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Sent: Wednesday, May 12, 2004 2:48 PM
To: Chris Santucci [REDACTED]
Cc: Quandt, Jeff
Subject: Suggested agenda items for PE04-021 technical meeting
Categories: PE04021-ToyotaThrottleControl
Attachments: PE04-021 Technical Meeting - Suggested Agenda Items.pdf; PE04021-DTCSummaryR1.pdf

Hi Chris,

I received a package yesterday from your office with a throttle body and accelerator pedal enclosed, thank you for your assistance with this. Can you advise the application details for the components Toyota provided? Part #'s taken off components are – for the throttle body: 22030-28040, 4D22, 00722, and for the accelerator pedal: 78010-33010, 44230603.

I've attached ODI's suggested agenda items for the technical meeting. It's focused on the technical aspects of the ETC system and is mostly the result of my review of information provided in Toyota Repair Manuals. I'm not very knowledgeable on this system, so Toyota may need to supplement or disregard some of the suggested items, please do so as necessary. The suggested items are outlined in three broad areas. The first is historical/general, with the objective of having Toyota discuss at a high level the various ETC systems in use on gasoline powered passenger vehicles (we spoke about the cable and non-cable based systems, so it's these systems and any others you think are pertinent). The second section is focused on the ETC system used in the subject vehicles; the primary objective is to provide detailed information about components, functionality, software and diagnostics used in the subject ETC system. The last section relates to a vehicle demonstration. We can discuss the suggested agenda further after you've reviewed, let me know.

I'm expecting that Toyota will want to include other agenda items (e.g., status/findings of Toyota's investigation/analysis, any new information, recommendations, Toyota's position, etc) and I will leave it to you to develop this part of the agenda. My preference would be to have a draft of the agenda prior to the meeting, and as early as possible; please let me know if you will be able to provide this. I'm cognizant that ODI's review of the PE IR response may raise new questions. I'm proposing we deal with these issues as possible should they arise.

I've also attached an update of the DTC summary I provided you via email on 5/7 (please disregard the previous version). One thing I'd like to be included in the technical presentation is a chart(s) that shows for each DTC related to ETC, what is being monitored, what are the detection criteria, what are the detection thresholds, which DTCs cause warning light illumination and which DTCs cause loss of ETC/Limp Off Road mode. Also, if there are DTCs that have an impact on other vehicle systems identify them and describe what the impact is. The updated DTC summary includes further detail regarding the questions I have on specific DTC codes (the ones with 'yes' in the question column) and I'd also like to get answers to these questions. If this is to be part of the meeting, it may be better to do this during the vehicle demonstration, with a smaller more technical group, and while we have use of the vehicle and diagnostic tester (I'm assuming you will bring both); your call on this one.

For the vehicle demo, please try to demonstrate the setting of as many of the DTCs as possible. If a particular DTC can not be set in a practical manner, then please plan to discuss/describe what conditions would have to exist to set the fault and the likely scenarios that might cause this. As we've discussed, ODI may request use of Toyota's diagnostic tester. Let me know if you need to discuss further.

Lastly, I anticipate the audience will consist of Jeff and Kathy, and Ken will be invited as an alternate (as is typical). Additionally, Bob Young and Mike Pyne (from Rulemaking) have also expressed an interest in attending. I'll keep you posted as we move forward.

Best Regards,
Scott

2/21/2010

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Suggested Agenda Items for PE04-021 Technical Meeting

HISTORICAL/GENERAL:

Provide historical background and high-level summary of Toyota ETC systems (gasoline):

Review all MMY's to use ETC similar to subject, in US, in other markets.

Describe different design versions (DV) or generations (e.g. cable/non-cable type).

Describe primary reasons for design revisions.

For each DV:

Describe which vehicle systems are involved with, or impacted by, ETC.

Describe ETC components, contrast with other DVs.

Who are the component suppliers?

Describe basic ETC operational strategies, contrast with other DVs.

Who developed the control software?

Describe basic ETC software strategies, contrast with other DVs.

Who developed the control and diagnostic software?

SUBJECT ETC SYSTEM:

Provide detailed information regarding the ETC system used on the subject vehicles.

Throttle body assembly (TBA) and throttle valve (TV) control operation:

Describe the throttle actuator control (TAC) and its functionality.

Explain the control motor technology/operation.

What is meant by "duty cycle"?

