



Technical Service Information

FORD/MAZDA FNR5/5NR5 PRELIMINARY INFORMATION

Beginning at the start of production for the 2006 model year, four cylinder applications in Ford Fusion, Mercury Milan, Lincoln MKZ, Zephyr, and Mazda 3 and 6 series, now utilize a new version of the 4F27E/FN4A-EL transaxle which goes by the name of the FNR5/5NR5. This new transaxle has been redesigned to accommodate five forward ratios thru a new intermediate gear set. This gear set has been split up into a planetary assembly capable of placing the pinion shaft into a reduction, or 1:1 ratio. Mechanical control of the intermediate shaft is comprised of a reduction brake, a one-way roller clutch and a direct (5th) clutch. Hydraulic and electronic control of this new gear set are located under the pan on the side of the transmission. The TCM monitors applications, gear changes and ratios with the added forward clutch pressure switch and the intermediate shaft speed sensor, which reads the driven transfer gear. The TCM has incorporated Electronic Synchronous Shift Control (ESSC), which provides greater adaptive control of the shift elements to avoid abrupt gear changes and downshifts. The ESSC is also capable of adapting shift control as wear accumulates in the Transaxle to prolong it's life.

Refer to the following figures to see the changes that took place in the electronics, gear train, the added valve body, and the casing to make this possible.

Refer to Figure 1 to see 4F27E/FN4A-EL and FNR5/5NR5 application charts to show the similarity between them.

Refer to Figure 2 to see a view of the 4F27E/FN4A-EL and FNR5/5NR5 for external identification, and location of the added Intermediate Shaft Speed Sensor.

Refer to Figure 3 to see the location of the Forward Clutch Pressure switch and it's function as well as pressure tap information on the front side of the case.

Refer to Figure 4 to see an exploded view of the Intermediate shaft and all of its components.

Refer to Figure 5 to see the power-flow of the Intermediate shaft in Reduction, 1st, 2nd, 3rd and 4th gears.

Refer to Figure 6 to see the power-flow of the Intermediate shaft in 1:1, 5th gear.

Refer to Figure 7 to see the Location of the Pressure Control Solenoid "B" and Shift solenoid "F" and their ohm test values.

Refer to Figure 8 to see case passage identification of the Secondary Valve Body.

Refer to Figure 9 for Main Case Rear Cover side Passage identification.

Refer to Figure 10 for Rear Cover Passage identification.

Refer to Figure 11 for Main Case Valve Body side Passage identification.

Refer to Figure 12 for Secondary Valve Body Passage identification.

Refer to Figure 13 for Hydraulic schematics of the Secondary Valve Body in Forward ranges 1st thru 4th Gears.

Refer to Figure 14 for Hydraulic schematics of the Secondary Valve Body in Forward ranges 5th Gear.

Refer to Figure 15 for Hydraulic schematics of the Secondary Valve Body in Reverse range, as well as a description of hydraulic flow.



Technical Service Information

TRANSAXLE COMPONENT APPLICATION CHART AND RATIO INFORMATION

4F27E/FN4A-EL TRANSAXLE COMPONENT APPLICATION CHART

RANGE	Forward Clutch	2nd-4th Band	Direct Clutch	Reverse Clutch	Low/Rev Clutch	Low One-Way Clutch	Gear Ratio
PARK							
REVERSE				ON	ON		2.65
NEUTRAL							
DRIVE-1st	ON					HOLD	2.82
DRIVE-2nd	ON	ON					1.50
DRIVE-3rd	ON		ON				1.00
DRIVE-4th		ON	ON				0.73
MANUAL-2nd	ON	ON					1.50
MANUAL-1st	ON				ON		2.82

NOTE: Failsafe on this unit is 3rd gear in all forward ranges.

FNR5/5NR5 TRANSAXLE COMPONENT APPLICATION CHART

RANGE	Forward Clutch	2-4 Brake Band	3rd&4th Clutch	Reverse Clutch	Low/Rev Clutch	Low One-Way Clutch	Direct Clutch 5th	Reduction Brake & OWC*	Gear Ratio
PARK								ON	
REVERSE				ON	ON			ON	3.40
NEUTRAL								ON	
DRIVE-1st	ON					HOLD		ON	3.61
DRIVE-2nd	ON	ON						ON	1.92
DRIVE-3rd	ON		ON					ON	1.28
DRIVE-4th		ON	ON					ON	0.93
DRIVE-5th		ON	ON				ON		0.69
MANUAL-2nd	ON	ON						ON	1.92
MANUAL-1st	ON				ON			ON	3.61

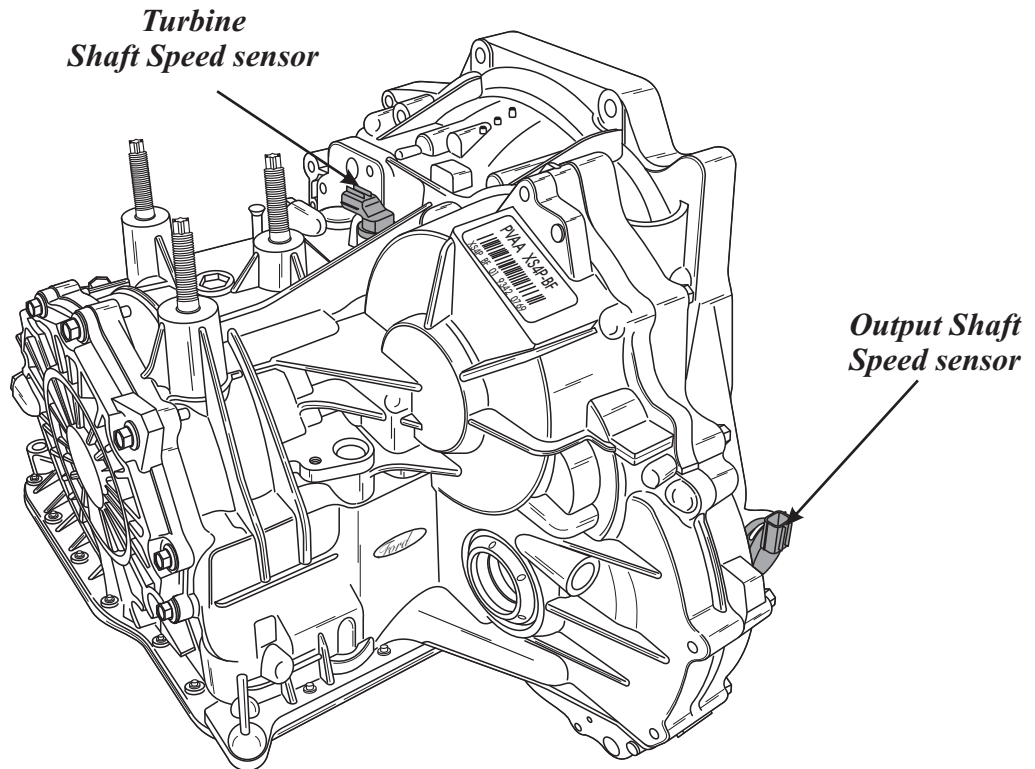
NOTE: Failsafe on this unit is 3rd gear in all forward ranges.

