

2008 Ford Mustang
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

2008 TRANSMISSIONS

Automatic Transaxle/Transmission - 5R55S - Mustang

SPECIFICATIONS

Material

Item	Specification	Fill Capacity
Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 (Rotunda)	-	-
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V	-
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B	-
Premium Long-Life Grease XG-1-C or XG-1-K (US); CXG-1-C (Canada)	ESA-M1C75-B	-

GENERAL SPECIFICATIONS

Item	Specification
CAUTION: Use only MERCON® V transmission fluid. Use of any other fluids may result in transmission failure. - Normal maintenance - Fluid change not necessary, filled for life. - Severe duty maintenance - Change the fluid at 48,000 km (30,000 mi) intervals.	
NOTE: Approximate dry capacity includes cooler and tubes. Fluid level procedures should be used to determine actual fluid requirements and fluid specification. DO NOT OVERFILL. If it is necessary to add or change fluid, use only fluid which has been certified by the supplier as meeting the Ford Motor Company specification shown.	
Fluid Filter	
In-Line Transmission Fluid Filter Kit 7B155	-
In-Line Transmission Fluid Filter 7B155	-

ASSEMBLY WEIGHT

Description	Specification
4.0L Equipped Vehicles	87.5 kg (193 lb)
4.6L Equipped Vehicles	88.3 kg (195 lb)

END PLAY SPECIFICATIONS

Transmission Overdrive End	Select Thrust Washer (No. 1 Nylon)	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Play Dimension D	Part Number	Thickness	ID: Color
38.05-38.13 mm (1.498-1.501 in)	F7TZ-TA	1.55-1.60 mm (0.061-0.063 in)	White
38.14-38.23 mm (1.50-1.51 in)	F7TZ-MA	1.75-1.80 mm (0.069-0.071 in)	Green
38.29-38.42 mm (1.507-1.513 in)	F7TZ-NA	1.85-1.90 mm (0.073-0.075 in)	Red
38.43-38.61 mm (1.51-1.52 in)	F7TZ-RA	2.05-2.10 mm (0.081-0.083 in)	Black
38.62-38.74 mm (1.52-1.53 in)	F7TZ-SA	2.15-2.20 mm (0.095-0.097 in)	Yellow

END PLAY SPECIFICATIONS

Rear (No. 4) Dimension E	Selective Needle Bearings (No. 4)		ID: Notches
	Part Number	Thickness	
1.67-1.85 mm (0.066-0.073 in)	XW4Z-7D014-CA	2.65-2.80 mm (0.104-0.110 in)	0
1.86-2.04 mm (0.073-0.080 in)	XW4Z-7D014-DA	2.80-2.95 mm (0.110-0.116 in)	1
2.05-2.23 mm (0.081-0.088 in)	XW4Z-7D014-EA	3.00-3.15 mm (0.118-0.124 in)	2
2.25-2.43 mm (0.089-0.096 in)	XW4Z-7D014-FA	3.20-3.35 mm (0.126-0.132 in)	3

CAUTION: Always obey local traffic laws, do not exceed posted limits.**SHIFT SPEEDS - 4.0L ENGINE**

Throttle Position	Overdrive Position "D"	Axle Ratio
	Shift	Shift Speed
Closed	5-4	37-42 km/h (23-26 mph)
	4-1	16-19 km/h (10-12 mph)
Minimum Monitor PID TP Volt 1.25	1-2	19-21 km/h (12-13 mph)
	2-3	27-31 km/h (17-19 mph)
	3-4	34-35 km/h (21-22 mph)
	4-5	39-43 km/h (24-27 mph)
Wide Open	1-2	64-68 km/h (40-42 mph)
	2-3	93-101 km/h (58-63 mph)
	3-4	140-145 km/h (87-90 mph)
	4-5	171-174 km/h (106-108 mph)

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

CAUTION: Always obey local traffic laws, do not exceed posted limits.**SHIFT SPEEDS - 4.6L ENGINE**

Throttle Position	Overdrive Position "D"	Axle Ratio
	Shift	Shift Speed
Closed	5-4	39 km/h (24 mph)
	4-1	16 km/h (10 mph)
Minimum Monitor PID TP Volt 1.25	1-2	18 km/h (11 mph)
	2-3	27 km/h (17 mph)
	3-4	35 km/h (22 mph)
	4-5	39 km/h (24 mph)
Wide Open	1-2	68 km/h (42 mph)
	2-3	106 km/h (66 mph)
	3-4	148 km/h (92 mph)
	4-5	217 km/h (135 mph)

BAND ADJUSTMENT AND TORQUE CHART

Description	Number of Turns to Back Off	Locknut		Adjusting Screw	
		N.m	Lb-Ft	N.m	Lb-Ft
Intermediate Band	1.5	54	40	14	10
Overdrive Band	1.5	54	40	14	10

SELECTIVE SNAP RINGS

Coast and Direct Clutch Drum				
Part Number	Thickness		Diameter	
	mm	Inch	mm	Inch
E860126-S	1.37	0.0539	130.1	5.122
E860127-S	1.73	0.0681	130.1	5.122
E860128-S	2.08	0.0819	130.1	5.122
E860129-S	2.44	0.0961	130.1	5.122

SELECTIVE SNAP RINGS

Forward Clutch Cylinder				
Part Number	Thickness		Diameter	
	mm	Inch	mm	Inch
XW4Z-7D483-AB	1.73	0.0681	141.45	5.56
XW4Z-7D483-AC	2.08	0.0819	141.45	5.56
XW4Z-7D483-AD	2.44	0.0961	141.45	5.56

SERVICE IDENTIFICATION MODEL CHART

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2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Vehicle Application

7000 Prefix and Suffix	C=Column F=Floor	Engine Displacement	Vehicle Application
8R3P-BA	F	4.0L	Mustang
8R3P-AA	F	4.6L	Mustang

SOLENOID OPERATION CHART

Gearshift Selector Position	PCM Commanded Gear	5R55S Solenoid States						
		SSA	SSB	SSC	SSD	PCA	PCB	PCC
P	P	ON	OFF	OFF	ON	L	H/L	L
N	N	ON	OFF	OFF	ON	L	H/L	L
R	R	ON	OFF	OFF	ON	L/H	L	H
D	1	ON	OFF	OFF	ON	H	H/L	L
	2	ON	OFF	ON	ON	L/H	H	L
	3	ON	ON	OFF	ON	H	L/H	L
	4	OFF	OFF	OFF	ON	H	H/L	H
	5	OFF	OFF	ON	ON	H	H	H
D Overdrive (Circle D) Cancelled	1	ON	OFF	OFF	ON	H	H/L	L
	2	ON	OFF	ON	ON	L/H	H	L
	3	ON	ON	OFF	ON	H	L/H	L
	4	OFF	OFF	OFF	OFF	L/H	H	H
Manual 3	3	ON	ON	OFF	OFF	H	L	H/L
Manual 2	2	ON	OFF	ON	OFF	H	L	H/L
Manual 1	1	ON	OFF	OFF	OFF	H	L	H/L

H = HIGH

L = LOW

H/L = PCM controlled

Manual = if equipped

BAND/CLUTCH APPLICATION CHART A

	Overdrive Band	Intermediate Band	Reverse Band	Forward Clutch	Direct Clutch	Coast Clutch
Reverse			A ^a		A ^a	
1st				A ^a		
2nd	A			A ^a		
3rd		A ^a		A ^a		
4th				A ^a	A ^a	
5th	A ^a			A ^a	A ^a	
1st ^b				A ^a		
2nd ^b	A ^a			A ^a		

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

3rd ^b		A ^a		A ^a		
4th ^b				A ^a	A ^a	Ac ^c
Manual 3rd		Ac ^c		A ^a		Ac ^c
Manual 2nd	A ^a		Ac ^c	A ^a		
Manual 1st			Ac ^c	A ^a		Ac ^c

^a A = Applied

^b D Position (overdrive cancelled)

^c Ac = Applied to carry coast torque

BAND/CLUTCH APPLICATION CHART B

	Direct One-Way Clutch		Low One-Way Clutch		Engine Braking
	Drive	Coast	Drive	Coast	
Reverse	H ^a	NE ^b	NE ^b	NE ^b	NO
1st	H ^a	NE ^b	H ^a	NE ^b	NO
2nd	OR ^c	OR ^c	H ^a	NE ^b	NO
3rd	H ^a	NE ^b	OR ^c	OR ^c	NO
4th	H ^a	NE ^b	OR ^c	OR ^c	NO
5th	OR ^c	OR ^c	OR ^c	OR ^c	YES
1st ^d	H ^a	NE ^b	H ^a	NE ^b	YES
2nd ^d	OR ^c	OR ^c	H ^a	NE ^b	YES
3rd ^d	H ^a	NE ^b	OR ^c	OR ^c	YES
4th ^d	H ^a	NE ^b	OR ^c	OR ^c	YES
Manual 3rd	H ^a	NE ^b	OR ^c	OR ^c	YES
Manual 2nd	OR ^c	OR ^c	H ^a	NE ^b	YES
Manual 1st	H ^a	NE ^b	H ^a	NE ^b	YES

^a H = Hold

^b NE = No effect

^c OR = Overrunning

^d D Position (overdrive cancelled)

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

LINE PRESSURE CHART - 4.0L AND 4.6L ENGINES

Range	Idle Pressure		WOT Stall Pressure	
	PC C	Line	PC C	Line
N	0-103 kPa (0-15 psi)	758-1,034 kPa (110-150 psi)		
R	758-862 kPa (110-125 psi)	965-1,551 kPa (140-225 psi)	758-862 kPa (110-125 psi)	2,000-2,482 kPa (290-360 psi)
Overdrive (Circle D), 2, 1	0-103 kPa (0-15 psi)	758-1,045 kPa (110-150 psi)	0-103 kPa (0-15 psi)	1,448-1,793 kPa (210-260 psi)

STALL SPEED CHART

Vehicle	Engine	RPM
Mustang	4.0L	2,678-3,130
Mustang	4.6L	2,556-3,014

TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Band adjustment screw	14	10	-
Case-to-center support screw	11	8	-
Digital transmission range (TR) sensor-to-case screws	8	-	71
Engine-to-transmission retaining bolts	48	35	-
Extension housing screws and studs	30	22	-
Flexplate cover	35	26	-
Fluid level indicator plug-to-drain pipe assembly	10	-	89
Fluid pan drain plug	26	19	-
Fluid pump housing screws	22	16	-
Heat shield screws	10	-	89
Locknut for band adjustment	54	40	-
Main control valve body-to-case screws ^a	-	-	-
Manual control lever shaft nut	48	35	-
Manual control valve detent spring-to-case screw	10	-	89
Output shaft-to-flange nut	130	96	-
Pressure tap plug to case	13	10	-
Pump assembly-to-case screws	25	18	-
Reverse servo assembly-to-case screws (Stage 1) ^a	-	-	-
Reverse servo assembly-to-case screws (Stage 2) ^a	-	-	-
Separator-to-main control screws	7	-	62
Selector lever cable bracket screws	28	21	-
Solenoid body-to-case screws ^a	-	-	-
Speed sensor-to-case screws	14	10	-
Starter motor cable	13	10	-

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Starter motor flange screws	25	18	-
Starter motor wire	6	-	53
Torque converter adapter plate nuts to converter	44	32	-
Torque converter adapter plate-to-flexplate nut	44	32	-
Torque converter adapter plate-to-flexplate nut	44	32	-
Transmission cooler tube bracket nut	25	18	-
Transmission cooler tube fitting to case	47	35	-
Transmission cooler tube nut-to-case fitting	40	30	-
Transmission crossmember-to-floor pan screws	63	46	-
Transmission fluid filter-to-case screws	10	-	89
Transmission fluid pan-to-case screws	11	8	-
Transmission insulator-to-extension housing center screw	70	52	-
Transmission output shaft flange bolts	103	76	-
Vehicle harness-to-solenoid body screw	5	-	44

^a Refer to the procedure.

DESCRIPTION AND OPERATION

TRANSMISSION DESCRIPTION

This transmission has:

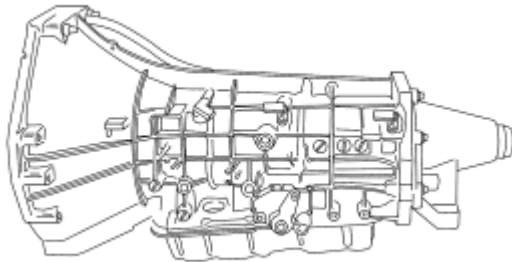
- five forward speeds.
- electronic shift, pressure and torque converter clutch controls.
- three planetary gear sets.
- three bands.
- three multi-plate clutches.
- two one-way clutches.

All hydraulic functions are directed by electronic solenoids. The solenoids control:

- static engagement feel.
- shift feel.
- shift scheduling.
- molded torque converter clutch (TCC) applications.
- engine braking utilizing the coast clutch and bands.
- manual first and second timing.
- reverse inhibit timing.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



A0022808

Fig. 1: Identifying Transmission View
Courtesy of FORD MOTOR CO.

IDENTIFICATION TAGS



N0000790

Fig. 2: ID Tag Located on Transmission Case
Courtesy of FORD MOTOR CO.

Item	Description
1	Transmission part number
2	Bar code 1
3	Transmission plant model code part 1
4	Transmission plant model code part 2
5	Bar code 2
6	Transmission serial number
7	Transmission build date (DD MM YY)
8	Assembly plant line shift

All vehicles are equipped with a vehicle certification label, located on the driver side door lock post. Refer to the code in the space marked TR. For model, service ID level or build date information, refer to the transmission service ID tag located on the transmission case.

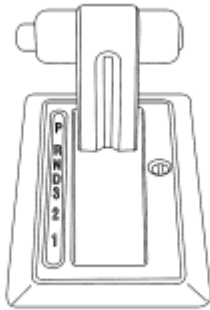
RANGE SELECTION

Depending on the vehicle options selected, the transmission range selector may have different range positions.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

The standard range selector has 7 positions: P, R, N, D, 3, 2 and 1.



N0011162

Fig. 3: Identifying Range Selector Lever
Courtesy of FORD MOTOR CO.

Park

In the PARK position:

- there is no power flow through the transmission.
- the parking pawl locks the output shaft to the case.
- the engine may be started.
- the ignition key may be removed.

Reverse

In the REVERSE position:

- the vehicle may be operated in a rearward direction, at a reduced gear ratio.
- backup lamps are illuminated.

Neutral

In the NEUTRAL position:

- there is no power flow through the transmission.
- the output shaft is not held and is free to turn.
- the engine may be started.

Drive - Overdrive Enabled

D is the normal position for most forward driving.

The D position provides:

- automatic shifts 1-5 and 5-1.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- apply and release of the torque converter clutch.
- maximum fuel economy during normal operation.
- engine braking in 5th gear.

Drive - Overdrive Canceled

The D position provides:

- activated by pressing the transmission control (TC) switch on the shifter handle.
- automatic shifts 1-4 and 4-1.
- apply and release of the torque converter clutch.
- maximum fuel economy during normal operation.
- engine braking in 4th gear.
- for cancelling overdrive through TC switch.
- illuminates the Overdrive OFF on the instrument panel.

Position 3 - 3rd Gear

The position provides:

- third gear start and hold.
- apply and release of the torque converter clutch.
- improved traction on slippery roads.
- engine braking.

Position 2 - 2nd Gear

The position provides:

- second gear start and hold.
- apply and release of the torque converter clutch.
- improved traction on slippery roads.
- engine braking.

Position 1 - 1st Gear

If this position is selected at normal road speeds, the transmission will downshift into the next lower gear and continue downshifting until the vehicle reaches 1st gear.

This position provides:

- first gear operation only.
- engine braking for descending steep grades.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Electronic Transmission Error Indicator

The vehicle is equipped with a redundant electronic gearshift indicator. This character appears with the key in the run position and displays the same gear selection as shown on the range selector floor console next to the range selector lever. A transmission malfunction is indicated if an "E" character flashes or remains on.

SHIFT PATTERNS

Upshifts

Transmission upshifting is controlled by the PCM. The PCM receives inputs from various engine or vehicle sensors and driver demands to control shift scheduling, shift feel and torque converter clutch (TCC) operation.

The PCM has an adaptive learn strategy to electronically control the transmission which will automatically adjust the shift feel. When the battery has been disconnected or a new battery installed, certain transmission operating parameters may be lost. The PCM must relearn these parameters. During this learning process you may experience slightly firm shifts, delayed or early shifts. This operation is considered normal and will not affect the function of the transmission. Normal operation will return once these parameters are stored by the PCM.

Downshifts

Under certain conditions the transmission will downshift automatically to a lower gear range (without moving the range selector lever). There are 3 categories of automatic downshifts: coastdown, torque demand and forced (or kickdown) shifts.

Coastdown

The coastdown downshift occurs when the vehicle is coasting down to a stop.

Torque Demand

The torque demand downshift occurs (automatically) during part throttle acceleration when the demand for torque is greater than the engine can provide at that gear ratio. If applied, the transmission will disengage the TCC to provide added acceleration.

Kickdown

For maximum acceleration, the driver can force a downshift by pressing the accelerator pedal to the floor. A forced downshift into a lower gear is possible below calibrated speeds. Specifications for downshift speeds are subject to variations due to tire size and engine and transmission calibration requirements.

TORQUE CONVERTER

The torque converter transmits and multiplies torque. The torque converter is a 4-element device:

- Impeller assembly

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Turbine and damper assembly
- Reactor assembly
- Clutch

The standard torque converter components operate as follows:

- Rotation of the converter housing and impeller sets the fluid in motion.
- The turbine reacts to the fluid motion from the impeller, transferring rotation to the geartrain through the input shaft.
- The reactor redirects fluid going back into the impeller, allowing for torque multiplication.
- The clutch and damper assembly dampens powertrain torsional vibration and provides a direct mechanical connection for improved efficiency.
- Power is transmitted from the torque converter to the planetary gear sets and other components through the input shaft.

GEARTRAIN

Power is transmitted from the torque converter to the planetary gear sets through the input shaft. Bands and clutches are used to hold and drive certain combinations of gear sets. This results in 5 forward ratios and 1 reverse ratio, which are transmitted to the output shaft and differential.

Gear Ratio	
1st	3.22 to 1
2nd	2.29 to 1
3rd	1.55 to 1
4th	1.00 to 1
5th	0.71 to 1
Reverse	3.07 to 1

Planetary Gearset - Overdrive

For component location, refer to **Transmission**.

The planetary gear overdrive carrier is driven by the input shaft.

- The overdrive planetary gearset carrier drives the center shaft via the overdrive one-way clutch in 1st, 3rd, 4th and REVERSE gears.
- In 2nd and 5th gears, the overdrive sun gear is held causing the pinion gears to rotate around the overdrive sun gear.
- The pinion gears, in turn, drive the overdrive ring gear resulting in the 5th (overdrive) gear ratio.
- The overdrive planetary gearset is internally splined to the coast clutch for engine braking.

Planetary Gearset - Forward

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

For component location, refer to **Transmission**.

The forward planetary gearset is splined to the output shaft.

- The forward planetary gearset is driven by the forward ring gear when the forward clutch is applied.
- The forward planetary gearset pinions drive the forward sun gear.
- The forward sun gear is splined to the input shell.
- The forward carrier is splined to the output shaft.

Planetary Gearset - Low/Reverse

For component location, refer to **Transmission**.

The low/reverse planetary gearset is connected to the reverse brake drum by lugs from the low/reverse brake drum to the lugs of the low/reverse planetary gearset.

- The low/reverse planetary gearset is driven by the forward sun gear which is splined to the input shell.
- The forward sun gear drives the pinions in the low/reverse planetary gearset.
- The pinions of the low/reverse planetary gearset drive the output shaft ring gear and output shaft hub which is splined to the output shaft.
- The low/reverse planetary gearset can be held by the low one-way clutch in the low/reverse brake drum, or by the low/reverse band.

Input Shaft

For component location, refer to **Transmission**.

- The radial positioning of the input shaft is controlled by 2 bushings in the stator support.
- Axial positioning of the input shaft is controlled by the splines in the converter turbine hub and the retaining ring in the overdrive planetary carrier.

Output Shaft

For component location, refer to **Transmission**.

The output shaft is supported by a bearing in the case and by a bearing in the extension housing. End positioning is controlled by the parking gear and by the reverse ring gear hub and snap ring.

APPLY COMPONENTS

Band - Overdrive

For component location, refer to **Transmission**.

During 2nd and 5th gear operation, hydraulic pressure is applied to the overdrive servo.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- This pressure causes the piston to move and apply force to the band.
- This action causes the overdrive band to hold the overdrive drum.
- This causes the overdrive sun gear to be held stationary through the adapter plate and the overdrive drum.

Band - Low/Reverse

For component location, refer to **Transmission**.

During 2nd gear, 1st gear and REVERSE operation, hydraulic pressure is applied to the low/reverse servo.

- This pressure causes the servo to move and apply force to the low/reverse band.
- This action causes the low/reverse brake drum to be held.
- This action causes the low/reverse planetary assembly to be held stationary.

Band - Intermediate

For component location, refer to **Transmission**.

During 3rd gear operation, hydraulic pressure is applied to the intermediate servo.

- This pressure causes the servo to move and apply force to the intermediate band.
- This action causes the direct clutch drum to be held.
- The intermediate band holds the intermediate brake and direct clutch drum to the case in 3rd gear.
- This causes the input shell and forward sun gear to be held stationary.

Clutches - Direct

For component location, refer to **Transmission**.

The direct clutch is a multi-disc clutch made up of steel and friction plates.

- The direct clutch is applied with hydraulic pressure and disengaged by return springs and the exhaust of the hydraulic pressure.
- It is housed in the direct clutch drum.
- During 4th, 5th and REVERSE gear application, the direct clutch is applied transferring torque from the forward clutch cylinder to the direct clutch drum.
- This action causes the forward sun gear to drive the pinions of the low/reverse planetary carrier.

Clutches - Forward

For component location, refer to **Transmission**.

The forward clutch is a multi-disc clutch made up of steel and friction plates.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- The forward clutch is applied with hydraulic pressure and disengaged by return springs and the exhaust of the hydraulic pressure.
- The forward clutch is applied in all forward gears.
- When applied, the forward clutch provides a direct mechanical coupling between the center shaft and the forward ring gear and hub.

Clutches - Coast

For component location, refer to **Transmission**.

The coast clutch is a multi-disc clutch made up of steel and friction plates.

- The coast clutch is applied with hydraulic pressure and disengaged by return springs and the exhaust of the hydraulic pressure.
- The coast clutch is housed in the overdrive drum.
- The coast clutch is applied when in manual 1st and 3rd, 4th with OD cancelled, and REVERSE positions.
- When applied, the coast clutch locks the overdrive sun gear to the overdrive planetary carrier, thus preventing the one-way clutch from overrunning when the vehicle is coasting.
 - This allows the use of engine compression to help slow the vehicle and provide engine braking.

One-Way Clutch - Direct

For component location, refer to **Transmission**.

The direct one-way clutch is a sprag-type one-way clutch that is pressed into the center shaft.

- The direct one-way clutch is driven by the ring gear of the overdrive planetary carrier.
- The direct one-way clutch holds and drives the outer splines of the center shaft in 1st, 3rd, 4th and REVERSE gears.
- The direct one-way clutch overruns during all coast operations and at all times in 2nd and 5th gear.

One-Way Clutch - Low/Reverse

For component location, refer to **Transmission**.

The low/reverse one-way clutch is a sprag-type one-way clutch.

- The low/reverse one-way clutch holds the low/reverse drum and low/reverse planetary assembly to the case in 1st and 2nd gear.
- In all other gears the low/reverse one-way clutch overruns.

One-Way Clutch - Overdrive

For component location, refer to **Transmission**.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

The overdrive one-way clutch is a sprag-type one-way clutch that connects the input shaft to the center shaft during drive operation.

The overdrive one-way clutch transmits torque in REVERSE, 1st, 3rd and 4th gears, as well as in manual 1st, manual 3rd and manual 4th gears.

- The input shaft connects through the overdrive planetary carrier to the inner race.
- The outer race is part of the center shaft.
- The inner race contacts the assembly of sprags, and wedges them between the inner and outer races.
- The wedging action causes the input shaft and center shaft to be connected.

HYDRAULIC SYSTEM

Fluid Pump

For component location, refer to **Transmission**.

- The fluid pump provides the fluid pressure necessary to charge the torque converter, main control assembly, transmission cooling system, lubrication system and apply devices.
- The fluid pump is a positive displacement, gear type pump.
 - The fluid pump is driven by the torque converter impeller hub.

Filter

For component location, refer to **Transmission**.

- All fluid drawn from the transmission fluid pan by the fluid pump passes through the fluid filter.
- The transmission fluid filter and its accompanying seals are part of the fluid path from the sump (pan) to the fluid pump.
 - The transmission fluid filter has a bypass section which allows fluid vented at the main regulator valve to be recirculated to the fluid pump, without passing through the transmission fluid filter.

Main Control

For component location, refer to **Transmission**.

- The main control assembly and related components are part of the pressure side of the hydraulic system.
- The main control assembly consists of the solenoids, the valve body assembly and the separator plate.
- These components combine to convert electrical signals into hydraulic actions.
 - All valves in the main control assembly are an anodized aluminum and cannot be sanded, filed or dressed in any other way. If there is any damage to the valves that prevents or restricts their movement, install a new main control assembly.

TRANSMISSION ELECTRONIC CONTROL SYSTEM

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Electronic System Description

The PCM and its input/output network control the following transmission operations:

- Shift timing
- Line pressure (shift feel)
- Torque converter clutch (TCC)

The transmission control strategy combined with the engine control provides optimum powertrain operation under all conditions. When determining the best operating strategy for transmission operation, the PCM uses input information from certain engine-related and driver-demand-related sensors and switches.

In addition, the PCM receives input signals from certain transmission-related sensors and switches. The PCM also uses these signals when determining transmission operating strategy.

Using all of these input signals, the PCM can determine when the time and conditions are right for a shift, or when to apply or release the torque converter clutch. It will also determine the pressure needed to optimize shift feel. To accomplish this, the PCM uses 3 pressure controls, 1 torque converter clutch and 4 shift solenoids to control transmission operation.

The following provides a brief description of each of the sensors and actuators used to control transmission operation.

PCM

The operation of the transmission is controlled by the PCM. Many input sensors provide information to the PCM. The PCM then controls the actuators which determine transmission operation.

Air Conditioning (A/C) Clutch

An electromagnetic clutch is energized when the clutch cycling pressure switch closes. The switch is located on the suction accumulator/drier. The closing of the switch completes the circuit to the clutch and draws it into engagement with the compressor driveshaft. When the A/C is engaged, operating pressures are adjusted to compensate for additional load on the engine.

Brake Pedal Position (BPP) Switch

The brake pedal position (BPP) switch tells the PCM when the brakes are applied. The torque converter clutch disengages when the brakes are applied. The BPP switch closes when the brakes are applied and opens when they are released. The BPP is also used to disengage the brake shift interlock.

Engine Coolant Temperature (ECT) Sensor

The engine coolant temperature (ECT) sensor detects engine coolant temperature and supplies the information to the PCM. The ECT sensor is used to control TCC operation.

Cylinder Head Temperature (CHT) Sensor

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

The cylinder head temperature (CHT) sensor is a thermistor device in which resistance changes with the temperature. The electrical resistance of a thermistor decreases as temperature increases, and the resistance increases as the temperature decreases. The varying resistance affects the voltage drop across the sensor terminals and provides electrical signals to the PCM corresponding to temperature.

Electronic Ignition (EI) System

The electronic ignition (EI) consists of a crankshaft position sensor, a pair of 4-tower ignition coils and the PCM. The ignition control module operates by sending crankshaft position information from the crankshaft position sensor to the ignition control module. The ignition control module generates a profile ignition pickup (PIP) signal (engine RPM) and sends it to the PCM. The PCM uses PIP signal in the transmission strategy, wide-open throttle (WOT) shift control, TCC control and operating pressures.

Intake Air Temperature (IAT) Sensor

The intake air temperature (IAT) sensor provides the sequential fuel injection (SFI) system mixture temperature information. The IAT sensor is used both as a density corrector for air flow calculation and to proportion cold enrichment fuel flow. The IAT sensor is installed in the air cleaner outlet tube. The IAT sensor is also used in determining control pressures.

Mass Air Flow (MAF) Sensor

The mass air flow (MAF) sensor measures the mass of air flowing into the engine. The MAF sensor output signal is used by the PCM to calculate injector pulse width. For transmission strategies, the MAF sensor is used to regulate electronic pressure control, shift and torque converter clutch scheduling.

Transmission Control (TC) Switch

The transmission control (TC) switch is a momentary contact switch that allows the driver to cancel operation of 5th Overdrive (Circle D) gear.

The TC switch is located on the end of the selector lever.

When the driver initially presses the TC switch, a signal is sent to the PCM.

The PCM uses the shift solenoids to disengage/disable 5th gear operation and activate the coast clutch.

At the same time, the PCM illuminates the transmission control indicator lamp (TCIL) to notify the driver that 5th gear is canceled.

When the TC switch is pressed again, 5th Overdrive (Circle D) gear operation is enabled, the coast clutch is released and the TCIL is turned OFF.

Whenever the ignition is cycled (vehicle shut OFF, then started again), the TC switch is turned OFF and 5th gear will be enabled, even if the TCS had been on when the ignition was shut off.

Transmission Control Indicator Lamp (TCIL)

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

The TCIL is located in the instrument panel and is labeled Overdrive OFF. It is illuminated in conjunction with the TC switch.

The TCIL will flash if a fault has been detected in a monitored sensor or solenoid used for transmission operation.

Throttle Position (TP) Sensor

The throttle position (TP) sensor is a potentiometer mounted on the throttle body. The TP sensor detects the position of the throttle plate and sends this information to the powertrain control module. The TP sensor is used for shift scheduling, electronic pressure control (EPC) and TCC control.

