

ATTENTION:

GENERAL MANAGER ☐

PARTS MANAGER ☐

CLAIMS PERSONNEL ☐

SERVICE MANAGER ☐

IMPORTANT - All
Service Personnel
Should Read and
Initial in the boxes
provided, right.

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QUALITY DRIVEN® SERVICE

SERVICE BULLETIN

APPLICABILITY: 2023-24MY Forester
2020-22MY Legacy Outback 2.5L
2017-22MY Impreza
2018-22MY Crosstrek

NUMBER: 09-120-24

DATE: 07/08/24

SUBJECT: DTCs: P0016, P0017, P0018, P0019 & P0087

INTRODUCTION:

This bulletin announces availability of new reprogramming files for the Engine Control Module (ECM) developed to remedy the following DTCs:

- **P0016:** Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A
- **P0017:** Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B
- **P0018:** Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor A
- **P0019:** Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor B
- **P0087:** Fuel Rail/System Pressure – Too Low Bank 1

These files contain enhanced logic for the self-diagnosis program of the ECM and to optimize stabilization of fuel pressure. If any of the DTCs listed above are found to be stored in the ECM, follow the procedures outlined below.

PRODUCT CHANGE INFORMATION:

The production change information is currently TBD.

CAUTION: VEHICLE SERVICING PERFORMED BY UNTRAINED PERSONS COULD RESULT IN SERIOUS INJURY TO THOSE PERSONS OR TO OTHERS.

Subaru Service Bulletins are intended for use by professional technicians ONLY. They are written to inform those technicians of conditions that may occur in some vehicles, or to provide information that could assist in the proper servicing of the vehicle. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do the job correctly and safely. If a condition is described, DO NOT assume that this Service Bulletin applies to your vehicle, or that your vehicle will have that condition.

**Subaru of America, Inc. is
ISO 14001 Compliant**

ISO 14001 is the international standard for excellence in Environmental Management Systems. Please recycle or dispose of automotive products in a manner that is friendly to our environment and in accordance with all local, state and federal laws and regulations.

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PAK FILE AVAILABILITY:

FORESTER					
MY	Model	File Description	Old ECM Part #	Decryption Keyword	New CID #
19	Forester	22765AL826.pak	22765AL820 22765AL821 22765AL822 22765AL823 22765AL824 22765AL825 22765AL826	A44B186E	XE1FB00A
20	Forester	22765AN466.pak	22765AN460 22765AN461 22765AN462 22765AN463 22765AN464 22765AN465	585CB1E4	XE1M700a00G
21	Forester	22765AR675.pak	22765AR670 22765AR671 22765AR672 22765AR673 22765AR674	67CEE2A	XE1P800a00G
22	Forester	22765AR604.pak	22765AR600 22765AR601 22765AR602 22765AR603	E1A8EC6C	XE1R600k00G
22	Forester	22765AR554.pak	22765AR550 22765AR551 22765AR552 22765AR553	B4E98F7C	XE1R600a00G
22	Forester	22765AR614.pak	22765AR610 22765AR611 22765AR612 22765AR613	73EC24BE	XE1R600z00G
23	Forester	22765AS922.pak	22765AS920 22765AS921	C836CC9E	XE1W400k00G
23	Forester	22765AS932.pak	22765AS930 22765AS931	2A612513	XE1W400z00G
23	Forester	22765AV271.pak	22765AV270	72189CAD	XE1W400p00G
23	Forester	22765AV281.pak	22765AV280	BDD321F8	XE1W400s00G

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LEGACY & OUTBACK					
MY	Model	File Description	Old ECM Part #	Decryption Keyword	New CID #
20	Legacy	22765AN20G.pk2	22765AN20A 22765AN20B 22765AN20C 22765AN20D 22765AN20E 22765AN20F	B2057C2C	XE1J500m00G
20	Outback	22765AP54G.pk2	22765AP54A 22765AP54B 22765AP54C 22765AP54D 22765AP54E 22765AP54F	CC08FB94	XE1J500n00G
21	Legacy	22765AR18E.pk2	22765AR18A 22765AR18B 22765AR18C 22765AR18D	27AE7CA8	XE1P700m00G
21	Outback	22765AR19E.pk2	22765AR19A 22765AR19B 22765AR19C 22765AR19D	CCC65A5A	XE1P700n00G
22	Legacy	22765AS22E.pk2	22765AS22A 22765AS22B 22765AS22C 22765AS22D	134A759D	XE1Q300m00G
22	Outback	22765AS23E.pk2	22765AS23A 22765AS23B 22765AS23C 22765AS23D	6105B0F3	XE1Q300m00G

