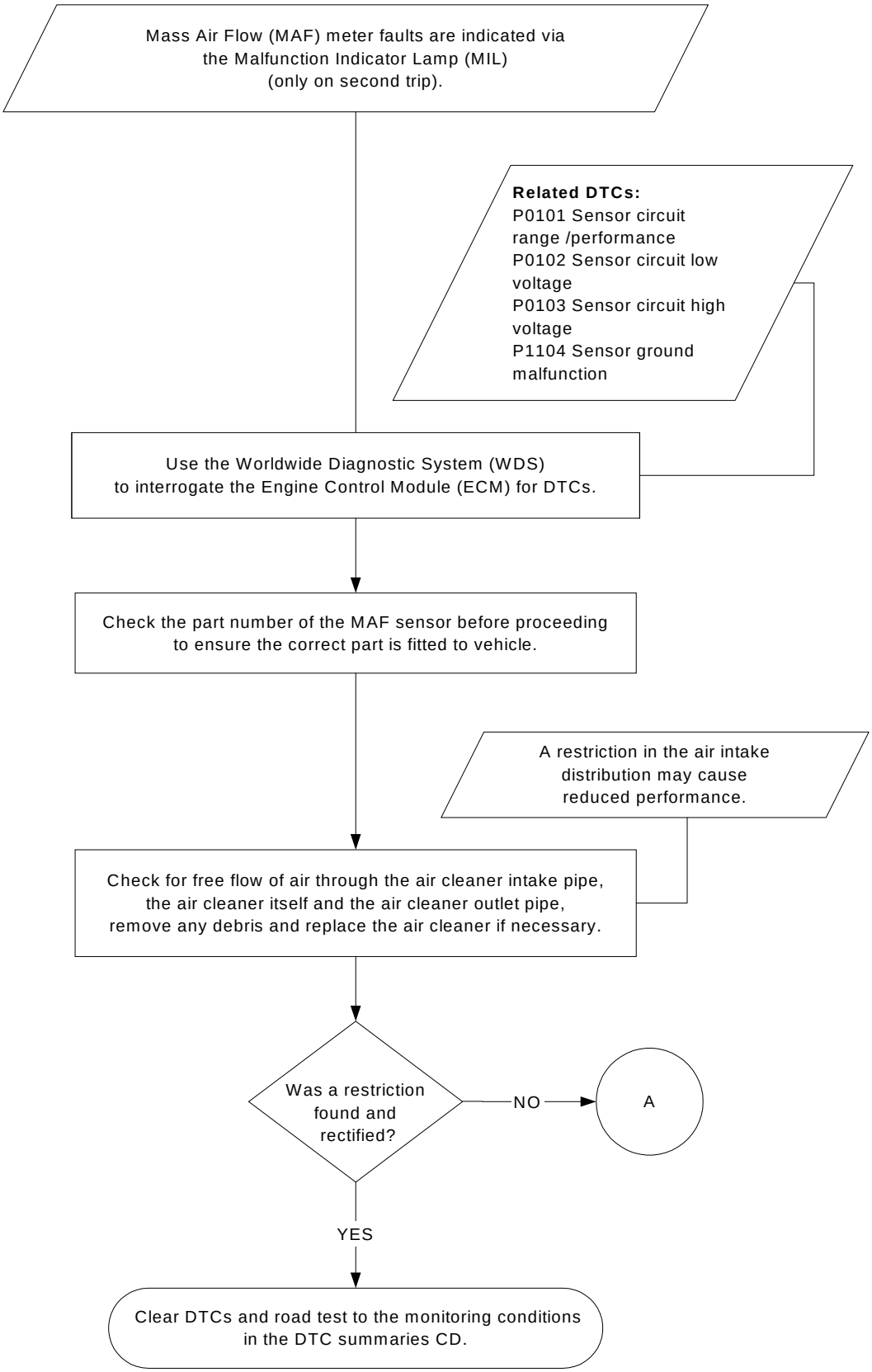
P-11 Cont.


A
See additional information
Generic connector
inspection.
Disconnect the relevent Knock Sensor electrical connector
and carry out a Generic Connector Inspection:
V6 and V8 N/A
KS bank 1 - PI020
KS bank 2 - PI019
V8 SC
KS bank 1 - PI058
KS bank 2 - PI019
See Additional Information
Generic Harness Check.
Using a Digital Multi Meter (DMM)
check the resistance across the relevent KS pins 001 and 002
expected reading 120 KOhms - 280 KOhms.
Also check to ensure no short circuits are apparent on flylead.
Were the readings
as expected?
YES
B
NO
Renew the KS.

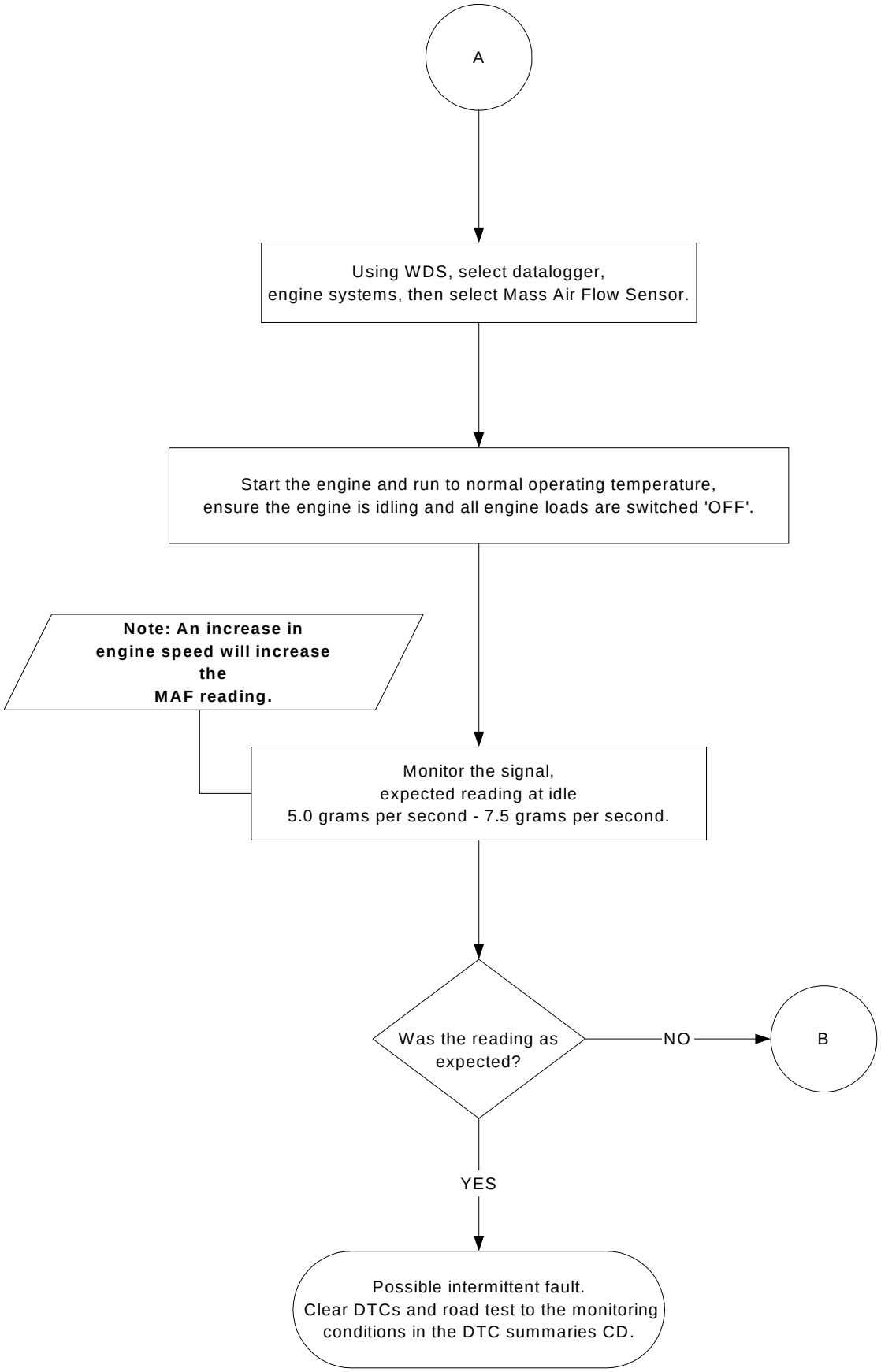
P-11 Cont.


B
Where possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF' and disconnect ECM electrical connector PI001 and carry out a Generic Connector Inspection.
See Additional Information Generic Harness Check.
Refer to S-TYPE Electrical Guide.
Carry out a Generic Harness Check between the relevent KS electrical connector and the ECM electrical connector.
Was a fault found and rectified?
YES
END
NO
Clear DTCs and road test to the monitoring conditions in the DTC summaries CD.
If fault persists ensure sensor is correctly installed to the cylinder block.
If fault persists contact Technical Hotline.