Digital Transmission Range (TR) Sensor

The digital transmission range (TR) sensor is located on the outside of the transmission at the manual lever. The digital TR sensor completes the start circuit in PARK, NEUTRAL and the back-up lamp circuit in REVERSE. The digital TR sensor also opens and closes a set of 4 switches that are monitored by the powertrain control module to determine the position of the manual lever (P, R, N, D, 3, 2, 1).

Turbine Shaft Speed (TSS) Sensor

The turbine shaft speed (TSS) sensor is a magnetic pickup that sends the PCM the torque converter turbine speed information.

The TSS sensor is mounted externally on the case.

The PCM uses TSS information to help determine appropriate operating pressures and TCC operation.

Output Shaft Speed (OSS) Sensor

The output shaft speed (OSS) sensor is a magnetic pickup, located at the park gear, that sends a signal to the powertrain control module to indicate transmission output shaft speed. The OSS sensor is mounted externally on the case. The OSS is used for torque converter clutch control, speed scheduling and to determine electronic pressure control.

Intermediate Shaft Speed Sensor

The intermediate shaft speed sensor is a magnetic pickup that sends planetary sun gear speed information to the PCM. The sensor is mounted externally on the center of the case.

The PCM uses the sensor information to aid in determining pressure requirements.

Pressure Control Solenoids (PCA, PCB, PCC)

The pressure control (PC) solenoids are a variable-force style (VFS) solenoid. The VFS-type solenoid is an electrohydraulic actuator combining a solenoid and a regulating valve.

The line pressure tap is used to verify output pressure from PC A or PC B by turning either one off while

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

verifying the output from the other solenoid. The second pressure tap is used to verify the output from the PC C solenoid.

There are 3 PC solenoids located in the solenoid body assembly used to control line pressure, band and clutch application pressure within the transmission.

The PCM varies the current to the PC solenoid.

The PCM has an adaptive learn strategy to electronically control the transmission which will automatically adjust the shift feel. When the battery is disconnected or a new battery installed, certain transmission operating parameters can be lost. The PCM must relearn these parameters. During this learning process, you may experience slightly firm shifts, delayed or early shifts. This operation is considered normal and will not affect the function of the transmission. Normal operation will return once these parameters are stored by the PCM.

Torque Converter Clutch (TCC) Solenoid

The TCC solenoid is a pulse width modulating-type solenoid that is used to control the apply and release of the TCC.

Shift Solenoids - (SSA, SSB, SSC, SSD)

Four ON/OFF shift solenoids allow the PCM to control shift scheduling.

- The solenoids are 3-way, normally closed style.
- The shift solenoids SSA, SSB, SSC and SSD provide gear selection of 1st through 5th and reverse gears by directing PC pressures to the appropriate elements.

Coast braking and manual gears are also controlled by the shift solenoids.

Transmission Fluid Temperature (TFT) Sensor

- The transmission fluid temperature (TFT) sensor is a thermistor-type sensor that varies a reference voltage signal. The resistance in the TFT varies with temperature. The PCM monitors the voltage signal across the TFT, and uses this information to determine the transmission fluid temperature.
- The TFT is located on the solenoid body.
- The PCM uses the TFT signal to help determine shift scheduling, torque converter clutch operation and pressure control requirements.

It sends a voltage signal to the PCM. The voltage signal varies with transmission fluid temperature. The PCM uses this signal to determine whether a cold start shift schedule is necessary. The shift schedule is compensated when the transmission fluid temperature is cold. The PCM also inhibits torque converter clutch operation at low transmission fluid temperatures and determines PC solenoid operations.

Accelerator Pedal Position (APP) Sensor

The accelerator pedal position (APP) sensor is mounted on the accelerator pedal. The APP detects the position of the accelerator pedal and inputs this information as a voltage to the PCM. The PCM uses the APP sensor

information to aid in determining shift scheduling, EPC and TCC control.

DIAGNOSTIC TESTS

PRELIMINARY INSPECTION

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

The following items must be checked prior to beginning the diagnostic procedures:

Know and Understand the Concern

In order to correctly diagnose a concern, first understand the customer concern or condition. Customer contact may be necessary in order to begin to verify the concern. Understand the condition as to when the concern occurs, for example:

- hot or cold vehicle temperature.
- hot or cold ambient temperature.
- vehicle driving conditions.
- vehicle loaded/unloaded.

After understanding when and how the concern occurs, proceed to verify the concern.

Verification of Condition

This part provides information that must be used in both determining the actual cause of customer concerns and executing the appropriate procedures.

The following procedures must be used when verifying customer concerns for the engine.

Determine Customer Concern

NOTE: **Some transmission conditions can cause engine concerns. An electronic pressure control short circuit can cause engine misfiring. The torque converter clutch not disengaging will stall the engine.**

Determine customer concerns relative to vehicle use and dependent driving conditions, paying attention to the following items:

- Hot or cold vehicle operating temperature
- Hot or cold ambient temperatures

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Type of terrain
- Vehicle loaded/unloaded
- City/highway driving
- Upshift
- Downshift
- Coasting
- Engagement
- Noise/vibration - check for dependencies, either RPM dependent, vehicle speed dependent, shift dependent, gear dependent, range dependent or temperature dependent.

Check Transmission Fluid Level and Condition

Transmission Fluid Level Check

CAUTION: The vehicle should not be driven if the transmission fluid level is low or internal failure may result.

NOTE: If the vehicle has been operated for an extended period of time at highway speeds, in city traffic, in hot weather, or pulling a trailer, the transmission fluid must cool down 30 minutes to obtain an accurate reading.

This vehicle is not equipped with a transmission fluid level indicator. An incorrect level may affect the transmission operation and can result in transmission damage. To correctly check and add transmission fluid to the transmission, refer to Transmission Fluid Level Check.

High Transmission Fluid Level

A transmission fluid level that is too high can cause the transmission fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of transmission fluid from the vent tube and possible transmission damage. If an overfill reading is indicated, refer to Transmission Fluid Level Check.

Low Transmission Fluid Level

A low transmission fluid level can result in poor transmission engagement, slipping or damage. It can also indicate a leak in one of the transmission seals or gaskets.

Adding Transmission Fluid

CAUTION: The use of any type of transmission fluid other than specified may result in transmission damage.

If transmission fluid must be added, add transmission fluid in 0.25L (0.5 pt) increments through the transmission fluid pan level check screw opening. Do not overfill the transmission fluid, refer to Transmission

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Fluid Level Check. For transmission fluid type, refer to the **SPECIFICATIONS.**

Transmission Fluid Condition Check

1. Observe the color and the odor of the transmission fluid. Under normal circumstances, the color should be dark reddish, not brown or black.
2. Allow the transmission fluid to drip onto a facial tissue and examine the stain.
3. If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.
4. If fluid contamination or transmission failure is confirmed by the sediment in the bottom of the transmission fluid pan, the transmission must be disassembled and completely cleaned.
5. Carry out diagnostic checks and adjustments. Refer to **Diagnosis By Symptom.**

Water in Transmission Fluid

To correctly repair an automatic transmission or transaxle that has had water or coolant introduced into the system, completely disassemble, clean and replace the following parts:

- All internal and external seals
- All friction material; clutches and bands
- Torque converter
- All parts with bonded seals
- All solenoids
- All transmission fluid filters

Prior to installing the transmission or transaxle, the transmission fluid cooler(s), transmission fluid cooler tubes and transmission fluid cooler hoses need to be flushed and cleaned.

ROAD TESTING VEHICLE

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

NOTE: When the battery has been disconnected or a new battery installed, certain transmission operating parameters may be lost. The PCM must relearn these parameters. During this learning process you may experience slightly firm shifts, delayed or early shifts. This operation is considered normal and will not affect the function of the transmission. Normal operation will return once these parameters are stored by the PCM.

The Shift Point Road Test and Torque Converter Operation Test provide diagnostic information on transmission shift controls and torque converter operation.

SHIFT POINT ROAD TEST

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

This test verifies that the shift control system is operating correctly.

1. Bring the engine and transmission up to normal operating temperature.
2. Operate the vehicle with the selector lever in the D position.
3. Apply minimum throttle and observe the speeds at which upshift occurs and the torque converter engages. Refer to the following Shift Speeds chart.
4. Stop the vehicle. Select the D position and cancel overdrive by pressing the transmission control (TC) switch. Repeat Step 3. The transmission will make all upshifts except 4-5 and the torque converter clutch (TCC) should apply above 46 km/h (27 mph).
5. Press the accelerator pedal to the floor, wide open throttle (WOT). The transmission should shift from 3rd to 2nd, or 3rd to 1st, depending on vehicle speed, and the TCC should release.
6. With the vehicle speed above 48 km/h (30 mph), move the transmission range selector lever from D position to manual 1 position and release the accelerator pedal. The transmission should immediately downshift to 3rd gear. When vehicle speed drops below 32 km/h (20 mph), the transmission should downshift into 1st gear.
7. If transmission fails to upshift/downshift or the TCC does not apply/release, refer to **Diagnosis By Symptom** for possible causes.

CAUTION: Always obey local traffic laws, do not exceed posted limits.

SHIFT SPEEDS - 4.0L ENGINE

Throttle Position	Overdrive Position "D"	Axle Ratio
	Shift	Shift Speed
Closed	5-4	37-42 km/h (23-26 mph)
	4-1	16-19 km/h (10-12 mph)
Minimum	1-2	19-21 km/h (12-13 mph)
Monitor		27-31 km/h

2008 Ford Mustang
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

PID:	2-3	(17-19 mph)
TP Volt 1.25	3-4	(34-35 km/h)
	4-5	(21-22 mph)
		(39-43 km/h)
Wide	1-2	(24-27 mph)
Open	2-3	(64-68 km/h)
	3-4	(40-42 mph)
	4-5	(93-101 km/h)
		(58-63 mph)
		(140-145 km/h)
		(87-90 mph)
		(171-174 km/h)
		(106-108 mph)

CAUTION: Always obey local traffic laws, do not exceed posted limits.

SHIFT SPEEDS - 4.6L ENGINE

Throttle Position	Overdrive Position "D"	Axle Ratio
	Shift	Shift

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

		Speed
Closed	5-4	39 km/h (24 mph)
	4-1	16 km/h (10 mph)
Minimum	1-2	18 km/h (11 mph)
Monitor PID:	2-3	27 km/h (17 mph)
TP Volt 1.25	3-4	35 km/h (22 mph)
	4-5	39 km/h (24 mph)
Wide	1-2	68 km/h (42 mph)
Open	2-3	106 km/h (66 mph)
	3-4	148 km/h (92 mph)
	4-5	217 km/h (135 mph)

TORQUE CONVERTER DIAGNOSIS

Prior to installing a new torque converter, all diagnostic procedures must be followed. This is to prevent the unnecessary installation of good torque converters. Only after a complete diagnostic evaluation can the decision

be made to install a new or remanufactured torque converter.

Begin with the normal diagnostic procedures as follows:

1. Preliminary Inspection.
2. Know and Understand the Customer Concern.
3. Verify the Concern - Carry out the **Torque Converter Clutch (TCC) Solenoid**; refer to **Torque Converter Operation Test**.
4. Carry out Diagnostic Procedures.
 - Run on-board diagnostics. See On-Board Diagnostics with scan tool. Refer to **Diagnostics**.
 - Repair all non-transmission related DTCs first.
 - Repair all transmission DTCs.
 - Rerun on-board diagnostics to verify repair.
 - Carry out the **Line Pressure Test**. Refer to **Special Testing Procedures**.
 - Carry out the **Stall Speed Test**. Refer to **Special Testing Procedures**.
 - Carry out the Diagnosis by Symptom Index. Refer to **Diagnosis By Symptom**.
 - Use the index to locate the appropriate routine that best describes the symptom(s). The routine will list all possible components that may cause or contribute to the symptom. Check each component listed, diagnose and service as necessary before servicing the torque converter.

Torque Converter Operation Test

This test verifies that the torque converter clutch control system and the torque converter are operating correctly.

1. Carry out the Quick Test. See On-Board Diagnostics with scan tool. Refer to **Diagnostics**. Check for DTCs. Refer to the **Diagnostic Trouble Code (DTC) Charts**.
2. Bring the engine to normal operating temperature by driving the vehicle at highway speeds for approximately 15 minutes in Overdrive (Circle D) position.
3. After normal operating temperature is reached, maintain a constant vehicle speed of about 80 km/h (50 mph) and tap the brake pedal with the left foot.
4. The engine RPM should increase when the brake pedal is tapped, and decrease about 5 seconds after the pedal is released. If this does not occur, refer to Torque Converter Operation Concerns in **Diagnosis By Symptom**.
5. If the vehicle stalls in Overdrive (Circle D) or manual 2 at idle with vehicle at a stop, move the transmission selector lever to manual 1 position. If the vehicle stalls, refer to **Diagnosis By Symptom**, Torque Converter Operation Concerns. Repair as necessary. If the vehicle does not stall in Overdrive (Circle D), refer to **Diagnosis By Symptom**.

VISUAL INSPECTION

This inspection will identify modifications or additions to the vehicle operating system that may affect

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

diagnosis. Inspect the vehicle for non-Ford factory add-on devices such as:

- Electronic add-on items:
 - air conditioning.
 - generator (alternator).
 - engine turbo.
 - cellular telephone.
 - cruise control.
 - CB radio.
 - linear booster.
 - backup alarm signal.
 - computer.
- Vehicle modification:

These items, if not installed correctly, will affect the PCM or transmission function. Pay particular attention to add-on wiring splices in the PCM harness or transmission wiring harness, abnormal tire size or axle ratio changes.

- Leaks; refer to **Leakage Inspection**.
- Correct linkage adjustments; refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

Selector Lever Linkage Check

Check for a misadjustment in selector lever linkage by matching the detents in the transmission selector lever with those in the transmission. If they match, the misadjustment is in the indicator. Do not adjust the selector lever linkage.

Hydraulic leakage at the manual control valve can cause delay in engagements and/or slipping while operating if the linkage is not correctly adjusted. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

Check TSBs

Refer to all TSBs which pertain to the transmission concern and follow the procedure as outlined.

Carry Out On-Board Diagnostics Key ON Engine OFF (KOEO), Key ON Engine Running (KOER)

After a road test, with the vehicle warm and before disconnecting any connectors, carry out the Quick Test using a suitable diagnostic scan tool. Refer to the **Introduction - Gasoline Engines** article for diagnosis and testing of the powertrain control system.

DIAGNOSTICS

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Special Tools

Illustration	Tool Name	Tool Number
 ST1300-A	100W/12 Volt DC UV Lamp	164-R0751 or equivalent
 ST1585-A	Transmission Fluid Pressure Gauge	307-004 (T57L-77820-A)
 ST1633-A	Alignment Gauge, TR Sensor	307-351 (T97L-70010-A)
 ST2538-A	Air Test Plate and Gaskets, Transmission	307-433-01, 307-433-02, 307-433-03
 ST1137-A	73 III Automotive Meter	105-R0057 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

Diagnosing electronically controlled automatic transmissions is simplified using the following procedures. It is important to remember that there is a definite procedure to follow. Do not take shortcuts or assume that critical checks or adjustments have already been made. Follow the procedures as written to avoid missing critical components or steps. By following the diagnostic sequence, the technician will be able to diagnose and repair the concern the first time.

On-Board Diagnostics with Scan Tool

NOTE: For detailed instruction and other diagnostic methods using the scan tool, refer

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

to the scan tool tester and the [Introduction - Gasoline Engines](#) article.

These quick tests should be used to diagnose the PCM and should be carried out in order.

- Quick Test 1.0 - Visual Inspection
- Quick Test 2.0 - Set Up
- Quick Test 3.0 - Key On, Engine Off (KOEO)
- Quick Test 4.0 - Continuous Memory
- Quick Test 5.0 - Key On, Engine Running (KOER)
- Special Test Mode
 - Wiggle Test Mode
 - Output Test Mode
- PCM Reset Mode
- Clearing DTCs
- OBD II Drive Cycle

For further information on other diagnostic testing features using the VCM or generic scan tool, refer to the [Introduction - Gasoline Engines](#) article.

DIAGNOSTIC PARAMETERS IDENTIFICATION (PID) CHART

PID Name	PID Description	Units
BOO	Brake On Off Switch	Mode
ECT	Engine Coolant Temperature	Degrees
GEAR	GEAR Commanded State (not actual)	Mode
GEAR_MAX	Highest Gear Allowed	Number
GEAR_RAT	Gear Ratio	Ratio
ISS_SRC	Unfiltered Intermediate Shaft Speed	RPM
OSSFm	Output Shaft Speed Failure Mode	Fault
OSS_SRC	Unfiltered Output Shaft Speed	RPM
PCA	Pressure Control Solenoid A	Pressure
PCAAMP	Pressure Control Solenoid A	Current
PCA_F	Pressure Control Solenoid A	Fault
PCB	Pressure Control Solenoid B	Pressure
PCBAMP	Pressure Control Solenoid B	Current
PCB_F	Pressure Control Solenoid B	Fault
PCC	Pressure Control Solenoid C	Pressure
PCCAMP	Pressure Control Solenoid C	Current
PCC_F	Pressure Control Solenoid C	Fault
PCFM	Pressure Control Solenoid C Failure Mode	Fault
RPM	Engine Revolutions Per Minute	RPM

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

SHIFT_TYP	Shift type	Mode
SSA/SS1	Shift Solenoid No. 1 Commanded State	Mode
SSA/SS1_F	Shift Solenoid No. 1 Status	Fault
SSB/SS2	Shift Solenoid No. 2 Commanded State	Mode
SSB/SS2_F	Shift Solenoid No. 2 Status	Fault
SSC/SS3	Shift Solenoid No. 3 Commanded State	Mode
SSC/SS3_F	Shift Solenoid No. 3 Status	Fault
SSD/SS4	Shift Solenoid No. 4 Commanded State	Mode
SSD/SS4_F	Shift Solenoid No. 4 Status	Fault
TCC	Torque Converter Clutch Solenoid Commanded State	Mode, percentage
TCCFM	Torque Converter Unlocking Due to Slipping	Fault
TCC_F	Torque Converter Clutch Fault	Fault
TCC_OT	Transmission Over Temperature Lockup Mode	Mode
TCC_RAT	Transmission Slip Ratio	Ratio
TCIL	Transmission Control Indicator Light	Mode
TCS	Overdrive Cancel Switch/Hold Switch	Mode
TCSLIP_ABSL	Absolute Value of Slip	RPM
TC_SLIPACT	Torque Converter Slip Actual	RPM
TC_SLIPDSD	Torque Converter Slip Desired	RPM
TFT	Transmission Fluid Temperature	Voltage, temperature
TFT_F	Transmission Fluid Temperature Status	Fault
TR	Transmission Range	Mode
TR1	Digital Transmission Range Switch 1	Mode
TR2	Digital Transmission Range Switch 2	Mode
TR3	Digital Transmission Range Switch 3	Mode
TR3_V	Digital Transmission Range Switch 3	Voltage
TR4	Digital Transmission Range Switch 4	Mode
TRAN_OT	Transmission Over-Temperature	Fault
TRAN_RAT	Transmission Gear Ratio	Ratio
TR_F	Transmission Range Status	Fault
TSS	Turbine Shaft Speed Sensor	RPM
TSSFM	Turbine Shaft Speed Sensor Failure Mode	Fault
TSS_SRC	Unfiltered Turbine Shaft Speed Sensor	RPM

TRANSMISSION DRIVE CYCLE TEST

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

NOTE: The Transmission Drive Cycle Test must be followed exactly. Transmission failure must occur 4 times consecutively for shift error DTC to be set, and 5 times consecutively for continuous torque converter clutch (TCC) code to set.

NOTE: When carrying out the Transmission Drive Cycle Test, use the Solenoid Operation Chart for correct solenoid operation. Refer to Pinpoint Tests - OSC Equipped Vehicle.

After carrying out the Quick Test, use the Transmission Drive Cycle Test for checking continuous codes.

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With transmission in Overdrive (Circle D) position, moderately accelerate from stop to 80 km/h (50 mph). This allows the transmission to shift into 5th gear. Hold speed and throttle open steady for a minimum of 15 seconds.
5. With transmission in 5th gear and maintaining steady speed and throttle opening, lightly apply and release brake to operate stop lamps. Then hold speed and throttle steady for a minimum of 5 seconds.
6. Brake to a stop and remain stopped for a minimum of 20 seconds.
7. Repeat steps 4 through 6 at least 5 times.
8. Carry out the Quick Test and record continuous DTCs.

After On-Board Diagnostics

NOTE: The vehicle wiring harness, PCM and non-transmission sensors may affect transmission operations. Repair these concerns first.

After the on-board diagnostic procedures are completed, repair all DTCs.

Begin with non-transmission related DTCs, then repair any transmission related DTCs. Refer to the Diagnostic Trouble Code (DTC) Charts for information on condition and symptoms. This chart will be helpful in referring to the correct manual(s) and aids in diagnosing internal transmission concerns and external non-transmission inputs. The pinpoint tests are used in diagnosing transmission electrical concerns. Make sure that the vehicle wiring harness and the PCM are diagnosed as well. The Introduction - Gasoline Engines article will aid in diagnosing non-transmission electronic components.

Before Pinpoint Tests

NOTE: Prior to entering pinpoint tests, check the PCM wiring harness for correct connections, bent or broken pins, corrosion, loose wires, correct routing, correct seals and their condition. Check the PCM, sensors and actuators for damage. Refer to the Introduction - Gasoline Engines article.

NOTE: If a concern still exists after electrical diagnosis, refer to Diagnosis By

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Symptom.

If DTCs appear while carrying out the on-board diagnostics, refer to the **Diagnostic Trouble Code (DTC) Charts** for the appropriate repair procedure. Prior to entering pinpoint tests, refer to any TSBs for transmission concerns.

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS

DTC CHART

**May also be generated by some other non-electric transmission hardware system.					
*Output circuit check, generated only by electrical symptoms.					
Five Digit DTC	Component	Description	Condition	Symptom	Action
P0102, P0103, P1100, P1101	Mass Air Flow (MAF) Sensor	MAF concerns	MAF system inoperative which may cause a transmission concern.	High/low electronic pressure control (EPC) pressure, incorrect shift schedule. Incorrect torque converter clutch (TCC) engagement scheduling. Symptoms similar to a throttle position (TP) sensor failure.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0112	Intake Air Temperature (IAT) Sensor	IAT indicates 125°C (254°F) (grounded)	Voltage drop across IAT exceeds scale set for temperature 125°C (254°F).	Incorrect EPC pressure. Either high or low which will result in harsh or soft shifts.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0113	IAT	IAT indicates -40°C (-40°F) (open circuit)	Voltage drop across IAT exceeds scale set for temperature -40°C (-40°F).	Incorrect EPC pressure. Either high or low which will result in harsh or soft shifts.	REFER to the <u>Introduction - Gasoline Engines</u> article.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

P0114	IAT	IAT out of on-board diagnostic range	IAT temperature higher or lower than expected during key ON engine OFF (KOEO) and key ON engine running (KOER).	Rerun on-board diagnostic at normal operating temperature.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0117	Engine Coolant Temperature (ECT) Sensor	ECT indicates 125°C (254°F)	Voltage drop across ECT exceeds scale set for temperature 125°C (254°F) (grounded).	TCC will always be off, resulting in reduced fuel economy.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0118	ECT Sensor	ECT indicates -40°C (-40°F)	Voltage drop across ECT exceeds scale set for temperature -40°C (-40°F) (open circuit).	TCC will always be off, resulting in reduced fuel economy.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0121, P0122, P0123, P1120, P1121, P1125, P1124	TP Sensor	TP concern	PCM has detected an error. This error may cause a transmission concern.	Harsh engagements, firm shift feel, abnormal shift schedule, TCC does not engage. TCC cycling.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0121- P0124, P0221- P0224, P2100- P2107, P2110- P2112, P2121- P2124, P2126- P2129, P2121-	Accelerator Pedal Position (APP) Sensor	APP concern	PCM has detected an error. This error may cause a transmission concern.	Harsh engagements, firm shift feel, abnormal shift schedule, torque converter clutch does not engage. TCC cycling.	REFER to the <u>Introduction - Gasoline Engines</u> article.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

P2135, P2138- P2140					
P0300- P0308, P0320, P0340, P1351- P1364	Electronic Ignition (EI)	EI concerns	EI system is inoperative which may cause a transmission concern.	Harsh engagements and shifts, late wide open throttle (WOT) shifts, no TCC engagement.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0500, P0503, U1039	ABS	Insufficient vehicle speed sensor (VSS) input from ABS through the communication link	PCM detected a loss of vehicle speed signal through the communication link from ABS.	No transmission symptom. Instrument panel speedometer may be affected.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P0705	Digital Transmission Range (TR) Sensor	Digital TR circuit failure	Digital TR circuits, indicating an invalid pattern in TR_D. Condition caused by a short to ground or an open in TR4, TR3A, TR2 and/or TR1 circuits. This DTC cannot be set by an incorrectly adjusted digital TR sensor.	Harsh engagements or wrong gear commanded. Defaults to Overdrive (Circle D) or invalid position.	Go to <u>Pinpoint Test C.</u>
P0708	Digital TR Sensor	Digital TR sensor circuit TR3A open	Digital TR sensor circuit TR3A reading 2.6v - 5.0v (open circuit). This DTC cannot be set by an incorrectly adjusted digital	Harsh engagements or wrong gear commanded. Defaults to Overdrive (Circle D) or invalid position.	Go to <u>Pinpoint Test C.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

			TR sensor.		
P0711	Transmission Fluid Temperature (TFT) Sensor	No change in TFT	PCM has detected no TFT change during operation.	DTC is set.	Go to <u>Pinpoint Test B.</u>
P0712	TFT Sensor	157°C (315°F) indicated TFT sensor circuit grounded	Voltage drop across TFT sensor exceeds scale set for temperature of 157°C (315°F).	DTC set.	Go to <u>Pinpoint Test B.</u>
P0713	TFT Sensor	-40°C (-40°F) indicated TFT sensor circuit open	Voltage drop across TFT sensor exceeds scale set for temperature - 40°C (-40°F).	DTC set.	Go to <u>Pinpoint Test B.</u>
P0715	Turbine Shaft Speed (TSS) Sensor	Insufficient input from TSS sensor	PCM detected a loss of TSS signal during operation.	-	Go to <u>Pinpoint Test E.</u>
P0717	TSS Sensor	Insufficient input from TSS sensor	PCM detected a loss of TSS signal during operation.	-	Go to <u>Pinpoint Test E.</u>
P0718	TSS Sensor	TSS sensor signal noisy	PCM has detected a noisy TSS signal.	-	Go to <u>Pinpoint Test E.</u>
P0720	Output Shaft Speed (OSS) Sensor	Insufficient input from OSS sensor	PCM detected a loss of OSS signal during operation.	Abnormal shift schedule, harsh shifts.	Go to <u>Pinpoint Test E.</u>
P0721	OSS Sensor	OSS sensor signal noisy	PCM has detected an erratic OSS signal.	Abnormal shift schedule, harsh shifts.	Go to <u>Pinpoint Test E.</u>
P0722	OSS Sensor	Insufficient input from OSS sensor	PCM detected a loss of OSS signal during operation.	Abnormal shift schedule, harsh shifts.	Go to <u>Pinpoint Test E.</u>
P0731**	Shift Solenoid A (SSA), Shift Solenoid B	1st gear ratio error	No 1st gear.	Correct gear ratio not achieved for commanded	REFER to <u>Diagnosis By Symptom.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	(SSB), Shift Solenoid C (SSC) or Internal Parts			gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine RPM could be higher or lower than expected.	
P0732**	SSA, SSB, SSC or Internal Parts	2nd gear ratio error	No 2nd gear.	Correct gear ratio not achieved for commanded gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine RPM could be higher or lower than expected.	REFER to <u>Diagnosis By Symptom.</u>
P0733**	SSA, SSB, SSC or Internal Parts	3rd gear ratio error	No 3rd gear.	Correct gear ratio not achieved for commanded gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction	REFER to <u>Diagnosis By Symptom.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				material). Engine RPM could be higher or lower than expected.	
P0734**	SSA, SSB, SSC or Internal Parts	4th gear ratio error	No 4th gear.	Correct gear ratio not achieved for commanded gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine RPM could be higher or lower than expected.	REFER to <u>Diagnosis By Symptom.</u>
P0735	SSA, SSB, SSC, Shift Solenoid D (SSD) or Internal Parts	5th gear ratio error	No 5th gear.	Correct gear ratio not achieved for commanded gear. Shift errors may also be due to other transmission concerns (stuck valves, damaged friction material). Engine RPM could be higher or lower than expected.	REFER to <u>Diagnosis By Symptom.</u>
P0740*	Torque Converter Clutch	TCC solenoid circuit failure during on-	TCC solenoid circuit fails to provide voltage	Open or short to battery power: harsh	Go to <u>Pinpoint Test A.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	(TCC) Solenoid	board diagnostic	drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostics. May flash transmission control indicator lamp (TCIL).	shifts or engagements, engine RPM higher than expected. Short to ground: vehicle stalls when in drive gear at idle, harsh shifts or engagements or engine RPM lower than expected.	
P0741**	TCC Solenoid	TCC solenoid circuit error or stuck OFF	The PCM picked up an excessive amount of TCC slippage during normal vehicle operation.	Stuck OFF: harsh shifts or engagements. Engine RPM may be higher than expected.	Go to <u>Pinpoint Test A.</u>
P0743*	TCC Solenoid	TCC solenoid circuit failure during on-board diagnostics	TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostics.	Open or short to battery power: harsh shifts or engagements, engine RPM higher than expected. Short to ground: vehicle stalls when in drive gear at idle, harsh shifts or engagements or engine RPM lower than expected.	Go to <u>Pinpoint Test A.</u>
P0745	Pressure Control A (PCA) Solenoid	PCA solenoid or circuit fault	PCA functional fault-low pressure	Incorrect shift pattern indicating mechanical or hydraulic	REFER to <u>Diagnosis By Symptom.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				failure of the transmission.	
P0748	PCA	PCA solenoid inoperative	Electrical failure of the solenoid detected.	Possible slip in gear and/or 3rd gear ratio.	Go to <u>Pinpoint Test D.</u>
P0750*	SSA	SSA solenoid circuit failure	SSA circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic.	Open or short to battery power: 1st gear ratio incorrect or no gear ratio errors, no 1st gear. Short to ground: no 4th or 5th gear.	Go to <u>Pinpoint Test A.</u>
P0753*	SSA	SSA solenoid circuit failure	SSA circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic.	Open or short to battery power: 1st gear ratio incorrect or no gear ratio errors, no 1st gear. Short to ground: no 4th or 5th gear.	Go to <u>Pinpoint Test A.</u>
P0755*	SSB	SSB solenoid circuit failure	SSB circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic.	Open or short to battery power: no 3rd gear. Short to ground: no 1st gear.	Go to <u>Pinpoint Test A.</u>
P0758*	SSB	SSB solenoid circuit failure	SSB circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM driver	Open or short to battery power: no 3rd gear. Short to ground: no 1st gear.	Go to <u>Pinpoint Test A.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

