



TECHNICAL BULLETIN

S303-14

09/2002

Subject

ENGINE MANAGEMENT DIAGNOSTIC FLOWCHARTS

Model: S-TYPE

Year: 2002 Onwards

VIN M45255 Onwards

Section: 303

Engine Systems

Sub-Section: 303-14

Electronic Engine Controls

Summary

This Technical Bulletin has been issued to aid in the diagnosis of V6 and V8 Engine Management system components.

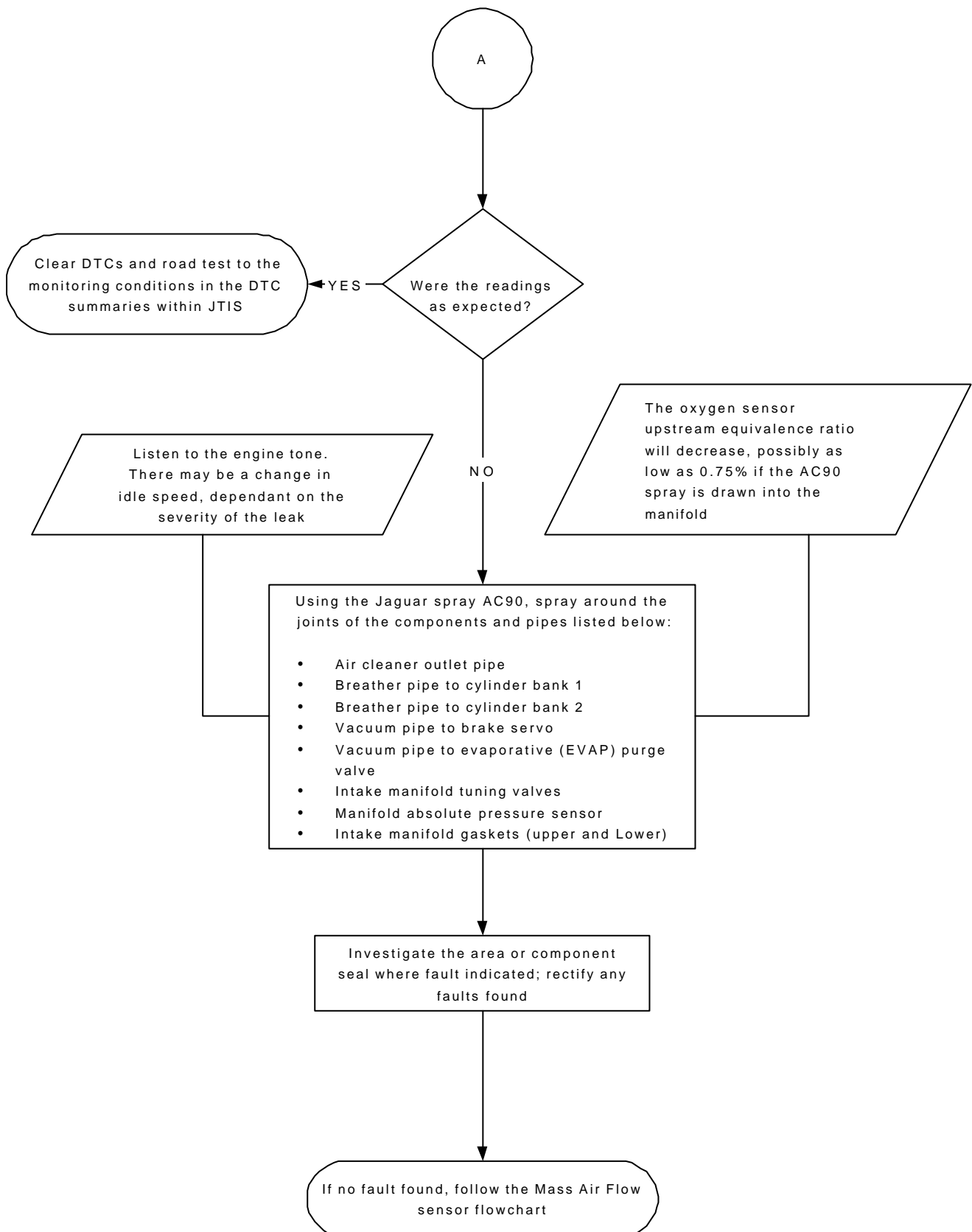
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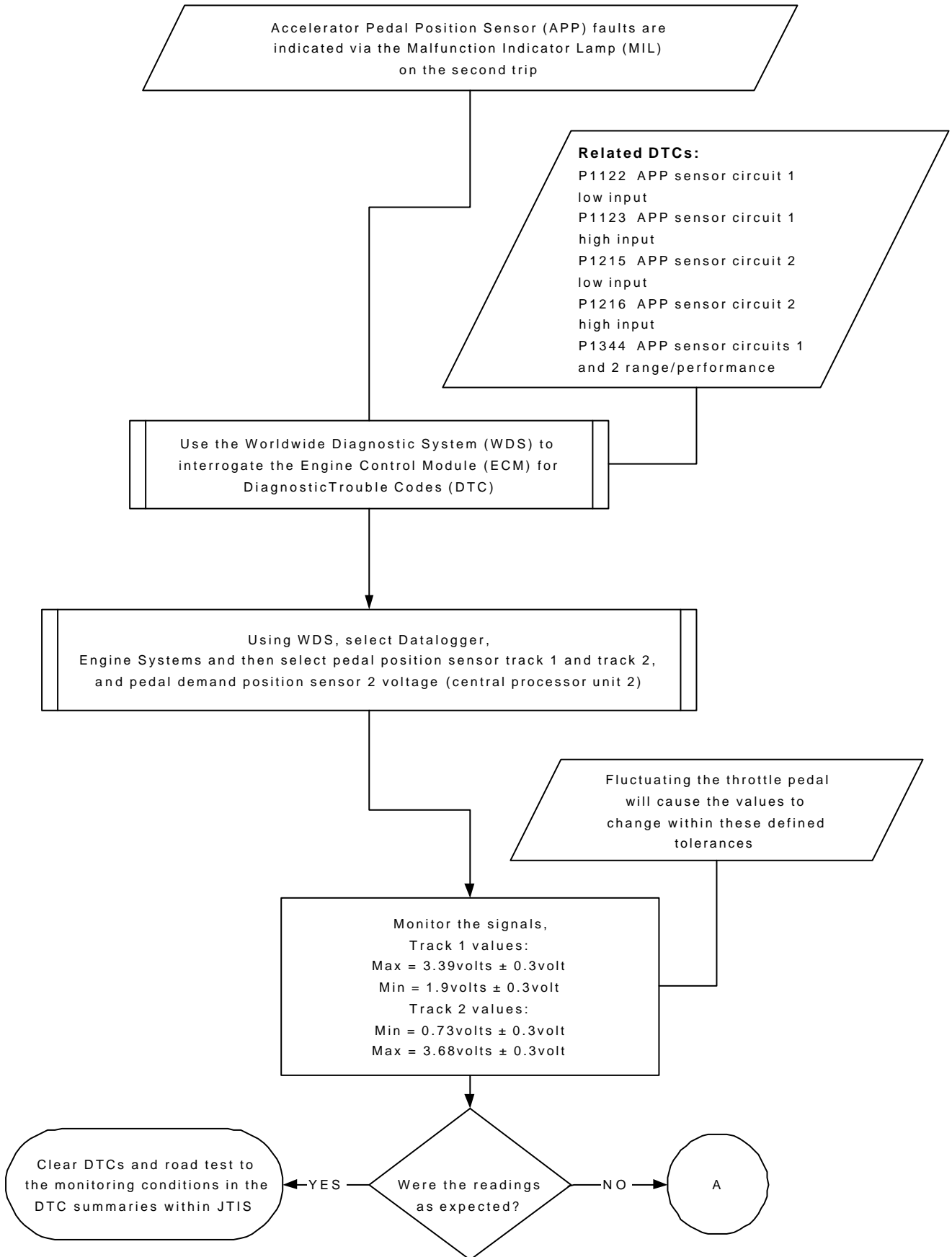
**Air Leakage
Flowchart P-1**



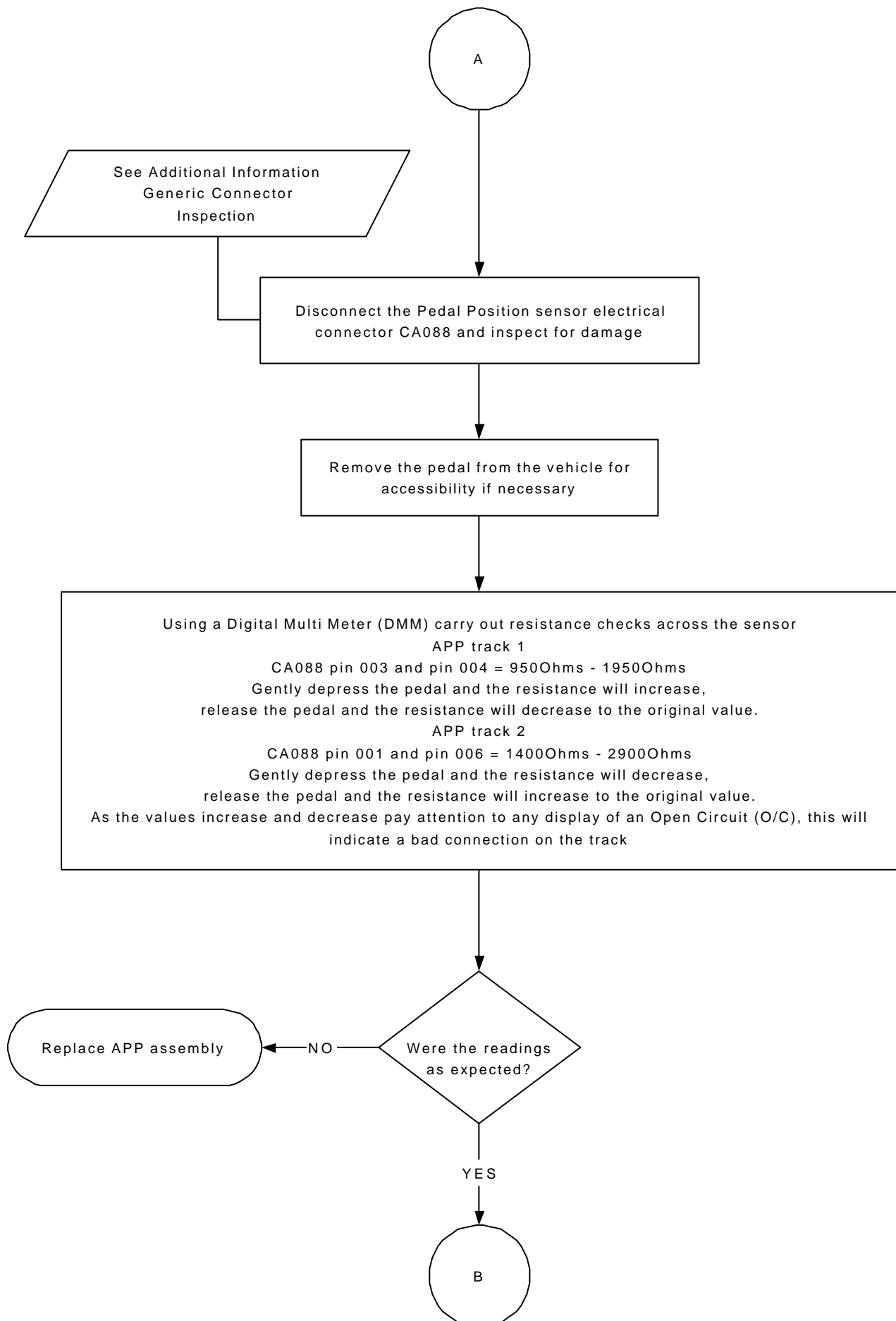
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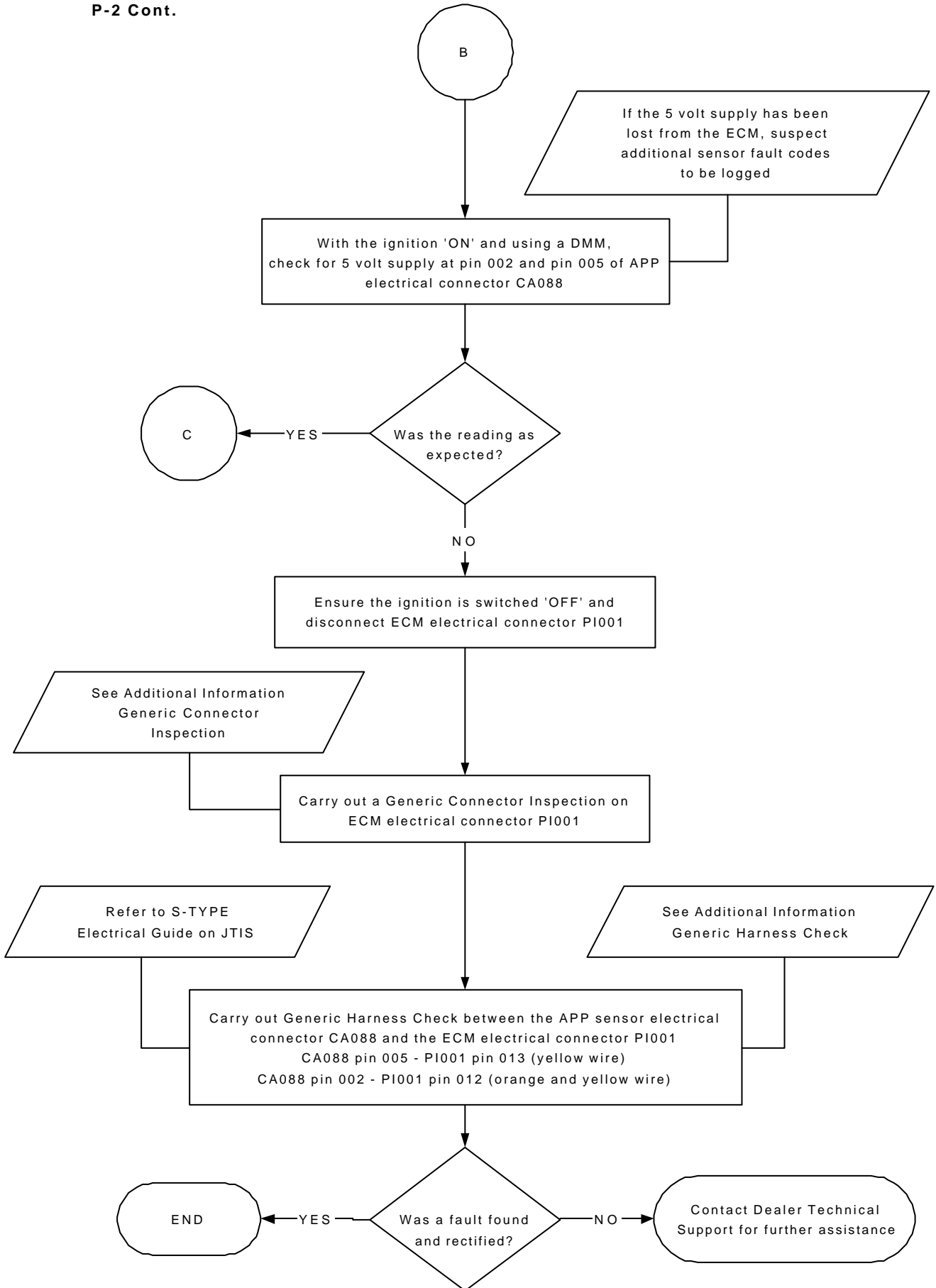
Accelerator Pedal Position Sensor Flowchart P-2



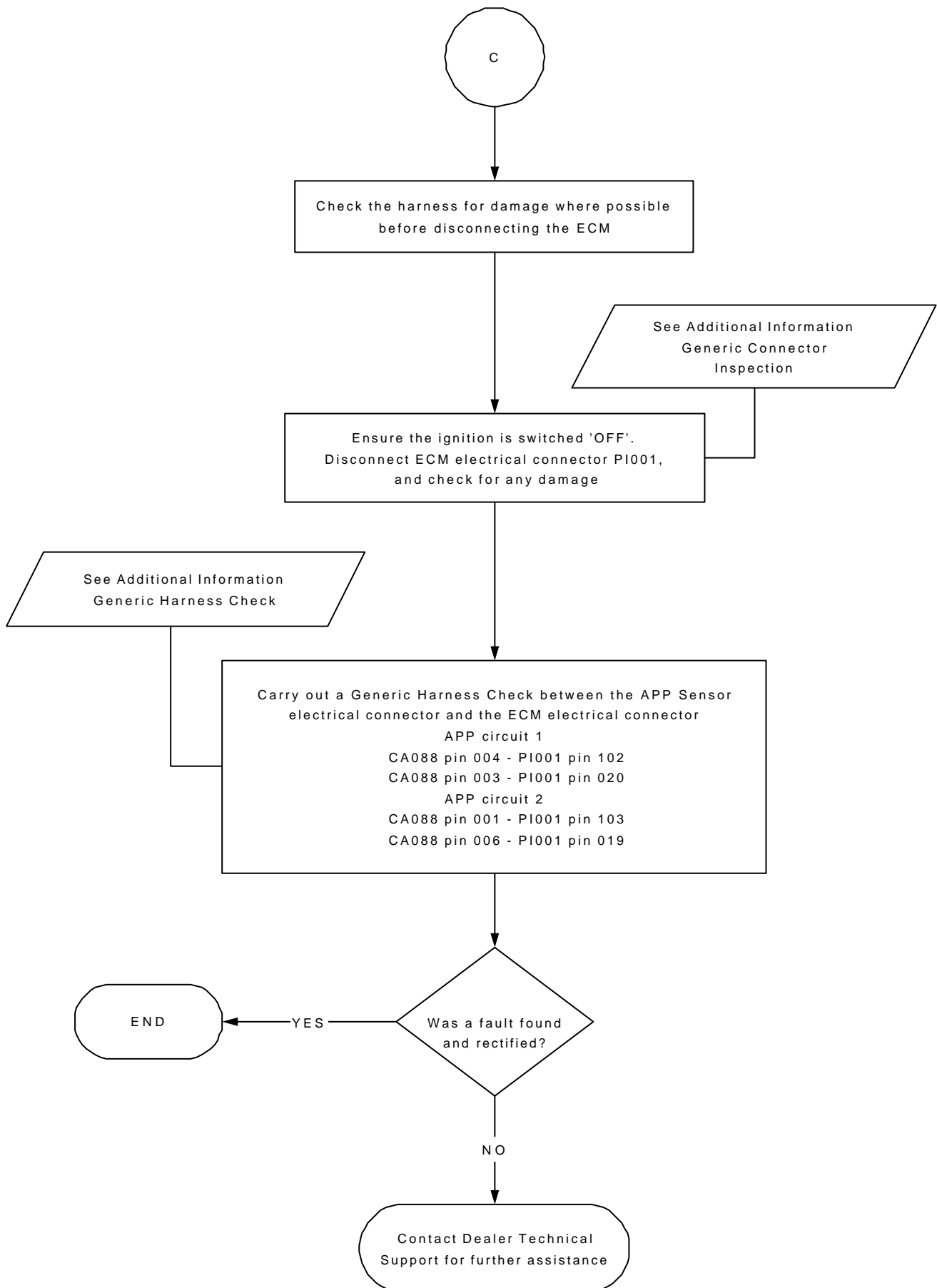
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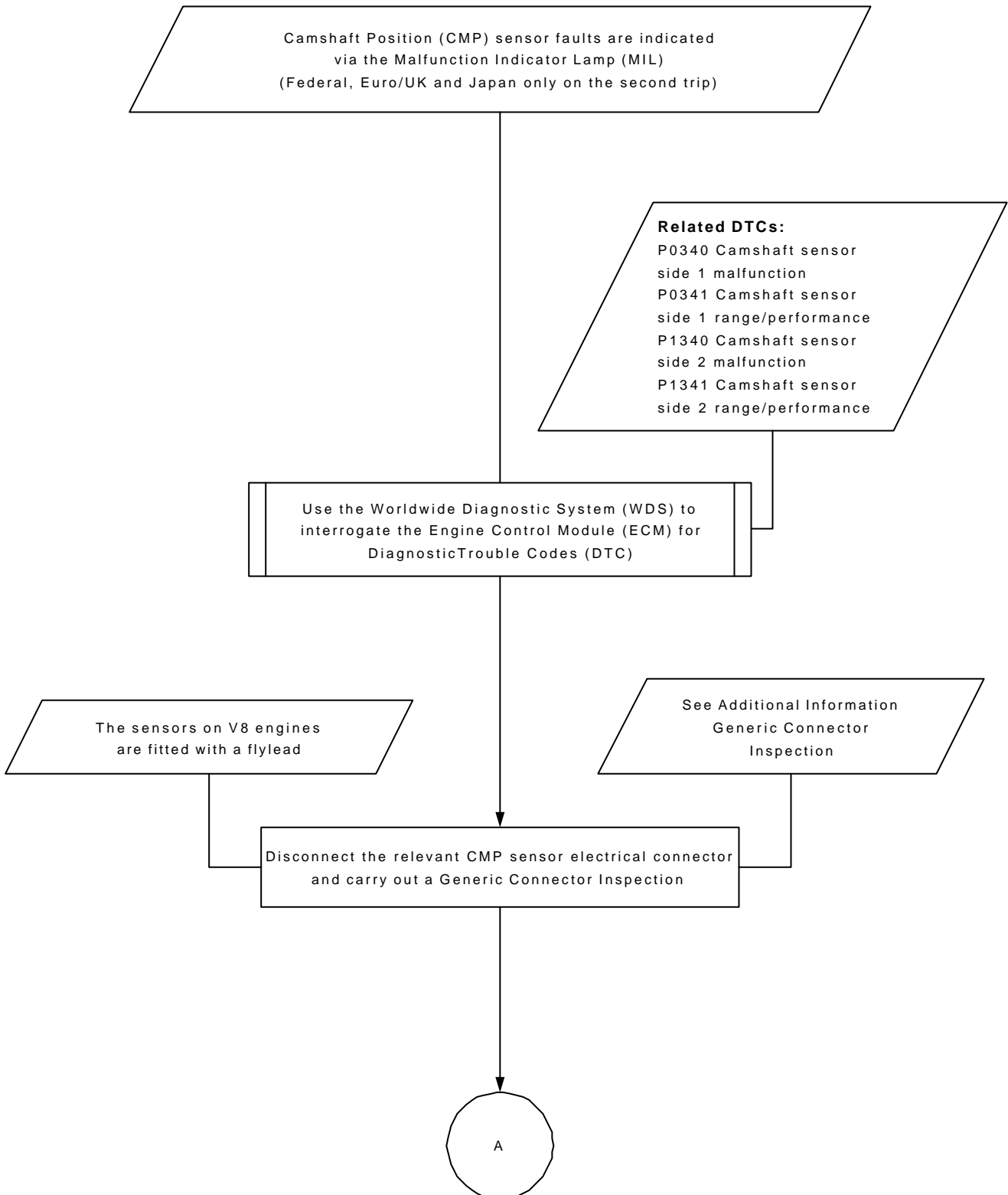
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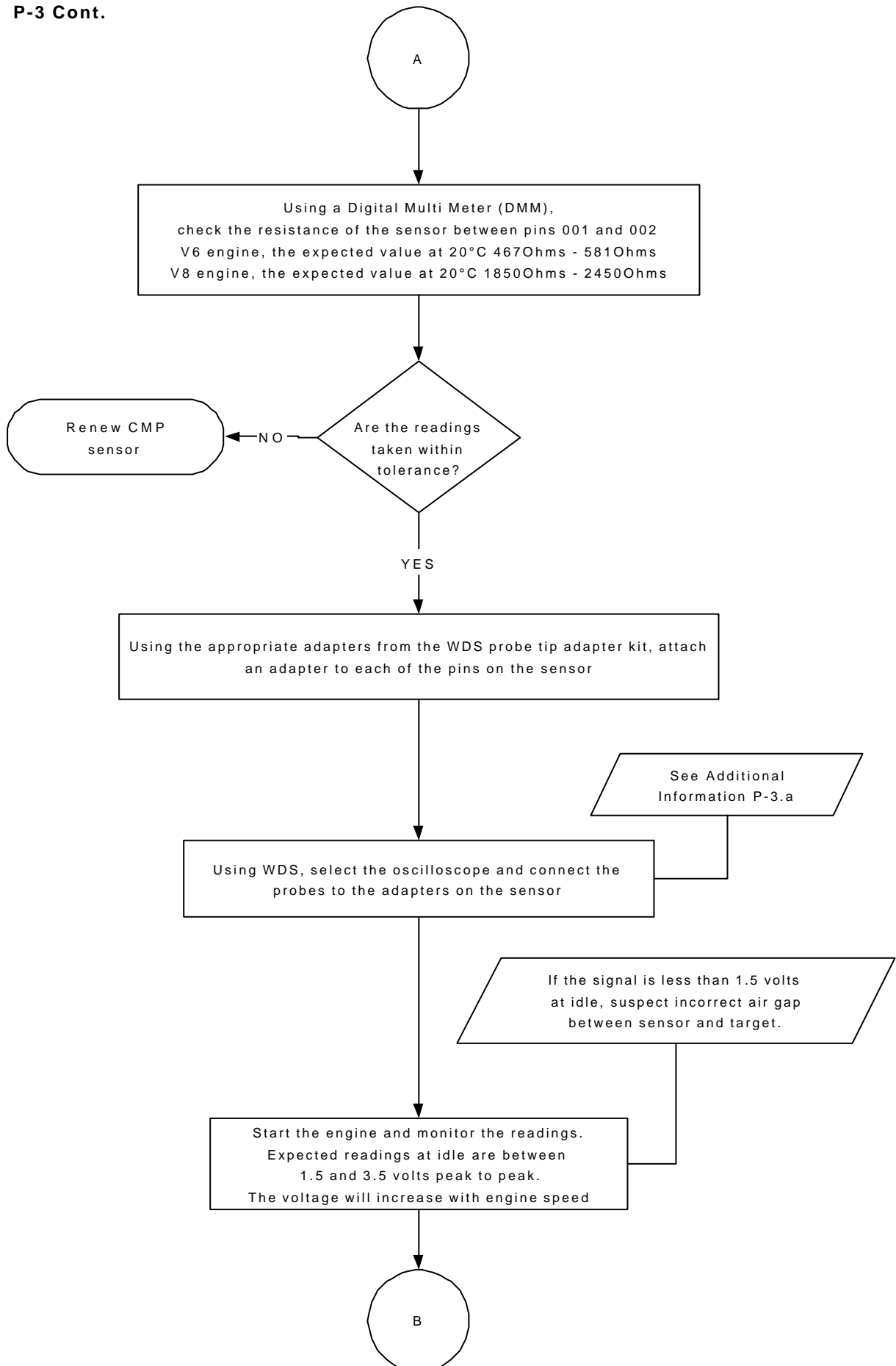
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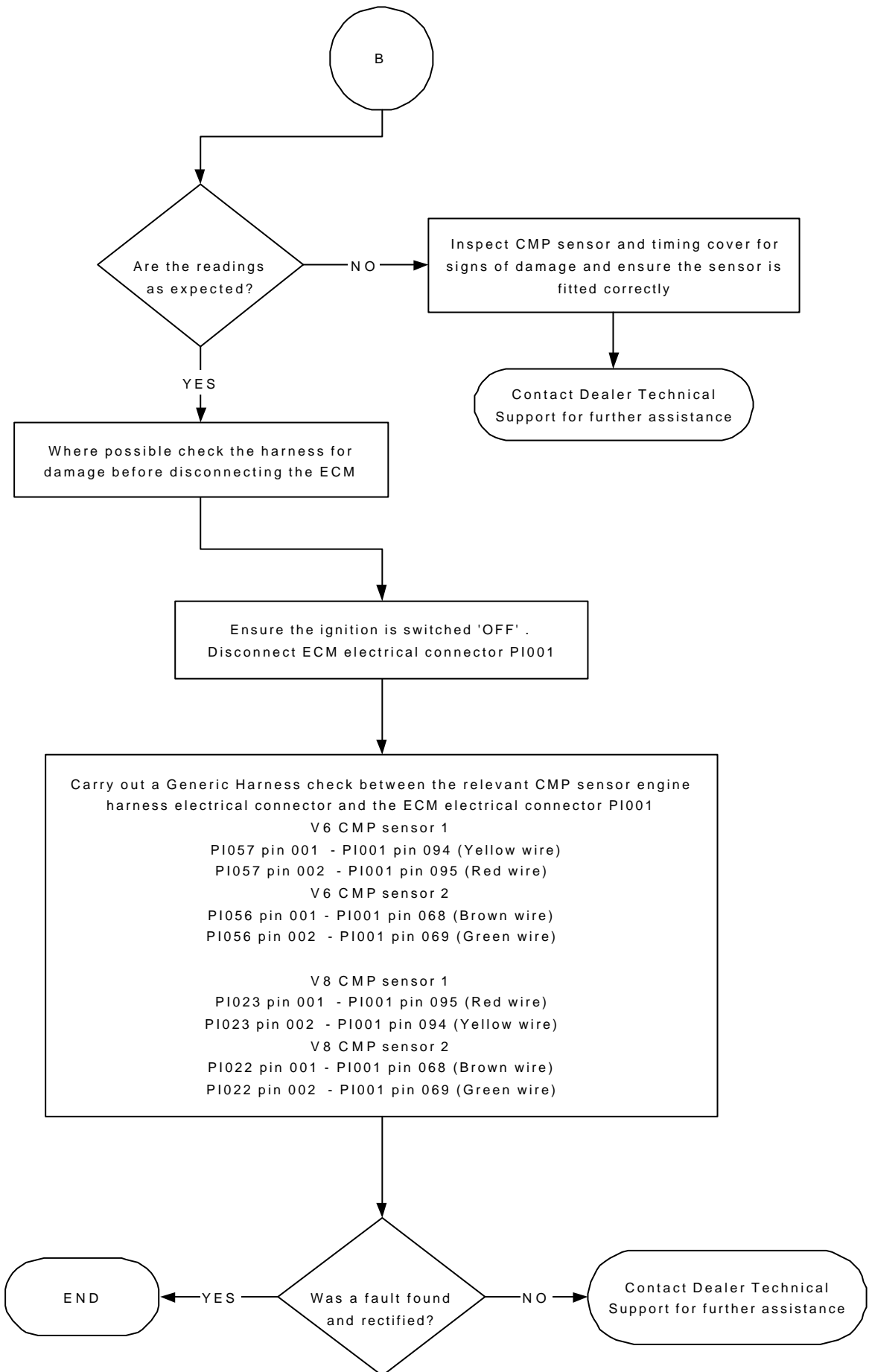
Camshaft Position Sensor Flowchart P-3



P-3 Cont.