Describe the throttle position sensor (TPS) and its functionality.

Explain sensor use and redundancy.

Describe how idle speed control (ISC) is accomplished.

Is an air bypass device used?

What does IDL ON/OFF mean? How is idle state determined?

Does the TV move during ISC operations (for air modulation)?

What is the rest TV position (and compare to idle TV position)?

Describe similarities/differences to other DV.

Describe hardware/software similarities and differences.

Does the subject TB use a magnetic clutch motor-TV coupling?

Do other DV use a different rest TV position (idle/closed)?

Accelerator pedal assembly.

Describe the accelerator pedal sensor (APS) and its functionality.

Explain sensor use and redundancy.

Describe similarities/differences to other DV.

Electronic Control Module (ECM) and Diagnostics.

Describe ETC related aspects of ECM hardware (architecture) and software.

Who designed, developed, and tested the control software?

Provide a summary of ETC relevant diagnostic trouble codes (DTCs).

What components are monitored, how monitored, what thresholds are set?

Which DTCs cause a warning light, a loss of ETC, any other impact(s)?

Describe Toyota's limp off the road strategy.

What steps must be taken for ETC reinstatement?

Describe similarities/differences to other DV.

Are the subject control and/or diagnostic software common to other DVs?

VEHICLE ASSESSMENT:

Demonstrate ETC operation with a V6 equipped vehicle and Toyota diagnostic tester:

Simulate, or demonstrate the following:

ETC component failures (as many DTCs as possible);

Diagnostic tester capabilities (monitoring, fault clearing, etc.);

LIMP OFF ROAD mode performance;

ETC reinstatement procedures;

ISC management (e.g., A/C engagement, gear shifts, etc);

Diagnostic Trouble Codes (DTCs) for 2.4L L4 - 2AZ-FE MY 2003

#	Prd #	Question Detail	DTC No	Detection Criteria - Voltage(s)/Condition(s)	DC time thres	Question*
1	1	TPS Sw. A	P0120	VTA <= .2V OR VTA >= 4.8V	idle: 10s, off idle: 2s	Yes
2	1	TPS Sw. A Low	P0122	VTA <= .2V	idle: 10s, off idle: 2s	
3	1	TPS Sw. A High	P0123	VTA >= 4.97V	idle: 10s, off idle: 2s	Yes
4	1	TPS Sw. B	P0220	VTAA <= .5V OR VTA2 >= 4.97V) AND .2V <= VTA <= 1.8V	idle: 10s, off idle: 2s	Yes
5	1	TPS Sw. B Low	P0222	VTAA <= .5V	idle: 10s, off idle: 2s	
6	1	TPS Sw. B High	P0223	VTAA >= 4.97V AND .2V <= VTA <= 1.8V	idle: 10s, off idle: 2s	
7	1	TPS Sw. A/B Correlation	P2135	(a) ABS_VAL(VTA-VTA2) <= .02V, OR (b) VTA <= .2V and VTA2 <= .5V	(a) .5s (b) .4s	Yes
8	2	TPS Sw. A Range/Performance	P0121	VTA - VTA2 out of threshold	idle: 10s, off idle: 2s	Yes
9	3	Idle Air Control System	P0505	Idle varies greatly from target	2 trip detection	Yes
10	4	TAC Motor Circuit Low	P2102	TAC motor duty >= 80% AND TAC motor 1 < .5A	2s	Yes
11	4	TAC Motor Circuit High	P2103	(a) TAC motor 1 >= 10A (b) TAC motor 1 >= 7A	(a) not stated (b) .6s	Yes
12	5	TAC System - Stuck Open	P2111	Not explained	Not stated	Yes
13	5	TAC System - Stuck Closed	P2112	Not explained	Not stated	Yes
14	6	TAC Motor Current Range/Performance	P2118	Loss of system power	Not stated	Yes
15	7	TAC Throttle Body Range/Performance	P2119	Throttle opening angle varies greatly from target	Not stated	Yes
16	8	APS Sw. D	P2120	(VPA1 <= .2V AND VPA2 >= .97°) OR VPA1 >= 4.8V	.5s	
17	8	APS Sw. D Low Input	P2122	VPA1 <= .2V AND VPA2 >= .97°	.5s	
18	8	APS Sw. D High Input	P2123	VPA1 >= 4.8V	2s	
19	8	APS Sw. E	P2125	VPA2 <= .5V AND VPA1 >= .97°, OR VPA1 >= 4.8V AND .2V <= VPA1 <= 3.45V	.5s	Yes
20	8	APS Sw. E Low Input	P2127	VPA2 <= .5V AND VPA1 >= 97°	.5s	
21	8	APS Sw. E High Input	P2128	VPA1 >= 4.8 AND .2 <= VPA1 <= 3.45	2s	Yes
22	8	APS Sw. D/E Correlation	P2138	(a) ABS_VAL(VPA1 - VPA2) <= .02V, OR (b) VPA1 <= .2V AND VPA2 <= .5V	2s (either)	
23	9	APS Sw. D Range/Performance	P2121	(a) VPA1 - VPA2 out of threshold (b) IDL is off	(a) .5s (b) Not stated	Yes Yes

