Evaporative System – Diagnostic Flow Charts

MODEL 2002 MY-ON X-TYPE

VIN C00001-ON

Issue:

This bulletin provides information on diagnosing the evaporative system of 2002 MY-ON X-TYPE vehicles.

EVAPORATIVE SYSTEM – TABLE OF CONTENTS

Note: All three leak detection DTCs (P0442, P0455 and P0456) are logged as temporary codes when a leak is detected on the first trip within a leak check. If the fault re-occurs and is detected on a second leak check (second trip) the relevant fault code is then logged as a permanent DTC. When diagnosing faults with the evaporative system, the permanent code is the code, which needs to be investigated.

LEAK CHECK BRIEF SUMMARY

Background

This diagnostic is designed to determine the presence of a leak in the fuel vapor system.

There are two elements to this diagnostic, 0.040 in and 0.020 in tests; these are executed during normal vehicle operation. The 0.040 in test will operate when the vehicle is in motion, the 0.020 in test runs when the vehicle returns to rest. Both tests operate in a similar manner; the major difference is the level of depression pulled during the test cycle. Figure 1, shows a typical fuel tank pressure profile during a leak test.

Leak Check - Federal Test - (Fig. 1)

Leak Test Profile.

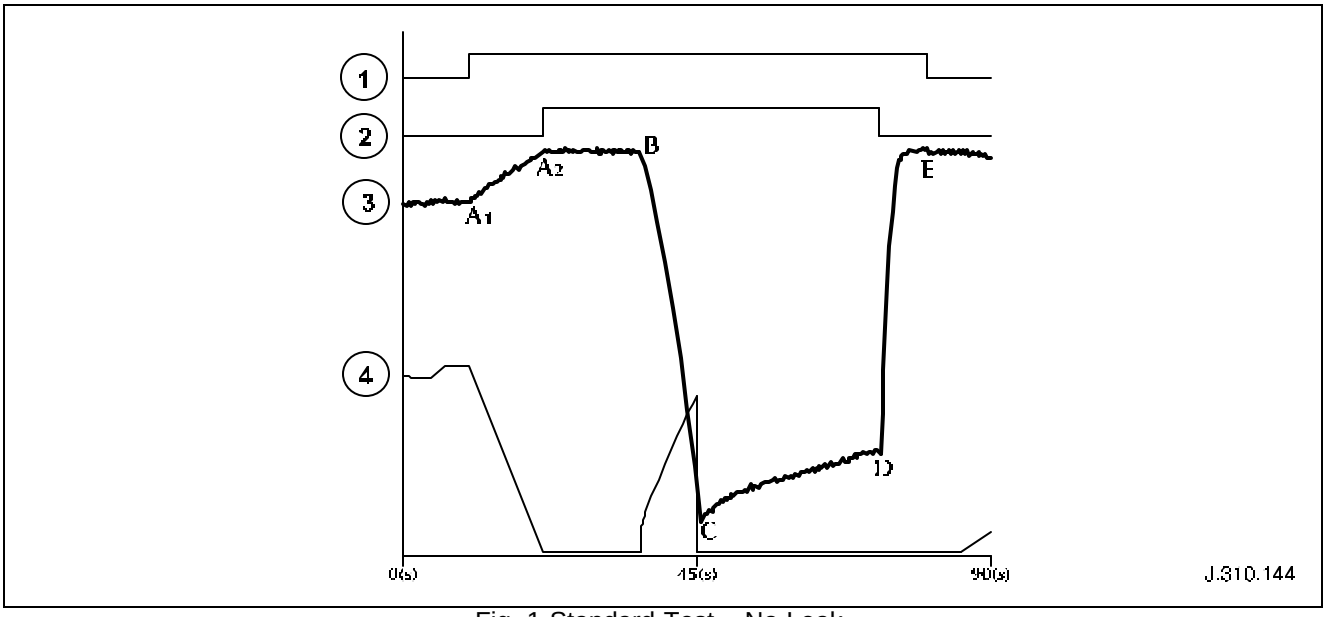


Fig. 1 Standard Test – No Leak

1 Leak Check Status Flag.
2 CCV Status Flag.
3 Fuel Tank Pressure.
4 Evaporative Valve Duty Cycle.

At the point that the test initializes A_1, the evaporative (purge) valve begins to close. At A_2 the Canister Close Valve (CCV) closes. The vapor system is now sealed (assuming that there is not a leak present). The pressure in the fuel tank will now begin to increase (the amount of increase is dependant upon the amount and type of fuel, the temperature, and if a leak is present) until B.

It is over this section that the system determines if the evaporative (purge) valve is unable to fully close (P0443).

At B, the evaporative (purge) Valve begins to open; a depression is now produced in the fuel tank due to engine vacuum. The tank pressure is pulled down to –2 Kpa (-20 mBar) for the 0.040 in test and -1.25 Kpa (-12.5 mBar) for the 0.020 in test.

The rate that this pull down occurs is dependant upon the presence of a leak, if the target pressure cannot be achieved in the prescribed time then the system judges there to be a 'gross leak' (P0455 - note this code is also used to indicate evaporative (purge) valve stuck closed and CCV stuck open).

When the target pressure is achieved, the evaporative (purge) valve re-closes C (again, the system is now sealed). A settling period now ensues and the system determines if it is necessary to perform a second pull down (this does not always occur).

The pressure in the tank now begins to increase (again it is dependent upon the amount and type of fuel, the temperature, and the presence of a leak). A leak at this stage will have a significant effect on the rate of pressure rise.

At D, the CCV re-opens and the remaining pressure in the tank is lost, the tank pressure will return close to atmospheric pressure before purge re-initializes E. It is the time taken for this pressure to return to or close to atmospheric pressure, that determines if there is a restriction in the atmospheric port (vent port) of the vapor system (P0446).

The ECM now performs a calculation using various elements of the test cycle and determines the presence and relative size of a leak. If a leak is present, the relative P codes will be flagged accordingly.

Evaporative Leak Check Diagnostic Trouble Code Flowchart index
Leak Check Flowchart P-1.a, pages 6, 7, 8 and 9 **DTC P0442 – 0.040 in. leak** 0.040 in. leak detected. During the 0.040 in. leak check, a leak between 0.040 in. and approximately 0.110 in. has been detected.
Leak Check Flowchart P-1.a, pages 6, 7, 8 and 9 **DTC P0456 – 0.020 in. Leak** 0.020 in. leak detected. During the 0.020 in. leak check, a leak between 0.020 in. and 0.040 in. has been detected.
Leak Check Flowchart P-1.b, pages 10 and 11 **DTC P0443 Evaporative Purge Valve Leaking (Methods 1 – 2)** Evaporative purge valve leaking. During the first stage of the 0.040 in. leak check (first pressure rise) the fuel tank pressure has decreased to a negative pressure by an excessive amount. This fault is diagnosed during the first phase of the on board diagnostic (OBD) 0.040 in. test (See Figure 1 from A_2 B).
Leak Check Flowchart P-1.c, pages 12,13 and 14 **DTCs P0444/P0445 Evaporative Purge Valve** Evaporative purge valve electrical circuit failure P0444 is logged when an open circuit or high resistance is detected on the evaporative purge valve to engine control module (ECM) drive circuit and if the evaporative purge valve fails. P0445 is logged when a short circuit to ground is detected on the purge valve to ECM drive circuit and if the evaporative purge valve fails.
Leak Check Flowchart P-1.d, page 15 **DTC P0446 Evaporative Canister Close Valve** Evaporative CCV stuck closed. A level of restriction is present in the vapor line between the fuel tank and the carbon canister outlet/atmospheric port. This fault is diagnosed during the final phase of the on board diagnostics (OBD) 0.040 in. test, (see Figure 1 from D to E). **Note: Depending upon the severity of the blockage, it is possible that some level of difficulty has been experienced during a fuel fill operation.**

Leak Check Flowchart P-1.e, pages 16, 17 and 18

DTC P0447/P0448 Evaporative CCV

Evaporative CCV electrical circuit failure

P0447 is logged when an open circuit or high resistance is detected on the CCV to ECM drive circuit and if the evaporative CCV fails.

P0448 is logged when a short circuit to ground is detected on the CCV to ECM drive circuit and if the evaporative CCV fails.

Leak Check Flowchart P-1.f, page 19

DTC P0450 Fuel Tank Pressure Sensor Malfunction

Fuel Tank Pressure Sensor (FTPS) malfunction.
During normal driving the FTPS is monitored to ensure it changes by more than 0.03Kpa, if not the fault code is flagged.

Leak Check Flowchart P-1.g, pages 20, 21 and 22

DTCs P0452/P0453 Fuel Tank Pressure Sensor

Fuel Tank Pressure Sensor (FTPS) electrical circuit failure. P0452 is logged when an open circuit or short circuit to ground is detected on the FTPS to ECM sense circuit. FTPS failure and sensor supply open circuit.

P0453 is logged when a short circuit high is detected on the FTPS to ECM sense circuit, FTPS failure and sensor ground circuit open circuit.

Leak Check Flowchart P-1.h, pages 23, 24, 25, 26, 27, 28 and 29

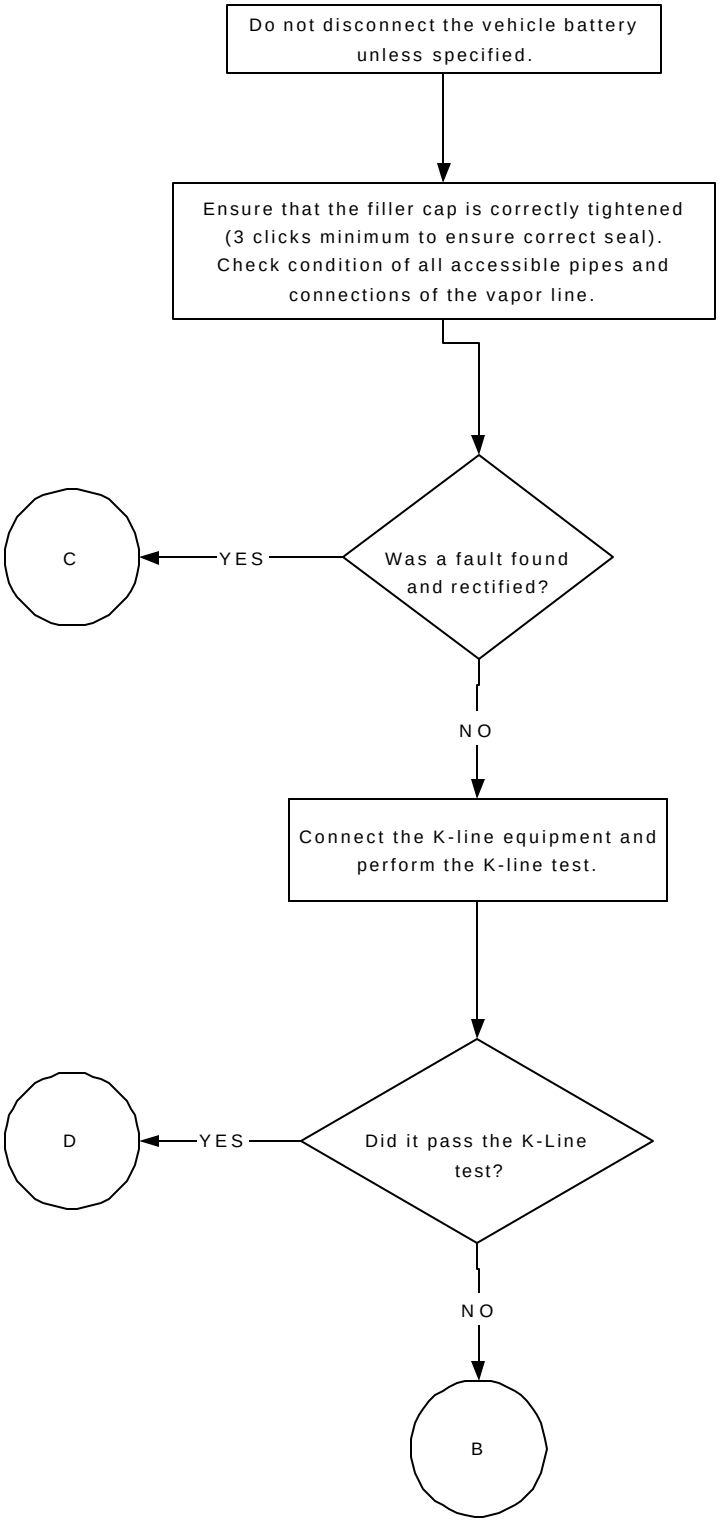
DTC P0455 - Gross leak detected

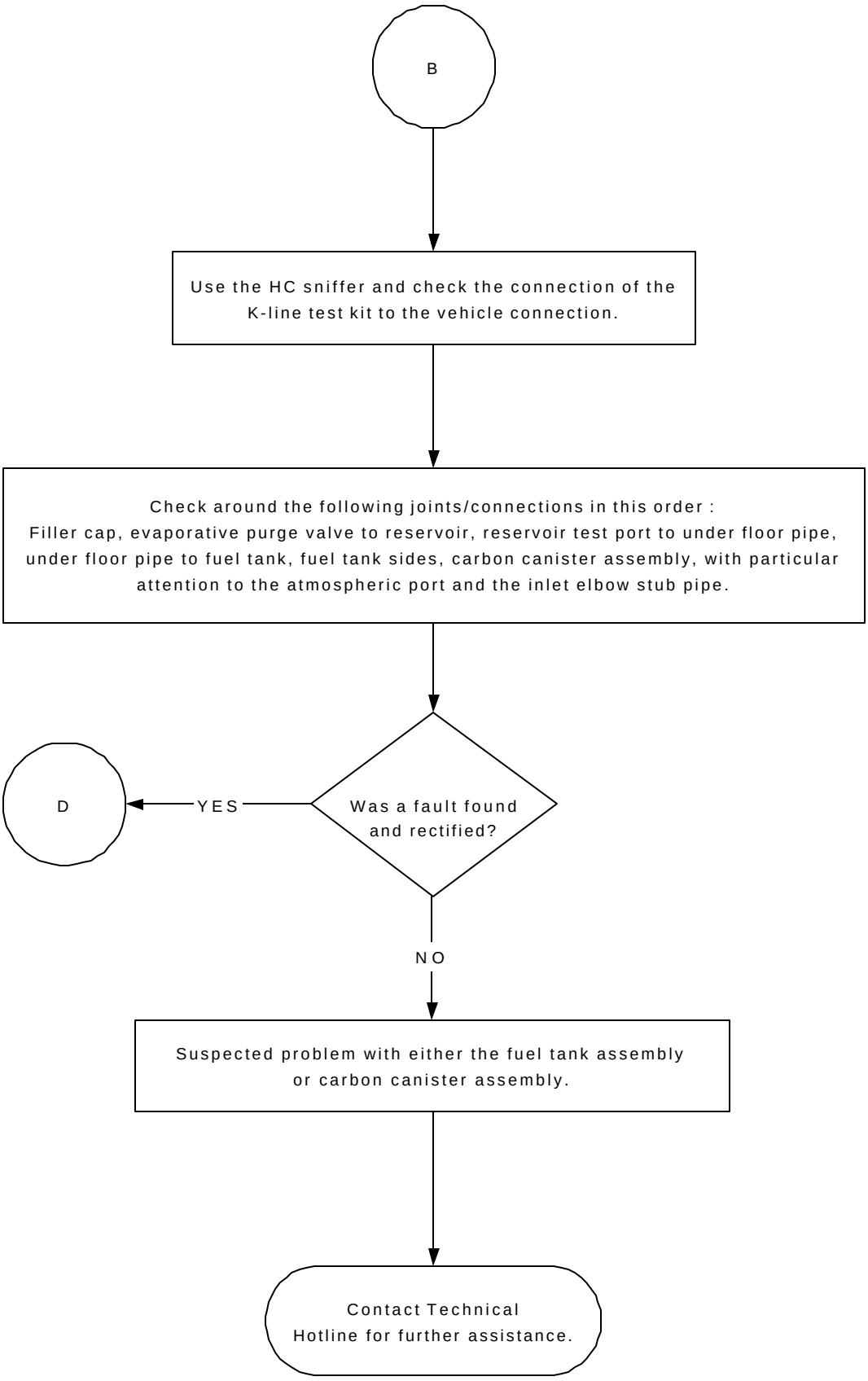
During the 0.040in leak check, the required depression (-2Kpa) has not been achieved within the fuel tank.

