



Technical Bulletin #990

Transmission: 41TE/42LE/42RLE/45RFE/545RFE
Series

Subject: Module Strategies and Learn Values

Application: All

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41TE/42LE/42RLE/45RFE/545RFE Series

Module Strategies and Learn Values

Shift Strategies

Routine shift schedules at various operating temperatures.

Extreme Cold - Oil temperature below -16° F. Park, reverse, neutral, 1st and 3rd gear in drive. Manual 2 and 1 will have 2nd gear. No EMCC

Super Cold - Oil temperature between -12° F. and 10° F. Delayed 2-3 up shifts, delayed 3-4 up shifts, early 4-3 coast down shift, high speed (4-2, 3-2, and 2-1) shifts are prevented. Shifts at higher throttle openings will be earlier. No EMCC

Cold - Oil temperature between 10° F. and 36° F. This is the same shift scheduling as Super cold with the exception that the 2-3 up shifts are not delayed.

Warm - Oil temperature between 40° F. and 80° F. Normal operations (up shifts, kick down, and coast down) No EMCC operation.

Hot - Oil temperature at start up between 80° F. and 240° F. Normal operations (up shifts, kick down, and coast down). Normal EMCC operation.

Overheat - Oil temperature above 240° F. or engine coolant temperature above 244° F. Delayed 2-3 up shifts (28-31 mph), delayed 3-4 up shifts (41-48 mph), 3rd gear FEMCC from 30-48 mph, 2nd gear PEMCC above 35 mph. Above 25 mph the torque converter will not unlock unless the throttle angle is less than 2° or kick down to 1st gear is made.

TCM Shutdown Routines

The TCM continuously checks for electrical, mechanical, and hydraulic problems. If a problem is detected, the TCM stores a DTC. Some DTCs cause the TCM to go into limp-in mode. There are 4 basic shutdown modes.

Immediate Shutdown - The TCM de-energizes the EATX relay. The system will go into an immediate fail-safe default of 2nd gear 41/42 series and 3rd gear RFE series. The RFE will have 2nd gear if the shifter is moved into the lower 2 or L ranges. Park, Neutral, and Reverse are still available.

Orderly Shutdown - The TCM recognizes a problem that does not require an immediate shutdown. The transmission will remain in current gear and the EATX relay will remain energized until the effects of de-energizing it will not cause the engine to over speed. When safe the EATX relay will be de-energized and default actions will be the same as immediate shutdown.

Technical Bulletin #990

TCM Shutdown Routines (continued)

Logical Shutdown - The TCM does not de-energize the EATX relay. Instead the transmission utilizes 1st and 3rd gears while in D and uses 2nd gear while in 2 or L. All transmission operation in this mode will be at a pre-set line pressure (open loop RFEs). The transmission will resume normal operation if the problem goes away. Three recoveries are permitted in a given key cycle, after the fourth occurrence the operation described above will be maintained.

Logical Shutdown with Recovery - Same as Logical Shutdown but resumes normal operation if the detected problem goes away. If three recoveries occur in a given key cycle an Orderly Shutdown occurs.

Quick Learn

All of the electronically controlled transmissions will have a quick learn feature that must be done after transmission repair has been completed (the exception is first design controllers used in A604; if they have been updated they will have quick learn capabilities). New seals, new rings, new clutch's mean that the shift qualities must be relearned and CVI values reset to base values in order to prevent premature failures caused during road testing. The vehicle must still be driven in order to fine tune these learn values. Quick learn resets more than 70 learn parameters to their preset values.

Drive Learn (RFE only)

The RFE transmissions have a drive learn that allows you to fine tune individual shifts such as N-D engagement feel. This feature allows individual shifts schedules to be fine tuned. Important to note; If the shift linkage is out of adjustment causing the range sensor to feed back transitional signals to the module you will have erratic shift concerns that **will not set a code** and cause shift concerns. When in OD it must read OD on the scan parameter and not a temporary (T3 or T4) parameter. Perform the Drive learn as follows for concerns:

Procedure to learn a Smooth 1st Neutral to Drive Shift

This is only if the concern is delayed or harsh shift the FIRST time the transmission is put into gear after the vehicle is allowed to set with the engine not running for at least 10 minutes.