			failure during on-board diagnostic.		
P0760*	SSC	SSC solenoid circuit failure	SSC circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic.	Open or short to battery power: 2nd and 5th gear ratio incorrect. Short to ground: 1st gear ratio incorrect or no gear ratio errors.	Go to <u>Pinpoint Test A.</u>
P0763*	SSC	SSC solenoid circuit failure	SSC circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM driver failure during on-board diagnostic.	Open or short to battery power: 2nd and 5th gear ratio incorrect. Short to ground: 1st gear ratio incorrect or no gear ratio errors.	Go to <u>Pinpoint Test A.</u>
P0765	SSD	SSD solenoid circuit failure	SSD circuit failed to provide voltage drop across solenoid. Circuit shorted to ground.	Short to ground: no engine braking.	Go to <u>Pinpoint Test A.</u>
P0768	SSD	SSD solenoid circuit failure	SSD circuit failed to provide voltage drop across solenoid. Circuit shorted to ground.	Short to ground: no engine braking.	Go to <u>Pinpoint Test A.</u>
P0775	Pressure Control B (PCB)	PCB solenoid or circuit fault	PCB functional fault - low pressure.	Incorrect shift pattern indicating mechanical or hydraulic failure of the	REFER to <u>Diagnosis By Symptom.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				transmission.	
P0778	PCB	PCB solenoid inoperative	Electrical failure of the solenoid detected.	No 2nd and 5th gear.	Go to <u>Pinpoint Test D.</u>
P0791	Intermediate Shaft Speed Sensor	Intermediate shaft speed sensor signal failure	PCM has detected a loss of the intermediate shaft speed sensor signal.	Harsh shifts.	Go to <u>Pinpoint Test E.</u>
P0794	Intermediate Shaft Speed Sensor	Intermediate shaft speed sensor signal intermittent	PCM has detected an intermittent intermediate shaft speed sensor signal.	Harsh shifts.	Go to <u>Pinpoint Test E.</u>
P0795	Pressure Control C (PCC)	PCC solenoid or circuit fault	PCC functional fault - low pressure.	Incorrect shift pattern indicating mechanical or hydraulic failure of the transmission.	REFER to <u>Diagnosis By Symptom.</u>
P0798	PCC	PCC solenoid inoperative	Electrical failure of the solenoid detected.	Incorrect gear ratio in 4th and 5th gear.	Go to <u>Pinpoint Test D.</u>
P0960	PCA	PCA solenoid circuit open	Voltage through PCA solenoid is checked. Error is noted if tolerance is exceeded.	Open circuit - causes maximum PCA pressure, harsh engagements and shifts.	Go to <u>Pinpoint Test D.</u>
P0962**	PCA	PCA solenoid circuit failure, short to ground	Voltage through PCA solenoid is checked. An error will be noted if tolerance is exceeded.	Short circuit - causes minimum PCA pressure (minimum capacity) and limits engine torque (alternate firm). Slips in	Go to <u>Pinpoint Test D.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				gear and 3rd gear incorrect.	
P0963	PCA	PCA solenoid short to battery power or short to ground	Voltage through PCA solenoid is checked. An error will be noted if tolerance is exceeded.	Short to power - causes maximum PCA pressure, harsh engagements and shifts. Short to ground - No 3rd gear.	Go to <u>Pinpoint Test D.</u>
P0964	PCB	PCB solenoid circuit open	Voltage through PCB solenoid is checked. Error is noted if tolerance is exceeded.	Open circuit - causes maximum PCB pressure, harsh engagements and shifts.	Go to <u>Pinpoint Test D.</u>
P0966	PCB	PCB solenoid circuit failure, short to ground	Voltage through PCB solenoid is checked. An error will be noted if tolerance is exceeded.	Short to ground. No 2nd and 5th gear.	Go to <u>Pinpoint Test D.</u>
P0967	PCB	PCB solenoid short to battery voltage, short to ground	Voltage through PCB solenoid is checked. An error will be noted if tolerance is exceeded.	Short to battery power: harsh shift and engagements. Short to ground - No 2nd and 4th gear.	Go to <u>Pinpoint Test D.</u>
P0968	PCC	PCC solenoid circuit open	Voltage through PCC solenoid is checked. Error is noted if tolerance is exceeded.	Open circuit - causes maximum PCC pressure, harsh engagements	Go to <u>Pinpoint Test D.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				and shifts.	
P0970	PCC	PCC solenoid circuit failure, short to ground	Voltage through PCC solenoid is checked. An error will be noted if tolerance is exceeded.	No 4th and 5th gear.	Go to <u>Pinpoint Test D.</u>
P0971	PCC	PCC solenoid short to power, short to ground	Voltage through PCC solenoid is checked. An error will be noted if tolerance is exceeded.	Short to battery power: harsh shift and engagements. Short to ground - No 4th and 5th gear.	Go to <u>Pinpoint Test D.</u>
P1116	ECT Sensor	ECT out of on-board diagnostic range	ECT temperature higher or lower than expected during KOEO and KOER.	Rerun on-board diagnostic at normal operating temperature.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P1124	TP Sensor	TP sensor voltage high/low for on-board diagnostic	TP sensor was not in the correct position for on-board diagnostic.	Rerun at appropriate throttle position per application.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P1460	A/C	A/C clutch cycling pressure switch error	A/C or defrost ON condition may result from A/C clutch being ON during on-board diagnostic.	DTC set during on-board diagnostic - rerun with A/C OFF. Failed ON - EPC pressure slightly low with A/C OFF.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P1572	Brake Pedal Position (BPP) Switch	BPP switch circuit failed	Brake ON circuit failure during normal operation.	Failed ON or not connected - TCC will not engage at less than 1/3 throttle.	REFER to the <u>Introduction - Gasoline Engines</u> article.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				Failed OFF or not connected - TCC will not disengage when brake is applied.	
P1636	SSx	SSx ISIG communication error	PCM has detected an error with the ISIG chip.	-	INSTALL a new PCM.
P1700	Transmission	Transmission indeterminate failure	Internal component failure. Direct one-way clutch failure.	FMEM becomes active - engine RPM limited to 4,000 RPM. Failed a neutral condition in 1st, 3rd or 4th gear in automatic Mode. Only 2nd and 5th gear available. Other DTCs that may set P1700: P0745, P1747, P1760, P1714, P1715, P0750, P0755.	If other solenoid DTCs are present, DIAGNOSE and REPAIR them first. CLEAR DTCs and DRIVE vehicle. If P1700 returns, DISASSEMBLE transmission and INSPECT the direct one-way clutch. REPAIR as required. CLEAR DTC. DRIVE vehicle and VERIFY repair.
P1702	Digital TR Sensor	Digital TR signal intermittent, code P0705, P0708 are set	See P0705, P0708 conditions.	See P0705, P0708 symptoms.	Go to <u>Pinpoint Test C.</u>
P1703	BPP Switch	Brake not actuated during on-board diagnostic KOER	Brake not cycled during KOER.	Failed ON or not connected - TCC will not engage at less than 1/3 throttle.	REFER to the <u>Introduction - Gasoline Engines</u> article.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				Failed OFF or not connected - TCC will not disengage when brake is applied.	
P1703	BPP Switch	BPP switch circuit failed	Brake ON circuit failure during KOEO.	Failed ON or not connected - TCC will not engage at less than 1/3 throttle. Failed OFF or not connected - TCC will not disengage when brake is applied.	REFER to the <u>Introduction - Gasoline Engines</u> article.
P1704	Digital TR Sensor	Digital TR not in P or N positions during KOEO/KOER	Digital TR sensor or selector lever cable incorrectly adjusted or digital TR circuit failure.	DTC is set.	Go to <u>Pinpoint Test C.</u>
P1705	Digital TR Sensor	Digital TR not in P or N during KOEO/KOER	KOEO/KOER not run in park or neutral, or digital TR circuit failure.	DTC is set.	RERUN KOEO/KOER in P or N or Go to <u>Pinpoint Test C.</u>
P1711	TFT Sensor	TFT out of on-board diagnostic range	Transmission not at operating temperature during on-board diagnostic.	DTC set - vehicle cold or overheated.	Warm or cool vehicle to normal operating temperature. Go to <u>Pinpoint Test B.</u>
P1714	SSA	SSA inoperative	Mechanical failure of the solenoid detected.	Stuck OFF. Open or short to battery power: 1st gear ratio incorrect or no gear ratio errors, no 1st gear. May turn on	Go to <u>Pinpoint Test F.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

				malfunction indicator lamp (MIL). Stuck ON. No 4th or 5th gear.	
P1715	SSB	SSB inoperative	Mechanical failure of the solenoid detected.	Stuck OFF: 3rd gear ratio incorrect, no 3rd gear. Stuck ON: 1st gear ratio incorrect or no 1st gear.	Go to <u>Pinpoint Test F.</u>
P1716	SSC	SSC inoperative	Mechanical failure of the solenoid detected.	Stuck OFF: 2nd and 5th gear ratio incorrect. Stuck ON: 1st gear ratio incorrect or no gear ratio errors.	Go to <u>Pinpoint Test F.</u>
P1717	SSD	SSD inoperative	Mechanical failure of the solenoid detected.	Stuck ON: no engine braking.	Go to <u>Pinpoint Test F.</u>
P1740**	TCC Solenoid	TCC solenoid inoperative	TCC not commanded. Mechanical failure of the solenoid detected.	Stuck OFF: harsh shifts or engagements, engine RPM higher than expected. Stuck ON: vehicle stalls when in drive gear at idle, harsh shifts or engagements or engine RPM lower than expected.	Go to <u>Pinpoint Test F.</u>
P1780	Transmission Control Switch (TCS)	TCS not changing states	TCS not cycled during self-test. TCS circuit or switch open or	No overdrive cancel when cycled during KOER.	RERUN on-board diagnostics and cycle switch. REFER to <u>AUTOMATIC TRANSAXLE/TRANSMISSION</u>

			shorted.		EXTERNAL CONTROLS article for further diagnosis and repair.
P1783	TFT Sensor	Transmission overtemp condition indicated	Transmission fluid temperature exceeded 127° C (270°F).	Increase in control pressure.	Go to <u>Pinpoint Test B.</u>

TRANSMISSION CONNECTOR LAYOUTS

Connector Reference and Terminal Readings

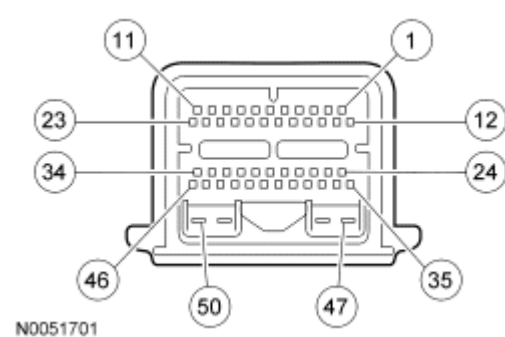


Fig. 4: Identifying PCM
 Courtesy of FORD MOTOR CO.

Pin Number	Circuit Description
3	Output shaft speed (OSS) sensor signal input
4	Intermediate shaft speed sensor signal input
11	Pressure control solenoid A (PC A)
15	Turbine shaft speed (TSS) sensor signal input
16	Digital transmission range (TR) sensor TR1 to PCM
17	Digital TR sensor TR2 to PCM
23	Pressure control solenoid B (PC B)
27	Digital TR sensor TR3A to PCM
28	Digital TR sensor TR4 to PCM
29	Transmission fluid temperature (TFT) sensor
34	Pressure control solenoid C (PC C)
41	Signal return
42	Shift solenoid A (SSA)
43	Shift solenoid B (SSB)
44	Shift solenoid C (SSC)
45	Shift solenoid D (SSD)
46	Torque converter clutch (TCC) solenoid

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

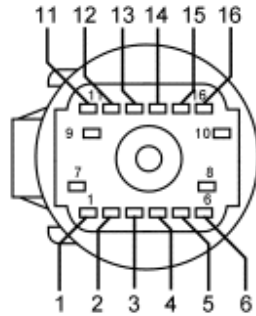


Fig. 5: Identifying Transmission Vehicle Harness
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Description
1	Pressure control solenoid B (PC B)
2	Transmission fluid temperature (TFT) sensor input
3	Solenoid power
4	Pressure control solenoid C (PC C)
5	Shift solenoid D (SSD)
6	Shift solenoid C (SSC)
11	Pressure control solenoid A (PC A)
12	Signal return
14	Torque converter clutch (TCC) solenoid
15	Shift solenoid B (SSB)
16	Shift solenoid A (SSA)

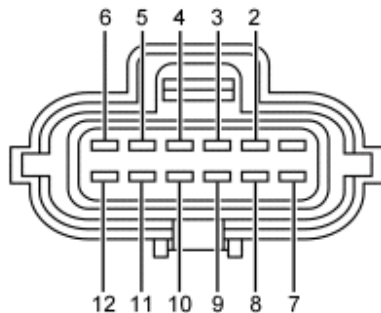
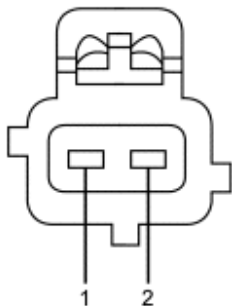


Fig. 6: Identifying Digital Transmission Range (TR) Sensor
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Description
2	Signal return
3	Digital transmission range (TR) sensor TR3A
4	Digital transmission range (TR) sensor TR1
5	Digital transmission range (TR) sensor TR2

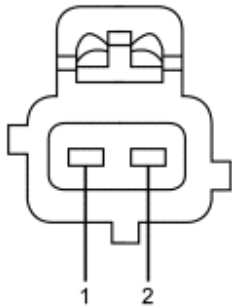
6	Digital transmission range (TR) sensor TR4
7	Ground
8	Neutral switch sense input
9	Not used
10	Starter solenoid central power
11	Not used
12	Starter relay (overload protected)



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Fig. 7: Identifying Turbine Shaft Speed (TSS) Sensor
 Courtesy of FORD MOTOR CO.

Pin Number	Circuit Description
1	Turbine shaft speed (TSS) sensor signal
2	Signal return



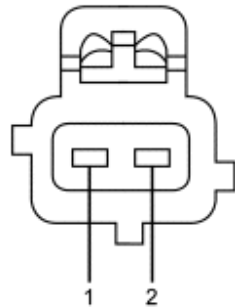
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Fig. 8: Output Shaft Speed (OSS) Sensor
 Courtesy of FORD MOTOR CO.

Pin Number	Circuit Description
1	Output shaft speed (OSS) sensor signal
2	Signal return

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



A0051261

Fig. 9: Identifying Intermediate Shaft Speed Sensor Harness Connector
Courtesy of FORD MOTOR CO.

Pin Number	Circuit Description
1	Intermediate shaft speed sensor signal
2	Signal return

DIGITAL TRANSMISSION RANGE (TR) SENSOR DIAGNOSIS CHART

Selector Lever Position	PID: TR	TR4	TR3	TR2	TR1	TR3_V PCM pin 27 to signal return
Park	P	Closed	Closed	Closed	Closed	0.0 volts
Reverse	R	Open	Open	Closed	Closed	1.3 - 1.8 volts
Neutral	N	Closed	Open	Open	Closed	1.3 - 1.8 volts
Overdrive	D	Open	Open	Open	Open	1.3 - 1.8 volts
Manual 3	3	Open	Closed	Open	Closed	0.0 volts
Manual 2	2	Open	Closed	Closed	Open	0.0 volts
Manual 1	1	Closed	Closed	Open	Open	0.0 volts

A. TR3_V is the voltage at the PCM pin 27 Circuit to signal return.

- **Voltages for TR1, TR2 and TR4:**

- 0 = 0.0 volts.
- 1 = 9.0-14.0 volts.

- **Voltage for TR3A:**

- 0 = 0.0 volts.
- 1 = 1.3-1.8 volts.

Wiggle Test Information for Open/Shorts

- A. TR4, TR3A, TR2 and TR1 are all closed in PARK. PARK is a good position to check for intermittent open circuits.
- B. TR4, TR3A, TR2 and TR1 are all open in OVERDRIVE, so OVERDRIVE is a good position to check for shorts to ground. To determine the shorted components while observing the TR PIDs, unplug the TR and see if the short goes away. If the short is still present, unplug the transmission

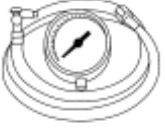
2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

harness and see if the short goes away. If the short is still present, then the short is in the PCM or vehicle harness. Remove the suspect circuit(s) wire terminal from the PCM connector. If the short is still present, then the PCM has an internal failure; otherwise the failure is in the vehicle harness.

PINPOINT TESTS - OSC EQUIPPED VEHICLE

Special Tools

Illustration	Tool Name	Tool Number
 ST1565-A	Transmission Fluid Pressure Gauge	307-004 (T57L-77820-A)
 ST1137-A	73 III Automotive Meter	105-R0057 or equivalent
 ST2634-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

Shift Solenoid Pre-Diagnosis

Anytime an electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new as necessary.

Use the following shift solenoid operation information when carrying out Pinpoint Test A.

SOLENOID OPERATION CHART

Gearshift Selector Position	PCM Commanded Gear	5R55S Solenoid States						
		SSA	SSB	SSC	SSD	PCA	PCB	PCC
P/N	P/N	ON	OFF	OFF	ON	L	H/L	L
R	R	ON	OFF	OFF	ON	L/H	L	H
D	1	ON	OFF	OFF	ON	H	H/L	L
	2	ON	OFF	ON	ON	L/H	H	L
	3	ON	ON	OFF	ON	H	L/H	L
	4	OFF	OFF	OFF	ON	H	H/L	H
	5	OFF	OFF	ON	ON	H	H	H
D Cancelled	1	ON	OFF	OFF	ON	H	H/L	L

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	2	ON	OFF	ON	ON	L/H	H	L
	3	ON	ON	OFF	ON	H	L/H	L
	4	OFF	OFF	OFF	OFF	L/H	H	H
Manual 3	3	ON	ON	OFF	OFF	H	L	H/L
Manual 2	2	ON	OFF	ON	OFF	H	L	H/L
Manual 1	1	ON	OFF	OFF	OFF	H	L	H/L
H = HIGH L = LOW H/L = PCM controlled Manual = if equipped								

Shift Solenoid Failure Mode Chart

Failed ON or OFF due to PCM and/or vehicle wiring concerns, solenoid electrically, mechanically or hydraulically stuck ON or OFF.

SOLENOID FAILURE MODE CHART A - 5R55S

Gear	Actual Gear							
	SSA		SSB		SSC		SSD	
	ON	OFF	ON	OFF	ON	OFF	ON	OFF
D Position								
1	1	1	3	1	2	1	1	1/M1
2	2	2	2	2	2	1	2	M2
3	3	3	3	1	3	3	3	3/M3
4	1	4	4	4	4/5	4	4	4/M4
5	2	5	5	5	5	4	5	5
D Position - Overdrive (Circle D) Cancelled								
1M	M1	M1	M3	M1	M2	M1	1	M1
2M	M2	M2	1.1	M2	M2	M1	2	M2
3M	M3	M3	M3	M1	1.1	M3	3	M3
4M	M1	M4	M4	M4	5	M4	4	M4
R	R	R	N	R	R	R	R	R
Slip = Slip due to low line pressure 1.1 = Actual ratio with Forward Clutch, Intermediate and Overdrive Band applied.								

SOLENOID FAILURE MODE CHART B - 5R55S

Gear	Actual Gear					
	PC A		PC B		PC C	
	L	H	L	H	L	H
D Position						
1/S	1	1	1	1	1	1
2	2	2	1	2	2	2

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

3	1/S	3	3	3	3	3
4	4	4	4	4	1	4
5	5	5	4	5	2	5
D Position - Overdrive (Circle D) Cancelled						
1M	1	M1	1	M1	1M	M1
2M	M2	M2	1	M2	2M	M2
3M	1	M3	3	M3	3M	M3
4M	M4	M4	4	M4	1	M4
R	R/S	R	R/S	R	R	R
H = High L = Low Slip = Slip due to low line pressure 1.1 = Actual ratio with Forward Clutch, Intermediate and Overdrive Band applied.						

Pinpoint Tests

Refer to appropriate SYSTEM WIRING DIAGRAM ARTICLE for schematic and connector information.

PINPOINT TEST A: SHIFT AND TORQUE CONVERTER CLUTCH (TCC) SOLENOIDS

NOTE: Refer to the Transmission Vehicle Harness Connector illustration [Transmission Connector Layouts](#).

NOTE: Read and record all DTCs. All digital transmission range (TR) sensor and vehicle speed (VSS) DTCs must be repaired before entering output state control (OSC).

A1 ELECTRONIC DIAGNOSTICS

- Select PARK.
- Key in OFF position.
- Check to make sure the transmission harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Connect the diagnostic tool.
- Key in ON position.
- Access the transmission PIDs.
- **Is the scan tool able to access the transmission PIDs?**

YES : Go to A2 .

NO : REPEAT procedure to access the transmission PIDs. If the scan tool did not access the transmission PIDs, REFER to the [Introduction - Gasoline Engines](#) article for diagnosis of PCM.

A2 WIGGLE TEST

- Select PIDs to be monitored.
- SSA

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- SSB
 - SSC
 - SSD
 - TCC
- Select ON to turn suspect solenoid(s) ON.
 - Wiggle all wiring and connectors to the transmission. Monitor the solenoid state for changes.
 - Select OFF to turn solenoid(s) OFF.
 - Repeat steps for each solenoid.
 - **Does the suspect solenoid(s) state change?**
YES : REPAIR the circuit. TEST the system for normal operation.
NO : Go to A3.

A3 SOLENOID FUNCTIONAL CHECK

- Monitor each solenoid state.
- Turn each solenoid ON and OFF.
- **Does the solenoid turn ON and OFF when commanded and can solenoid activation be heard?**
YES : Go to A4.
NO : Go to A5.

A4 OSC TRANS-DRIVE MODE (GEAR OR TCC)

- Select GEAR for shift solenoids.
- Select TCC for torque converter clutch solenoid.
- **Does the transmission upshift and downshift or torque converter engage/disengage when commanded?**
YES : CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to **Diagnosis By Symptom** to diagnose shift or torque converter concern.
NO : Go to A5.

A5 CHECK CIRCUIT 1862 (VT/WH) FOR BATTERY VOLTAGE

- Disconnect: Transmission Vehicle Harness Connector C199
- Visually inspect all wires and connectors for damage.
- Key in ON position.

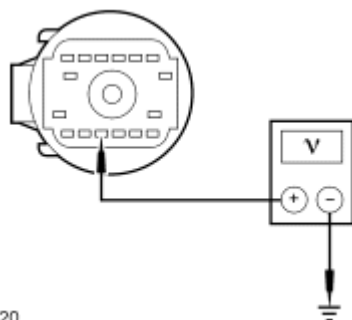
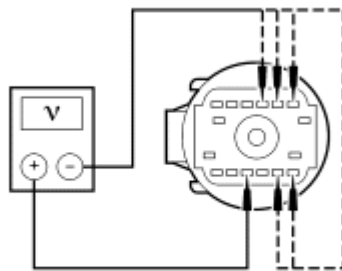


Fig. 10: Checking Circuit 1862 (VT/WH) For Battery Voltage
Courtesy of FORD MOTOR CO.

- Measure the voltage at C199-3, circuit 1862 (VT/WH) harness side.
- **Is the voltage greater than 10 volts?**
YES : Go to A6.
NO : REPAIR the circuit. TEST for normal operation.

A6 ELECTRICAL SIGNAL CHECK



N0052521

Fig. 11: Connecting Positive Lead To Pin 3 And Connecting Negative Lead To Pin 5, 6, 14, 15 And 16

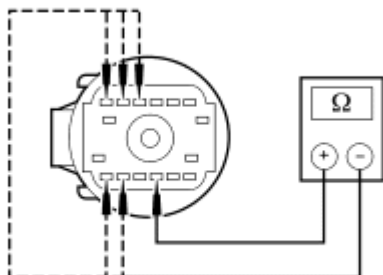
Courtesy of FORD MOTOR CO.

- Leave positive lead connected to C199-3, circuit 1862 (VT/WH) and connect negative lead to C199 pins 5, 6, 14, 15 and 16.
- Select SSA, SSB, SSC, SSD or TCC.
- Measure the voltage while cycling the solenoids ON and OFF.
- **Does the voltage change?**

YES : Go to A7.

NO : REPAIR the circuit. TEST the system for normal operation.

A7 CHECK SOLENOID RESISTANCE AT SOLENOID



N0052522

Fig. 12: Measuring Resistance Between Pin 3 And Pin 5, 6, 14, 15 And 16 Solenoid Side
Courtesy of FORD MOTOR CO.

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- Measure the resistance between C199-3 and pins 5, 6, 14, 15 and 16 solenoid side.

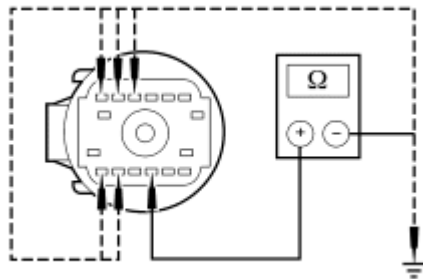
Solenoid	Resistance (ohms)
SSA	16-45
SSB	16-45
SSC	16-45
SSD	16-45
TCC	9-16

- **Is the resistance within specification?**

YES : Go to A8.

NO : INSTALL a new solenoid body assembly. TEST the system for normal operation.

A8 CHECK SOLENOID FOR SHORT TO GROUND



N0052523

Fig. 13: Measuring Resistance Between Pin 3 And Pin 5, 6, 14, 15 And 16 Solenoid Side And Ground

Courtesy of FORD MOTOR CO.

- Measure the resistance between C199-3 and pins 5, 6, 14, 15 and 16 solenoid side and ground.
- **Is the resistance less than 5 ohms?**
 - YES** : INSTALL a new solenoid body assembly.
 - NO** : REFER to **Diagnosis By Symptom** for diagnosis of shift or torque converter concerns.

PINPOINT TEST B: TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

NOTE: Refer to the Transmission Vehicle Harness Connector illustration **Transmission Connector Layouts**.

B1 ELECTRONIC DIAGNOSTICS

- Select PARK.
- Key in OFF position.
- Check to make sure the transmission harness connector is fully seated, terminals are fully engaged

in connector and in good condition before proceeding.

- Connect the diagnostic tool.
- Key in ON position.
- Access the transmission PIDs.
- **Is the scan tool able to access the transmission PIDs?**

YES : Go to B2 .

NO : REPEAT procedure to access the transmission PIDs. If the scan tool did not access the transmission PIDs, REFER to the **Introduction - Gasoline Engines** article for diagnosis of PCM.

B2 WARM-UP/COOL-DOWN CYCLE

- While monitoring the transmission fluid temperature (TFT) PIDs, carry out the following test: If transmission is cold, run transmission to warm it up. If transmission is warm, allow transmission to cool down.
- **Do the TFT PIDs increase as the transmission is warmed up or decrease as the transmission is cooled or does the TFT temperature or voltage drop in and out of range?**

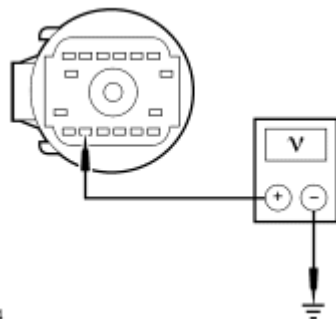
YES : If the TFT PIDs increase as the transmission is warmed or decrease as the transmission is cooled, CLEAR all DTCs. ROAD TEST to verify if concern is still present. If concern is still present, REFER to **Diagnosis By Symptom** to diagnose transmission overheating.

If the TFT sensor temperature or TFT sensor voltage drop in and out of range, INSPECT for intermittent concern in the internal/external harness, sensor or connector.

NO : Go to B3.

B3 ELECTRICAL SIGNAL CHECK

- Disconnect: Transmission Harness Connector C199
- Visually inspect all wires and connectors for damage.



N0052524

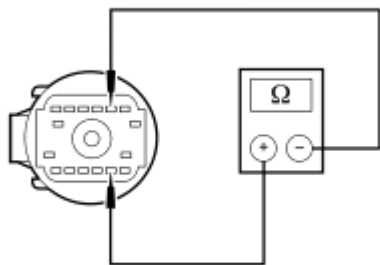
Fig. 14: Measuring Voltage At C199-2, Circuit 922 (OG/BK) Harness Side
Courtesy of FORD MOTOR CO.

- Measure the voltage at C199-2, circuit 922 (OG/BK) harness side.
- **Is the voltage between 4.5 and 5.0 volts?**

YES : Go to B4.

NO : REPAIR the circuit. TEST the system for normal operation.

B4 CHECK RESISTANCE OF THE TFT SENSOR



N0052525

Fig. 15: Measuring Resistance Between C199-2 & C199-12 At Solenoid Body Connector
Courtesy of FORD MOTOR CO.