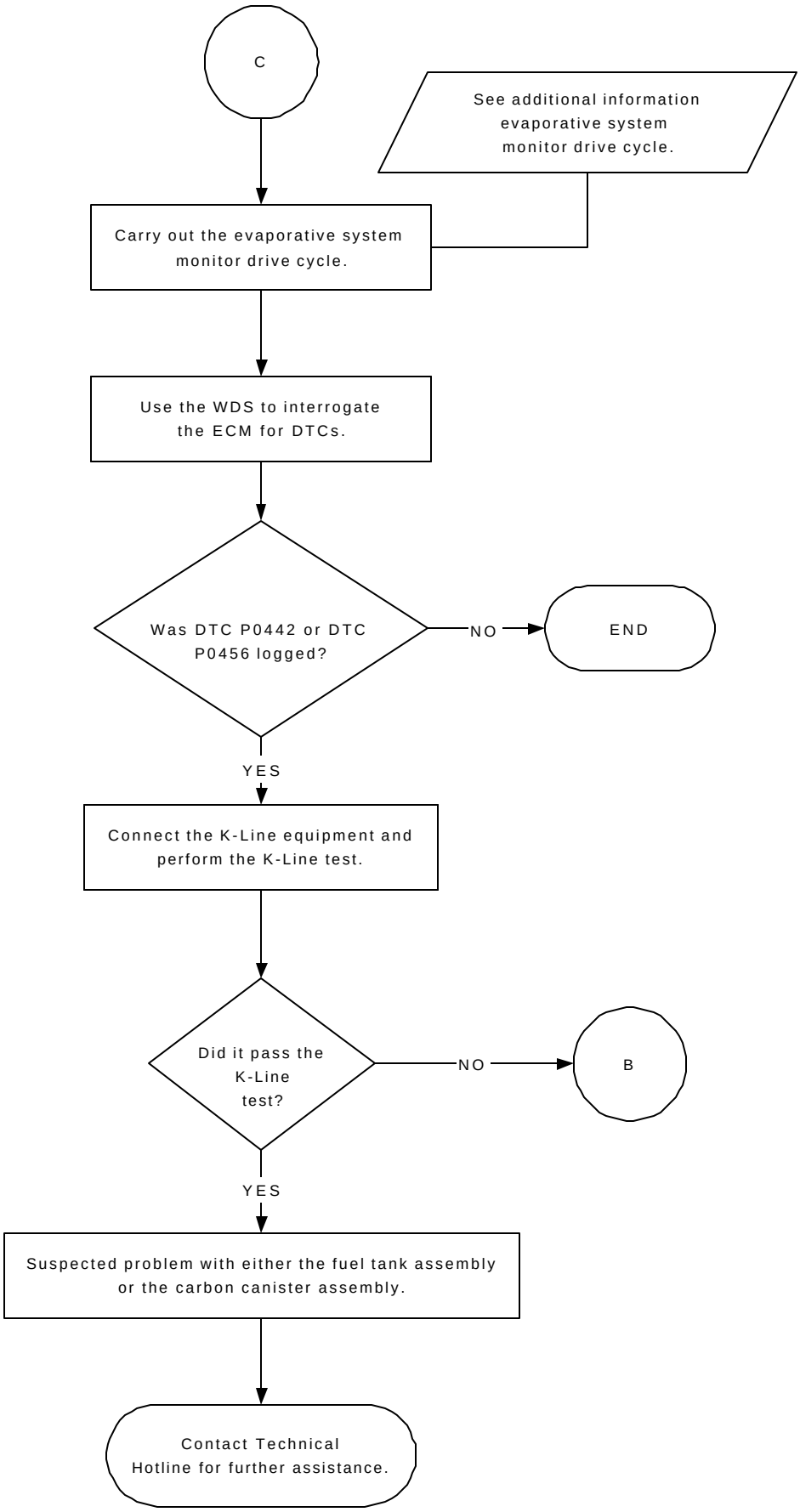
For more information on the above Diagnostic Trouble Codes, refer to the latest version of DTC Summaries CD-ROM

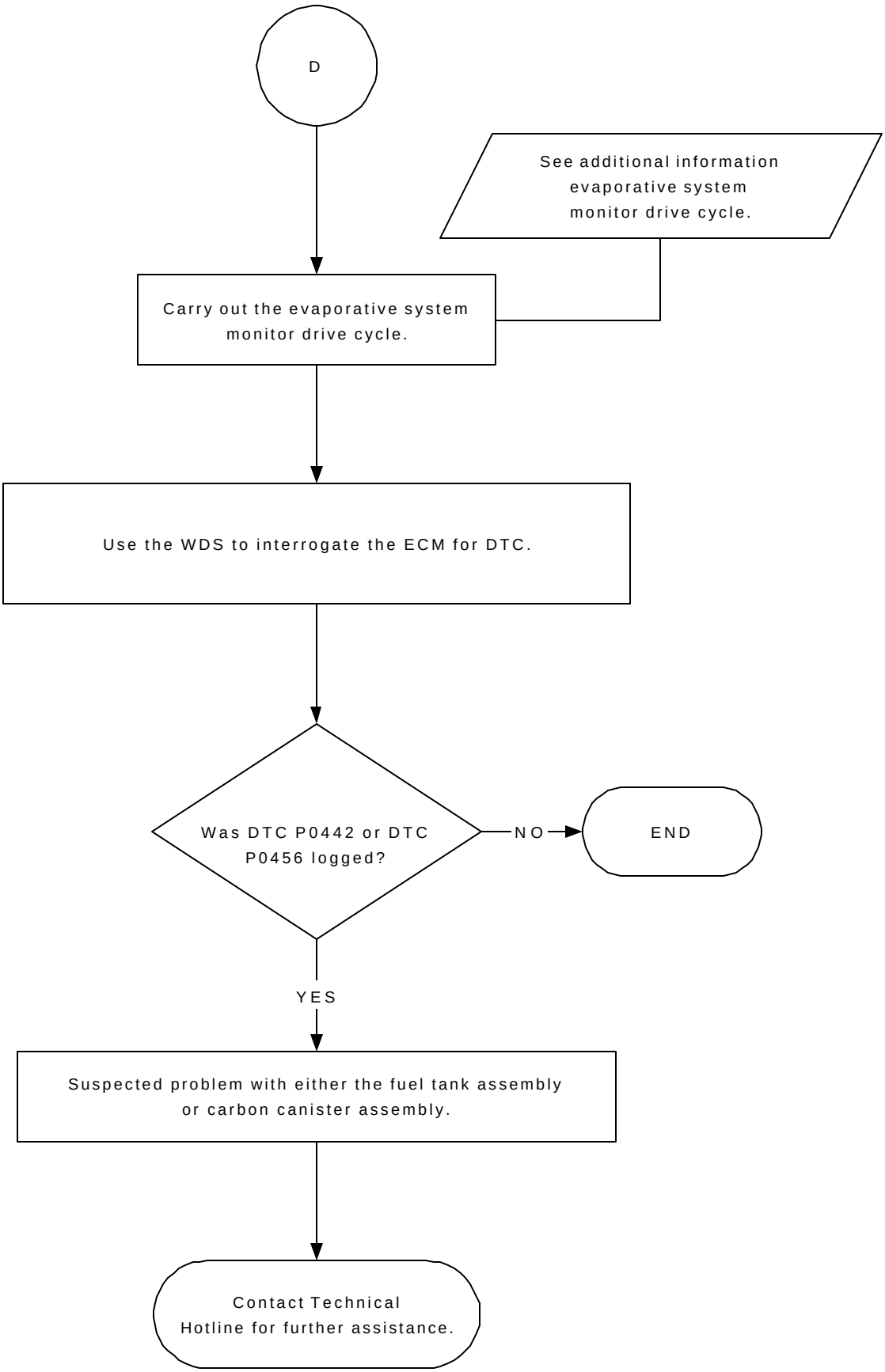
Always refer to The Technical Hotline if problems are encountered.

Leak Check Flowchart P- 1.a
P0442 - 0.040 in. or
P0456 - 0.020 in. leak

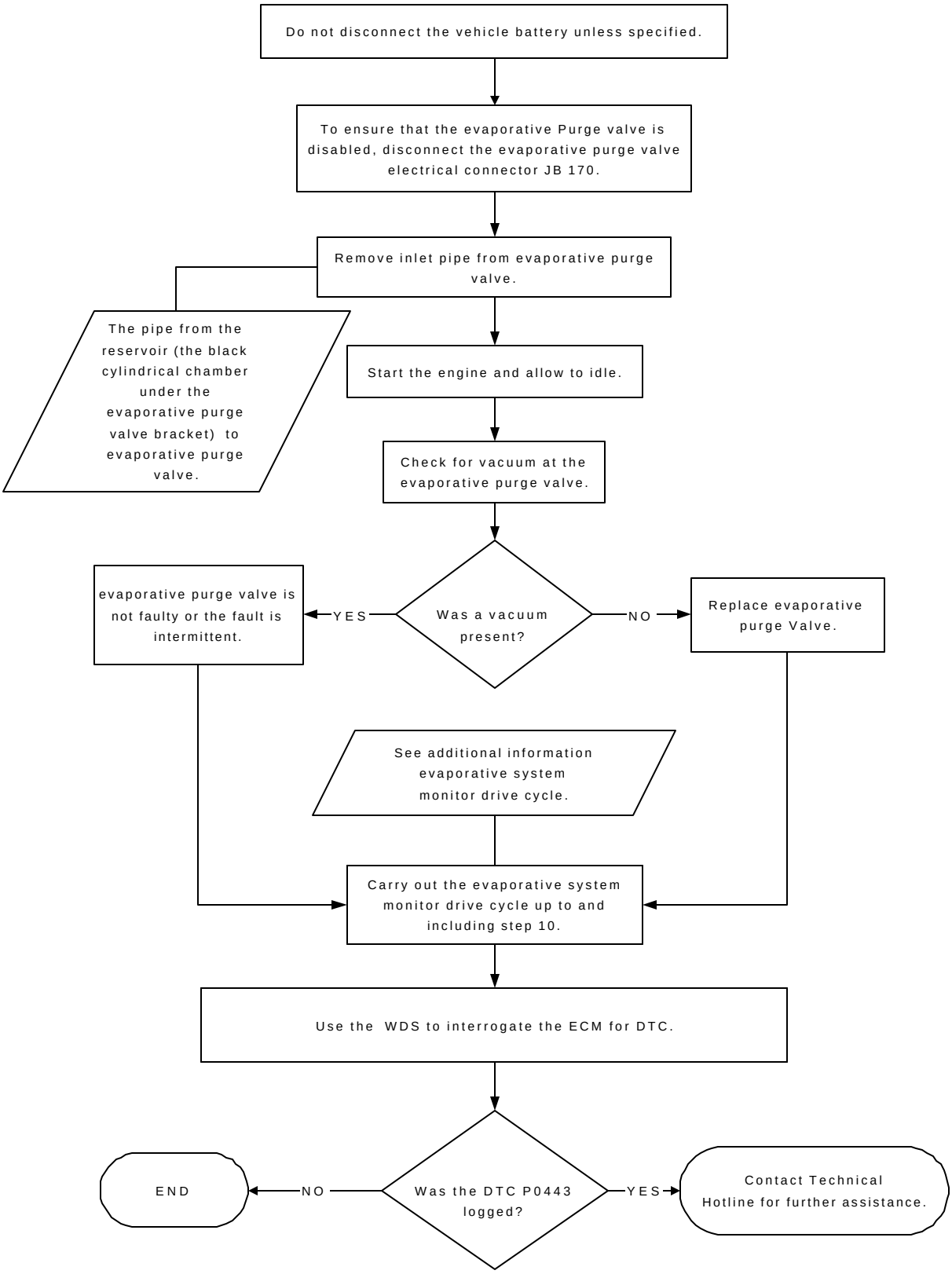



B
Use the HC sniffer and check the connection of the K-line test kit to the vehicle connection.
Check around the following joints/connections in this order :
Filler cap, evaporative purge valve to reservoir, reservoir test port to under floor pipe, under floor pipe to fuel tank, fuel tank sides, carbon canister assembly, with particular attention to the atmospheric port and the inlet elbow stub pipe.
Was a fault found and rectified?
YES
D
NO
Suspected problem with either the fuel tank assembly or carbon canister assembly.
Contact Technical Hotline for further assistance.

