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TOYOTA LANDCRUISER V8 Twin Turbo Diesel with Automatic Transmission AB60F

Subject: AB60F 6-speed Automatic Transmission—Converter Lockup Improvement

Background: This module is designed to fix a serious problem of the converter lockup functionality, which is responsible for a dramatic lack of fuel efficiency at speeds between 60 and 120km/h, bad engine brake effect when driving downhill and poor driving performance.

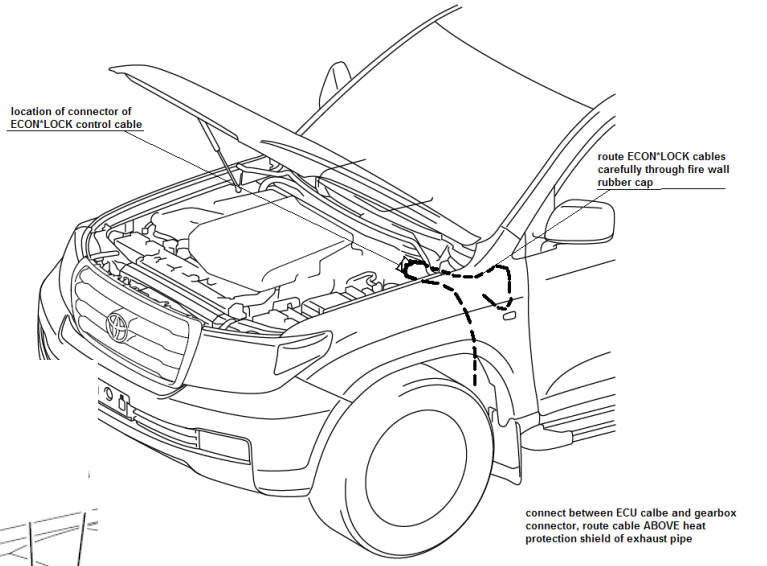
Although TOYOTA should be aware of this problem, so far, TOYOTA remains inactive to fix this problem.

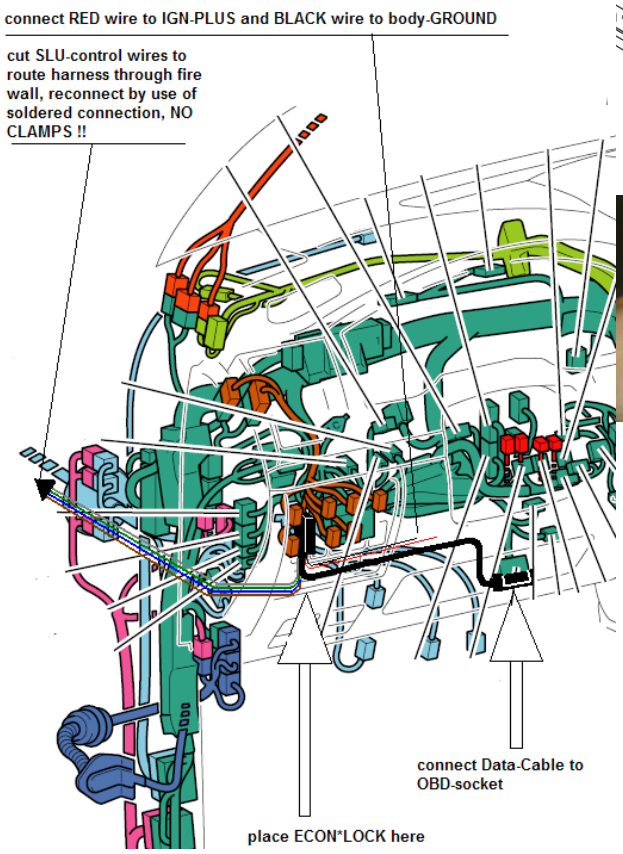
ECON*LOCK has been designed to use the converter lockup signal from the ECU and modifies it, so that the converter locks up at the expected conditions, improves fuel efficiency, improves the engine brake effect and makes the vehicle overall much more nippy.