***OWC = One Way Clutch, which is locked when the Reduction Brake is ON**

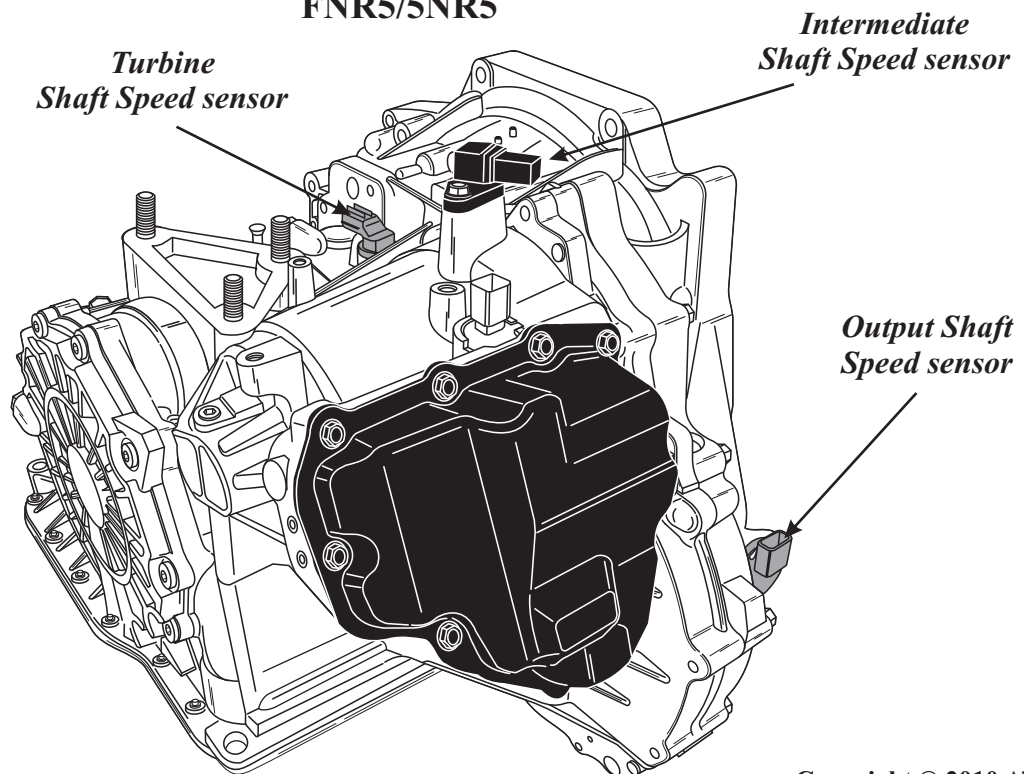
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Figure 1

FORD/MAZDA 4F27E/FN4A-EL



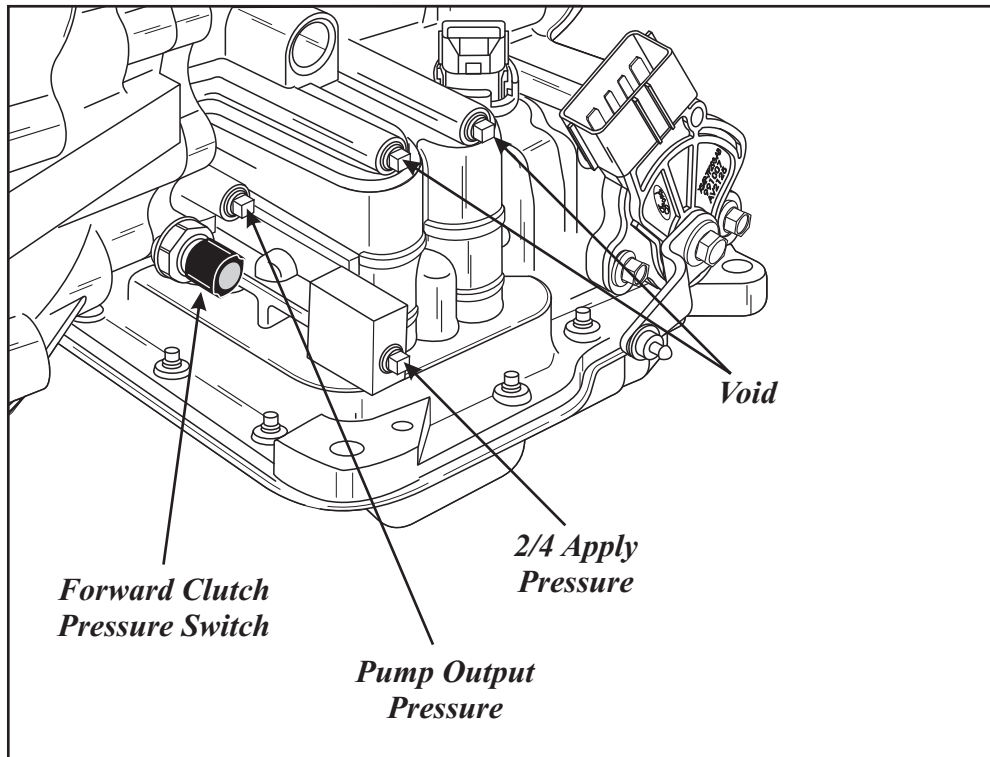
FORD/MAZDA FNR5/5NR5



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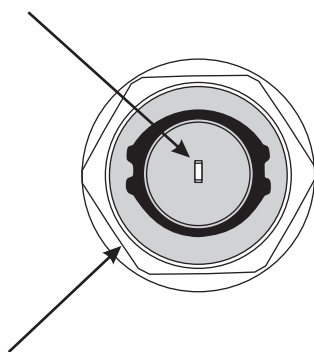
Figure 2