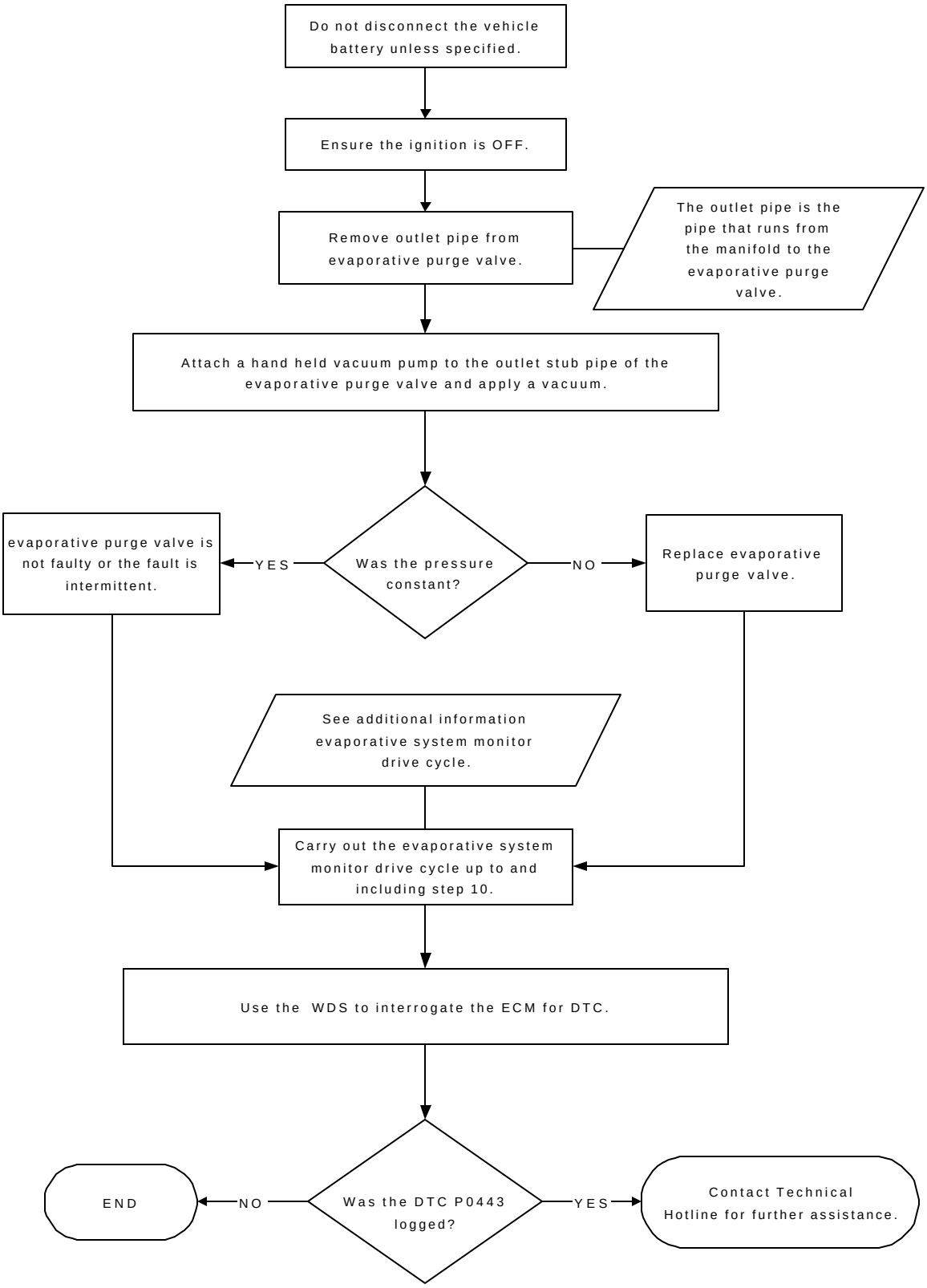

C
See additional information evaporative system monitor drive cycle.
Carry out the evaporative system monitor drive cycle.
Use the WDS to interrogate the ECM for DTCs.
Was DTC P0442 or DTC P0456 logged?
NO
END
YES
Connect the K-Line equipment and perform the K-Line test.
Did it pass the K-Line test?
NO
B
YES
Suspected problem with either the fuel tank assembly or the carbon canister assembly.
Contact Technical Hotline for further assistance.


D
See additional information evaporative system monitor drive cycle.
Carry out the evaporative system monitor drive cycle.
Use the WDS to interrogate the ECM for DTC.
Was DTC P0442 or DTC P0456 logged?
NO
END
YES
Suspected problem with either the fuel tank assembly or carbon canister assembly.
Contact Technical Hotline for further assistance.

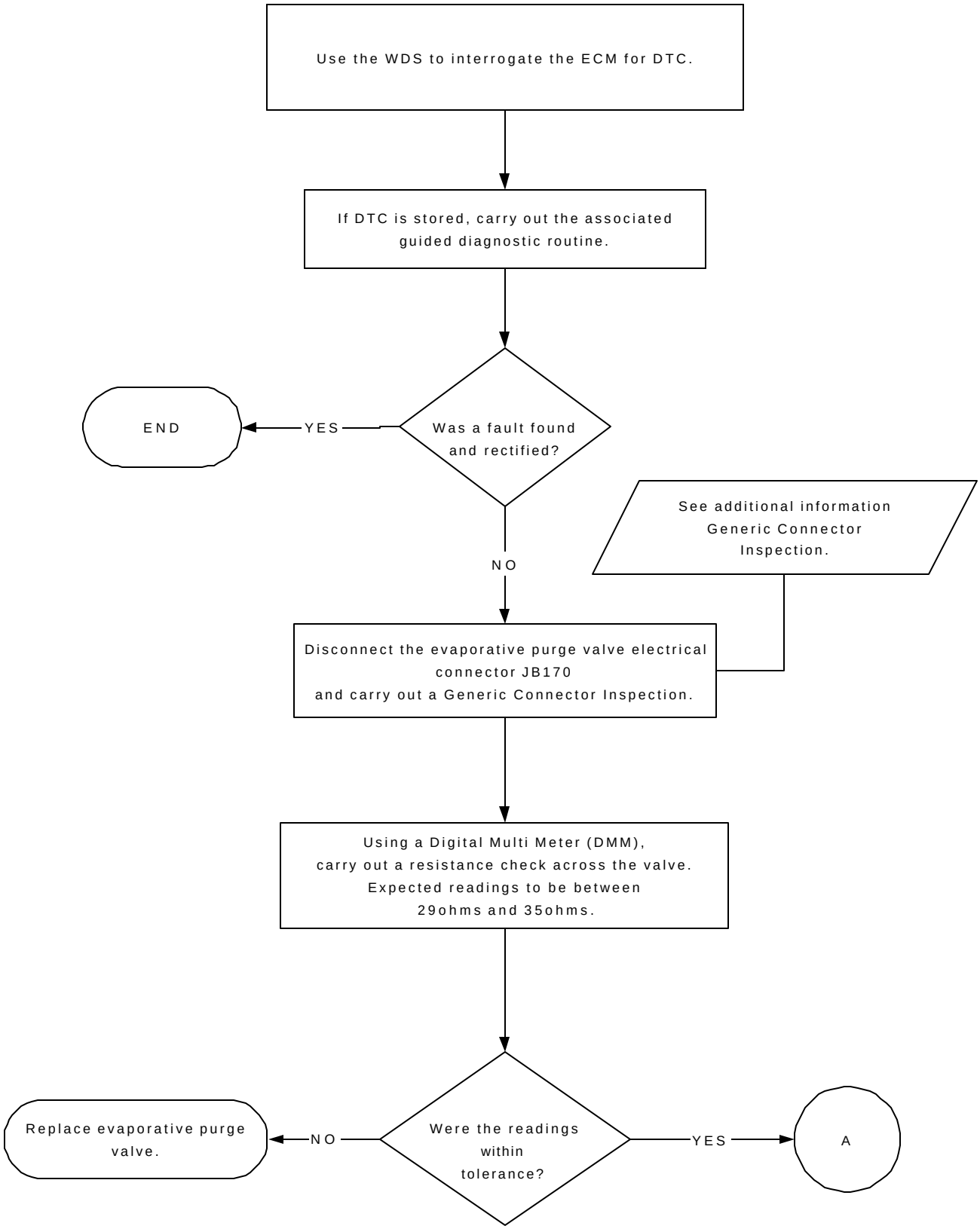
Leak Check Flowchart P-1.b
P0443 Evaporative Purge Valve Leaking.
Method 1 Manual

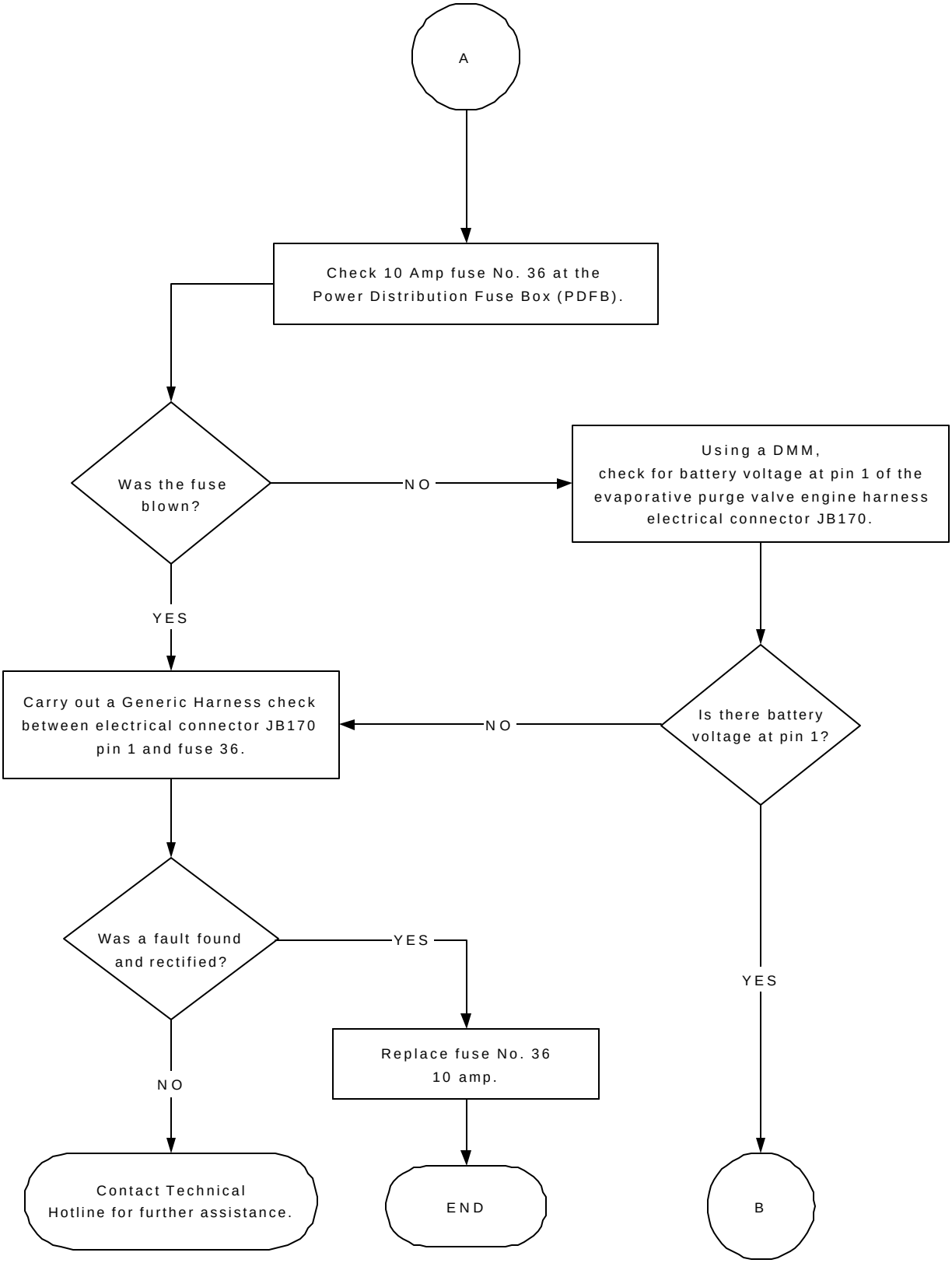


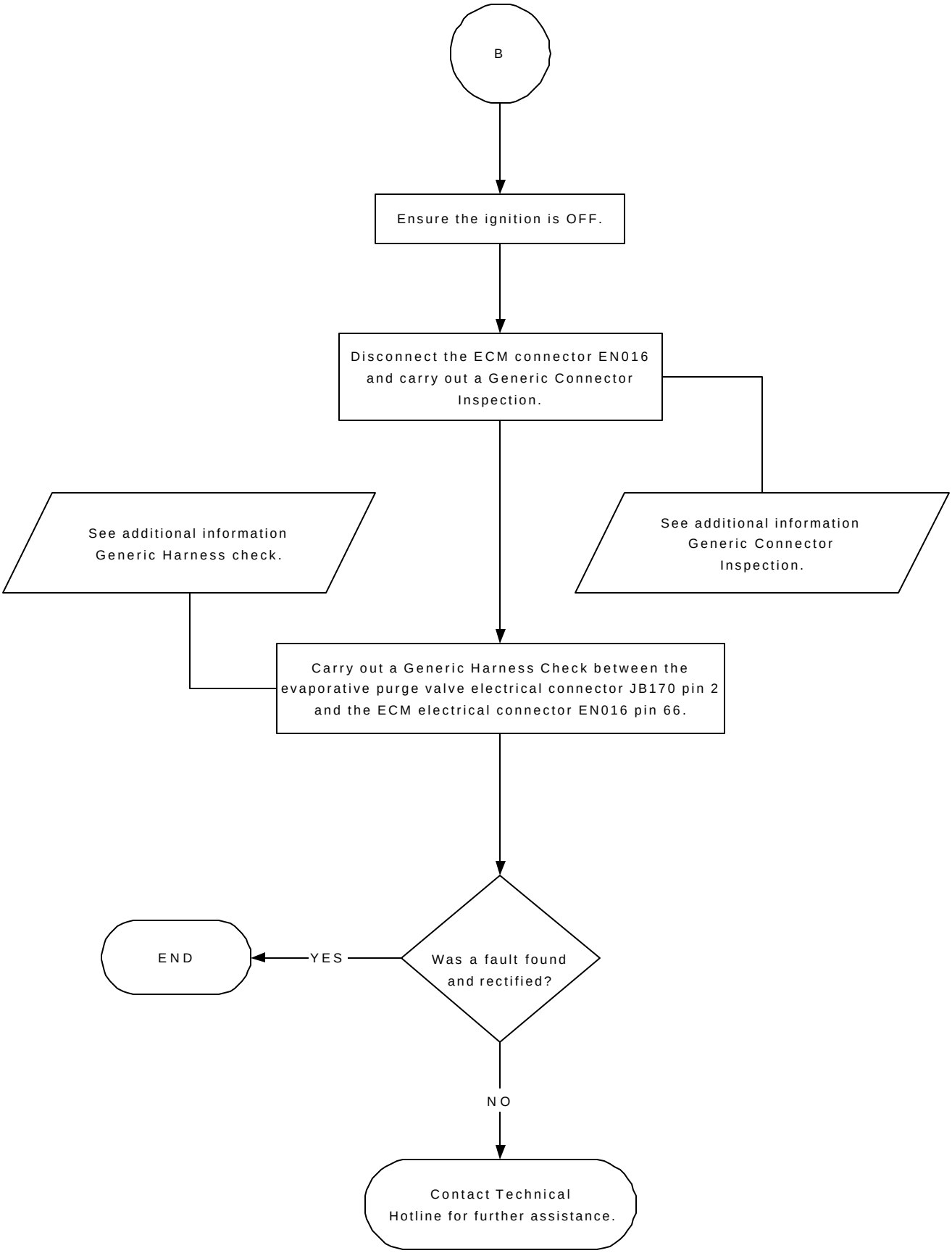
Leak Check Flowchart P-1.b
P0443 Evaporative Purge Valve Leaking
Method 2 - Using a Vacuum Pump