Installation: If the **ECON*LOCK** is availabe with a plug & drive harness, the installation is pretty easy.

1) Place **ECON*LOCK** on the passenger side under the dashboard next to the ECU.

2) Route the **ECON*LOCK** harness along the fire wall under the plastic cover to the driver side. Follow the whole way down to the supension arm of the front wheel.





Route the harness out of the corner and push it back to wards the cable connector of the gearbox. The cable has to be feeded OVER the head protectors of the exhaust pipe, to ease this work, one fixing screw of the heat protection plate has to be opened.

3) Disconnect the original gearbox control cable with the big connector and fit the adapter between original connector and gearbox.

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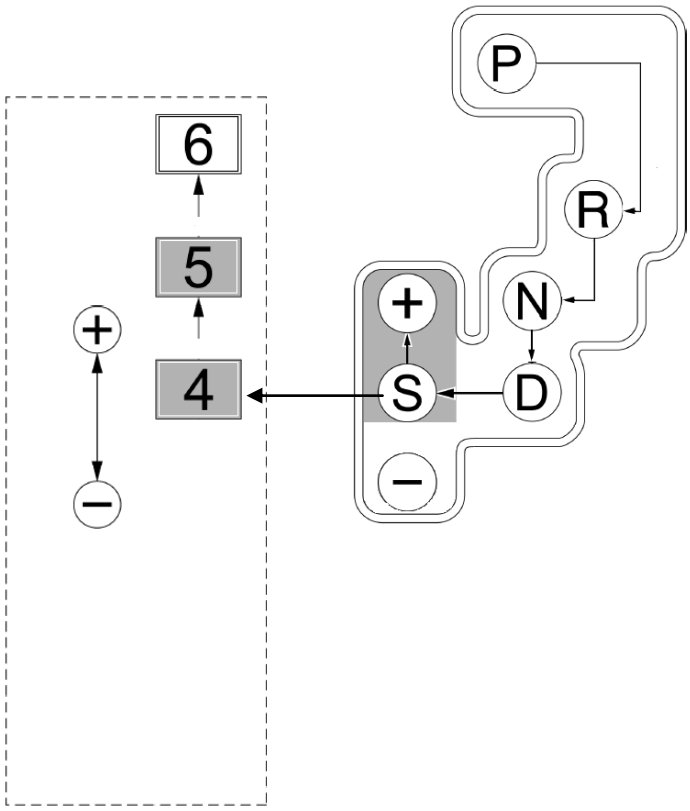
5) Connect the POWER supply

6) Connect the OBD-Cable to the OBD-Socket

7) The **ECON*LOCK** requires a power supply from the Ignation system. Since there are no IGN-terminals available under the dashboard, one source could be the supply of the wiper-ECU.

Operation: AFTER starting the engine, **ECON*LOCK** needs to be activated to work in D-mode.



The activation is confirmed by one BEEP, either immediately when „D“ is activated or as soon as the brakes are released (brake light go off).

Once **ECON*LOCK** is activated, the operation will be performed within the mapping of the **ECON*LOCK** controller.

At any time it is possible to change back to regular ECU-control by shifting into D and lifting the food from the acceleration pedal.

The switch between **ECON*LOCK** and ECU-control can be done while vehicle is in motion at any speed.

To turn OFF ECON*LOCK, simply press „2nd-Mode“ twice (to activate and deactivate the 2nd-Mode). To reactivate ECON*LOCK you need to shift into S-6 once. The deactivation will be confirmed with two beeps.