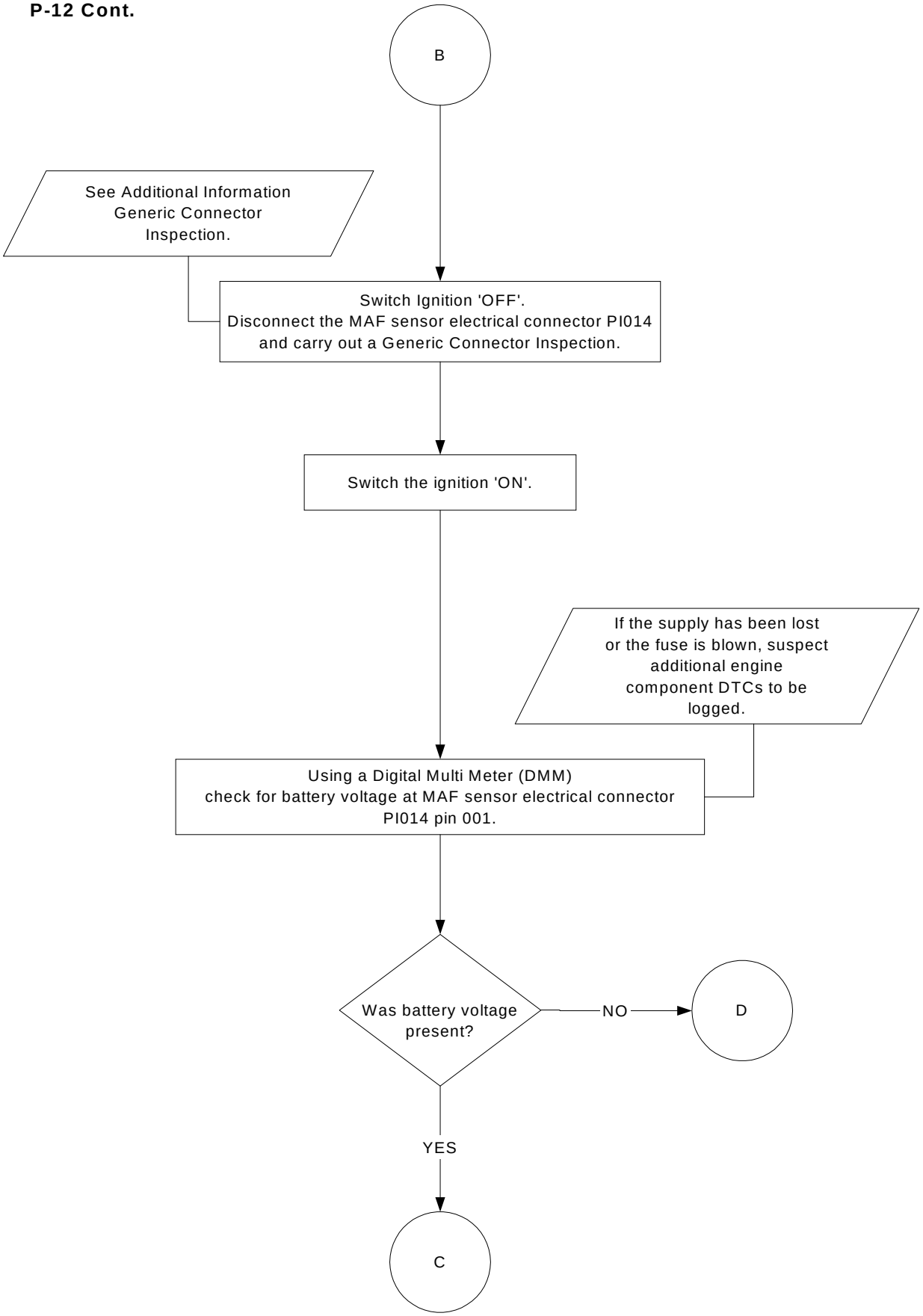
Mass Air Flow Meter
Flowchart P-12



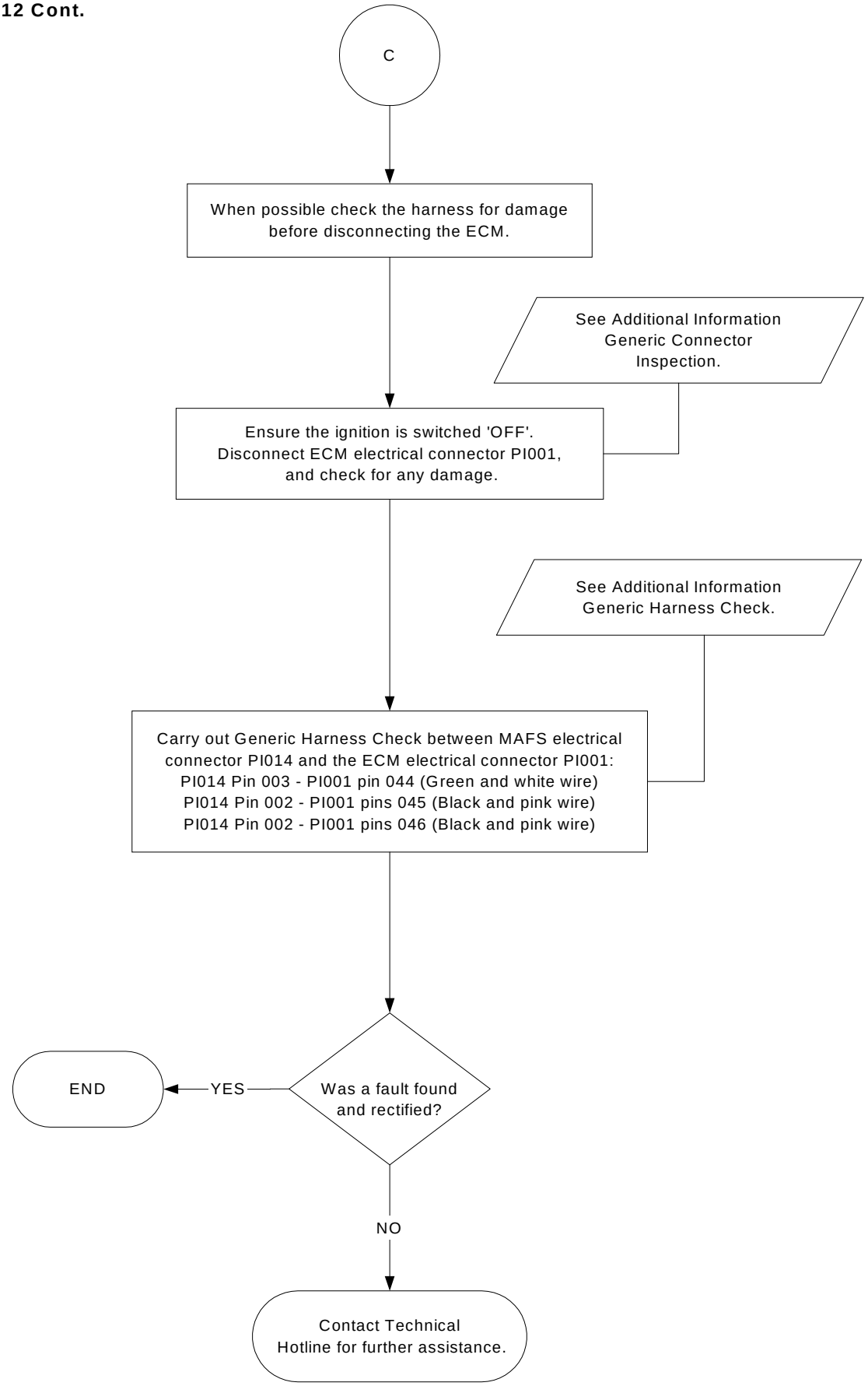
P-12 Cont.


A
Using WDS, select datalogger,
engine systems, then select Mass Air Flow Sensor.
Start the engine and run to normal operating temperature,
ensure the engine is idling and all engine loads are switched 'OFF'.
Note: An increase in
engine speed will increase
the
MAF reading.
Monitor the signal,
expected reading at idle
5.0 grams per second - 7.5 grams per second.
Was the reading as
expected?
NO
B
YES
Possible intermittent fault.
Clear DTCs and road test to the monitoring
conditions in the DTC summaries CD.

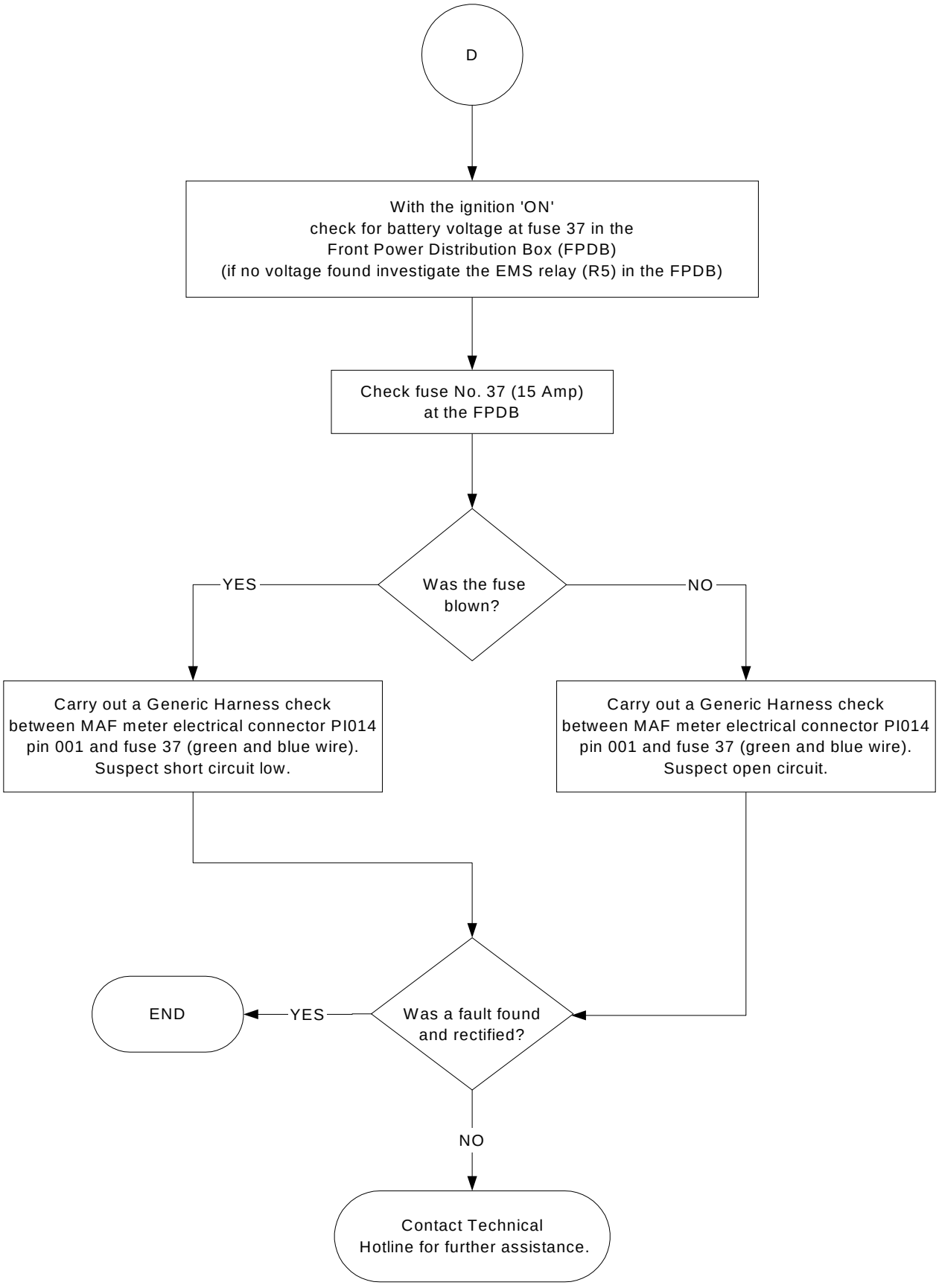
P-12 Cont.


B
See Additional Information Generic Connector Inspection.
Switch Ignition 'OFF'. Disconnect the MAF sensor electrical connector PI014 and carry out a Generic Connector Inspection.
Switch the ignition 'ON'.
If the supply has been lost or the fuse is blown, suspect additional engine component DTCs to be logged.
Using a Digital Multi Meter (DMM) check for battery voltage at MAF sensor electrical connector PI014 pin 001.
Was battery voltage present?
NO
D
YES
C

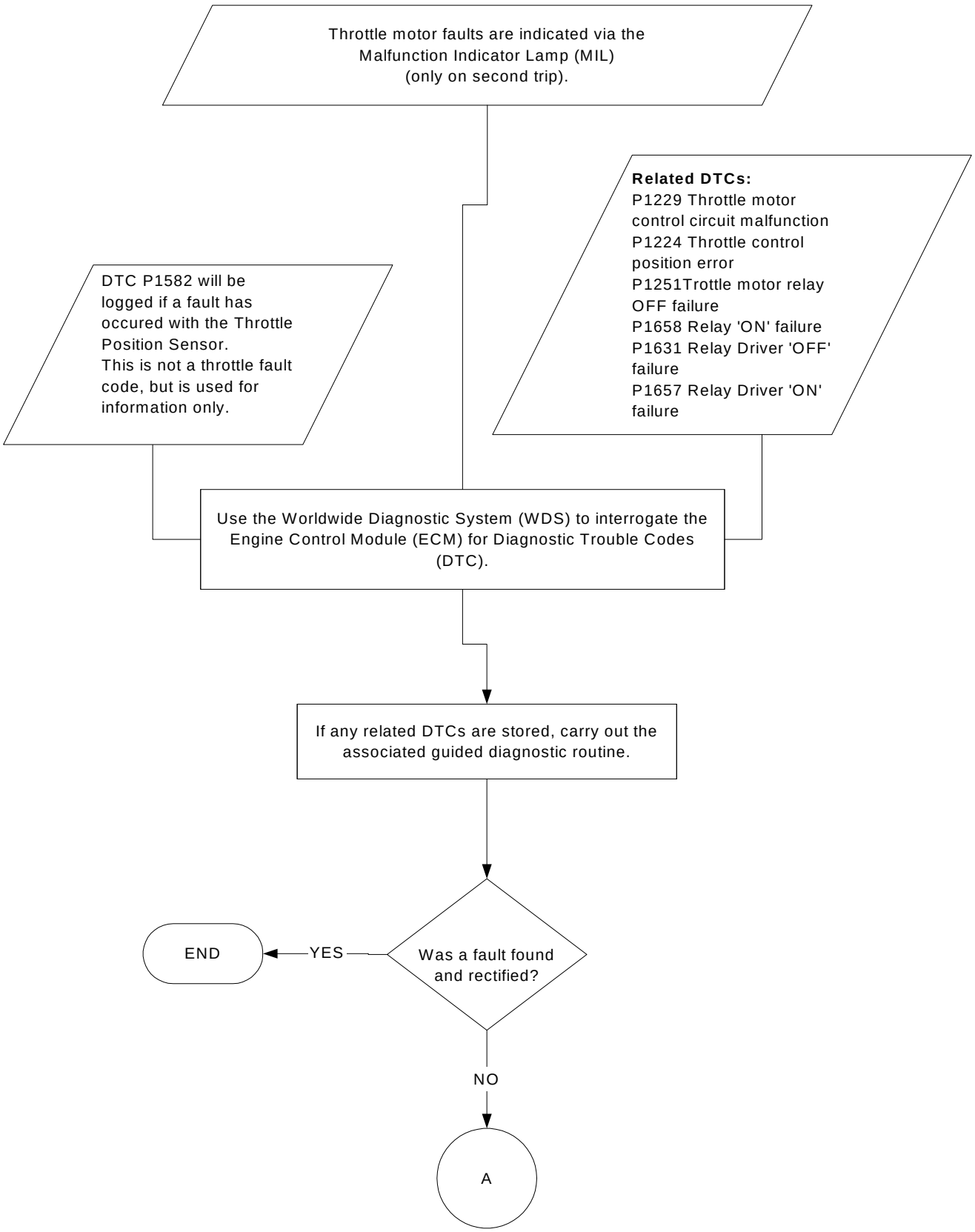
P-12 Cont.