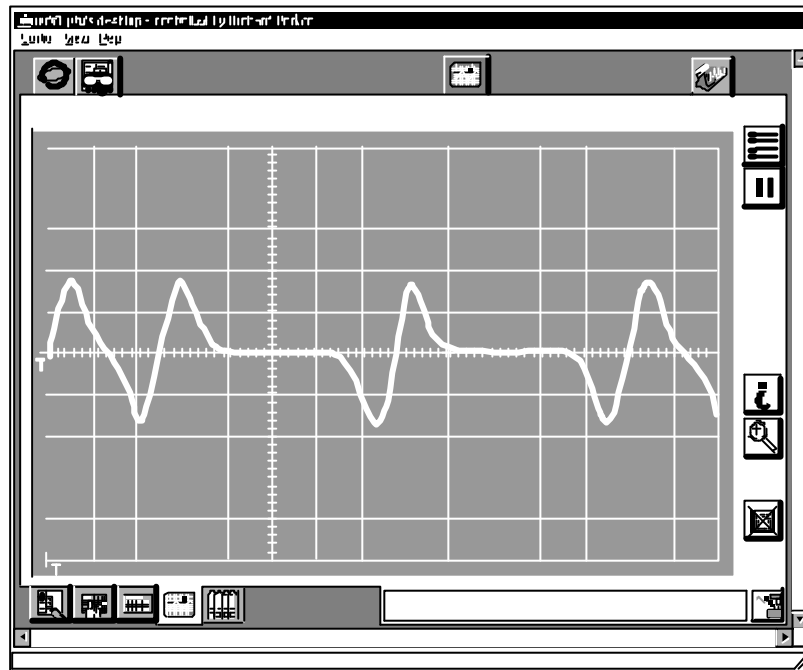


P-3 Cont.



Additional Information P-3a**Oscilloscope set up.**

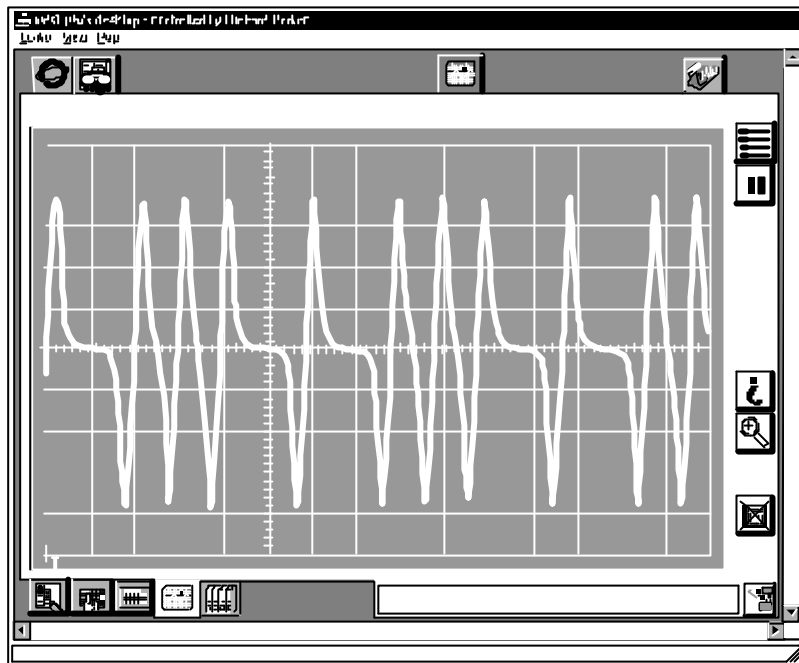
- 1 Configuration sub tab.
Channel 1
Select: Red probe and black probe-Differential.
- 2 Channel calculation sub tab.
Select: Maximum voltage.
- 3 Main oscilloscope display sub tab.
Y-axis select: Scale set to 1 volt/div.
X-axis select: Scale set to 10 ms/div.
- 4 Select: Full screen.



J.100.223

Fig. 1 Trace of the camshaft position sensor at idle

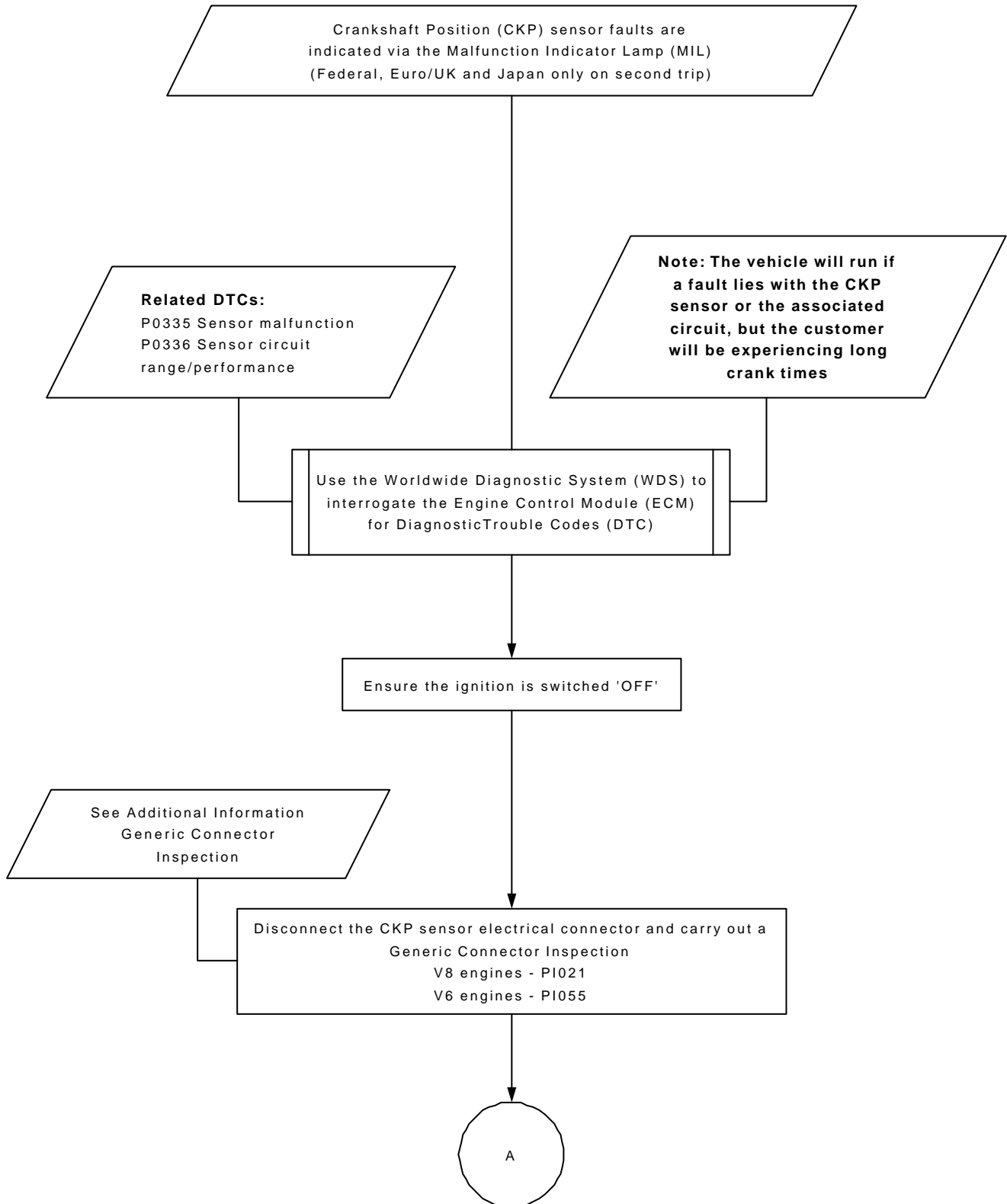
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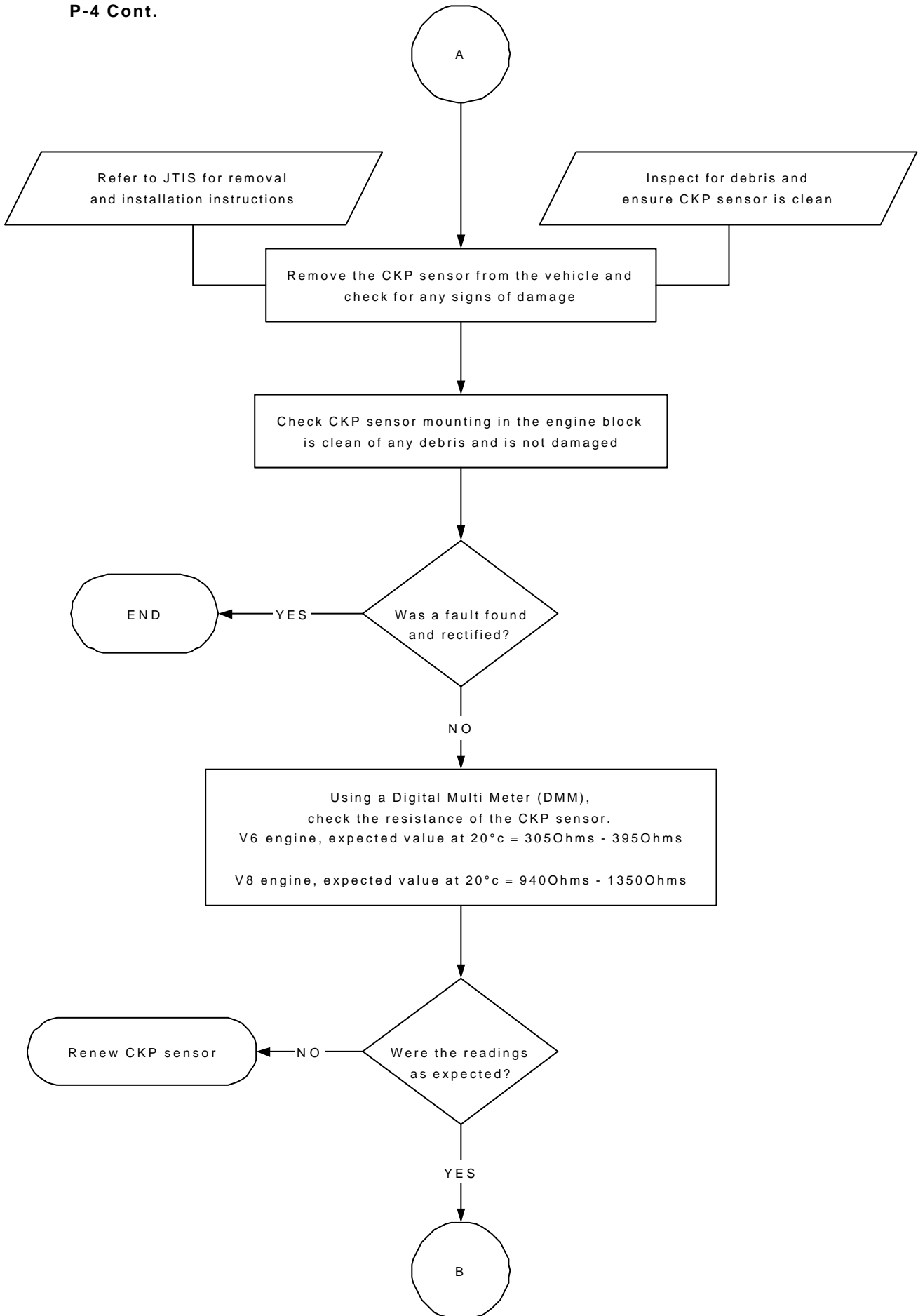
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Fig. 2 Trace of camshaft position sensor at 2000rpm

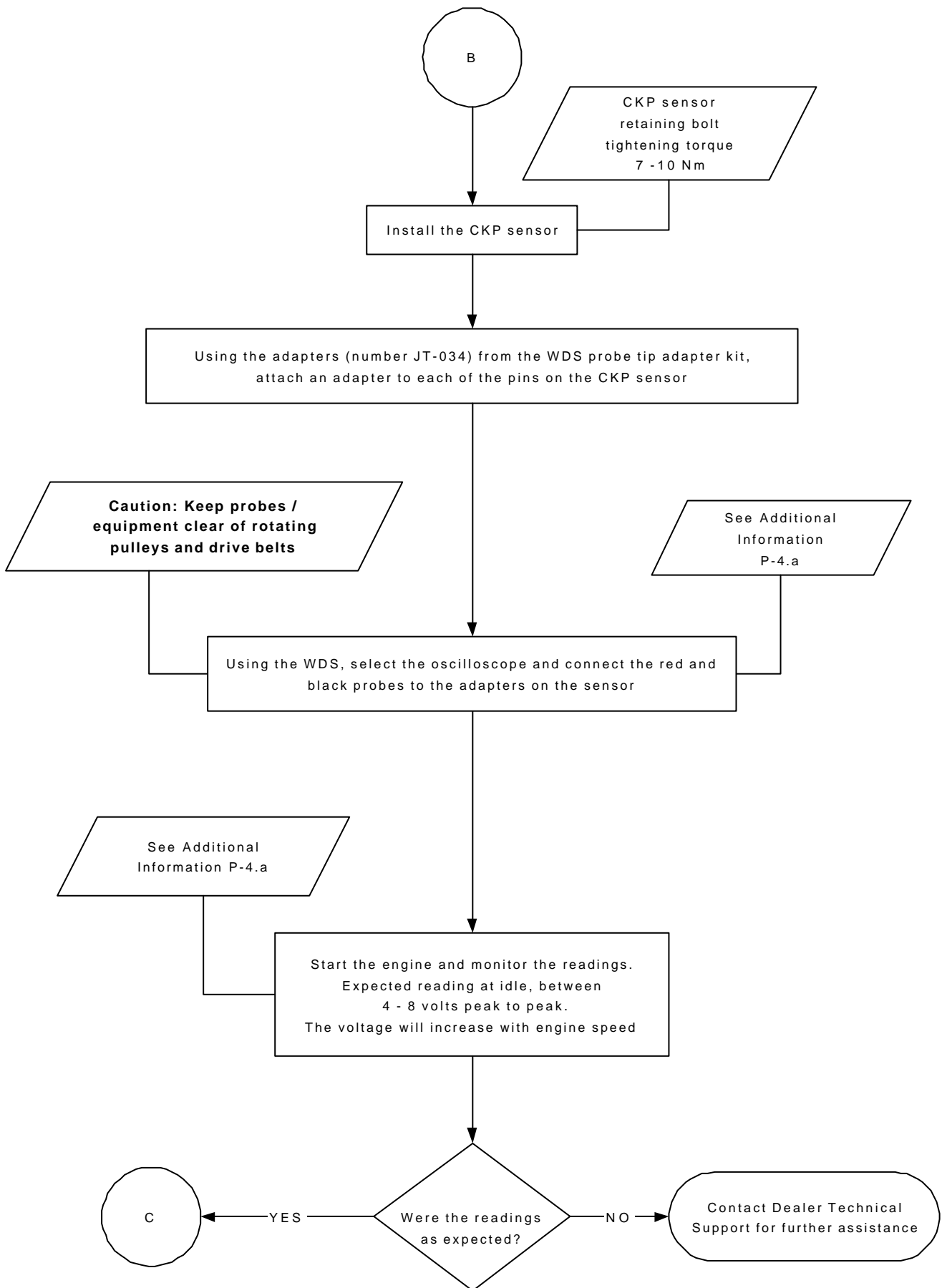
**Crankshaft Position Sensor
Flowchart P-4**



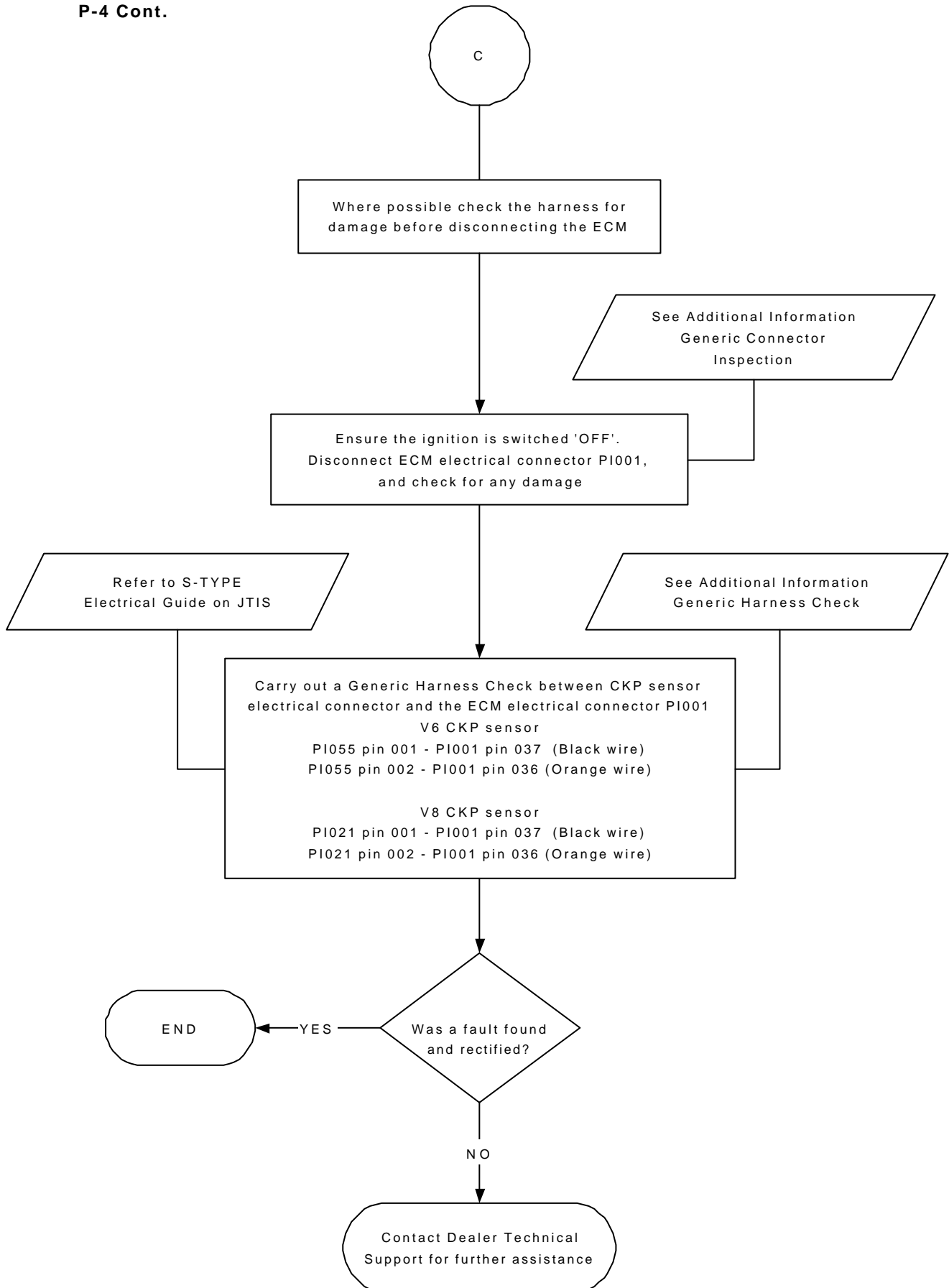
P-4 Cont.



P-4 Cont.

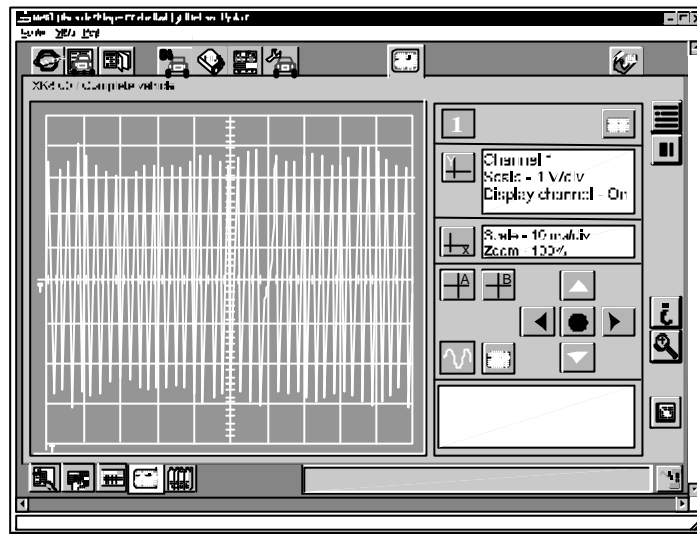


P-4 Cont.



Additional Information P-4.a**Oscilloscope set up.**

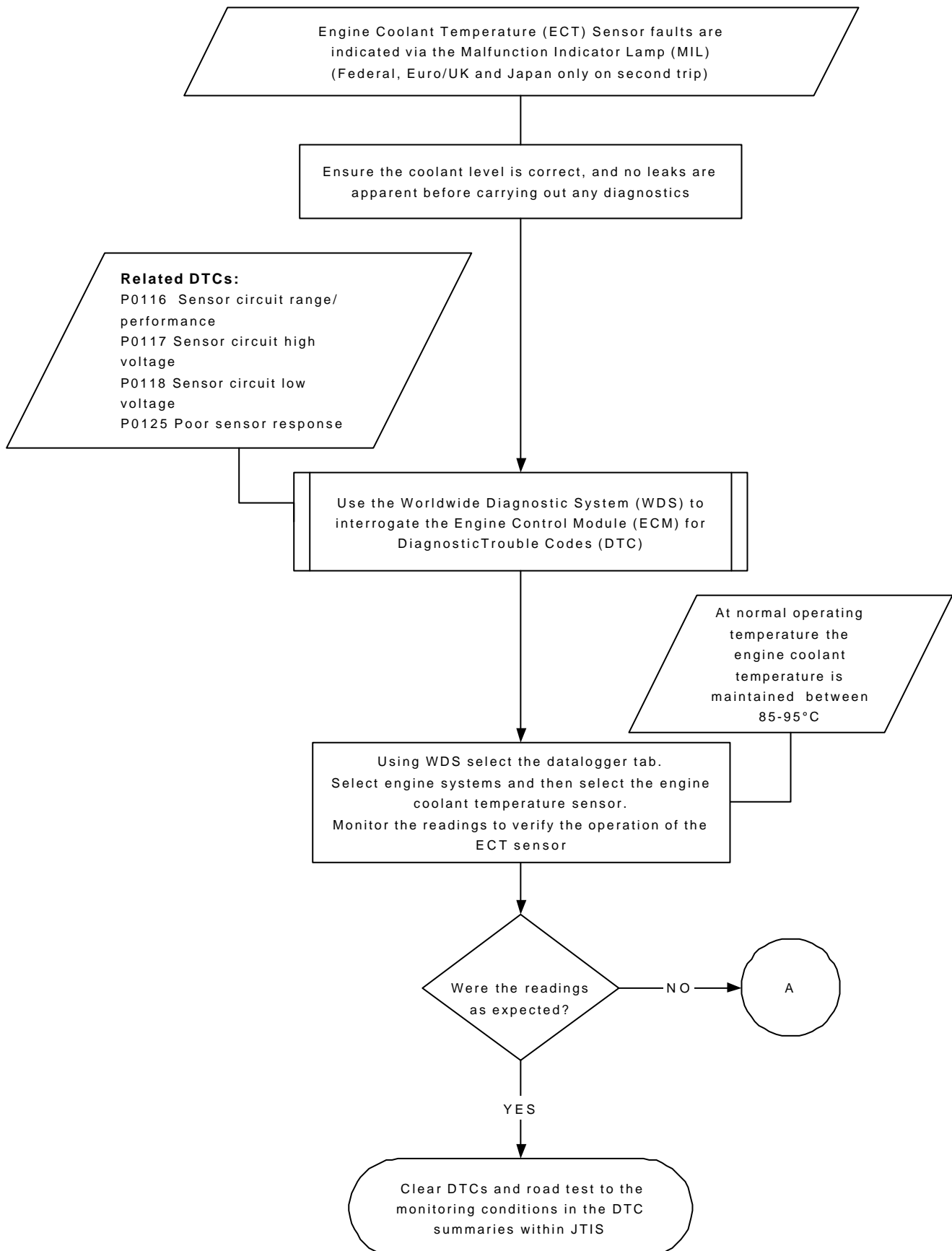
- 1 Configuration sub tab.
Channel 1
Select: Red probe and black probe - Differential.
- 2 Channel calculation sub tab.
Select: Maximum voltage.
- 3 Main oscilloscope display sub tab.
Y-axis select: Scale set to 1 V/div.
X-axis select: Scale set to 10 ms/div.
- 4 Select: Full screen.