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2017 IMPREZA						
MY	Model	Specification	File Description	Old ECM Part #	Decryption Keyword	New CID #
17	Impreza	2.0L NA 5MT AGS	22765AU28C.pak	22765AJ59A 22765AJ59B 22765AJ59C 22765AJ59D 22765AJ59E 22765AJ59F 22765AJ59G 22765AJ59H 22765AJ59J 22765AJ59K 22765AU28A 22765AU28B	4B2C5F3C	XH3J2J1C
17	Impreza	2.0L NA CVT AGS	22765AU29C.pak	22765AJ60A 22765AJ60B 22765AJ60C 22765AJ60D 22765AJ60E 22765AJ60F 22765AJ60G 22765AJ60H 22765AJ60J 22765AJ60K 22765AU29A 22765AU29B	C2BF1E71	XH3J2J1D
17	Impreza	2.0L NA 5MT	22765AU30C.pak	22765AK61A 22765AK61B 22765AK61C 22765AK61D 22765AK61E 22765AK61F 22765AK61G 22765AK61H 22765AK61J 22765AK61K 22765AU30A 22765AU30B	B5807CBD	XH3J2J1A
17	Impreza	2.0L NA CVT	22765AU31C.pak	22765AL71A 22765AL71B 22765AL71C 22765AL71D 22765AL71E 22765AL71F 22765AL71G 22765AL71H 22765AL71J 22765AL71K 22765AU31A 22765AU31B	81CC4B80	XH3J2J1B

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2018 IMPREZA						
MY	Model	Specification	File Description	Old ECM Part #	Decryption Keyword	New CID #
18	Impreza	2.0L NA CVT AGS	22765AV39B.pak	22765AM28A 22765AM28B 22765AM28C 22765AM28D 22765AM28E 22765AM28F 22765AM28G 22765AM28H 22765AM28J 22765AV39A	3947027B	XH3JF01D
18	Impreza	2.0L NA 6MT	22765AV890.pak	22765AJ610 22765AJ611 22765AJ612 22765AJ613 22765AJ614 22765AJ615 22765AJ616 22765AJ617 22765AJ618 22765AJ619	265EB864	XH3J2J1E
18	Impreza	2.0L NA CVT	22765AV900.pak	22765AJ620 22765AJ621 22765AJ622 22765AJ623 22765AJ624 22765AJ625 22765AJ626 22765AJ627 22765AJ628 22765AJ629	73E92267	XH3J2J1F
18	Impreza	2.0L NA 5MT AGS	22765AJ59K.pak	22765AM64A 22765AM64B 22765AM64C 22765AM64D 22765AM64E 22765AM64F 22765AM64G 22765AM64H	9B767F3E	9B767F3E
18	Impreza	2.0L NA 5MT	22765AK61K.pak	22765AM65A 22765AM65B 22765AM65C 22765AM65D 22765AM65E 22765AM65F 22765AM65G 22765AM65H	9DB28E88	XH3J2C1A
18	Impreza	2.0L NA CVT AGS	22765AV39B.pak	22765AM66A 22765AM66B 22765AM66C 22765AM66D 22765AM66E 22765AM66F 22765AM66G 22765AM66H	3947027B	XH3JF01D