FORWARD CLUTCH PRESSURE SWITCH LOCATION

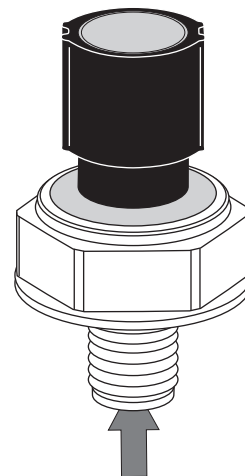


FORWARD CLUTCH PRESSURE SWITCH OPERATION

*Connect Positive lead here
(Single terminal)*



*Connect Negative lead here
(Casing of the switch)*



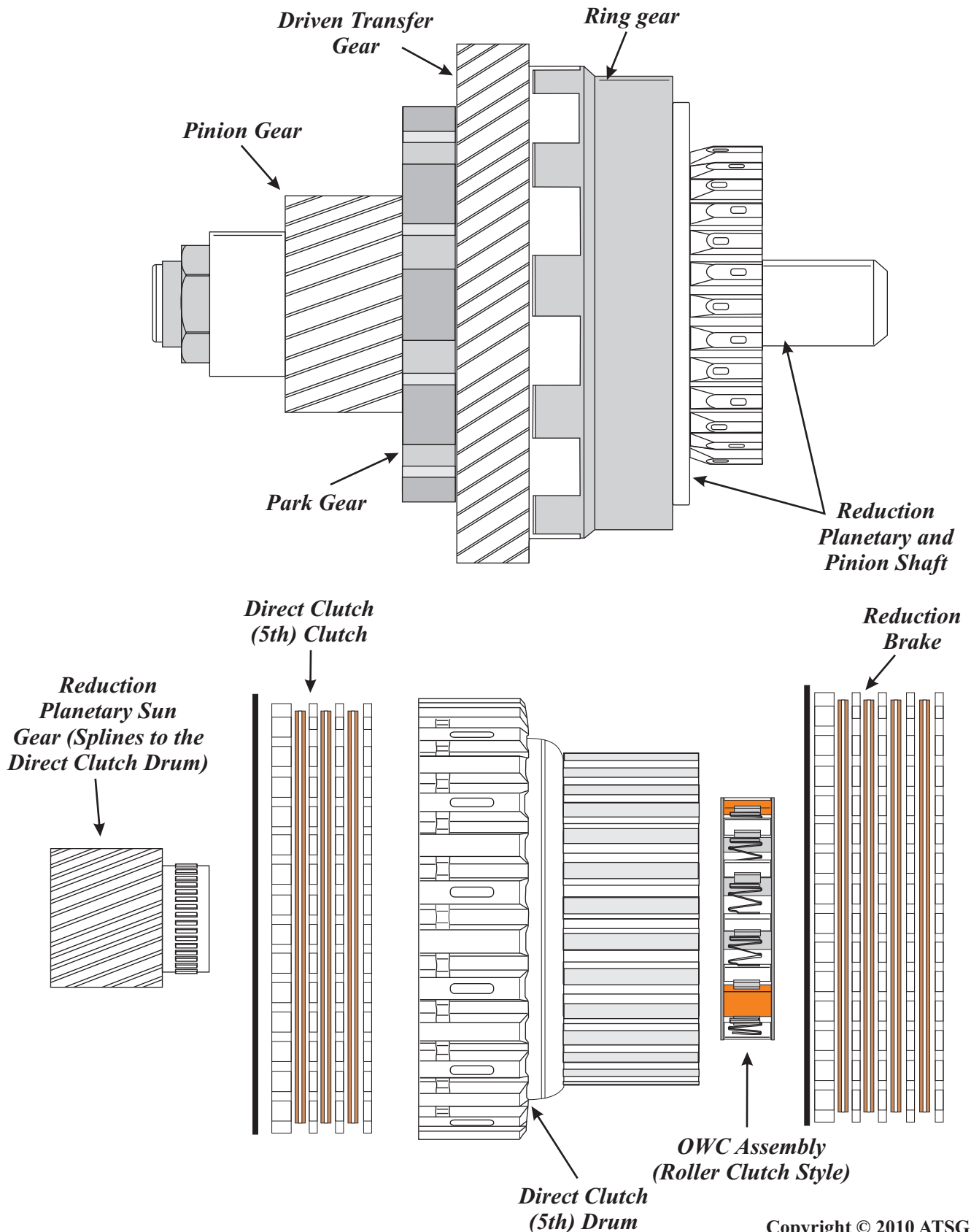
Apply air pressure here

The Forward Clutch Pressure switch is a Normally Open switch. It closes at approximately 40 psi. This switch provides information to the TCM during Drive engagement and for passing gear, to ensure smooth engagements and downshifts.