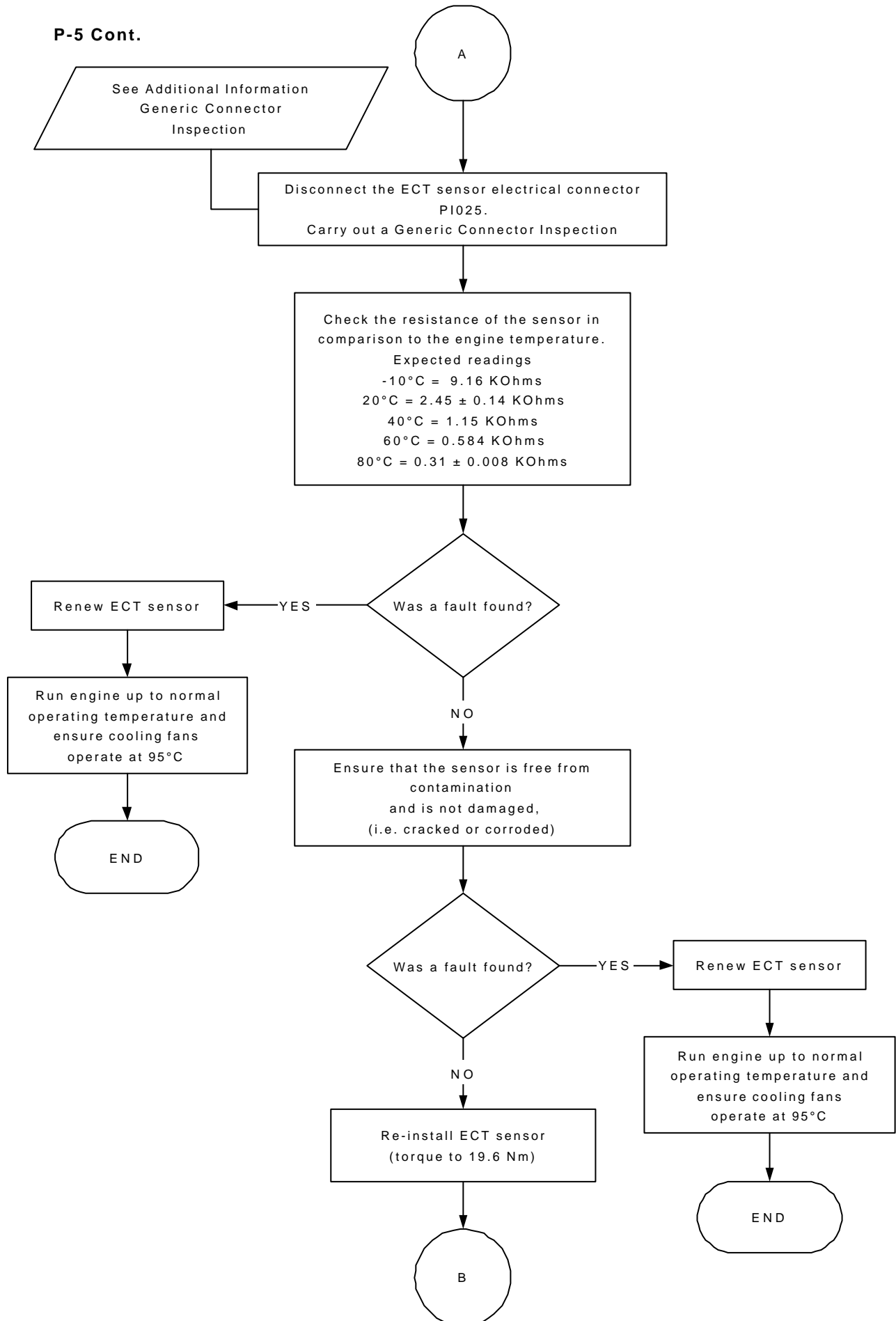


J.100.225

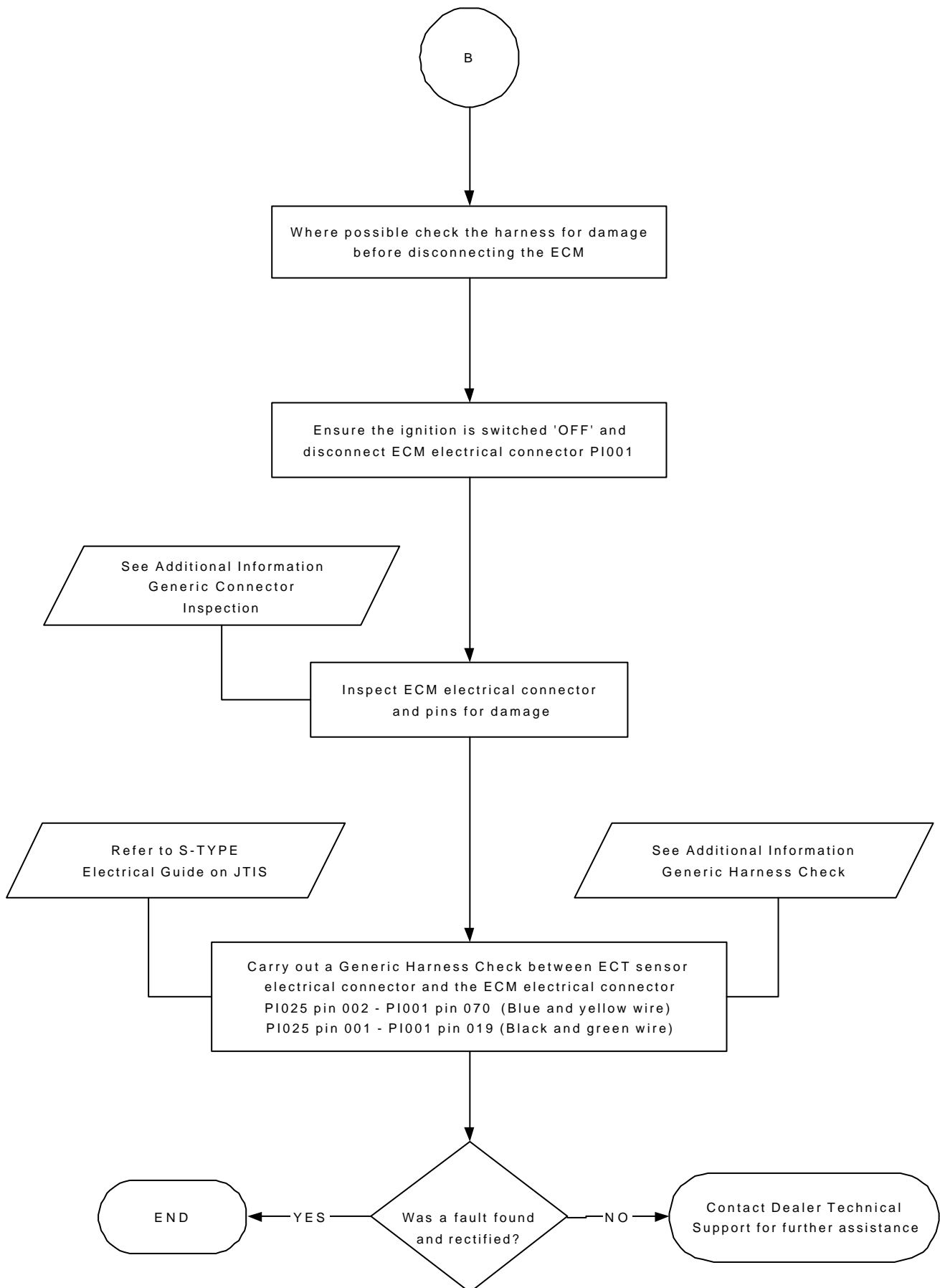
Fig. 3 Trace of the crankshaft position sensor at idle

Engine Coolant Temperature Sensor Flowchart P-5

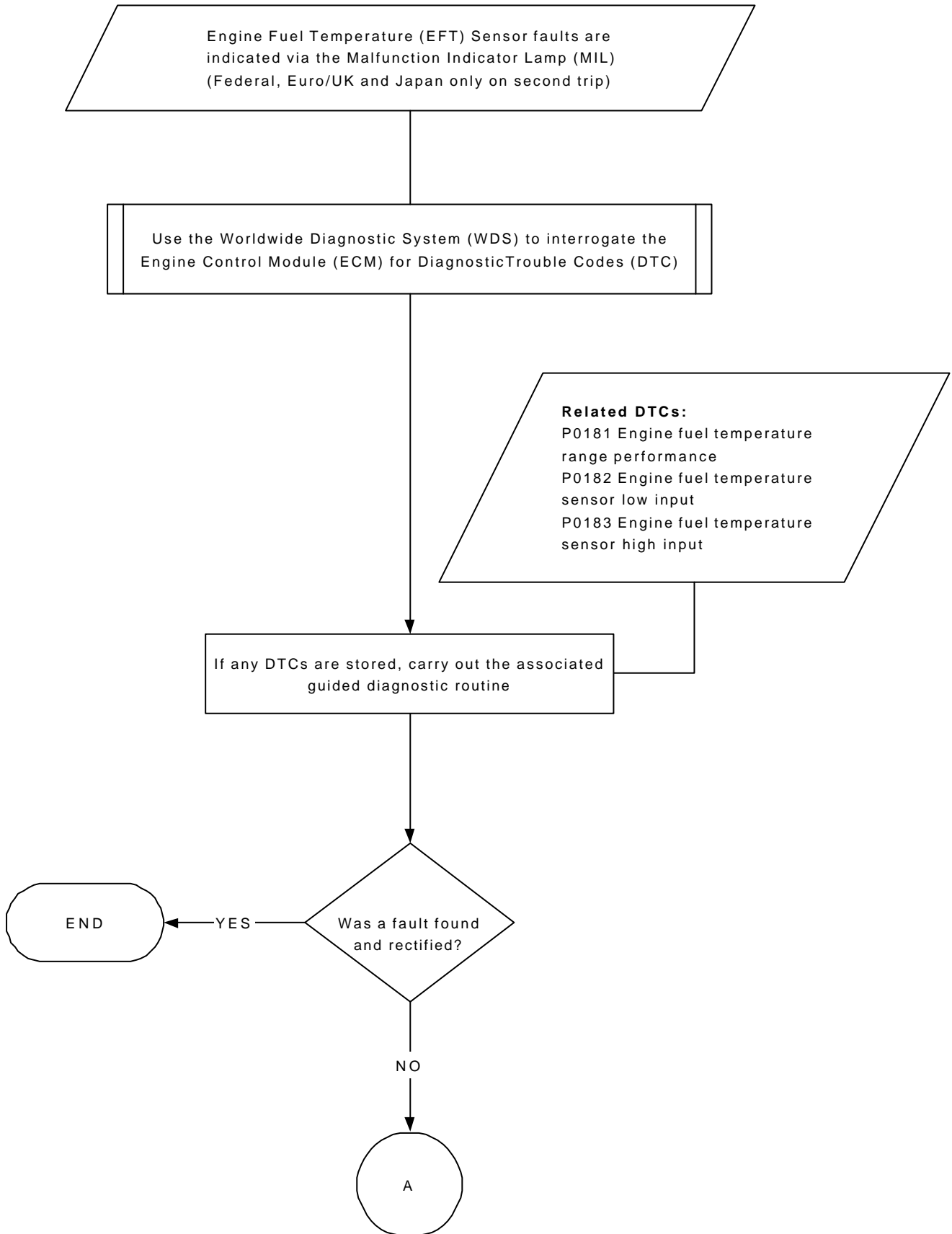




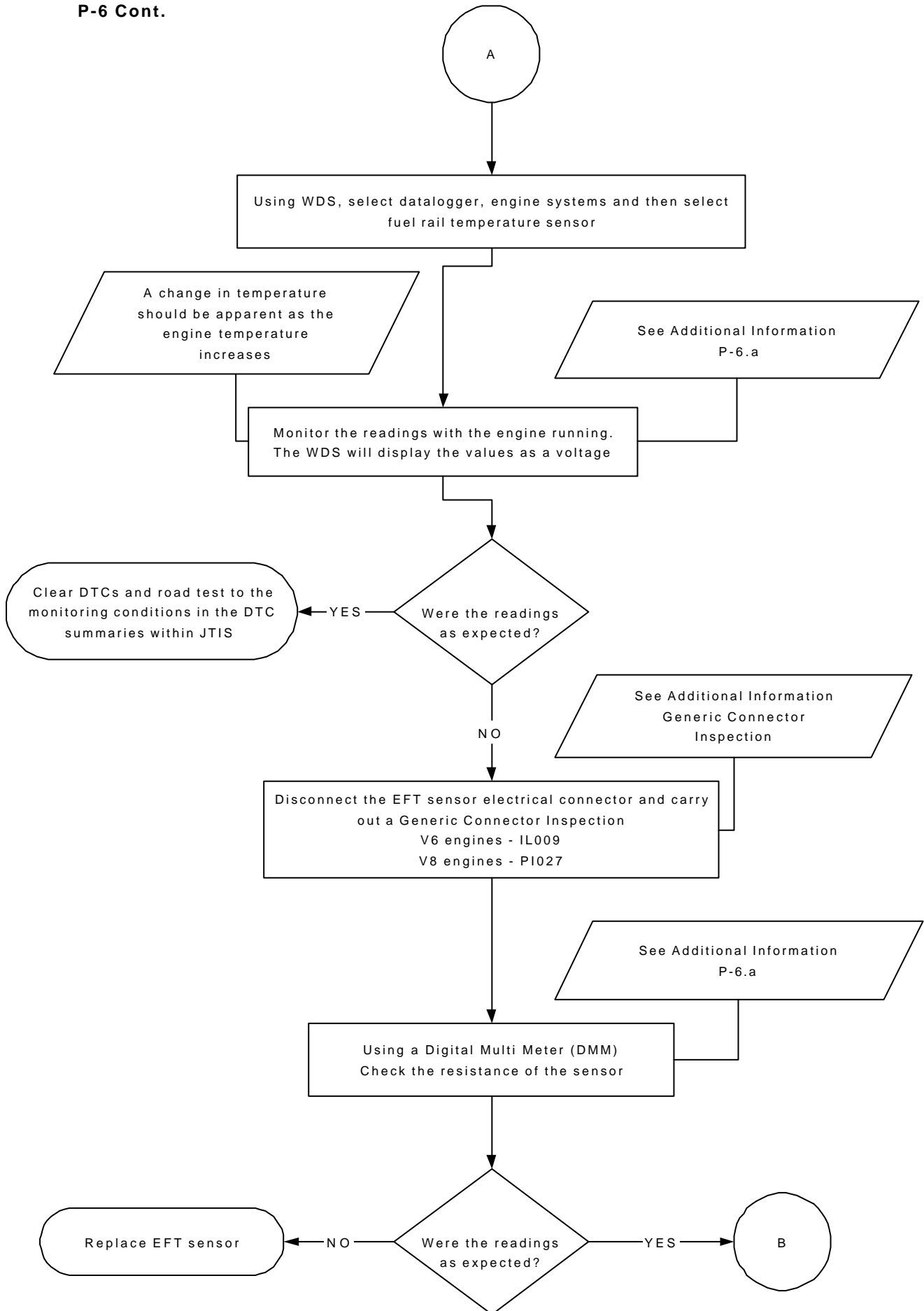
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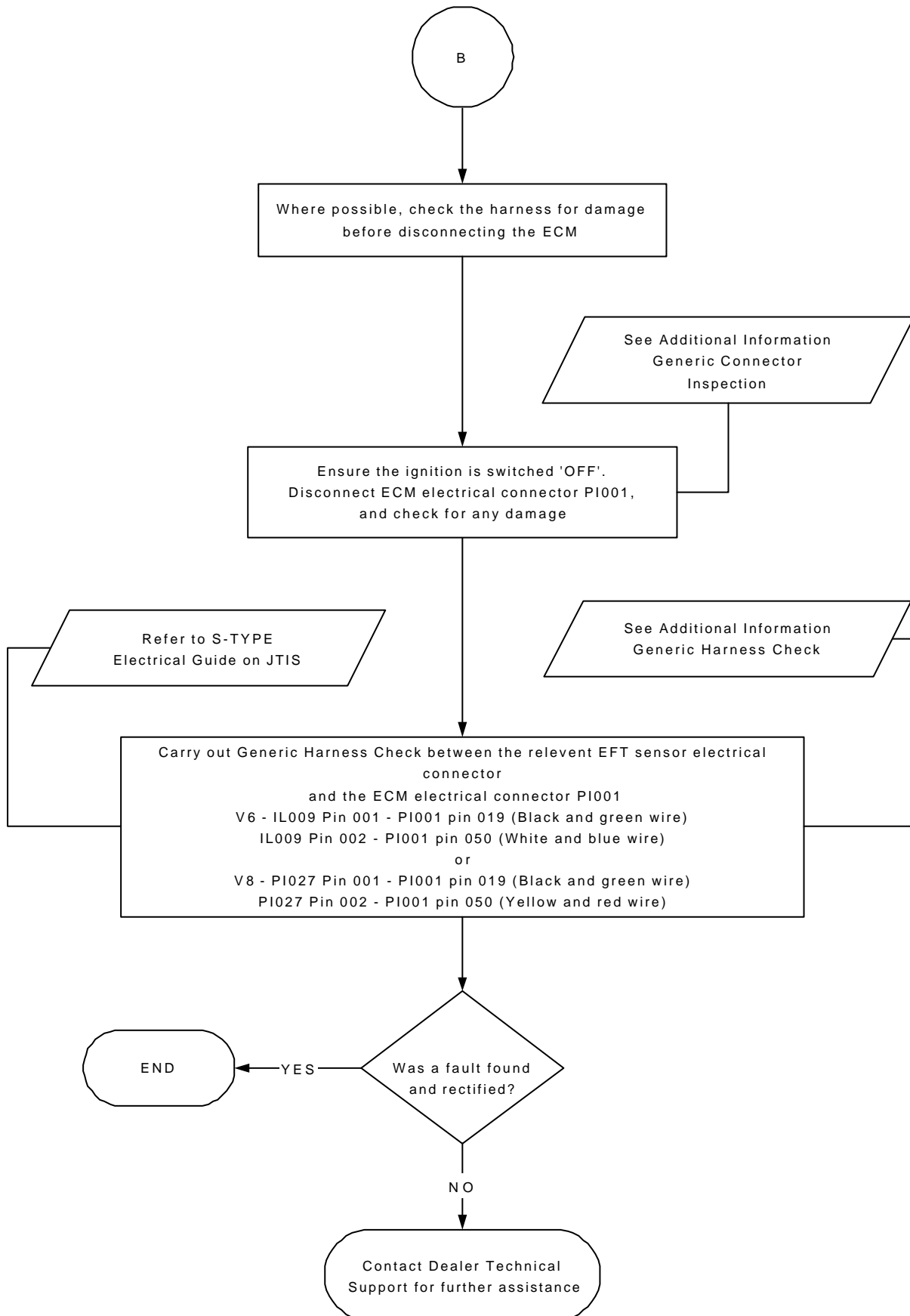
**Engine Fuel Temperature Sensor
Flowchart P-6**



P-6 Cont.



P-6 Cont.



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 Kohms	4.15 volts ± 0.04 v
10°C (50°F)	58.9 k-ohms ± 2.9 Kohms	3.52 volts ± 0.06 v
20°C (68°F)	37.3 k-ohms ± 2.1 Kohms	3.09 volts ± 0.07 v
30°C (86°F)	24.2 k-ohms ± 1.4 Kohms	2.62 volts ± 0.07 v
40°C (104°F)	16.1 k-ohms ± 0.9 Kohms	2.15 volts ± 0.08 v

Abbreviations:

WDS - Worldwide Diagnostic System.

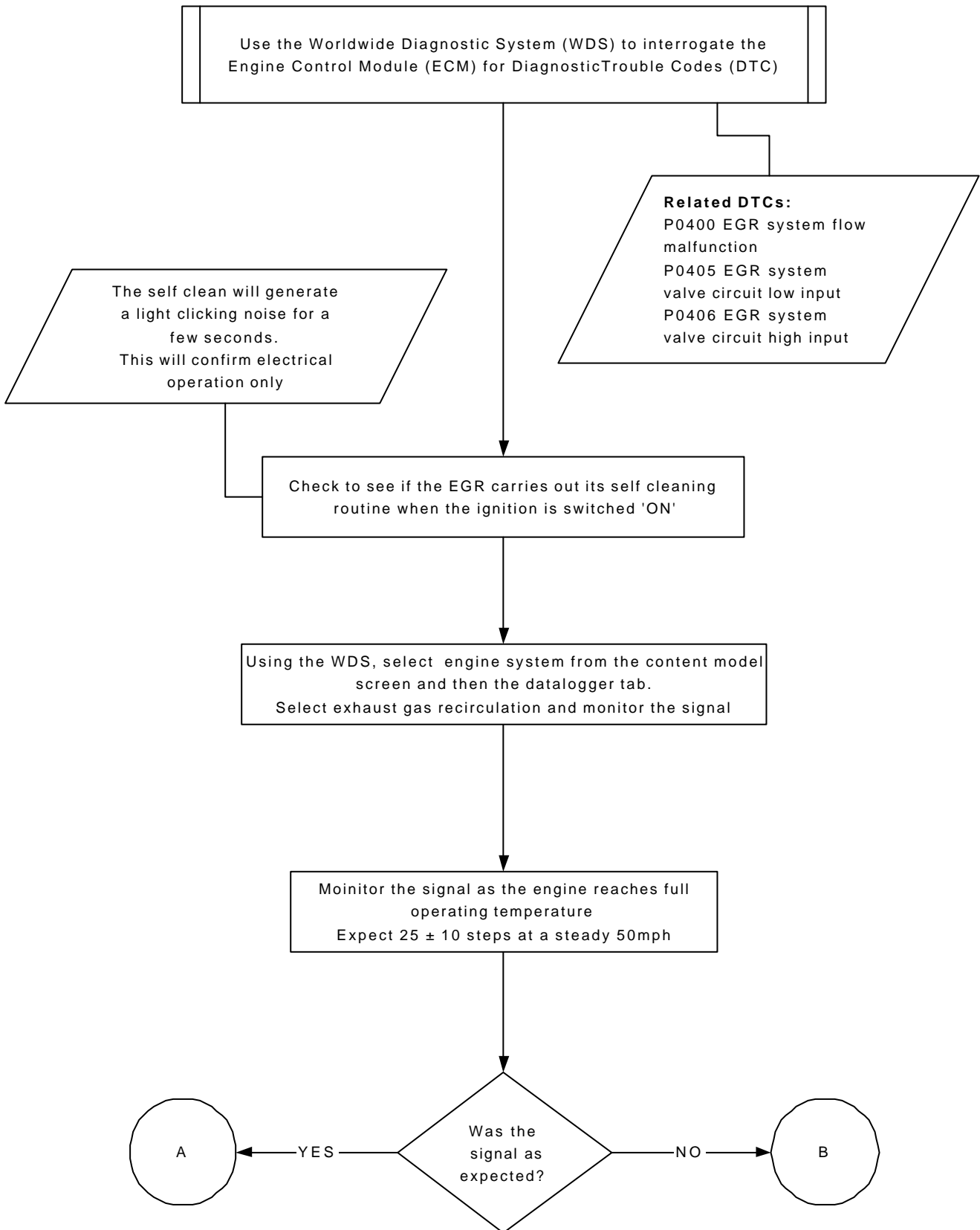
DMM - Digital Multi Meter.

Note:

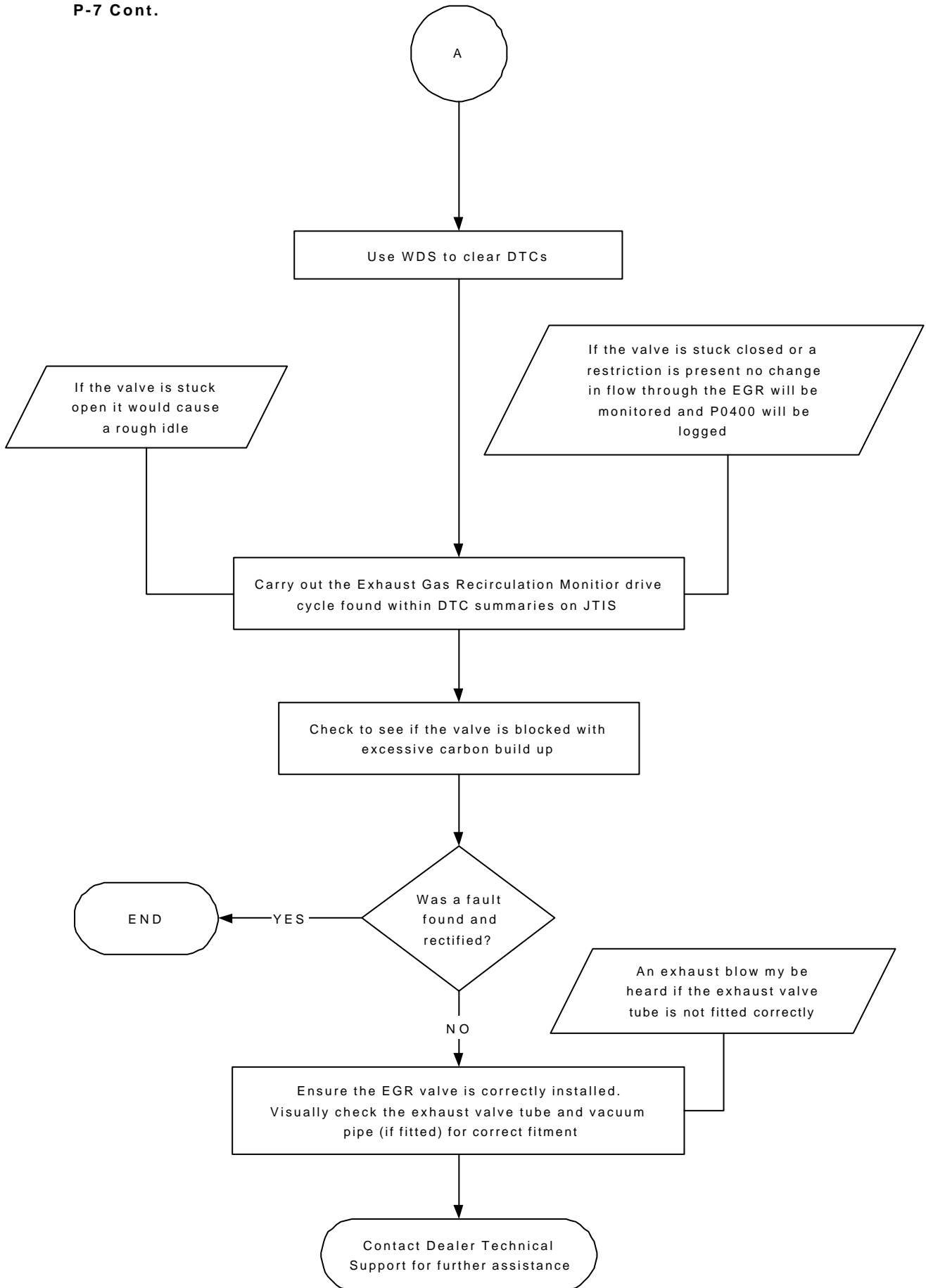
When testing the Engine Fuel Temperature sensor, if the vehicle is cold (approximately workshop temperature 20°C) it is possible to invoke a temperature change by rubbing the rail where the sensor is situated, this will increase the temperature and decrease the resistance.

WARNING: PARTS MAY BE HOT.

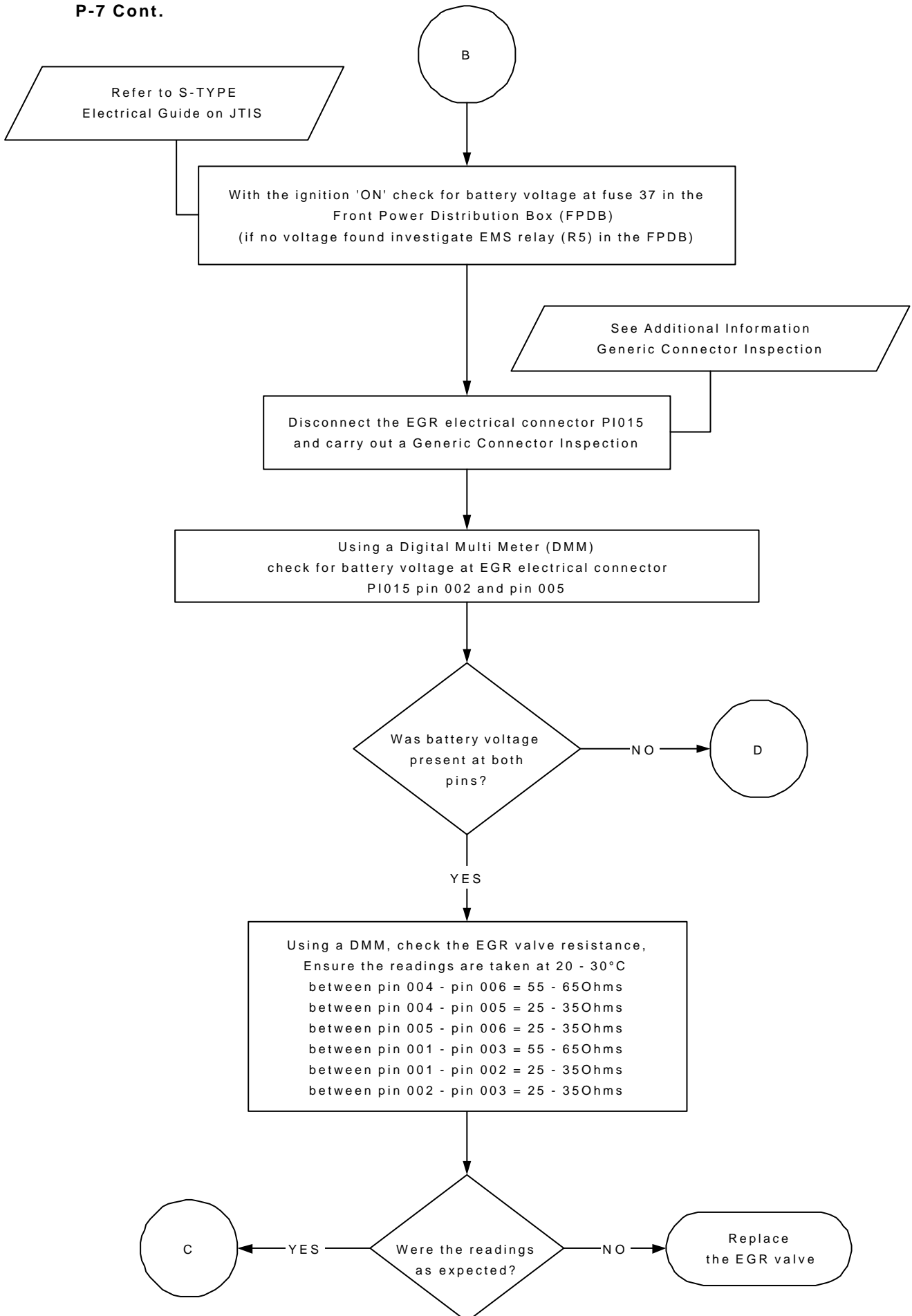
**V8 N/A & SC Exhaust Gas
Recirculation Valve Flowchart P-7**