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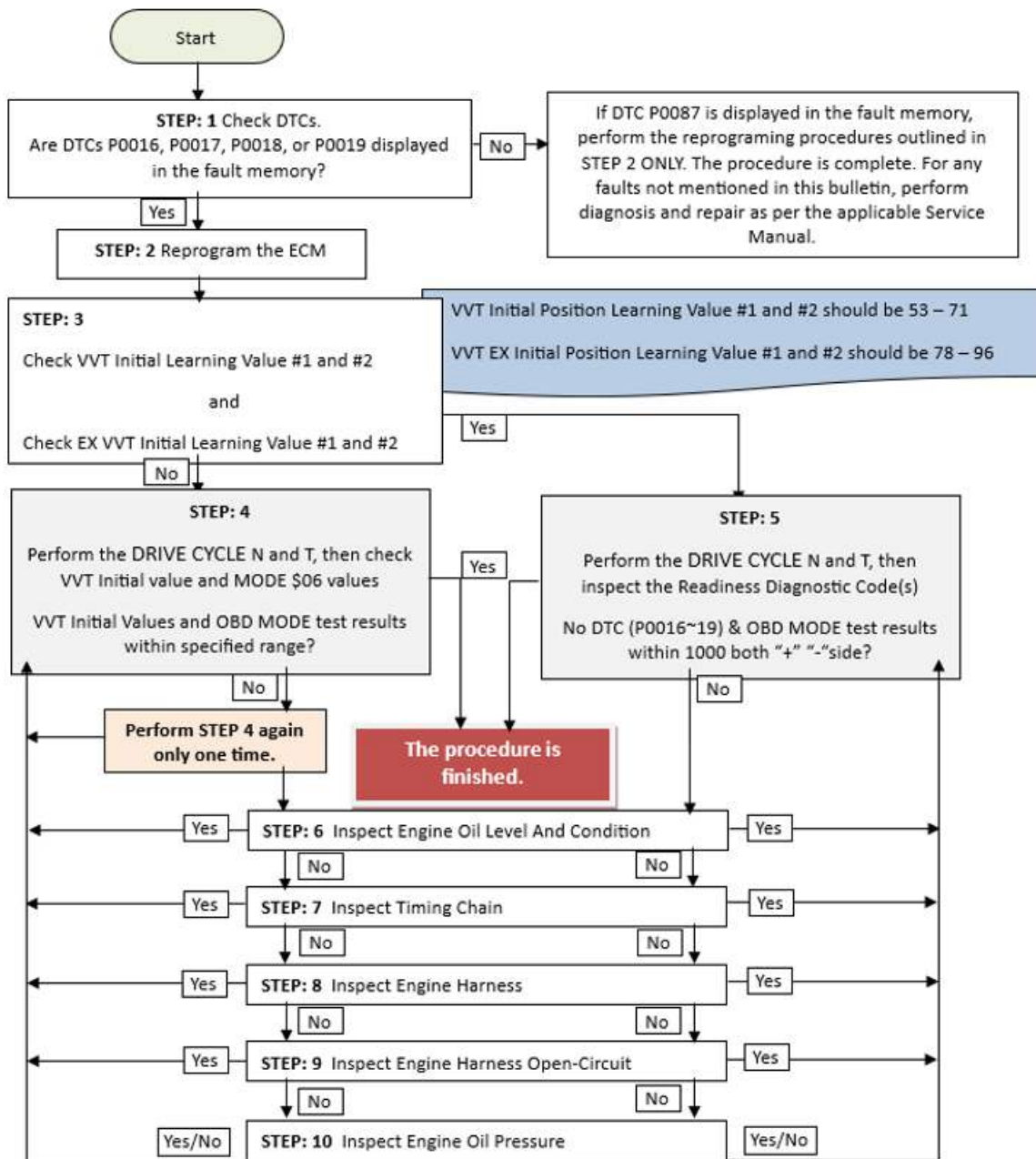
2019-22 IMPREZA						
MY	Model	Specification	File Description	Old ECM Part #	Decryption Keyword	New CID #
19	Impreza	2.0L NA CVT	22765AM67J.pak	22765AM67A 22765AM67B 22765AM67C 22765AM67D 22765AM67E 22765AM67F 22765AM67G 22765AM67H	FDF3FD0B	XH3NB01B
20	Impreza	2.0L NA 5MT AGS	22765AP11E.pak	22765AP11A 22765AP11B 22765AP11C 22765AP11D	F5C87F48	XE1M600C00G
20	Impreza	2.0L NA 5MT	22765AP12E.pak	22765AP12A 22765AP12B 22765AP12C 22765AP12D	E469A8DB	XE1M600A00G
20	Impreza	2.0L NA CVT AGS	22765AP13E.pak	22765AP13A 22765AP13B 22765AP13C 22765AP13D	55C01662	XE1M600D00G
20	Impreza	2.0L NA CVT	22765AP14E.pak	22765AP14A 22765AP14B 22765AP14C 22765AP14D	56C0CF73	XE1M600B00G
20	Impreza	2.0L NA 5MT	22765AP84D.pak	22765AP84A 22765AP84B 22765AP84C	56DAE48B	XE1P700C00G
21	Impreza	2.0L NA 5MT	22765AP85D.pak	22765AP85A 22765AP85B 22765AP85C	D74E750C	XE1P700A00G
21	Impreza	2.0L NA CVT AGS	22765AP86D.pak	22765AP86A 22765AP86B 22765AP86C	D3D70F22	XE1P700D00G
21	Impreza	2.0L NA CVT	22765AP87D.pak	22765AP87A 22765AP87B 22765AP87C	EC09E228	XE1P700B00G
22	Impreza	2.0L NA 5MT AGS	22765AS27C.pak	22765AS27A 22765AS27B	B93F17AA	XE1R500C00G
22	Impreza	2.0L NA 5MT	22765AS28C.pak	22765AS28A 22765AS28B	ED385E11	XE1R500A00G
22	Impreza	2.0L NA CVT AGS	22765AS29C.pak	22765AS29A 22765AS29B	7009AF79	XE1R500D00G
22	Impreza	2.0L NA CVT	22765AS30C.pak	22765AS30A 22765AS30B	B09D1F18	XE1R500B00G