Diagnostic Service Procedures for 2.4L L4 - 2AZ-FE MY 2003

Possible Trouble Area

#	RM pg.	Possible Trouble Area
1	5-61	TPS, TBA, Harness, ECM
2	5-66	TPS, TBA
3	5-155	TBA, Air Induc Sys, PCV, ECM
4	5-172	Open/Short in TCA Motor Circuit, TBA(motor), ECM
5	5-177	TAC Motor/Circuit, TBA, Throttle Valve
6	5-179	ETCS Power Open, ECM
7	5-182	ETCS, ECM
8	5-184	APS Circuit Open/Short, APS, ECM
9	5-192	APS, ECM

* details attached

**Information summarized from MY 2003 Camry Repair Manual
Volume 1, Pub No. RM972U1, section 5 titled Diagnostics.
Similar DTCs exist for the 3.0L V6 1MZ-FE engine.**

KEY: TPS = throttle position sensor, TBA = throttle body assembly, ECM = electronic control module, PCV = positive crankcase vent, TAC = throttle actuator control, ETCS = electronic throttle control system, APS = accelerator pedal sensor

Questions for specific DTCs

#	<i>DTC No</i>	<i>Question Detail</i>
1	P0120	<p>1) What is meant by the repair manual (RM) statement "Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied?" How is this possible?</p> <p>2) Is the voltage limit 4.97V or 4.8V (see P0123)?</p>
3	P0123	1) Is the voltage limit 4.97V or 4.8V (see P0120)?
4	P0220	1) What is meant by the RM statement "Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied?" How is this possible?
7	P2135	1) For condition (a), does this mean that the outputs from VTA and VTA2 have to be at the same voltage level? What is the normal difference in the signals levels ($\geq 1.5V$)?
8	P0121	1) Explain in better detail the statement "Difference between VTA and VTA2 is out of threshold." What is being tested and what are the time and voltage limits of the threshold?
9	P0505	<p>1) Explain in better detail the statement "Idle speed continues to vary greatly from target speed." What is being tested and what are the time and voltage limits of the threshold?</p> <p>2) Explain "2 trip logic" statement, are these OBD trips?</p>
11	P2103	<p>1) What is the relationship between the first ($I \geq 10A$) and second conditions ($I \geq 7A$ for $t \geq .6s$)? Is this DTC detected when either (or both) of these conditions exist?</p> <p>2) What is the time threshold associated with the first condition ($I \geq 10A$)? Does this occur instantaneously?</p>
12	P2111	1) Explain in better detail the statement "Lock throttle control motor during control throttle control motor (Stuck open)." What is being tested and what are the time and other limits of the threshold?
13	P2112	1) Explain in better detail the statement "Lock throttle control motor during control throttle control motor (Stuck closed)." What is being tested and what are the time and other limits of the threshold?
15	P2119	1) Explain in better detail the statement "Throttle opening angle continues to vary greatly from target throttle opening angle." What is being tested and what are the time and other limits of the threshold?
19	P2125	1) The stated voltage thresholds for the second condition (involving VPA1) cannot physically occur. Should one of the VPA1 values in the second condition be a VPA2?
21	P2128	1) The stated voltage thresholds for the two conditions cannot physically occur. Should one of the VPA1 values actually be a VPA2?
23	P2121	<p>1) Explain in better detail the statement "(a) Difference between VPA1 and VPA2 is out of threshold." What is being tested and what are the time and other limits of the threshold?</p> <p>2) Is the requirement in condition (b) (IDL is OFF) in addition to requirement (a), ie, (a) AND (b) must be true?</p>