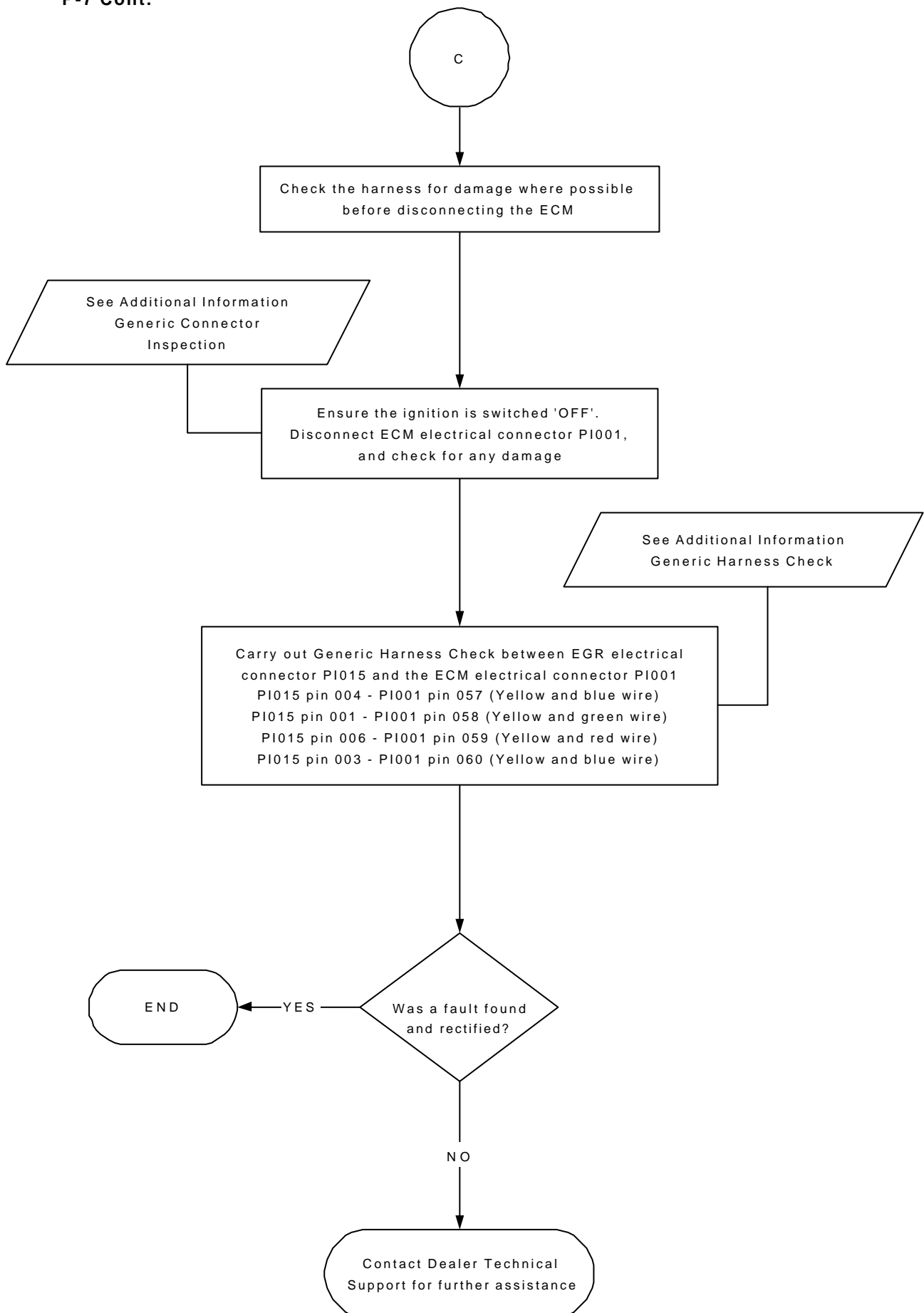
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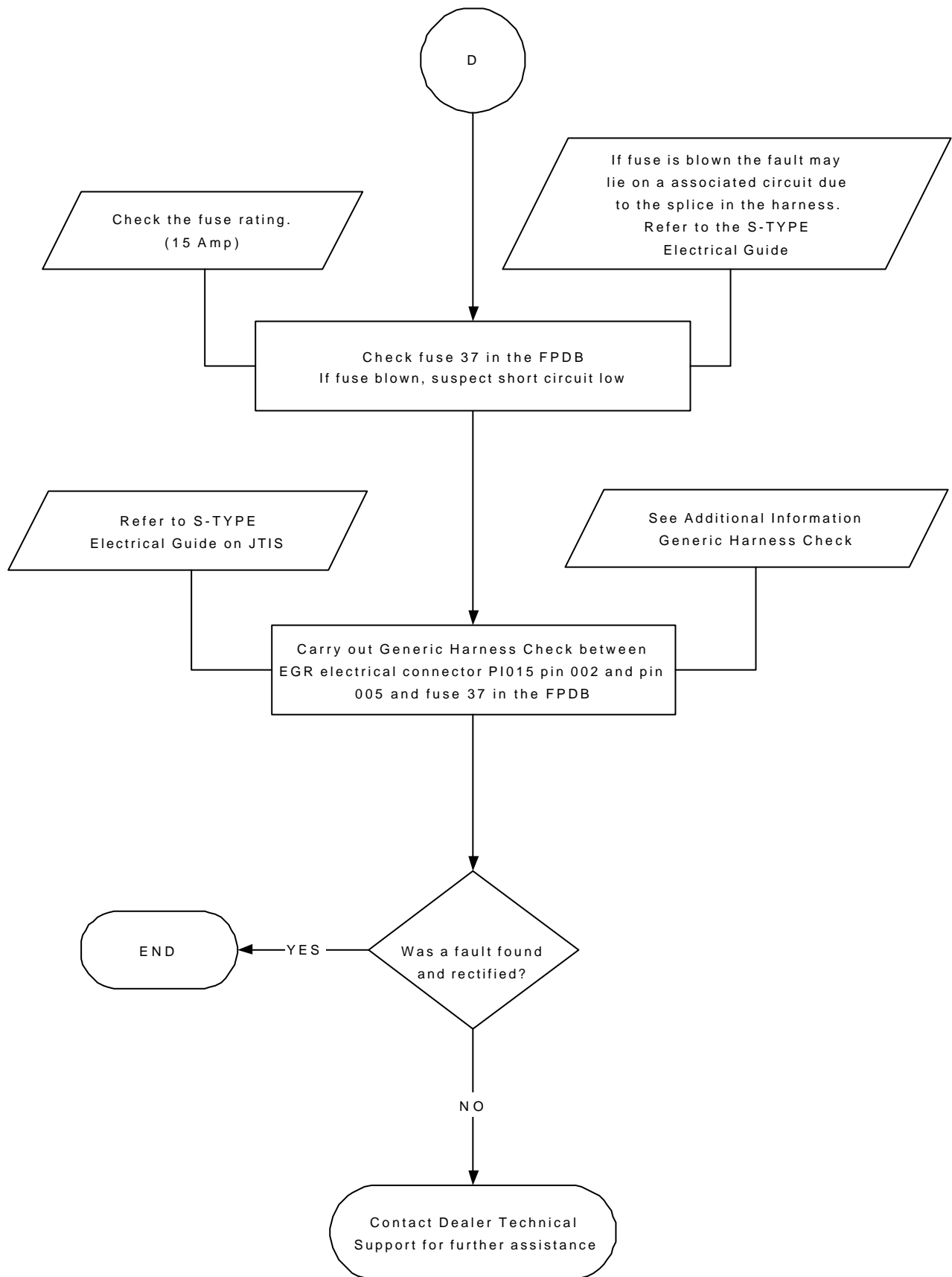
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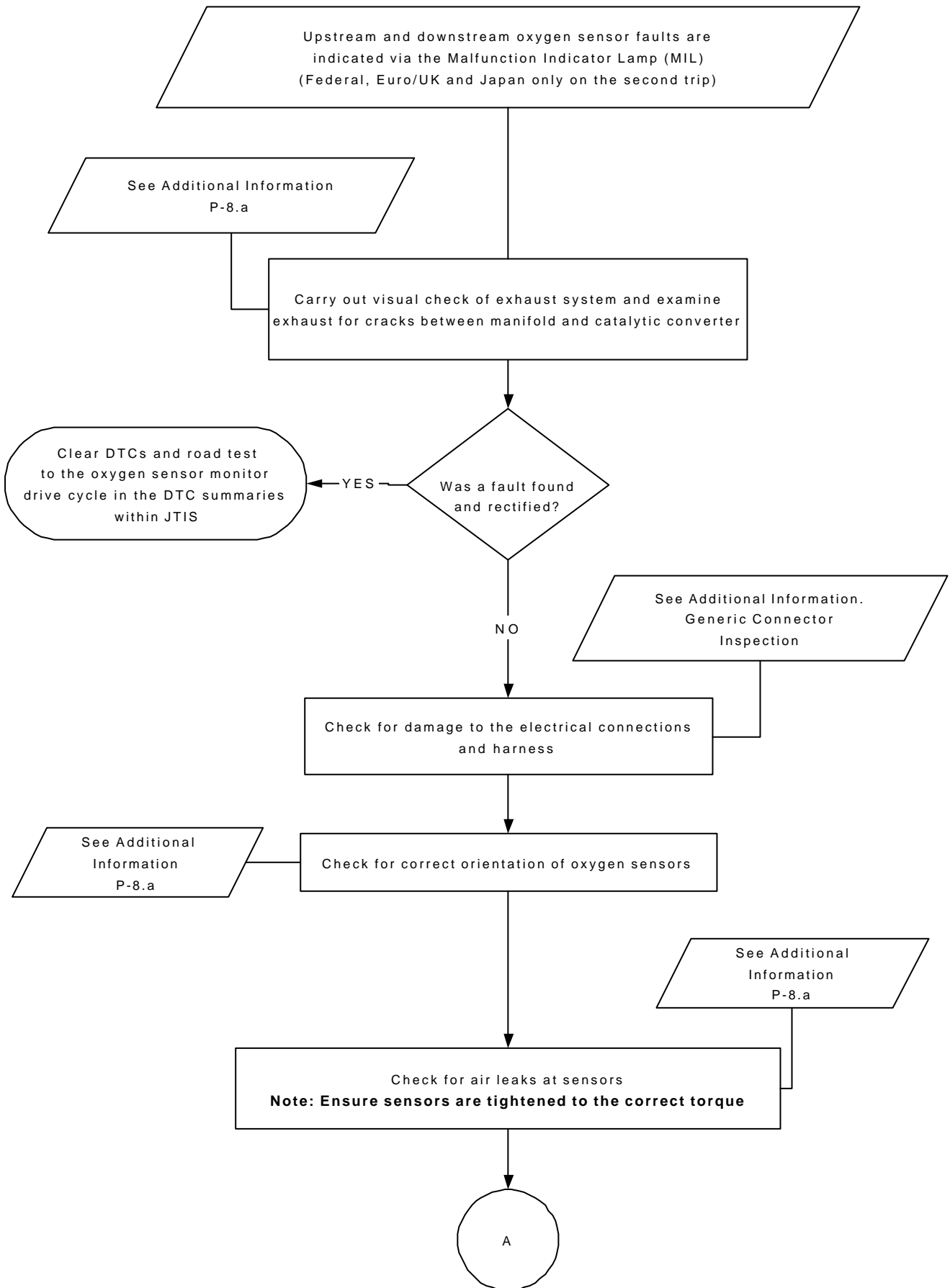
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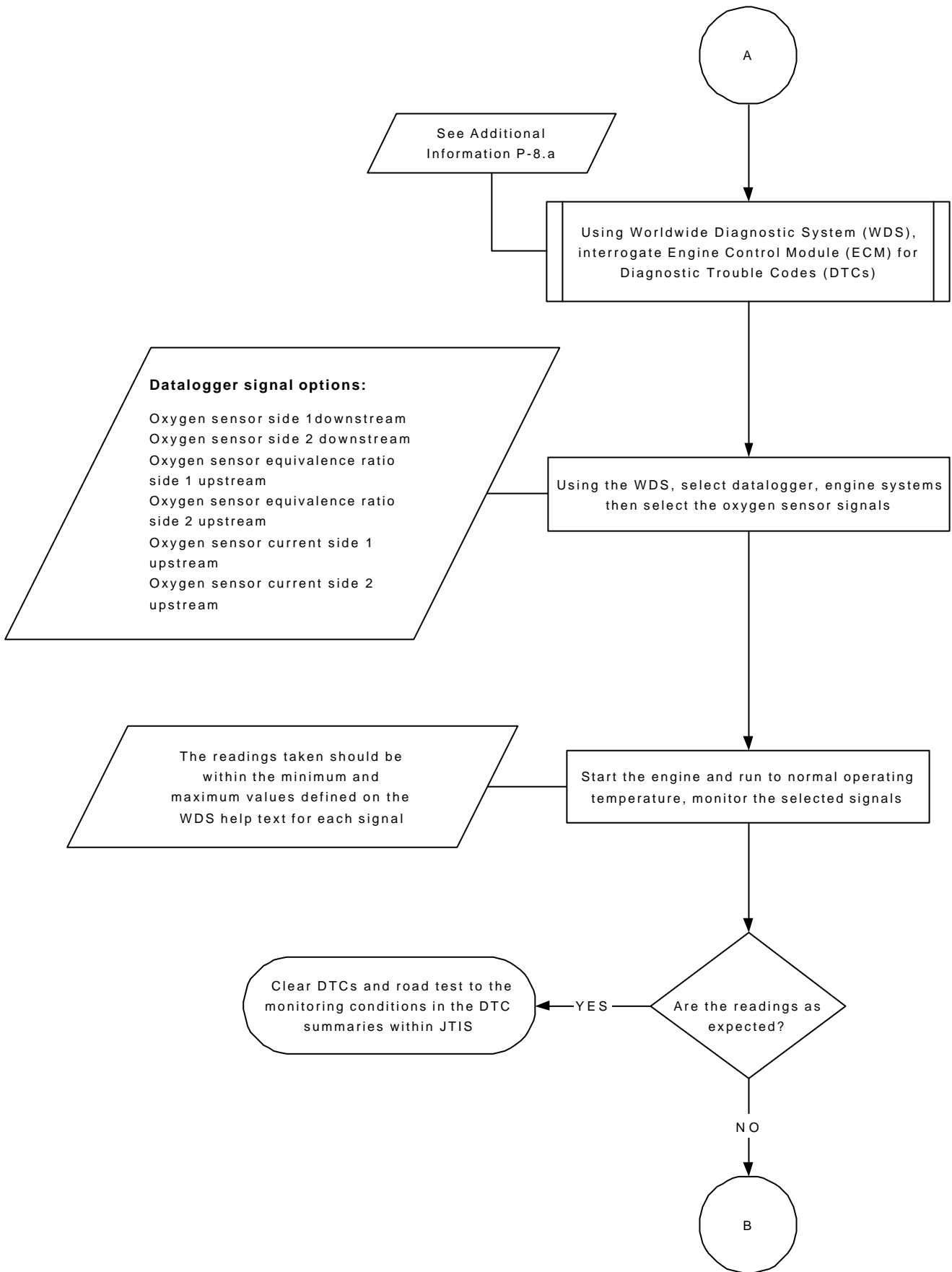
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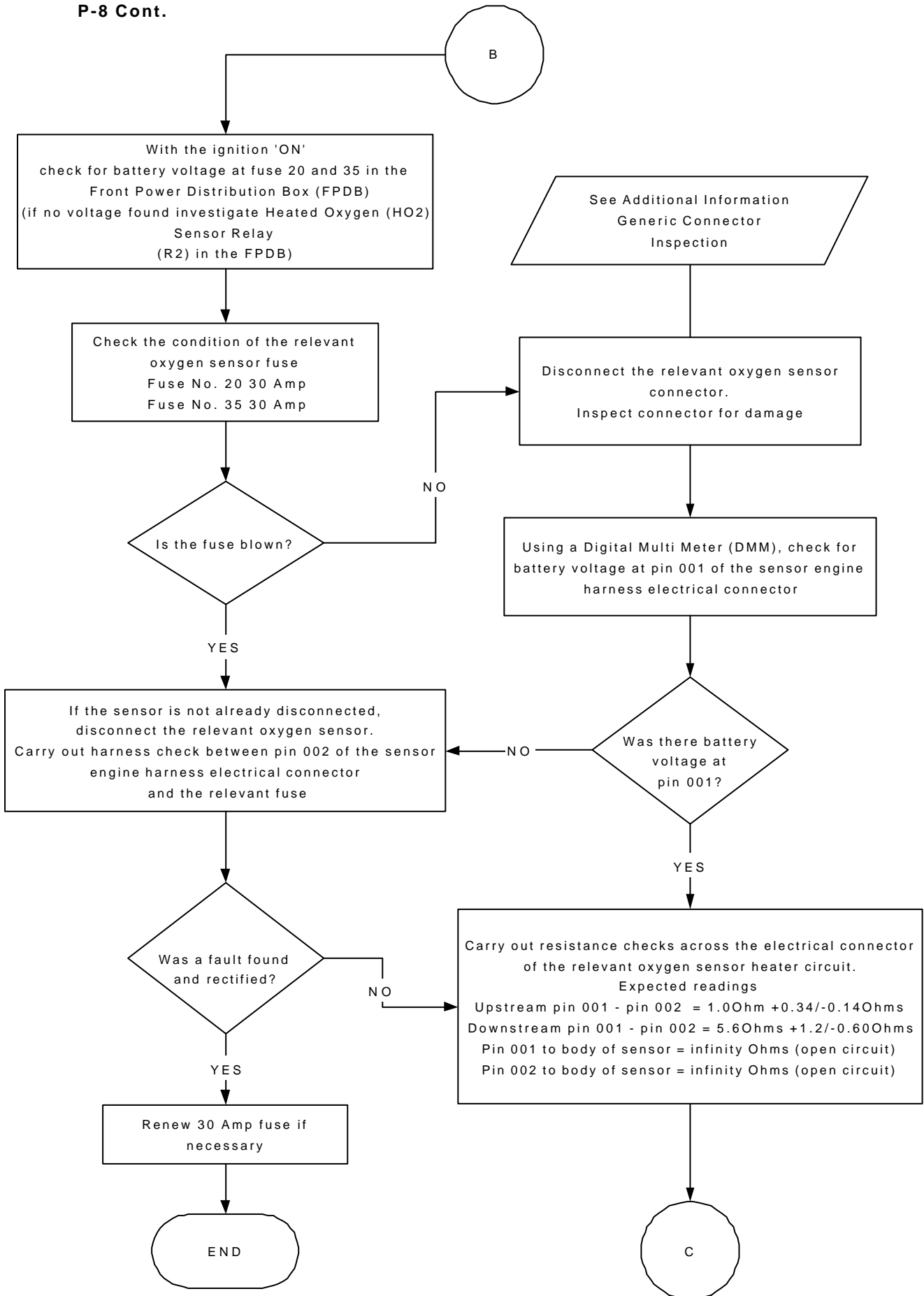
Upstream and Downstream Oxygen Sensor Flowchart P-8



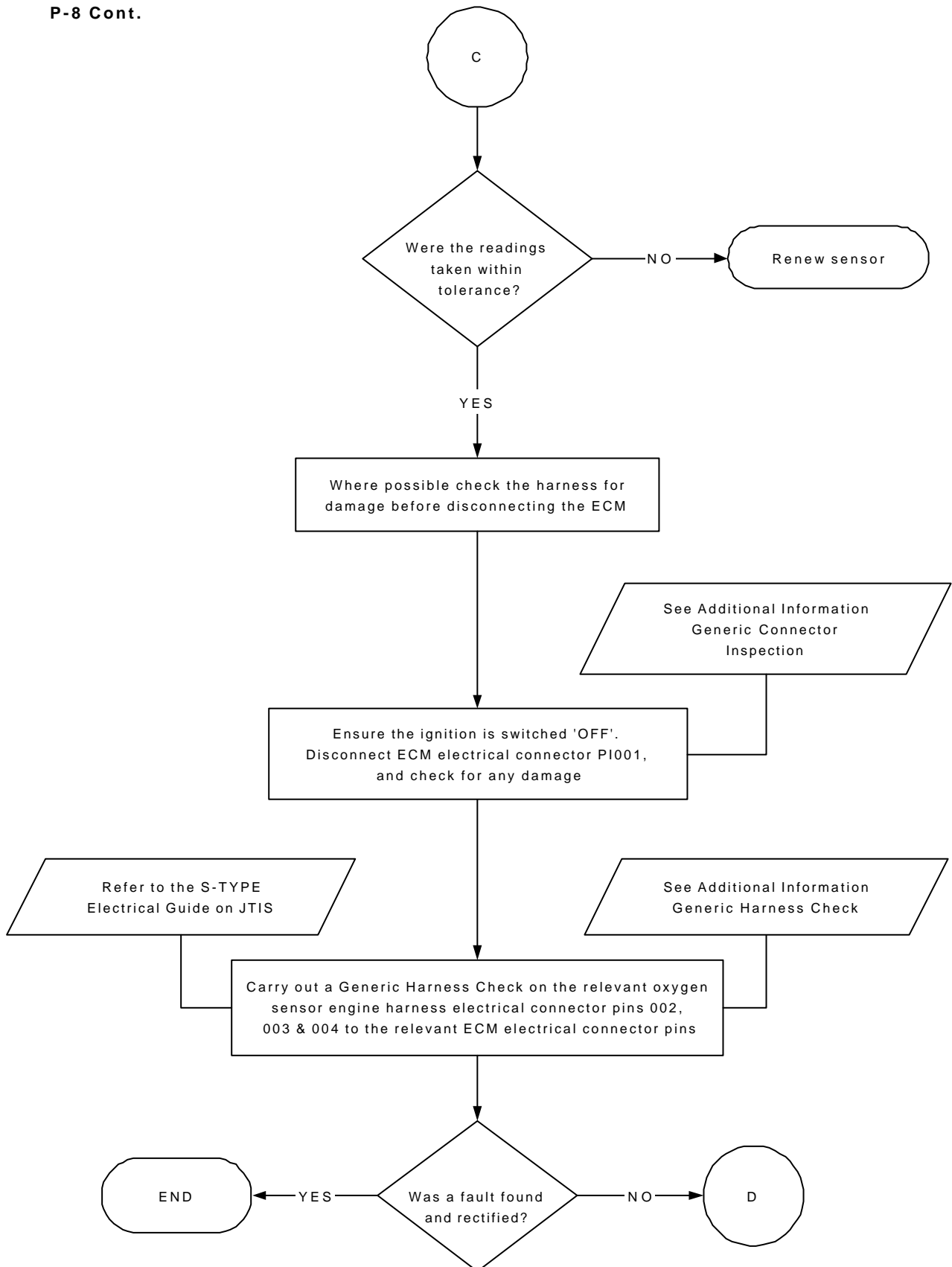
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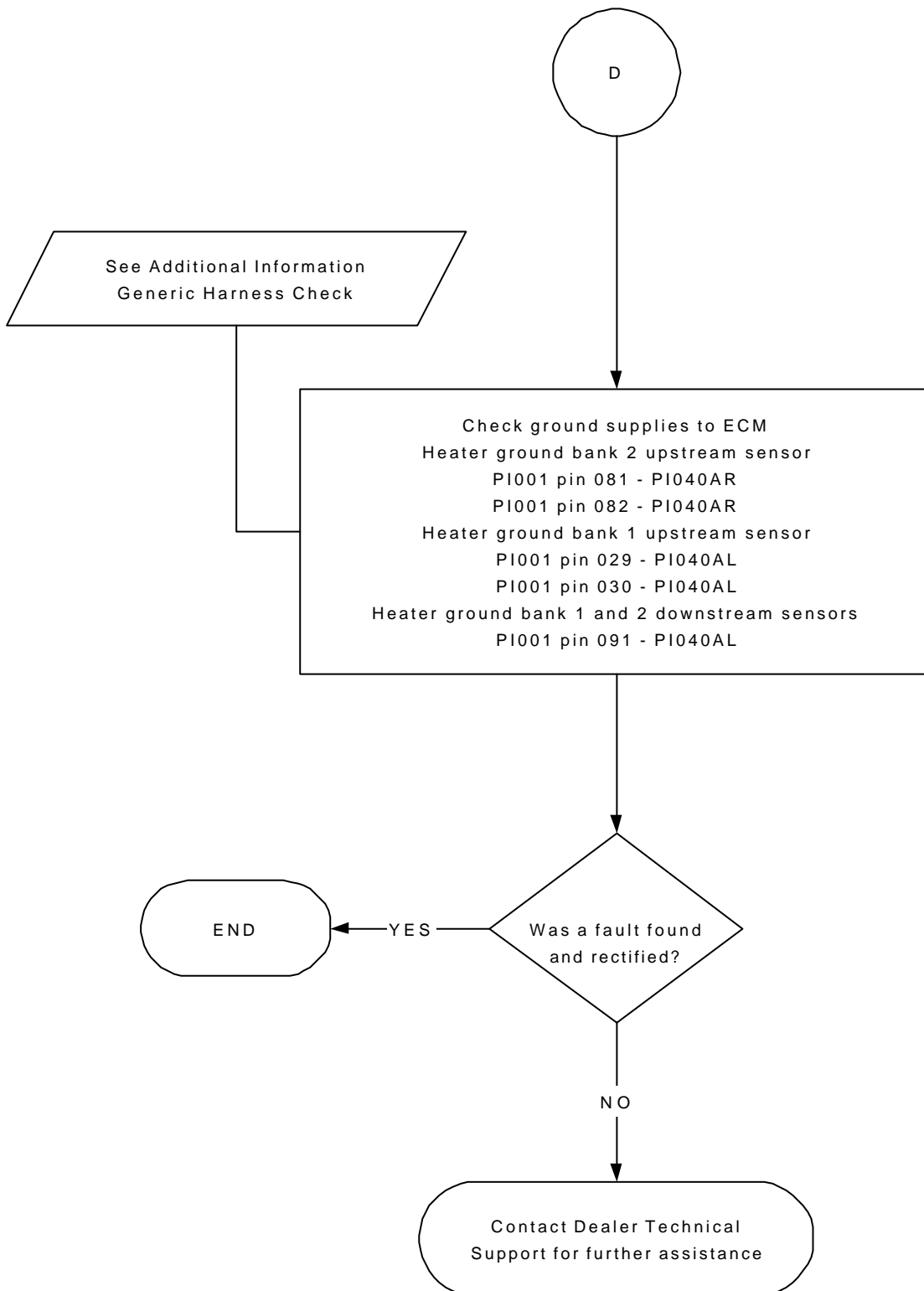
P-8 Cont.



P-8 Cont.



P-8 Cont.



Additional Information P-8.a**Subject - Upstream and downstream oxygen Sensors.****Checks.**

- The upstream sensor is also known as the uhego and has a grey connector.
- The downstream sensor is also known as the 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, this can be checked by removing the catalytic converter and visually checking 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.

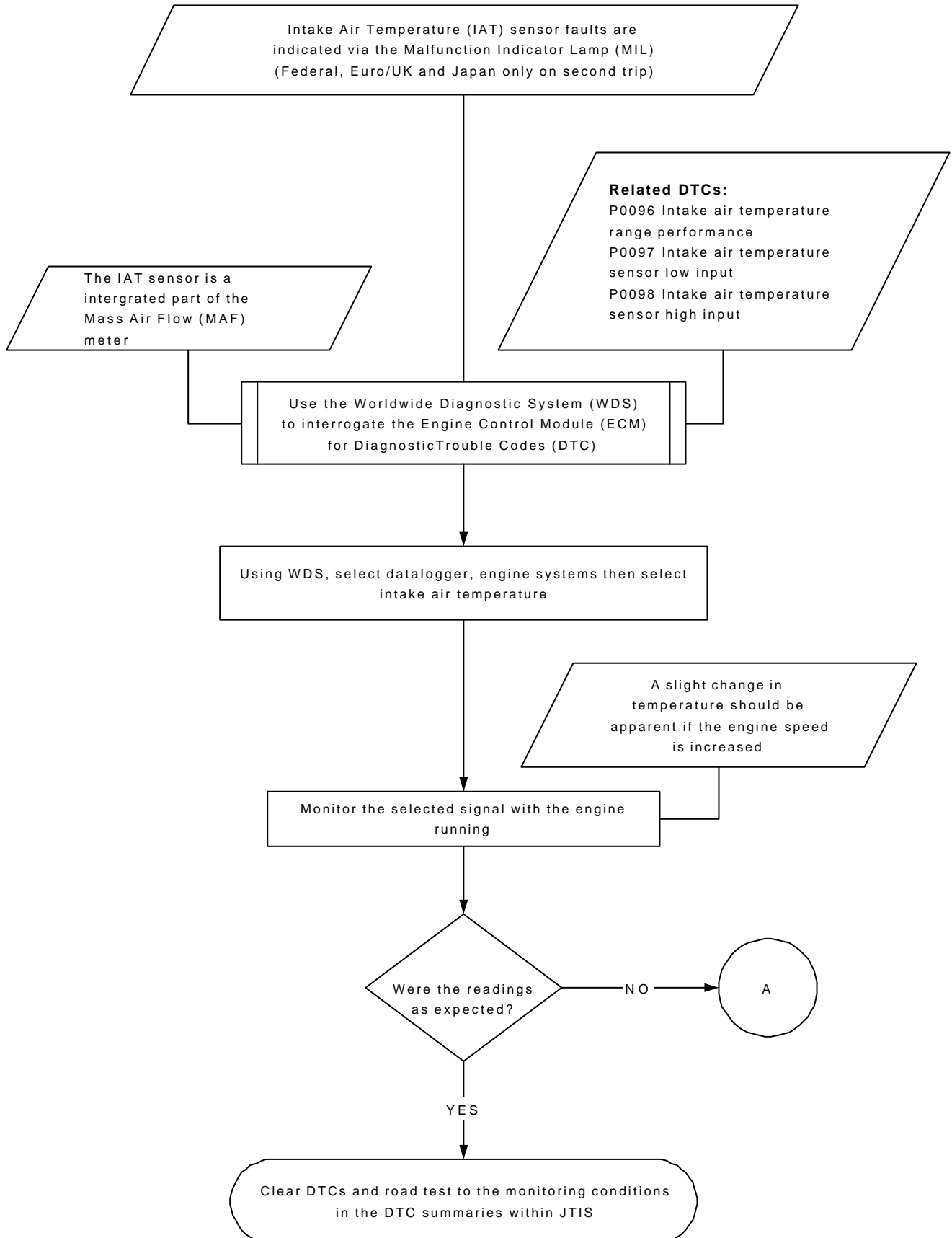
Installation. (Always refer to JTIS)

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.