C
When possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between MAFS electrical connector PI014 and the ECM electrical connector PI001:
PI014 Pin 003 - PI001 pin 044 (Green and white wire)
PI014 Pin 002 - PI001 pins 045 (Black and pink wire)
PI014 Pin 002 - PI001 pins 046 (Black and pink wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

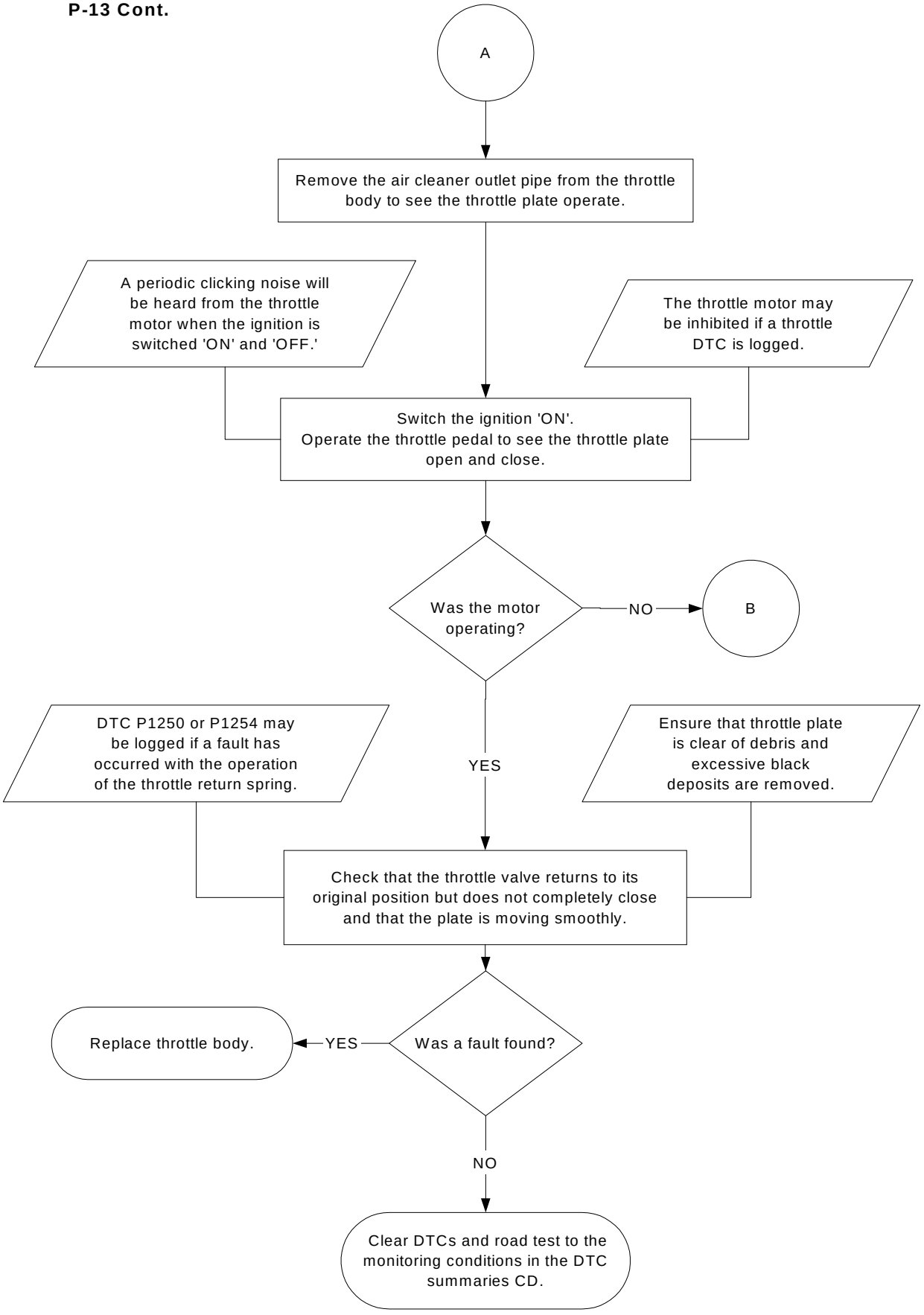
P-12 Cont.


D
With the ignition 'ON'
check for battery voltage at fuse 37 in the
Front Power Distribution Box (FPDB)
(if no voltage found investigate the EMS relay (R5) in the FPDB)
Check fuse No. 37 (15 Amp)
at the FPDB
Was the fuse
blown?
YES
NO
Carry out a Generic Harness check
between MAF meter electrical connector PI014
pin 001 and fuse 37 (green and blue wire).
Suspect short circuit low.
Carry out a Generic Harness check
between MAF meter electrical connector PI014
pin 001 and fuse 37 (green and blue wire).
Suspect open circuit.
Was a fault found
and rectified?
YES
END
NO
Contact Technical
Hotline for further assistance.