- Measure the resistance between C199-2 and C199-12 at the solenoid body connector.
- Record the resistance.
- Resistance should be approximately in the following ranges:

TRANSMISSION FLUID TEMPERATURE

°C	°F	Resistance (Ohms)
-40 to - 20	-40 to - 4	967K - 284K
-19 to - 1	-3 - 31	284K - 100K
0 - 20	32 - 68	100K - 37K
21 - 40	69 - 104	37K - 16K
41 - 70	105 - 158	16K - 5K
71 - 90	159 - 194	5K - 2.7K
91 - 110	195 - 230	2.7K - 1.5K
111 - -	231 - -	1.5K -

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

130	266	0.8K
131	267	0.8K -
-	-	0.54K
150	302	

- **Is the resistance in the range?**

YES : REFER to **Diagnosis By Symptom** to diagnose an overheating concern.

NO : INSTALL a new solenoid body assembly.

PINPOINT TEST C: DIGITAL TRANSMISSION RANGE (TR) SENSOR

NOTE: Refer to the Digital Transmission Range (TR) Sensor Connector illustration and Digital Transmission Range (TR) Sensor Diagnosis Chart **Transmission Connector Layouts**.

C1 VERIFY DTCs

- Select PARK.
- Key in OFF position.
- Carry out On-Board Diagnostic Test.
- **Are only DTCs P0705 and P0708 present?**

YES : Go to C4.

NO : Go to C2.

C2 VERIFY DIGITAL TRANSMISSION RANGE (TR) SENSOR ALIGNMENT

- Select PARK.
- Key in OFF position.
- Check to make sure the digital TR sensor harness connector is fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Apply the parking brake.
- Select NEUTRAL.
- Disconnect the selector lever cable/linkage from the manual lever.
- Verify that the TR Sensor Alignment Gauge fits in the appropriate slots.
- **Is the digital TR sensor correctly adjusted?**

YES : Go to C3.

NO : ADJUST the digital TR sensor. REFER to **Digital Transmission Range (TR) Sensor**. PLACE selector lever into PARK and CLEAR DTCs. RERUN OBD Tests. Go to C3 .

C3 VERIFY SELECTOR LEVER CABLE/LINKAGE ADJUSTMENT

- Connect the selector lever cable/linkage.
- Place the selector lever in D.
- Verify that the selector lever cable/linkage is correctly adjusted. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- **Is the selector lever cable/linkage correctly adjusted?**

YES : Go to C4.

NO : ADJUST the selector lever cable/linkage. REFER to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article. Go to C4.

C4 CHECK ELECTRICAL SIGNAL OPERATION

- Select PARK.
- Disconnect: Digital TR Sensor C167

CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.

- Inspect both ends of the connector for damage or pushed-out pins, corrosion, loose wires and missing or damaged seals.
- **Is there damage to the connector, pins or harness?**
YES : REPAIR as necessary. CLEAR DTCs and RERUN OBD Tests.
NO : If diagnosing a DTC, go to C5.

If diagnosing a starting concern or a backup lamp concern, go to C10 .

C5 CHECK ELECTRICAL SYSTEM OPERATION (DIGITAL TR AND PCM)

- Key in OFF position.
- Connect: Digital TR Sensor C167
- Connect the diagnostic tool.
- Key in ON position.
- Access the transmission PIDs.
- Move transmission range selector lever into each gear and stop.
- Observe the PIDs, TR, TR1, TR2, TR3, TR3_V and TR4 while wiggling harness, tapping on sensor or driving the vehicle.
- Compare the PIDs to the Digital Transmission Range (TR) Sensor Diagnosis Chart.
- **Do the PIDs TR, TR1, TR2, TR3, TR3_V and TR4 match the Digital Transmission Range (TR) Sensor Diagnosis chart, and do the PIDs remain steady when the harness is wiggled, the sensor is tapped on or the vehicle driven?**

YES : The problem is not in the digital TR sensor system. REFER to **Diagnosis By Symptom** for further diagnosis.

NO : If the PIDs change when wiggling harness, tapping on the sensor or driving the vehicle, the problem may be intermittent. Go to C6 .

C6 CHECK DIGITAL TR SENSOR OPERATION

- Disconnect: Digital TR Sensor C167

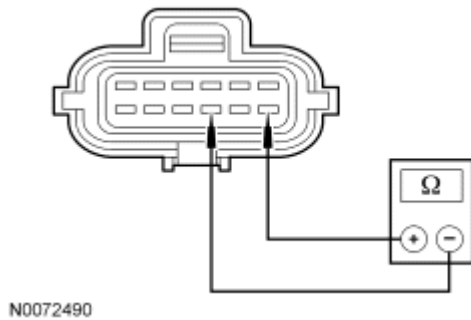


Fig. 16: Measuring Resistance Between Digital TR Sensor Pin 10 & 12, Component Side With Selector Lever In PARK & NEUTRAL
Courtesy of FORD MOTOR CO.

CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.

- Measure the resistance between digital TR sensor pin 10 and pin 12, component side, with the selector lever in PARK and then NEUTRAL.

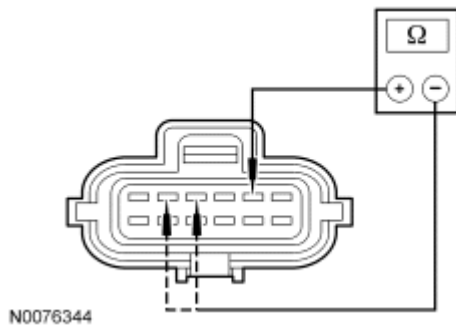


Fig. 17: Measuring Resistance Between Digital TR Sensor C167-2, Pins 4 & 5, Component Side With Selector Lever In REVERSE
Courtesy of FORD MOTOR CO.

- Measure the resistance between digital TR sensor C167-2, and pins 4 and 5, component side, with the selector lever in REVERSE.
- **Are all the resistances less than 5 ohms?**
YES : Concern is not in the digital TR sensor, REFER to **STARTING SYSTEM** article or **EXTERIOR LIGHTING** article.
NO : INSTALL a new digital TR sensor. CLEAR DTCs and REPEAT OBD Tests.

C7 CHECK DIGITAL TR SENSOR OPERATION

- Disconnect: Digital TR Sensor C167

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

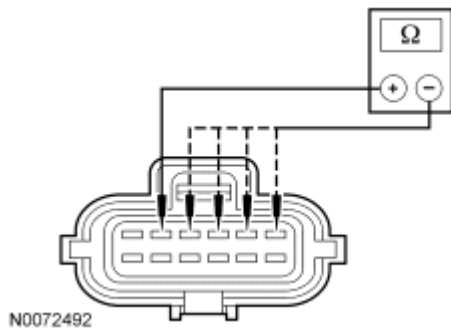


Fig. 18: Measuring Resistance Between Digital TR Sensor Pin 2 & Pins 3, 4, 5 And 6, Component Side
Courtesy of FORD MOTOR CO.

CAUTION: Do not pry on connector. This will damage the connector and result in a transmission concern.

- Measure the resistance between digital TR sensor pin 2 and pins 3, 4, 5 and 6, component side, with the selector lever in each position. Compare the measurements to the Digital Transmission Range (TR) Sensor Diagnosis Chart.
- **Do the measurements match Digital Transmission Range (TR) Sensor Diagnosis Chart?**
YES : Concern is not in the digital TR sensor, go to C8.
NO : INSTALL a new digital TR sensor. CLEAR DTCs and REPEAT OBD Tests.

C8 CHECK PCM HARNESS CIRCUITS FOR OPENS

- Key in OFF position.
- Disconnect: PCM C175T
- Inspect for damaged or pushed-out pins, corrosion or loose wires.
- Disconnect: Digital TR Sensor C167

CAUTION: Do not pry the connector. This will damage the connector and result in a transmission concern.

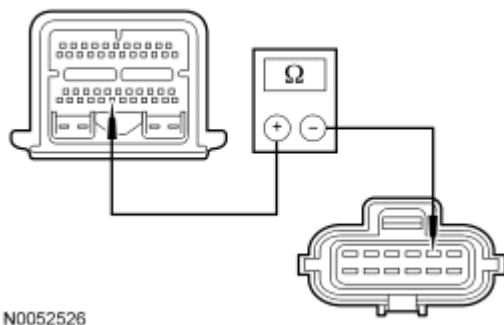


Fig. 19: Checking PCM Harness Circuits For Opens (1 Of 5)
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Measure the resistance between TR sensor C167-2, circuit 359 (GY/RD) harness side and signal return PCM C175T-41, circuit 359 (GY/RD) harness side.

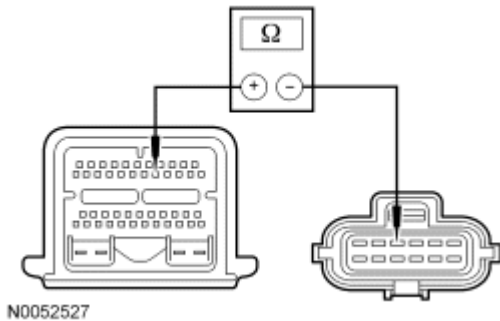


Fig. 20: Checking PCM Harness Circuits For Opens (2 Of 5)
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-16, circuit 1144 (YE/BK) harness side and TR sensor C167-4, circuit 1144 (YE/BK) harness side.

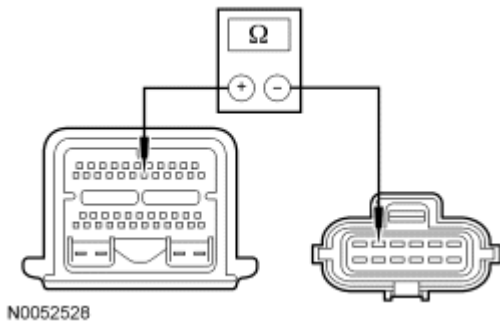


Fig. 21: Checking PCM Harness Circuits For Opens (3 Of 5)
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-17, circuit 1145 (LB/BK) harness side and TR sensor C167-5, circuit 1145 (LB/BK) harness side.

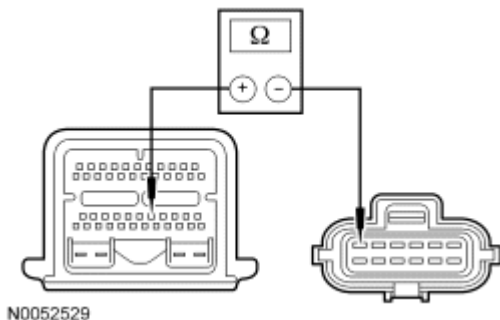


Fig. 22: Checking PCM Harness Circuits For Opens (4 Of 5)
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-28, circuit 1143 (WH/BK) harness side and TR sensor C167-6, circuit 1143 (WH/BK) harness side.

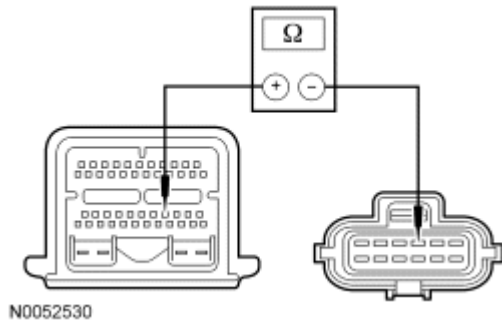


Fig. 23: Checking PCM Harness Circuits For Opens (5 Of 5)
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-27, circuit 1268 (RD/BK) harness side and TR sensor C167-3, circuit 1268 (RD/BK) harness side.

- **Are the resistances less than 5 ohms?**

YES : Go to C9.

NO : REPAIR the circuits. TEST the system for normal operation.

C9 CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND OR POWER

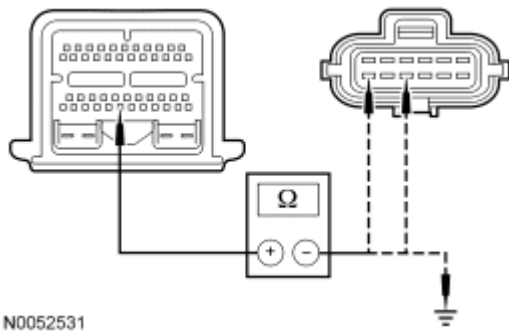


Fig. 24: Measuring Resistance Between PCM C175T-41, Circuit 359 (GY/RD) Harness Side
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-41, circuit 359 (GY/RD) harness side and TR C167-10, circuit 32 (WH/PK) harness side, and TR C167-12, circuit 12 (WH/PK), harness side and ground.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

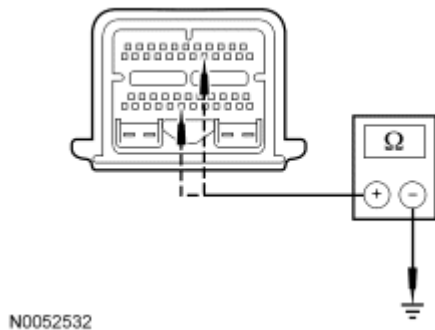


Fig. 25: Measuring Resistance Between PCM C175T-16, Circuit 1144 (YE/BK) Harness Side & Ground
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-16, circuit 1144 (YE/BK) harness side and ground; and PCM C175T-41, circuit 359 (GY/RD) harness side and ground.

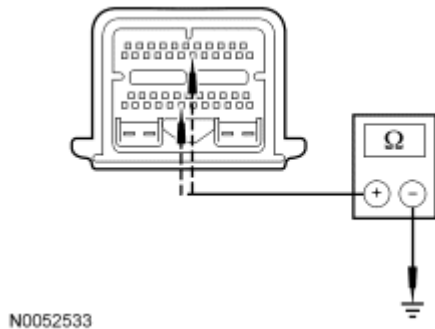


Fig. 26: Measuring Resistance Between PCM C175T-17, Circuit 1145 (LB/BK) Harness Side & Ground
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-17, circuit 1145 (LB/BK) harness side and ground; and PCM C175T-41, circuit 359 (GY/RD) harness side and ground.

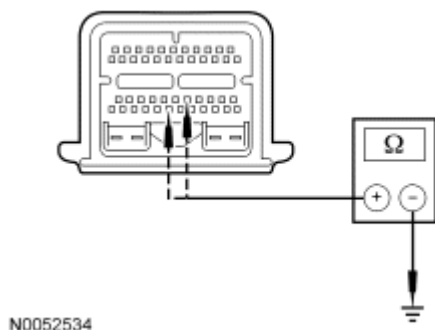


Fig. 27: Measuring Resistance Between PCM C175T-28, Circuit 1143 (WH/BK) Harness Side & Ground
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Measure the resistance between PCM C175T-28, circuit 1143 (WH/BK) harness side and ground; and PCM C175T-41, circuit 359 (GY/RD) harness side and ground.

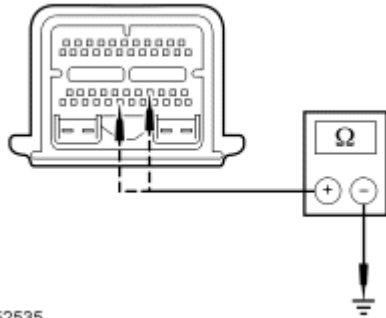


Fig. 28: Measuring Resistance Between PCM C175-27, Circuit 1268 (RD/BK) Harness Side & Ground

Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175-27, circuit 1268 (RD/BK) harness side and ground; and PCM C175T-41, circuit 359 (GY/RD) harness side and ground.

- **Are the resistances greater than 10,000 ohms?**

YES : Go to C10.

NO : REPAIR the circuits. TEST the system for normal operation. CLEAR DTCs. RERUN OBD Tests.

C10 CHECK FOR SHORT BETWEEN TR/PCM INPUT SIGNAL CIRCUITS

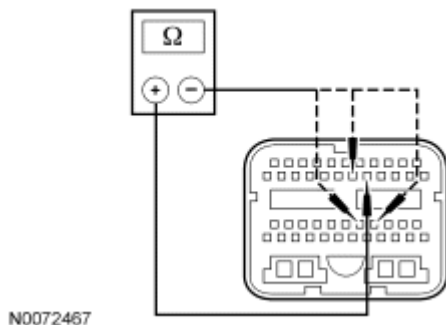


Fig. 29: Measuring Resistance Between PCM C175T-16, Circuit 1144 (YE/BK) Harness Side

Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-16, circuit 1144 (YE/BK) harness side; and PCM C175T-17, circuit 1145 (LB/BK), PCM C175T-27, circuit 1268 (RD/BK) and PCM C175T-28, circuit 1143 (WH/BK) harness side.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

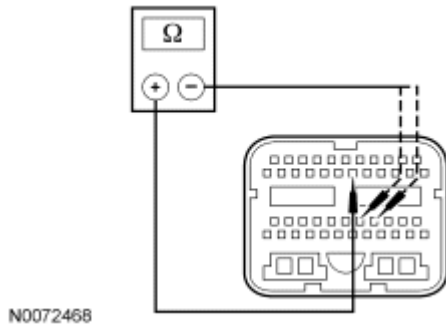


Fig. 30: Measuring Resistance Between PCM C175T-17, Circuit 1145 (LB/BK) Harness Side
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-17, circuit 1145 (LB/BK) harness side; and between PCM C175T-27, circuit 1268 (RD/BK) and PCM C175T-28, circuit 1143 (WH/BK) harness side.

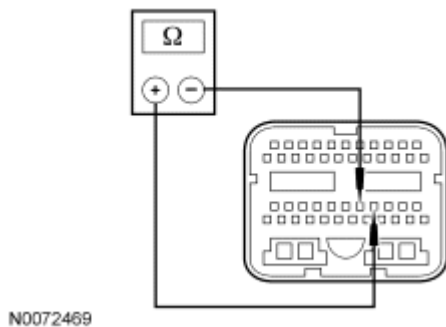


Fig. 31: Measuring Resistance Between PCM C175T-27, Circuit 1268 (RD/BK) Harness Side
Courtesy of FORD MOTOR CO.

- Measure the resistance between PCM C175T-27, circuit 1268 (RD/BK) harness side; and between PCM C175T-28, circuit 1143 (WH/BK) harness side.
- **Are the resistances greater than 10,000 ohms?**
YES : INSTALL a new PCM. TEST the system for normal operation.
NO : REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST D: PRESSURE CONTROL (PC) SOLENOIDS (PCA, PCB, PCC)

NOTE: Refer to the Transmission Vehicle Harness Connector illustration Transmission Connector Layouts.

NOTE: Read and record all DTCs. All digital transmission range (TR) sensor and vehicle speed sensor (VSS) DTCs must be repaired before entering output state control (OSC).

D1 ELECTRONIC DIAGNOSTICS

- Select PARK.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Key in OFF position.
- Check to make sure the transmission harness connector is fully seated, terminals are fully engaged in the connector and in good condition before proceeding.
- Install 300 psi pressure gauges into Line and PC C tap.
- Connect the diagnostic tool.
- Key in ON position.
- Access the transmission PIDs.
- **Is the scan tool able to access the transmission PIDs?**

YES : Go to D2 .

NO : REPEAT procedure to access the transmission PIDs. If the scan tool did not access the transmission PIDs, REFER to **Introduction - Gasoline Engines** article for diagnosis of PCM.

D2 SOLENOID FUNCTIONAL TEST

- Monitor pressure gauges.

NOTE: Make sure that the solenoids not being tested are off or at zero.

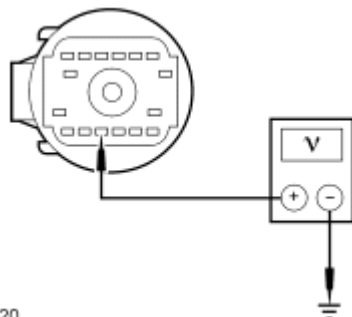
- With the engine running, command the PCA, PCB and PCC solenoids to change the pressure.
- **For PC A and PC B: Does the pressure reading for A or B follow the commanded pressure (actual A and B pressures will be higher than the commanded pressure)? For PC C: Does the pressure reading match the commanded pressure?**

YES : CLEAR DTCs.

NO : Go to D3.

D3 CHECK FOR BATTERY VOLTAGE

- Key in OFF position.
- Disconnect: Transmission Harness Connector C199
- Visually inspect all wires and connectors for damage.
- Key in ON position.



N0052520

Fig. 32: Measuring Voltage At C199-3, Circuit 1862 (VT/WH) Harness Side
Courtesy of FORD MOTOR CO.

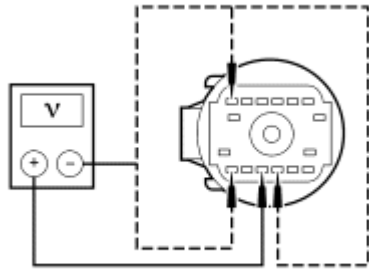
- Measure the voltage at C199-3, circuit 1862 (VT/WH) harness side.

- Is the voltage greater than 10 volts?

YES : Go to D4.

NO : REPAIR the circuit. TEST the system for normal operation.

D4 ELECTRICAL SIGNAL CHECK



N0052540

Fig. 33: Connecting Positive Lead Connected Pin 3 And Negative Lead To Pins 1, 4 And 11 Harness Side

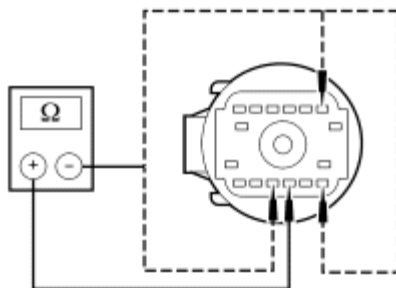
Courtesy of FORD MOTOR CO.

- Measure the voltage between C199-3, circuit 1862 (VT/WH) harness side, and C199-1, circuit 966 (LB/PK), C199-4, circuit 912 (WH/RD) and C199-11, circuit 925 (WH/YE) harness side.
- Activate solenoids (ON and OFF) while monitoring the voltage reading.
- Does the voltage and solenoid state change?

YES : Go to D5.

NO : CHECK for open or short circuit in harness or PCM.

D5 CHECK SOLENOID RESISTANCE AT SOLENOID



N0052541

Fig. 34: Measuring Resistance Between PC Solenoid Pin 3 & Pins 1, 4 & 11 Component Side

Courtesy of FORD MOTOR CO.

- Measure the resistance between PC solenoid pin 3 and pins 1, 4 and 11 component side. Resistance should be between 3.3 and 7.5 ohms.
- Is the resistance within specifications?

YES : Go to D6.

NO : INSTALL a new solenoid body assembly.

D6 CHECK SOLENOID FOR SHORT TO GROUND

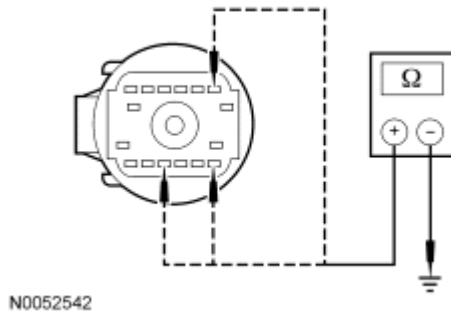


Fig. 35: Measuring Resistance Between PC Solenoid Pins 1, 4, 11 & Ground Solenoid Side
Courtesy of FORD MOTOR CO.

- Measure and record the resistance between the PC solenoid pins 1, 4, 11 and ground solenoid side.
- **Is the resistance less than 10,000 ohms?**

YES : INSTALL a new solenoid body assembly. TEST the system for normal operation.

NO : REFER to **Diagnosis By Symptom** for diagnosis of pressure concerns. TEST the system for normal operation.

PINPOINT TEST E: TURBINE SHAFT SPEED (TSS), INTERMEDIATE SHAFT SPEED AND OUTPUT SHAFT SPEED (OSS) SENSORS

NOTE: Refer to the Turbine Shaft Speed (TSS), Intermediate Shaft Speed and Output Shaft Speed (OSS) Sensor Connector illustrations **Transmission Connector Layouts**.

E1 ELECTRONIC DIAGNOSTICS

- Select PARK.
- Key in OFF position.
- Check to make sure the transmission harness connectors are fully seated, terminals are fully engaged in connector and in good condition before proceeding.
- Connect the diagnostic tool.
- Key in ON position.
- Access the transmission PIDs.
- **Is the scan tool able to access the transmission PIDs?**

YES : Go to E2 .

NO : REPEAT procedure to access the transmission PIDs. If the scan tool did not access the transmission PIDs, REFER to the **Introduction - Gasoline Engines** article for diagnosis of PCM.

E2 DRIVE CYCLE TEST

- While monitoring the appropriate sensor PID, drive the vehicle so that the transmission upshifts

and downshifts through all gears.

- **Does the TSS, intermediate shaft speed or OSS PID increase and decrease with engine and vehicle speed?**

YES : Go to E3.

NO : If the TSS, intermediate shaft speed or OSS PID does not increase and decrease with engine and vehicle speed, INSPECT for open or short in vehicle harness, sensor a PCM concern or internal hardware concern. Go to E4 .

E3 DRIVE CYCLE TEST ERRATIC

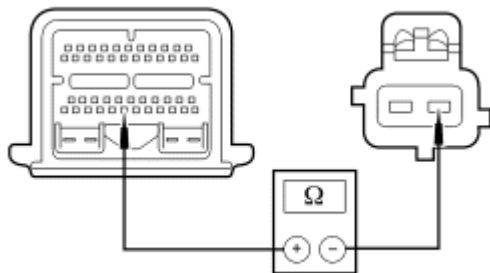
- While monitoring the appropriate sensor PID, drive the vehicle so that the transmission upshifts and downshifts through all gears.
- **Is the TSS, intermediate shaft speed or OSS PID signal erratic (drop to zero or near zero and return to normal operation)?**

YES : If the sensor signal is erratic, INSPECT for intermittent concern in the harness, sensor or connector. Go to E4 .

NO : CLEAR all DTCs. RERUN OBD.

E4 CHECK PCM HARNESS CIRCUITS FOR OPENS

- Key in OFF position.
- Disconnect: PCM C175T
- Inspect for damaged or pushed-out pins, corrosion or loose wires.
- Lower the rear of the transmission to gain access to the sensors.
- Disconnect: TSS Sensor C143
- Disconnect: Intermediate Shaft Speed Sensor C164
- Disconnect: OSS Sensor C193



N0052544

Fig. 36: Measuring Resistance Between PCM C175T-41, Circuit 359 (GY/RD) - OSS
Courtesy of FORD MOTOR CO.

- For OSS, measure the resistance between PCM C175T-41, circuit 359 (GY/RD) harness side and the sensor C193-2, circuit 359 (GY/RD) harness side.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

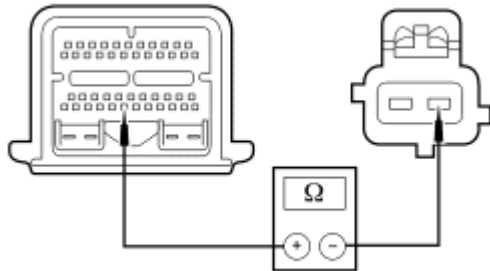


Fig. 37: Measuring Resistance Between PCM C175T-41, Circuit 359 (GY/RD) - Intermediate Shaft Speed
Courtesy of FORD MOTOR CO.

- For intermediate shaft speed, measure the resistance between PCM C175T-41, circuit 359 (GY/RD) harness side and the intermediate shaft speed sensor C164-2, circuit 359 (GY/RD) harness side.

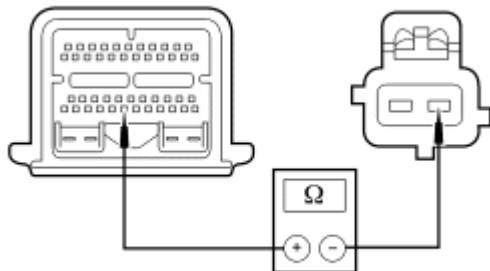


Fig. 38: Measuring Resistance Between PCM C175T-41, Circuit 359 (GY/RD) - TSS
Courtesy of FORD MOTOR CO.

- For TSS, measure the resistance between PCM C175T-41, circuit 359 (GY/RD) harness side and the TSS sensor C143-2, circuit 359 (GY/RD) harness side.

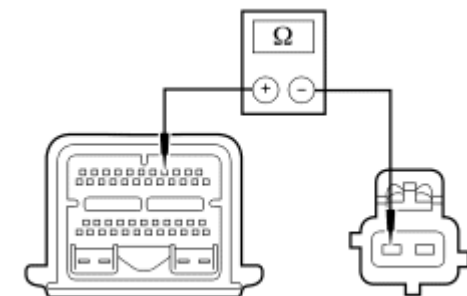


Fig. 39: Measuring Resistance Between C175T-4, Circuit 134 (GY/OG) Harness Side - Intermediate Shaft Speed
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- For intermediate shaft speed, measure the resistance between C175T-4, circuit 134 (GY/OG) harness side and the intermediate shaft speed sensor C164-1, circuit 134 (GY/OG) harness side.

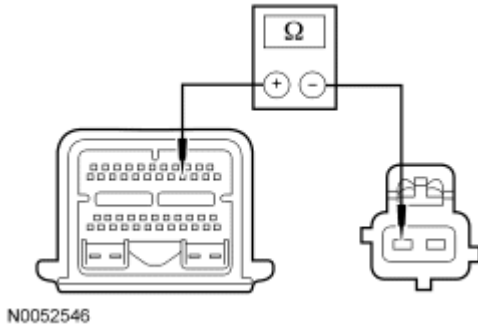


Fig. 40: Measuring Resistance Between C175T-15, Circuit 970 (DG/WH) Harness Side - TSS
Courtesy of FORD MOTOR CO.

- For TSS, measure the resistance between C175T-15, circuit 970 (DG/WH) harness side and the TSS sensor C143-1, circuit 970 (DS/WH) harness side.