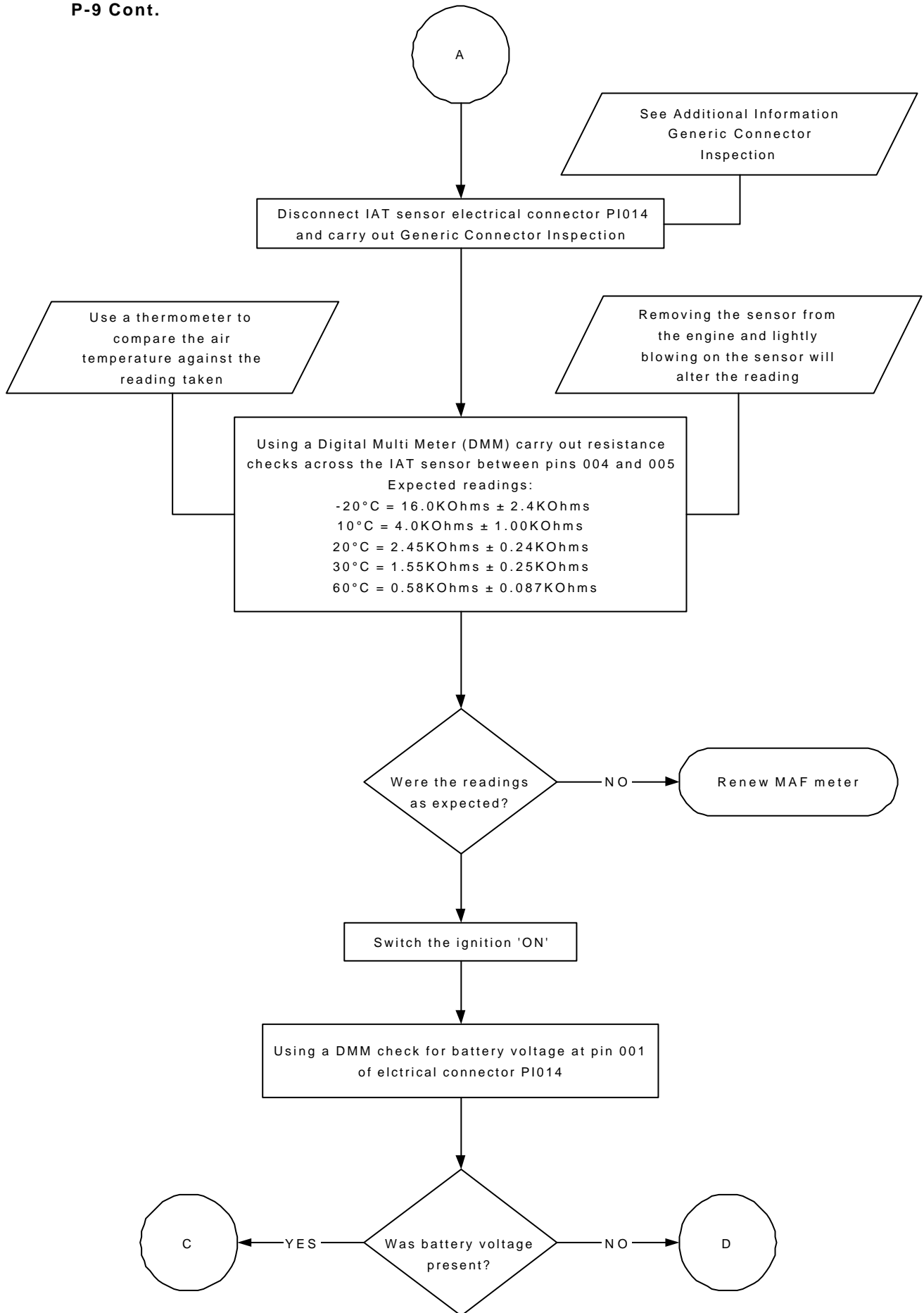
P-8.a Cont.

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 JTIS for further information on DTC Summaries			

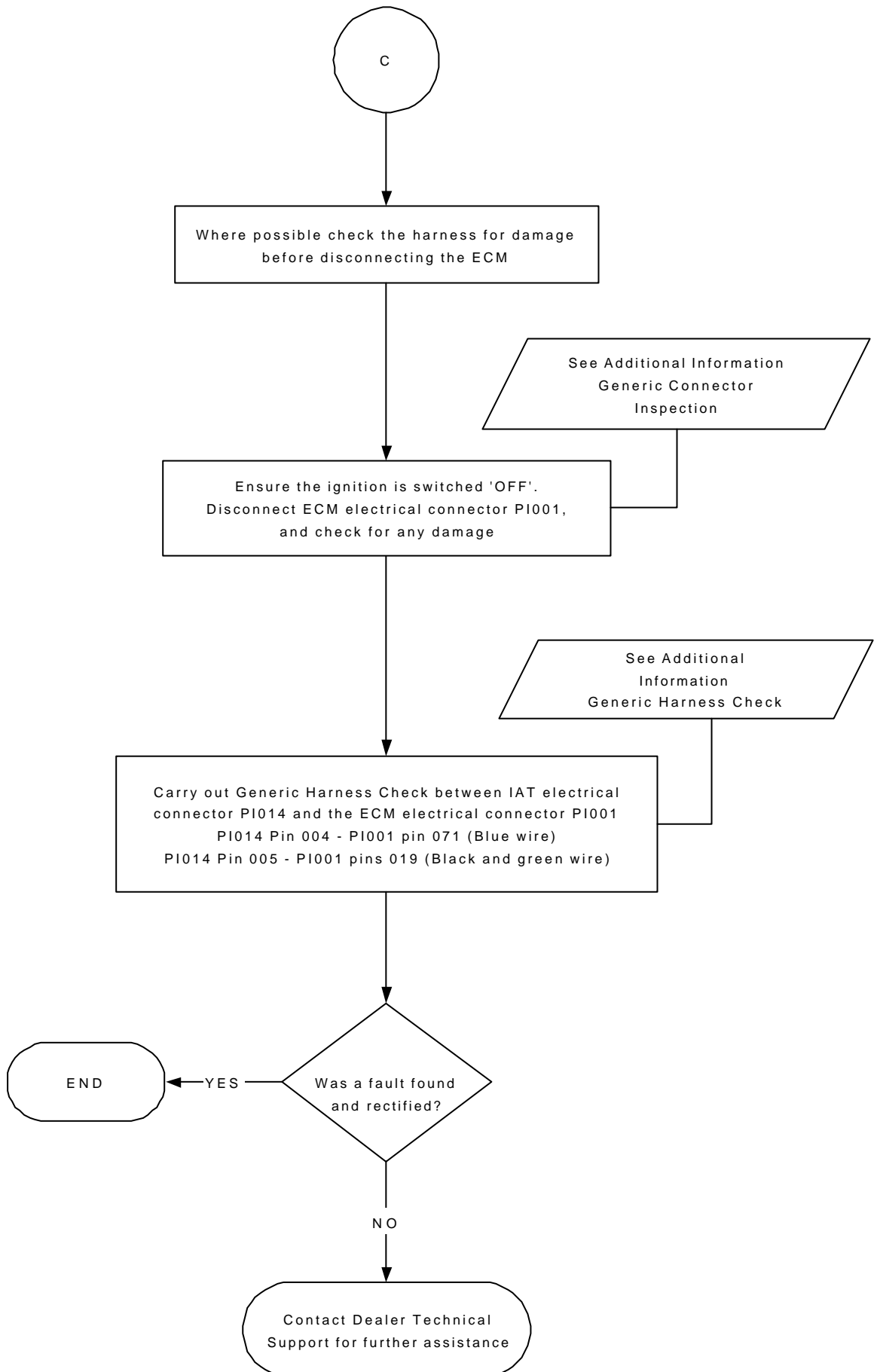
**V6/V8 N/A Intake Air Temperature
Sensor Flowchart P-9**



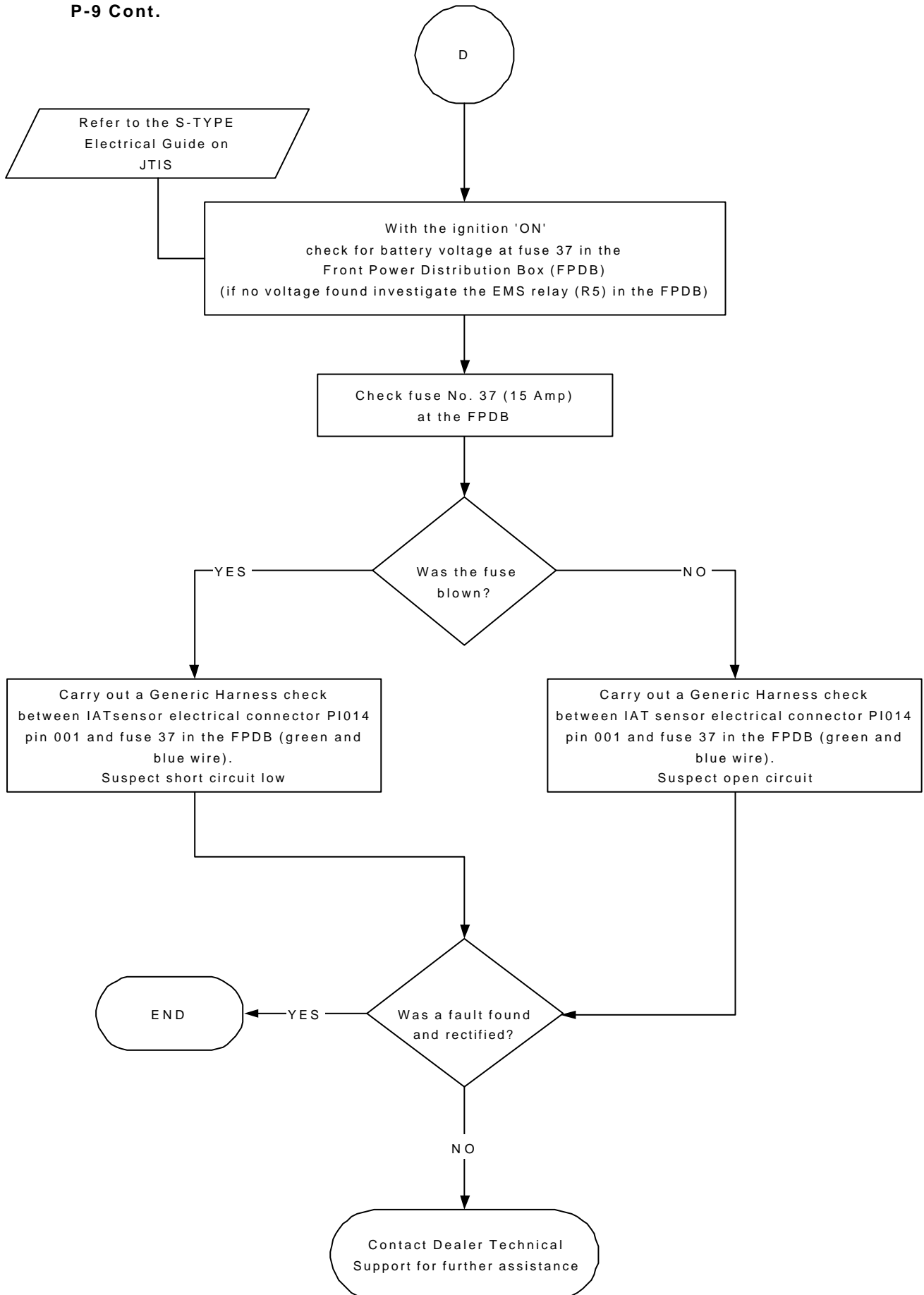
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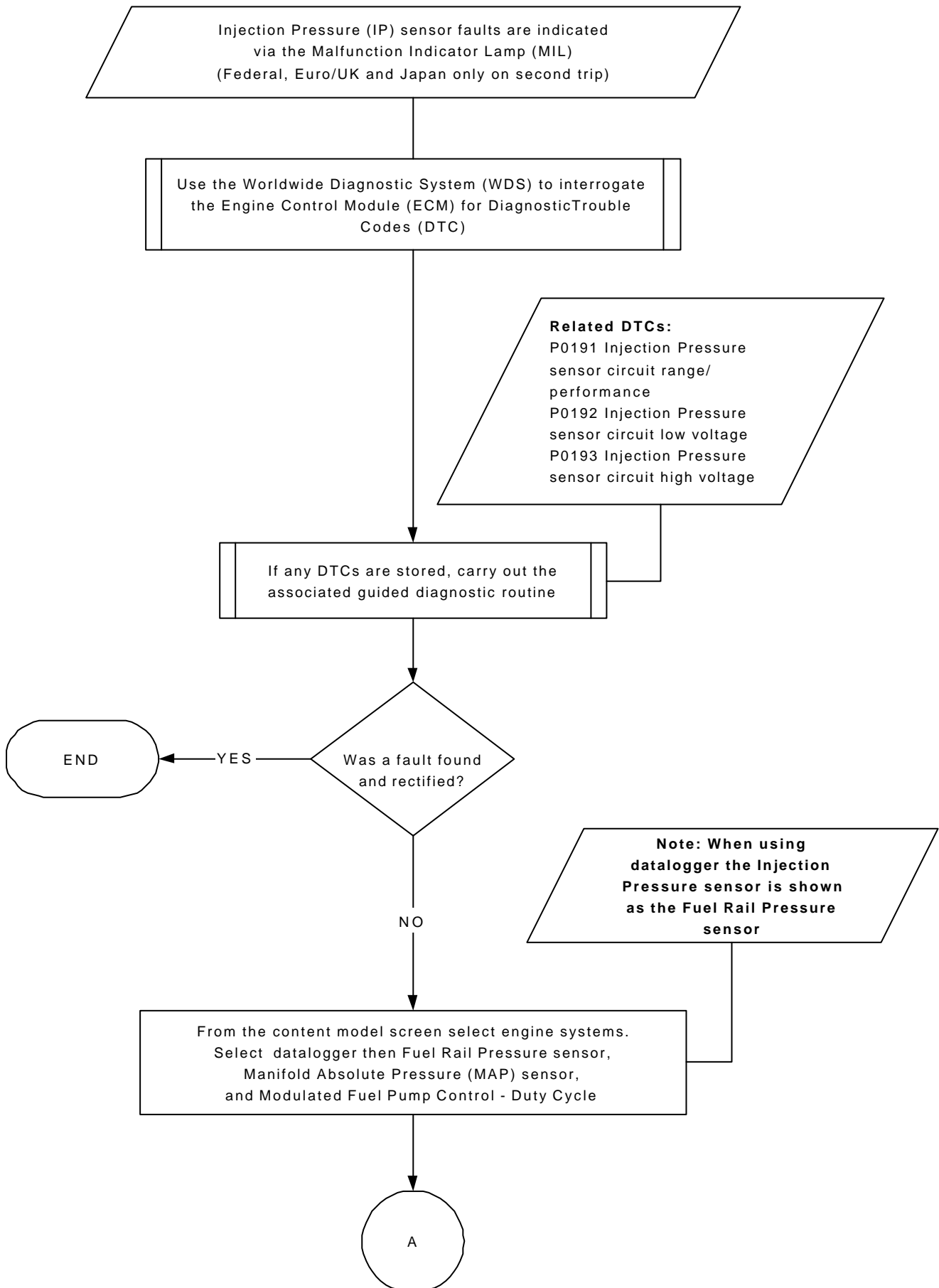
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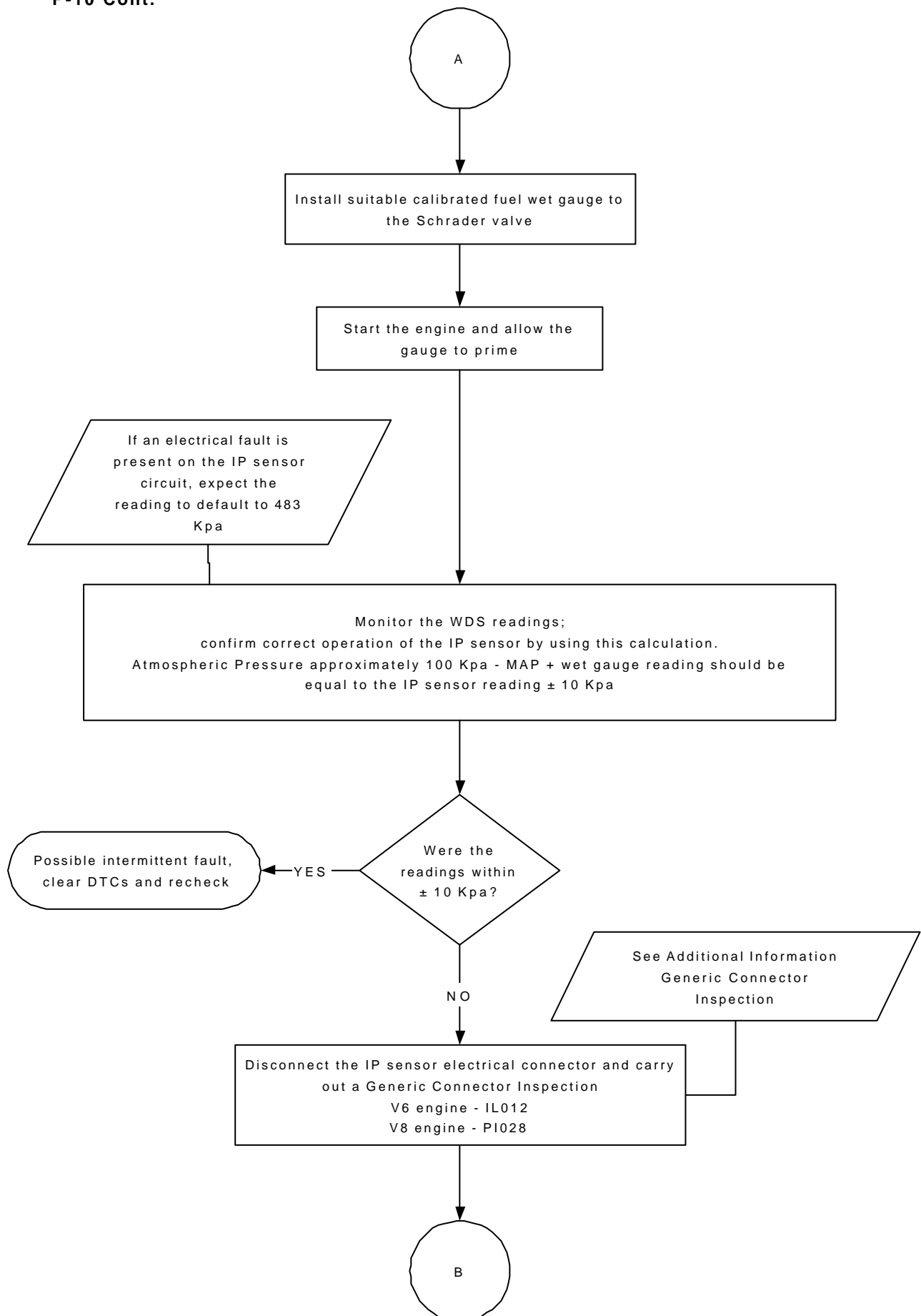
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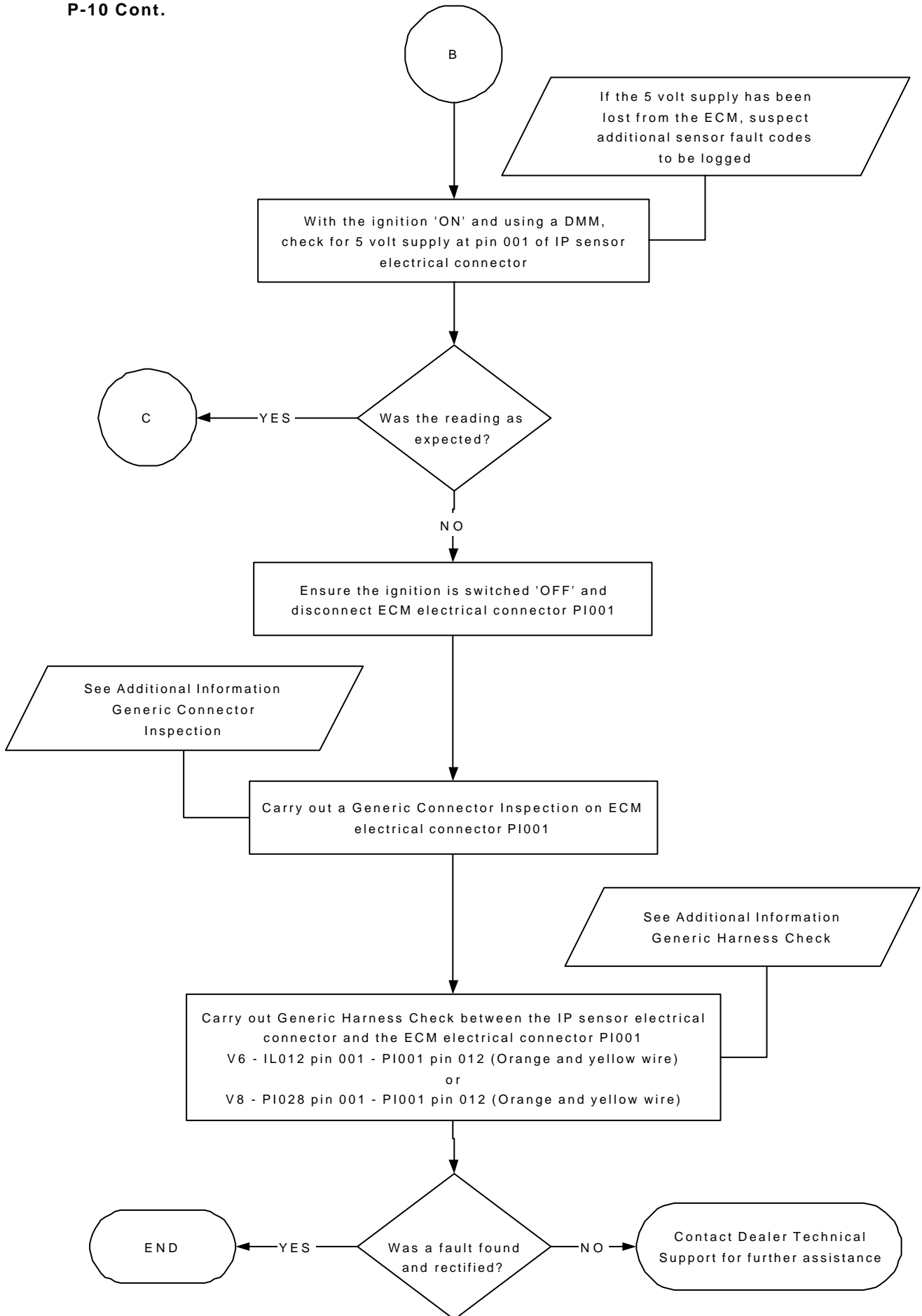
**Injection Pressure Sensor
Flowchart P-10**