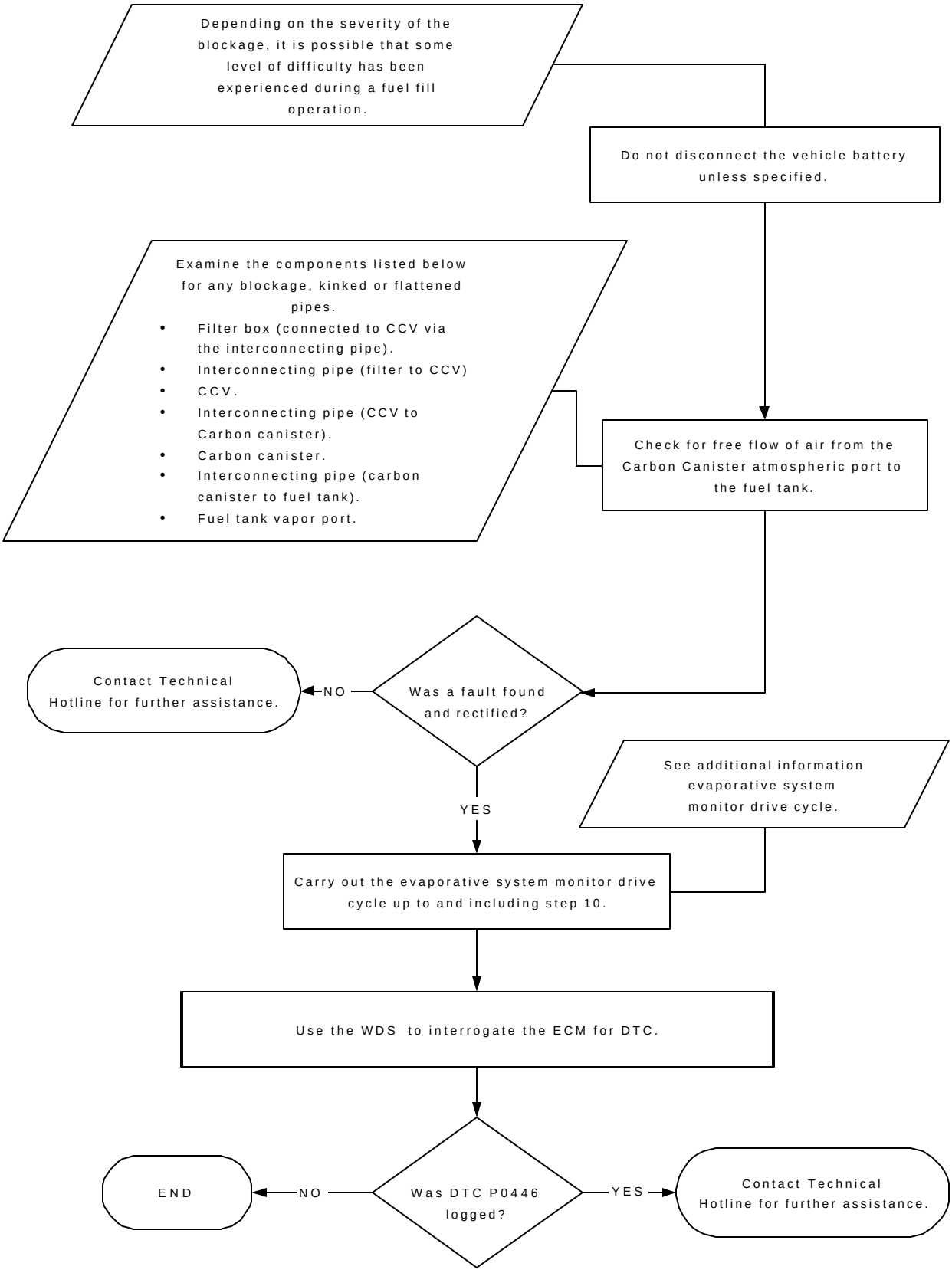
Leak Check Flowchart P-1.c
P0444/P0445 Evaporative Purge Valve



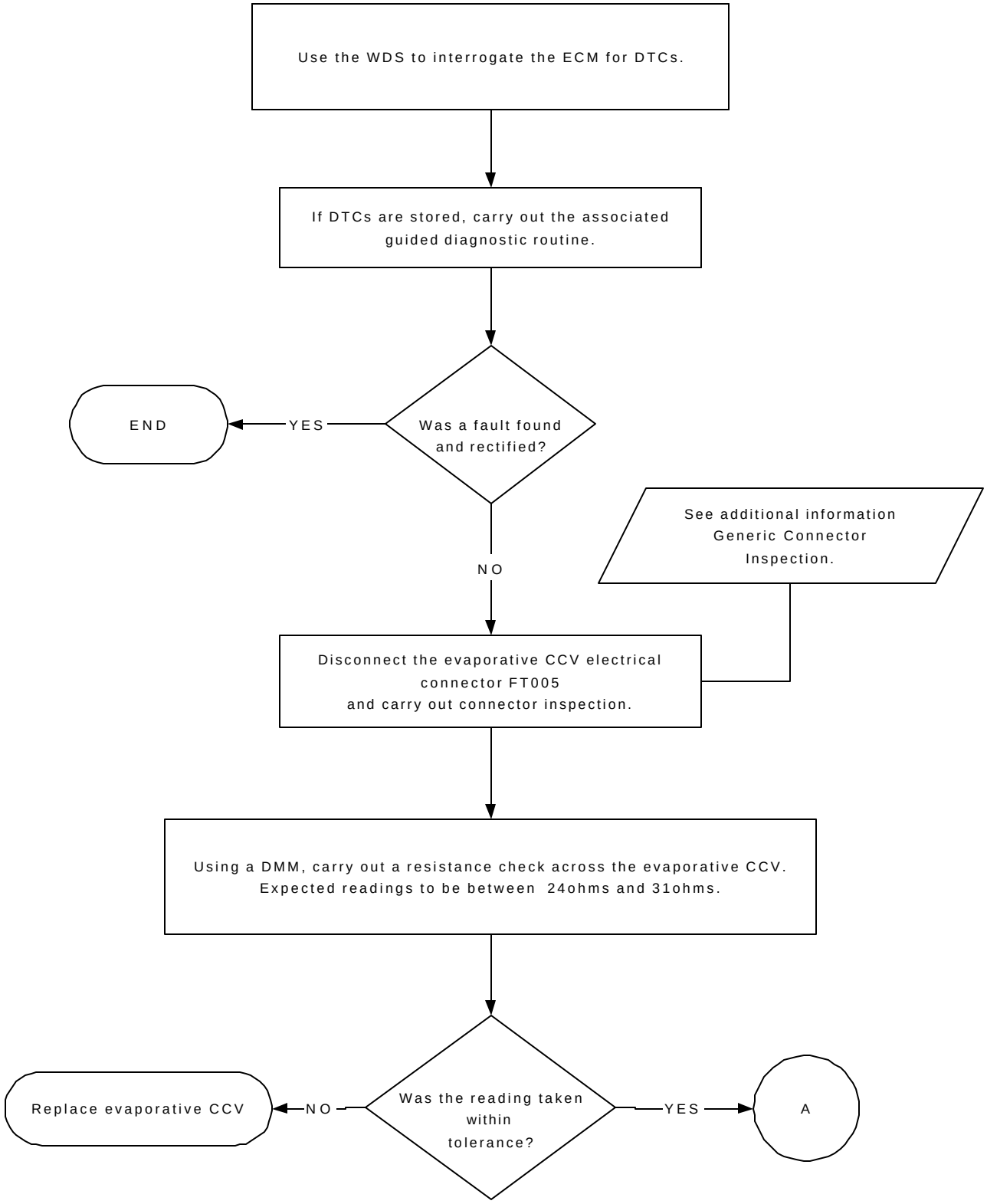

A
Check 10 Amp fuse No. 36 at the Power Distribution Fuse Box (PDFB).
Was the fuse blown?
NO
Using a DMM, check for battery voltage at pin 1 of the evaporative purge valve engine harness electrical connector JB170.
YES
Carry out a Generic Harness check between electrical connector JB170 pin 1 and fuse 36.
NO
Is there battery voltage at pin 1?
Was a fault found and rectified?
YES
YES
Replace fuse No. 36 10 amp.
NO
Contact Technical Hotline for further assistance.
END
B

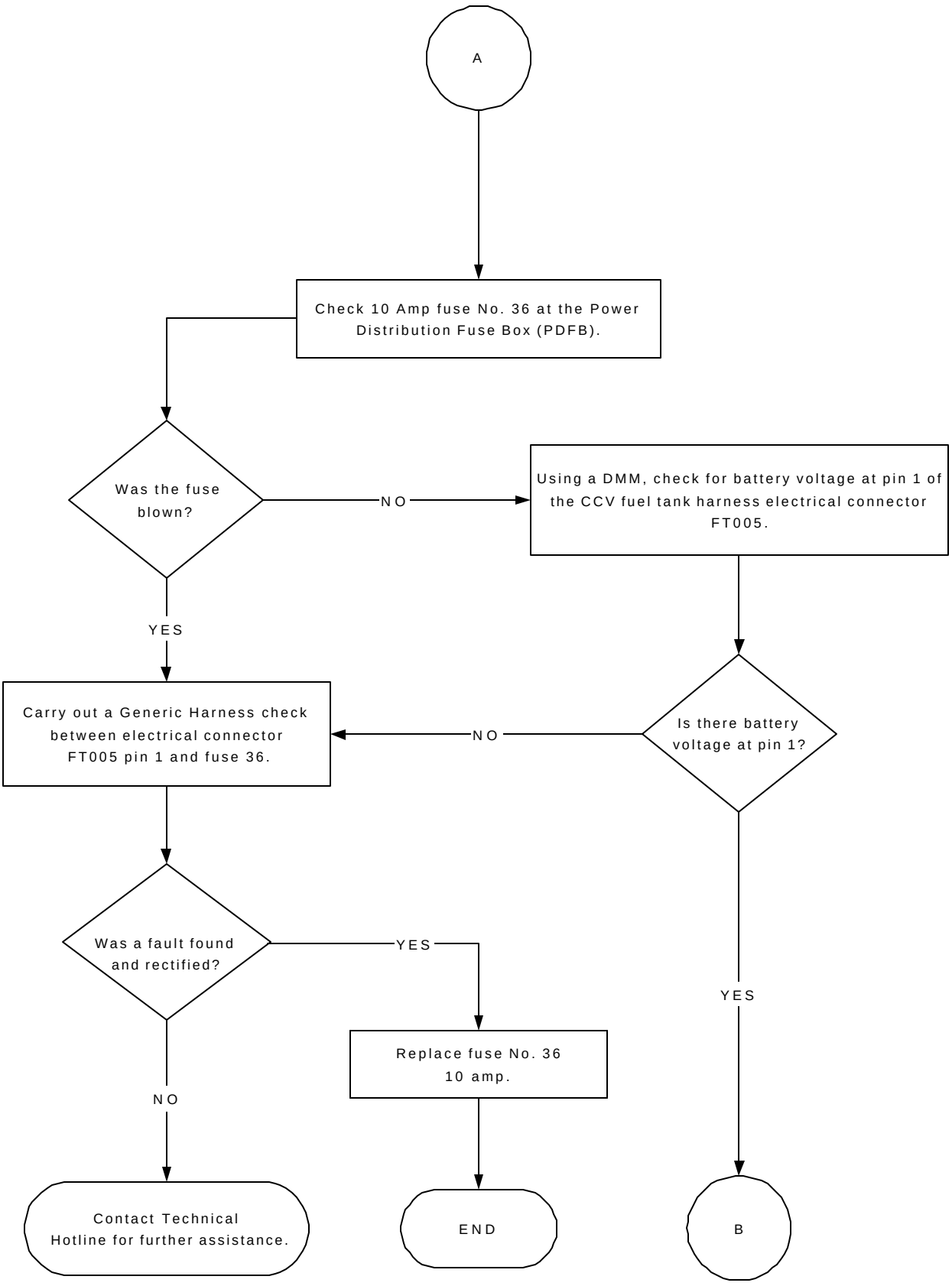

B
Ensure the ignition is OFF.
Disconnect the ECM connector EN016 and carry out a Generic Connector Inspection.
See additional information Generic Harness check.
See additional information Generic Connector Inspection.
Carry out a Generic Harness Check between the evaporative purge valve electrical connector JB170 pin 2 and the ECM electrical connector EN016 pin 66.
Was a fault found and rectified?
YES
END
NO
Contact Technical Hotline for further assistance.

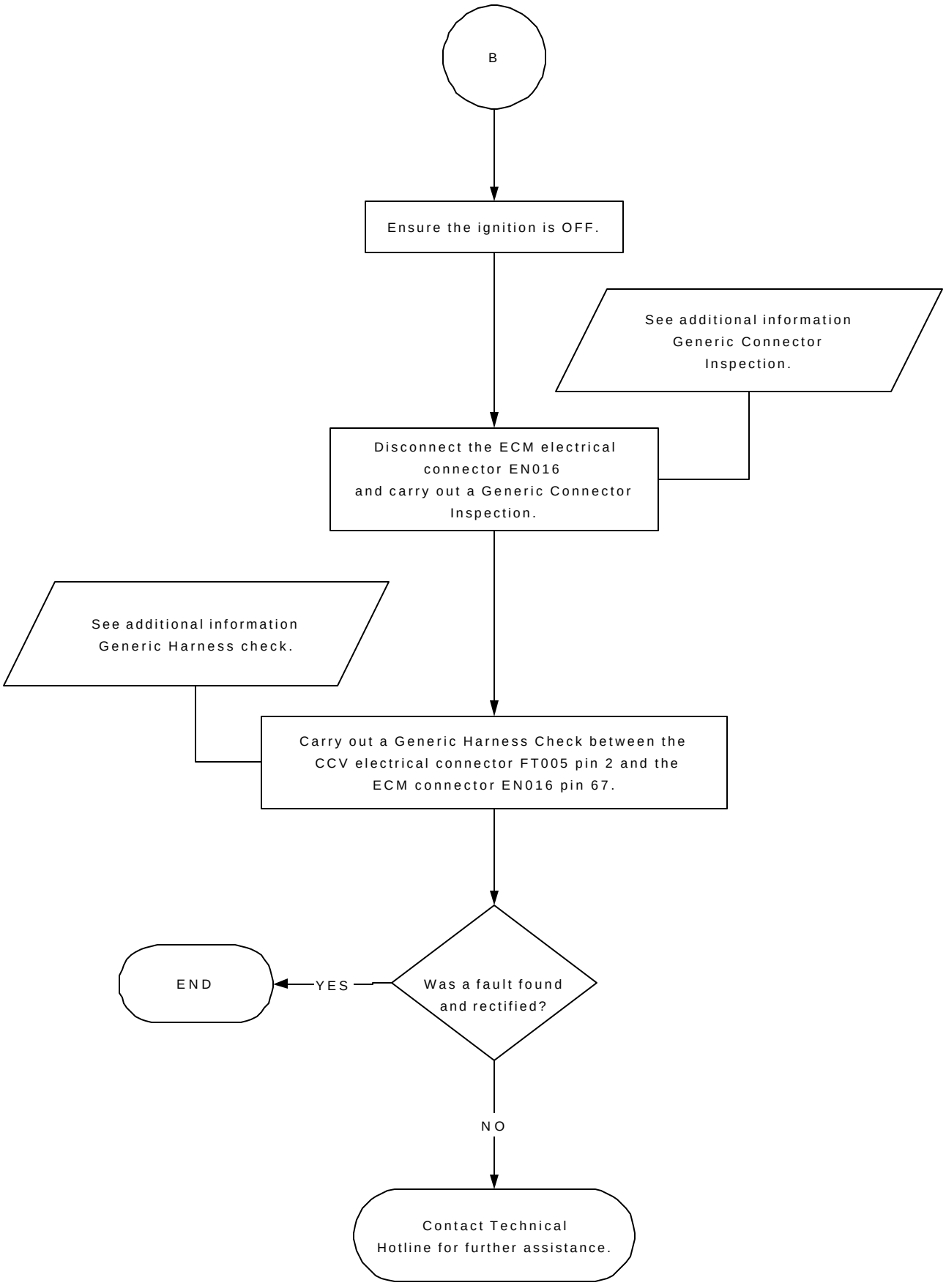
Leak Check Flowchart P-1.d
P0446 Evaporative CCV



