SERVICE BULLETIN

NUMBER: 21-012-14 REV. A

GROUP: Transmission and Transfer Case

DATE: July 09, 2014

THIS BULLETIN SUPERSEDES SERVICE BULLETIN 21-012-14, DATED APRIL 25, 2014. INTERNAL ATTRIBUTES HAVE BEEN UPDATED TO ALLOW ADDITIONAL APPLICABLE VEHICLES. THERE ARE NO CHANGES TO THE CONTENT OF THE SERVICE BULLETIN.

SUBJECT:

Transmission Shift Enhancements - Adaptation Drive Learn Procedure

OVERVIEW:

This bulletin involves performing a subjective shift quality rating when customers experience poor shift quality and if necessary, performing the transmission adaptation learn procedure. In addition, this bulletin involves performing transmission adaptation learn procedure when the transmission is repaired/replaced and/or the valve body/TCU assembly (mechatronic) is replaced, or when the adaptation memory cells are cleared with the wiTECH diagnostic scan tool.

MODELS:

2013 - 2014	DS	Ram 1500 Pickup
2012 -2014	LD	Charger
2012 -2014	LX	300C
2014	WD	Durango
2014	WK	Grand Cherokee

NOTE: This bulletin applies to vehicles equipped with the 845RE (Sales Codes DFL), 8HP45 (Sales Codes DFG), or the 8HP70 8-Speed Automatic Transmission (Sales Codes DFD).

DISCUSSION:

The 845RE, 8HP45, or the 8HP70 8-Speed Automatic Transmission uses a sophisticated shift algorithm that includes learned information so that the shift quality remains excellent even as the transmission wears. This learned information is recorded in memory cells referred to "Adaptation Memory Cells". Each applied clutch records the amount of time it takes to fill the clutch (Fast Filling Counter/Filling Time) and the amount of pressure (Filling Counter/Filling Pressure). The adaptation memory cells are set to zero (0) on every new transmission (new in vehicle and/or replaced for service) and when the transmission control module is replaced for service. In addition, the adaptation memory cells are set to zero (0) when the transmission control module adaptation memory cells are cleared using

the wiTECH diagnostic scan tool. Until the adaptation has been learned/relearned, the transmission shift quality may not meet the customers expectations.

NOTE: Anytime the transmission has been overhauled (unless the valve body/TCU assembly (mechatronic) was replaced), the adaptation memory cells must be cleared using the wiTECH.

The adaptation memory cells appear on the wiTECH for every clutch. Each clutch will include:

- Fast Filling Counter = the number of filling time events that has taken place
- Filling Time = +/- number of ms (milli seconds) from zero (standard set value).
- Filling Counter = the number of filling pressure events that has taken place
- Filling Pressure = +/- mb (millibar)/PSI (Pounds Per Square Inch) from zero (standard set value)

If the adaptation memory cell "counter" is zero (0), than the adaptation memory cell has not been updated. The, Filling counter ideally should be at least 12 (6 on 8HP70/90) and Fast Filling counter at least 4 (2 on 8HP70/90) to improve shift quality and with each subsequent count, shift quality will improve even more.

Typical wiTECH Display of Adaptation Memory Cells				
Graph	Name	Value	Unit	Type
	Clutch A- Filling Pressure	0	PSI	Sensors
	Clutch A- Filling Counter	6	Counts	Sensors
	Clutch A- Filling Time	0	ms	Sensors
	Clutch A- Fast Filling Counter	2	Counts	Sensors
	Clutch B - Filling Pressure	0	PSI	Sensors
	Clutch B - Filling Counter	6	Counts	Sensors
	Clutch B - Filling Time	0	ms	Sensors
	Clutch B - Fast Filling Counter	2	Counts	Sensors
	Clutch C- Filling Pressure	1	PSI	Sensors
	Clutch C- Filling Counter	6	Counts	Sensors
	Clutch C- Filling Time	18	ms	Sensors
	Clutch C- Fast Filling Counter	2	Counts	Sensors

	Clutch D- Filling Pressure	1	PSI	Sensors
	Clutch D- Filling Counter	6	Counts	Sensors
	Clutch D- Filling Time	-6	ms	Sensors
	Clutch D- Fast Filling Counter	2	Counts	Sensors
	Clutch E- Filling Pressure	2	PSI	Sensors
	Clutch E- Filling Counter	6	Counts	Sensors
	Clutch E- Filling Time	2	ms	Sensors
	Clutch E- Fast Filling Counter	3	Counts	Sensors

SYMPTOM/CONDITION:
Customers may indicate that their transmission shift quality does not meet their expectations.