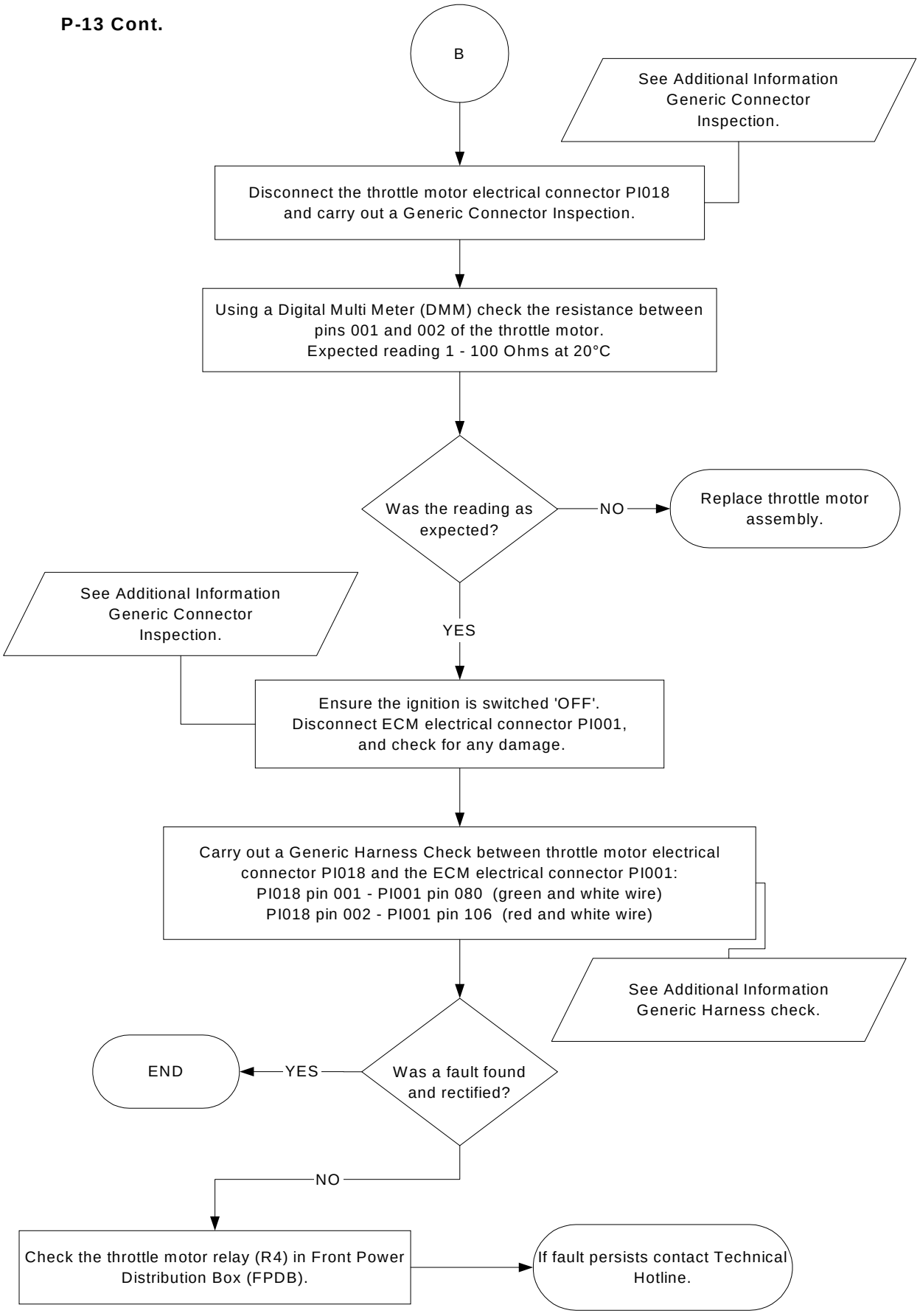
Throttle Motor
Flowchart P-13



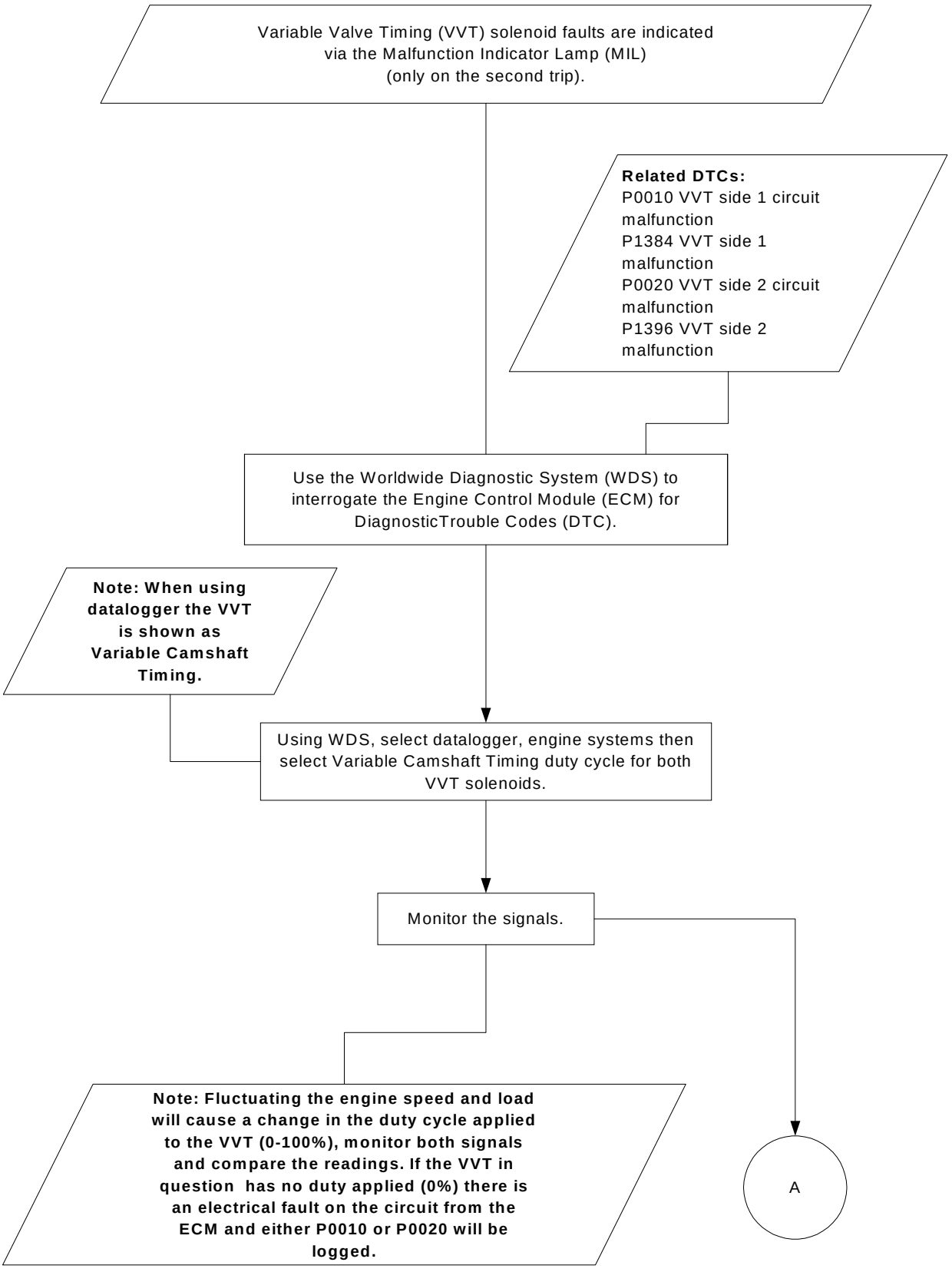
P-13 Cont.


A
Remove the air cleaner outlet pipe from the throttle body to see the throttle plate operate.
A periodic clicking noise will be heard from the throttle motor when the ignition is switched 'ON' and 'OFF.'
The throttle motor may be inhibited if a throttle DTC is logged.
Switch the ignition 'ON'. Operate the throttle pedal to see the throttle plate open and close.
Was the motor operating?
NO
B
YES
DTC P1250 or P1254 may be logged if a fault has occurred with the operation of the throttle return spring.
Ensure that throttle plate is clear of debris and excessive black deposits are removed.
Check that the throttle valve returns to its original position but does not completely close and that the plate is moving smoothly.
Was a fault found?
YES
Replace throttle body.
NO
Clear DTCs and road test to the monitoring conditions in the DTC summaries CD.

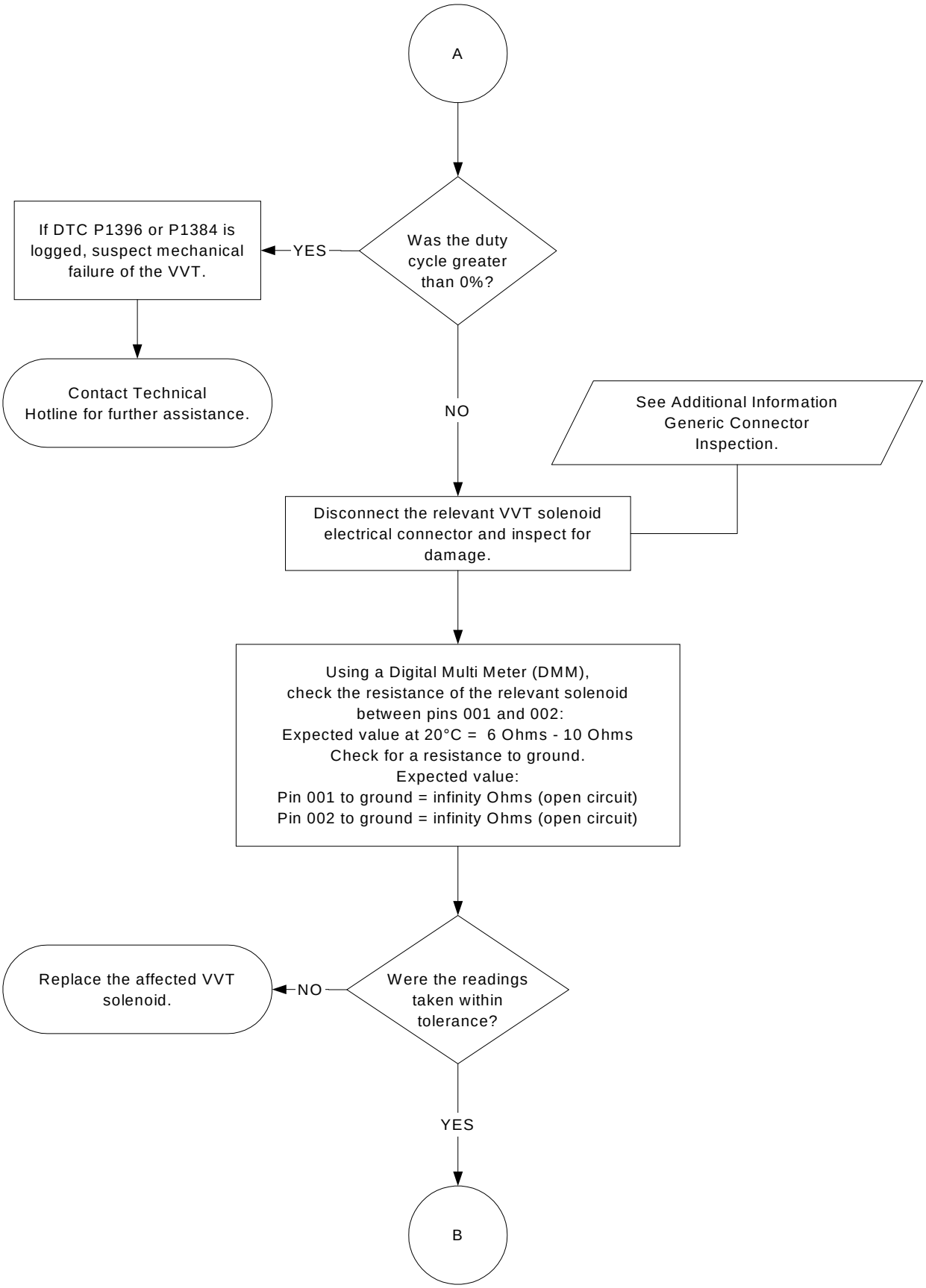
P-13 Cont.


B
See Additional Information Generic Connector Inspection.
Disconnect the throttle motor electrical connector PI018 and carry out a Generic Connector Inspection.
Using a Digital Multi Meter (DMM) check the resistance between pins 001 and 002 of the throttle motor.
Expected reading 1 - 100 Ohms at 20°C
Was the reading as expected?
NO
Replace throttle motor assembly.
See Additional Information Generic Connector Inspection.
YES
Ensure the ignition is switched 'OFF'.
Disconnect ECM electrical connector PI001, and check for any damage.
Carry out a Generic Harness Check between throttle motor electrical connector PI018 and the ECM electrical connector PI001:
PI018 pin 001 - PI001 pin 080 (green and white wire)
PI018 pin 002 - PI001 pin 106 (red and white wire)
See Additional Information Generic Harness check.
Was a fault found and rectified?
YES
END
NO
Check the throttle motor relay (R4) in Front Power Distribution Box (FPDB).
If fault persists contact Technical Hotline.

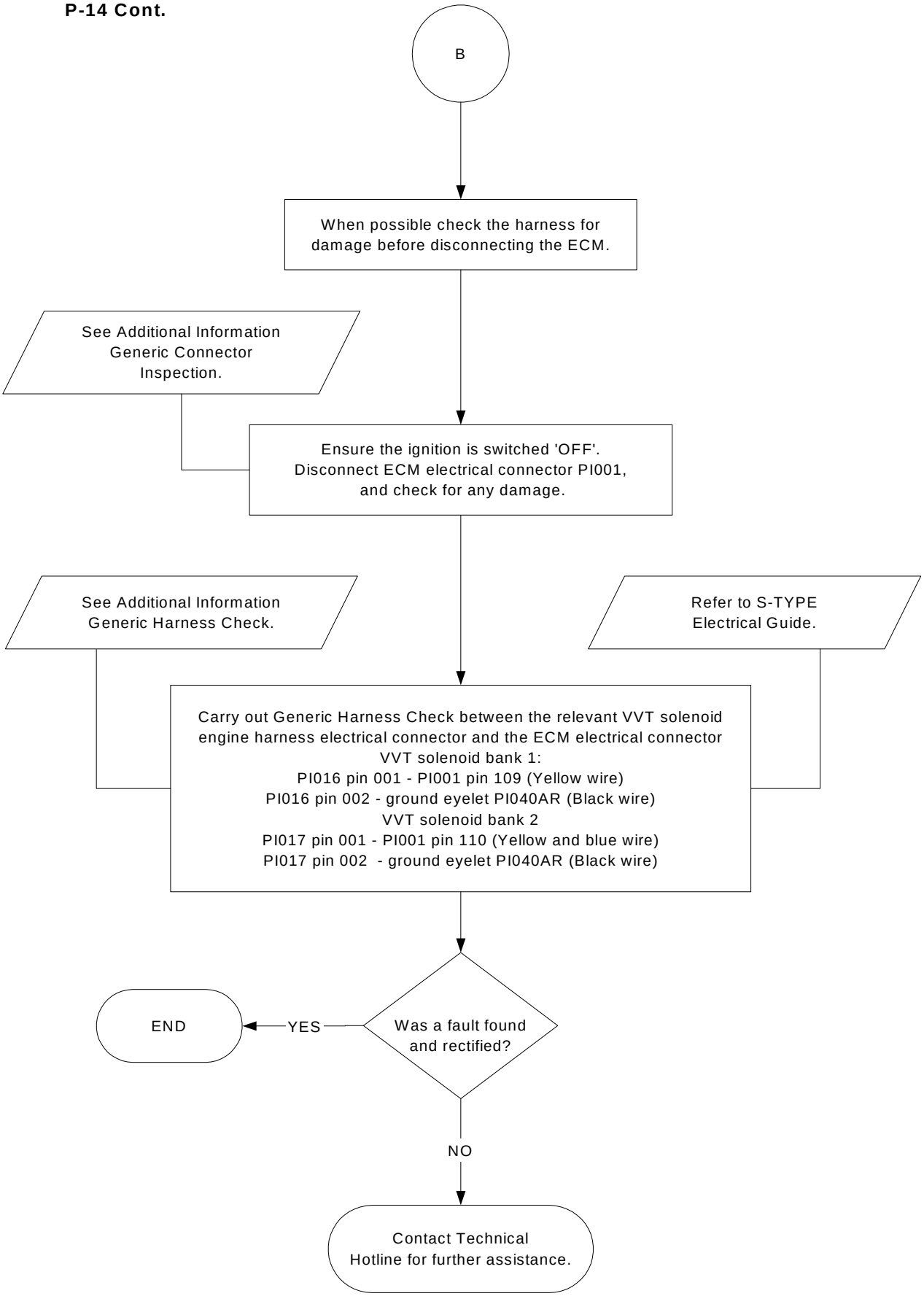
V6/V8 N/A Variable Valve Timing
Flowchart P-14