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Figure 3

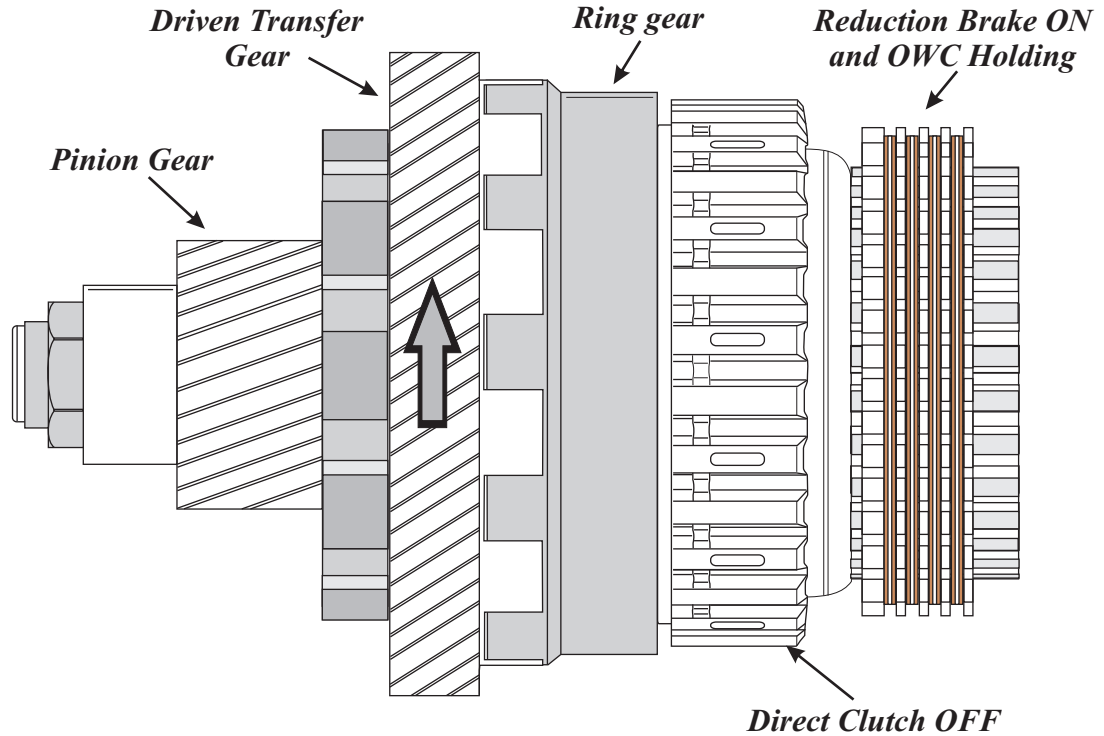
INTERMEDIATE SHAFT COMPONENTS



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Figure 4

REDUCTION 1st, 2nd, 3rd AND 4th GEARS

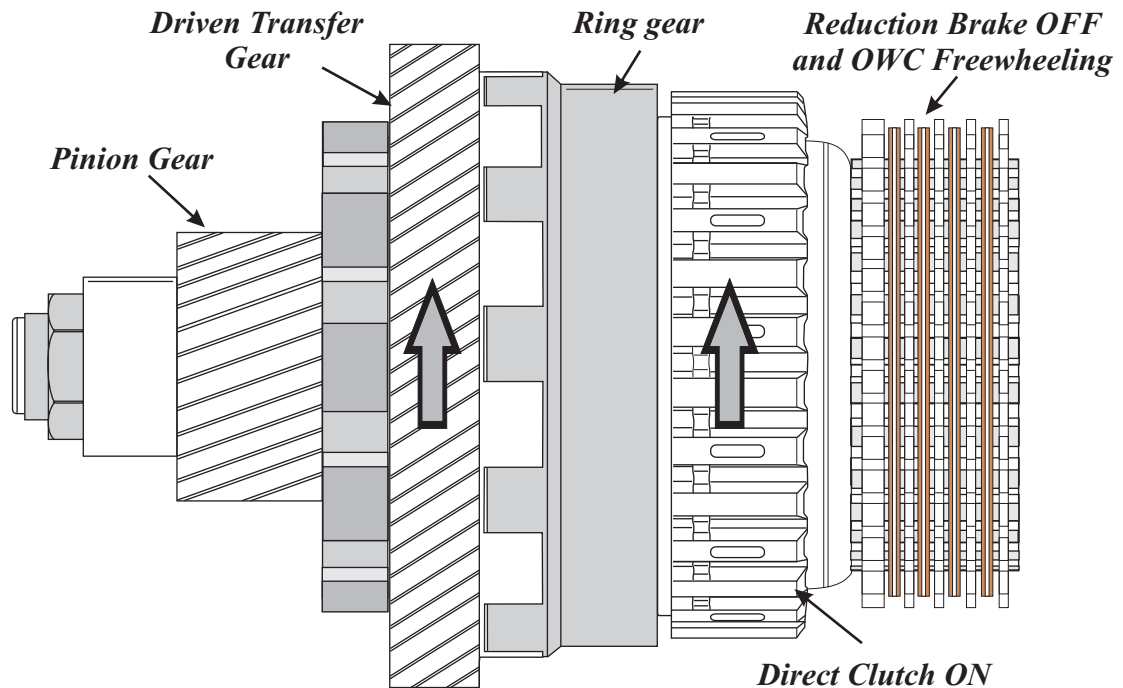


Summary: The Driven transfer gear drives the ring gear around the planetary pinions and the sun-gear which is held by the Direct Clutch housing creating a gear reduction.

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Figure 5

1:1 5th GEAR

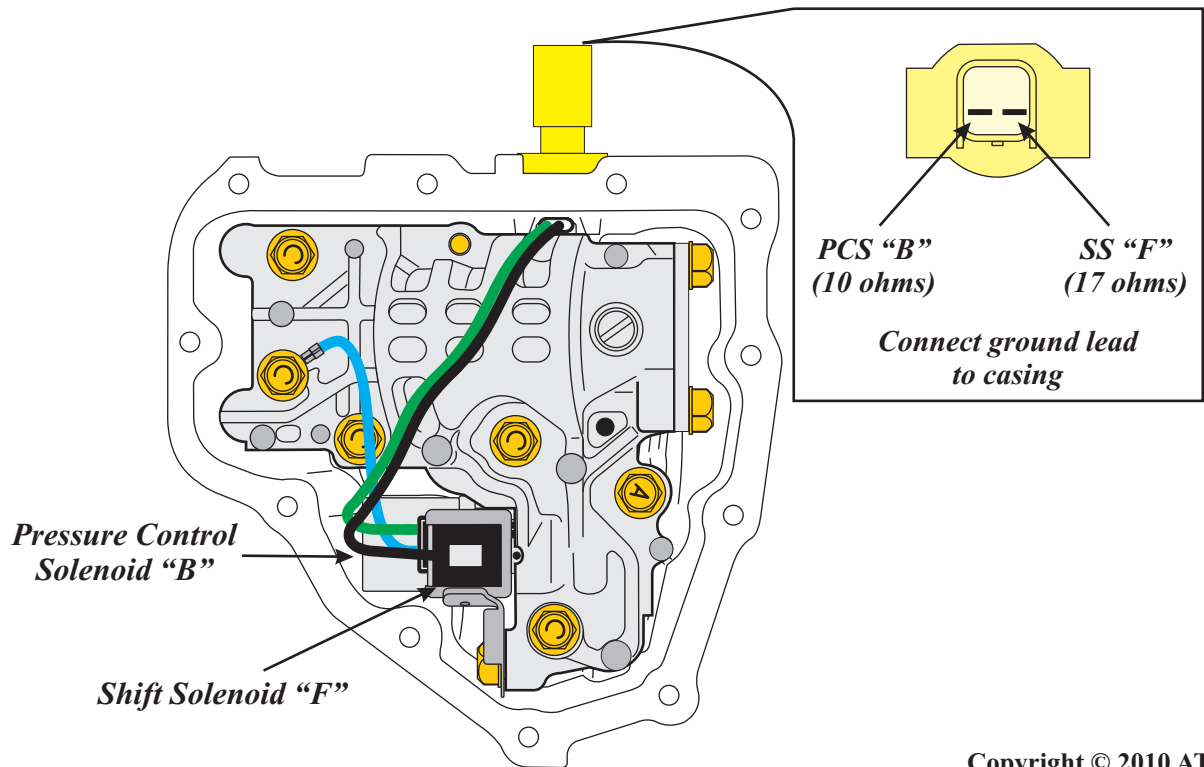


Summary: The Direct Clutch is ON and the Driven transfer gear drives the planetary at a 1:1 ratio.