DIAGNOSIS:
Perform "REPAIR PROCEDURE A" anytime the Transmission is replaced, Transmission has been overhauled, valve body/TCU assembly (mechatronic) is replaced, and/or the adaptation memory cells have been cleared with the wiTECH.

Perform the **"EIGHT SPEED TRANSMISSION SHIFT QUALITY DIAGNOSIS"** anytime a customer indicates that their shift quality does not meet their expectations.

EIGHT SPEED TRANSMISSION SHIFT QUALITY DIAGNOSIS

To ensure that the process is repeatable, dealers should perform the following recommendations:

- Identify specific employees to perform the Subjective Shift Quality Analysis. These employees become the Qualified Subjective Shift Quality Auditors.
- Each Qualified Subjective Shift Quality Auditor should drive approximately five 8-speed vehicles to establish a baseline for the shift quality of each shift as received at the dealerships.

NOTE: This evaluation and procedure MUST NOT be done while the vehicle is still in Shipping Mode. Place the vehicle in Customer Mode prior to performing.

1. Using the wiTECH, check for active Diagnostic Trouble Codes (DTC) in the Transmission Control Module's (TCM) memory.
2. Were there any active DTC's in the TCM's memory?
   a. YES>>>Using the appropriate trouble shooting procedure, diagnose and repair conditions that may have set the DTC(s).
   b. NO>>>Proceed to the next step.

3. Start the vehicle and operate the engine until the transmission oil temperature is at least 30°C (86°F). It may be necessary to apply the service brake and shift the transmission into gear to improve warm-up time and/or drive the vehicle until the transmission temperature reaches 30°C (86°F).

NOTE: Some vehicles may be equipped with a message center in the cluster that provides transmission temperature values. If the vehicle is not equipped with this message center, than the wiTECH must be used to identify transmission temperature.

Determining Shift Quality Subjective Measurement Chart									
Condition Noted									
Not Tolerable	Severe	Very Poor	Poor	Marginal	Barely Accept	Fair	Good	Very Good	Perfect
1	2	3	4	5	6	7	8	9	10

4. The "Eight Speed Shift Quality Worksheet" will be used for documenting the Shift Quality Subjective rating as well as the Adaptation Memory Cell data. Refer to DealerCONNECT>Service>Diagnostic Check Sheets (Located on the Service Tab in the "Repair Information" box)>Transmission. Print a copy of the worksheet and attach a copy of the worksheet on the Repair Order once completed.
5. Determine shift quality using the "Determining Shift Quality Subjective Measurement Chart". Shift quality will be evaluated on a scale of 1 to 10. The shifts should include 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8 upshifts along with 8-7, 7-6, 6-5, 5-4, 4-3, 3-2, and 2-1 down shifts with light braking and reverse engagement.
6. The transmission adaptations will improve as the vehicle is driven.
7. Drive the vehicle in a safe area where the transmission is allowed to shift from first gear through each gear up to eighth gear. From a stop, slowly accelerate the vehicle using a constant throttle/pedal to approximately 72 KPH to 80 KPH (45 MPH to 50 MPH). The transmission must shift from first gear up to eighth gear.
8. Record the Shift Quality Subjective Rating for each shift.

NOTE: The Shift Quality Subjective Rating should not be established by comparing each shift event to other shift events in a single vehicle. Example: Do not compare the 1-2 shift to the 3-4 to establish the subjective rating. The Subjective Quality Rating for each shift should be established by comparing the shift quality of a specific shift to the baseline of that specific shift established from driving multiple vehicles.

NOTE: On vehicles equipped with the paddle shifter or ERS, use of the paddle shift system/ERS shifter should be used to help maintain specific gear positions.

9. From 72 KPH (45 MPH), lightly brake to a stop.

NOTE: The time allowance includes time to perform the Subjective Shift Quality assessment (upshift from first gear to eight gear and down shift from eight gear to first gear) three times if necessary.

10. On the Shift Quality Worksheet, record the Shift Quality Subjective Rating for each shift.

11. While the vehicle is static and the service brake is applied perform a shift from Neutral to Reverse.
12. If any shift has a Subjective Shift Quality Evaluation less than five (5), perform the Adaptation Drive Learn identified in "REPAIR PROCEDURE B".

NOTE: Customers may need to be informed that adaptation will continue to update as the vehicle is driven providing improved shifts as the vehicle mileage increases.