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2019-22 Crosstrek						
MY	Model	Specification	File Description	Old ECM Part #	Decryption Keyword	New CID #
19	Crosstrek	2.0L NA 6MT	22765AM817.pak	22765AM810 22765AM811 22765AM812 22765AM813 22765AM814 22765AM815 22765AM816	TBD	TBD
19	Crosstrek	2.0L NA CVT	22765AM827.pak	22765AM820 22765AM821 22765AM822 22765AM823 22765AM824 22765AM825 22765AM826	TBD	TBD
20	Crosstrek	2.0L NA 6MT	22765AN934.pak	22765AN930 22765AN931 22765AN932 22765AN933	B816B9FF	XE1M600E00G
20	Crosstrek	2.0L NA CVT	22765AN953.pak	22765AN950 22765AN951 22765AN952	ABB8C540	XE1M600F00G
21	Crosstrek	2.5L NA CVT	22765AP814.pak	22765AP810 22765AP811 22765AP812 22765AP813	32282FD2	XE1P700G00G
21	Crosstrek	2.0L NA 6MT	22765AP923.pak	22765AP920 22765AP921 22765AP922	67DDE383	XE1P700E00G
21	Crosstrek	2.0L NA CVT	22765AP933.pak	22765AP930 22765AP931 22765AP932	2CC36181	XE1P700F00G
22	Crosstrek	2.0L NA 6MT	22765AS312.pak	22765AS310 22765AS311	B9C9F065	XE1R500E00G
22	Crosstrek	2.0L NA CVT	22765AS322.pak	22765AS320 22765AS321	090EB7B3	XE1R500F00G
22	Crosstrek	2.5L NA CVT	22765AS344.pak	22765AS340 22765AS341 22765AS342 22765AS343	989D58B6	XE1R500G00G

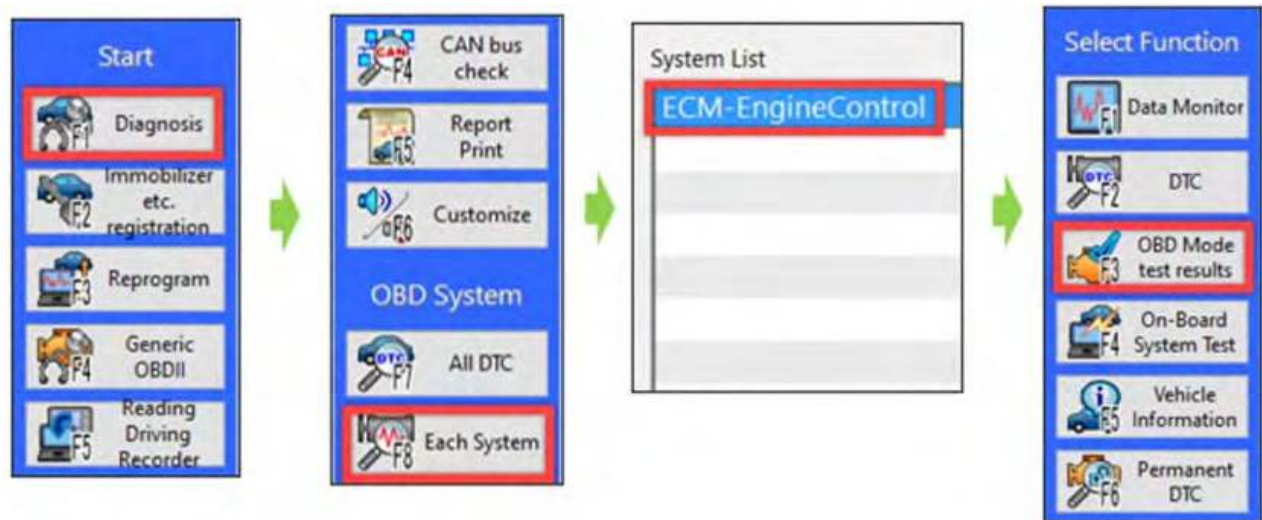
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SERVICE PROCEDURE / INFORMATION:



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(*1) Use the following instructions to perform and read the OBD MODE test results. This procedure will be required when performing the diagnostic steps outlined below.



Read the following data monitor values:

1. MID - \$35 TID - \$8B
2. MID - \$35 TID - \$8C
3. MID - \$35 TID - \$8D
4. MID - \$35 TID - \$8E
5. MID - \$36 TID - \$8B
6. MID - \$36 TID - \$8C
7. MID - \$36 TID - \$8D
8. MID - \$36 TID - \$8E

MID	TID	Scaling ID	Value	Unit	Minimum	Maximum	Result
\$31	\$BE	\$17	0.05	psi	0.00	5.56	OK
\$31	\$BF	\$17	0.14	psi	0.00	3.65	OK
\$35	\$8B	\$9D	308.0	°	0.0	4000.0	OK
\$35	\$8C	\$9D	-291.5	°	-4000.5	0.0	OK
\$35	\$8D	\$9D	228.0	°	0.0	4500.0	OK
\$35	\$8E	\$9D	-284.5	°	-4500.0	0.0	OK
\$35	\$D3	\$9D	1.0	°	-10.5	10.0	OK
\$35	\$D5	\$9D	-1.0	°	-10.5	10.0	OK
\$35	\$D6	\$9D	-0.5	°	-10.5	10.0	OK
\$36	\$8B	\$9D	327.5	°	0.0	4000.0	OK
\$36	\$8C	\$9D	-285.0	°	-4000.5	0.0	OK
\$36	\$8D	\$9D	324.0	°	0.0	4500.0	OK
\$36	\$8E	\$9D	-132.0	°	-4500.0	0.0	OK
\$36	\$D3	\$9D	1.0	°	-10.5	10.0	OK

Continued...