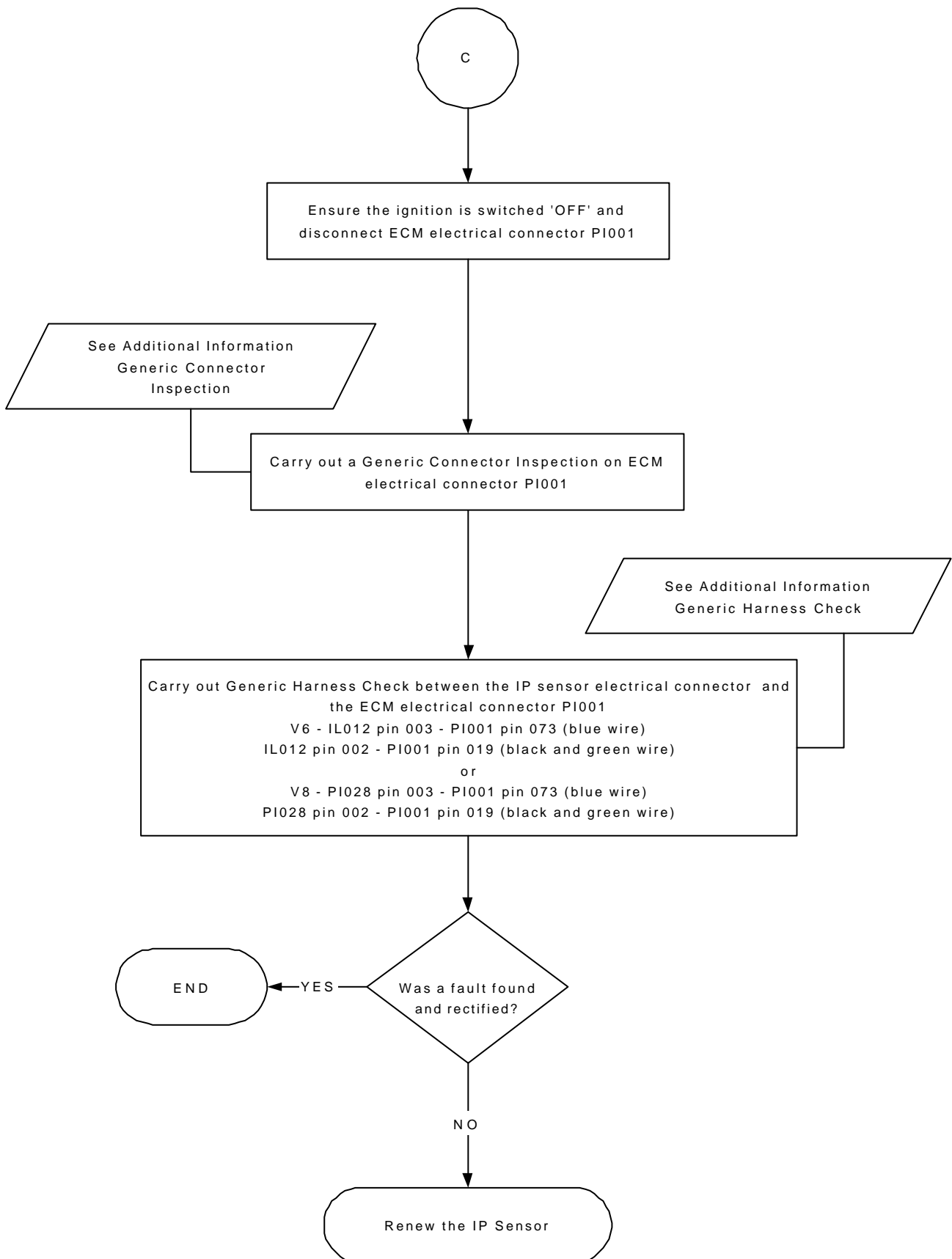
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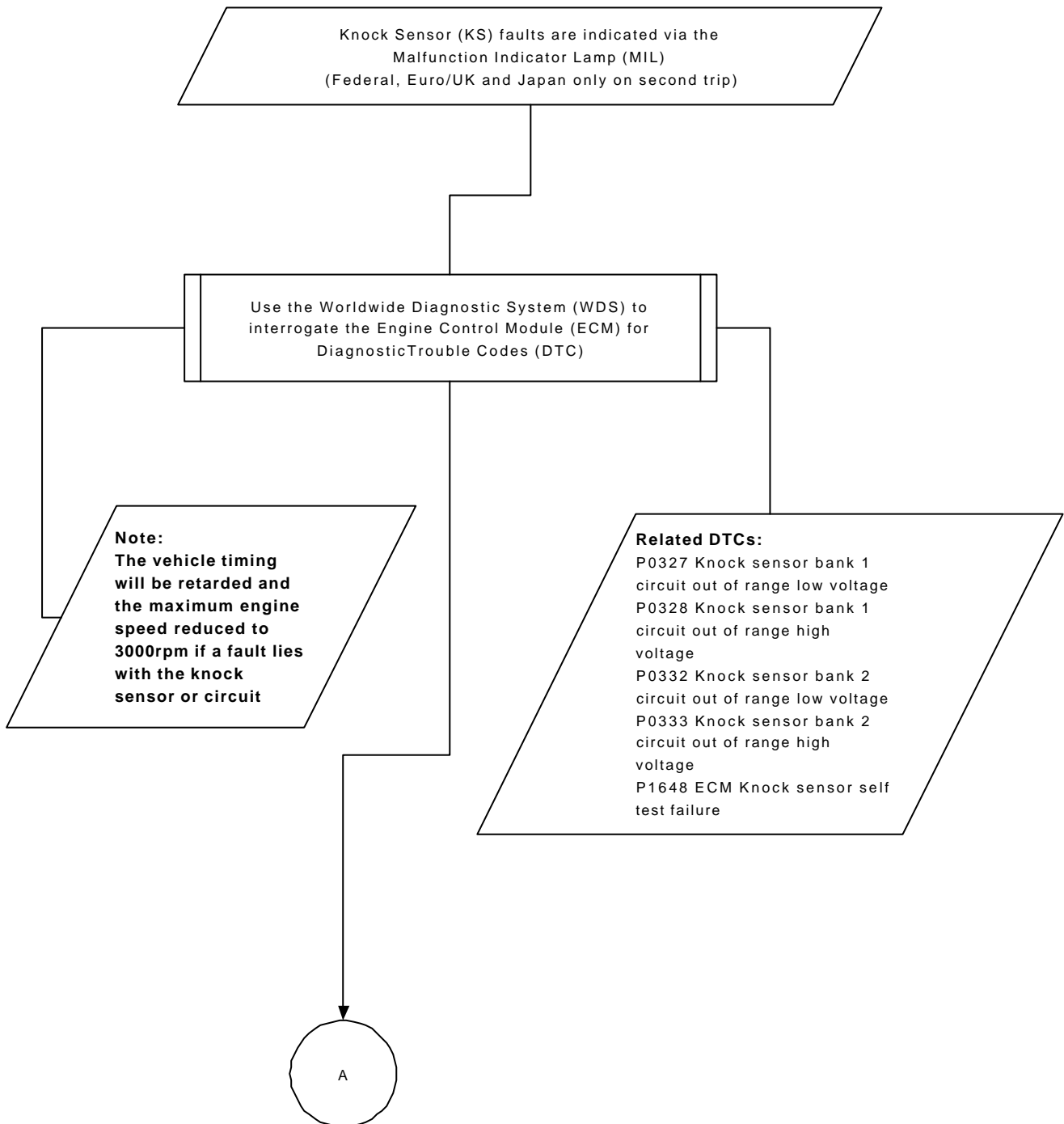
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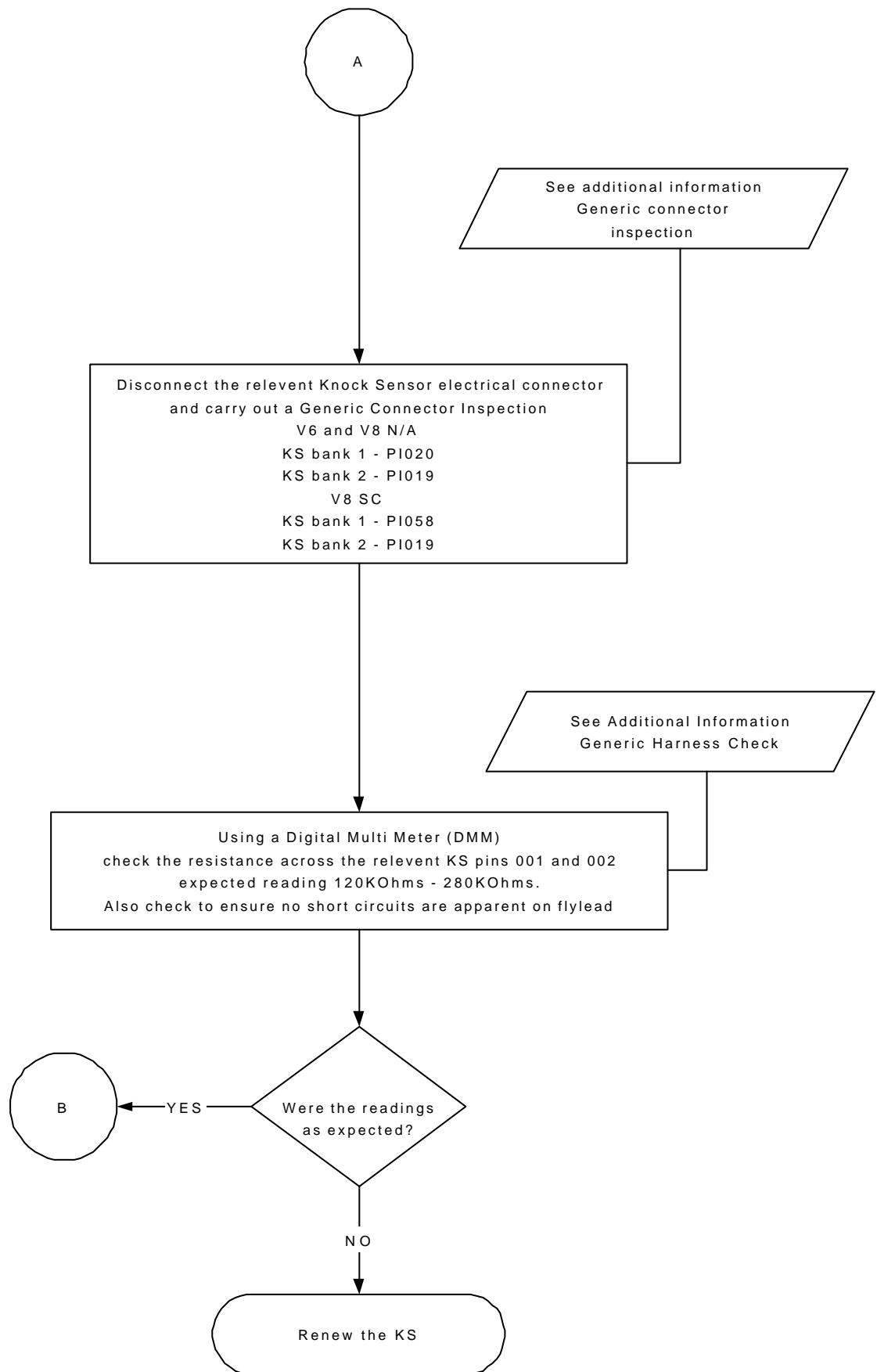
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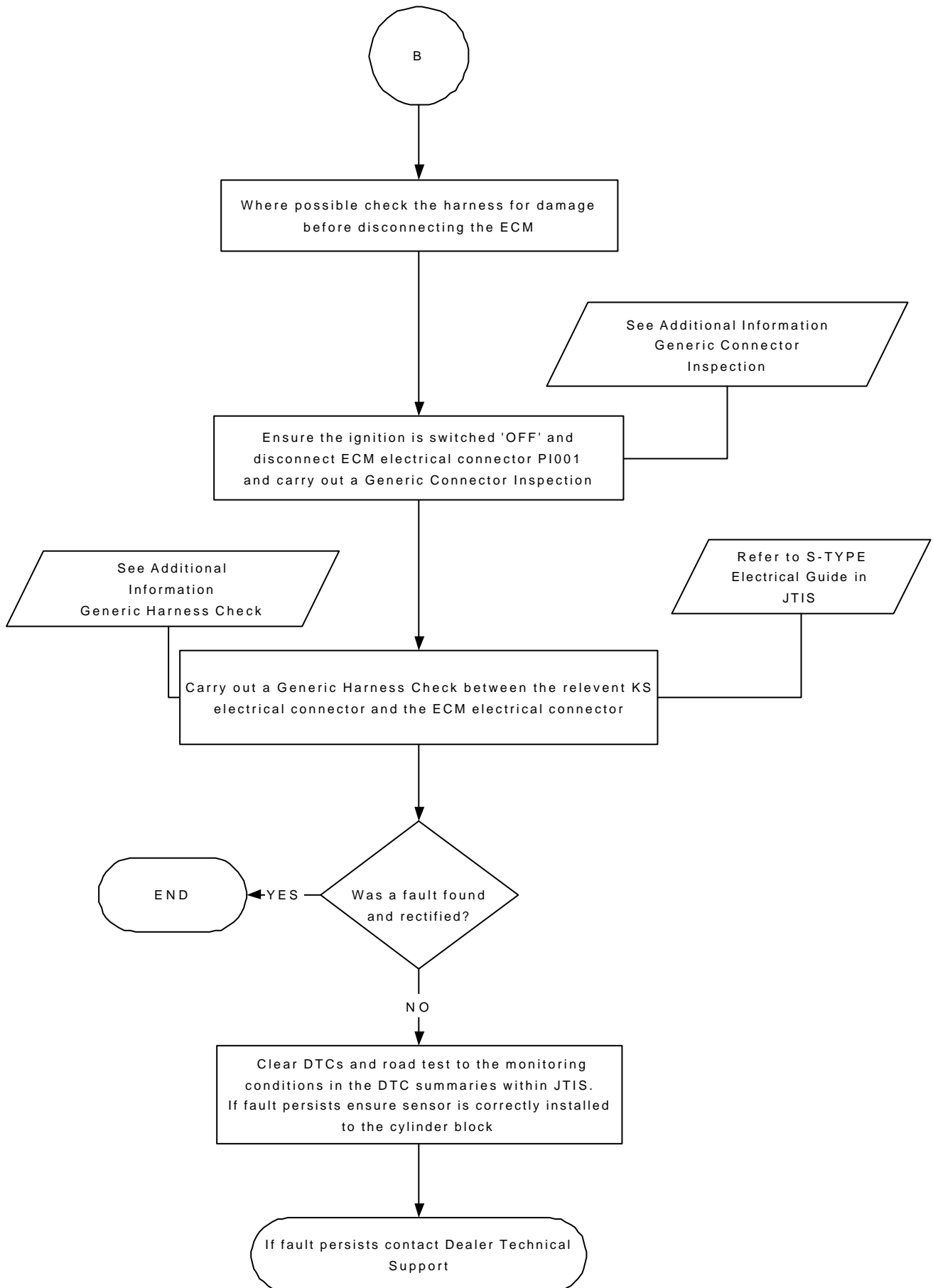
Knock Sensor Flowchart P-11



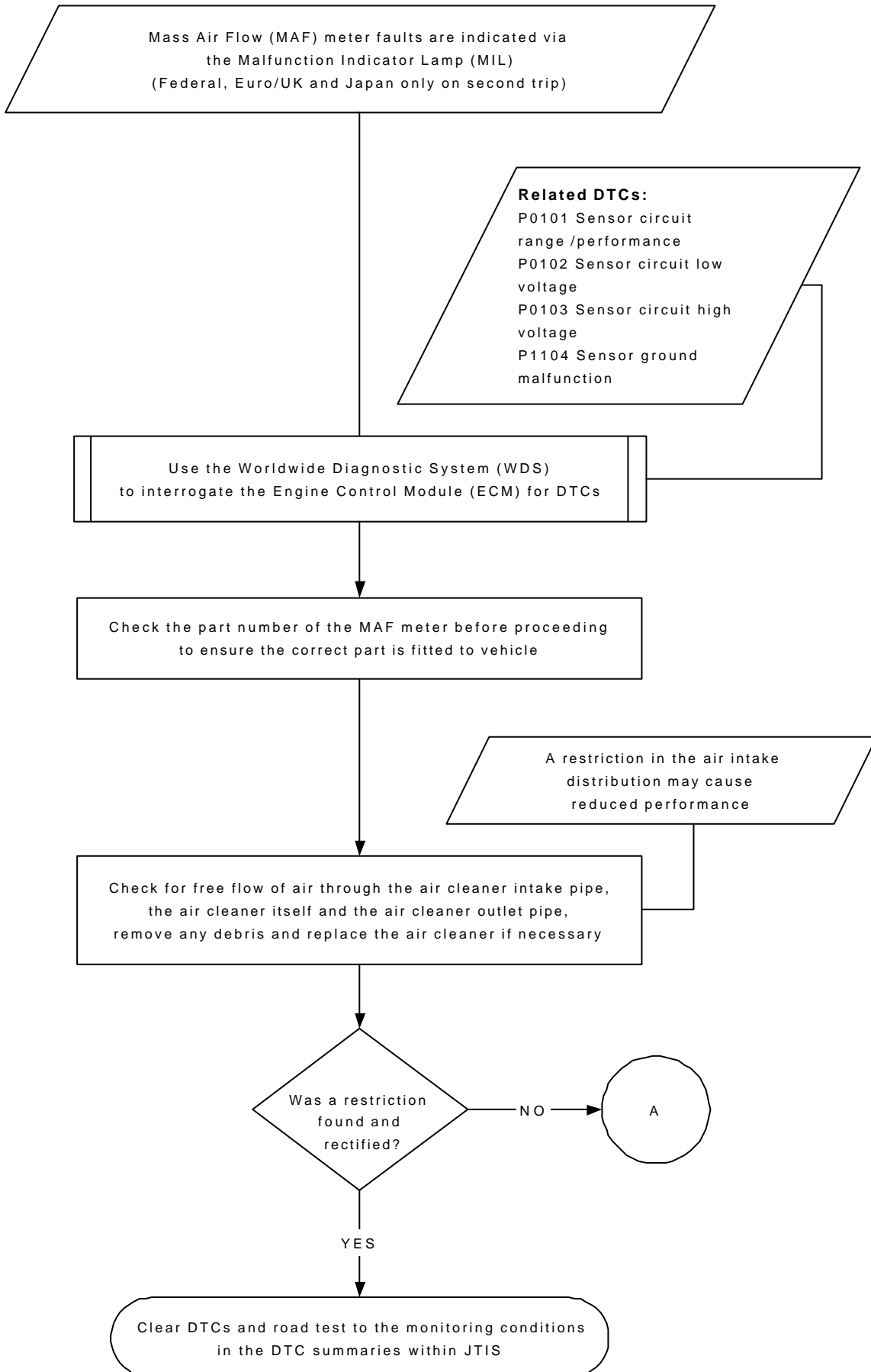
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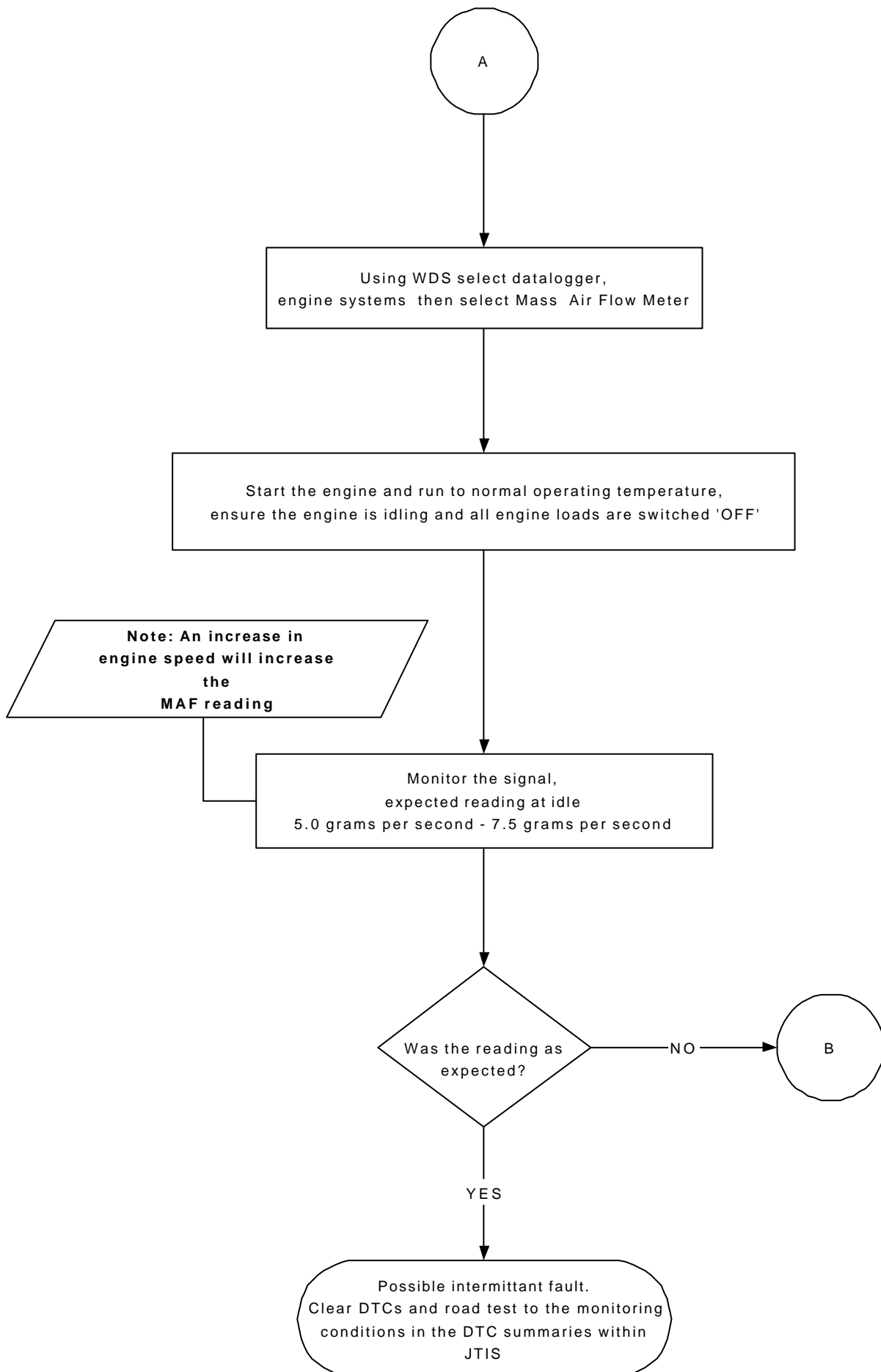
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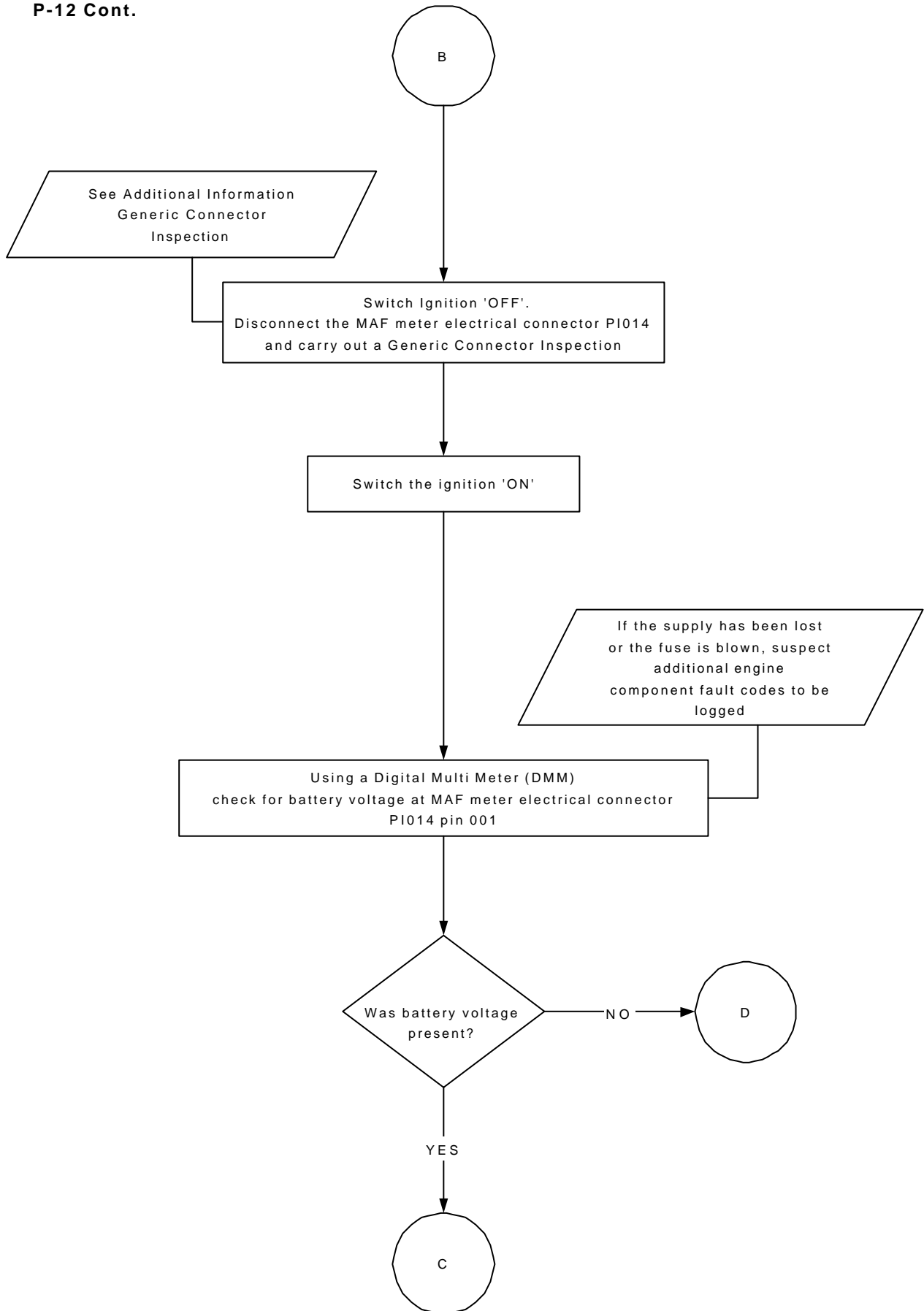
**Mass Air Flow Meter
Flowchart P-12**