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Figure 6

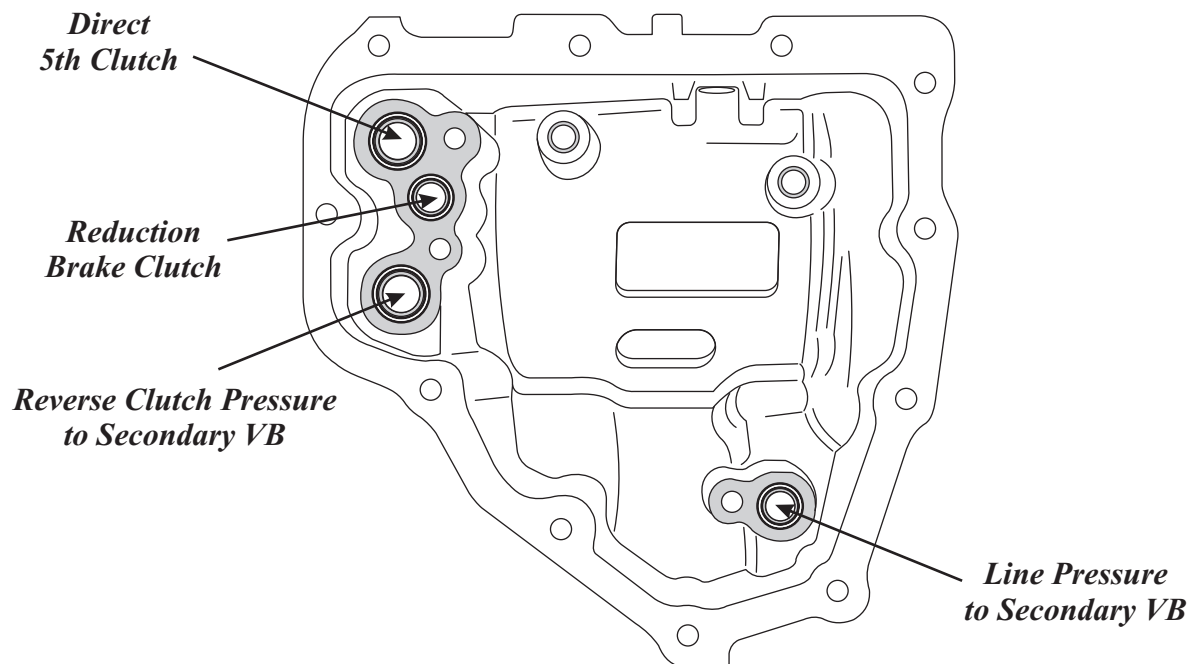
SECONDARY VALVE BODY SOLENOID LOCATION



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Figure 7

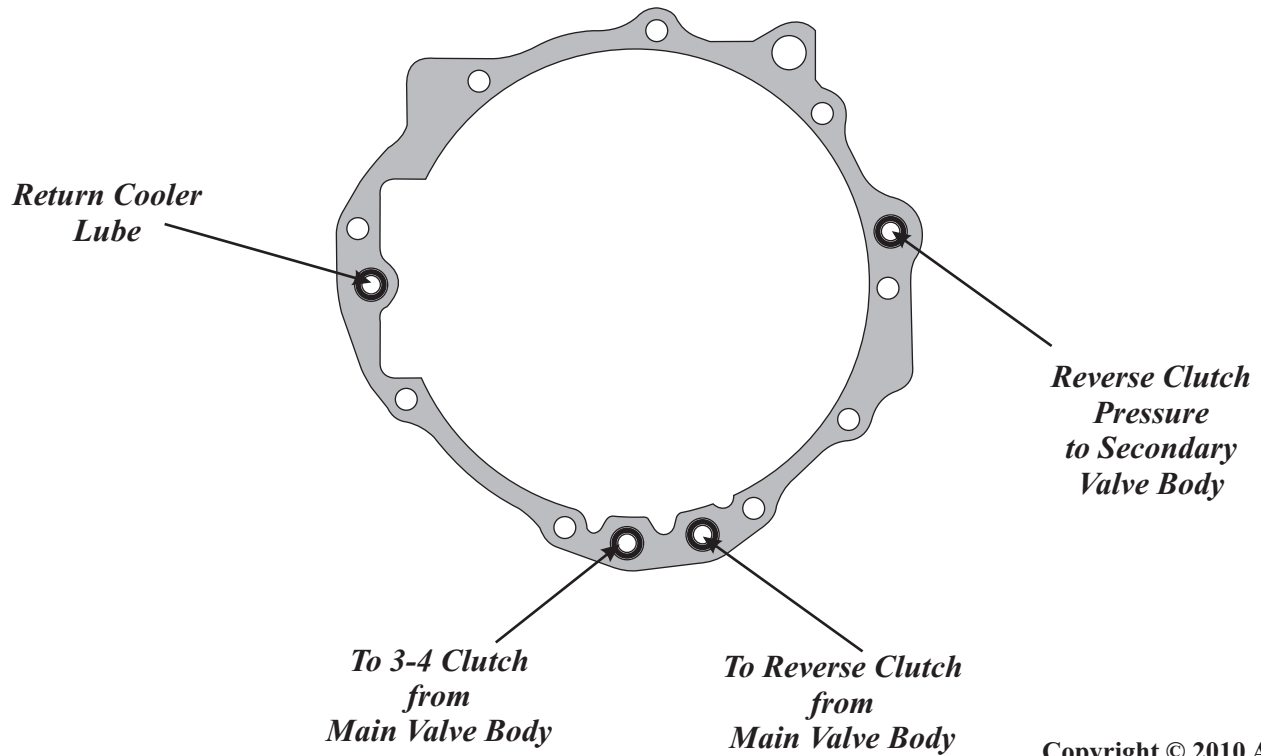
SECONDARY VALVE BODY CASE PASSAGE IDENTIFICATION