SPECIAL TOOLS/EQUIPMENT REQUIRED:

NPN	wiTECH VCI Pod Kit
NPN	Laptop

REPAIR PROCEDURE A:

NOTE: Repair Procedure A should only be performed if a Transmission is replaced, Transmission has been overhauled, valve body/TCU assembly (mechatronic) is replaced, and/or the adaptation memory cells have been cleared with the wiTECH.

1. To ensure that the process is repeatable, dealers should perform the following recommendations:
   a. Identify specific employees to perform the Adaptation Procedure. These employees become the Qualified Adaptation Procedure Technicians.
   b. Each Qualified Adaptation Procedure Technician should drive approximately five 8-speed vehicles to establish a baseline for the shift quality of each shift as received at the dealerships.

NOTE: It may be necessary to compare shift quality only to like vehicles. E. G. Ram 1500 shift quality to other Ram 1500 vehicles.

2. The Adaptation Drive Learn procedure is very sensitive to transmission temperature, transmission input shaft torque, and transmission turbine RPM. The Adaptation Drive Learn procedure must be performed at the following:
   a. Transmission Oil Temperature between 30°C (86°F) - 100°C (212°F).
   b. UPSHIFTS - Transmission input Shaft Torque between Between 100 N·m and 150 N·m (74 ft. lbs. and 111 ft. lbs.) (will be monitored on wiTECH as Engine Crankshaft Torque).
   c. UPSHIFTS - Transmission input shaft RPM 1250 - 2000 RPM (can be monitored by monitoring Engine RPM using the tachometer on the cluster).
3. The Adaptation Drive Learn procedure will be performed driving the vehicle while maintaining the previous criteria. The following needs to be considered when determining the Adaptation Drive Learn procedure drive route:
   a. The Adaptation Drive Learn procedure needs to be performed on a road that can be driven safely while accelerating repeatedly to a speed of 64 - 80 KPH (40 - 50 MPH).
   b. The route road needs to be very smooth - imperfections in the road surface such as pot holes, tar strips, etc. can cause minor deflections in torque causing a delay in obtaining the adaptation.

c. Avoid hills although a constant slight incline will allow the transmission input shaft torque to be obtained easier. A too severe of an incline may cause the transmission to down shift. The adaptation must be learned in the proper gear. The procedure will restart once the proper gear has been obtained. Also, if the route contains hills that both incline and decline, the transmission input shaft torque load may be too light and the adaptations will not be recorded.
d. Traffic congestion should be avoided. The procedure will require the vehicle to be driven safely while accelerating repeatedly to a speed of 64 - 80 KPH (40 - 50 MPH).
e. Avoid Traffic Lights/Stop Signs/Yield Signs/etc. The procedure will require the vehicle to be driven safely while accelerating repeatedly to a speed of 64 - 80 KPH (40 - 50 MPH).
f. The Adaptation Drive Learn procedure is performed with an assistant so that wiTECH can be properly monitored while maintaining safe driving practices.

4. With the Scan Tool, erase transmission related DTCs.
5. Accelerate the vehicle from a stop to approximately 64 - 80 KPH (40 - 50 MPH) making sure the transmission upshifts to seventh gear. The following parameters must be kept during acceleration in order for the adaptation to take place:
   a. Turbine (Input) Speed between 1,250 - 2,000 rpm
   b. Torque between 100 N·m and 150 N·m (74 ft. lbs. and 111 ft. lbs.)
6. Release the throttle (0% position) allowing the vehicle to coast until the transmission performs a 6-5 down-shift.

NOTE: In order for the adaptation of the B Clutch, the transmission must be allowed to perform a 6-5 downshift without braking with transmission input shaft torque between negative (-) 60 N·m and negative (-) 40 N·m (negative (-) 44 ft. lbs. and negative (-) 30 ft. lbs.) and input shaft RPM Between 750 and 1100 rpm.

7. Continue to coast (brake can be applied once the 6-5 downshift has occurred) until third gear can be obtained.
8. Perform steps 4-6 until the Filling Counters for each clutch displays:
   a. **8HP45/845RE - Filling Counters by 10 counts**
   b. **8HP70/8HP90 - Filling Counters by 6 counts**
9. The tables below may be used as an alternate reference for the optimal conditions required to learn the Fast Filling Adaptations.