STEP1: Are DTCs P0016, P0017, P0018, or P0019 displayed in the ECM fault memory?

YES – Proceed to STEP 2.

NO – If DTC P0087 is stored, perform the reprogramming procedures outlined in STEP 2 ONLY. The service procedure is finished, no further action is required. For any other DTCs not mentioned in the bulletin, perform diagnosis and repair as per the applicable Service Manual.

STEP2: Reprogram the ECM following the normal Flashwrite or SSM5-R procedure. Detailed information regarding the SSM5-R reprogramming procedures can be found in TSB **14-28-21R**.

Subaru of America, Inc. (SOA) highly recommends utilizing either the Subaru Midtronics DCA8000 Dynamic Diagnostic Charging System or the Subaru Midtronics GR8-1100 Diagnostic Battery Charger to the vehicle and utilizing the Power Supply Mode feature anytime a vehicle control module is being reprogrammed. Once the Midtronics charger is connected to the vehicle, if the battery is fully charged, it takes less than three (3) minutes to boot-up the charger, select the Power Supply Mode, and have the battery voltage stabilized and ready for reprogramming.

NOTES:

- For instructions on using the Power Supply Mode, reference the applicable User Manual for the Midtronics DCA-8000 Dynamic Diagnostic Charging System and the Midtronics GR8-1100 Diagnostic Battery Charger on STIS
- Confirm all electrical loads such as lights, audio, HVAC, seat heaters, and rear defroster are all switched OFF before setting up the charger for Power Supply Mode.
- Select the correct battery type (Enhanced Flooded, Flooded, Gel, AGM or AGM Spiral).
- Input the CCA which matches the vehicle's battery. **NOTE:** OE and replacement batteries have different CCA ratings. Always confirm the battery's CCA rating before proceeding.
- If using a DCA-8000 Dynamic Diagnostic Charging System, set the power supply voltage to
- 13.5 Volts.
- DO NOT connect the DST-i or DST-010 until the Power Supply mode function has completed its battery test mode and the Charging Voltage has dropped to and shows a steady 13.5 Volts on the display.
- Once Power Supply Mode reaches a steady 13.5 Volts, connect the DST-i or DST-010 to the OBD connector and proceed with initiating the normal SSM5-R reprogramming process.
- Amperage will fluctuate based upon the vehicle's demand for power. **NOTE:** If the voltage rises beyond 14 Volts while programming is in process, the procedure will abort. This can indicate a need to test or charge the vehicle battery before any further attempt at programming is made.
- ALWAYS set the power supply voltage to 13.5 Volts when using Power Supply Mode. NEVER turn the ignition switch on when charging at voltages 15 Volts or higher.

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REMINDER: If the DCA-8000 or GR8-1100 indicates the vehicle's battery must be charged, charge the battery fully before proceeding to reprogram the vehicle while using the Power Supply Mode.

NOTE: Control module failures resulting from battery discharge during reprogramming are not a matter for warranty. Should any DTCs reset after the reprogramming update is performed, diagnose per the procedure outlined in the applicable Service Manual.



End of procedure for vehicles **WITHOUT** DTCs P0016, P0017, P0018, or P0019 stored in the ECM.

STEP3: Start the vehicle and allow to idle. Using the SSM, read the value the following four data monitor items (ALWAYS Save SSM Data):

1. VVT Initial Position Learning Value #1
2. VVT Initial Position Learning Value #2
3. VVT EX Initial Position Learning Value #1
4. VVT EX Initial Position Learning Value #2

	Item	Value	Acceptable Range
EGI	VVT Initial Position Learning Value #1	78.7	53-71
EGI	VVT Initial Position Learning Value #2	81.0	53-71
EGI	VVT Ex Initial Position Learning Value #1	111.1	78-96
EGI	VVT Ex Initial Position Learning Value #2	109.2	78-96

Are all of the data monitor item values within the acceptable range listed in the table above?

YES - proceed to STEP 5.

NO - proceed to STEP 4.

STEP 4: Perform the procedures outlined in “#7 INSPECTION MODE N” and “#10 INSPECTION MODE T”. Then re-check the threshold values in STEP 3 along with the OBD MODE test results (*1)

“#7 INSPECTION MODE N” procedure.

Using the applicable Service Manual, refer to: DIAGNOSTICS > ENGINE> Inspection Mode> #7 DRIVE CYCLE N

- A. Confirm the battery voltage is 12 Volts or more and the fuel tank is at least half full.
- B. Using SSM, clear the fault memory. Prepare the SSM to be kept in the vehicle during the following road test.