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Figure 8

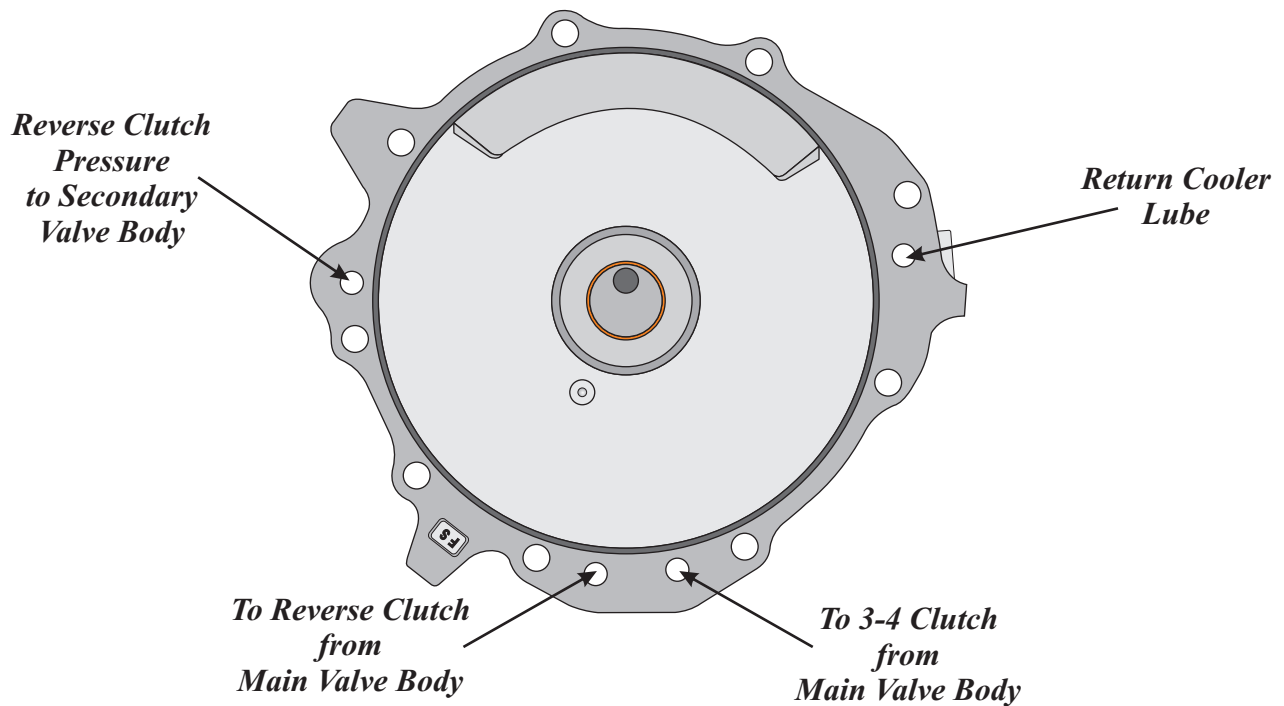
Main Case Rear Cover Side



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Figure 9

Rear Cover