Adaptation Conditions Table			
Conditions Where Adaptations Occur			
Condition	Transmission Temperature	Torque N·m (ft. lbs.)	Input Speed (RPM)
Upshifts	Between 30° C and 100° C (86° F and 212° F)	Between 100 N·m and 150 N·m (74 ft. lbs. and 111 ft. lbs.)	Between 1250 and 2000 rpm
6-5 Downshifts for B Clutch	Between 30° C and 100° C (86° F and 212° F)	Between negative (-) 60 N·m and negative (-) 40 N·m (negative (-) 44 ft. lbs. and negative (-) 30 ft. lbs.)	Between 750 and 1100 rpm

Clutch versus Shift Table					
Shifts Where Each Clutch Will Adapt					
	A Clutch	B Clutch	C Clutch	D Clutch	E Clutch
Shift	6 - 7	6 - 5	2 - 3 and 4 - 5	3 - 4	1 - 2 and 5 - 6
Optimal conditions under which adaptation learning occurs	Best performed at highway speeds in excess of 80 kph (50 mph)	Coasting with throttle at 0% position	Best performed at light to medium throttle - normal vehicle launch	Best performed at light to medium throttle - normal vehicle launch	Best performed at light to medium throttle - normal vehicle launch

10. Perform the **"EIGHT SPEED TRANSMISSION SHIFT QUALITY DIAGNOSIS"**.

REPAIR PROCEDURE B:

NOTE: Repair Procedure B should only be performed if a customer indicates that their shift quality does not meet their expectations.

1. To ensure that the process is repeatable, dealers should perform the following recommendations:
   a. Identify specific employees to perform the Adaptation Procedure. These employees become the Qualified Adaptation Procedure Technicians.
   b. Each Qualified Adaptation Procedure Technician should drive approximately five 8-speed vehicles to establish a baseline for the shift quality of each shift as received at the dealerships.

NOTE: It may be necessary to compare shift quality only to like vehicles. E. G. Ram 1500 shift quality to other Ram 1500 vehicles.

2. The Adaptation Drive Learn procedure is very sensitive to transmission temperature, transmission input shaft torque, and transmission turbine RPM. The Adaptation Drive Learn procedure must be performed at the following:
   a. Transmission Oil Temperature between 50°C (122°F) - 100°C (212°F).
   b. UPSHIFTS - Transmission input Shaft Torque between Between 100 N·m and 150 N·m (74 ft. lbs. and 111 ft. lbs.) (will be monitored on wiTECH as Engine Crankshaft Torque).
   c. UPSHIFTS - Transmission input shaft RPM 1250 - 2000 RPM (can be monitored by monitoring Engine RPM using the tachometer on the cluster).

NOTE: Adaptation learning will be aborted if the transmission oil temperature is above 100° C (212° F).

3. The Adaptation Drive Learn procedure will be performed driving the vehicle while maintaining the previous criteria. The following needs to be considered when determining the Adaptation Drive Learn procedure drive route:
   a. The Adaptation Drive Learn procedure needs to be performed on a road that can be driven safely while accelerating repeatedly to a speed of 64 - 80 KPH (40 - 50 MPH).

b. The route road needs to be very smooth - imperfections in the road surface such as pot holes, tar strips, etc. can cause minor deflections in torque causing a delay in obtaining the adaptation.
c. Avoid hills although a constant slight incline will allow the transmission input shaft torque to be obtained easier. A too severe of an incline may cause the transmission to down shift. The adaptation must be learned in the proper gear. The procedure will restart once the proper gear has been obtained. Also, if the route contains hills that both incline and decline, the transmission input shaft torque load may be too light and the adaptations will not be recorded.
d. Traffic congestion should be avoided. The procedure will require the vehicle to be driven safely while accelerating repeatedly to a speed of 64 - 80 KPH (40 - 50 MPH).
e. Avoid Traffic Lights/Stop Signs/Yield Signs/etc. The procedure will require the vehicle to be driven safely while accelerating repeatedly to a speed of 64 - 80 KPH (40 - 50 MPH).
f. The Adaptation Drive Learn procedure is performed with an assistant so that wiTECH can be properly monitored while maintaining safe driving practices.

4. With the Scan Tool, erase transmission related DTCs.

NOTE: First and second gears do not require a standard clutch filling adaptation procedure.

5. Use the following "8-Speed Clutch Application Chart" and the "Standard Clutch Filling Adaptation Conditions Table" to determine which clutches require adaptation based upon which shifts had a Subjective Shift Quality Evaluation less than five (5) as identified in the Diagnosis Section. Example: When performing the diagnosis, it was determined that the 2-1 downshift had a subjective rating of 4. Note that clutch "C" and clutch "E" are applying and releasing while clutch "A" and clutch "B" remain engaged. Since clutch "A" and clutch "B" are not applying and releasing, they will not have anything to do with poor shift quality during the 2-1 downshift. However, during the 2-1 downshift, clutch "E" is releasing and clutch "C" is applying thus it is recommended that both of these clutches require the adaptation to be updated. Using the "Standard Clutch Filling Adaptation Conditions Table", clutch "C" and clutch "E" require the adaptation procedure which are performed in 4th and 7th gear.