Continued...

- C. With gear selector in the park position (neutral for MT models), idle the engine at approximately 2500 rpm for 40 seconds or more.
- D. Move the gear selector into the drive position (appropriate gear range for MT models). Accelerate the vehicle to 31 mph or more.
- E. When the vehicle speed is 31 mph or more, release the accelerator pedal and brake pedal (and clutch for MT models) and allow the vehicle to decelerate without any gear shift changes. Maintain the engine speed between 2500 rpm to 1900 rpm for 5 seconds during this deceleration.

NOTE: Depending on road conditions, an appropriate gear might have to be selected to maintain the desired engine speed. The vehicle speed is not important as long as the engine speed is within range during the declaration

- F. In a suitable area, safely bring the vehicle full stop and allow it to idle for 5 minutes.

“#7 INSPECTION MODE N” procedure is complete. Proceed to “#10 INSPECTION MODE T” procedure.

“#10 INSPECTION MODE T” procedure.

Using the applicable Service Manual, refer to: DIAGNOSTICS > ENGINE> Inspection Mode > #10 INSPECTION MODE T

- A. Confirm the battery voltage is 12 Volts or more the fuel is at least half full.
- B. Start the engine.
- C. Allow the engine to idle for at least 3 minutes.
- D. Accelerate the vehicle speed to approximately 37 mph.
- E. While maintaining approximately 37 mph, cycle the accelerator from a 0% to 20% opening angle. Try to keep these cycles within 5 second intervals. Maintain this driving pattern for 20 minutes or more.

NOTE: It is acceptable to stop the vehicle if needed depending on road/traffic conditions during this driving pattern.

- F. Release the accelerator pedal and brake pedal (and clutch for MT models) and allow the vehicle to decelerate with any gear shift changes.
- G. In a suitable area, safely bring the vehicle full stop and turn off the engine.

Continued...

“#10 INSPECTION MODE T” procedure is complete.

Read the threshold values from STEP3 (pictured below) and the OBD MODE test results (*1)

Are all of the data monitor item values within the acceptable range listed in the table below? Are the threshold values between -1000 to + 1000?

	Item	Value	Acceptable Range
EGI	VVT Initial Position Learning Value #1	78.7	53-71
EGI	VVT Initial Position Learning Value #2	81.0	53-71
EGI	VVT Ex Initial Position Learning Value #1	111.1	78-96
EGI	VVT Ex Initial Position Learning Value #2	109.2	78-96

YES - The procedure is FINISHED.

NO - Repeat STEP4 ONE TIME ONLY and if the result answer is still “NO”, proceed to STEP 6.

STEP5: Perform the “#7 INSPECTION MODE N” and “#10 INSPECTION MODE T” procedure.

“#7 INSPECTION MODE N” procedure.

Using the applicable Service Manual, refer to: DIAGNOSTICS > ENGINE> Inspection Mode > #7 INSPECTION MODE N

- A. Confirm the battery voltage is 12 Volts or more the fuel is at least half full.
- B. Using SSM, clear the fault memory. Prepare the SSM to be kept in the vehicle during the following road test.
- C. With gear selector in the park position, idle the engine at approximately 2500 rpm for 40 seconds or more.
- D. Move the gear selector into the drive position. Accelerate the vehicle to 31 mph or more.
- E. When the vehicle speed is 31 mph or more, release the accelerator pedal and brake pedal, allow the vehicle to decelerate without any gear shift changes. Maintain the engine speed between 2500 rpm to 1900 rpm for 5 seconds during this deceleration.

NOTE: Depending on road conditions, an appropriate gear might have to be selected to maintain the desired engine speed. The vehicle speed does is not important as long as the engine speed is within range during the declaration.

- F. In a suitable area, safely bring the vehicle full stop and allow it to idle for 5 minutes.

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“#7 INSPECTION MODE N” procedure is complete. Proceed to “#10 INSPECTION MODE T” procedure.

“#10 INSPECTION MODE T” procedure.

Using the applicable Service Manual, refer to: DIAGNOSTICS > ENGINE> Inspection Mode > #12 INSPECTION MODE T

H. Confirm the battery voltage is 12 Volts or more the fuel is at least half full.

I. Start the engine.

J. Allow the engine to idle for at least 3 minutes.

K. Accelerate the vehicle speed to approximately 37 mph.

L While maintaining approximately 37 mph, cycle the accelerator from a 0% to 20% opening angle. Try to keep these cycles within 5 second intervals. Maintain this driving pattern for 20 minutes or more.