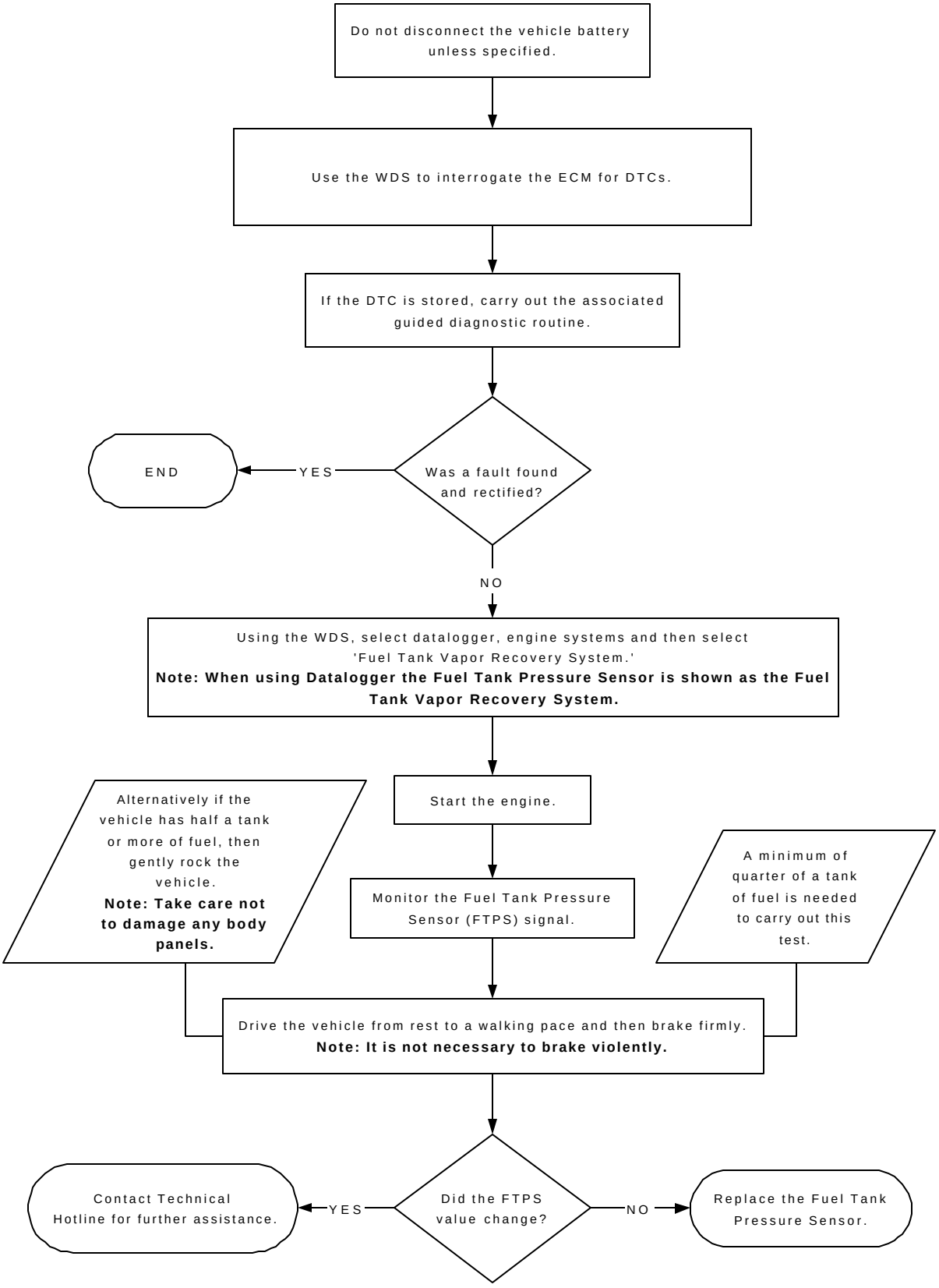
Leak Check Flowchart P-1.e
P0447/P0448 Evaporative CCV



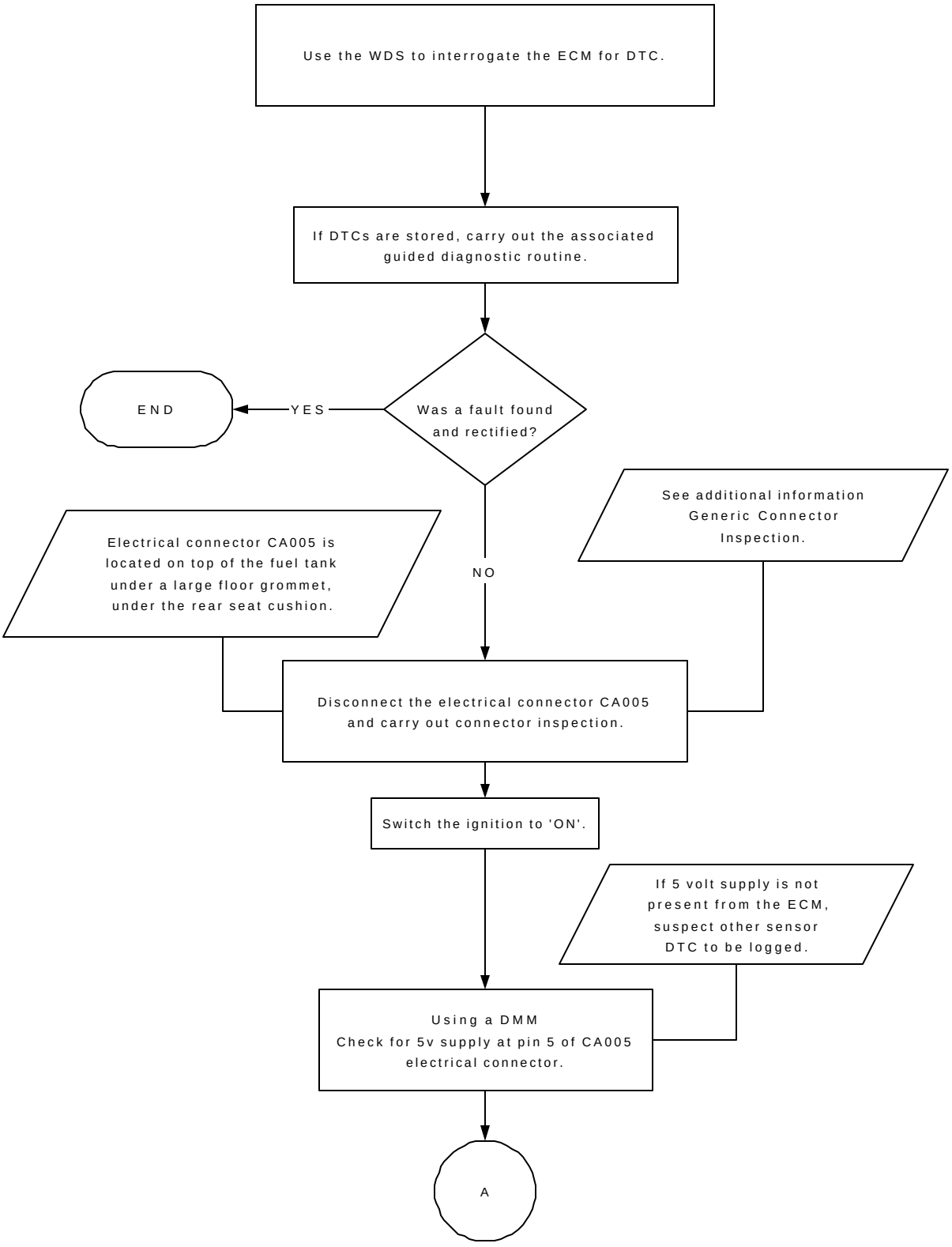

A
Check 10 Amp fuse No. 36 at the Power Distribution Fuse Box (PDFB).
Was the fuse blown?
NO
Using a DMM, check for battery voltage at pin 1 of the CCV fuel tank harness electrical connector FT005.
YES
Carry out a Generic Harness check between electrical connector FT005 pin 1 and fuse 36.
NO
Is there battery voltage at pin 1?
Was a fault found and rectified?
YES
YES
Replace fuse No. 36 10 amp.
NO
Contact Technical Hotline for further assistance.
END
B

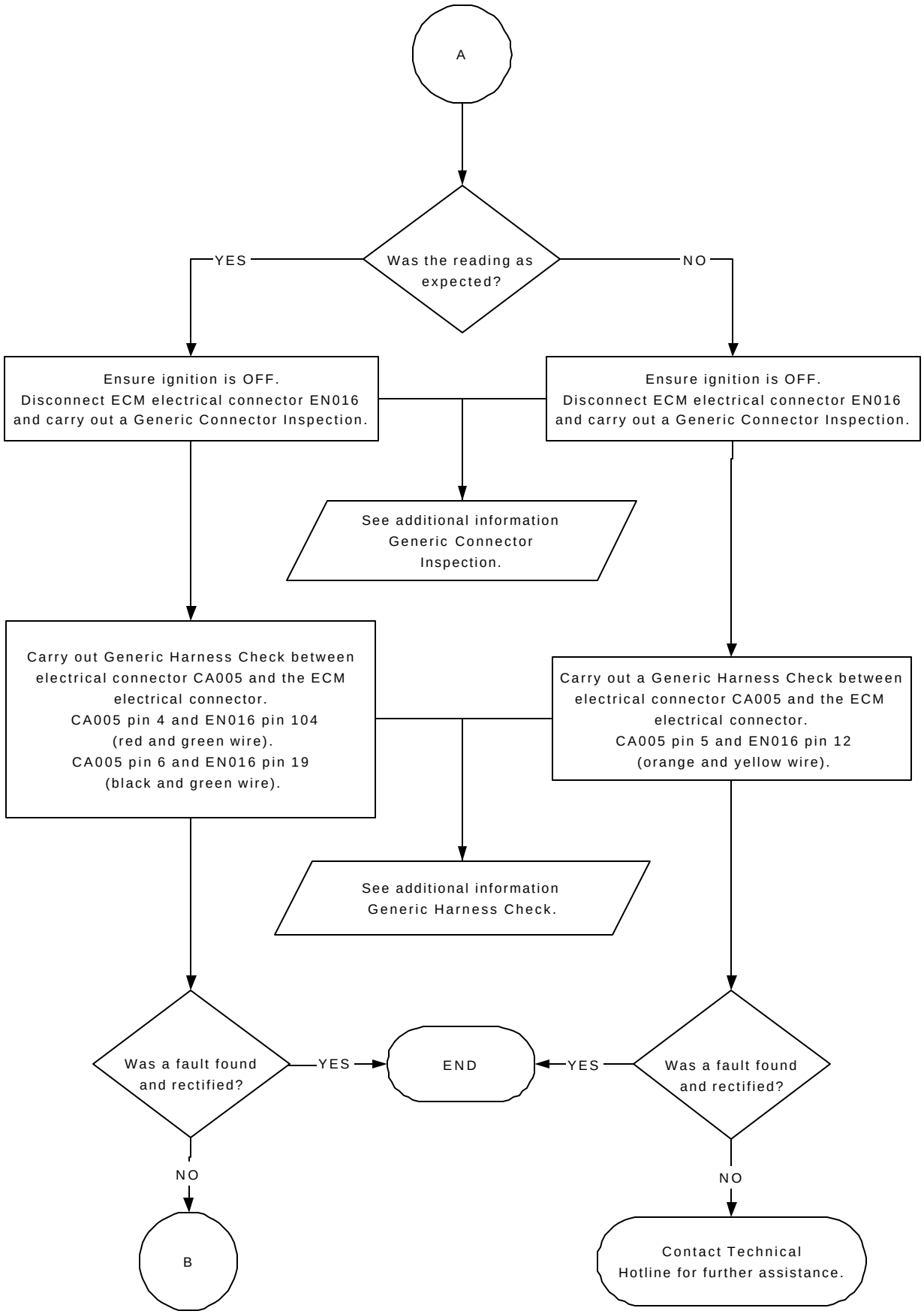

B
Ensure the ignition is OFF.
See additional information
Generic Connector
Inspection.
Disconnect the ECM electrical
connector EN016
and carry out a Generic Connector
Inspection.
See additional information
Generic Harness check.
Carry out a Generic Harness Check between the
CCV electrical connector FT005 pin 2 and the
ECM connector EN016 pin 67.
Was a fault found
and rectified?
YES
END
NO
Contact Technical
Hotline for further assistance.

Leak Check Flowchart P-1.f
P0450 Fuel Tank Pressure Sensor Malfunction



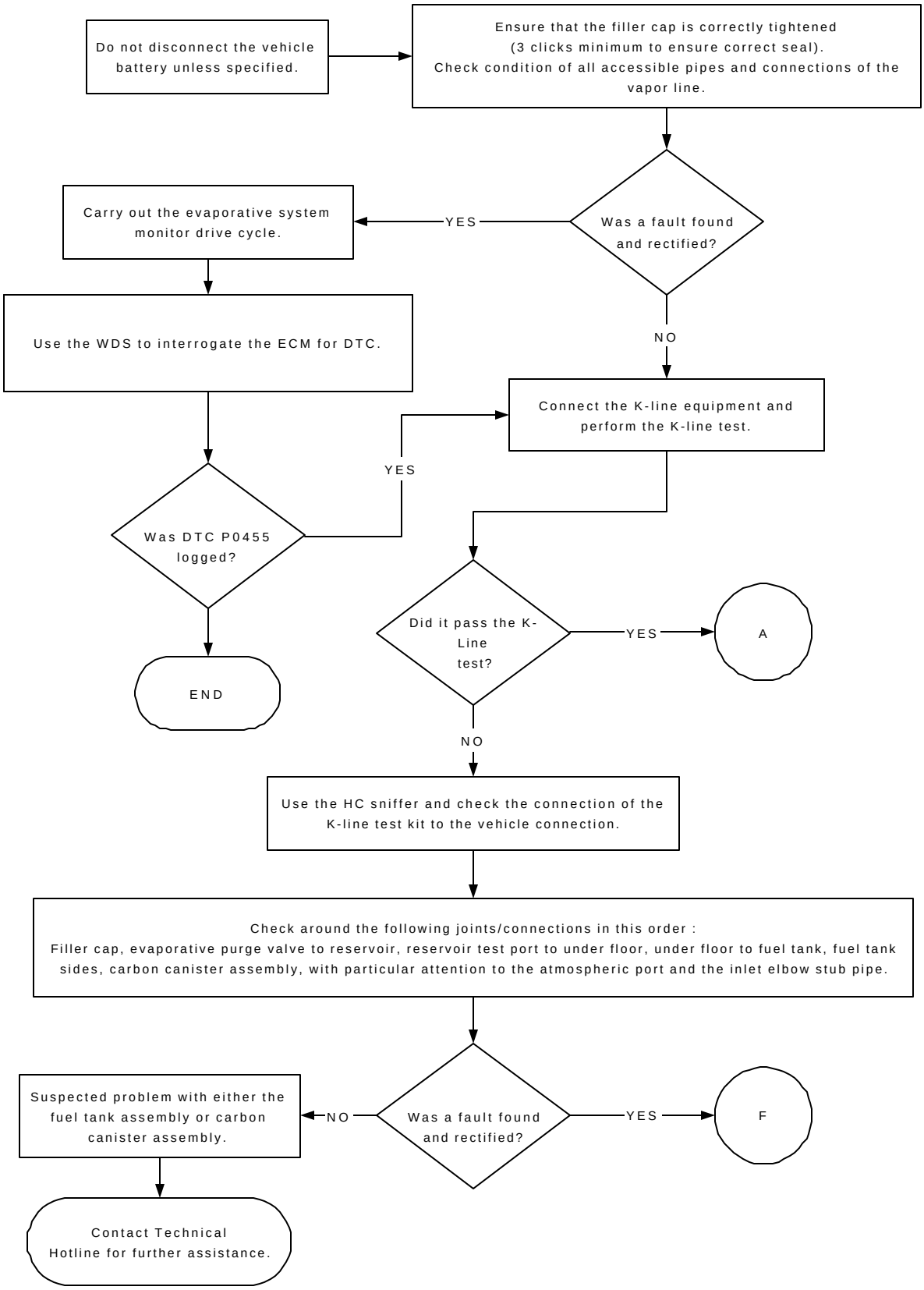
Leak Check Flowchart P-1.g
P0452/P0453 Fuel Tank Pressure Sensor