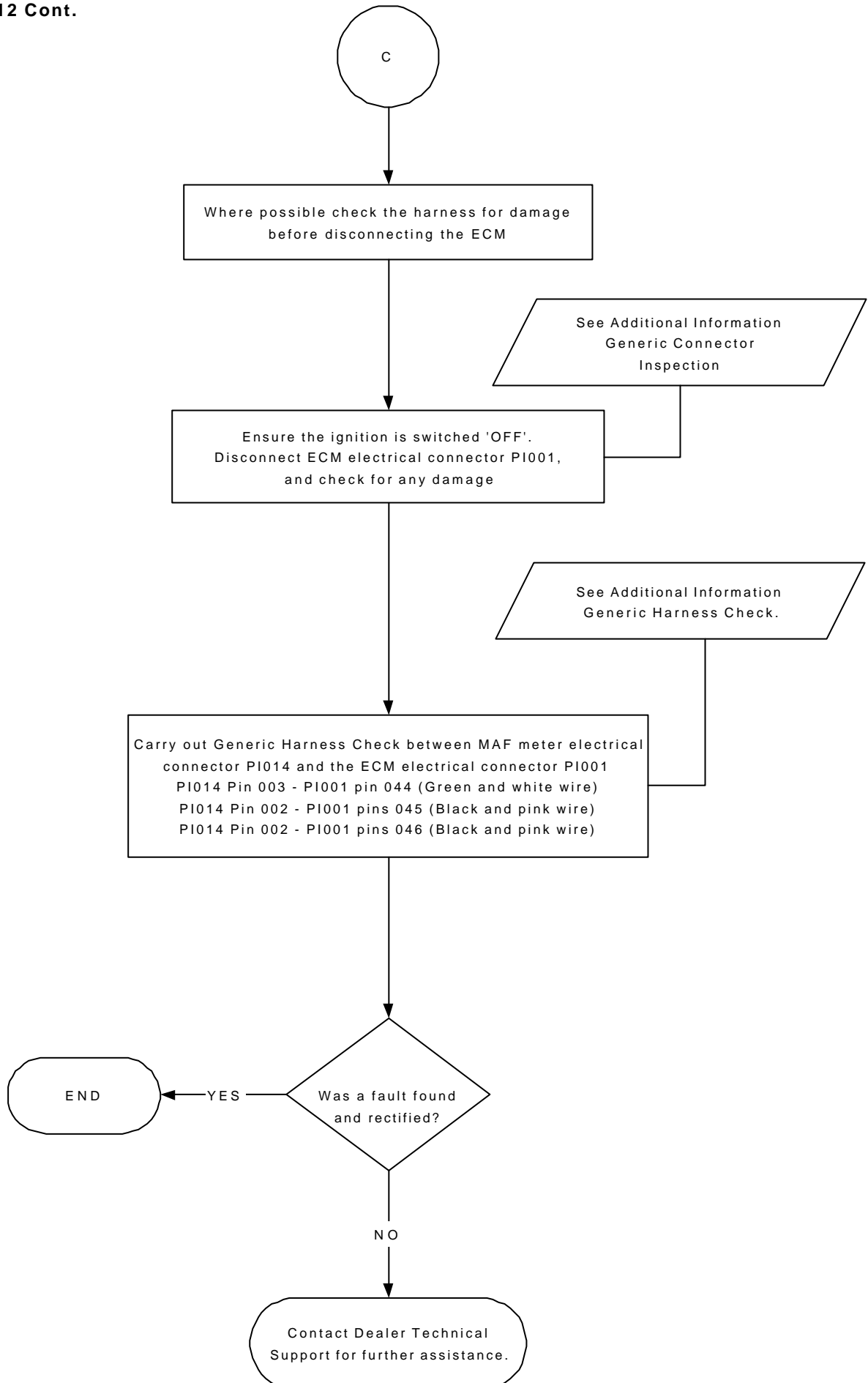
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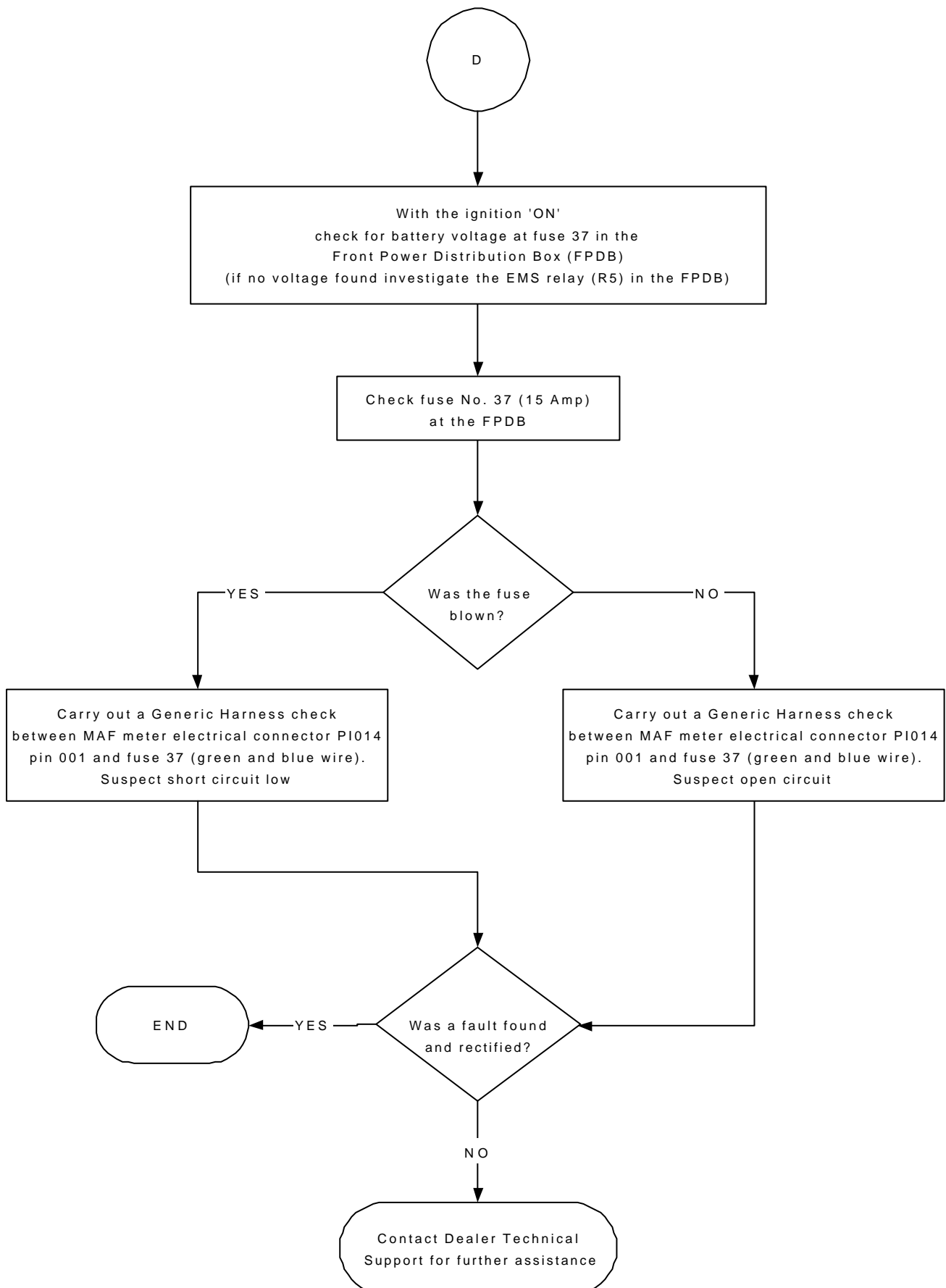
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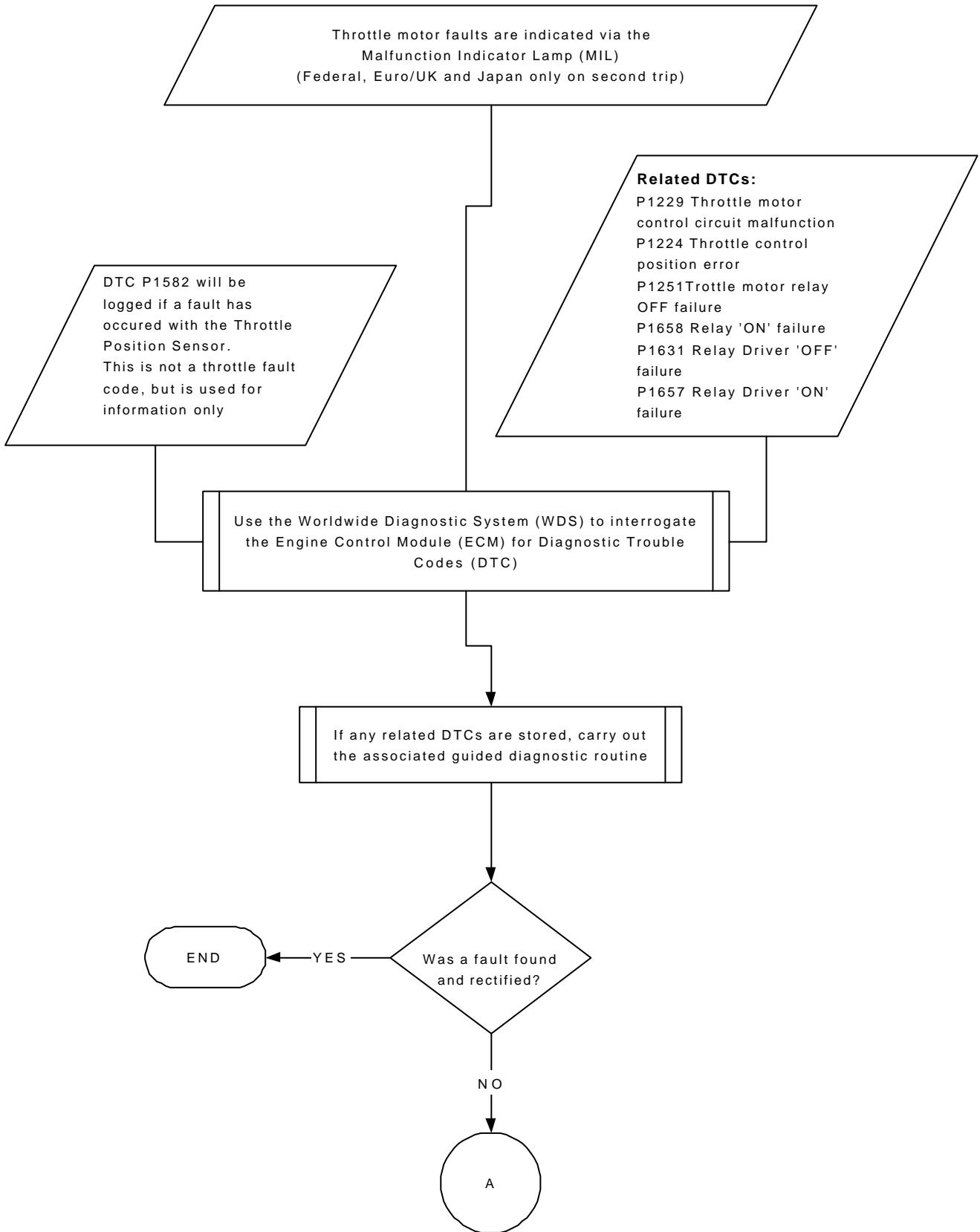
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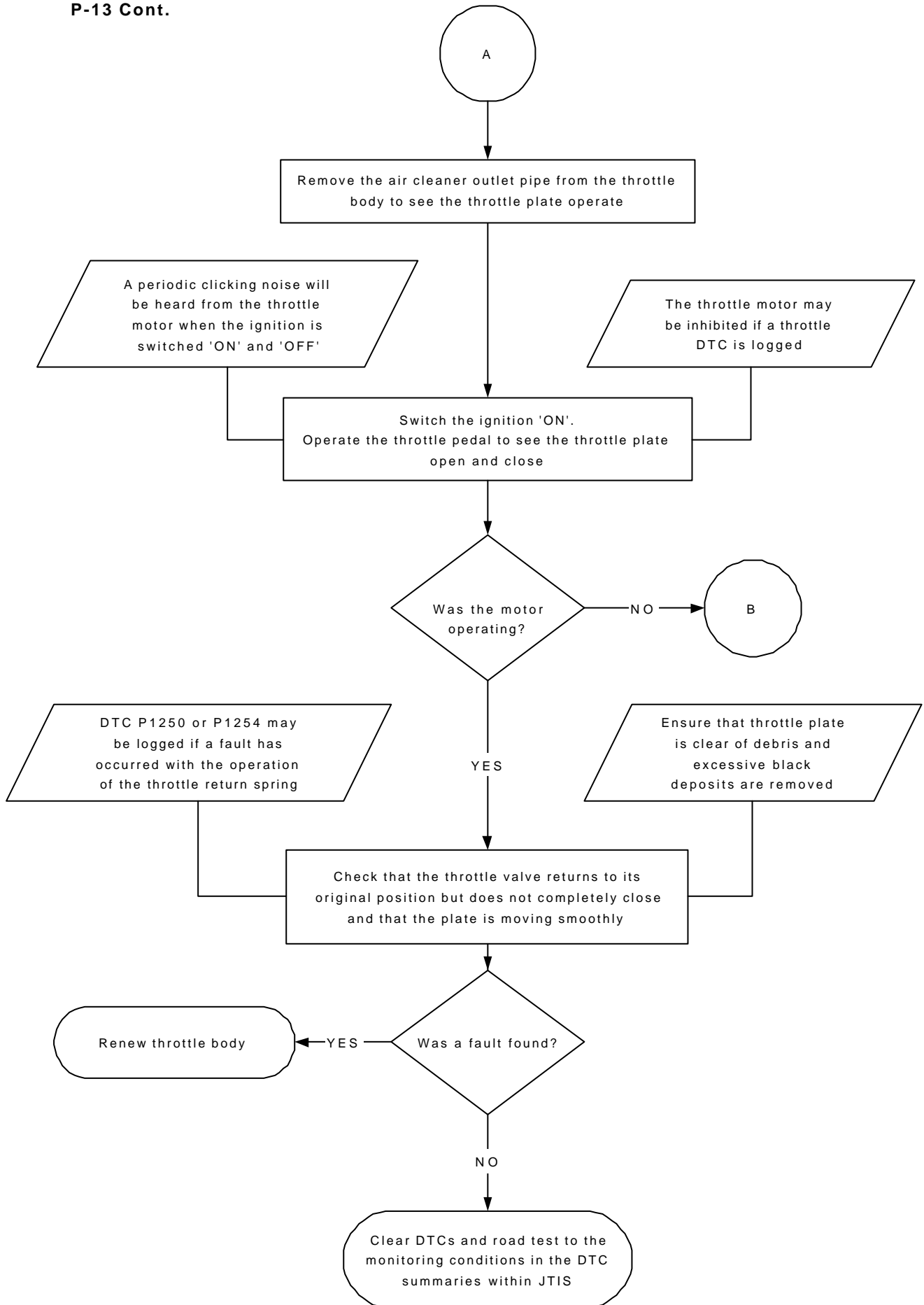
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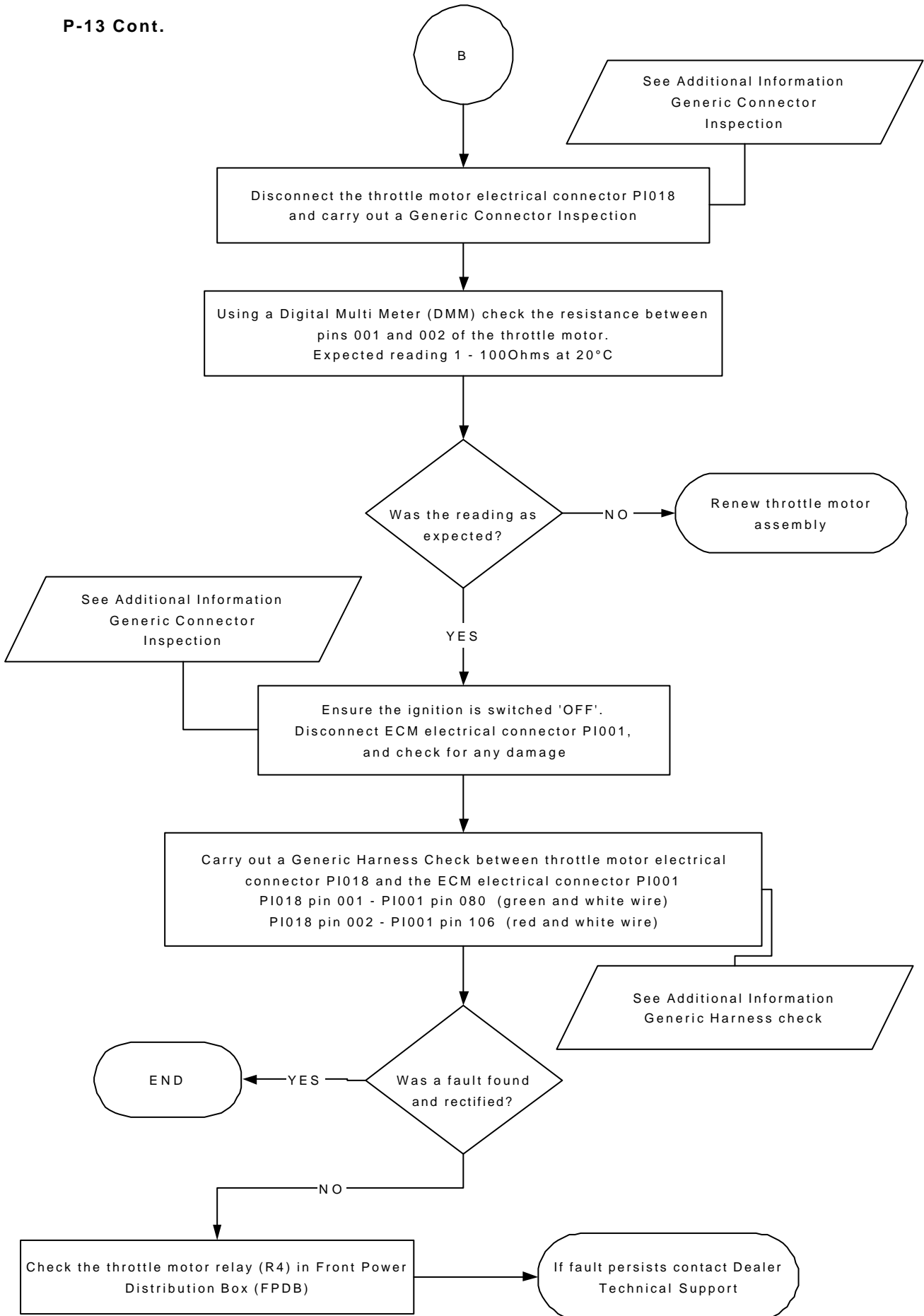
**Throttle Motor
Flowchart P-13**



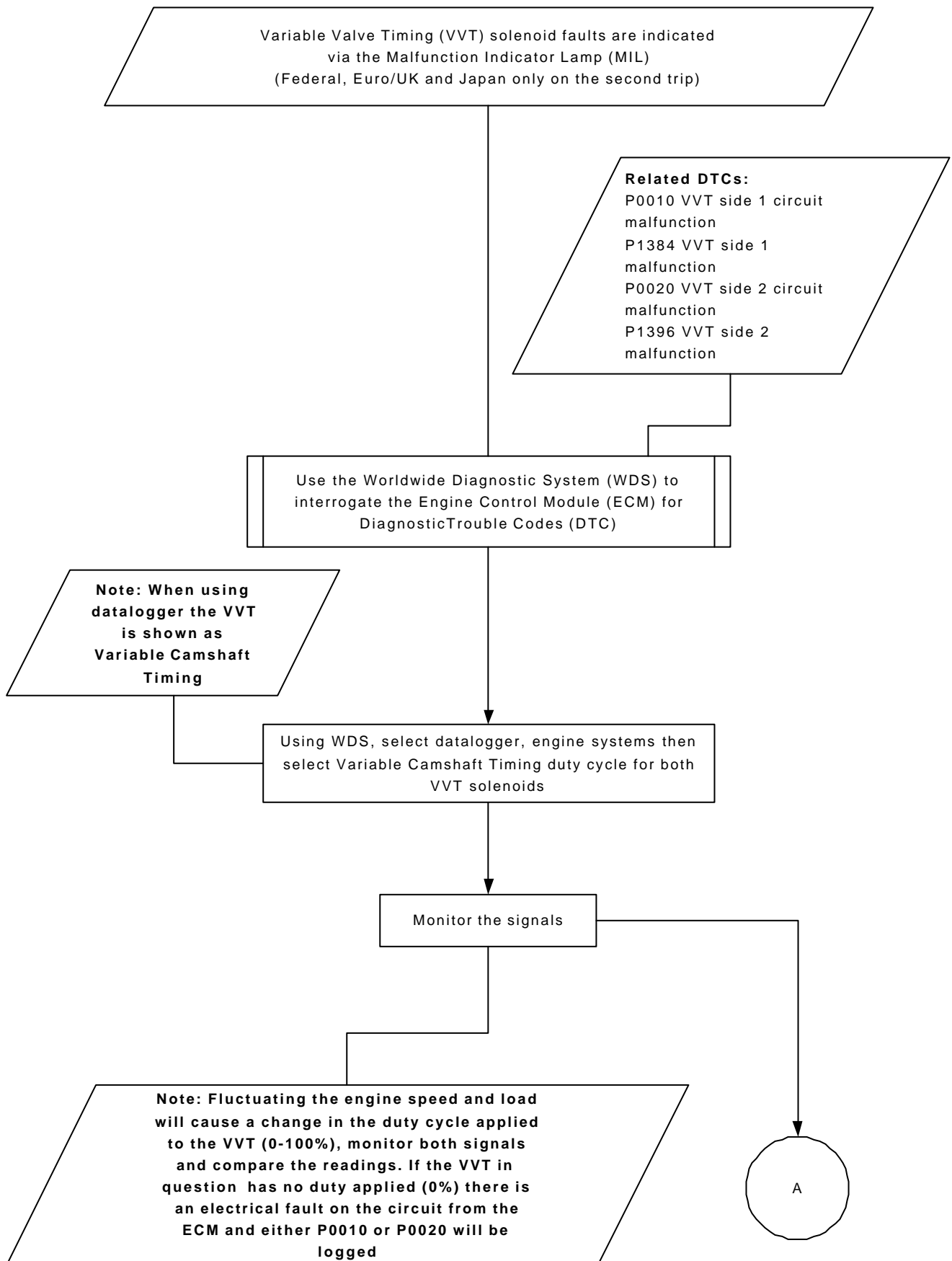
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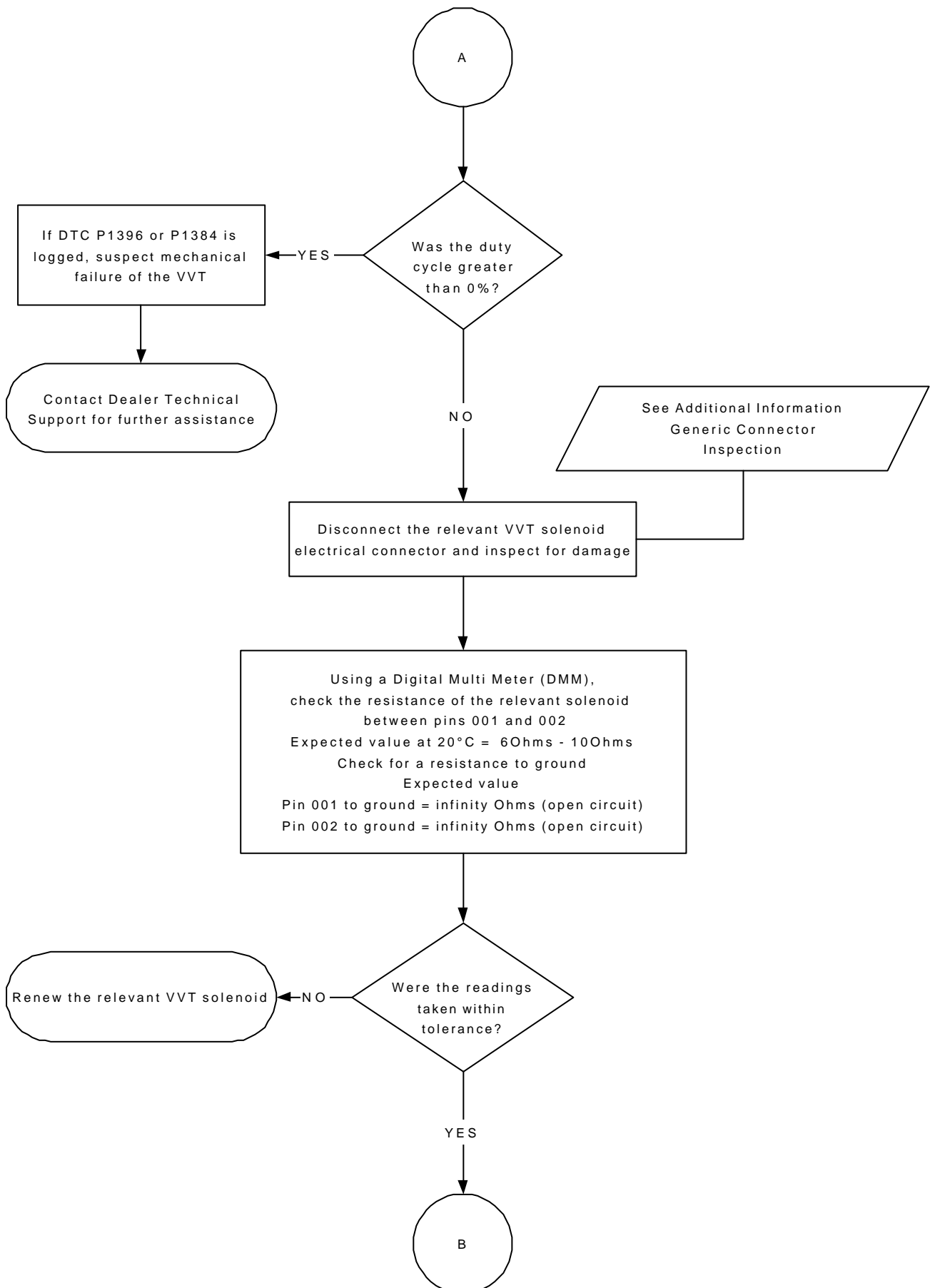
P-13 Cont.



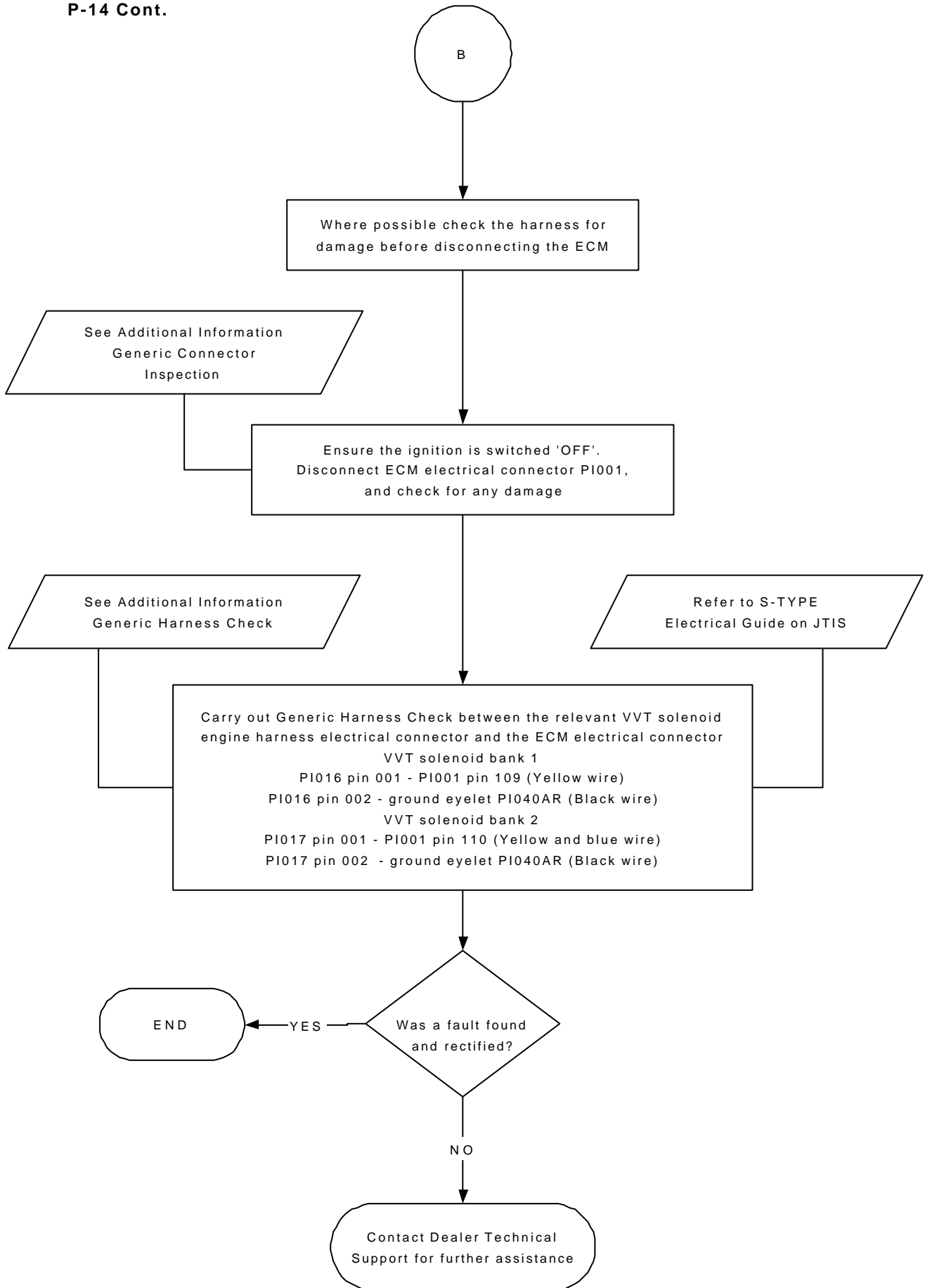
**V6/V8 N/A Variable Valve Timing
Flowchart P-14**



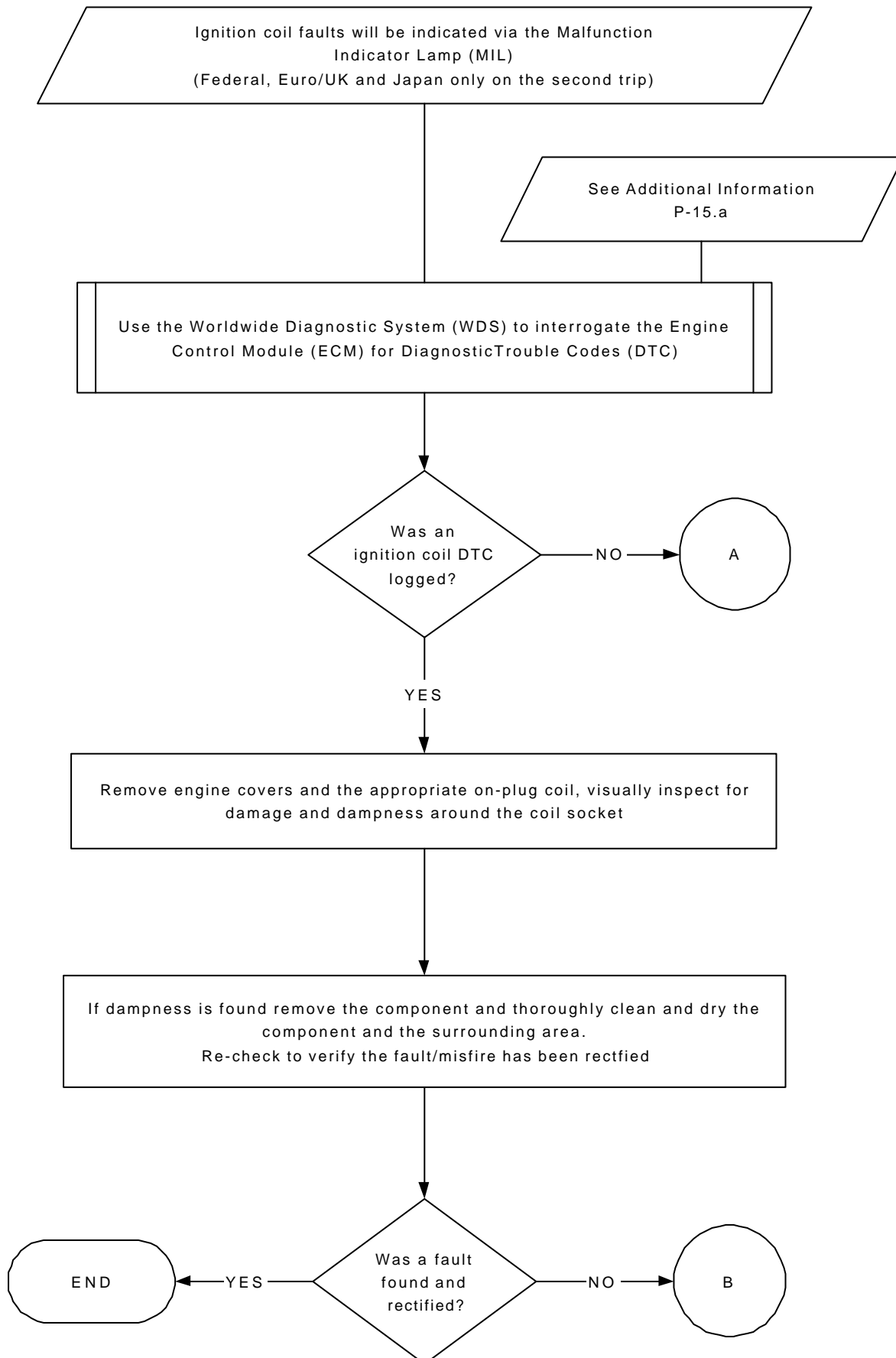
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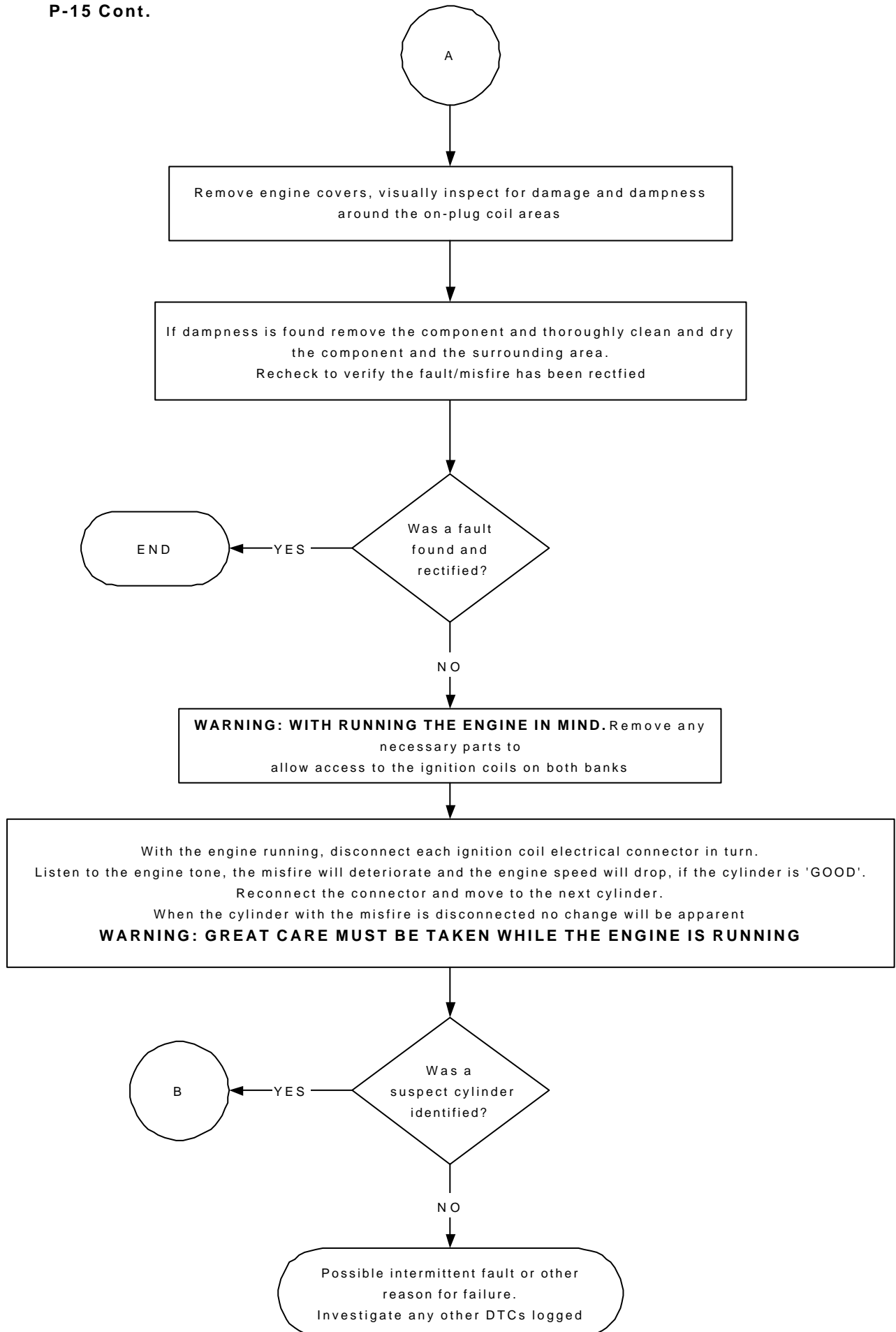
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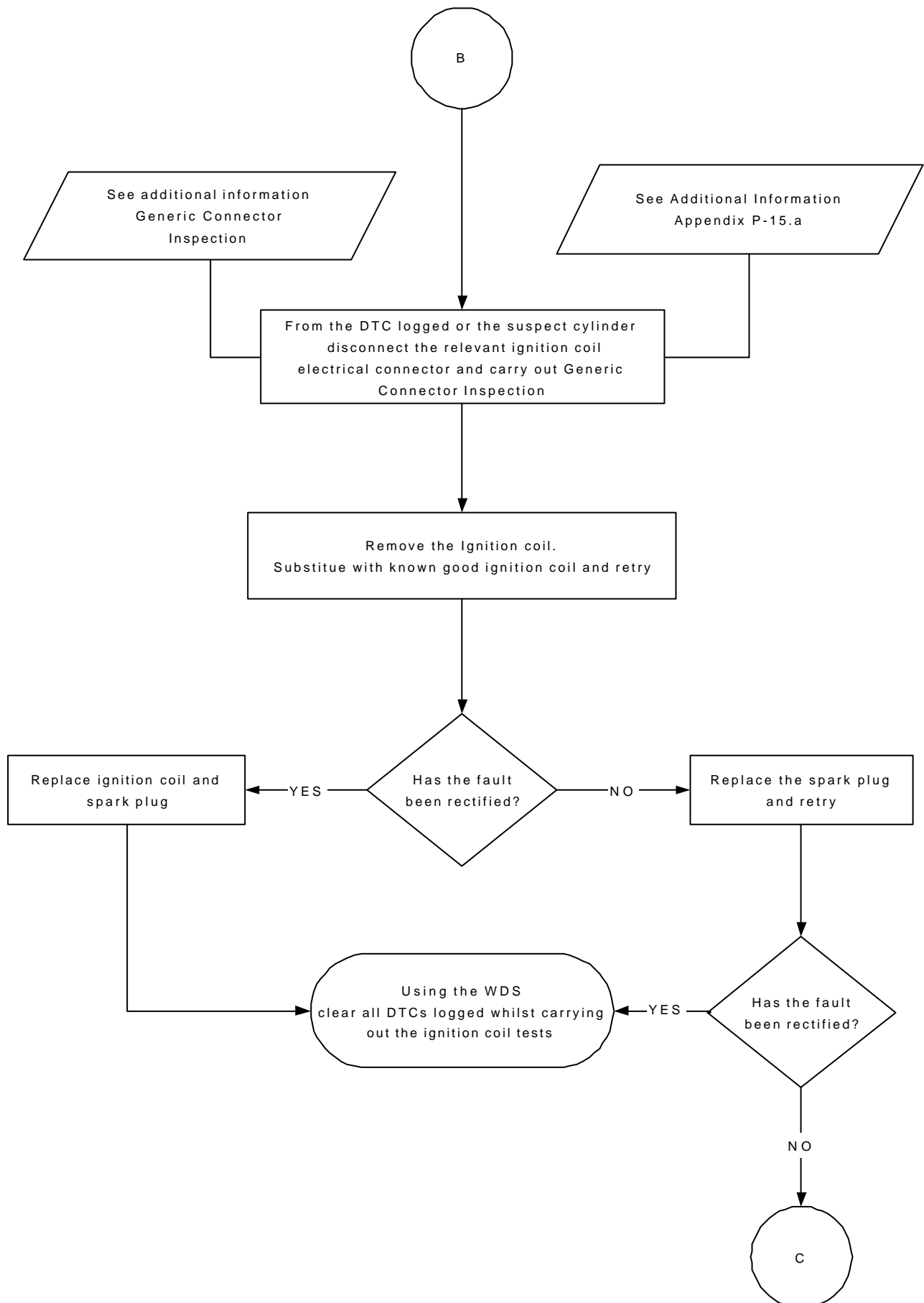
Ignition Coil Flowchart P-15