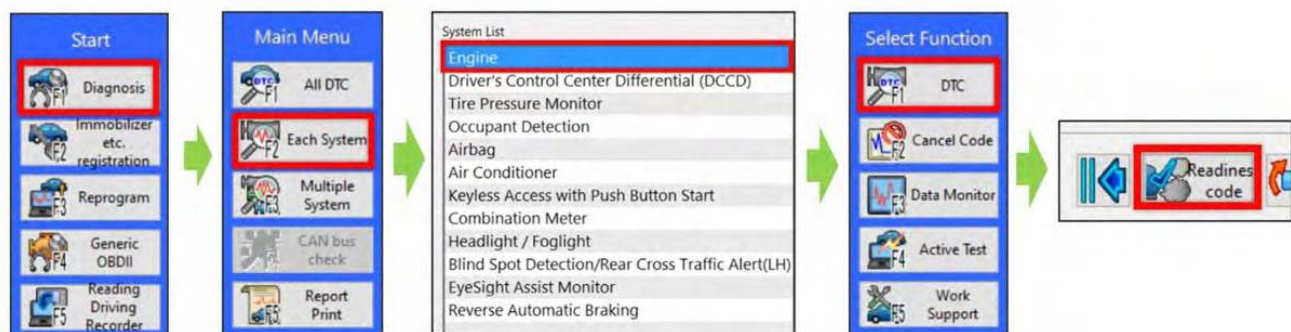
NOTE: It is acceptable to stop the vehicle if needed depending on road/traffic conditions during this driving pattern.

M. Release the accelerator pedal and brake pedal (and clutch for MT models) and allow the vehicle to decelerate with any gear shift changes.

N. In a suitable area, safely bring the vehicle full stop and turn off the engine.

“#10 INSPECTION MODE T” procedure is complete.

O. Using SSM, select Diagnosis > Each System > Engine > DTC > Readiness Code



Continued...

- P. Read the readiness codes for P0016, P0017, P0018, P0019, P000A, P000B, P000C, and P000D. Confirm the self-diagnosis is complete and that the codes are not pending.

Status▲	Code▲	
Readiness code: self-diagnosis is not completed		
Readiness	P000A	"A" Camshaft Position Slow Response Bank 1
Readiness	P000B	"B" Camshaft Position Slow Response Bank 1
Readiness	P000C	"A" Camshaft Position Slow Response Bank 2
Readiness	P000D	"B" Camshaft Position Slow Response Bank 2
Readiness	P0016	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A
Readiness	P0017	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B
Readiness	P0018	Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor A
Readiness	P0019	Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor B

- Q. Check the DTC and data monitor threshold values. Using SSM, select Diagnosis > Select Vehicle > OBD System – Each System > ECM-EngineControl > OBD MODE test results (*1)

Are there **NO** DTCs present and the threshold values between -1000 to + 1000?

YES - The procedure is FINISHED.

NO - Proceed to STEP 6

STEP6: Inspect the engine oil level and condition.

IMPORTANT: If the engine oil and filter were replaced prior to diagnosis, there is no need for inspection. Proceed to STEP: 7.

Is there any abnormal condition or inappropriate oil level??

YES - Perform the engine oil and filter change. Repeat STEP 4 or STEP 5, then continue diagnosis.

NO – Proceed to STEP 7

STEP7: Performed the outlined timing chain inspection outlined below:

IMPORTANT: If the timing chain was replaced prior to diagnosis, there is no need to perform the inspection. Proceed to STEP 8.

A. Using SSM, clear the fault memory.

B. Switch the ignition to the “OFF” position.

C. Disconnect the oil control solenoid valve connector on the bank with associated DTC.

Continued...

- D. Switch the ignition switch to the “ON” position.
- E. Using SSM and the engine not running, read the “VVTAdvanceAngle Value” data monitor value.
- F. Start the engine and read the “VVTAdvanceAngle Value” data monitor value for a duration of 10 seconds.
- G. Switch the ignition to the “OFF” position.

Is the “VVTAdvanceAngle Value” data monitor value out of -10 degrees to +10 degrees?

YES - Adjust and / repair the timing chain as needed. Repeat STEP 4 and STEP 5, then continue diagnosis.

NO - Proceed to STEP 8.

STEP8: Perform a visual inspection of the engine harness and the connectors specified below for any physical damage.

IMPORTANT: If the engine harness was replaced prior to diagnosis, there is no need to perform the inspection. Proceed to STEP9.

Connectors:

- **ECM**
- **Oil Control Solenoid**
- **CAM Position Sensor**
- **Crank Position Sensor**

Was there any damage found?

YES - Repair the damaged harness and / or connector. Repeat STEP 4 and STEP 5, then continue diagnosis.

NO – Proceed to STEP 9.

STEP9: Perform the following Ohm tests:

- A. Switch the ignition to the “OFF” position.
- B. Disconnect the ECM and the Crank Position Sensor. Disconnect the Oil Control Valve and Cam Position Sensor associated with the DTC.

Continued...