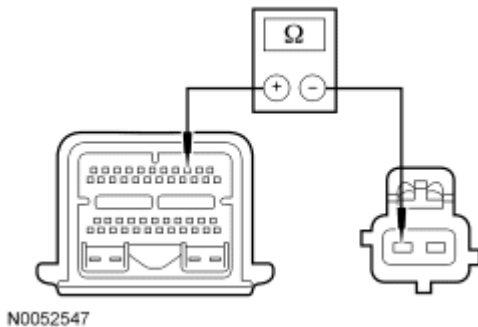


Fig. 41: Measuring Resistance Between C175T-3, Circuit 136 (DB/YE) Harness Side - OSS
Courtesy of FORD MOTOR CO.

- For OSS, measure the resistance between C175T-3, circuit 136 (DB/YE) harness side and the OSS sensor C193-1, circuit 136 (DB/YE) harness side.
- **Are all resistances less than 5 ohms?**

YES : Go to E5.

NO : REPAIR the circuit. TEST the system for normal operation.

E5 CHECK PCM HARNESS CIRCUITS FOR SHORT TO GROUND

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

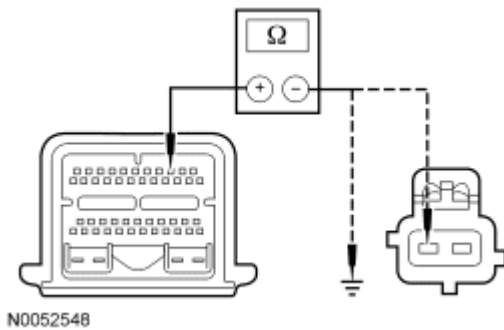


Fig. 42: Measuring Resistance Between C175T-3, Circuit 136 (DB/YE) Harness Side - OSS
Courtesy of FORD MOTOR CO.

- For OSS, measure the resistance between C175T-3, circuit 136 (DB/YE) harness side and OSS sensor C193-1, circuit 136 (DB/YE) harness side and ground.

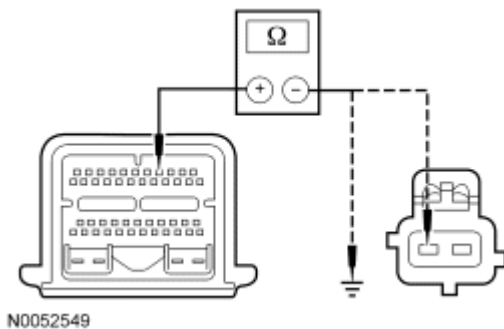


Fig. 43: Measuring Resistance Between PCM C175T-4, Circuit 134 (GY/OG) Harness Side - Intermediate Shaft Speed
Courtesy of FORD MOTOR CO.

- For intermediate shaft speed, measure the resistance between PCM C175T-4, circuit 134 (GY/OG) harness side and intermediate shaft speed sensor C164-1, circuit 134 (GY/OG) harness side and ground.

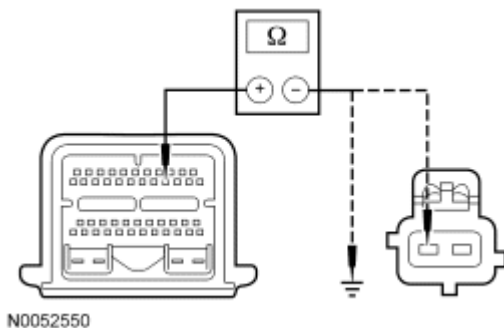


Fig. 44: Measuring Resistance Between PCM C175T-15, Circuit 970 (DG/WH) Harness Side - TSS
Courtesy of FORD MOTOR CO.

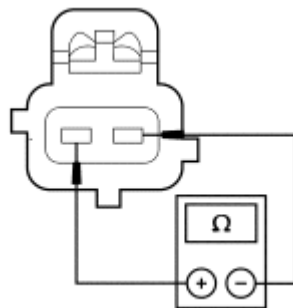
- For TSS, measure the resistance between PCM C175T-15, circuit 970 (DG/WH) harness side and TSS sensor C143-1, circuit 970 (DG/WH) harness side and ground.

- **Are the resistances greater than 10,000 ohms?**

YES : Go to E6.

NO : REPAIR the circuits. TEST the system for normal operation. CLEAR DTCs. RERUN OBD Tests.

E6 CHECK RESISTANCE OF TSS, INTERMEDIATE SHAFT SPEED OR OSS SENSOR



A0005211

Fig. 45: Checking Resistance Of TSS, Intermediate Shaft Speed Or OSS Sensor
Courtesy of FORD MOTOR CO.

- Connect ohmmeter negative lead to one pin of the sensor and the positive lead to the other pin on the sensor.
- Record the resistance. Resistance should be as follows:

Resistance (ohms)	Temperature
266-390	-20°C (4°F)
325-485	21°C (70°F)
492-738	150°C (302°F)

- **Is the resistance within specification for the appropriate sensor?**

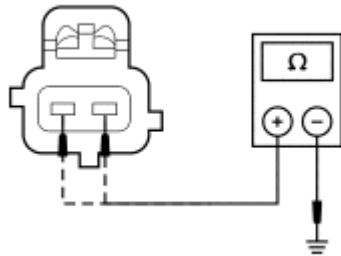
YES : Go to E7.

NO : INSTALL a new sensor.

E7 CHECK SENSORS FOR SHORT TO GROUND

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



A0005501

Fig. 46: Measuring Resistance Between Pin 1 And 2 Of Each Sensor And Ground
Courtesy of FORD MOTOR CO.

- Measure the resistance between pin 1 and 2 of each sensor and ground.
- **Is the resistance less than 10,000 ohms?**
YES : INSTALL a new sensor.
NO : REFER to **Diagnosis By Symptom** for diagnosis of shift or torque converter concerns.

PINPOINT TEST F: SOLENOID MECHANICAL FAILURE

NOTE: **Repair all other DTCs before repairing the following DTCs: P1714, P1715, P1716, P1717 and P1740.**

F1 ELECTRONIC DIAGNOSIS

- Select PARK.
- Connect the diagnostic tool.
- Key in ON position.
- Carry out Key ON Engine OFF (KOEO) Test until continuous DTCs have been displayed.
- If any of the following DTCs are present, continue with this test: P1714, P1715, P1716, P1717 and P1740.
- **Are other DTCs present for transmission fluid temperature (TFT) or shift solenoids?**
YES : REPAIR the DTCs for TFT or shift solenoids first. CLEAR DTCs and CARRY OUT **Transmission Drive Cycle Test**. RERUN Quick Test.
NO : INSTALL a new solenoid and/or body. REFER to the **Diagnostic Trouble Code (DTC) Charts** for code description. Go to F2 .

F2 TRANSMISSION DRIVE CYCLE TEST

- Carry out Transmission Drive Cycle Test. Refer to **Transmission Drive Cycle Test**.
- **Does the vehicle upshift and downshift OK?**
YES : Go to F3.
NO : REFER to **Diagnosis By Symptom** to diagnose shift concerns.

F3 RETRIEVE DTCs

- Connect the diagnostic tool.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

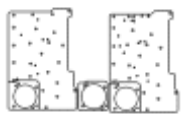
- Select PARK.
- Key in ON position.
- Carry out Key ON Engine OFF (KOEO) Test until continuous DTCs have been displayed.
- **Are DTCs P1714, P1715, P1716, P1717 and P1740 still present?**

YES : INSTALL a new PCM. ROAD TEST and RERUN Quick Test.

NO : Testing completed. If a concern still exists, REFER to **Diagnosis By Symptom** for concern diagnosis.

SPECIAL TESTING PROCEDURES

Special Tools

Illustration	Tool Name	Tool Number
 ST2538-A	Transmission Test Plate and Gasket	307-433-01, 307-433-02, 307-433-03
 ST1565-A	Transmission Fluid Pressure Gauge	307-004 (T57L-77820-A)
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

The special tests are designed to aid the technician in diagnosing the hydraulic and mechanical portion of the transmission.

Engine Idle Speed Check

Refer to the **Introduction - Gasoline Engines** article for diagnosis and testing of the engine idle speed.

Line Pressure Test

CAUTION: Carry out **Line Pressure Test** prior to carrying out **Stall Speed Test**. If line pressure is low at stall, do not carry out **Stall Speed Test** or further transmission damage will occur. Do not maintain wide open throttle (WOT) in any gear range for more than 5 seconds.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

NOTE: Certain sensor failures may cause high PC, failure mode effect management (FMEM) actions. Be sure that self-test and electrical repairs have been carried out or test results may be incorrect.

NOTE: The line pressure tap is used to verify output pressure from PC A or PC B by turning either one off, while verifying the output from the other solenoid. The second pressure tap is used to verify the output from the PC C solenoid.

This test verifies that the line pressure is within specification.

1. Connect the pressure gauge to the line pressure tap.
2. Start the engine and check line pressures. Refer to the following Line Pressure Chart to determine if line pressure is within specifications.



Fig. 47: Identifying Line Pressure Tap
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Line pressure tap

LINE PRESSURE CHART - 4.0L AND 4.6L ENGINES

Range	Idle Pressure		WOT Stall Pressure	
	PC C	Line	PC C	Line
N	0-103 kPa (0-15 psi)	758-1,034 kPa (110-150 psi)		
	758-862 kPa	965-1,551 kPa	758-862 kPa	2,000-2,482 kPa

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

R	(110-125 psi)	(140-225 psi)	(110-125 psi)	(290-360 psi)
Overdrive (Circle D), 2, 1	0-103 kPa (0-15 psi)	758-1,045 kPa (110-150 psi)	0-103 kPa (0-15 psi)	1,448-1,793 kPa (210-260 psi)

3. If the line pressure is not within specification, check the PC C pressure.
4. Connect the pressure gauge to the PC C pressure tap.

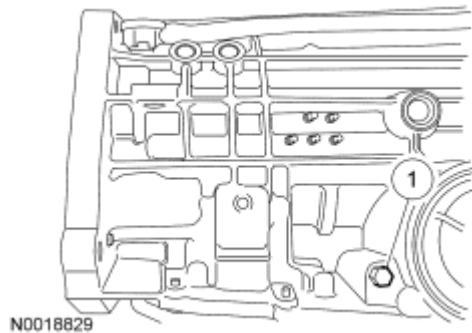


Fig. 48: Identifying Pressure Gauge To PC C Pressure Tap
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Pressure control (PC C) tap

5. Start the engine and check the PC C pressure. Refer to **LINE PRESSURE DIAGNOSIS CHART** for specification.
6. If the PC C pressure is not within specification, go to **Pinpoint Test D** to diagnose PC C operation. If PC C operation is OK, refer to **LINE PRESSURE DIAGNOSIS CHART** for line pressure concern causes.
7. When pressure tests are completed, install the pressure tap plugs.
 - Tighten to 13 Nm (10 lb-ft).

LINE PRESSURE DIAGNOSIS CHART

Test Results	Possible Source
High at Idle - All Ranges	• Wiring harnesses • PC C boost valve • PC C solenoid • Main regulator valve

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Low at Idle - All Ranges	• Low fluid level • Fluid inlet filter/seal • Main control body • Cross leaks • Gaskets • Pump • Separator plate
Low - All Forward Ranges	• Forward clutch • Main control • Overdrive servo • Intermediate servo
Low in PARK Only	• Valve body
Low in REVERSE Only	• Separator plate • Rear servo piston, cover seal • Reverse clutch • Overdrive servo • Intermediate servo • Valve body • Forward clutch
Low in NEUTRAL Only	• Valve body • Overdrive servo • Intermediate servo
Low in D Only	• Forward clutch • Overdrive servo • Intermediate servo • Valve body
Low in D Only (O/D Cancelled)	• Forward clutch • Overdrive servo • Intermediate servo • Valve body
Low in 1st Position	• Forward clutch • Valve body
Low in 2nd Position	• Intermediate servo • Overdrive servo • Intermediate servo • Forward clutch

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Low in 3rd Position

- Intermediate servo
- Overdrive servo
- Forward clutch

Stall Speed Test

This test checks operation of the following items:

- Torque converter clutch (TCC)
- Forward clutch
- Low-one way clutch (OWC) assembly
- Engine operation
- Overdrive OWC assembly

WARNING: Block all wheels, set the parking brake and firmly apply the service brake to reduce the risk of vehicle movement during this procedure. Failure to follow these instructions may result in serious personal injury.

CAUTION: Always carry out the Line Pressure Test procedures prior to carrying out the Stall Speed Test. If line pressure is low at stall, do not carry out the Stall Speed Test or further transmission damage will occur.

CAUTION: After testing each of the following ranges D, 3, 2, 1 and R, move the transmission range selector lever to N and run the engine at 1,000 RPM for about 15 seconds to allow the torque converter to cool before testing the next range, otherwise transmission damage can occur.

CAUTION: Do not maintain wide open throttle (WOT) in any range for more than 5 seconds, otherwise transmission damage can occur.

CAUTION: If the engine RPM recorded by the scan tool exceeds maximum specified RPM, release the accelerator pedal immediately, otherwise transmission damage can occur. Clutch or band slippage is indicated.

NOTE: Prolonged use of this procedure may set DTC P0712, P1783. After carrying out Stall Speed Test, run OBD Test and Clear DTCs from memory.

NOTE: The Stall Speed Test should be carried out with the engine and transmission at normal operating temperatures.

1. Connect a scan tool to the vehicle.
2. Press the accelerator pedal to the floor (WOT) in each range. Record RPM reached in each range. Stall

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

speeds should be as follows:

STALL SPEED CHART

Vehicle	Engine	RPM
Mustang	4.0L	2,678-3,130
Mustang	4.6L	2,556-3,014

If the stall speeds were too high, refer to the following Stall Speed Diagnosis Chart. If the stall speeds were too low, first check the engine idle speed. If the engine idle is OK, remove the torque converter and check the torque converter one-way clutch (OWC) for slippage.

STALL SPEED DIAGNOSIS CHART

Transmission Range Selector Lever Position	Stall Speeds High	Stall Speeds Low
D, D (Overdrive (Circle D) cancelled) and 1	Overdrive one-way clutch, rear one-way clutch	-
D (Overdrive (Circle D) cancelled), 2 and 1	Forward clutch, overdrive one-way clutch	-
D	Forward clutch, overdrive one-way clutch	-
D, D (Overdrive (Circle D) cancelled), 3, 2, 1 and R	General pressure concerns, forward clutch, overdrive one-way clutch	Converter one-way clutch or engine driveability concerns
R Only	High/reverse, high clutch, low and reverse band/servo	-
2 Only	Intermediate band/servo	-
1 Only	Low/reverse band/servo	-

Air Pressure Tests

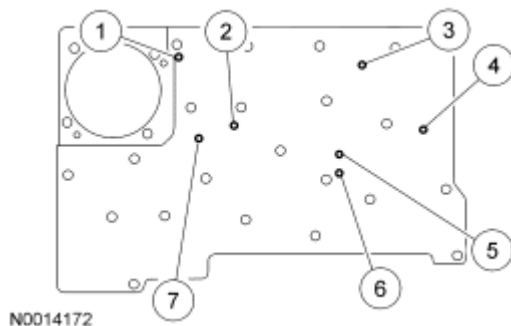


Fig. 49: Identifying Air Pressure Testing Ports
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Item	Part Number	Description
1	-	Reverse servo
2	-	Intermediate servo
3	-	Overdrive servo
4	-	Coast clutch
5	-	Forward clutch
6	-	Direct clutch
7	-	Reverse servo modulator

A no-drive or erratic shift condition may be due to inoperative bands and clutches. To diagnose these conditions, a series of checks can be made by substituting air pressure for fluid to determine the location of the damaged or obstructed component.

Follow the procedure to determine the location of the inoperative clutch or band by substituting air pressure into the various test plate passages.

NOTE: Use only dry, regulated 276 kPa (40 psi) maximum air pressure.

1. Remove the main control valve body. Refer to **Main Control Valve Body**.
2. Install the transmission test plate and gasket. Tighten to 10 N.m (89 lb-in).

NOTE: Do not apply air to the test plate vent hole.

3. Apply air to the appropriate clutch or servo port (refer to plate layout diagram). Refer to the Air Pressure Test Diagnostic Chart for conditions, possible causes and actions.
4. After the testing is completed, remove the air test plate and gasket and proceed with any repairs that are needed.
5. After the repairs are completed, install the main control valve body. Refer to **Main Control Valve Body**.

AIR PRESSURE TEST DIAGNOSTIC CHART

Condition	Possible Causes	Actions
Dull thud heard or movement felt when air is applied and released	Clutches, bands and fluid passages are OK.	Concerns may not be in the transmission. Check the PCM, wiring harness and non-transmission related components.
No drive	Clutches and bands inoperative.	Disassemble the transmission, clean and inspect to locate area of concern.
Erratic shifts	Clutches and bands inoperative due to incorrect pressures.	Disassemble the transmission, clean and inspect to locate area of concern.
No dull thud heard	Clutches, bands and fluid passages may be damaged or obstructed.	Disassemble the transmission, clean and inspect to locate area of concern.
No movement felt	Clutches, bands and fluid passages may be damaged or obstructed.	Disassemble the transmission, clean and inspect to locate area of concern.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Hissing sound heard	Clutch seals or check ball may be damaged or leaking.	Disassemble the transmission, clean and inspect to locate area of concern.
Servos do not operate	Seals and pistons may be damaged. Supply and release ports may be obstructed. Spring may be broken.	Disassemble the transmission, clean and inspect to locate area of concern.
Multiple clutches are applied	Fluid passages in the center support or the clutch cylinders may be obstructed.	Disassemble the transmission, clean and inspect to locate area of concern. Check fluid passages in the center support for obstructions.

LEAKAGE INSPECTION

Special Tools

Illustration	Tool Name	Tool Number
 ST1300-A	100W/12 Volt DC UV Lamp	164-R0751 or equivalent

Material

Item	Specification
Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 (Rotunda)	-
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

Leak Check Test with a Black Light - Dye-Lite® ATF/Power Steering Fluid Leak Detection Dye 164-R3701 or equivalent (specifically formulated for ATF) is used to detect a transmission fluid leak.

1. Add dye to the transmission fluid. Use one 30.0 mL (1 oz.) of dye solution for every 3.8L (4 qt) of transmission fluid.
2. Start and run the engine until the transaxle reaches its normal operating temperature. Observe the back of the cylinder block and top of the torque converter housing for evidence of fluid leakage. Raise the vehicle on a hoist and run the engine at fast idle, then at engine idle, occasionally shifting to the DRIVE and REVERSE ranges to increase pressure within the transaxle. Observe the front of the flexplate, back of the cylinder block (in as far as possible), inside the torque converter housing and the entire case until fluid leakage is evident and the probable source of leakage can be determined.

EXTERNAL FLUID LEAKS

Leak Path	Possible Source

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Leaks at the fluid pan to case	• Pan bolts not tightened to specification. • Pan gasket damaged. • Case pan rail damaged.
Fluid cooler lines or fittings leaking	• Cooler line(s), cooler line fitting(s) damaged. Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article. • Cooler line fitting-to-case union damaged. Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article. • Case damage at case fitting. •
Fluid cooler line nut-to-case fittings leaking	• Damaged or missing O-ring seals. Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article. • Fitting(s) not tightened to specifications. Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article.
Leaks at the fluid cooler	• Fluid cooler damage. Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article. • Fitting(s) damaged or not tightened to specifications. Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article.
Leaks at external sensors	• Damaged or missing O-ring seals. • Screw not tightened to specification.
Leaks at the manual control lever seal	• Damaged or missing lever seal.
Leaks at the solenoid body harness connector	• Solenoid body harness connector O-ring seal(s), either on the harness end or the solenoid body, damaged or missing.
Fluid leakage in torque converter area	• For possible sources, refer to Fluid Leakage in the Torque Converter Area Chart.

External Sealing

CAUTION: Do not try to stop a fluid leak by increasing the torque beyond specifications. This may cause damage to the transmission case threads.

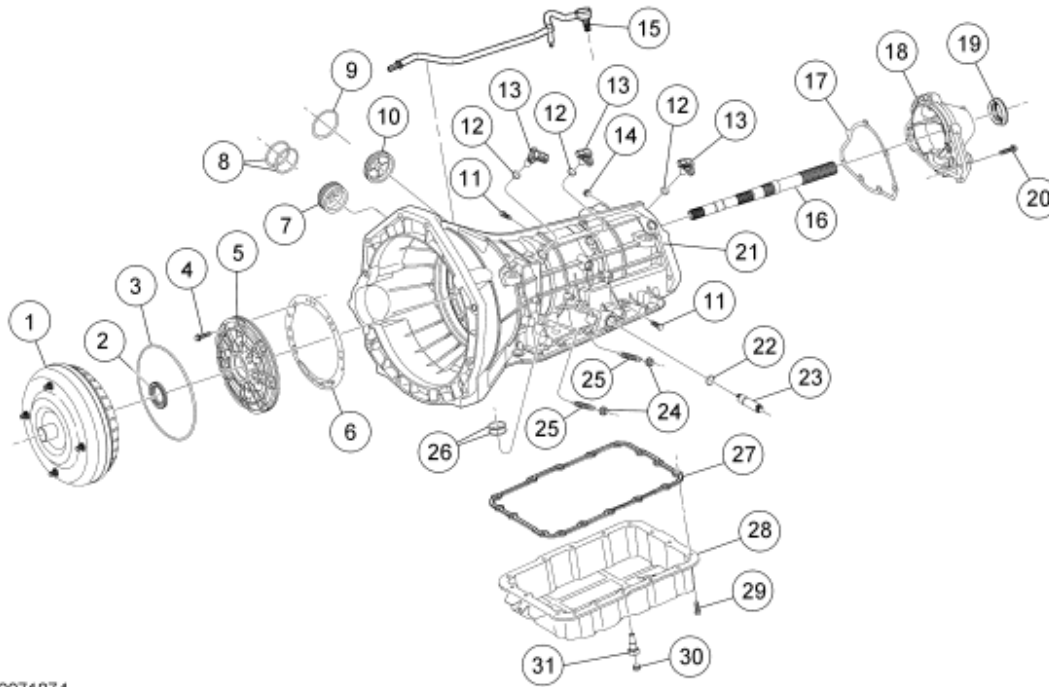
The transmission has the following parts to prevent external fluid leakage:

- Gaskets
- Lip-type seals
- O-ring seals
- Seal rings
- Seal grommets

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Seal washers
- Thread sealant



NO071874

Fig. 50: Exploded View Of External Sealing
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7902	Torque converter assembly
2	7A248	Seal assembly - front fluid pump
3	7A248	Seal - front fluid pump
4	W704892-S300	Screw and washer assembly (8 required)
5	7G187	Fluid pump
6	7A136	Gasket - fluid pump
7	7D027	Cover - overdrive servo
8	W703119-S300	Seals - overdrive servo cover (2 required)
9	W702969-S300	Seal - intermediate servo cover
10	7D027	Cover - intermediate servo
11	390318-S2	Plugs - pipe (2 required)
12	W702981-S300	O-ring seals - sensor-to-case (3 required)
13	7H103	Sensor assemblies - (3 required)
14	6026	Plug - case
15	7034	Vent assembly
16	7060	Shaft - output

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

17	7086	Gasket - extension housing
18	7A039	Extension housing assembly
19	7052	Seal - extension housing
20	W500311-S309	Screw - extension housing (7 required)
21	7005	Case assembly
22	7B498	Seal - manual lever
23	7A256	Manual lever
24	7C492	Screws - band adjuster (2 required)
25	71000-S100	Nuts - band adjuster (2 required)
26	W705928-S300	O-ring seals (2 required)
27	7A191	Gasket - fluid pan
28	7A194	Fluid pan
29	W500213-S309	Screw - fluid pan (16 required)
30	W704999	Plug - short hex
31	7A101	Plug - fluid drain

External Sealing

CAUTION: Do not try to stop a fluid leak by increasing the torque beyond specifications. This may cause damage to the transmission case threads.

The transmission has the following parts to prevent external fluid leakage:

- Gaskets
- Lip-type seals
- O-ring seals
- Seal rings
- Seal grommets
- Seal washers
- Thread sealant

Fluid Leakage in Torque Converter Area

Leakage at the front of the transmission, as evidenced by fluid around the torque converter housing part of the case, may have several sources. By careful observation, it is possible in many instances to pinpoint the source of the leak before removing the transmission from the vehicle.

The paths, which the fluid takes to reach the bottom of the torque converter housing part of the case, are shown in the illustration. The 6 numbers in the illustration correspond with the 6 flow path steps.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

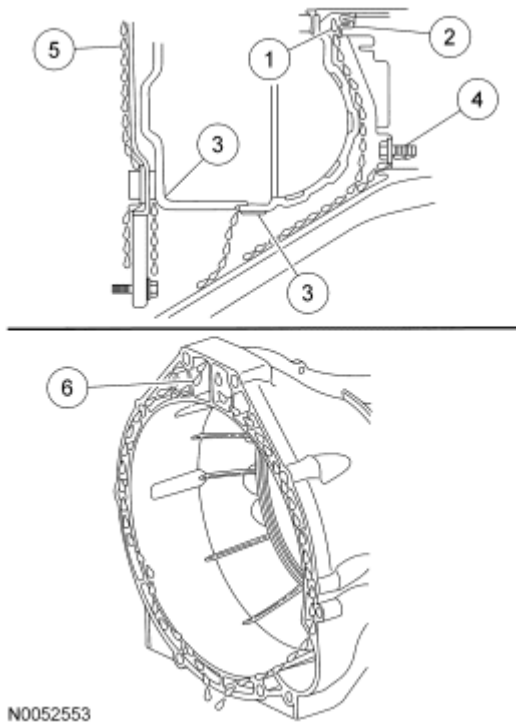


Fig. 51: Identifying Fluid Leakage In Torque Converter Area
Courtesy of FORD MOTOR CO.

Leak Path	Symptom	Possible Source
1, 2 and 4	Leak at the front of the transmission	Pump lip seal
1, 2 and 4	Leak at the front of the transmission	Converter hub weld
1, 2 and 4	Leak at the front of the transmission	External pump seal (large)
1, 2 and 4	Leak at the front of the transmission	Pump-to-case screws
1, 2 and 4	Leak at the front of the transmission	Pump gasket
3	Leak at the front of the transmission	Torque converter seal weld
3	Leak at the front of the transmission	Torque converter stud
5	Leak at the front of the transmission	Engine oil leak; rear main seal
5	Leak at the front of the transmission	Engine valve cover
5	Leak at the front of the transmission	Oil galley
5	Leak at the front of the transmission	Engine oil pressure sensor
6	Leak between engine and transmission case	Venting

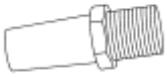
TRANSMISSION FLUID COOLER

Special Tools

Illustration	Tool Name	Tool Number

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



Transmission Fluid Fill Tool

307-437

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

Transmission Fluid Cooler Flow Test

CAUTION: Whenever a transmission has been disassembled to install new parts or a new or remanufactured transmission has been installed, a new transmission fluid cooler (either in-tank, auxiliary or oil-to-air [OTA]) if equipped, will need to be installed, otherwise transmission damage can occur.

CAUTION: Use only clean automatic transmission fluid specified for this transmission. Do not use supplemental fluid additives, treatments or cleaning agents. The use of these materials may affect transmission operation and result in internal damage to the transmission.

CAUTION: When internal wear or damage has occurred in the transmission, metal particles, clutch plate material or band material may have been carried into the transmission fluid cooler. These contaminants are a major cause of recurring transmission concerns and must be removed from the system before the transmission is put back into use.

When evidence of transmission fluid contamination (such as metal particles, clutch plate material or band material) is found in the cooling system, the transmission fluid cooler flow test should be carried out.

If the transmission cooling system fails the transmission fluid cooler flow test, install a new transmission fluid cooler and flush out the fluid cooler lines. If installing a new transmission fluid cooler, use only factory approved components.

CAUTION: The transmission fluid must be at normal operating temperature 85°C - 93°C (185°F - 200°F) to make sure that the cooler bypass is open. The cooler bypass is located in the main control valve body. The transmission fluid at normal operating temperature will be hot.

NOTE: The engine idle, transmission selector lever linkage/cable adjustment, fluid level and line pressure must be within specification before carrying out this test. Refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article for adjustments. For information on engine idle diagnosis, refer to the **Introduction - Gasoline Engines** article. For information on fluid level check, refer to **Transmission Fluid Level Check**. For information on line pressure, refer to **Special Testing Procedures**.

1. Place the transmission range selector lever into PARK.
2. Raise the vehicle on a hoist and place suitable safety stands under the vehicle. Refer to **JACKING AND LIFTING** article.
3. Hold the large drain plug with a wrench, and remove the small (center) fluid level indicating plug using a 3/16-inch Allen key.

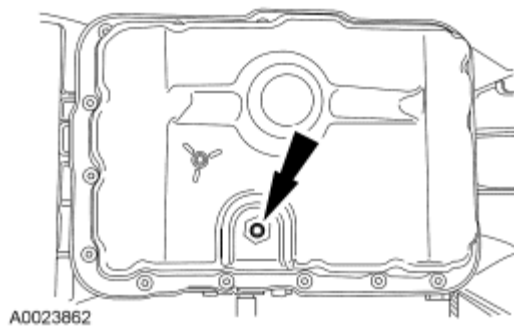


Fig. 52: Identifying Small (Center) Fluid Level Indicating Plug
Courtesy of FORD MOTOR CO.

4. Install the special tool into the pan.

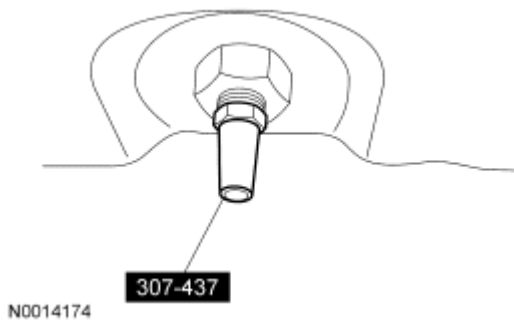


Fig. 53: Identifying Special Tool (307-437)
Courtesy of FORD MOTOR CO.