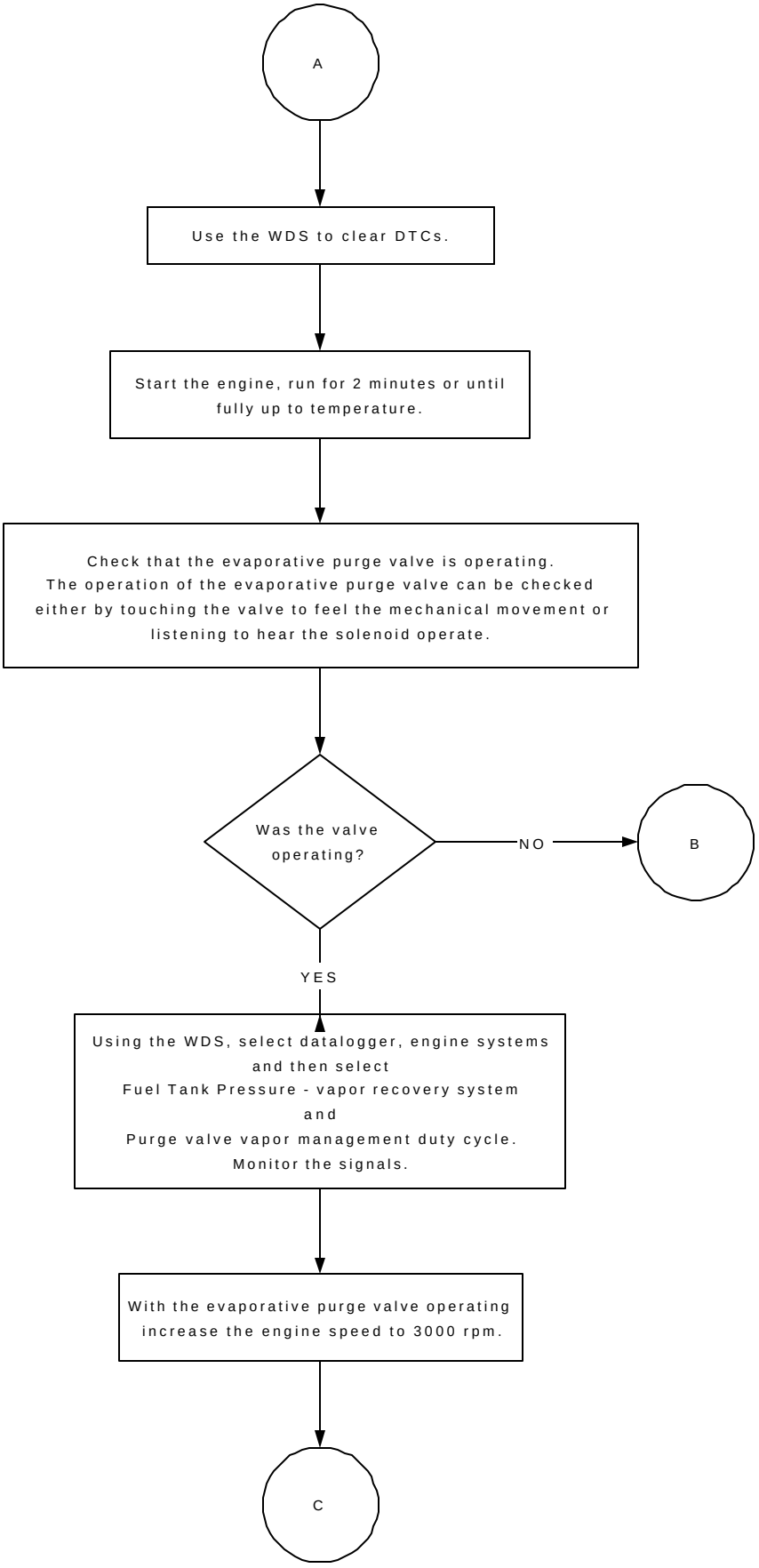


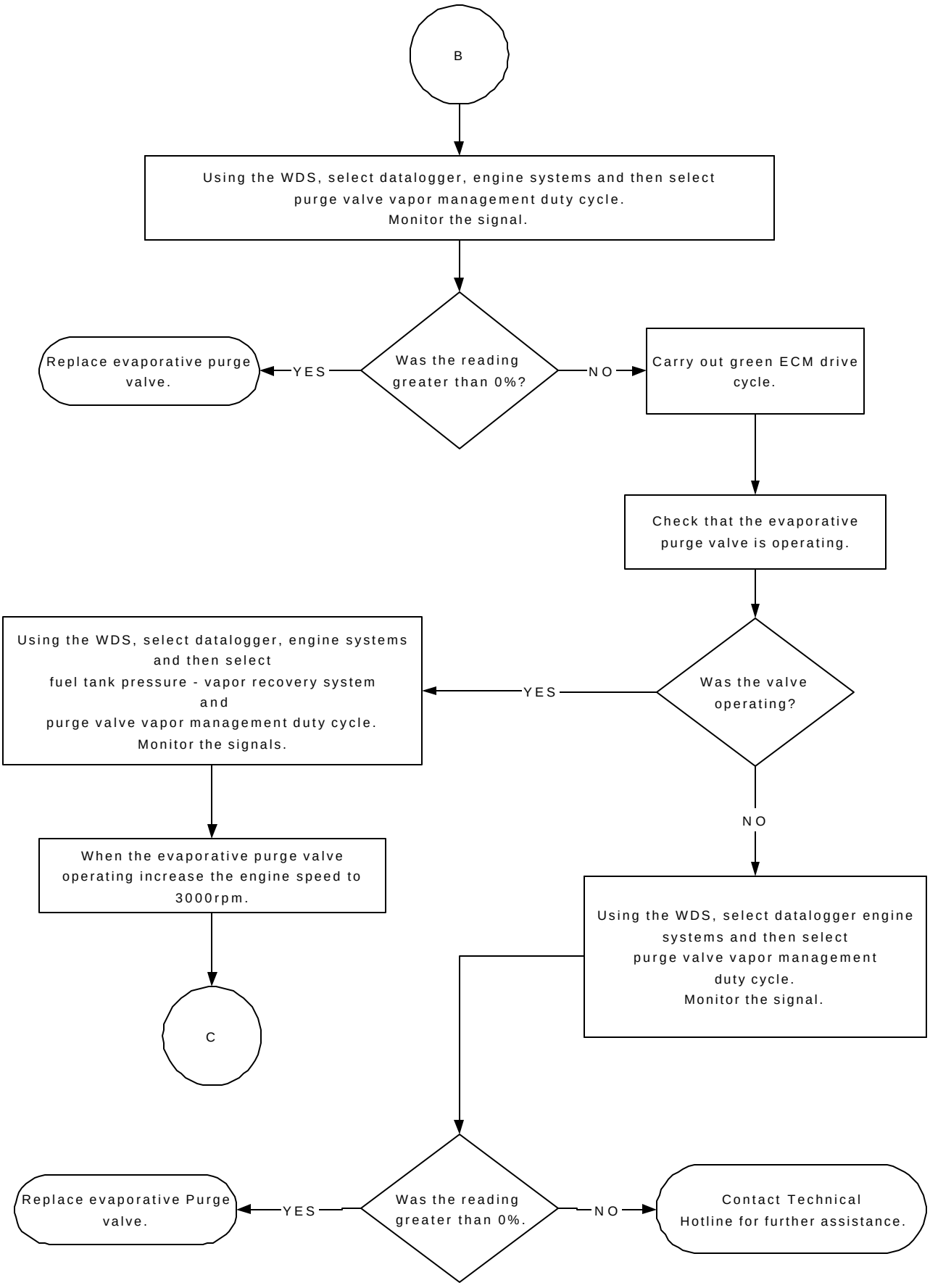

A
Was the reading as expected?
YES
NO
Ensure ignition is OFF.
Disconnect ECM electrical connector EN016 and carry out a Generic Connector Inspection.
Ensure ignition is OFF.
Disconnect ECM electrical connector EN016 and carry out a Generic Connector Inspection.
See additional information Generic Connector Inspection.
Carry out Generic Harness Check between electrical connector CA005 and the ECM electrical connector.
CA005 pin 4 and EN016 pin 104 (red and green wire).
CA005 pin 6 and EN016 pin 19 (black and green wire).
Carry out a Generic Harness Check between electrical connector CA005 and the ECM electrical connector.
CA005 pin 5 and EN016 pin 12 (orange and yellow wire).
See additional information Generic Harness Check.
Was a fault found and rectified?
YES
END
YES
Was a fault found and rectified?
NO
NO
B
Contact Technical Hotline for further assistance.

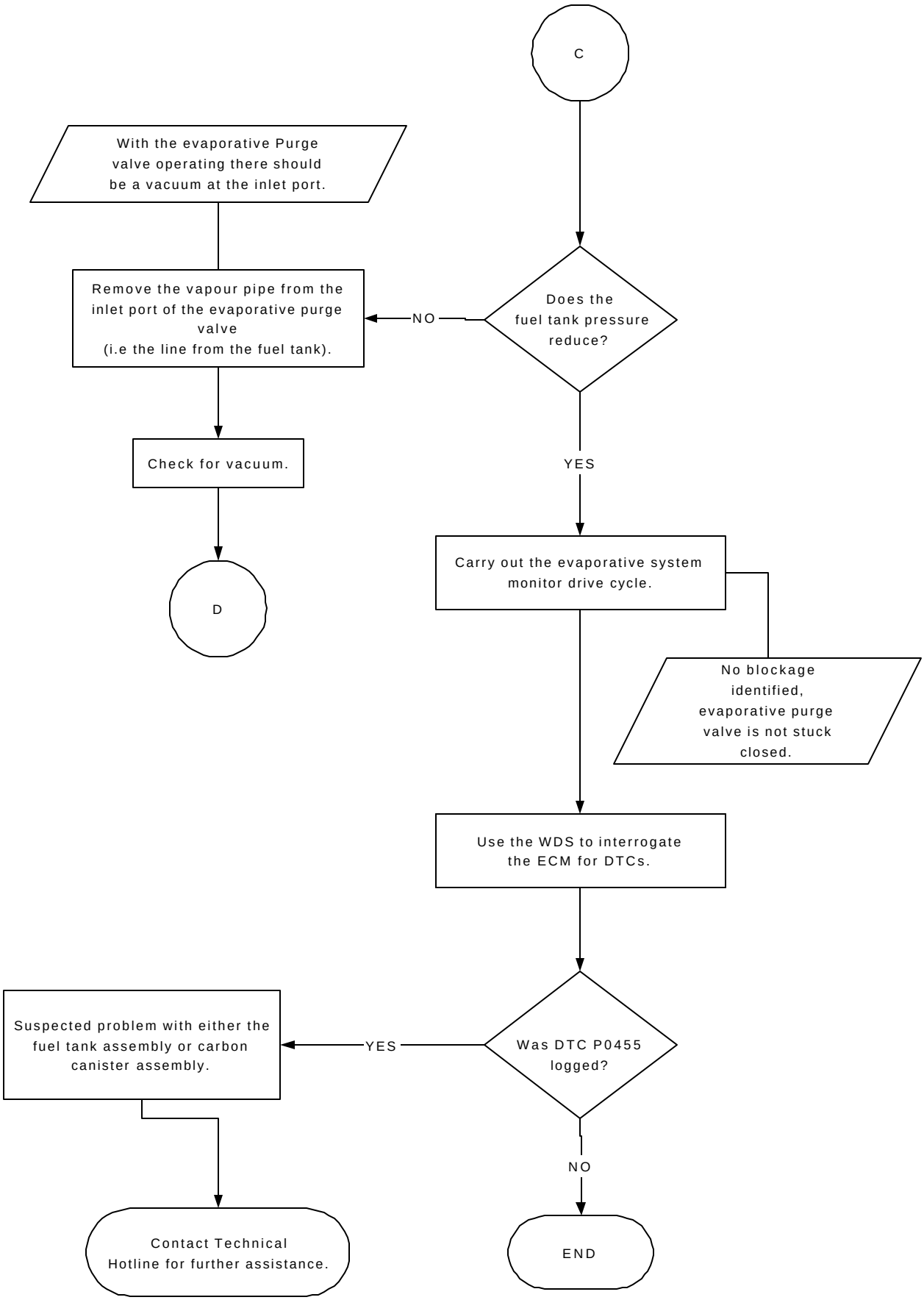

B
Remove the fuel tank to gain access to the Fuel Tank Pressure Sensor (FTPS) electrical connector.
Carryout a Generic Connector Inspection on the FTPS electrical connector FT001.
See additional information Generic Connector Inspection.
See additional information Generic Harness Check.
Carry out harness check between CA005 electrical connector and the FT001 electrical connector.
CA005 pin 4 and FT001 pin 2 (red and green wire).
CA005 pin 5 and FT001 pin 1 (orange and yellow wire).
CA005 pin 6 and FT001 pin 3 (lack and green wire).
Was a fault found and rectified?
YES
END
NO
Replace the Fuel Tank Pressure Sensor.