- C. Measure the resistance between the following connectors specified in the tables below and record the results:

P0016												
	Right Intake Oil Control Solenoid				Right Intake Camshaft Position Sensor				Crankshaft Position Sensor			
	ECM		Solenoid		ECM		Sensor		ECM		Sensor	
	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal
Leg/Obk	E53	99	E105	2	E53	78	E61	2	E53	66	E65	1
Forester	E158	99	E38	2	E158	78	E36	2	E158	66	E10	1
Imp/Cros	E158	99	E38	2	E158	78	E36	2	E158	66	E10	1

P0017												
	Right Exhaust Oil Control Solenoid				Right Exhaust Camshaft Position Sensor				Crankshaft Position Sensor			
	ECM		Solenoid		ECM		Sensor		ECM		Sensor	
	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal
Leg/Obk	E53	108	E107	2	E53	65	E63	2	E53	66	E65	1
Forester	E158	108	E63	2	E158	65	E62	2	E158	66	E10	1
Imp/Cros	E158	108	E63	2	E158	65	E62	2	E158	66	E10	1

P0018												
	Left Intake Oil Control Solenoid				Left Intake Camshaft Position Sensor				Crankshaft Position Sensor			
	ECM		Solenoid		ECM		Sensor		ECM		Sensor	
	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal
Leg/Obk	E53	100	E106	2	E53	77	E62	2	E53	66	E65	1
Forester	E158	100	E37	2	E158	77	E35	2	E158	66	E10	1
Imp/Cros	E158	100	E37	2	E158	77	E35	2	E158	66	E10	1

P0019												
	Left Exhaust Oil Control Solenoid				Left Exhaust Camshaft Position Sensor				Crankshaft Position Sensor			
	ECM		Solenoid		ECM		Sensor		ECM		Sensor	
	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal	Connector	Terminal
Leg/Obk	E53	109	E108	2	E53	64	E64	2	E53	66	E65	1
Forester	E158	109	E66	2	E158	64	E65	2	E158	66	E10	1
Imp/Cros	E158	109	E66	2	E158	64	E65	2	E158	66	E10	1

Continued...

Are there resistance values 1 Ohm or higher?

YES - Replace the damaged harness. Repeat STEP 4 and STEP 5, then continue diagnosis.

NO - Proceed to STEP 10.

STEP10: Perform and engine oil pressure test as per the applicable Service Manual: Engine > Mechanical > Engine Oil Pressure > INSPECTION

Was the engine oil pressure found to be within specification?

YES - Repeat STEP 4 and STEP 5, then continue diagnosis.

NO - Proceed to inspect the items listed below in the following order. Clean or replace the needed parts depending on the inspection results. Repeat STEP 4 and STEP 5, then continue diagnosis.

- **Engine Oil Strainer**
- **Oil Passages in the Chain Cover**
- **Oil Passages in the Cam Sprocket**
- **Cam Carriers (possible scoring)**

WARRANTY / CLAIM INFORMATION:

For vehicles within the Basic New Car Limited Warranty period, Emissions Defect Warranty or covered by an active Subaru Added Security Classic or Gold plan, this repair may be submitted using the following claim information:

For ECM reprogramming ONLY

Labor Description	Labor Operation #	Labor Time	Fail Code
REPROGRAMMING, ENGINE CONTROL MODULE*	A452-086	.4	UPG-48

IMPORTANT: Always note the original Calibration Identification number (CID) / ROMID the vehicle came in with on the repair order before reprogramming and, make sure to list the NEW CID / ROMID for any newly installed programming (as confirmed from the actual control module AFTER installation). The NEW CID / ROMID MUST also be noted on the repair order as this information is required for entry in the Miscellaneous Detail field during claim submission. These numbers can be read using SSM5-R.

NOTE: The pfc file listings provided in this bulletin are the latest available at the time of publishing. Updates are often released thereafter without revision to the original bulletin. For this reason, it is critical to always have the latest version of Select Monitor software installed on your system. You can confirm if a later version is available by entering the CID listed in this bulletin into SSM5-R. If a newer CID is shown as available in SSM5-R, reprogram using that file.

Continued...

For Situations Continuing after Step 4 or 5 of the Work Procedure.

*When further Diagnosis and repairs are needed an additional job line / repair claim can be submitted. Please refer to the Subaru Labor Time Guide for warranty time and coverage. Below is a possible **EXAMPLE**.*

For vehicles within the Basic New Car Limited Warranty period or covered by an active Subaru Added Security Classic or Gold plan, a repair may be submitted using the following claim information:

Labor Description	Labor Operation #	Labor Time	Fail Code
OBDII OIL CHANGE TO FIX AVCS OPERATION	A455-443	1.0	BAT-42

IMPORTANT REMINDERS:

- SOA strongly discourages the printing and/or local storage of service information as previously released information and electronic publications may be updated at any time.
- Always check for any open recalls or campaigns anytime a vehicle is in for servicing.
- Always refer to STIS for the latest service information before performing any repairs.