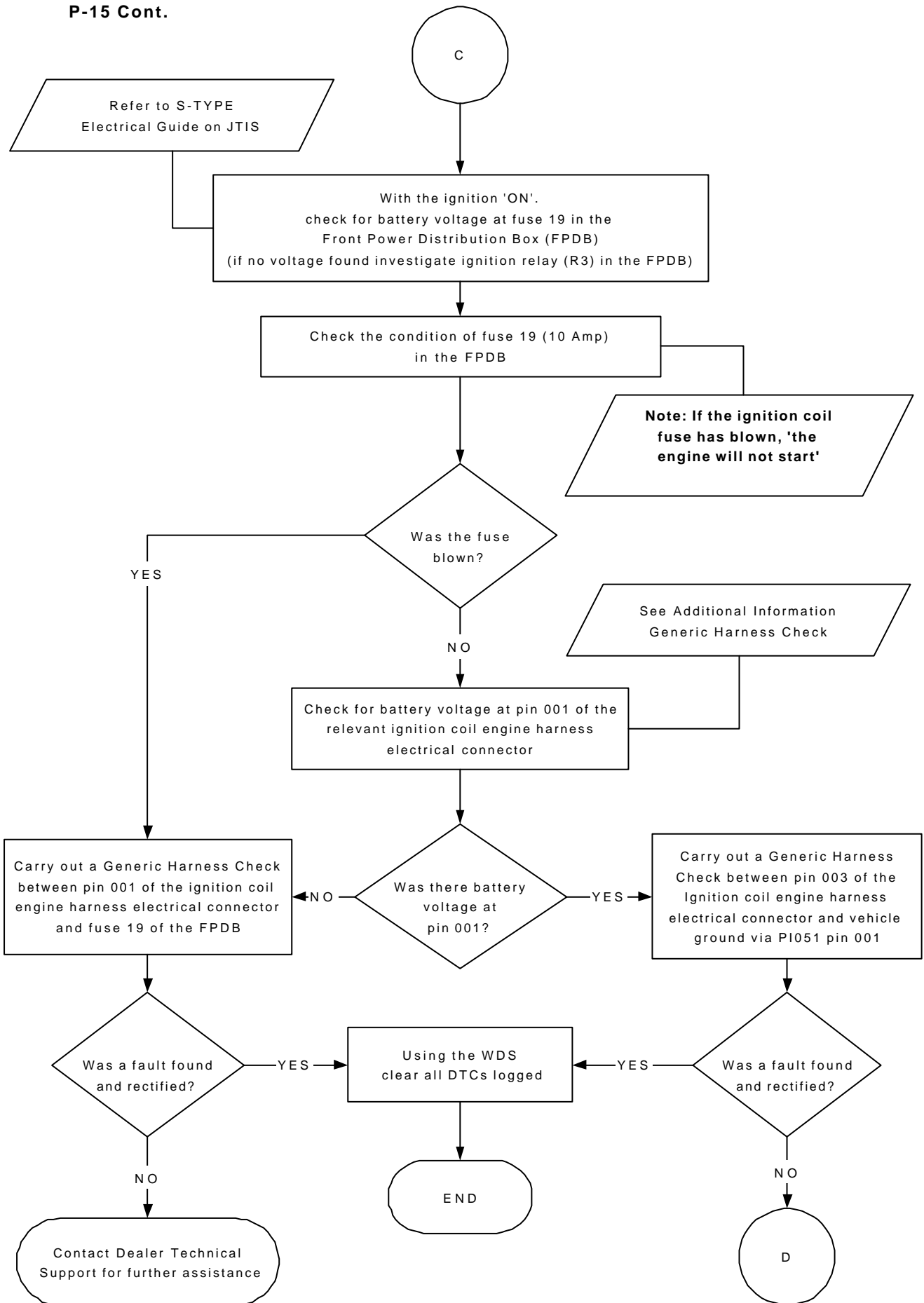
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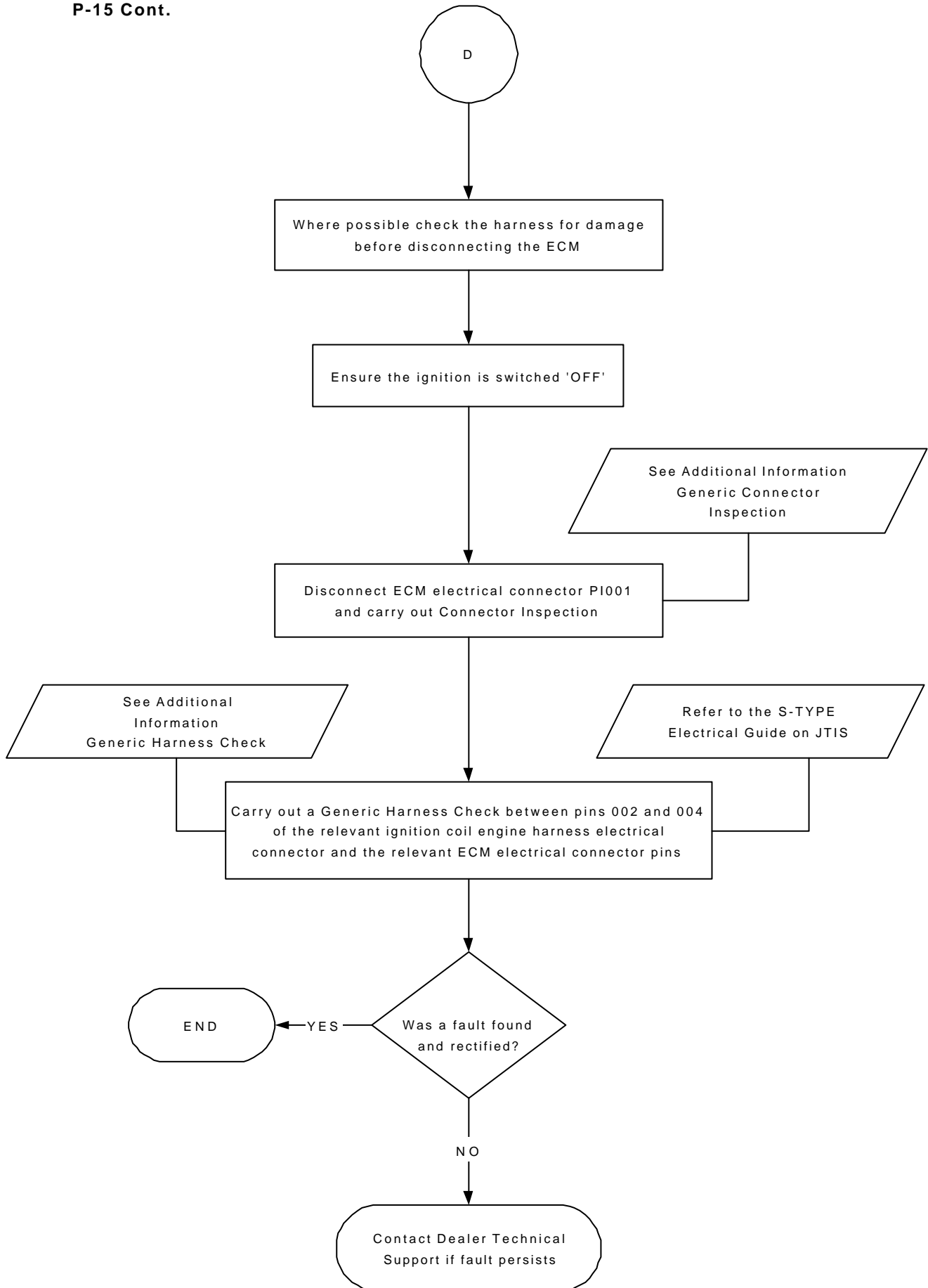
P-15 Cont.



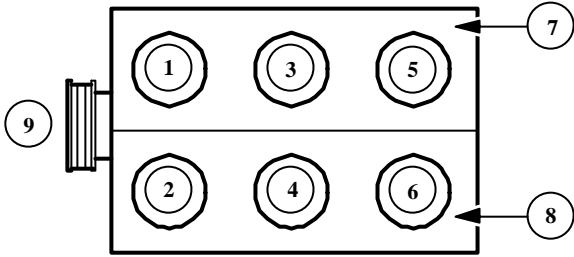
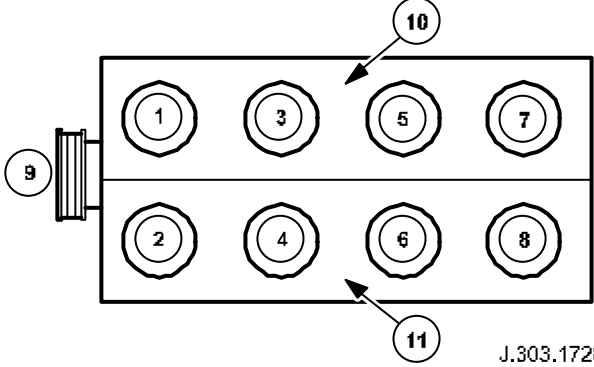
P-15 Cont.



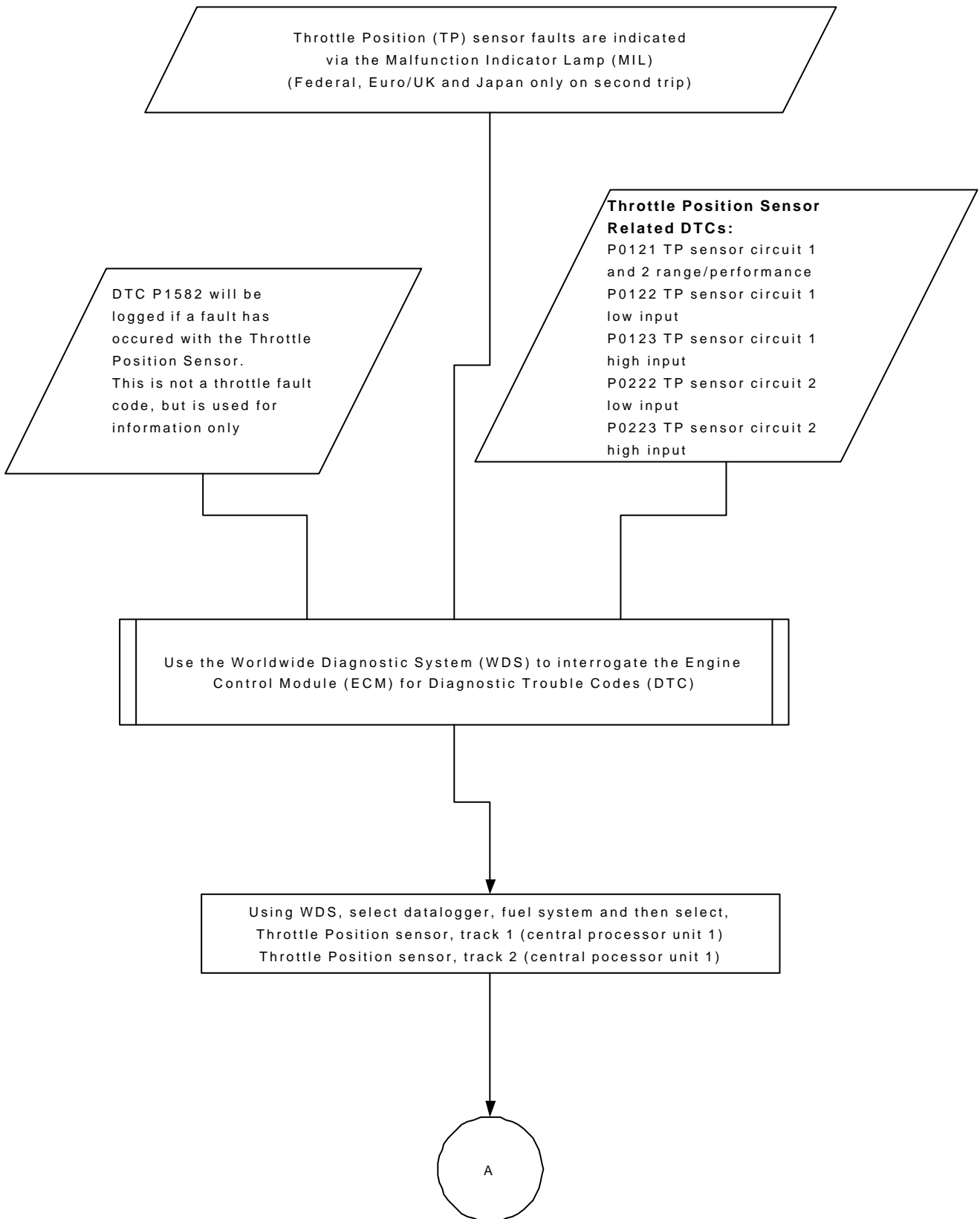
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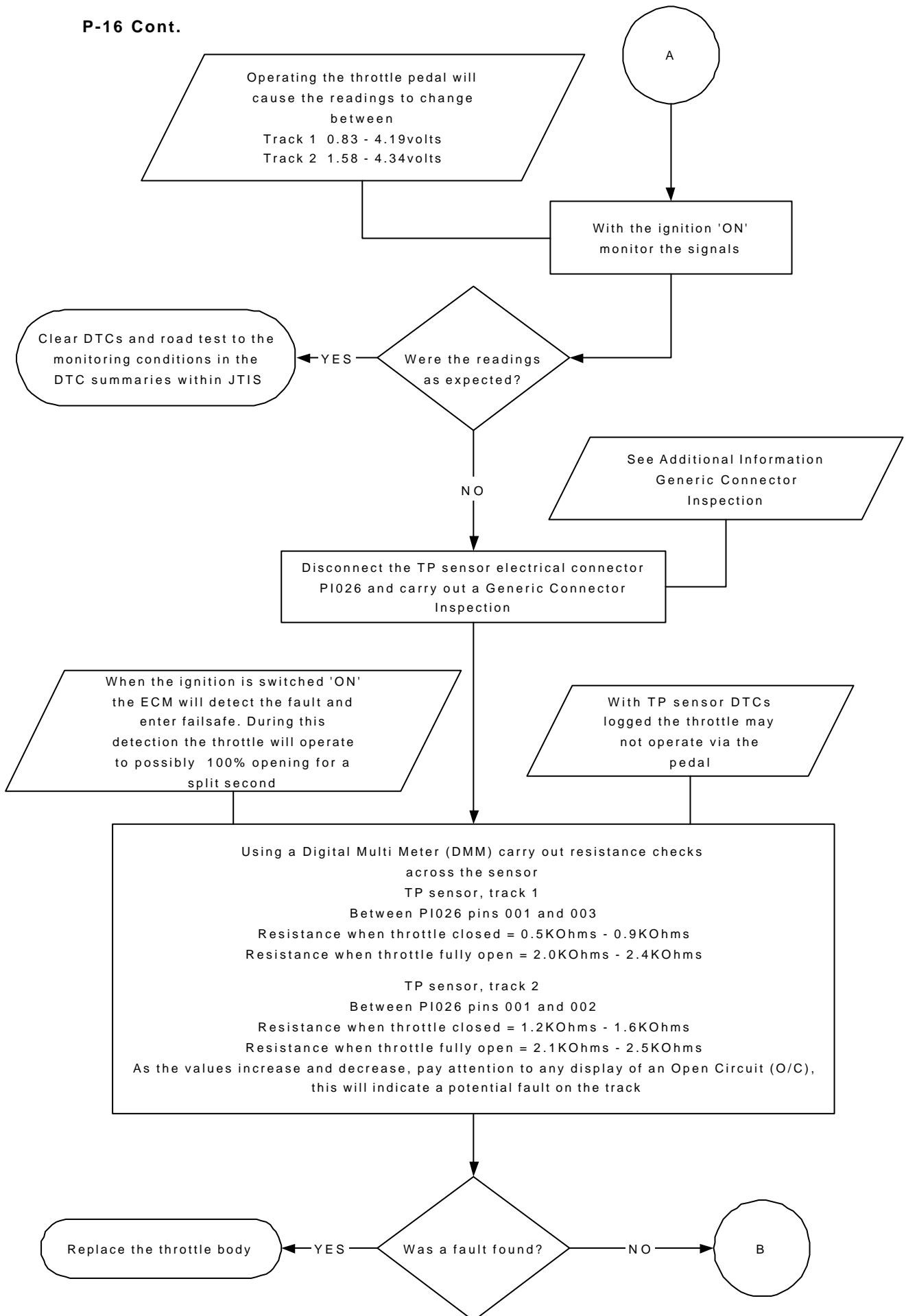
Additional Information P-15.a

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 JTIS for further information on DTC Summaries	
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	 <p style="text-align: right;">J.303.1704</p>
	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	 <p style="text-align: right;">J.303.1728</p>
	Fig. 5 V8
Always refer to Dealer Technical Support if problems are encountered.	

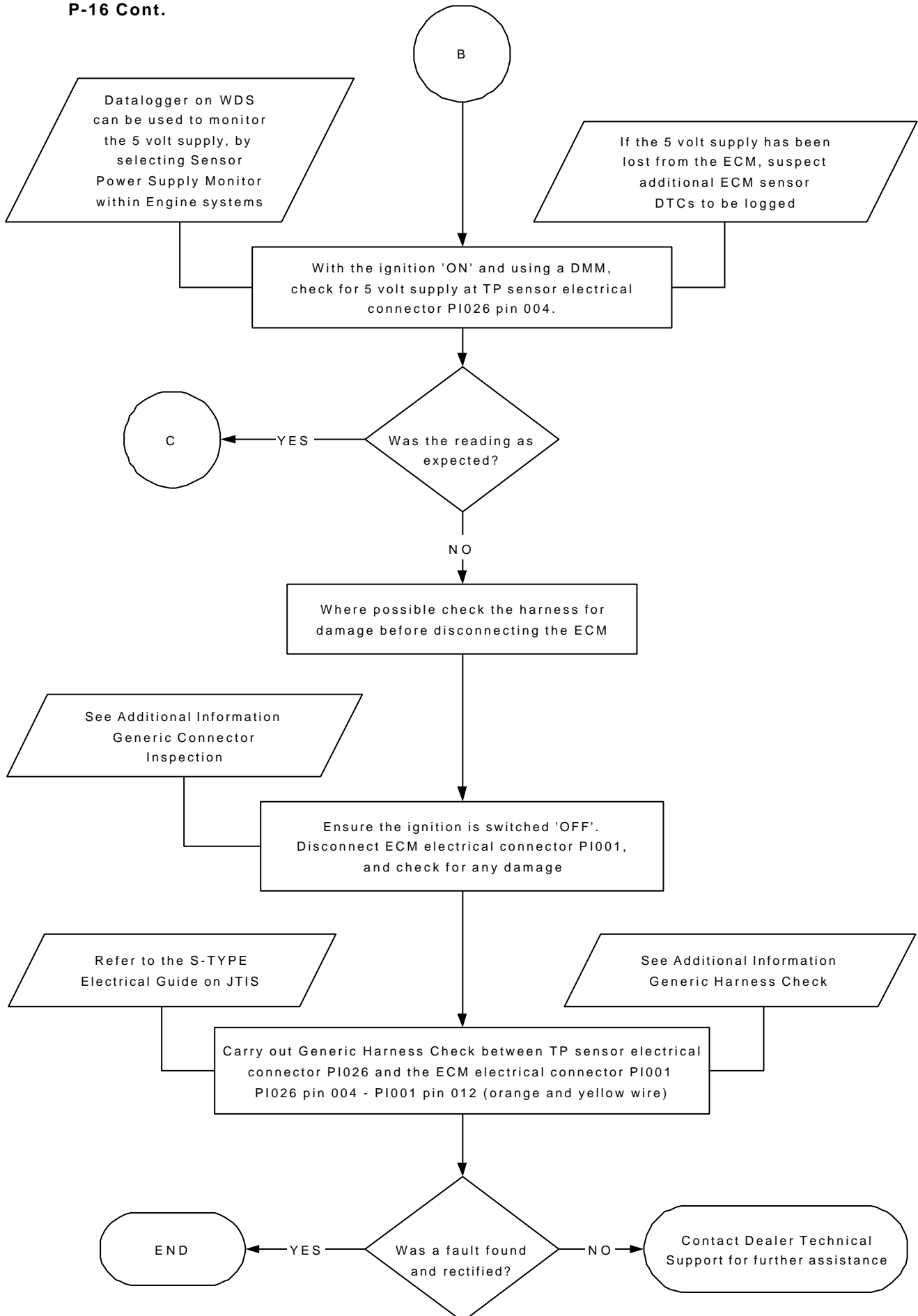
**Throttle Position Sensor
Flowchart P-16**



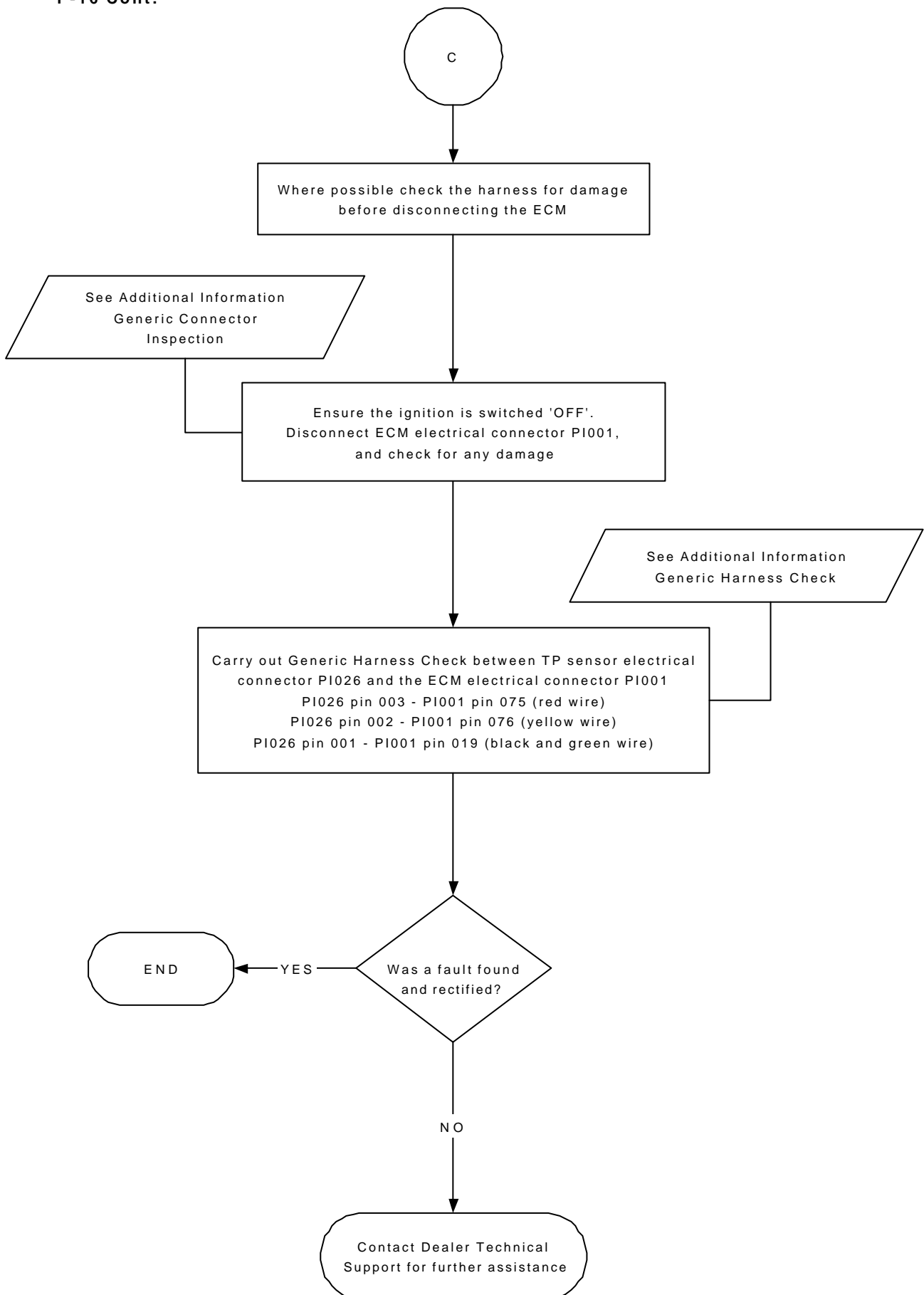
P-16 Cont.



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P-16 Cont.



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 Dealer Technical Support or your NSC/Importer 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. This Electrical Guide is in JTIS.
- 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 Dealer Technical Support or your NSC/Importer if problems are encountered.