5. Remove the cooler return line (upper line) from the fitting on the transmission case.

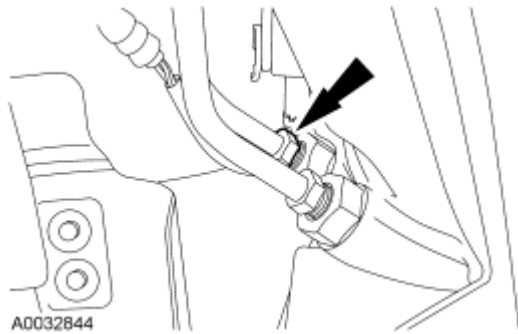


Fig. 54: Locating Cooler Return Line (Upper Line) From Fitting On Transmission Case
Courtesy of FORD MOTOR CO.

6. Connect one end of a clear hose to the cooler return line and route the other end of the hose to the special tool in the pan.

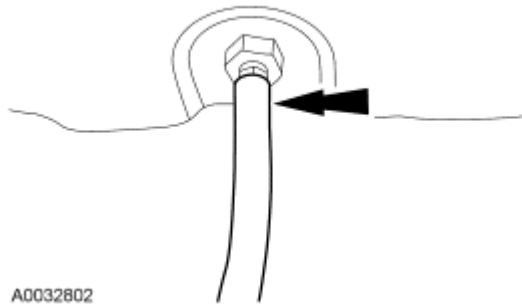


Fig. 55: Locating Cooler Return Line
Courtesy of FORD MOTOR CO.

7. Remove the safety stands and lower the vehicle.
8. Start the engine and run at idle.
9. With the engine running, raise the vehicle on a hoist and place suitable safety stands under the vehicle. Refer to **JACKING AND LIFTING** article.
10. Monitor the transmission fluid temperature to make sure that the transmission fluid is at normal operating temperature 85°C - 93°C (185°F - 200°F).
11. Once a steady flow of fluid (without air bubbles) is observed, remove the hose from the special tool and place the hose in a measuring container for 15 seconds. After 15 seconds, place the hose back onto the special tool. Lower the vehicle and turn the engine OFF. Measure the amount of fluid in the container. If adequate flow was observed, approximately 208 ml (7 oz.) will be in the measuring container. The test is complete. Reconnect the cooler line and install the fluid fill plug.
12. If the flow is not liberal, disconnect the hose from the cooler return line and connect the hose to the cooler inlet (lower fitting) on the transmission case. Reconnect the cooler return line to the case (upper fitting).
 - Tighten to 40 Nm (30 lb-ft).

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

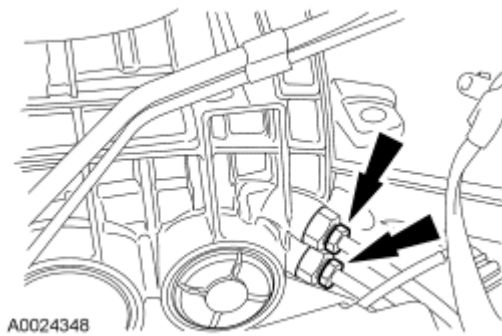


Fig. 56: Locating Transmission Cooler Tubes
Courtesy of FORD MOTOR CO.

13. Repeat Steps 8 through 11. If flow is now approximately 208 ml (7 oz.) in 15 seconds, the cooler lines and auxiliary cooler must be cleaned. Refer to **Transmission Fluid Cooler Backflushing and Cleaning**. Carry out this entire test after the **Transmission Fluid Cooler Backflushing and Cleaning**. If, after carrying out the backflushing and cleaning procedure, the flow is still not adequate, new cooler lines and/or an auxiliary cooler must be installed. If the flow from the case is still not adequate after the installation of new cooler lines and/or an auxiliary cooler (208 ml [7 oz.] in 15 seconds), the pump and/or torque converter may be at fault. Carry out the appropriate procedures for diagnosis and repair.

DIAGNOSIS BY SYMPTOM

Special Tools

Illustration	Tool Name	Tool Number
	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

The Diagnosis by Symptom Index gives the technician diagnostic information and direction, and suggests possible components, using a symptom as a starting point.

Diagnosis by Symptom Index - Directions

1. Using the Symptom Index, select the Concern/Symptom that best describes the condition.
2. Refer to the routine indicated in the Diagnosis by Symptom Index.
3. Always begin diagnosis of a symptom with:
 - a. preliminary inspections.
 - b. verification of conditions.
 - c. checking the fluid levels.
 - d. carrying out other test procedures as directed.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

NOTE: Not all concerns and conditions with electrical components will set a DTC. Be aware that the components listed may still be the cause.

NOTE: When the battery is disconnected or a new battery is installed, certain transmission operating parameters can be lost. The PCM must relearn these parameters. During this learning process, you may experience slightly firm shifts, delayed or early shifts. This operation is considered normal and will not affect the function of the transmission. Normal operation will return once these parameters are stored by the PCM.

4. Begin with the ROUTINE, if indicated. Follow the reference or action statements. Always carry out the on-board diagnostic tests as necessary. Never skip steps. Repair as necessary.
5. These components are listed in the removal sequence and by most probable cause. All components listed must be inspected to make sure that the repairs are complete.

Diagnosis by Symptom Index

DIAGNOSIS BY SYMPTOM INDEX

5R55S	Routines
Engagement Concerns: • No Forward in D or D (Overdrive (Circle D) cancelled) Only • No Forward Only (All Positions) • No Reverse Only • Harsh Reverse Only • Harsh Forward Only • Harsh Manual 1st Gear Only • Delayed/Soft Reverse Only • Delayed/Soft Forward Only • No Forward and No Reverse • Harsh Forward and Harsh Reverse • Delayed Forward and Delayed Reverse	201A 201B 202 203 204A 204B 205 206 207 208 209
Shift Concerns: • Some/All Shifts Missing (Automatic Mode Only) • Timing Concern Early/Late (Some/All) Erratic/Hunting (Some/All) • Feel Concerns Soft/Slipping (Some/All) Harsh (Some/All) • No First Gear in Drive, Engages in a Higher Gear	210 211 212 213 214 215

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

• No First Gear in Manual 1st	216
• No Manual 2nd Gear	217
Torque Converter Clutch Operation Concerns:	
• Does Not Apply	240
• Always Applied/Stalls Vehicle	241
• Cycling/Shudder/Chatter	242
Other Concerns:	
• Selector Lever Efforts High	251
• External Leaks	252
• Noise/Vibration - Forward or Reverse	254
• Engine Will Not Crank	255
• No Park Range	256
• Transmission Overheating	257
• No Engine Braking in Manual 2nd Position	258
• No Engine Braking in Manual 1st Position	259
• Transmission Fluid Venting or Foaming	261
• Vehicle Movement with Selector Lever in "N"	262
• Slips/Chatters in Manual 1st Gear	263
• Slips/Chatters in Manual 2nd Gear	264
• No Engine Braking in Manual 3rd Position	280
• No Engine Braking in Manual 4th (D Overdrive (Circle D) cancelled) Position	281
• Slips/Chatters in Manual 3rd Gear	282
• Engine Braking in ALL Gears	283
• No 2nd and 5th Gears (manual 2nd is ok)	284
• No 3rd, 4th and 5th gears	285

Diagnostic Routines

ENGAGEMENT CONCERN: NO FORWARD IN D OR D (Overdrive (Circle D) CANCELLED) ONLY

Possible Component	Reference/Action
201A - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoid B (PC B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D.</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

		Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Main Control		
	Screw not tightened to specification	Tighten to specification.
	Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
	Contamination	Disassemble and clean.
	Valves, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Center Support		
	Screw not tightened to specification	Tighten to specification.
	Seal rings or bearing damaged	Inspect for damage. Repair as necessary.
	Outside diameter of case bore damaged	Inspect for damage. Repair as necessary.
	Support damaged or leaking	Inspect for damage. Repair as necessary.
Overdrive Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.
	Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band		
	Band damaged	Inspect for damage. Repair as necessary.
	Servo worn or damaged	Inspect for damage. Repair as necessary.
	Not adjusted correctly	Inspect for damage. Repair as necessary.
Case		
	Damaged	Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: NO FORWARD

Possible Component	Reference/Action
201B - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoid B (PC B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	Incorrect transmission fluid level	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> .
	Transmission fluid condition	Carry out the Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Main Control		
	Screw not tightened to specification	Tighten to specification.
	Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
	Contamination	Disassemble and clean.
	Valves, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Forward Clutch Assembly		
	Seals, piston damaged	Inspect for damage. Repair as necessary.
	Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
	Friction elements damaged or worn	Inspect for damage. Repair as necessary.
	Return springs damaged	Inspect for damage. Repair as necessary.
	Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Center Support		
	Screw not tightened to specification	Tighten to specification.
	Seal rings or bearing damaged	Inspect for damage. Repair as necessary.
	Outside diameter of case bore damaged	Inspect for damage. Repair as necessary.
	Support damaged or leaking	Inspect for damage. Repair as necessary.
Forward Planetary Assembly		
	Planetary damage	Inspect for damage. Repair as necessary.
Low One-Way Clutch		
	Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.
Case		
	Damaged	Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: NO REVERSE

Possible Component	Reference/Action
202 - ROUTINE	
Powertrain Control System	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	PCM, vehicle wiring harnesses, pressure control solenoid C (PC C), shift solenoid B (SSB)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Main Control	Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck or bore damage Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Torque Converter Assembly	Torque converter internal failure preventing engagement, piston release	Remove the transmission. Inspect for damage. Refer to <u>Torque Converter</u> . If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter.
Direct Clutch Assembly	Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged	Inspect or damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Reverse Servo	Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Reverse Band	Band damaged Servo worn or damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Reverse Drum Assembly	One-way clutch damaged Bearing damaged	Inspect for damage. Install a new drum assembly. Inspect for damage. Install a new drum assembly.

ENGAGEMENT CONCERN: HARSH REVERSE ONLY

Possible Component	Reference/Action
203 - ROUTINE	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Powertrain Control System		
	PCM, vehicle wiring harnesses, pressure control solenoid C (PC C)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures		
	High pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control		
	Screws not tightened to specification	Tighten to specification.
	Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
	Contamination	Disassemble and clean.
	Valves, spring damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Direct Clutch Assembly		
	Seals, piston damaged	Inspect for damage. Repair as necessary.
	Check ball damaged, missing not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
	Friction elements damaged or worn	Inspect for damage. Repair as necessary.
	Return springs damaged	Inspect for damage. Repair as necessary.
Forward Clutch Assembly		
	Seals, piston damaged	Inspect for damage. Repair as necessary.
	Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
	Friction elements damaged or worn	Inspect for damage. Repair as necessary.
	Return springs damaged	Inspect for damage. Repair as necessary.
	Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Reverse Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.
	Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Reverse Band		
	Band damaged	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	Servo worn or damaged	Inspect for damage. Repair as necessary.
Reverse Drum Assembly	One-way clutch damaged	Inspect for damage. Install a new drum assembly.
	Bearing damaged	Inspect for damage. Install a new drum assembly.

ENGAGEMENT CONCERN: HARSH FORWARD ONLY

Possible Component		Reference/Action
204A - ROUTINE		
Powertrain Control System		
	PCM, vehicle wiring harnesses, pressure control solenoid A (PC A), pressure control solenoid C (PC C)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures		
	High pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control		
	Screws not tightened to specification	Tighten to specification.
	Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
	Contamination	Disassemble and clean.
	Valves, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Center Support		
	Screw not tightened to specification	Tighten to specification.
	Seal rings or bearing damage	Inspect for damage. Repair as necessary.
	Outside diameter of case bore damage	Inspect for damage. Repair as necessary.
	Support damaged or leaking	Inspect for damage. Repair as necessary.
Forward Clutch Assembly		
	Seals, piston damaged	Inspect for damage. Repair as necessary.
	Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
	Friction elements damaged or worn	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Return springs damaged
Bronze seal ring or bearing
damaged

Inspect for damage. Repair as necessary.
Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: HARSH MANUAL 1ST GEAR ONLY

Possible Component	Reference/Action
204B - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoid B (PC B), turbine shaft speed (TSS) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.

ENGAGEMENT CONCERN: DELAYED OR SOFT REVERSE ONLY

Possible Component	Reference/Action
205 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoid C (PC C)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
Low pressure	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Direct Clutch Assembly	
Seals, piston damaged Check ball damaged, missing not seating, off location	Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	Friction elements damaged or worn	Inspect for damage. Repair as necessary.
	Return springs damaged	Inspect for damage. Repair as necessary.
Reverse Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.
	Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Reverse Band		
	Band damaged	Inspect for damage. Repair as necessary.
	Servo worn or damaged	Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: DELAYED/SOFT FORWARD ONLY

Possible Component	Reference/Action
206 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoid B (PC B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
Low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valves, spring damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged.	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Center Support	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Screw not tightened to specification	Tighten to specification.
Seal rings or bearing damaged	Inspect for damage. Repair as necessary.
Outside diameter of case bore damaged	Inspect for damage. Repair as necessary.
Support damaged or leaking	Inspect for damage. Repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction element damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: NO FORWARD AND NO REVERSE

Possible Component	Reference/Action
207 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoid B (PC B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> .
Transmission fluid condition	Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Selector Lever Cable/Digital Transmission Range (TR) Sensor	
Cable system or digital transmission range (TR) sensor damaged, misaligned	Inspect and repair as necessary. Refer to <u>Transmission Range (TR) Sensor Adjustment</u> .
Main Control	
Screws not tightened to specification	Tighten screws to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve, springs damaged,	If damaged or parts are missing, install new main control

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	misassembled, missing, stuck or bore damaged	assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Input Shaft		
	Damaged	Inspect for damage. Repair as necessary.
Pump Assembly		
	Screws not tightened to specification	Tighten screws to specification.
	Gasket damaged	Inspect for damage. If damaged, install a new gasket.
	Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
	Pump gears cracked and/or seized	Inspect for damage. Install a new pump.
	Flow control valves, springs, or seals damaged, stuck or not assembled correctly	Inspect for damage. Install a new seal or flow control valve.
Overdrive Planetary Assembly		
	Planetary damaged	Inspect for damage. Repair as necessary.
Center Shaft Assembly		
	Damaged. One-way clutch damaged	Inspect for damage. Repair as necessary.
Forward Clutch Assembly		
	Seals, piston damaged	Inspect for damage. Repair as necessary.
	Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
	Friction elements damaged or worn	Inspect for damage. Repair as necessary.
	Return springs damaged	Inspect for damage. Repair as necessary.
	Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Forward Planetary Assembly		
	Planetary damaged	Inspect for damage. Repair as necessary.
Reverse Planetary Assembly		
	Planetary damaged	Inspect for damage. Repair as necessary.
Output Shaft		
	Damage	Inspect for damage. Repair as necessary.
Torque Converter		
	Damaged flexplate or adapter plate	Remove the transmission. Inspect for damage. Refer to Torque Converter . If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter.
	Damaged impeller hub	
	Damaged turbine hub	
Direct One-Way Clutch		

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Worn, damaged or assembled incorrectly

Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: HARSH FORWARD AND HARSH REVERSE

Possible Component	Reference/Action
208 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test B</u> and Go to <u>Pinpoint Test C</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid Incorrect transmission fluid level Transmission fluid condition	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> . Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Incorrect Pressures High pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Forward Clutch Assembly Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: DELAYED FORWARD AND DELAYED REVERSE

Possible Component	Reference/Action
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2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

209 - ROUTINE

Powertrain Control System	PCM, vehicle wiring harnesses, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test B</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	Incorrect transmission fluid level Transmission fluid condition	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> . Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Incorrect Pressures	High pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	Screws not tightened to specification Separator plate damaged Contamination Valves and springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Pump Assembly	Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized Flow control valves, springs, or seals damaged, stuck or not assembled correctly	Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve.

SHIFT CONCERN: SOME/ALL SHIFTS MISSING (AUTOMATIC MODE ONLY)

Possible Component	Reference/Action
210 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

solenoids A, B, C, torque converter clutch (TCC) solenoid, pressure control solenoids A, B, C (PC A, B, C), output shaft speed (OSS) sensor, digital transmission range (TR) sensor, intake air temperature (IAT) sensor, vehicle speed sensor (VSS) input	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM, IAT and VSS. Go to <u>Pinpoint Test A</u>, go to <u>Pinpoint Test C</u>, go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u>. Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Some Shifts Missing ONLY	If only some shifts are missing, determine which shift(s) is missing. Refer to the following routine(s) for further No Shift concerns: • No 1-2 Shift, Routine 220 • No 2-3 Shift, Routine 221 • No 3-4 Shift, Routine 222 • No 4-5 Shift, Routine 270 • No 5-4 Shift, Routine 271 • No 4-3 Shift, Routine 223 • No 3-2 Shift, Routine 224 • No 2-1 Shift, Routine 225
Transmission Fluid Incorrect transmission fluid level Transmission fluid condition	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u>. Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u>.
Selector Lever Cable/Digital TR Sensor Cable system or digital TR sensor damaged, misaligned	Inspect and repair as necessary. Refer to <u>Transmission Range (TR) Sensor Adjustment</u>.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u>. Refer to <u>Special Testing Procedures</u>.
Main Control Screws not tightened to specification Separator plate damaged Contamination Valve, springs damaged, misassembled.	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

missing, stuck or bore damaged	correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Pump Assembly	
Screws not tightened to specification	Tighten screws to specification.
Gasket damaged	Inspect for damage. If damaged, install a new gasket.
Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
Pump gears cracked and/or seized	Inspect for damage. Install a new pump.
Flow control valves, springs, or seals damaged, stuck or not assembled correctly	Inspect for damage. Install a new seal or flow control valve.
Overdrive Planetary Assembly	
Planetary damaged	Inspect for damage. Repair as necessary.
Center Support	
Screw not tightened to specification	Tighten to specification.
Seal rings or bearing damaged	Inspect for damage. Repair as necessary.
Outside diameter of case bore damaged	Inspect for damage. Repair as necessary.
Support damaged or leaking	Inspect for damage. Repair as necessary.
Direct Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.

SHIFT CONCERN: TIMING CONCERNS-EARLY/LATE

Possible Component	Reference/Action
211- ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, output shaft speed (OSS) sensor, intake air temperature (IAT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM and IAT. Go to <u>Pinpoint Test E</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Some Shifts Early/Late ONLY	
	If only some shifts are early/late, determine which shift(s) is missing. Refer to the following routine(s) for further No Shift concerns: • Soft/Slipping 1-2 Shift, Routine 226

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

		• Soft/Slipping 2-3 Shift, Routine 227 • Soft/Slipping 3-4 Shift, Routine 228 • Soft/Slipping 4-5 Shift, Routine 272 • Soft/Slipping 5-4 Shift, Routine 273 • Soft/Slipping 4-3 Shift, Routine 229 • Soft/Slipping 3-2 Shift, Routine 230 • Soft/Slipping 2-1 Shift, Routine 221
Transmission Fluid		
	Incorrect transmission fluid level	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> .
	Transmission fluid condition	Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Main Control		
	Screws not tightened to specification	Tighten to specification.
	Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
	Contamination	Disassemble and clean.
	Valve, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.
	Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band		
	Band damaged	Inspect for damage. Repair as necessary.
	Servo worn or damaged	Inspect for damage. Repair as necessary.
	Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: TIMING CONCERNS-ERRATIC/HUNTING (SOME/ALL)

Possible Component	Reference/Action
212 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, output shaft speed (OSS) sensor, intake air temperature (IAT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM and IAT. Go to <u>Pinpoint Test E</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Incorrect transmission fluid level	Adjust the transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> .
Transmission fluid condition	Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Further Diagnosis	
For further diagnosis for timing issues, refer to Reference/Action	Refer to the following routine(s) for specific diagnosis: • No 1-2 Shift, Routine 220 • No 2-3 Shift, Routine 221 • No 3-4 Shift, Routine 222 • No 4-5 Shift, Routine 270 • No 5-4 Shift, Routine 271 • No 4-3 Shift, Routine 223 • No 3-2 Shift, Routine 224 • No 2-1 Shift, Routine 225 • Soft/Slip 1-2 Shift, Routine 226 • Soft/Slip 2-3 Shift, Routine 227 • Soft/Slip 3-4 Shift, Routine 228 • Soft/Slip 4-5 Shift, Routine 272 • Soft/Slip 5-4 Shift, Routine 273 • Soft/Slip 4-3 Shift, Routine 229 • Soft/Slip 3-2 Shift, Routine 230 • Soft/Slip 2-1 Shift, Routine 231 • Harsh 1-2 Shift, Routine 232 • Harsh 2-3 Shift, Routine 233 • Harsh 3-4 Shift, Routine 234

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Harsh 4-5 Shift, Routine 274
- Harsh 5-4 Shift, Routine 275
- Harsh 4-3 Shift, Routine 235
- Harsh 3-2 Shift, Routine 236
- Harsh 2-1 Shift, Routine 237

ENGAGEMENT CONCERN: FEEL-SOFT/SLIPPING (SOME/ALL)

Possible Component	Reference/Action
213 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoids A, B, C, pressure control solenoids A, B, C, D (PC A, B, C, D), intermediate shaft speed sensor, transmission fluid temperature (TFT) sensor, intake air temperature (IAT) sensor, vehicle speed sensor (VSS) input	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM, IAT and VSS. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Some Shifts Soft/Slipping ONLY	If only some of the shifts are soft/slipping, determine which shift(s) is missing. Refer to the following routine(s) for further Soft/Slipping concerns: • Soft/Slipping 1-2 Shift, Routine 226 • Soft/Slipping 2-3 Shift, Routine 227 • Soft/Slipping 3-4 Shift, Routine 228 • Soft/Slipping 4-5 Shift, Routine 272 • Soft/Slipping 5-4 Shift, Routine 273 • Soft/Slipping 4-3 Shift, Routine 229 • Soft/Slipping 3-2 Shift, Routine 230 • Soft/Slipping 2-1 Shift, Routine 231
Transmission Fluid Incorrect transmission fluid level Transmission fluid condition	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> . Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Incorrect Pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

High/low pressures	<u>Procedures.</u>
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valves, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Torque Converter Assembly	
Torque converter internal failure preventing engagement, piston release	Remove the transmission. Inspect for damage. Refer to <u>Torque Converter</u> . If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter.
Fluid Pump Assembly	
Screws not tightened to specification	Tighten screws to specification.
Gasket damaged	Inspect for damage. If damaged, install a new gasket.
Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
Pump gears cracked and/or seized	Inspect for damage. Install a new pump.
Flow control valves, springs, or seals damaged, stuck or not assembled correctly	Inspect for damage. Install a new seal or flow control valve.
Coast Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Center Support	
Screw not tightened to specification	Tighten to specification.
Seal rings or bearings damaged	Inspect for damage. Repair as necessary.
Outside diameter of case bore damage	Inspect for damage. Repair as necessary.
Support damaged or leaking	Inspect for damage. Repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Direct Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Reverse Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Reverse Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Case	
Damaged	Inspect for damage. Repair as necessary.

SHIFT CONCERN: FEEL-HARSH (SOME/ALL)

Possible Component	Reference/Action
214- ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoids A, B, C, pressure control solenoids A, B, C, D (PC A, B, C, D), intermediate shaft speed sensor, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor, intake air temperature (IAT) sensor, vehicle speed sensor (VSS) input	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM, IAT and VSS. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Some Shifts Harsh ONLY	
	If only some of the shifts are harsh, determine which shift(s) is missing. Refer to the following routine(s) for further No Shift concerns:

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

		• Harsh 1-2 Shift, Routine 232 • Harsh 2-3 Shift, Routine 233 • Harsh 3-4 Shift, Routine 234 • Harsh 4-5 Shift, Routine 274 • Harsh 5-4 Shift, Routine 275 • Harsh 4-3 Shift, Routine 235 • Harsh 3-2 Shift, Routine 236 • Harsh 2-1 Shift, Routine 237
Transmission Fluid		
	Incorrect transmission fluid level	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> .
Incorrect Pressures		
	High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control		
	Screws not tightened to specification	Tighten to specification.
	Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
	Contamination	Disassemble and clean.
	Valves, springs damaged, misassembled, missing, stuck, or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
	Filter damaged, missing	Inspect for damage, repair as necessary.
Input Shaft		
	Damaged	Inspect for damage. Install new as necessary.
Overdrive Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.
	Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band		
	Band damaged	Inspect for damage. Repair as necessary.
	Servo worn or damaged	Inspect for damage. Repair as necessary.
	Not adjusted correctly	Inspect for damage. Repair as necessary.
Center Shaft Assembly		
	Center shaft assembly damaged	Inspect for damage. Repair as necessary.
	One-way clutch damaged	Inspect for damage. Repair as necessary.
Center Support		
	Screw not tightened to specification	Tighten to specification.
Intermediate Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Reverse Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Reverse Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Output Shaft	
Damaged	Inspect for damage. Install new as necessary.
Case	
Damaged	Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 1ST AND 2ND GEAR IN DRIVE, ENGAGES IN A HIGHER GEAR

Possible Component	Reference/Action
215 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoids A, B, C, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test C</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
	If damaged or parts are missing, install new main

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valves/springs damaged, misassembled, missing, stuck or bore damaged	control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.
Low One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

ENGAGEMENT CONCERN: NO 1ST GEAR IN MANUAL 1 POSITION

Possible Component	Reference/Action
216 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoids A, B, pressure control solenoids B, C (PC B, C)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test D</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valves, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Planetary Assembly	
Planetary damaged	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.
Low One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

SHIFT CONCERN: NO 2ND GEAR IN MANUAL 2 POSITION

Possible Component	Reference/Action
217 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoids A, B, C, pressure control solenoid B (PC B)	Carry out on-board diagnostic tests. For additional information, refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test D</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install a new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Overdrive Servo Servo retaining screws damaged Seals (piston and cover) damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Direct One-Way Clutch Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.
Low One-Way Clutch Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

TORQUE CONVERTER OPERATION CONCERNS: DOES NOT APPLY

Possible Component	Reference/Action
240 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid.	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

transmission fluid temperature (TFT) sensor and engine coolant temperature (ECT) sensor	and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test B</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Valve, springs damaged, misassembled, missing, stuck or bore damaged	Inspect for damage, repair as necessary.
Filter damaged, missing	
Torque Converter Assembly	
Torque converter internal failure preventing engagement, piston application	Remove the transmission. Inspect for damage. Refer to <u>Torque Converter</u> . If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter.
Pump Assembly	
Screws not tightened to specification	Tighten screws to specification.
Gasket damaged	Inspect for damage. If damaged, install a new gasket.
Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
Pump gears cracked and/or seized	Inspect for damage. Install a new pump.
Flow control valves, springs or seals damaged, stuck or not assembled correctly	Inspect for damage. Install a new seal or flow control valve.

TORQUE CONVERTER OPERATION CONCERN: ALWAYS APPLIED/STALLS VEHICLE

Possible Component	Reference/Action
241 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Main Control	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Torque Converter Assembly	
Torque converter internal failure preventing engagement, piston release	Remove the transmission. Inspect for damage. Refer to <u>Torque Converter</u> . If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter.
Low One-Way Clutch	
Worn, damaged or assembled incorrectly.	Inspect for damage. Repair as necessary.

TORQUE CONVERTER OPERATION CONCERN: CYCLING/SHUDDER/CHATTER

Possible Component	Reference/Action
242 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> . Repair as necessary. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Transmission fluid condition - contaminated, degraded	Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> . If contaminated, locate source of contamination. If burnt, inspect mechanical bands, clutches. Repair as necessary. Change transmission fluid. Carry out <u>Transmission Fluid Drain and Refill - Automated Equipment</u> . Refer to <u>Transmission Fluid Drain and Refill - Without Torque Converter Drain Plug</u> . Carry out <u>Transmission Fluid Cooler Backflushing and Cleaning</u> . Refer to <u>Transmission Fluid Cooler Backflushing and Cleaning</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valve, springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Torque Converter Assembly	
Torque converter internal leakage, clutch material damaged	Remove the transmission. Inspect for damage. Refer to <u>Torque Converter</u> . If the torque converter fails to pass the criteria or is damaged, install a new or remanufactured torque converter.

OTHER CONCERNS: SELECTOR LEVER EFFORTS HIGH

Possible Component	Reference/Action
251 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test C</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Selector Lever Cable, Digital Transmission Range (TR) Sensor Selector lever cable system or digital TR sensor damaged, misaligned	Inspect and repair as necessary. Refer to <u>Transmission Range (TR) Sensor Adjustment</u> or <u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u> article.
Main Control Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Case Manual control lever assembly damage, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged Manual valve lever shaft	Inspect for damage. If damaged, install a new part.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

retaining pin damaged

Inspect for damage. If damaged, repair as necessary.

OTHER CONCERNS: EXTERNAL LEAKS

Possible Component	Reference/Action
252 - ROUTINE	
Powertrain Control System OSS sensor, intermediate shaft speed, turbine shaft speed (TSS) sensor, digital transmission range (TR) sensor	Inspect for leakage. If areas around sensor show signs of leakage, install a new sensor O-ring seal. If area behind digital TR sensor shows signs of a leak, a new manual lever shaft seal may need to be installed.
Transmission Fluid Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Case Case vent damaged Output shaft flange damage	Inspect for damage. If damaged, repair as necessary. Inspect for damage. If damaged, repair as necessary.
Seals/Gaskets Leakage at gaskets, seals, cooler lines, torque converter studs, etc.	Refer to <u>Leakage Inspection</u> for potential leak locations. Remove all traces of lubricant on exposed surfaces of the transmission. Check vent for free breathing. Operate the vehicle at normal temperatures and carry out leak check test, refer to <u>Leakage Inspection</u> . Repair as necessary.
Vents Transmission fluid leakage through the vent system into the bellhousing	Incorrect transmission fluid level may cause the transmission fluid to vent. If not already carried out verify and adjust the fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> . Verify the transmission operating temperature by monitoring the transmission fluid temperature (TFT) while driving the vehicle for 32 km (20 mi) or 20 minutes. If the TFT exceeds 102°C (215°F) during the drive, refer to Routine No. 257 Transmission Overheating, Main Control, Thermostatic bypass valve. Remove all traces of transmission fluid on exposed surfaces of the transmission. Check the vent for damage and obstructions. Verify that the vent is operating correctly by applying air through the vent tubes. If the vent is damage or obstructed, repair as necessary.