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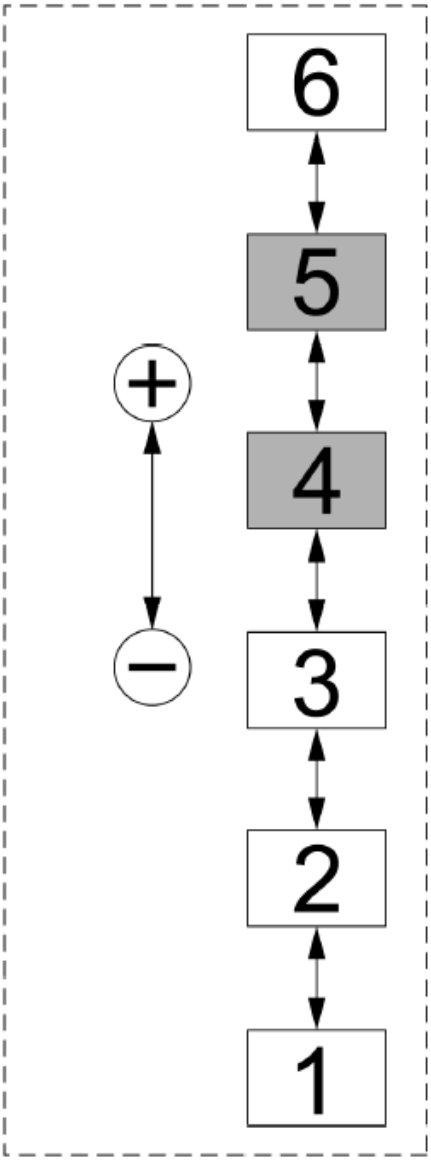

In **S-Mode-6** the converter will fully lock at speeds higher than 70km/h in 4th speed and 5th speed, in 6th speed immediately after shifting in (about 105km/h).
Engine Brake with full locked converter will be available in gear 4 and 5, in 6 only half locked.

In **S-Mode-5** the converter will fully lock at speeds higher than 70km/h in 4th speed and 5th speed.
Engine Brake with full locked converter will be available in gear 4 and 5.

In **S-Mode-4** the converter will fully lock at speeds higher than 60km/h in 4th speed and at 50km/h in 3rd speed.
Engine Brake with full locked converter will be availabe in gear 3 and 4.

In **S-Mode-3** the converter will fully lock at speeds higher than 35km/h in 3rd speed.
Engine Brake with full locked converter will be available in gear 3.

In **S-Mode-2** the converter will fully lock for Engine Brake and acceleration starting at 30km/h.

In **S-Mode-1** no lockup available

At any time the lockup signal as half lock or full lock from the ECU will be passed through the **ECON*LOCK** module. Especially in lower speeds the ECU likes to assist engine brake with half lock signal, although it has no real effect, **ECON*LOCK** allows this support.

ECON*LOCK turns off when engine has been turned off, or the switch **2nd** have been selected and is active for a moment (Instrument Panel light „2nd“ is on).

DISCLAIMER: The manufacturer of **ECON*LOCK** is not responsible for any kind of damaged on the drive train or any kind of other damaged caused due inproper handling of the vehicle. Altering a certfied vehicle is forbidden and could lead to a loss of operation permits by authorities. The installation of **ECON*LOCK** is on the vehicle owner´s risk and could lead to a loss of warranty of the vehicle. Because of legal reasons, **ECON*LOCK** is available as an assembly kit only, the completition has to be done by the vehicle owner himself. The purchase of **ECON*LOCK** is not on commercial basis, the fees are covering material and developent costs only and don´t cover any profits.

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OPERATION RECOMMENDATIONS FOR RALLY:

1) Things to know before:

The ECU needs a relatively long period of time to choose the proper gear due the dynamic acceleration pedal motion characteristics and extreme changing driving parameters off road. When the gear selector is in S-6, the ECU basically evaluates possible gears to engage from 3 to 6. Under normal driving conditions, this problem is partly resolved by use the slip of the torque converter, that is the reason, why you never can really be in the wrong gear.

The delaytime for choosing the proper gear can be up to 1 second, during a Rally a far too long time without the guarantee to finally stay in the proper gear. The more the driver narrows the possible gear range suiting best for the actual driving condition, the faster the ECU will finally come the correct conclusion. This is the reason, why the automatic gearbox can never be used in "D" for a Rally under competition circumstances.

The "helping" slip of the converter, which makes about 20% of the total loss of power between the engine and the wheels, is been killed by **ECON*LOCK** , because once the ECU decides for a gear which is within possible driving conditions and next to other parameters within in the green zone, **ECON*LOCK** will stop the slip by engaging the converter lockup. If that happens, and you are in the wrong gear, mostly in a too high gear, you have a lost of thrust forward.