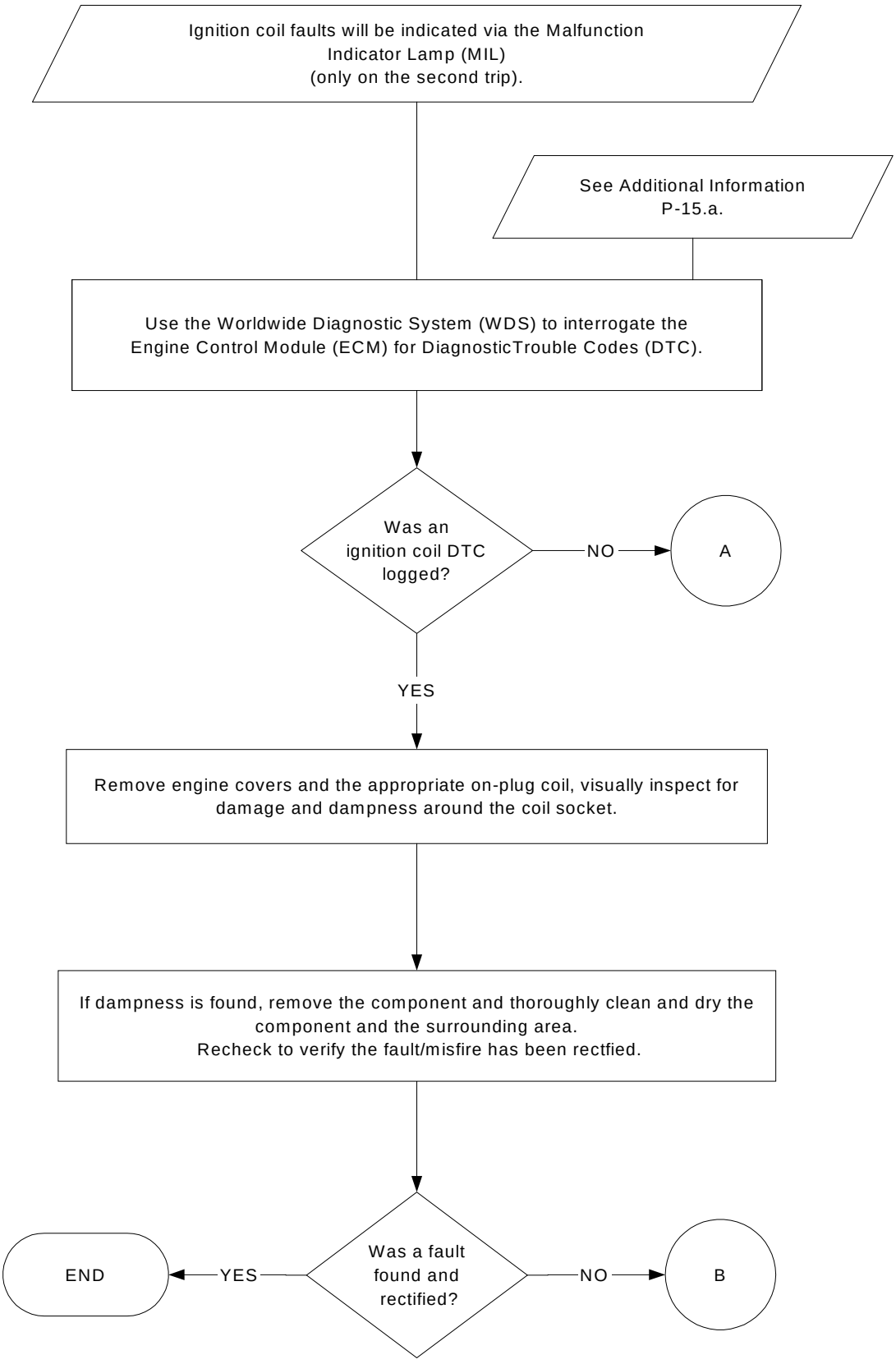
P-14 Cont.


A
Was the duty cycle greater than 0%?
YES
If DTC P1396 or P1384 is logged, suspect mechanical failure of the VVT.
Contact Technical Hotline for further assistance.
NO
See Additional Information Generic Connector Inspection.
Disconnect the relevant VVT solenoid electrical connector and inspect for damage.
Using a Digital Multi Meter (DMM), check the resistance of the relevant solenoid between pins 001 and 002:
Expected value at 20°C = 6 Ohms - 10 Ohms
Check for a resistance to ground.
Expected value:
Pin 001 to ground = infinity Ohms (open circuit)
Pin 002 to ground = infinity Ohms (open circuit)
Were the readings taken within tolerance?
NO
Replace the affected VVT solenoid.
YES
B

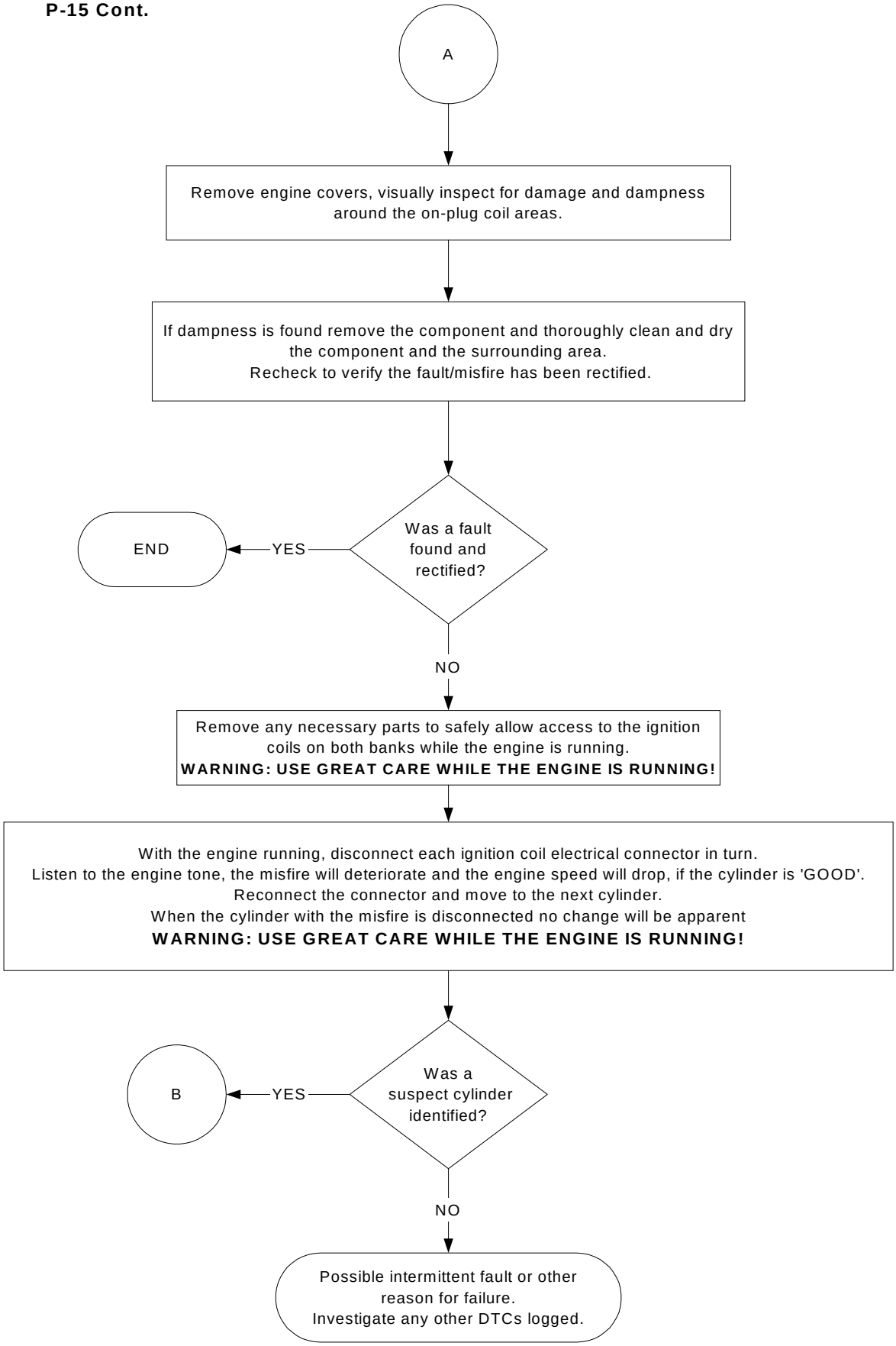
P-14 Cont.


B
When possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
See Additional Information Generic Harness Check.
Refer to S-TYPE Electrical Guide.
Carry out Generic Harness Check between the relevant VVT solenoid engine harness electrical connector and the ECM electrical connector
VVT solenoid bank 1:
PI016 pin 001 - PI001 pin 109 (Yellow wire)
PI016 pin 002 - ground eyelet PI040AR (Black wire)
VVT solenoid bank 2
PI017 pin 001 - PI001 pin 110 (Yellow and blue wire)
PI017 pin 002 - ground eyelet PI040AR (Black wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