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Figure 10

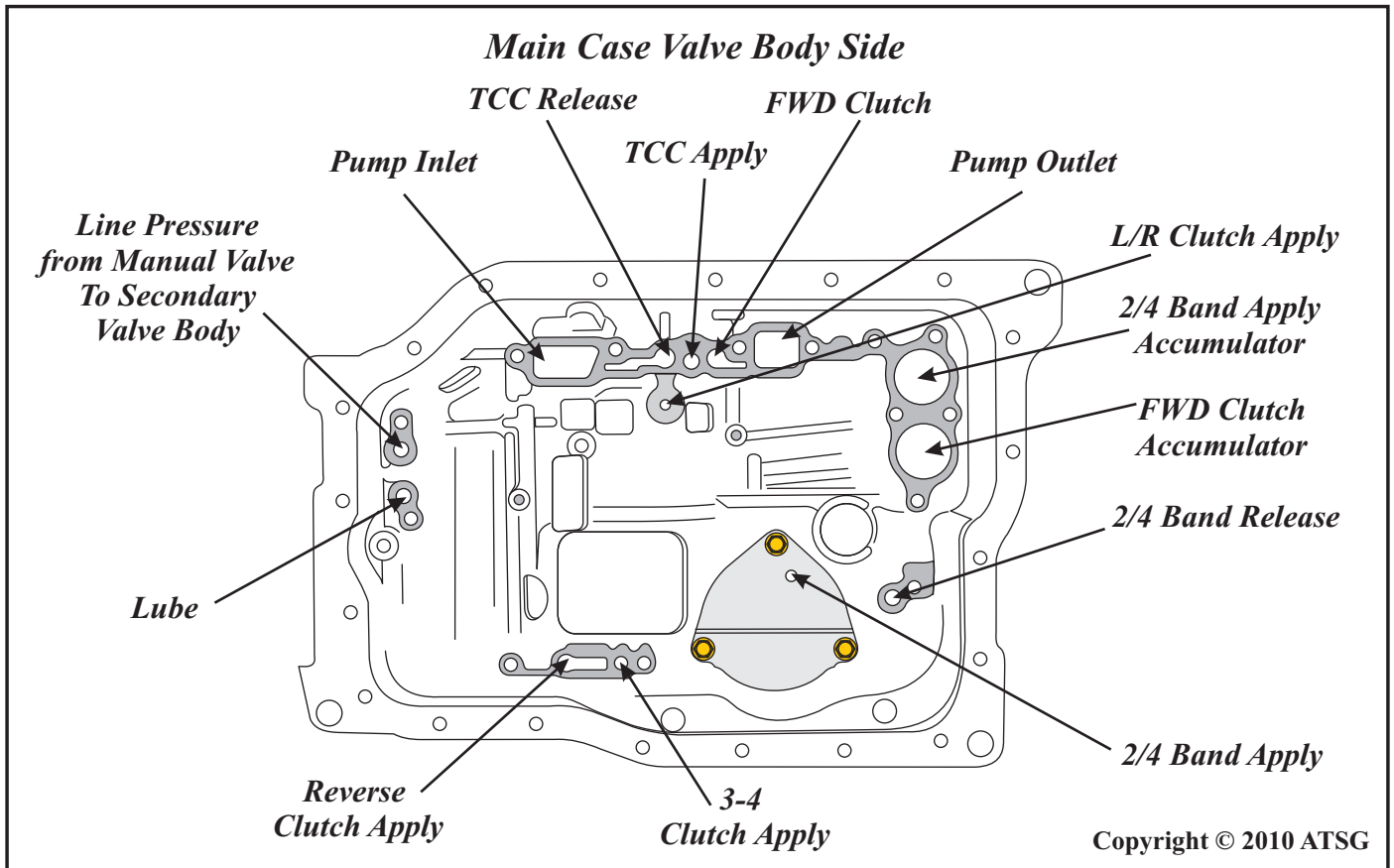


Figure 11

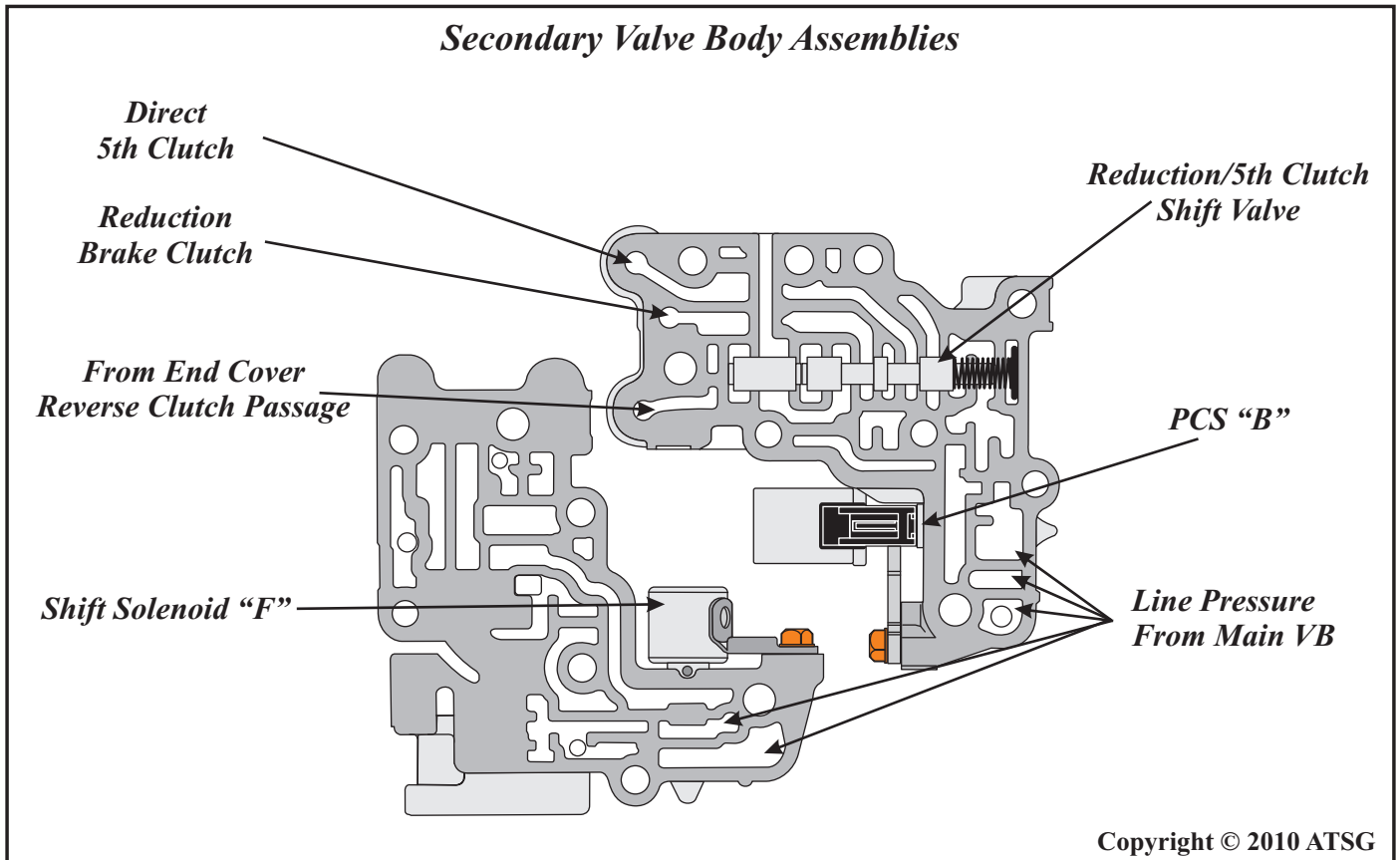
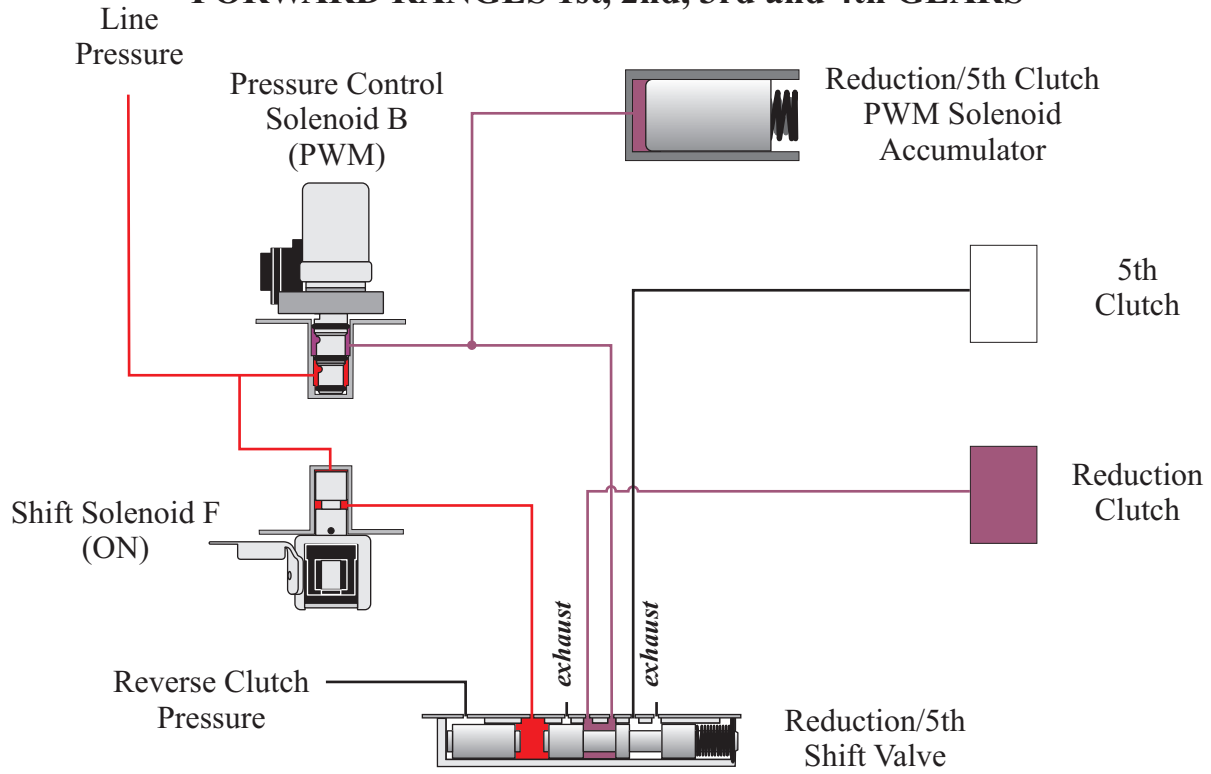