NOTE: Noise, vibration and harshness (NVH) symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, refer to **NOISE, VIBRATION AND**

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

HARSHNESS article. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, refer back to **NOISE, VIBRATION AND HARSHNESS** article for the next likely system and continue diagnosis.

OTHER CONCERN: NOISE/VIBRATION - FORWARD OR REVERSE

Possible Component	Reference/Action
254 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid, pressure control solenoids A, B, C (PC A,B,C)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Selector Lever Cable/Digital Transmission Range (TR) Sensor Selector lever cable or digital TR sensor damaged, misaligned	Inspect and repair as necessary. Refer to <u>Transmission Range (TR) Sensor Adjustment</u> or <u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u> article.
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck, or bore damaged, thermostatic bypass valve damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Torque Converter Assembly Torque converter hub damaged	Inspect for damage. Repair as necessary.
Flexplate or Adapter Plate Damaged Nuts not tightened to specification Adapter plate not aligned correctly	Inspect for damage. Repair as necessary. Tighten to specification. Remove transmission and using special service tool and procedure, align adapter plate.
Pump Assembly	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Screws not tightened to specification	Tighten screws to specification.
Gasket damaged	Inspect for damage. If damaged, install a new gasket.
Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
Pump gears cracked and/or seized	Inspect for damage. Install a new pump.
Flow control valves, springs or seals damaged, stuck or not assembled correctly	Inspect for damage. Install a new seal or flow control valve.
Low One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.
Clutch Assemblies	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for damage, mislocation, poor seating. Install a new cylinder as necessary.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.

OTHER CONCERN: ENGINE WILL NOT CRANK

Possible Component	Reference/Action
255 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test C</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Selector Lever Cable/Digital TR Sensor	
Selector lever cable or digital TR sensor damaged, misaligned	Inspect and repair as necessary. Refer to <u>Transmission Range (TR) Sensor Adjustment</u> or <u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u> article.
Main Control/Park System/TR Sensor Alignment	
Detent spring, rooster	Disconnect TR sensor electrical connector. Remove outer manual lever nut. Loosen TR sensor screws. Loosen detent spring screw. Move manual lever through all gear ranges. Place manual lever into the NEUTRAL position. Tighten the detent spring screw to correct specification. Install

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

comb, manual lever and TR sensor are not correctly aligned together	TR sensor alignment tool. Tighten the TR sensor screws alternating sequence until correct tightening specification is obtained. Remove tool. Install outer manual lever and nut. Tighten nut to correct specification. Install TR sensor connector. Verify that the vehicle will start in PARK and NEUTRAL. Verify that the reverse backup lamps illuminate in REVERSE.
Flexplate or Adapter Plate Damaged	Inspect for damage. Repair as necessary.
Pump Assembly Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized Flow control valves, springs or seals damaged, stuck or not assembled correctly	Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve.

OTHER CONCERN: NO PARK RANGE

Possible Component	Reference/Action
256 - ROUTINE	
Selector Lever Cable/Digital Transmission Range (TR) Sensor Selector lever cable system or digital TR sensor damaged, misaligned	Inspect and repair as necessary. Refer to <u>Transmission Range (TR) Sensor Adjustment</u> or <u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u> article.
Case Manual control lever assembly damage, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged Manual valve lever shaft retaining pin damaged	Inspect for damage. If damaged, repair as necessary. Inspect for damage. If damaged, repair as necessary.
Park System Park gear, parking pawl, parking pawl return spring, park or guide plate, parking actuating rod, parking pawl shaft, manual lever, manual lever detent spring damaged or misassembled	Inspect for damage. If damaged, repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

External linkages/brackets
damaged

Inspect for damage. If damaged, repair as necessary.

OTHER CONCERN: TRANSMISSION OVERHEATING

Possible Component	Reference/Action
257 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, torque converter clutch (TCC) solenoid, pressure control solenoids A, B, C (PC A, B, C), transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Hydraulic/Mechanical Thermostatic bypass valve in the main control valve body assembly	Verify correct thermal valve function, while monitoring the TFT. Drive the vehicle for about 32 km (20 miles) or 20 minutes. If the temperature exceeds 102°C (215°F) during the drive, install a new main control valve body assembly.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged, thermostatic bypass valve damaged Filter damaged, missing Thermostatic bypass valve damaged or malfunctioning	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary. If the verification procedure confirms the malfunction, install a new main control valve body assembly. If not malfunctioning, inspect for damage. If damaged, install a new main control valve body assembly.
Torque Converter Assembly Seized torque converter one-way clutch	Remove the transmission. Inspect for damage. Refer to <u>Torque Converter</u> . If the torque converter fails to pass the

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Excessive slip detected	criteria or is damaged, install a new or remanufactured torque converter.
Pump Assembly Screws not tightened to specification Gasket damaged Porosity, cross leaks, ball missing, plugged hole Pump gears cracked and/or seized Flow control valves, springs or seals damaged, stuck or not assembled correctly	Tighten screws to specification. Inspect for damage. If damaged, install a new gasket. Inspect for damage. If damaged, repair as necessary. Inspect for damage. Install a new pump. Inspect for damage. Install a new seal or flow control valve.
Case Case vent damaged	Inspect for damage. If damaged, repair as necessary.
Other Restriction in the transmission cooling system Excessive trailer tow load Engine driveability concerns	Refer to <u>TRANSAXLE/TRANSMISSION COOLING</u> article for information and diagnosis of cooling system. Refer to the owner guide for specifications on trailer towing. Check engine. Refer to <u>ENGINE SYSTEM - GENERAL INFORMATION</u> article.

OTHER CONCERN: NO ENGINE BRAKING IN MANUAL 3RD POSITION

Possible Component	Reference/Action
280 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoids A, B, C, reverse pressure switch, pressure control solenoids A, B (PC A, B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valve/springs damaged, misassembled, missing, stuck or bore damaged	correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Coast Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Center Support	
Screw not tightened to specification	Tighten to specification.
Seals rings or bearing damaged	Inspect for damage. Repair as necessary.
Outside diameter of case bore damaged	Inspect for damage. Repair as necessary.
Support damaged or leaking	Inspect for damage. Repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

OTHER CONCERN: NO ENGINE BRAKING IN MANUAL 4TH (D Overdrive (Circle D) CANCELLED) POSITION

Possible Component	Reference/Action
281 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid D, reverse pressure switch, pressure control solenoid B (PC B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Filter damaged, missing	Inspect for damage, repair as necessary.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Coast Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.

OTHER CONCERNS: NO ENGINE BRAKING IN MANUAL 2ND POSITION

Possible Component	Reference/Action
258 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoids A, C, D, pressure control solenoid A (PC A)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

OTHER CONCERN: NO ENGINE BRAKING IN MANUAL 1ST POSITION

Possible Component	Reference/Action
259 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoids A, C, D, pressure control solenoids A, B (PC A, B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

		Go to <u>Pinpoint Test A</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid		
	Incorrect transmission fluid level	Adjust transmission fluid to the correct level, refer to <u>Transmission Fluid Level Check</u> .
Incorrect pressures		
	High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Reverse Servo		
	Servo retaining screws damaged	Inspect for damage. Repair as necessary.
	Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Reverse Band		
	Band damaged	Inspect for damage. Repair as necessary.
	Servo worn or damaged	Inspect for damage. Repair as necessary.

OTHER CONCERNS: TRANSMISSION FLUID VENTING/FOAMING

Possible Component	Reference/Action
261 - ROUTINE	
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Transmission fluid condition	Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Pump Assembly	
Screws not tightened to specification	Tighten screws to specification.
Gasket damaged	Inspect for damage. If damaged, install a new gasket.
Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
Case	
Case vent damaged	Inspect for damage. If damaged, repair as necessary.
Other	
Transmission overheating	Refer to 257 routine.

OTHER CONCERN: VEHICLE MOVEMENT WITH GEAR SELECTOR IN N POSITION

Possible Component	Reference/Action
262 - ROUTINE	
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Selector Lever Cable/Digital Transmission Range (TR) Sensor	
Cable system or digital TR sensor damaged,	Inspect and repair as necessary. Refer to Transmission

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

misaligned	<u>Range (TR) Sensor Adjustment.</u>
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Clutch Assemblies Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn. Return springs damaged	Inspect for damage. Repair as necessary. Inspect for damage, mislocation, poor seating. Install a new cylinder as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Case Manual control lever assembly damage, manual valve inner lever pin bent, manual valve inner lever damaged, spring rod damaged Manual valve lever shaft retaining pin damaged	Inspect for damage. If damaged, repair as necessary. Inspect for damage. If damaged, repair as necessary.

OTHER CONCERN: SLIPS/CHATTERS IN MANUAL 1ST POSITION

Possible Component	Reference/Action
263 - ROUTINE Powertrain Control System PCM, vehicle wiring harnesses, pressure control solenoids A, B (PC A, B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid Incorrect transmission fluid level Transmission fluid condition	Adjust transmission fluid to the correct level. Refer to <u>Transmission Fluid Level Check</u> . Carry out Transmission Fluid Condition Check. Refer to <u>Preliminary Inspection</u> .
Incorrect Pressures	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

High/low pressures	Carry out Line Pressure Test . Refer to Special Testing Procedures .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	
Filter damaged, missing	Inspect for damage, repair as necessary.
Pump Assembly	
Screws not tightened to specification	Tighten screws to specification.
Gasket damaged	Inspect for damage. If damaged, install a new gasket.
Porosity, cross leaks, ball missing, plugged hole	Inspect for damage. If damaged, repair as necessary.
Pump gears cracked and/or seized	Inspect for damage. Install a new pump.
Flow control valves, springs, or seals damaged, stuck or not assembled correctly	Inspect for damage. Install a new seal or flow control valve.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Reverse Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Reverse Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

OTHER CONCERN: SLIPS/CHATTERS IN MANUAL 2ND POSITION

Possible Component	Reference/Action
264 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoids A, B (PC A, B)	Carry out on-board diagnostic tests. Refer to the Introduction - Gasoline Engines article for diagnosis and

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	testing of the PCM. Go to Pinpoint Test D . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to the correct level. Refer to Transmission Fluid Level Check .
Transmission fluid condition	Carry out Transmission Fluid Condition Check. Refer to Preliminary Inspection .
Incorrect Pressures	
High/low pressures	Carry out Line Pressure Test . Refer to Special Testing Procedures .
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Overdrive Planetary Assembly	
Planetary damaged	Inspect for damage. Repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.

OTHER CONCERN: SLIP/CHATTERS IN MANUAL 3RD POSITION

Possible Component	Reference/Action
282 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, pressure control solenoids A, B (PC A, B)	Carry out on-board diagnostic tests. Refer to the Introduction - Gasoline Engines article for diagnosis and testing of the PCM. Go to Pinpoint Test D . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to the correct level. Refer to Transmission Fluid Level Check .
Transmission fluid condition	Carry out Transmission Fluid Condition Check. Refer to

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	<u>Preliminary Inspection.</u>
Incorrect Pressures	
High/low pressures	Carry out Line Pressure Test . Refer to Special Testing Procedures .
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.
Low One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

OTHER CONCERN: ENGINE BRAKING IN ALL GEARS

Possible Component	Reference/Action
283 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid D	Carry out on-board diagnostic tests. Refer to the Introduction - Gasoline Engines article for diagnosis and testing of the PCM. Go to Pinpoint Test A . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Torque Converter Assembly	
Torque converter internal failure	Remove the transmission. Inspect for damage. Refer to Torque Converter . If the torque converter fails to pass the

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

preventing engagement, piston release

criteria or is damaged, install a new or remanufactured torque converter.

OTHER CONCERN: NO 2ND AND 5TH GEARS (MANUAL 2ND IS OK)

Possible Component	Reference/Action
284 - ROUTINE	
Hydraulic/Mechanical	Verify that Manual 2 is present and functions correctly. If Manual 2 is not operating correctly go to Shift Concerns: Routine 210 - Some/All Shifts Missing (Automatic Mode) and continue diagnosis. If Manual 2 is operating correctly continue with this routine.
Powertrain Control System PCM, vehicle wiring harnesses, pressure control solenoids B, C (PC B, C)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.

OTHER CONCERN: NO 3RD, 4TH AND 5TH GEARS

Possible Component	Reference/Action
285 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, pressure control solenoids A, B (PC A, B)	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Overdrive Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Planetary Assembly Planetary damaged	Inspect for damage. Repair as necessary.
Intermediate Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Intermediate Band

Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 1-2 SHIFT

Possible Component	Reference/Action
232 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoids B (PC B), turbine shaft speed (TSS) sensor, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Overdrive Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 2-3 SHIFT

Possible Component	Reference/Action
233 - ROUTINE	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Powertrain Control System

PCM, vehicle wiring harnesses, shift control solenoid B, pressure control solenoids A (PC A), turbine shaft speed (TSS) sensor, intermediate shaft speed sensor, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor

Carry out on-board diagnostic tests. Refer to the **Introduction - Gasoline Engines** article for diagnosis and testing of the PCM.

Go to **Pinpoint Test A**, go to **Pinpoint Test B**, go to **Pinpoint Test C**, go to **Pinpoint Test D** and Go to **Pinpoint Test E**.

Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.

Incorrect Pressures

High/low pressures

Carry out **Line Pressure Test**. Refer to **Special Testing Procedures**.

Main Control

Screws not tightened to specification

Tighten to specification.

Separator plate damaged

Inspect for damage. If damaged, install a new separator plate.

Contamination

Disassemble and clean.

Valve/springs damaged, misassembled, missing, stuck or bore damaged

If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.

Filter damaged, missing

Inspect for damage, repair as necessary.

Overdrive Servo

Servo retaining screws damaged

Inspect for damage. Repair as necessary.

Seals (piston and cover) damaged

Inspect for damage. Repair as necessary.

Overdrive Band

Band damaged

Inspect for damage. Repair as necessary.

Servo worn or damaged

Inspect for damage. Repair as necessary.

Not adjusted correctly

Inspect for damage. Repair as necessary.

Direct Clutch Assembly

Seals, piston damaged

Inspect for damage. Repair as necessary.

Check ball damaged, missing, not seating, off location

Inspect for mislocation, poor seating, damage. Install a new cylinder.

Friction elements damaged or worn

Inspect for damage. Repair as necessary.

Return springs damaged

Inspect for damage. Repair as necessary.

Intermediate Servo

Servo retaining screws damaged

Inspect for damage. Repair as necessary.

Seals (piston and cover) damaged

Inspect for damage. Repair as necessary.

Intermediate Band

Band damaged

Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 3-4 SHIFT

Possible Component	Reference/Action
234 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift control solenoid A, pressure control solenoids C (PC C), digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Center Support	
Screws not tightened to specification Seal rings or bearing damaged Outside diameter of case bore damaged Support damaged or leaking	Tighten to specification. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Direct Clutch Assembly	
Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged	Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Intermediate Servo	
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

SHIFT CONCERNS: HARSH 4-5 SHIFT

Possible Component	Reference/Action
274 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), turbine shaft speed (TSS) sensor, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Overdrive Servo Servo retaining screws damaged Seal (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 5-4 SHIFT

Possible Component	Reference/Action
275 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoid C (PC C), turbine shaft speed (TSS) sensor, digital transmission range (TR) sensor, transmission	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

fluid temperature (TFT) sensor	Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 4-3 SHIFT

Possible Component	Reference/Action
235 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid A (PC A), digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing</u>

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

High/low pressures	<u>Procedures.</u>
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves, springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Direct Clutch Assembly Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged	Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Intermediate Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Intermediate Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 3-2 SHIFT

Possible Component	Reference/Action
236 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoid B (PC B), turbine shaft speed (TSS) sensor, intermediate shaft speed sensor, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: HARSH 2-1 SHIFT

Possible Component	Reference/Action
237 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift control solenoid C, pressure control solenoid B (PC B), turbine shaft speed (TSS) sensor, digital transmission range (TR) sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Direct Clutch One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 1-2 SHIFT

Possible Component	Reference/Action
220 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), output shaft speed (OSS) sensor, digital transmission range (TR) sensor, vehicle speed sensor (VSS) input	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM and VSS. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid	
Incorrect transmission fluid level	Adjust transmission fluid to correct level. Refer to <u>Transmission Fluid Level Check</u> .
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Overdrive Planetary Assembly	
Planetary damaged	Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 2-3 SHIFT

Possible Component	Reference/Action
221 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid B, torque converter clutch (TCC) solenoid, pressure control solenoid A (PC A), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Forward Clutch Assembly	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball, damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 3-4 SHIFT

Possible Component	Reference/Action
222 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid C (PC C), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	
Filter damaged, missing	Inspect for damage, repair as necessary.
Center Support	
Screws not tightened to specification	Tighten to specification.
Seal rings or bearing damaged	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Outside diameter of case bore damaged	Inspect for damage. Repair as necessary.
Support damaged or leaking	Inspect for damage. Repair as necessary.
Direct Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for mislocation, poor seating, damage. Install a new cylinder.

SHIFT CONCERN: NO 4-5 SHIFT

Possible Component	Reference/Action
270 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM.
Transmission control switch (TCS)	Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. For TCS diagnosis, refer to <u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u> article.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 5-4 SHIFT

Possible Component	Reference/Action
271 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid C (PC C), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM.
Transmission control switch (TCS)	Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test. For TCS diagnosis, refer to <u>AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS</u> article.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valves/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Overdrive Servo

Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.

Overdrive Band

Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 4-3 SHIFT

Possible Component	Reference/Action
223 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid A, B, pressure control solenoid A (PC A), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Intermediate Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Intermediate Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

SHIFT CONCERN: NO 3-2 SHIFT

Possible Component	Reference/Action
224 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Overdrive Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Forward Clutch Assembly Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: NO 2-1 SHIFT

Possible Component	Reference/Action
225 - ROUTINE	

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), output shaft speed (OSS) sensor, digital transmission range (TR) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test C</u> , go to <u>Pinpoint Test D</u> and Go to <u>Pinpoint Test E</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valves/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Forward Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.
Return springs damaged	Inspect for damage. Repair as necessary.
Bronze seal ring or bearing damaged	Inspect for damage. Repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: SOFT/SLIPPING 1-2 SHIFT

Possible Component	Reference/Action
226 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC	Carry out on-board diagnostic tests. Refer to the

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

B), transmission fluid temperature (TFT) sensor, vehicle speed sensor (VSS) input	Introduction - Gasoline Engines article for diagnosis and testing of the PCM. Go to Pinpoint Test A , go to Pinpoint Test B and Go to Pinpoint Test D . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Transmission Fluid Incorrect transmission fluid level Transmission fluid condition	Adjust transmission fluid to correct level. Refer to Transmission Fluid Level Check . Carry out Transmission Fluid Condition Check. Refer to Preliminary Inspection .
Incorrect Pressures High/low pressures	Carry out Line Pressure Test . Refer to Special Testing Procedures .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valve/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Overdrive Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: SOFT/SLIPPING 2-3 SHIFT

Possible Component	Reference/Action
227 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid A (PC A), pressure control solenoid A, intermediate shaft speed sensor, transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the Introduction - Gasoline Engines article for diagnosis and testing of the PCM. Go to Pinpoint Test A , go to Pinpoint Test B , go to Pinpoint Test D and Go to Pinpoint Test E . Repair as required. Clear DTCs, road test and rerun on-

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valve/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Intermediate Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Intermediate Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: SOFT/SLIPPING 3-4 SHIFT

Possible Component	Reference/Action
228 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid C (PC C), transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification. Inspect for damage. If damaged, install a new separator

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged	plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Center Support Screw not tightened to specification Seal rings or bearing damaged Outside diameter of case bore damaged Support damaged or leaking	Tighten to specification. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Direct Clutch Assembly Seals, piston damaged Check ball damaged, missing, not seating, off location Friction elements damaged or worn Return springs damaged	Inspect for damage. Repair as necessary. Inspect for mislocation, poor seating, damage. Install a new cylinder. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Intermediate Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: SOFT/SLIPPING 4-5 SHIFT

Possible Component	Reference/Action
272 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Valves/springs damaged, misassembled, missing, stuck or bore damaged	control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Overdrive Servo	
Servo retaining screws damaged	Inspect for damage. Repair as necessary.
Seals (piston and cover) damaged	Inspect for damage. Repair as necessary.
Overdrive Band	
Band damaged	Inspect for damage. Repair as necessary.
Servo worn or damaged	Inspect for damage. Repair as necessary.
Not adjusted correctly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: FEEL - SOFT/SLIPPING 5-4 SHIFT

Possible Component	Reference/Action
273 - ROUTINE	
Powertrain Control System	
PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid C, (PC C) transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean.
Valves/springs damaged, misassembled, missing, stuck or bore damaged	If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Filter damaged, missing	Inspect for damage, repair as necessary.
Direct Clutch Assembly	
Seals, piston damaged	Inspect for damage. Repair as necessary.
Check ball damaged, missing, not seating, off location	Inspect for mislocation, poor seating, damage. Install a new cylinder.
Friction elements damaged or worn	Inspect for damage. Repair as necessary.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Return springs damaged	Inspect for damage. Repair as necessary.
Direct One-Way Clutch	
Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: FEEL - SOFT/SLIPPING 4-3 SHIFT

Possible Component	Reference/Action
229 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid A, pressure control solenoid A (PC A), transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the <u>Introduction - Gasoline Engines</u> article for diagnosis and testing of the PCM. Go to <u>Pinpoint Test A</u> , go to <u>Pinpoint Test B</u> and Go to <u>Pinpoint Test D</u> . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Intermediate Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Intermediate Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.

SHIFT CONCERN: SOFT/SLIPPING 3-2 SHIFT

Possible Component	Reference/Action
230 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift	Carry out on-board diagnostic tests. Refer to the

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

solenoid C, pressure control solenoid B (PC B), intermediate shaft speed sensor, transmission fluid temperature (TFT) sensor	Introduction - Gasoline Engines article for diagnosis and testing of the PCM. Go to Pinpoint Test A , go to Pinpoint Test B , go to Pinpoint Test D and Go to Pinpoint Test E . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures High/low pressures	Carry out Line Pressure Test . Refer to Special Testing Procedures .
Main Control Screws not tightened to specification Separator plate damaged Contamination Valves/springs damaged, misassembled, missing, stuck or bore damaged Filter damaged, missing	Tighten to specification. Inspect for damage. If damaged, install a new separator plate. Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage. Inspect for damage, repair as necessary.
Overdrive Servo Servo retaining screws damaged Seals (piston and cover) damaged	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Overdrive Band Band damaged Servo worn or damaged Not adjusted correctly	Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary. Inspect for damage. Repair as necessary.
Direct One-Way Clutch Worn, damaged or assembled incorrectly	Inspect for damage. Repair as necessary.

SHIFT CONCERN: FEEL - SOFT/SLIPPING 2-1 SHIFT

Possible Component	Reference/Action
231 - ROUTINE	
Powertrain Control System PCM, vehicle wiring harnesses, shift solenoid C, pressure control solenoid B (PC B), transmission fluid temperature (TFT) sensor	Carry out on-board diagnostic tests. Refer to the Introduction - Gasoline Engines article for diagnosis and testing of the PCM. Go to Pinpoint Test A , go to Pinpoint Test B and Go to Pinpoint Test D . Repair as required. Clear DTCs, road test and rerun on-board diagnostic test.
Incorrect Pressures	

2008 Ford Mustang

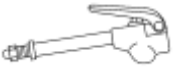
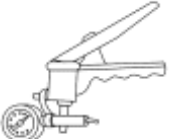
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

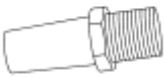
High/low pressures	Carry out <u>Line Pressure Test</u> . Refer to <u>Special Testing Procedures</u> .
Main Control	
Screws not tightened to specification	Tighten to specification.
Separator plate damaged	Inspect for damage. If damaged, install a new separator plate.
Contamination	Disassemble and clean. If damaged or parts are missing, install new main control assembly. If misassembled, reassemble correctly. DO NOT stone, file or sand valves. This will remove the anodized finish and may result in further main control or transmission damage.
Valves/springs damaged, misassembled, missing, stuck or bore damaged	
Filter damaged, missing	Inspect for damage, repair as necessary.

GENERAL PROCEDURES

TRANSMISSION FLUID LEVEL CHECK

Special Tools

Illustration	Tool Name	Tool Number
 ST2467-A	Rubber Tip Air Nozzle	100-D009 (D93L-7000-A)
 ST1269-A	Vacuum Pump Kit	416-D002 (D95L-7559-A)
 ST2715-A	Fluid Transporter/Evacuator/Injector	307-D465
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

 ST2581-A	Transmission Fluid Fill Tool	307-437
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Material

Item	Specification
® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

NOTE: **Left side of case shown.**

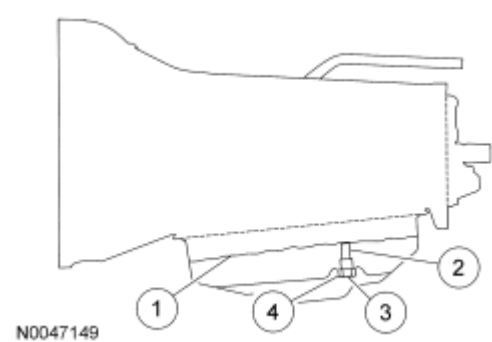
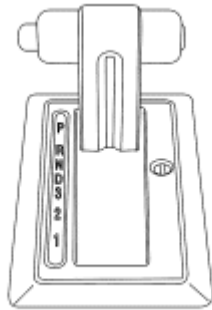


Fig. 57: Fluid Fill Reference
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Fluid level
2	7A010	Fluid level tube
3	W704999-S309	Fluid level and fill plug (small) (in-vehicle)
4	7A010	Fluid drain plug (large)

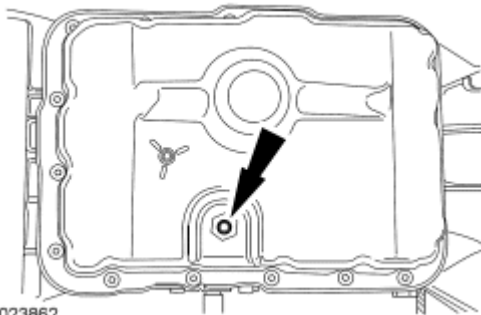
- Using the scan tool, monitor the transmission fluid temperature (TFT) using PID: TFT.
 - Start the vehicle.
- NOTE:** **Engine idle speed is approximately 650 RPM.**
- While proceeding with this procedure, run the engine until the transmission fluid temperature is between 27°-49°C (80°-120°F).
 - Move the range selector lever slowly through each gear, stopping in each position and allowing the transmission to engage.



N0011162

Fig. 58: Identifying Range Selector Lever
Courtesy of FORD MOTOR CO.

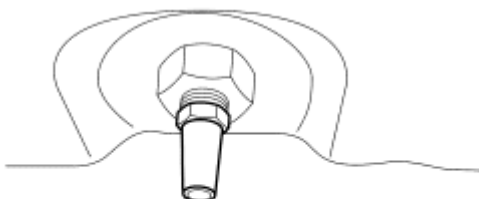
5. Place the range selector lever in the PARK position.
6. With the engine running, position the vehicle on a hoist and set it as close to level as possible. For additional information, refer to **JACKING AND LIFTING** article.
7. Hold the larger drain plug with a wrench and remove the small (center) fluid level indicating plug.



A0023862

Fig. 59: Identifying Small (Center) Fluid Level Indicating Plug
Courtesy of FORD MOTOR CO.

8. Install the special tool into the pan.

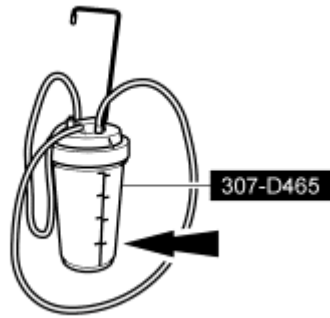


N0014174

Fig. 60: Identifying Special Tool (307-437)
Courtesy of FORD MOTOR CO.

NOTE: Prior to filling the special tool with clean transmission fluid, make sure that the canister is clean.

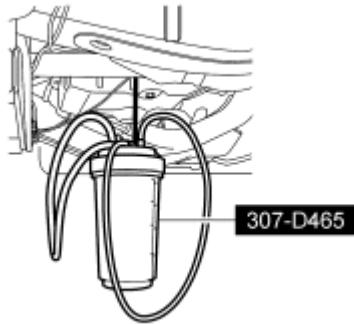
9. Fill the special tool with clean automatic transmission fluid.



N0014178

Fig. 61: Filling Special Tool 307-D465 With Clean Automatic Transmission Fluid
Courtesy of FORD MOTOR CO.

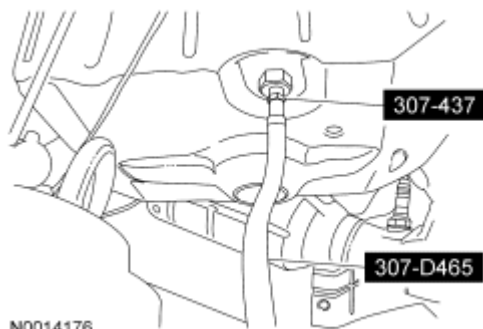
10. Hang the special tool under the vehicle. Position it upright and close to the transmission.



N0014177

Fig. 62: Hanging Special Tool 307-D465 Under Vehicle
Courtesy of FORD MOTOR CO.

11. Connect the special tools.
 - Connect the open end of the fluid hose from the Fluid Transporter/Evacuator/Injector to the Fluid Level and Fill Plug Adapter at the bottom of the transmission fluid pan.



N0014176

Fig. 63: Identifying Special Tools (307-437) And (307-D465)
Courtesy of FORD MOTOR CO.