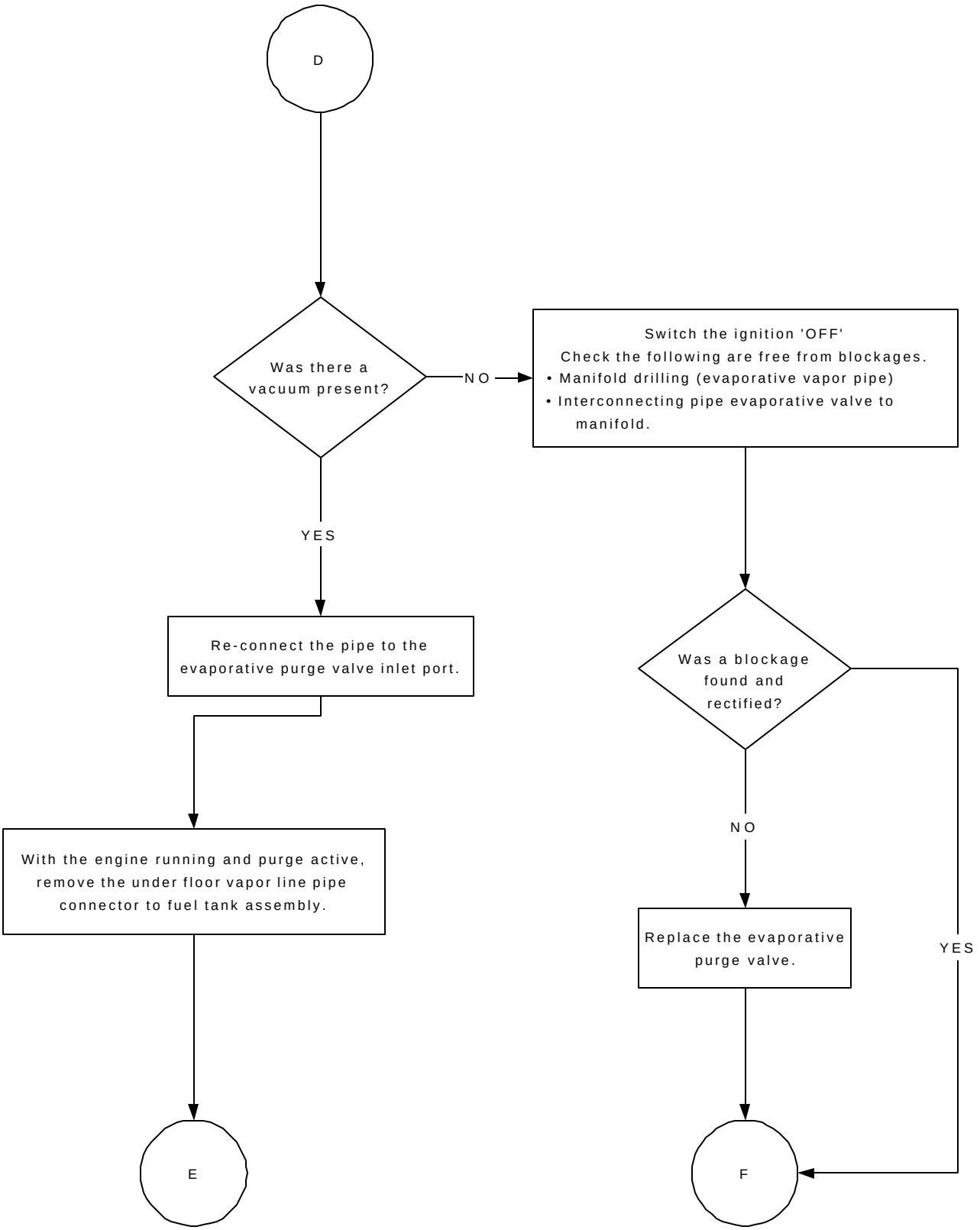
Flow Chart P-1.h
P0455 Gross Leak

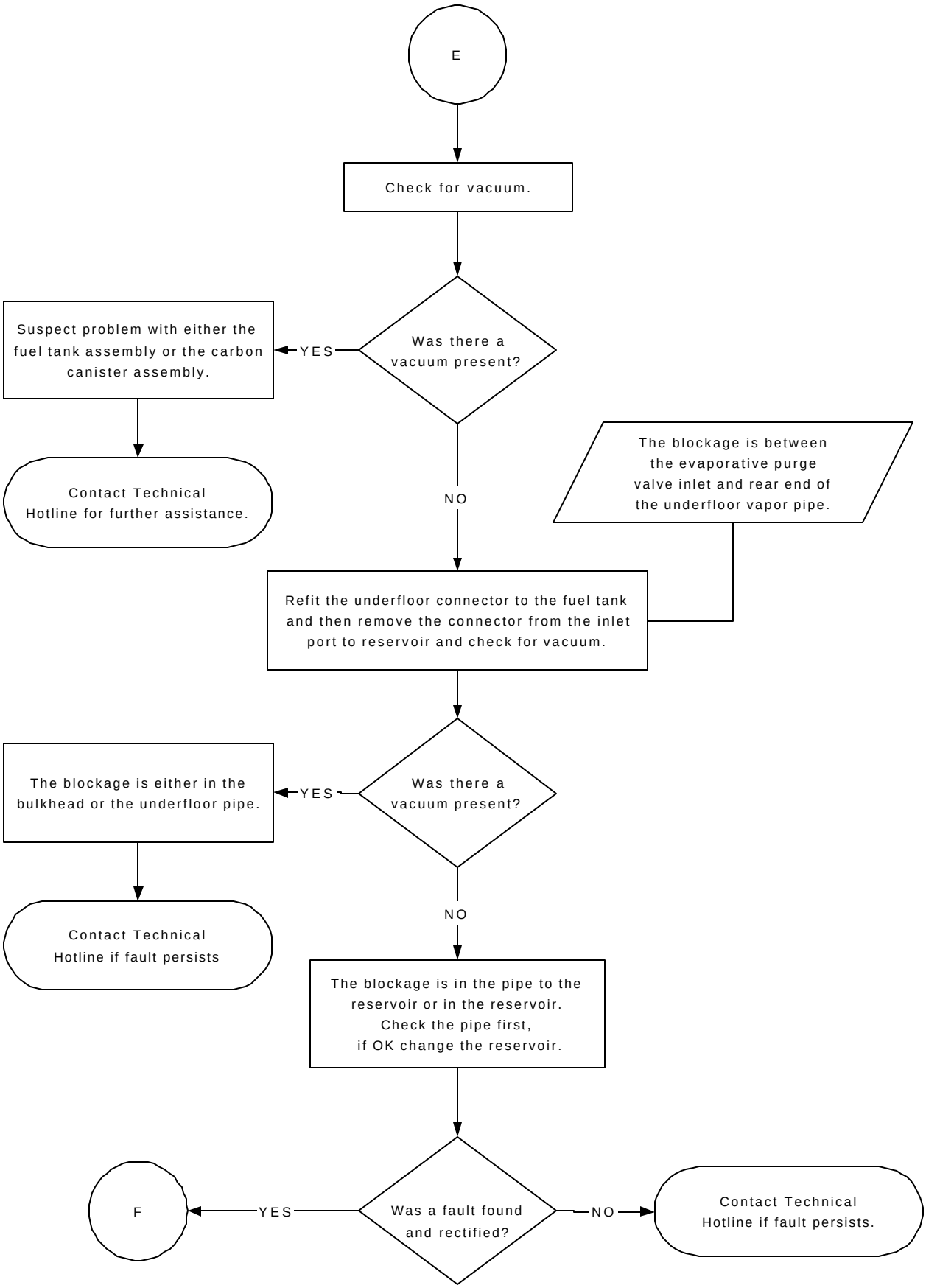


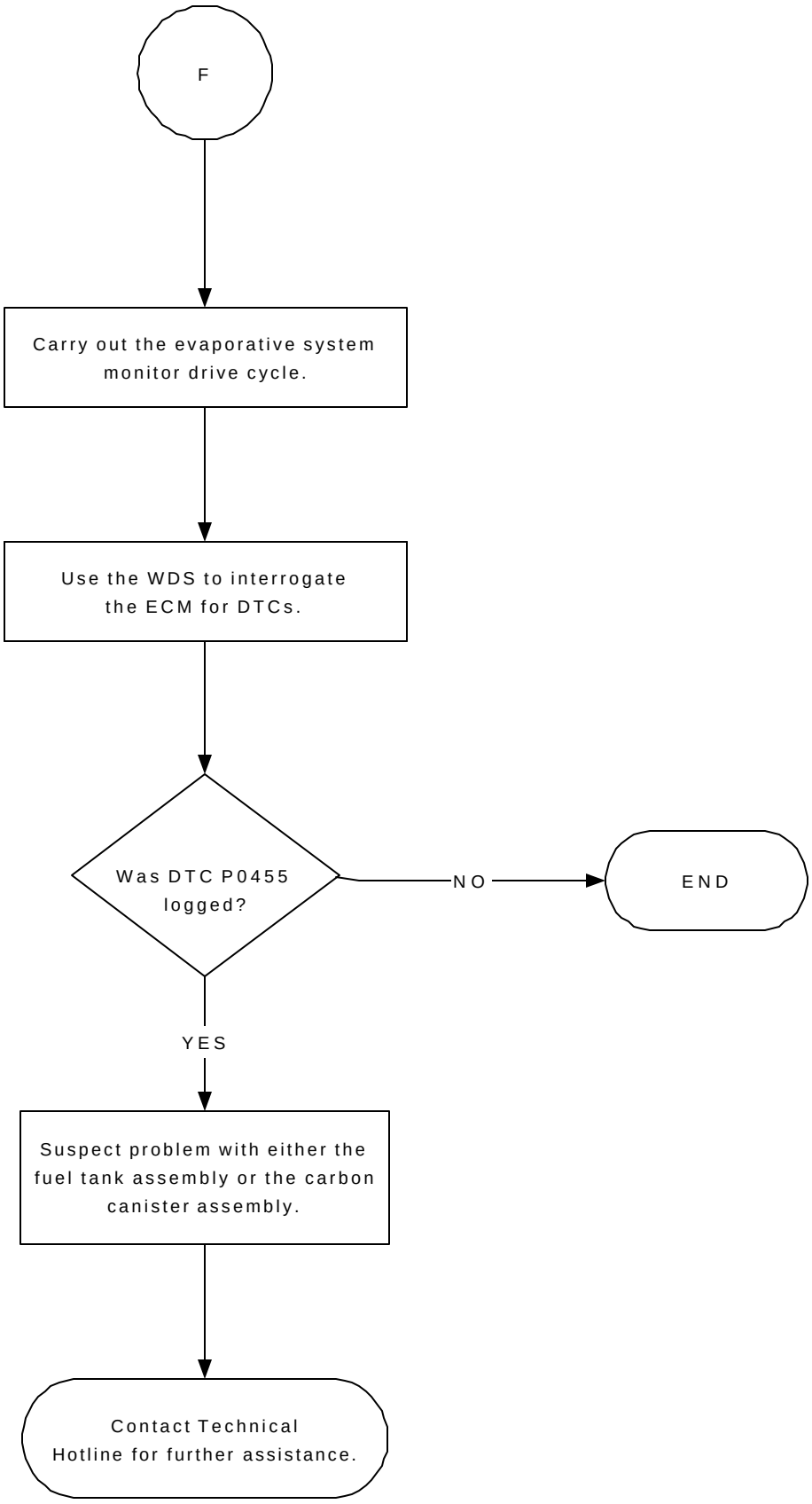

A
Use the WDS to clear DTCs.
Start the engine, run for 2 minutes or until fully up to temperature.
Check that the evaporative purge valve is operating. The operation of the evaporative purge valve can be checked either by touching the valve to feel the mechanical movement or listening to hear the solenoid operate.
Was the valve operating?
NO
B
YES
Using the WDS, select datalogger, engine systems and then select Fuel Tank Pressure - vapor recovery system and Purge valve vapor management duty cycle. Monitor the signals.
With the evaporative purge valve operating increase the engine speed to 3000 rpm.
C


B
Using the WDS, select datalogger, engine systems and then select purge valve vapor management duty cycle. Monitor the signal.
Was the reading greater than 0%?
YES
Replace evaporative purge valve.
NO
Carry out green ECM drive cycle.
Check that the evaporative purge valve is operating.
Was the valve operating?
YES
Using the WDS, select datalogger, engine systems and then select fuel tank pressure - vapor recovery system and purge valve vapor management duty cycle. Monitor the signals.
When the evaporative purge valve operating increase the engine speed to 3000rpm.
C
NO
Using the WDS, select datalogger engine systems and then select purge valve vapor management duty cycle. Monitor the signal.
Was the reading greater than 0%.
YES
Replace evaporative Purge valve.
NO
Contact Technical Hotline for further assistance.

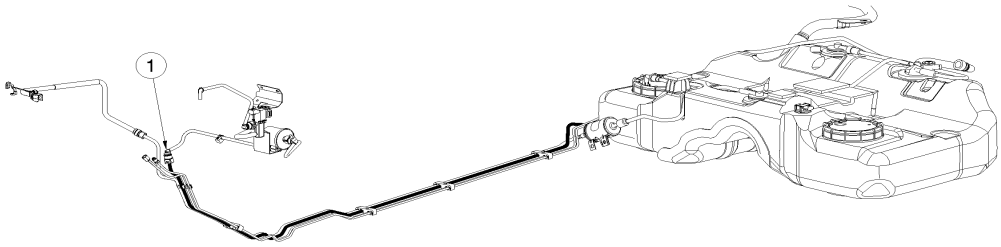

C
With the evaporative Purge valve operating there should be a vacuum at the inlet port.
Remove the vapour pipe from the inlet port of the evaporative purge valve (i.e the line from the fuel tank).
NO
Does the fuel tank pressure reduce?
Check for vacuum.
YES
D
Carry out the evaporative system monitor drive cycle.
No blockage identified, evaporative purge valve is not stuck closed.
Use the WDS to interrogate the ECM for DTCs.
Suspected problem with either the fuel tank assembly or carbon canister assembly.
YES
Was DTC P0455 logged?
NO
Contact Technical Hotline for further assistance.
END

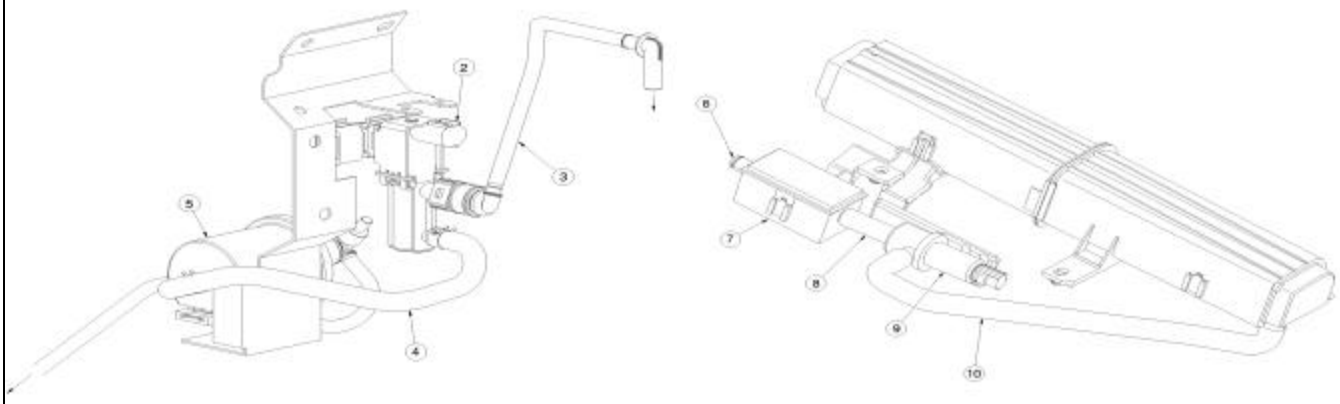

D
Was there a vacuum present?
NO
Switch the ignition 'OFF'
Check the following are free from blockages.
• Manifold drilling (evaporative vapor pipe)
• Interconnecting pipe evaporative valve to manifold.
YES
Re-connect the pipe to the evaporative purge valve inlet port.
Was a blockage found and rectified?
NO
YES
With the engine running and purge active, remove the under floor vapor line pipe connector to fuel tank assembly.
Replace the evaporative purge valve.
E
F


E
Check for vacuum.
Was there a vacuum present?
YES
Suspect problem with either the fuel tank assembly or the carbon canister assembly.
Contact Technical Hotline for further assistance.
NO
The blockage is between the evaporative purge valve inlet and rear end of the underfloor vapor pipe.
Refit the underfloor connector to the fuel tank and then remove the connector from the inlet port to reservoir and check for vacuum.
Was there a vacuum present?
YES
The blockage is either in the bulkhead or the underfloor pipe.
Contact Technical Hotline if fault persists
NO
The blockage is in the pipe to the reservoir or in the reservoir. Check the pipe first, if OK change the reservoir.
Was a fault found and rectified?
YES
F
NO
Contact Technical Hotline if fault persists.