2) how to operate the gearbox properly:

One typical indication of a Rally track next to the environmental conditions is the fact, that there are always rapidly changing driving conditions and road conditions. So far, there is no ECU from any manufacturer on the market, which understands these conditions or has been programmed for it. **ECON*LOCK** does not touch the ECU-software, it can´t influence the doing of the gearbox, but it controls the converter lockup and simulate certain conditions to the ECU, which then, are influencing the ECU-mapping.

In practical driving the shortest gearbox shift times are generated by this operation:

The driver accelerates by pressing the acceleration pedal almost down to the limit for example in 3rd pre-selected gear position. At this point the driver identifies further driving conditions which would permit the fourth gear to engage at next.
Shift the lever into position 4, stay on the pedal and lift the pedal backwards to about 35% of the pedal range to initiate the gearshift into 4th speed. It this maneuver happens at a speed of more than 60km/h and **ECON*LOCK** was permitted to lockup the converter already, **ECON*LOCK** will understand this pedal motion as a drivers intention to gear up and will lift the converter lock for only a few tenths of a second to permit a smooth gearchange.

The common point is, you need you right foot to initiate the gearing up procedure after you have changed you pre-selection upwards.

Revers it is a bit easier. Considering **ECON*LOCK** has locked the converter in 4th gear and you are driving faster than 60km/h, you might not be able to trigger a down gearing command for the ECU by jumping on the acceleration pedal. In this case you need to shift back into 3rd pre-selected gear. When you do that, stay on the acceleration pedal, not full but certainly more than 50%. This will enable a rapid down gearing by having the converter fully locked during the gear change and you will not lose any thrust.

Note: frequently down gearing does not make you faster. Toyota´s ECU cannot guarantee you, that your intention for down gearing at one speed will be really executed that way, it sometimes happens, to get you down to speeds. For example you intention is to down gear from 4 to 3 and you get instead the second speed. To avoid this, you need to use the shift. However, most of the terrain will be good for driving in S-4, high speeds on sand S-5 and forget S-6 off the roads. Also don´t play with S-3 and S-2 except you need to dig yourself out from a bomb crater.

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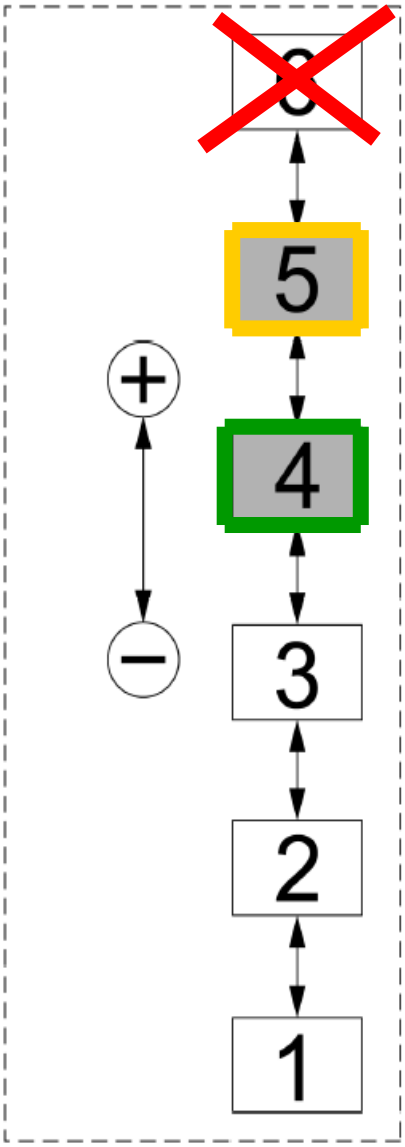

The 6th gear pre-selection:
The ECU will shift all six gears according to driving conditions, as mentioned above, this wide variety of gears needs the longest period of time to choose the correct gear. **ECON*LOCK** will lockup the converter in the 5th speed at 70km/h upwards and in 6th gear as soon as this gear is engaged, at about 110km/h at lowest throttle position or up to 150km/h at increasing throttle position. Forget this for Racing Off Road !