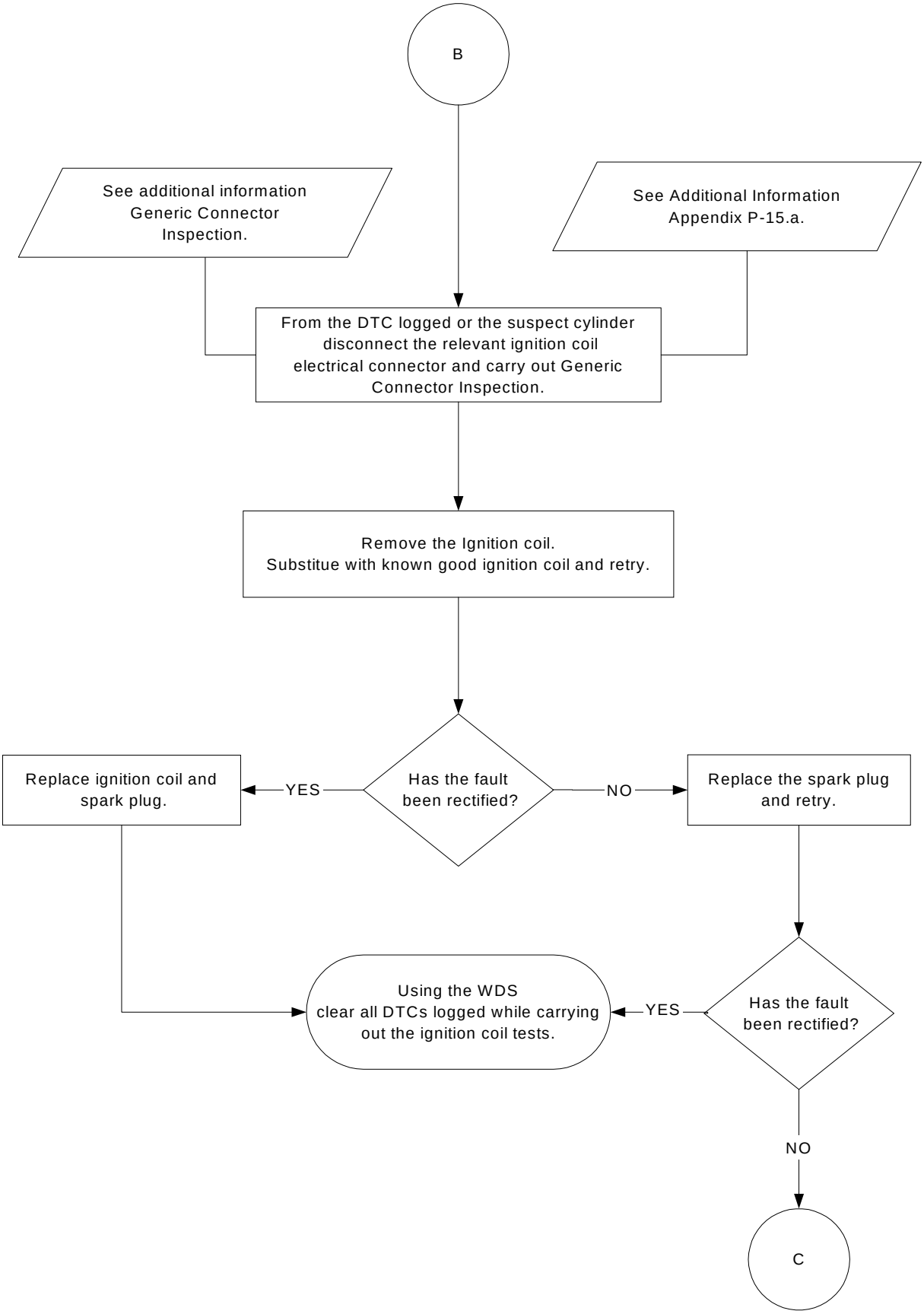
Ignition Coil
Flowchart P-15



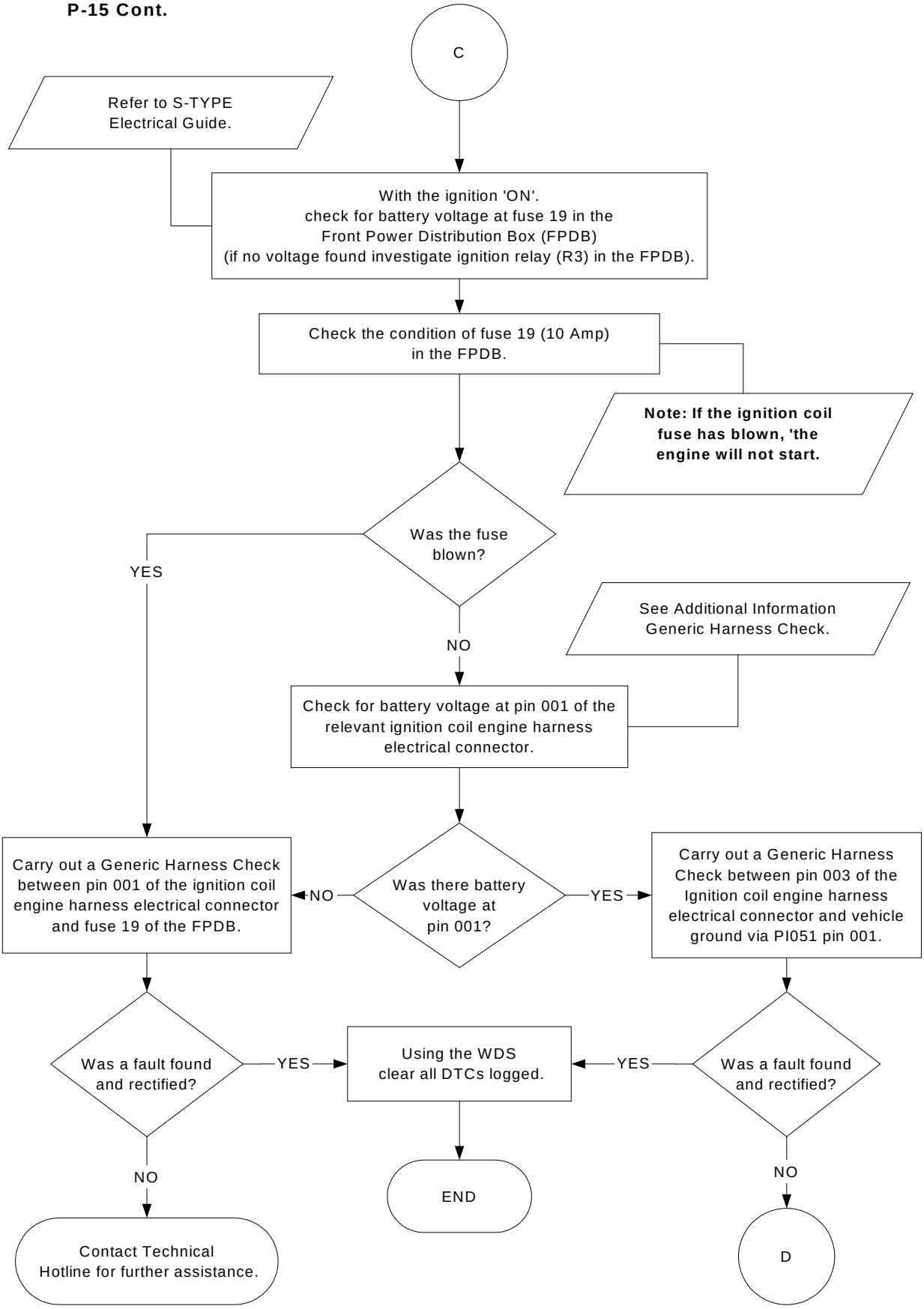
P-15 Cont.


A
Remove engine covers, visually inspect for damage and dampness around the on-plug coil areas.
If dampness is found remove the component and thoroughly clean and dry the component and the surrounding area.
Recheck to verify the fault/misfire has been rectified.
Was a fault found and rectified?
YES
END
NO
Remove any necessary parts to safely allow access to the ignition coils on both banks while the engine is running.
WARNING: USE GREAT CARE WHILE THE ENGINE IS RUNNING!
With the engine running, disconnect each ignition coil electrical connector in turn.
Listen to the engine tone, the misfire will deteriorate and the engine speed will drop, if the cylinder is 'GOOD'.
Reconnect the connector and move to the next cylinder.
When the cylinder with the misfire is disconnected no change will be apparent
WARNING: USE GREAT CARE WHILE THE ENGINE IS RUNNING!
Was a suspect cylinder identified?
YES
B
NO
Possible intermittent fault or other reason for failure.
Investigate any other DTCs logged.

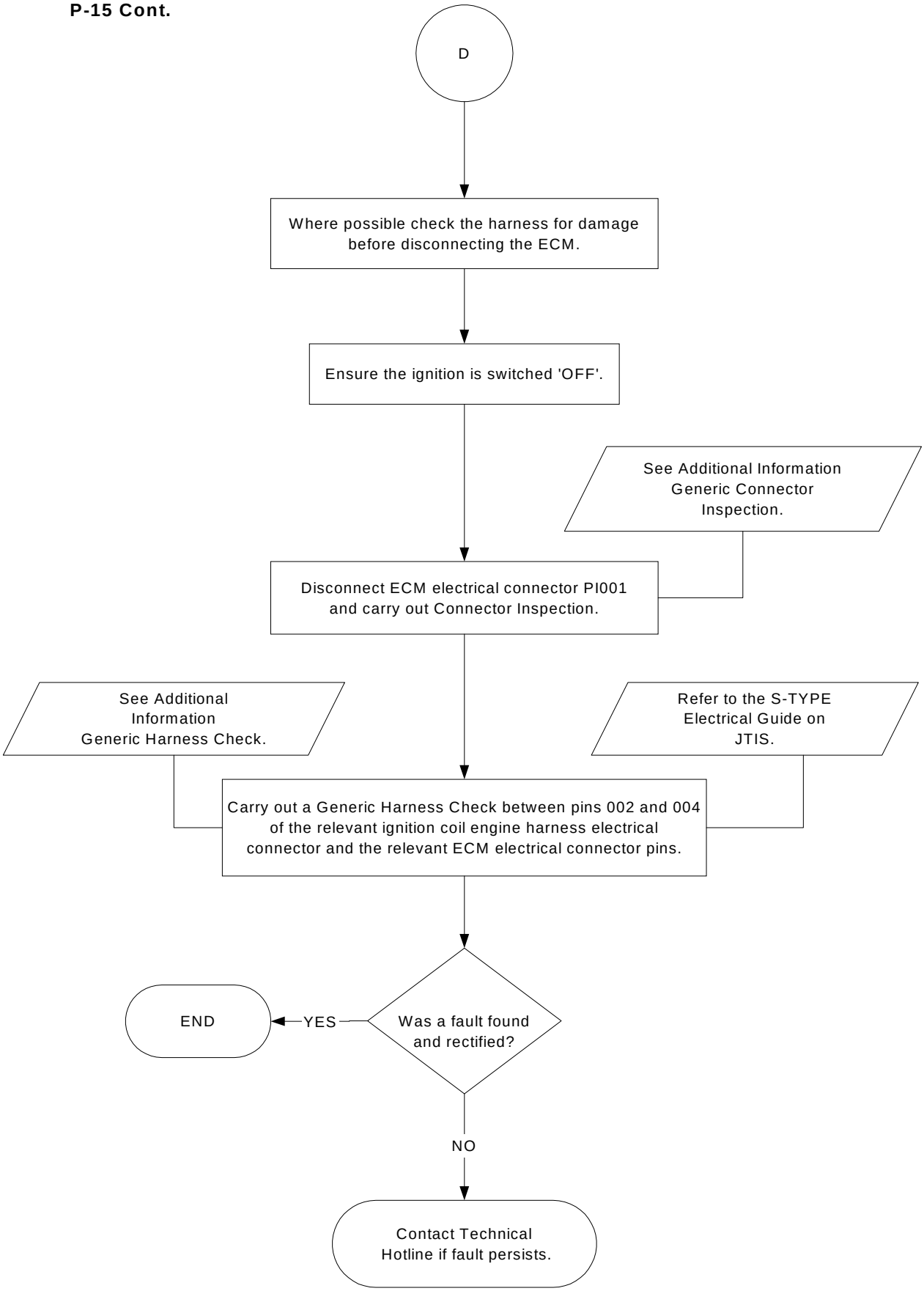
P-15 Cont.

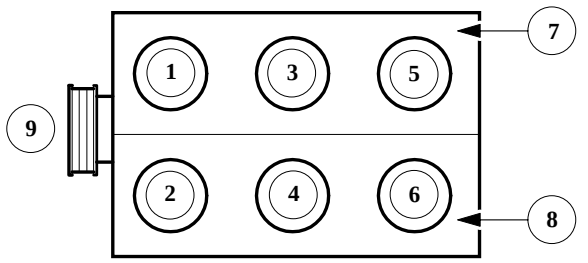
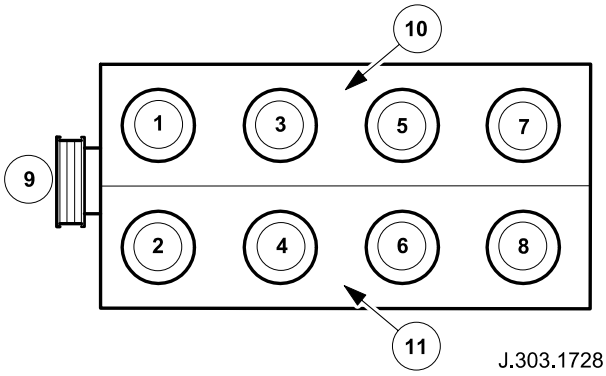

B
See additional information Generic Connector Inspection.
See Additional Information Appendix P-15.a.
From the DTC logged or the suspect cylinder disconnect the relevant ignition coil electrical connector and carry out Generic Connector Inspection.
Remove the Ignition coil. Substitue with known good ignition coil and retry.
Has the fault been rectified?
YES
Replace ignition coil and spark plug.
NO
Replace the spark plug and retry.
Has the fault been rectified?
YES
Using the WDS clear all DTCs logged while carrying out the ignition coil tests.
NO
C

P-15 Cont.