F
Carry out the evaporative system monitor drive cycle.
Use the WDS to interrogate the ECM for DTCs.
Was DTC P0455 logged?
NO
END
YES
Suspect problem with either the fuel tank assembly or the carbon canister assembly.
Contact Technical Hotline for further assistance.

Evaporative System Diagram			
1	Bulk head to under floor connection.	6	Atmospheric port.
2	Evaporative purge valve.	7	Filter.
3	Evaporative purge valve outlet pipe.	8	Interconnecting pipe.
4	Evaporative purge valve inlet pipe from reservoir.	9	Canister close valve. (CCV)
5	Reservoir chamber.	10	Carbon can outlet pipe to CCV.





DRIVE CYCLE FOR 'GREEN' ECM

To Enable ECM to Relearn Fuel Metering Adaptations

This procedure should be performed whenever the vehicle battery has been disconnected.
Due to component tolerance and wear during the normal running of a vehicle, fuel metering and air requirements for an engine will vary over time. The ECM has the ability to adjust for this variation by learning the level of compensation that is required. These compensation values are referred to as adaptations.
If the vehicle battery is disconnected, all adaptations held within the ECM will be lost (i.e. set to zero); the ECM is then referred to as 'Green'. To enable the engine to run correctly and for the evaporative purge system to function, the ECM must 'relearn' these adaptations. There a four areas or sites that need to be relearned.
This guide is intended to assist with the process of re-adapting the ECM without the need for any additional equipment, e.g. WDS unit.

Green ECM drive cycle.

1. Idle vehicle until fully warm. Coolant temperature gauge just below mid point (48/50%).
2. Leave idling for a further 3 minutes minimum. (Site 1)
3. Drive the vehicle, with the air conditioning off, on level road using a constant throttle (use speed control if fitted) for at least 60 seconds, in the following gears, at the stated engine speeds for sites 1,2,3 and 4 in table 1.
4. Return to rest and leave the vehicle idling for 60 seconds.

Table 1

Site	Engine	Transmission	Gear	Engine speed (RPM)
1	3.0L	Manual	N	Idle
	3.0L	Auto	P/N	Idle
	2.5L	Manual	N	Idle
	2.5L	Auto	P/N	Idle
2	3.0L	Manual	3rd	2000
	3.0L	Auto	3rd	1750
	2.5L	Manual	3rd	2000
	2.5L	Auto	3rd	1750
3	3.0L	Manual	4th	2250
	3.0L	Auto	4th	2000
	2.5L	Manual	4th	2250
	2.5L	Auto	4th	2250
4	3.0L	Manual	4th	2750
	3.0L	Auto	4th	2500
	2.5L	Manual	4th	2750
	2.5L	Auto	4th	2750

If sufficient adaptations have occurred, the evaporative purge valve should now be operating. This can be verified manually by either touching or listening to the valve. It is possible to feel the evaporative purge valve switching by touching the valve

WARNING: THE EVAPORATIVE PURGE VALVE IS LIKELY TO BE HOT.

To listen to the valve, for possible switching, use a stethoscope or other suitable instrument (switching frequency is 10 Hz).

Evaporative System Monitor Drive Cycle for X-TYPE
(Using Worldwide Diagnostic System – WDS)

Note: If WDS is not available, refer to the 'Drive Cycle' section within the 'Powertrain DTC summary' in JTIS.

1. Ensure the fuel filler cap is correctly fitted (minimum 3 clicks).
2. Use the WDS to clear DTCs from the ECM (even if no codes are present - this will reset the Test Identifiers (TIDs).
3. Fuel level greater than 30% and less than 85%.
4. Start and drive vehicle for a minimum of 2 minutes, ensuring vehicle is fully warm (temp gauge just below mid point).
5. Ensure the evaporative purge valve is operating by using datalogger within WDS. Select Engine Systems and then 'Purge vapor management valve – duty cycle'.
6. If purge is not active, perform 'Drive Cycle for Green ECM'.
7. Drive vehicle to road where drive cycle is to be performed.
8. Bring vehicle to rest, switch off ignition.
9. Leave the ignition off for 30 seconds, then restart engine.
10. Accelerate briskly up to 50 mph (80km/h) ensuring that engine speed reaches at least 3500 RPM for a minimum of 5 seconds.

Note: Ensure road test is conducted on a suitable road with appropriate speed limit.

0.040 in. Test

11. Avoiding high engine loads, drive the vehicle steadily between 40 mph / 64 km/h and 60 mph / 97 km/h.
    Use datalogger on WDS to monitor the following signals; purge vapor management valve – duty cycle, canister close valve – vapor recovery system and the fuel tank pressure – vapor recovery system, this will give an indication when the test is active, (see Fig. 1 of 'Evaporative System Diagnostic - Summary of Operation' for test profile).

    Dependant upon the level of vapor concentration, it may take up to 30 minutes before the test will initialize (vapor concentration cannot be measured using the WDS). When the test has initialized (CCV closed), it will take up to 90 seconds to complete. Avoid excessive fuel movement whilst the test is active.

0.020 in. Test

12. Continue driving the vehicle steadily between 40 mph / 64 km/h and 60 mph / 97 km/h avoiding high engine loads for a further 10 Minutes.
13. Avoiding excessive fuel movement, gently bring the vehicle to rest (coast to a stop). Let idle for 2 minutes.

Note: Ensure the road is clear when carrying out step 13 of this procedure.

14. Again, use datalogger to monitor the following signals; purge vapor management valve – duty cycle, canister close valve – vapor recovery system and the fuel tank pressure – vapor recovery system, this will give an indication when the test is active, (see Fig. 1 of 'Evaporative System Diagnostic - Summary of Operation' for test profile). When the test has initialized (CCV will be closed), it will take up to 90 seconds to complete.

If the 0.020 in. test has not executed it is likely that the vapor concentration in the purge system is too great, in these circumstances, perform the following:

15. Drive vehicle steadily for a further 30 minutes avoiding unnecessary excessive fuel movement.
16. Repeat step 13.
17. If 0.020 in. test fails to initialize a second time repeat above procedure from step 7.
18. Check for DTCs.

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 knocked 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 replacing 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 X-TYPE electrical guide (publication part number – S 2002 X-TYPE Issue 2) will show all other sources sharing that harness i.e. splices and sensors. This electrical guide is also 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 – 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 D/C; connect the DMM red probe to the suspect pin of the circuit and the DDM 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.

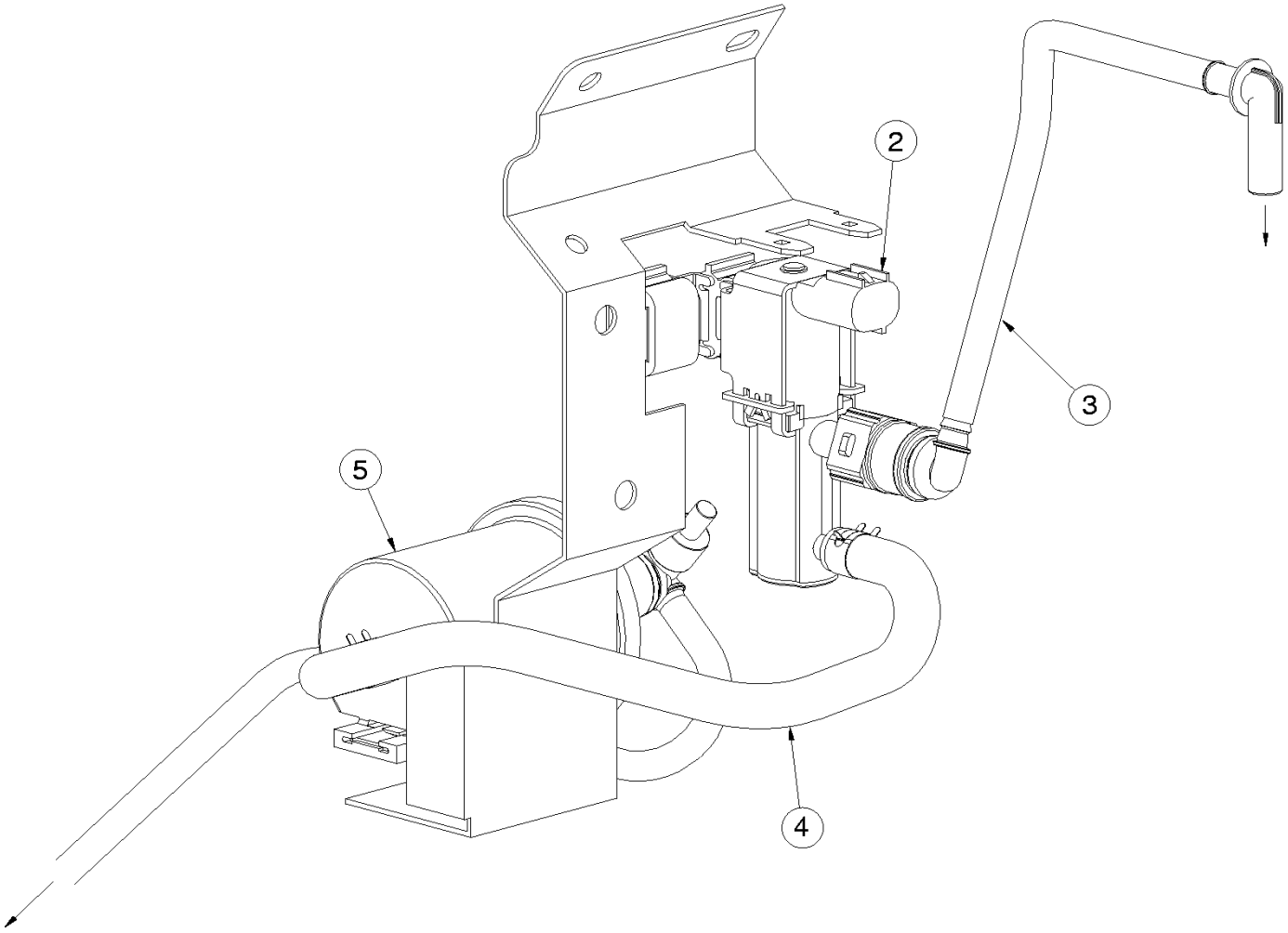
Always test the circuit with the ignition 'ON' and 'OFF' when trying to identify this fault condition.

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 low short circuit and investigate harness for damage.

Always refer to the Technical Hotline if problems are encountered.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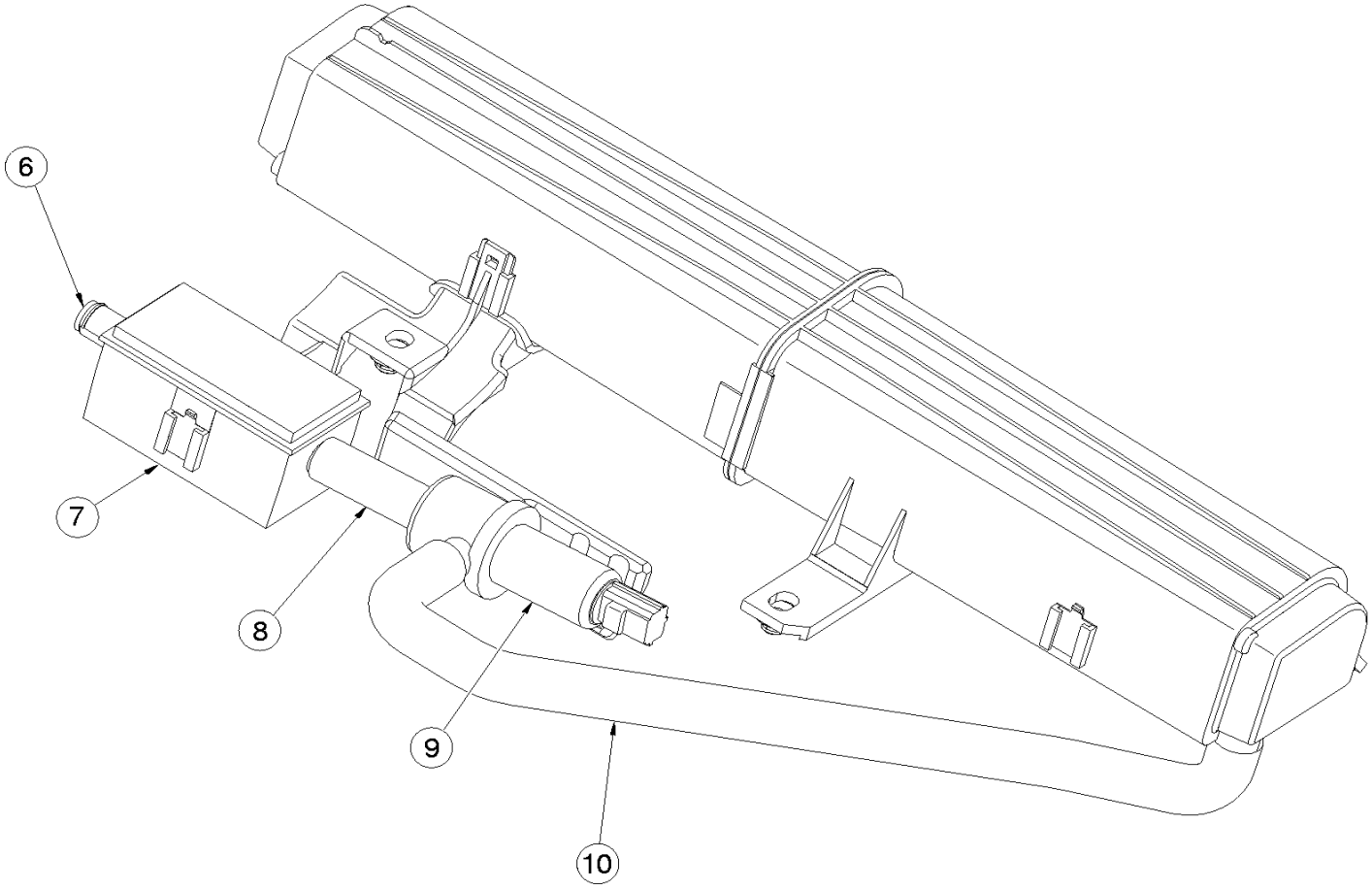
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