- Transmission oil temperature must be between 80° - 110° F (27° - 43° C).
- Start engine only when the engine and ignition have been off for at least 10 minutes.
- Vehicle at a stop and service brake applied, record UD CVI while performing a Neutral to Drive Shift. During the shift, the UD CVI will temporarily show a different value which is the 1st N-1 UD CVI. The first N-1 UD CVI accounts for air entrapment in the UD clutch that may occur after the engine has been off for a period of time.
- Repeat until the recorded 1st N-1 UD CVI value stabilizes.
- It is important that this procedure be performed when the transmission temperatures were listed as above. If temperatures are higher than the previous values it must cool down before performing this learn procedure. This will improve daily as the customer uses the vehicle. The TCM also learns at higher oil temperatures, but these values (line pressure correction values) are not available for viewing on a scan tool.

Procedure to Learn a Smooth Neutral to Drive Garage Shift

Perform this procedure if the complaint is for a delayed or harsh shift when the transmission is put into gear after the vehicle has had its first shift. Use the following steps to have the TCM learn the N-1 UD CVI.

Transmission oil temperature must be between 80° - 110° F (27° - 43° C)

- Start the vehicle engine and shift to drive.
 - Move the vehicle forward to a speed of at least 10 mph and come to a stop.
 - Repeat N-1 shifts at a stop while pausing in Neutral for at least 2-3 seconds and monitor UD CVI volume until the value stabilizes. The value will change during the N-D shift. This is normal since the UD value is different for the N-1 shift than the normal value shown which is used for 4-3 coast down and kick downs.
- Perform - Repeat shifts in this temperature

Procedure to Learn a first 2-3 Shift after a Restart or Shift to Reverse

Use the following procedure to have the TCM learn the first 2-3 shift OD CVI.

Transmission oil temperature must be above 80° F (27° C).

- With engine running, select reverse gear for over 2 seconds.
- Shift the transmission to Drive and accelerate the vehicle from a stop at a steady 15 degree throttle opening and perform a 2-3 shift while noting the OD CVI. During the shift, a different value will appear on the screen, which is the 1st, 2-3 OD CVI.
- Repeat until the first 2-3 up shift becomes smooth and the first 2-3 OD CVI stabilizes.

Procedure to Learn a first 2-3 Shift after a Restart or Shift to Reverse

Use the following procedure to have the TCM learn the first 2-3 shift OD CVI.

Transmission oil temperature must be above 80° F (27° C).

- With engine running, select reverse gear for over 2 seconds.
- Shift the transmission to Drive and accelerate the vehicle from a stop at a steady 15 degree throttle opening and perform a 2-3 shift while noting the OD CVI. During the shift, a different value will appear on the screen, which is the 1st, 2-3 OD CVI.
- Repeat until the first 2-3 up shift becomes smooth and the first 2-3 OD CVI stabilizes.

Procedure to Learn a Smooth 4-3 Coast down and Part Throttle 4-3 Kick down

Use the following procedure to have the TCM learn the UD shift volume.

Transmission oil temperature must be above 110° F (43° C).

- Vehicle speed between 40 - 60 mph, perform repeated 4-3 kick down shifts.
- Repeat until the UD volume becomes somewhat stable and shifts become smooth.

Technical Bulletin #990

Drive Learn (45RFE) continued...

Procedure to Learn a Smooth 4-3 Coast down and Part Throttle 4-3 Kick down (continued)

Use the following procedure to have the TCM learn the 2C shift volume.

Transmission oil temperature must be above 110° F (43° C).

- With vehicle speed below 20 mph and the transmission in 3rd gear, perform multiple 3-2 kick downs.
- Repeat until the 3-2 kick downs become smooth and the 2C CVI becomes stable.

Procedure to learn a Smooth Manual 2-1 Pull down Shift as well as a Neutral to Reverse Shift

Use the following procedure to have the TCM learn the L/R CVI volume.

Transmission oil temperature must be above 110° F (43° C).

- With vehicle speed around 25 - 30 mph in MANUAL 2nd, perform manual pull downs to LOW or 1st gear at closed throttle.
- Repeat until the L/R CVI become stable and the manual 2-1 becomes smooth.

Procedure to learn a Smooth Neutral to Reverse Shift

Perform the following shifts.

Transmission oil temperature must be above 110° F (43° C).

- With vehicle stopped, perform NEUTRAL to REVERSE shifts until the shift is smooth. An unlearned Neutral to Reverse shift may be harsh or exhibit a double bump.

If any of the shifts are still not smooth after the clutch volume stabilizes, an internal transmission problem may be present! Always verify that the software for the TCM is the latest software.