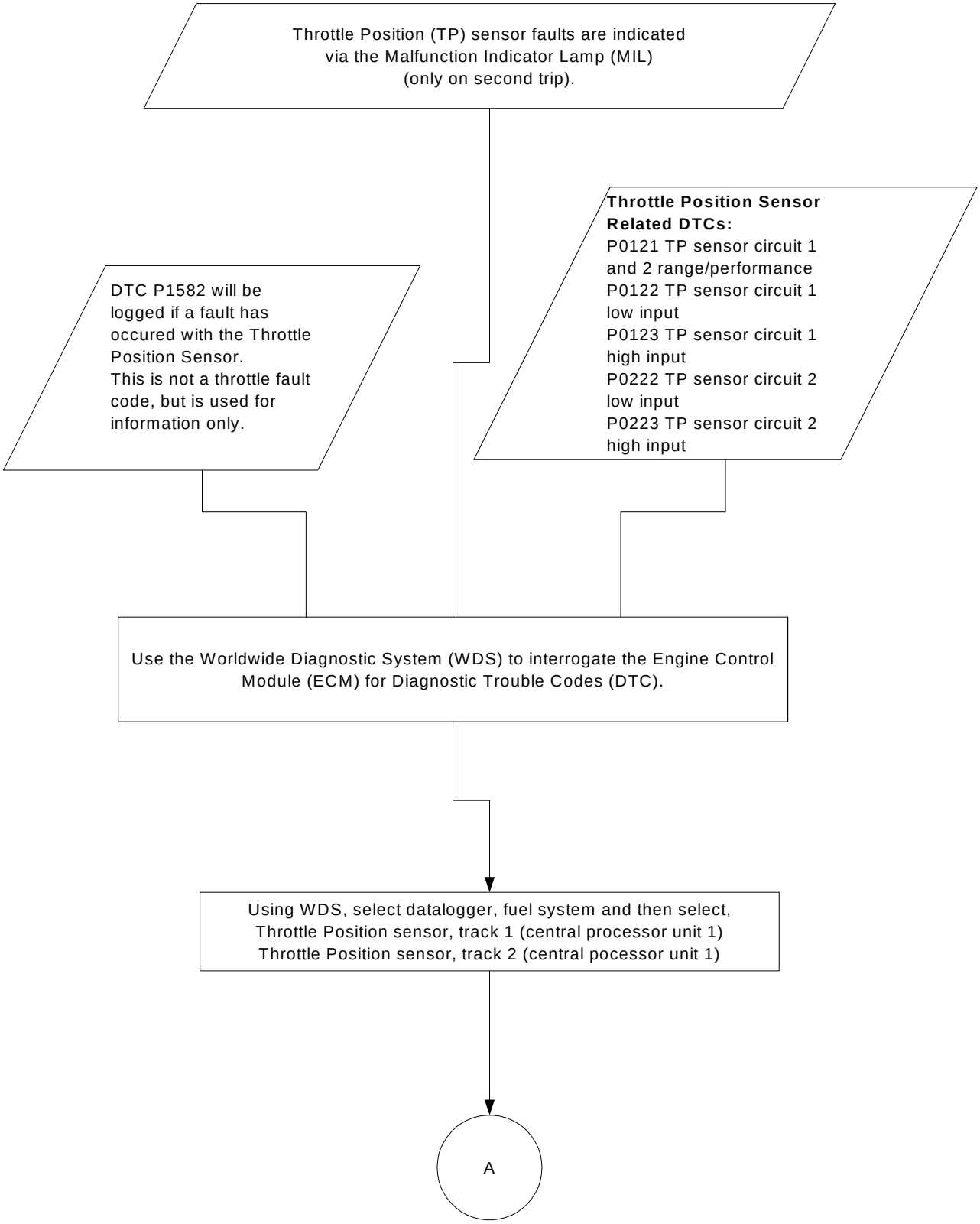

C
Refer to S-TYPE Electrical Guide.
With the ignition 'ON'. check for battery voltage at fuse 19 in the Front Power Distribution Box (FPDB) (if no voltage found investigate ignition relay (R3) in the FPDB).
Check the condition of fuse 19 (10 Amp) in the FPDB.
Note: If the ignition coil fuse has blown, 'the engine will not start.
Was the fuse blown?
YES
NO
See Additional Information Generic Harness Check.
Check for battery voltage at pin 001 of the relevant ignition coil engine harness electrical connector.
Carry out a Generic Harness Check between pin 001 of the ignition coil engine harness electrical connector and fuse 19 of the FPDB.
NO
Was there battery voltage at pin 001?
YES
Carry out a Generic Harness Check between pin 003 of the Ignition coil engine harness electrical connector and vehicle ground via PI051 pin 001.
Was a fault found and rectified?
YES
Using the WDS clear all DTCs logged.
YES
Was a fault found and rectified?
NO
END
NO
Contact Technical Hotline for further assistance.
D

P-15 Cont.

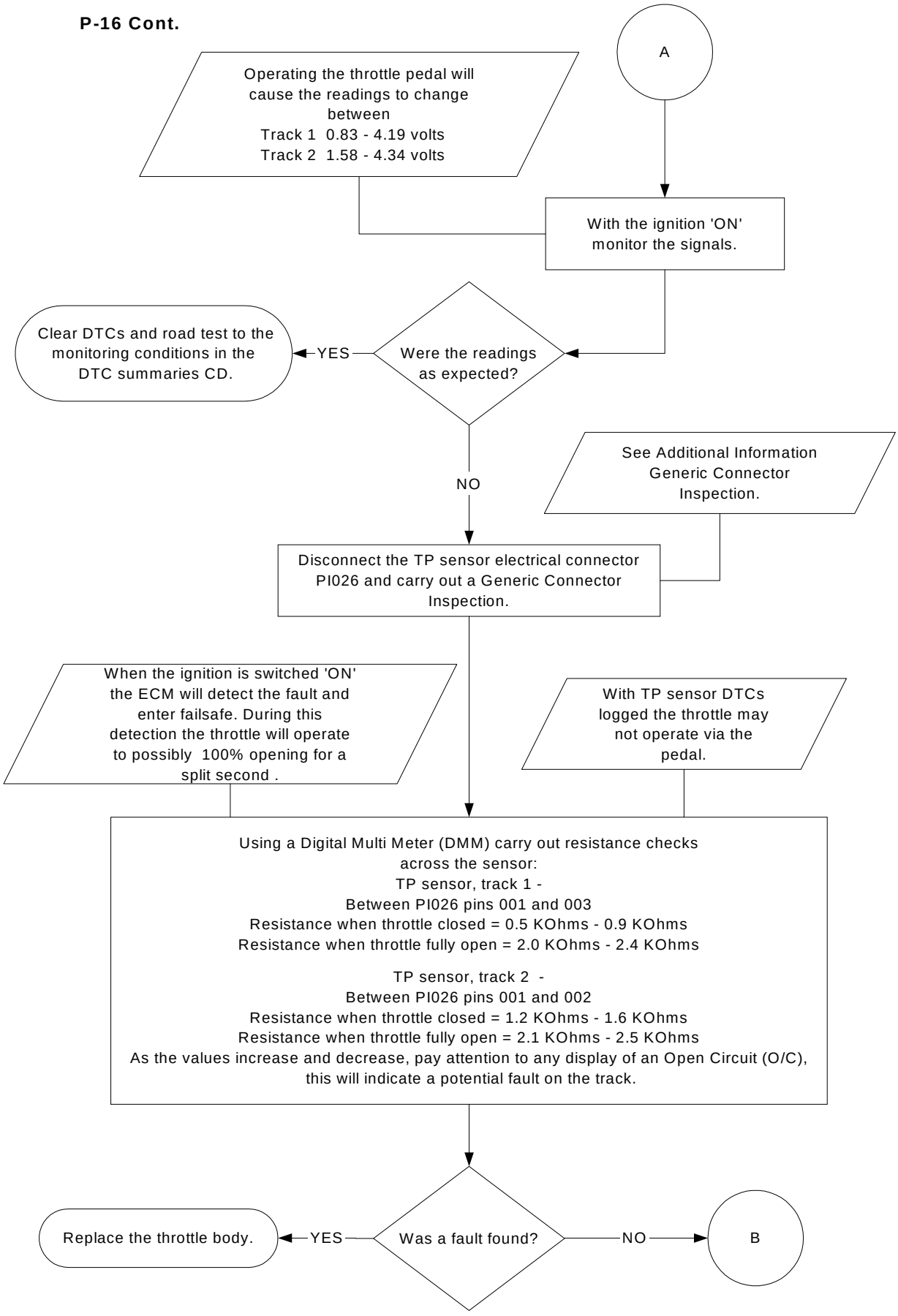

D
Where possible check the harness for damage before disconnecting the ECM.
Ensure the ignition is switched 'OFF'.
See Additional Information Generic Connector Inspection.
Disconnect ECM electrical connector PI001 and carry out Connector Inspection.
See Additional Information Generic Harness Check.
Refer to the S-TYPE Electrical Guide on JTIS.
Carry out a Generic Harness Check between pins 002 and 004 of the relevant ignition coil engine harness electrical connector and the relevant ECM electrical connector pins.
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline if fault persists.

Additional Information P-15.a	
Related Diagnostic Trouble Codes.	**Criteria.**
P1367 Ignition amplifier group 1 malfunction	All side 1 coils malfunction
P1368 Ignition amplifier group 2 malfunction	All side 2 coils malfunction
P0351 to P0356 Ignition amplifier malfunction at the associated cylinder number 1 to 8	Ignition coil open/short circuit/damaged harness on the associated cylinder
P0300 Misfire random/multiple cylinders	Random misfire detected or misfires on 1 or more cylinder
P0301 to P0306 Misfire at the associated cylinder number 1 to 8	Misfire detected on the associated cylinder
Refer to the DTC Summaries CD-ROM for further information.	
Side 1 of engine as indicated at 7 Fig. 4 Side 2 of engine as indicated at 8 Fig. 4 Front of engine as indicated at 9 Fig. 4	 J.303.1704 Fig. 4 V6
Side 1 of engine as indicated at 10 Fig. 5 Side 2 of engine as indicated at 11 Fig. 5 Front of engine as indicated at 9 Fig. 5	 J.303.1728 Fig. 5 V8
Always refer to the Technical Hotline if problems are encountered.	