The 5th gear pre-selection:
The ECU will shift from one to five and **ECON*LOCK** will lockup in 5th gear at speeds higher than 70km/h. It also locks up in 4th gear during engine brake effect. This gear is suitable for speeds between 90 and 140km/h and works also as an overdrive

The 4th gear pre-selection:
This gear is 1:1 straight, provides the maximum performance and is good for speeds between 60 and 100km/h. The ECU shifts between first and fourth gear. **ECON*LOCK** locks up the converter at speeds higher than 60km/h (1500Rpm) and is also locked for engine brake support down to third gear. This is the gear, in which the ECU is keeping an eye only on speed 3 and 4. **This is YOUR GEAR on racing**!

The 3rd gear pre-selection:
The ECU shifts up to gear 3 and is for speed climbing and especially for enforced engine brake support. **ECON*LOCK** locks the converter at speeds higher than 40km/h but also down to 2nd gear for engine brake support. This is for digging in compact sand.

The 2nd gear per-selection:
This is for extreme climbing only, **ECON*LOCK** locks at 30km/h

The first gear finally is the first gear, no lockup possible.

WARNING: When racing off road, the vehicle behavior might change sudden, when **ECON*LOCK** engages the converter lockup. Especially at high speed turns on sand and gravel operate with caution.

ECON LOCK

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SOUNDS OF ECON*LOCK and trouble shooting

beep beep beep beep beep beep…..

..this indicates, that **ECON*LOCK** does not have a working communication with the ECU of the vehicle. After turning on the ignitition and/or immediately starting the engine, this beeping can last up to 10sec. At more than 10sec this beeping indicates a loss of communication, in this case check the connection of the data cable on the OBD-socket.

beeeeeeep [once]

...this indicates, that you have selected “D” or “S-6” (other versions require no brake pedal pressed at this time) and that **ECON*LOCK** is activated. This occurs, when you start the engine and shift into “D” and release the brakes (newer software version does not care about the brake pedal switch) to start driving or when **ECON*LOCK** has been deactivated by pressing “2nd” (twice) and gets reactivated by shifting into “S-6”. Please note, previous software version does not activate **ECON*LOCK** if you shift straight from “D” into S-mode while the brake pedal is pressed and brake lights are on, in this case, you are in “S-mode” but **ECON*LOCK** is not activated.

beep beep [only two times]

...this indicates, that **ECON*LOCK** has been deactivated by pressing “2nd” or has been deactivated because of safety reasons. A safety related deactivation will not allow you to reactivate **ECON*LOCK** without having the ignition turned off before and engine restarted afterwards. A safety related deactivation will be performed, if **ECON*LOCK** is detecting abnormal circuit conditions at the SLU-valve. Abnormal circuit conditions can be for example a damage to the **ECON*LOCK** cable or interferences between ECU and gearbox.

ERROR CODE with Alarm on the vehicles instrument panel flashing **4WD**, **VSC** and **ENGINE ERROR**

...this indicates, that something is wrong with the gearbox communication, there is a long list of reasons for that, from unexpected shaft speeds at certain gears engaged up to loss of connection to at least one hydraulic valve of the gearbox. **ECON*LOCK** is sitting between the SLU-valve, controlling the converter lockup and the ECU. If, for example, **ECON*LOCK** will be disconnected from the gearbox cable, the ECU cannot detect the presence of the SLU-valve and triggers this error, the vehicle steps into an emergency mode and continues to operate. That is one reason, why an optional available jumper plug has to be connected if **ECON*LOCK** will be disconnected.

If **ECON*LOCK** is not powered up (fuse removed) and this engine error appears again, **ECON*LOCK** is not responsible for this problem (as long as the gearbox cable remains connected to **ECON*LOCK**). If the engine error appears only if **ECON*LOCK** is active and is about to lockup the converter, the problem is a time out error of **ECON*LOCKs** SLU-valve simulator, in this case, you need a new controller.