8-Speed Clutch Application Chart					
Gear	Clutch - A)	Clutch - B	Clutch - C	Clutch - D	Clutch - E
First	X	X	X		
Second	X	X			X
Third		X	X		X
Fourth		X		X	X
Fifth		X	X	X	
Sixth			X	X	X
Seventh	X		X	X	
Eight	X			X	X
Reverse	X	X		X	

Standard Clutch Filling Adaptation Conditions Table				
Steady State Gears And Conditions Where Each Clutch Will Adapt				
Clutch/Gear	Optimal Vehicle Speed	Input Speed RPM	Torque N·m (ft. lbs.)	Transmission Temperature
A Clutch/6th	73-81 kph (45-50 mph)	Between 950 and 1750 rpm	Between 50 N·m and 120 N·m (37 ft. lbs. and 89 ft. lbs.)	Between 50° C and 100° C (122° F and 212° F)
B Clutch/7th	73-81 kph (45-50 mph)	Between 950 and 1750 rpm	Between 50 N·m and 120 N·m (37 ft. lbs. and 89 ft. lbs.)	Between 50° C and 100° C (122° F and 212° F)
C Clutch/4th	32-56 kph (20-35 mph).	Between 950 and 1750 rpm	Between 25 N·m and 120 N·m (18 ft. lbs. and 89 ft. lbs.)	Between 50° C and 100° C (122° F and 212° F)
D Clutch/3rd	32-56 kph (20-35 mph).	Between 950 and 1750 rpm	Between 25 N·m and 120 N·m (18 ft. lbs. and 89 ft. lbs.)	Between 50° C and 100° C (122° F and 212° F)
E Clutch/7th	73-81 kph (45-50 mph)	Between 950 and 1750 rpm	Between 25 N·m and 120 N·m (18 ft. lbs. and 89 ft. lbs.)	Between 50° C and 100° C (122° F and 212° F)

6. Drive the vehicle using the paddle shifters or Gear +/- buttons on steering wheel to hold the transmission in the desired gear while maintaining the optimum input shaft speed and torque.
7. Then, increment the Filling Counter and Fast Filling Counter for each clutch requiring an adaptation update.
   a. **8HP45/845RE - Filling Counters by 12 counts and Fast Filling Counters by 4 counts**
   b. **8HP70/8HP90 - Filling Counters by 6 counts and Fast Filling Counters by 2 counts**
8. Perform the **"EIGHT SPEED TRANSMISSION SHIFT QUALITY DIAGNOSIS"** to verify the repair.

POLICY:
Reimbursable within the provisions of the warranty.

TIME ALLOWANCE:

Labor Operation No:	Description	Skill Category	Amount
08-19-05-9A	Adaptation Drive Learn - Determining Shift Quality Subjective Measurement, (2 -Skilled)	2- Automatic Transmission	0.5 Hrs.
08-19-05-9B	Adaptation Drive Learn - Repair B- Adaptation for Specific Shift Quality Concerns - Drive Learn Two Clutches (2 -Skilled)	2- Automatic Transmission	1.9 Hrs.
08-19-05-9C	Adaptation Drive Learn - Repair A - Adaptation After Transmission Repair, Replacement, and/or valve body/TCU assembly (mechatronic) Replacement (2 -Skilled)	2- Automatic Transmission	1.4 Hrs.
95-21-44-02	Adaptation Drive Learn - Determining Shift Quality Subjective Measurement — Porters Time Flat Fee Allowance		$25.00
95-14-01-02	Adaptation Drive Learn -Fuel Allowance - A Copy of the Fuel Receipt Must be Attached to the Repair Order		$32.00
Related Operations No:			
08-19-05-54	Adaptation Drive Learn - Repair B- Adaptation for Specific Shift Quality Concerns - Vehicles Equipped Without ERS or Paddle Shifter (2 -Skilled)	2- Automatic Transmission	0.3 Hrs.
08-19-05-55	Adaptation Drive Learn - Repair B - Each Additional Clutch (Maximum Three)	2- Automatic Transmission	0.2 Hrs.

FAILURE CODE:

ZZ	Service Action