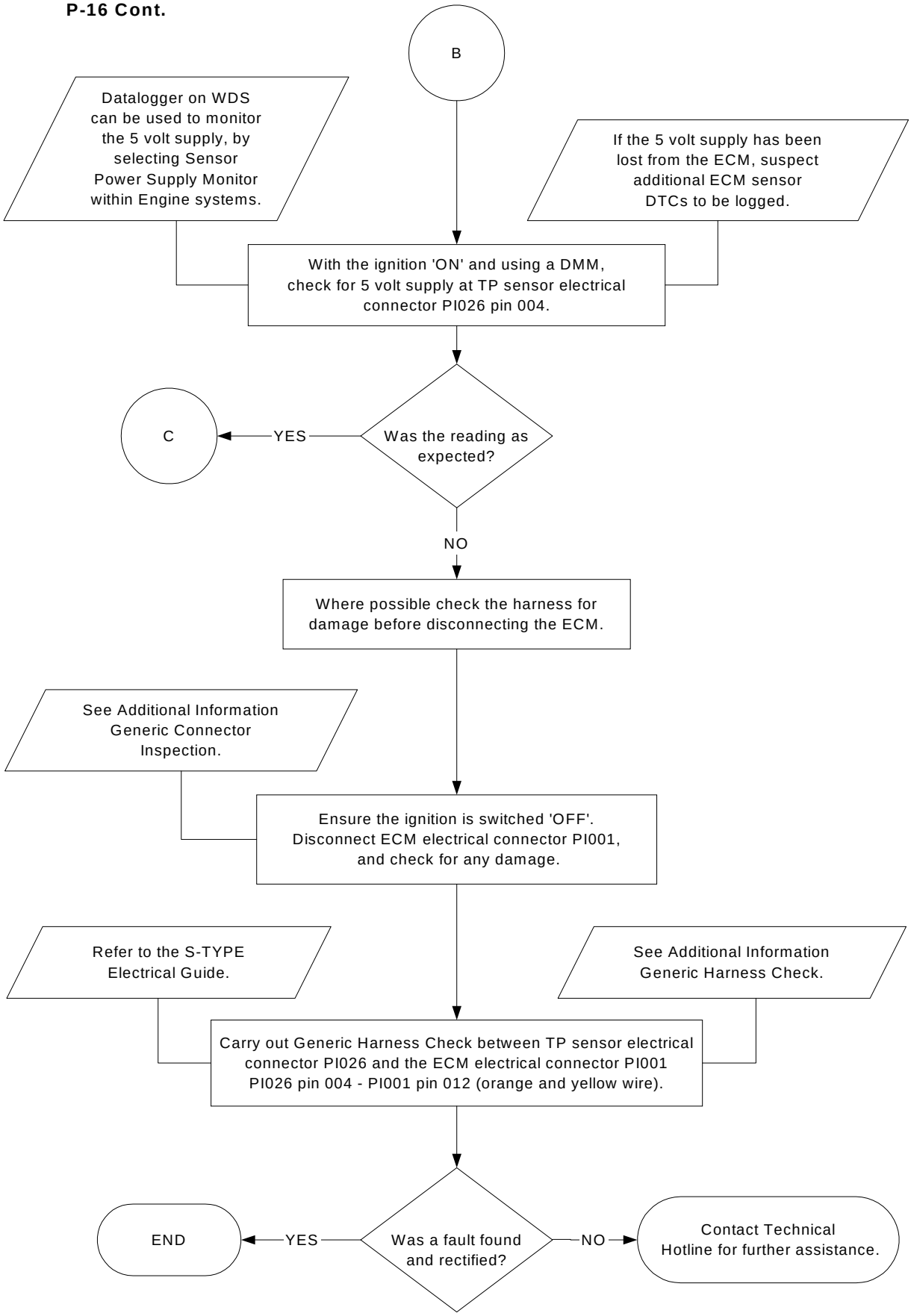
Throttle Position Sensor
Flowchart P-16



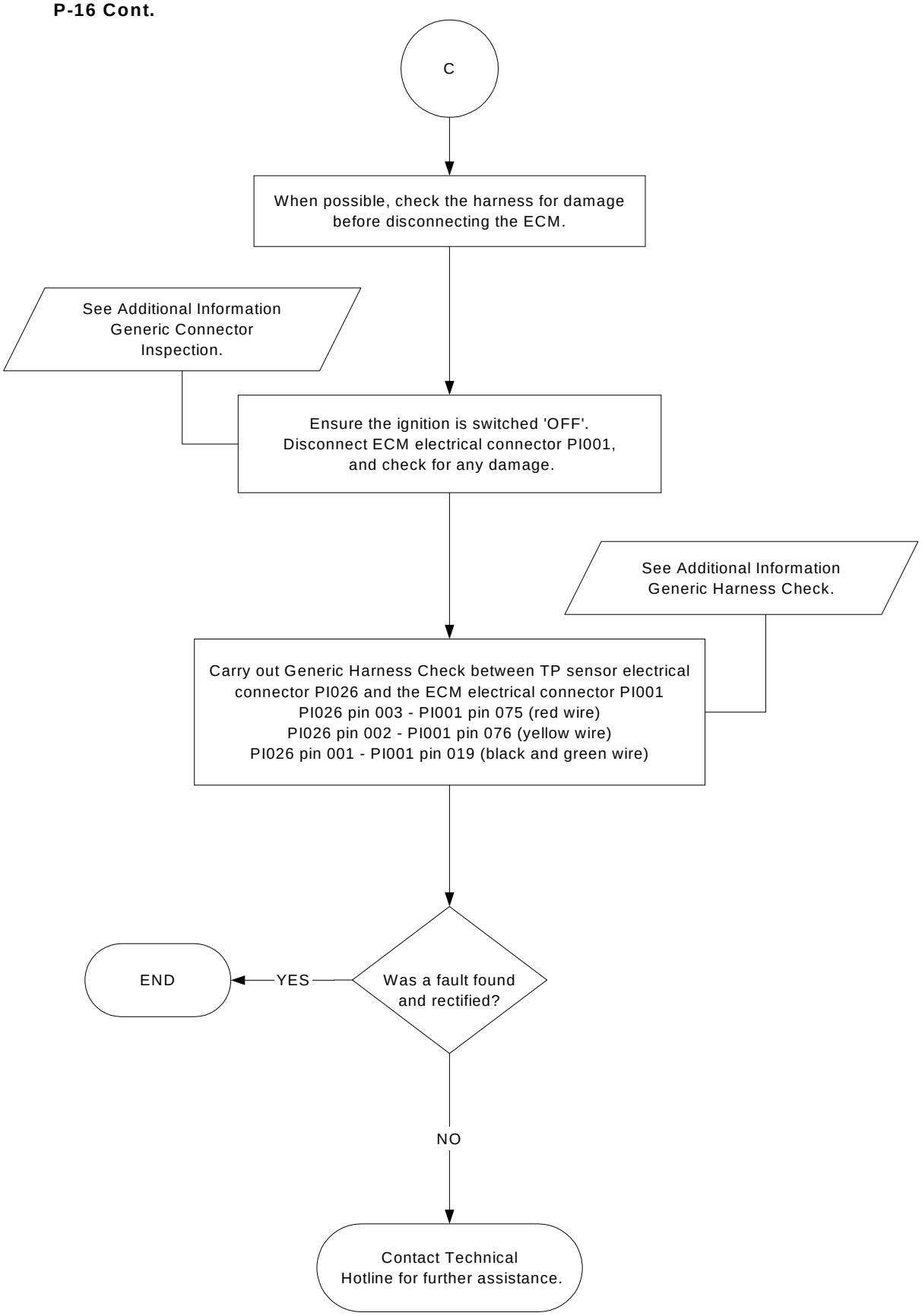
P-16 Cont.


A
Operating the throttle pedal will cause the readings to change between
Track 1 0.83 - 4.19 volts
Track 2 1.58 - 4.34 volts
With the ignition 'ON' monitor the signals.
Were the readings as expected?
YES
Clear DTCs and road test to the monitoring conditions in the DTC summaries CD.
NO
See Additional Information Generic Connector Inspection.
Disconnect the TP sensor electrical connector PI026 and carry out a Generic Connector Inspection.
When the ignition is switched 'ON' the ECM will detect the fault and enter failsafe. During this detection the throttle will operate to possibly 100% opening for a split second .
With TP sensor DTCs logged the throttle may not operate via the pedal.
Using a Digital Multi Meter (DMM) carry out resistance checks across the sensor:
TP sensor, track 1 -
Between PI026 pins 001 and 003
Resistance when throttle closed = 0.5 KOhms - 0.9 KOhms
Resistance when throttle fully open = 2.0 KOhms - 2.4 KOhms
TP sensor, track 2 -
Between PI026 pins 001 and 002
Resistance when throttle closed = 1.2 KOhms - 1.6 KOhms
Resistance when throttle fully open = 2.1 KOhms - 2.5 KOhms
As the values increase and decrease, pay attention to any display of an Open Circuit (O/C), this will indicate a potential fault on the track.
Was a fault found?
YES
Replace the throttle body.
NO
B

P-16 Cont.


B
Datalogger on WDS can be used to monitor the 5 volt supply, by selecting Sensor Power Supply Monitor within Engine systems.
If the 5 volt supply has been lost from the ECM, suspect additional ECM sensor DTCs to be logged.
With the ignition 'ON' and using a DMM, check for 5 volt supply at TP sensor electrical connector PI026 pin 004.
Was the reading as expected?
YES
C
NO
Where possible check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
Refer to the S-TYPE Electrical Guide.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between TP sensor electrical connector PI026 and the ECM electrical connector PI001 PI026 pin 004 - PI001 pin 012 (orange and yellow wire).
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

P-16 Cont.


C
When possible, check the harness for damage before disconnecting the ECM.
See Additional Information Generic Connector Inspection.
Ensure the ignition is switched 'OFF'. Disconnect ECM electrical connector PI001, and check for any damage.
See Additional Information Generic Harness Check.
Carry out Generic Harness Check between TP sensor electrical connector PI026 and the ECM electrical connector PI001
PI026 pin 003 - PI001 pin 075 (red wire)
PI026 pin 002 - PI001 pin 076 (yellow wire)
PI026 pin 001 - PI001 pin 019 (black and green wire)
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

Generic Connector Inspection

Electrical failures can be caused by problems with the connectors and their pins. Below are a number of points that may aid in investigation.

Backed-out Pins

Inspection of the connector; look for signs that the pin has backed-out. If a seal is fitted to the pin it may be protruding further out the back of the connector. If a pin has backed-out of the cavity in the connector, there is a possibility that it has been forced out when the connector was mated. Make sure that the pins are in line when the two halves of the connector are mated.

Bent Pins

Disconnect the two halves of the connector and visually inspect the pins. If a pin is bent over there is a possibility of a short from pin to pin. Pins can easily be bent over when the connector is mated. Check to ensure the pins within the connector are not out of alignment before the two halves of the connector are mated.

Water ingress/fluid ingress

Disconnect the connector and inspect for signs of water ingress. Corrosion may have occurred. If water or any other fluid is visible this may cause a bad connection or even short circuit to the other pins within the connector. Examine the connector seals for any damage and to ensure that the seals are fitted correctly. Ensure that the two halves of the connector latch together securely.

Probing

Ensure when probing a pin that the correct probe is used and excessive force is not used as this may weaken the locating clip and allow the pin to work loose. Care must be taken when probing female pins as the pin can easily be splayed if probed with the incorrect adaptor or the wrong tool. This would then have the potential to cause a bad connection between the two mating halves. Always use the Worldwide Diagnostic System probe kit when probing pins within a connector. (Jaguar probe adaptor kit part number. 3548-1358-00.)

Insertion force

Insertion force is imperative to ensure a good connection is made between the two mating pins. If the female pin is splayed, the connection will be poor. To check the insertion force of the female connector, identify the correct male pin within WDS probe adaptor kit. Gently insert the adaptor into the female pin and then repeat with the other pins within the connector. If the pin in question feels loose in comparison replace both male and female pins.

Chafing

Inspect the harness when in close contact to other objects (i.e. sharp steel brackets). Engine vibration will cause the outer protection to quickly chafe through if the harness is not routed correctly. When performing a repair, ensure that heat resistant tape is used where relevant. Before repairing or renewing any harness, always refer to the Electrical Wiring Harness Repair Guide, reference publication number JTP 586. When repairing a harness ensure the Jaguar harness repair kit is used. (Part number. 418-S065 and 418-S411.)

Always refer to the Technical Hotline if problems are encountered.

Generic Harness Check

- When carrying out any of the tests in the generic harness check, it is imperative that any other sources that share the harness are taken into consideration when a measurement is taken.
- The S-TYPE Electrical Guide will show all other sources sharing that harness i.e. splices and sensors.
- Always ensure the digital voltmeter is operating correctly before proceeding.
- Always use the WDS probe kit when probing pins within a connector.

Note: Do not insert the Digital Multi Meter (DMM) leads into the connector pins. (Probe adaptor kit part number: 3548-1358-00.)

Continuity test

Using a DMM, connect the DMM to the pins at both ends of the circuit that you are testing. Ensure you connect to the correct pin when a large number of pins are used in a connector. (Use WDS Probe adapter kit).

Set the DMM to the resistance test or the continuity beeper. The resistance should be between 0 and 10 ohms. If a high resistance or open circuit is found investigate harness for damage.

Short circuit high fault

The DMM can be connected to any ground source on the vehicle, but it is preferable to use the battery negative pole.
Set the DMM to Volts DC; connect the DMM red probe to the suspect pin of the circuit and the DMM black probe to the battery negative pole. No voltage should be seen. If 4 – 13 volts is seen, suspect short circuit high and investigate harness for damage.

Always test the circuit with the ignition 'ON' and 'OFF' when trying to identify this fault condition.

Short circuit low fault (to ground)

The DMM can be connected to any ground source on the vehicle, but it is preferable to use the battery negative pole.
Set the DMM to the resistance test; connect the DMM to the suspect pin of the circuit and the battery negative pole. An infinity reading/open circuit (O/C) should be seen.

If a resistance is seen, suspect short circuit low and investigate harness for damage.

Always refer to the Technical Hotline if problems are encountered.