Figure 12

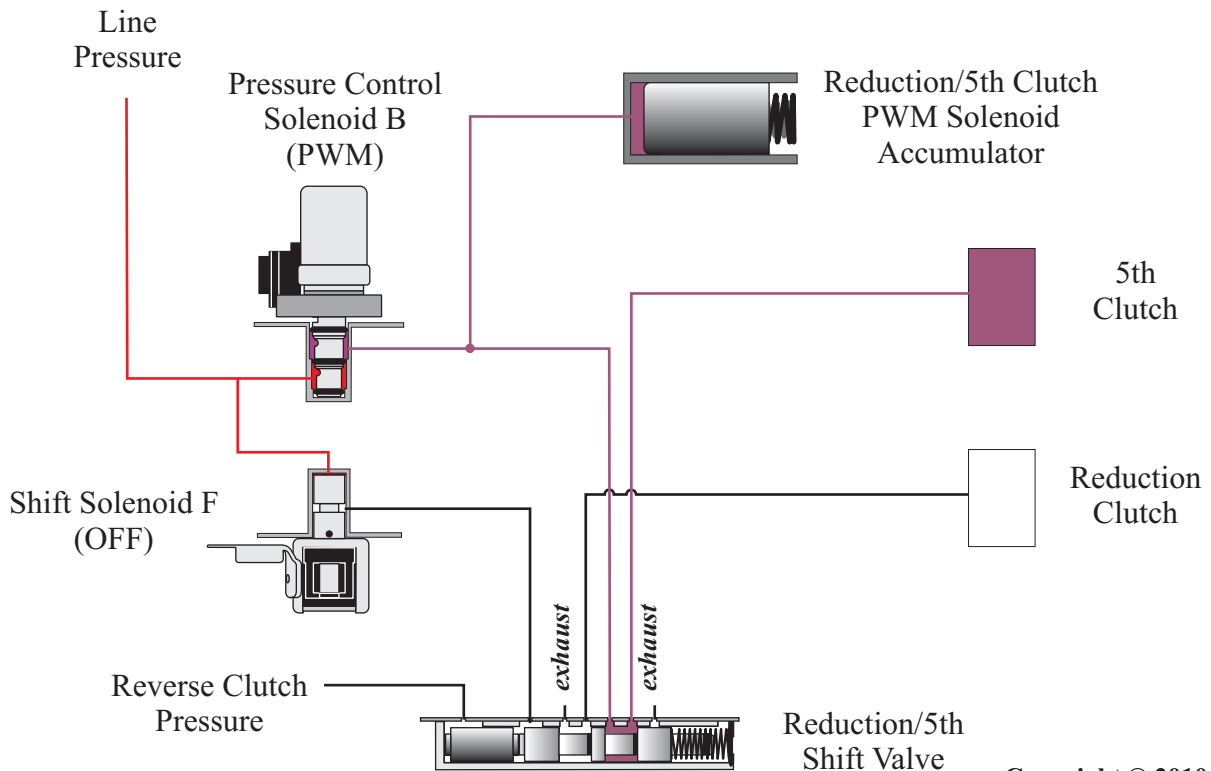
FORWARD RANGES 1st, 2nd, 3rd and 4th GEARS



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Figure 13

FORWARD RANGE 5th GEAR



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Figure 14

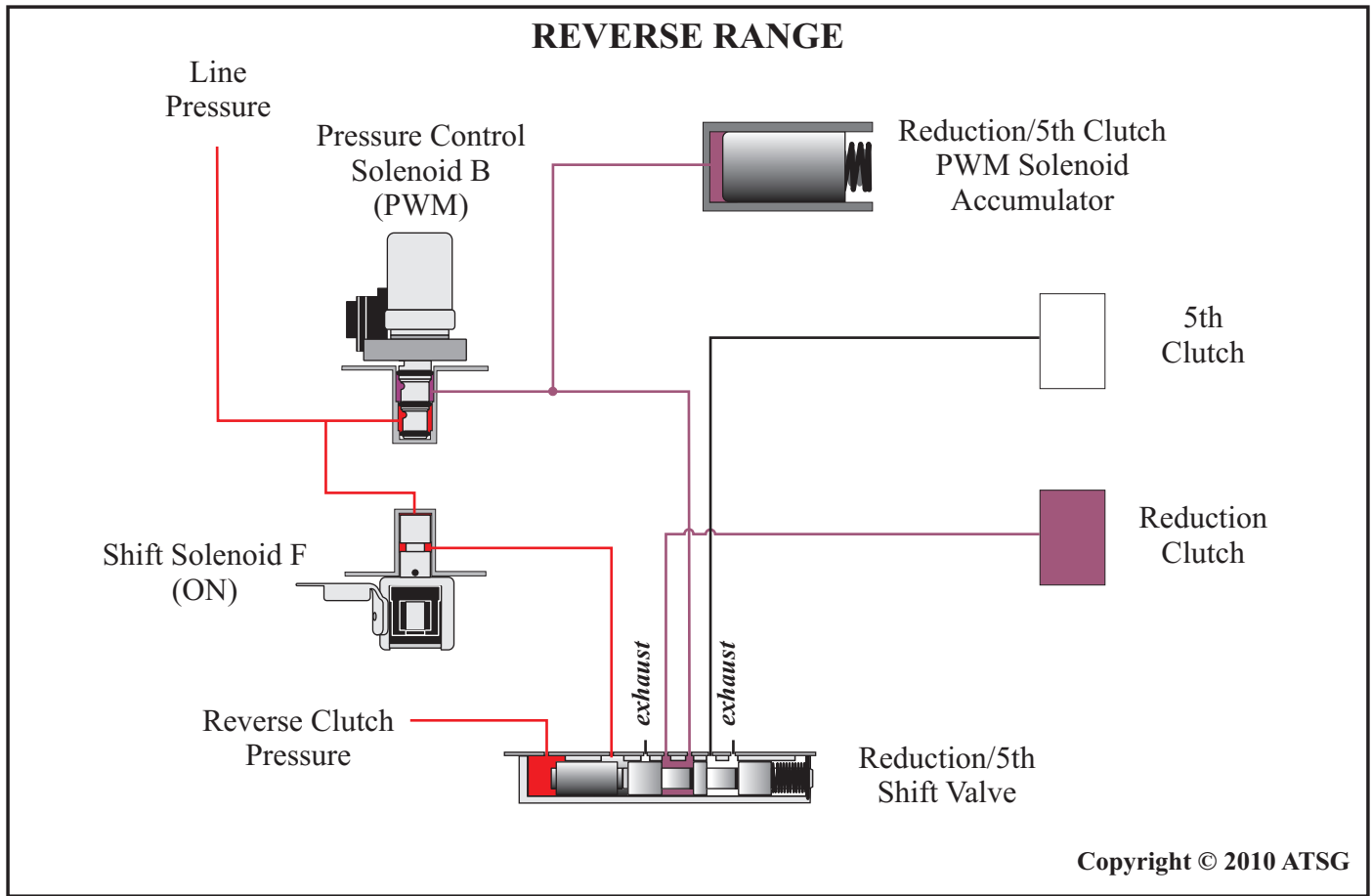


Figure 15

NOTE: When the Reduction/5th clutch shift valve is held closed by spring tension, the valve is in the 5th clutch apply position. When the valve is stroked by Shift Solenoid F, the valve is in the Reduction clutch apply position. PCS B controls the apply of both clutches and a sprag assists in the 4-5 & 5-4 timing. The accumulator is used to absorb the pulsing from PCS B. Reverse clutch oil is used to stroke the Reduction/5th Clutch Shift Valve to ensure that the valve is in the Reduction Brake Clutch apply position and also allows for a Reverse engagement in failsafe conditions.

Many thanks for the good folks at Alto for providing ATSG with an FNR5 transmission.