12. Apply a maximum of 206.85 kPa (30 psi) to the open end of the vacuum/pressure hose from the special tool. Fluid will immediately start flowing out of the special tool into the transmission fluid pan.

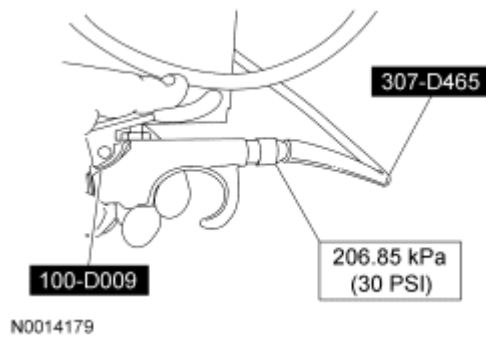


Fig. 64: Identifying Special Tools (100-D009) And (307-D465)
Courtesy of FORD MOTOR CO.

13. Add one pint of transmission fluid into the fluid pan. Stop the process by releasing the air pressure and removing the air nozzle from the end of the hose.
14. Inspect the fluid level in the special tool. If the fluid drains back into the canister, the transmission is full. If no fluid drains back, more fluid will need to be added. Repeat Steps 12 and 13.
15. Once the transmission is full, place a hand vacuum pump on the open end of the vacuum/pressure hose of the special tool and apply vacuum to the system. This will pull out any extra fluid trapped in the system and direct it into the container.

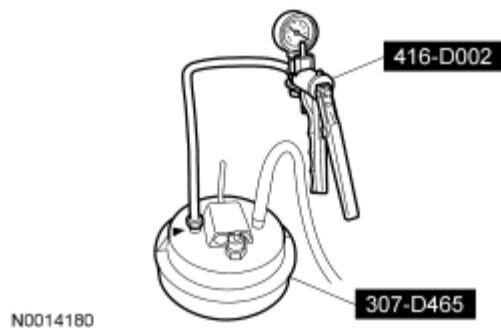


Fig. 65: Identifying Special Tools (416-D002) And (307-D465)
Courtesy of FORD MOTOR CO.

16. Allow the fluid to drain. Make sure that the fluid temperature is between 27°-49°C (80°-120°F). When the fluid comes out as a thin stream or drip, the fluid is at the correct level.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



Fig. 66: Allowing Fluid To Drain
Courtesy of FORD MOTOR CO.

17. Reinstall the small (center) fluid level indicating plug and tighten to 10 Nm (89 lb-in).

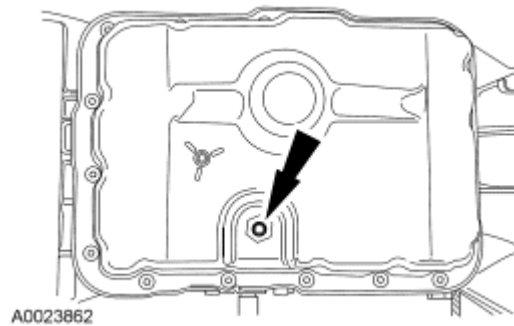


Fig. 67: Identifying Small (Center) Fluid Level Indicating Plug
Courtesy of FORD MOTOR CO.

18. Check the operation of the transmission by moving the range selector lever slowly through each gear, stopping in each position and allowing the transmission to engage.

TRANSMISSION FLUID DRAIN AND REFILL - AUTOMATED EQUIPMENT

Special Tools

Illustration	Tool Name	Tool Number
 ST2654-A	Automatic Transmission Flush and Fill Machine	211-00018 199-00010 or equivalent

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Draining

CAUTION: Use only clean automatic transmission fluid specified for this transmission. Do not use supplemental transmission fluid additives, treatments or clean agents. The use of these materials may affect transmission operation and result in damage to internal transmission components.

CAUTION: Always refer to the instructions supplied with the flush and fill machine or transmission damage can occur.

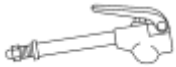
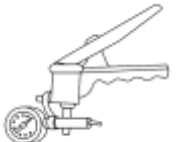
1. With the vehicle in PARK, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Use a suitable flush and fill machine to change the fluid.
3. When connecting the flush and fill machine, connect the machine to the fluid cooler tube after the fluid cooler on the cooler return line. This will help remove any foreign material trapped in the fluid coolers.

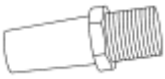
Refill

1. Use only clean automatic transmission fluid.
2. Once the fluid exchange has been completed, disconnect the flush and fill machine. Reconnect any disconnected fluid cooler tubes.
3. With the engine running, check and adjust the transmission fluid level, and check for any leaks. If fluid is needed, add fluid in increments of 0.24L (0.5 pt) until the correct level is achieved. For additional information, refer to **Transmission Fluid Level Check**.

TRANSMISSION FLUID DRAIN AND REFILL - WITHOUT TORQUE CONVERTER DRAIN PLUG

Special Tools

Illustration	Tool Name	Tool Number
 ST2467-A	Rubber Tip Air Nozzle	100-D009 (D93L-7000-A)
 ST1269-A	Vacuum Pump Kit	416-D002 (D95L-7559-A)
	Fluid Transporter/Evacuator/ Injector	307-D465

 ST2715-A		
 ST2581-A	Transmission Fluid Fill Tool	307-437
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool	

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

NOTE: Left side of case is shown.

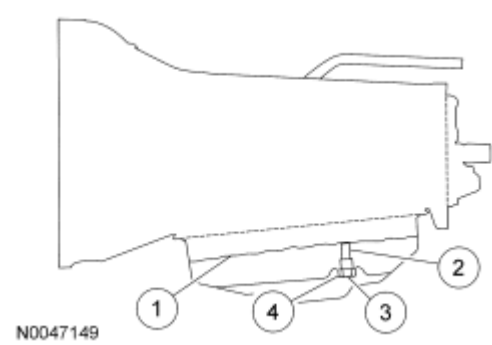


Fig. 68: Fluid Fill Reference
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Fluid level
2	7A010	Fluid level tube
3	W704999-S309	Fluid level and fill plug (small) (in-vehicle)
4	7A010	Fluid drain plug (large)

Draining

1. With the vehicle in NEUTRAL, position it on a hoist. Set the vehicle as close to level as possible. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the drain plug (large plug) and allow the fluid to drain.

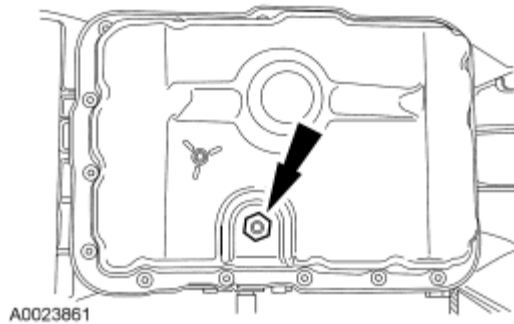


Fig. 69: Identifying Fluid Drain Plug
Courtesy of FORD MOTOR CO.

Filling

1. Install the fluid drain plug.
 - Tighten to 26 Nm (19 lb-ft).

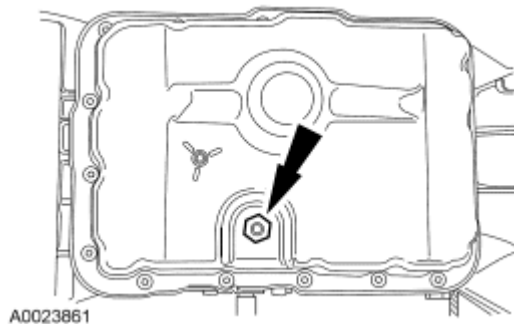


Fig. 70: Identifying Fluid Drain Plug
Courtesy of FORD MOTOR CO.

2. Hold the larger drain plug with a wrench and remove the small (center) fluid level indicating plug.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

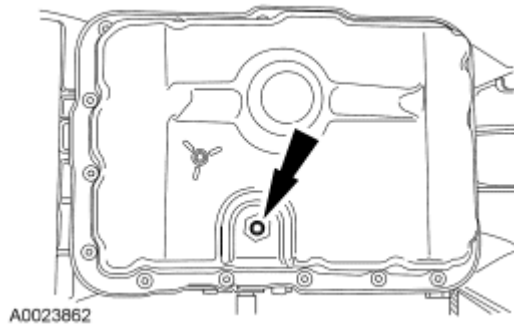


Fig. 71: Identifying Small (Center) Fluid Level Indicating Plug
Courtesy of FORD MOTOR CO.

3. Install the special tool into the pan.

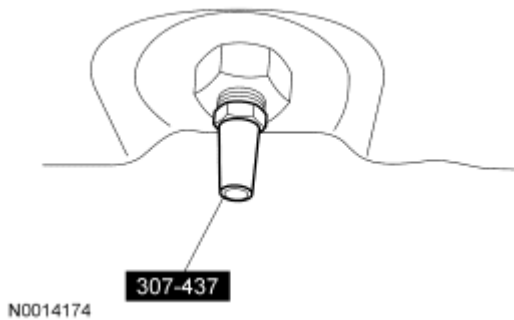


Fig. 72: Identifying Special Tool (307-437)
Courtesy of FORD MOTOR CO.

NOTE: Prior to filling the special tool with clean transmission fluid, make sure that the canister is clean.

4. Fill the special tool with clean automatic transmission fluid.

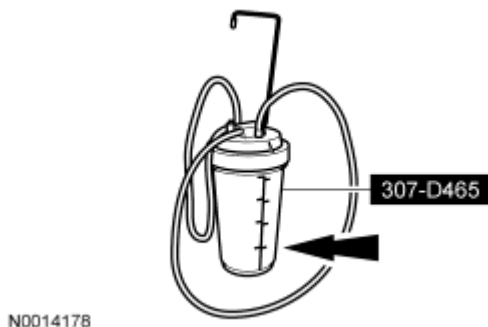
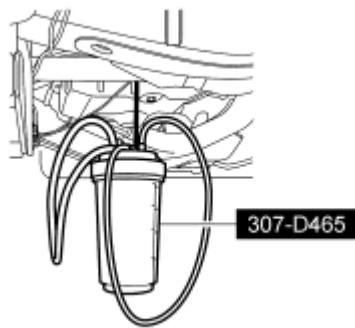


Fig. 73: Filling Special Tool 307-D465 With Clean Automatic Transmission Fluid
Courtesy of FORD MOTOR CO.

5. Hang the special tool under the vehicle, upright and close to the transmission.

2008 Ford Mustang

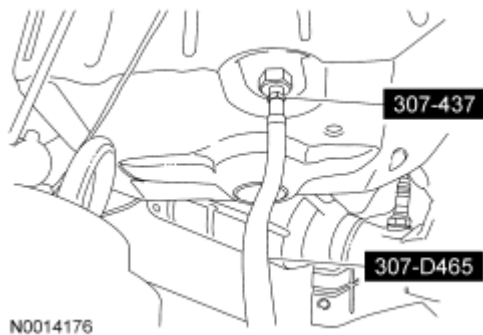
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



N0014177

Fig. 74: Hanging Special Tool 307-D465 Under Vehicle
Courtesy of FORD MOTOR CO.

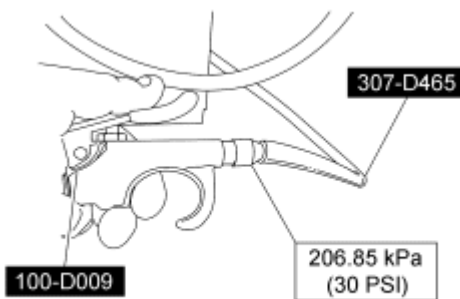
6. Connect the special tools.
 - Connect the open end of the fluid hose from the Fluid Transporter/Evacuator/Injector to the Adapter, Fluid Level and Fill Plug at the bottom of the transmission fluid pan.



N0014176

Fig. 75: Identifying Special Tools (307-437) And (307-D465)
Courtesy of FORD MOTOR CO.

7. Apply a maximum of 206.85 kPa (30 psi) to the open end of the vacuum/pressure hose from the special tool. Fluid will immediately start flowing out of the special tool into the transmission fluid pan.



N0014179

Fig. 76: Identifying Special Tools (100-D009) And (307-D465)
Courtesy of FORD MOTOR CO.

8. Add 2 or 3 quarts of transmission fluid into the fluid pan. Stop the process by releasing the air pressure

and removing the air nozzle from the end of the hose.

NOTE: Engine idle speed is approximately 650 RPM.

9. Start and run the engine until the transmission fluid temperature is between 27°-49°C (80°-120°F).
10. Inspect the fluid level in the special tool. If the fluid drains back into the canister, the transmission is full. If no fluid drains back, more fluid will need to be added. Repeat Steps 8 and 9.
11. Once the transmission is full, place a hand vacuum pump on the open end of the vacuum/pressure hose of the special tool and apply vacuum to the system. This will pull out any extra fluid trapped in the system and direct it into the container.

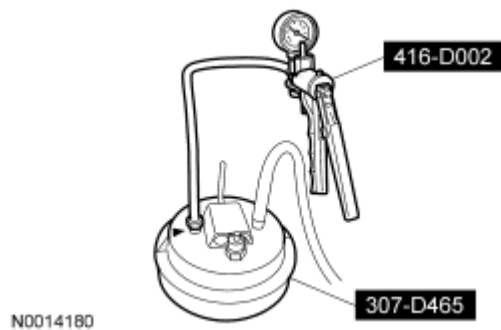


Fig. 77: Identifying Special Tools (416-D002) And (307-D465)
Courtesy of FORD MOTOR CO.

12. Allow the fluid to drain. When the fluid comes out as a thin stream or drip, the fluid is at the correct level.



Fig. 78: Allowing Fluid To Drain
Courtesy of FORD MOTOR CO.

13. Reinstall the small (center) fluid level indicating plug using a 3/16-inch Allen key.
 - Tighten to 10 Nm (89 lb-in).

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

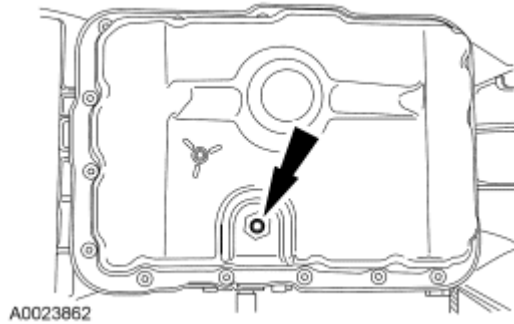


Fig. 79: Identifying Small (Center) Fluid Level Indicating Plug
Courtesy of FORD MOTOR CO.

TRANSMISSION FLUID COOLER BACKFLUSHING AND CLEANING

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

CAUTION: Whenever a transmission has been disassembled to install new parts or a new or remanufactured transmission has been installed, a new transmission fluid cooler, either in-tank, auxiliary or oil-to-air (OTA), if equipped will need to be installed, otherwise transmission damage can occur. Using a suitable torque converter/fluid cooler cleaner, clean and backflush the transmission fluid cooler tubes.

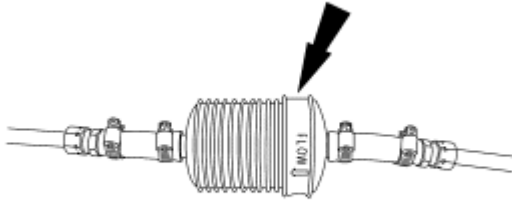
CAUTION: Use only clean automatic transmission fluid specified for this transmission. Do not use supplemental fluid additives, treatments or cleaning agent. The use of these materials may affect transmission operation and result in internal damage to the transmission.

When internal wear or damage has occurred in the transmission, metal particles, clutch plate material or band material may have been carried into the transmission fluid cooler. These contaminants are a major cause of recurring transmission concerns and must be removed from the system before the transmission is put back in use.

NOTE: Do not use any solvents while carrying out this procedure. Only use clean automatic transmission fluid.

1. Conduct backflushing with a suitable torque converter/transmission fluid cooler cleaner. Test the equipment to make sure that a vigorous fluid flow is present before proceeding. Install a new system filter if flow is weak or contaminated.

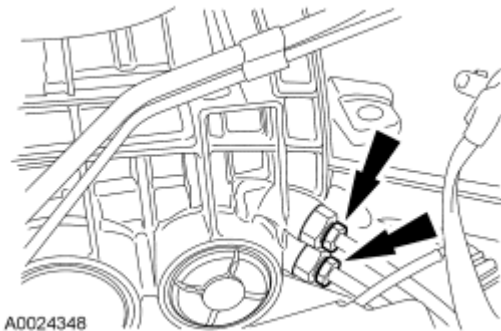
2. Remove and discard the inline transmission fluid filter, if equipped.



A0027074

Fig. 80: Identifying Transmission Fluid In-Line Filter
Courtesy of FORD MOTOR CO.

3. To aid in attaching the cleaner to the transmission steel cooler lines, connect 2 additional rubber hoses to the transmission end of the steel transmission cooler lines as described.
 - Connect the cleaner tank pressure line to the steel transmission cooler return line (transmission case upper fitting).
 - Connect a tank return hose to the steel transmission cooler pressure line (transmission case lower fitting). Place the outlet end of this hose in the solvent tank reservoir.



A0024348

Fig. 81: Locating Transmission Cooler Tubes
Courtesy of FORD MOTOR CO.

4. Turn on the pump and allow the transmission fluid to circulate a minimum of 5 minutes (cycling switch on and off will help dislodge contaminants in the cooler system).
5. Switch off the pump and disconnect the pressure hose from the transmission cooler return line.
6. Use compressed air to blow out the cooler(s) and lines (blow air into the transmission cooler return line) until all the fluid is removed.
7. Remove the rubber return hose from the remaining steel cooler line.

TRANSMISSION RANGE (TR) SENSOR ADJUSTMENT

Special Tools

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2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Illustration	Tool Name	Tool Number
 ST1633-A	Alignment Gauge, TR Sensor	307-351 (T97L-70010-A)

Adjust

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the selector lever cable from the manual control lever.

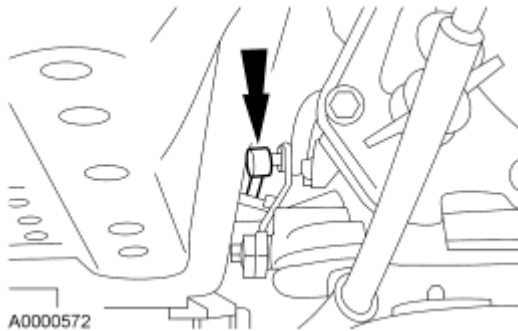


Fig. 82: Locating Shift Cable Eyelet At Manual Control Lever
Courtesy of FORD MOTOR CO.

3. Loosen the screws.

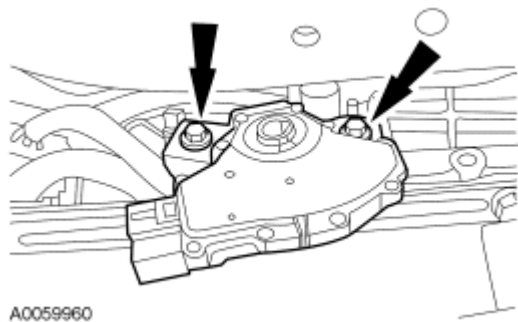


Fig. 83: Locating Digital TR Sensor Screws
Courtesy of FORD MOTOR CO.

CAUTION: Tightening one screw before tightening the other may cause the sensor to bind or become damaged.

NOTE: The manual lever must be in the NEUTRAL position.

4. Using the special tool, align the digital TR sensor and tighten the screws in an alternating sequence.
 - Tighten 8 Nm (71 lb-in).

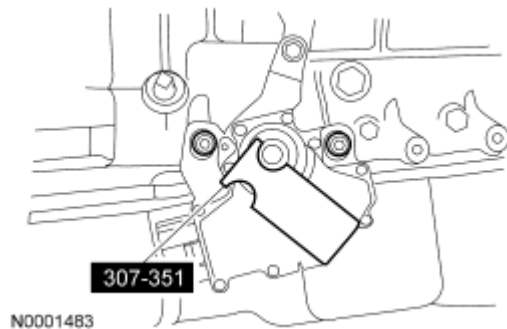


Fig. 84: Identifying Special Tool (307-351)
Courtesy of FORD MOTOR CO.

5. Install the selector lever cable to the manual control lever.

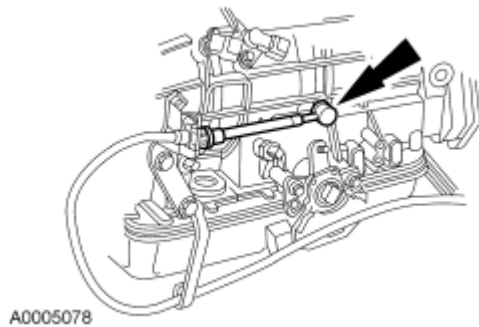


Fig. 85: Locating Transmission Shift Cable At Manual Control Lever
Courtesy of FORD MOTOR CO.

6. Verify that the selector lever cable is adjusted correctly. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

TORQUE CONVERTER

1. A new or remanufactured torque converter must be installed if one or more of the following statements is true:
 - A torque converter malfunction has been determined based on complete diagnostic procedures.
 - Converter stud or studs, impeller hub or bushing are damaged.
 - Discoloration (due to overheating).
 - Evidence of transmission assembly or transmission fluid contamination due to the following transmission or converter failure modes:
 - Major metallic failure.
 - Multiple clutches or clutch plate failures.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Sufficient component wear which results in metallic contamination.
- Internal torque converter contamination present. For additional information, refer to **Torque Converter Contamination Inspection**.

TORQUE CONVERTER CONTAMINATION INSPECTION

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

CAUTION: Do not use water-based cleaners or mineral spirits to clean or flush the torque converter or transmission damage will occur. Use only clean automatic transmission fluid designated for the transmission and converter being serviced.

NOTE: The torque converter drain plug and seal are not reusable. If equipped, discard the drain plug and seal, then install a new drain plug assembly.

1. If a new or remanufactured torque converter is not being installed, the following steps must be completed.
2. With the torque converter on a bench, pour a small amount of transmission fluid from the torque converter onto an absorbent white tissue or through a paper filter and examine the fluid.
3. Observe the color and odor of the fluid. The fluid should be red, not brown or black. Odor may indicate an overheating condition such as clutch disc or band failure.
4. Examine the stain on the tissue for evidence of particles (spec of any kind). Examine the fluid level indicator for signs of antifreeze (gum or varnish). If particles are present in the fluid or there is evidence of engine coolant or water, a new torque converter must be installed.
5. If there are no particles or contamination present, drain the remainder of the transmission fluid from the torque converter.
6. Add 1.9L (2 qt) of clean automatic transmission fluid into the converter and agitate by hand.
7. Thoroughly drain the fluid.

IN-VEHICLE SERVICING

FLUID PAN, GASKET AND FILTER

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

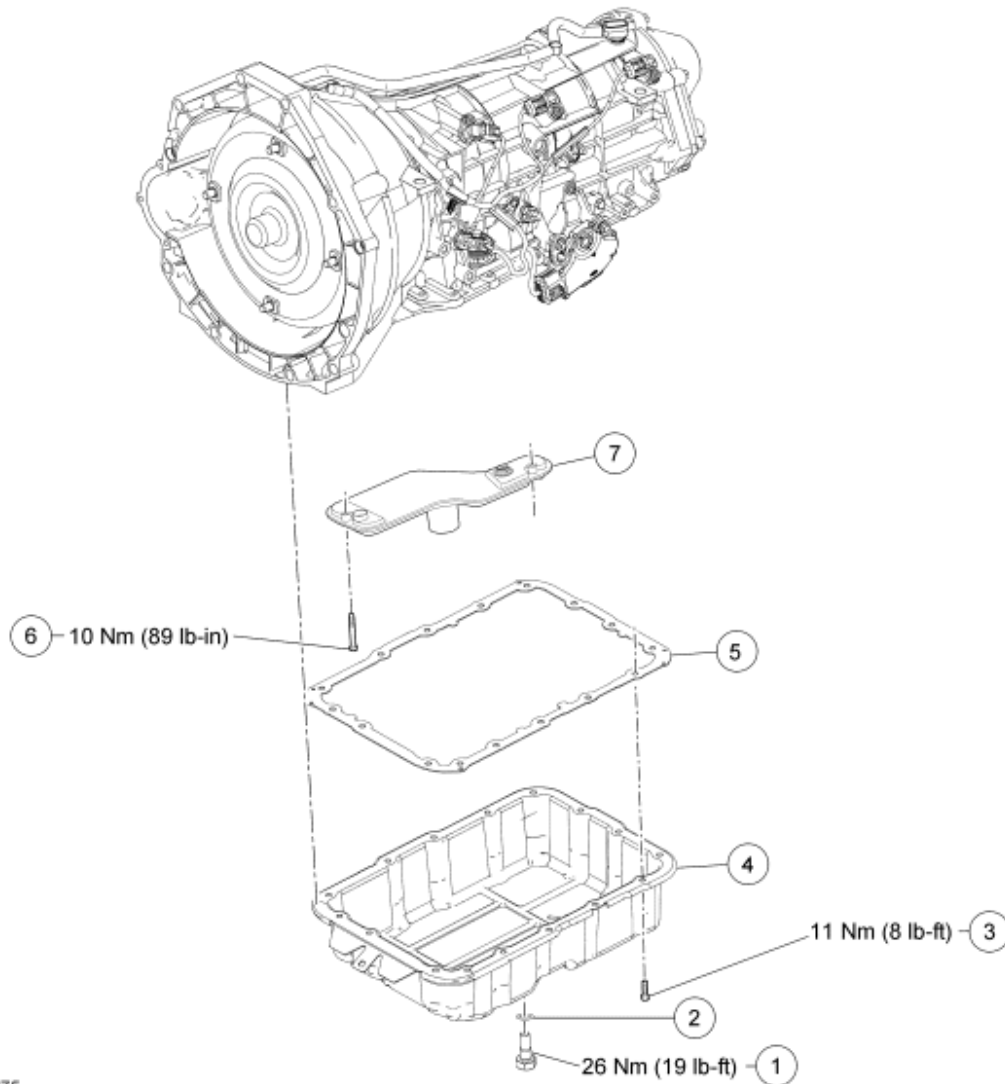


Fig. 86: Exploded View Of Fluid Pan, Gasket & Filter With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A010	Transmission fluid pan drain plug
2	6734	Transmission fluid pan drain plug gasket
3	W500213	Transmission fluid pan-to-case screw (16 required)
4	7A194	Transmission fluid pan
5	7A191	Transmission fluid pan gasket
6	W705559	Transmission fluid filter screw (2 required)
7	7A098	Transmission fluid filter

REMOVAL

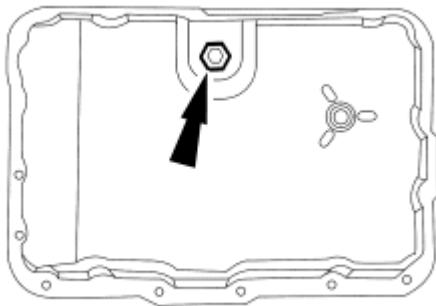
CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect for damage. If not damaged, the gasket should be reused.

NOTE: Install a new transmission fluid filter.

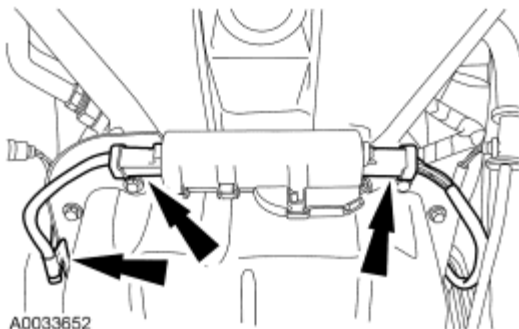
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the drain plug and drain the transmission fluid.
 - Discard the gasket.



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Fig. 87: Locating Drain Plug
Courtesy of FORD MOTOR CO.

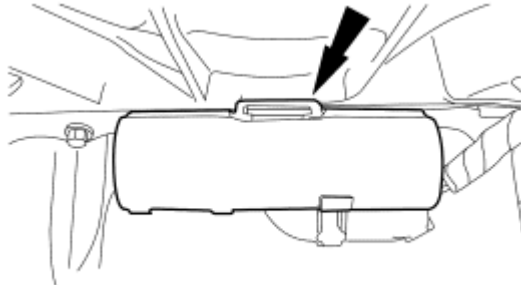
3. Disconnect the heated oxygen sensor (HO2S) connectors and retaining clip from the RH pan rail and then position the connectors aside.



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Fig. 88: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

4. Remove the HO2S connector from the front of the transmission pan rail.

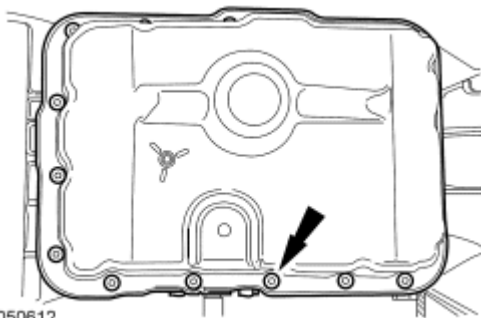


A0033653

Fig. 89: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

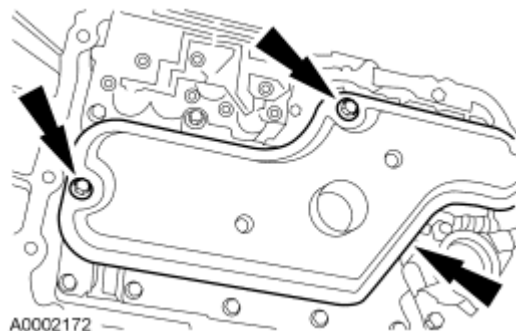
5. Remove the transmission fluid pan and gasket.



N0050612

Fig. 90: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

6. Remove and discard the transmission fluid filter.



A0002172

Fig. 91: Locating Transmission Fluid Filter And Screws
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Clean and inspect the transmission fluid pan and magnet.

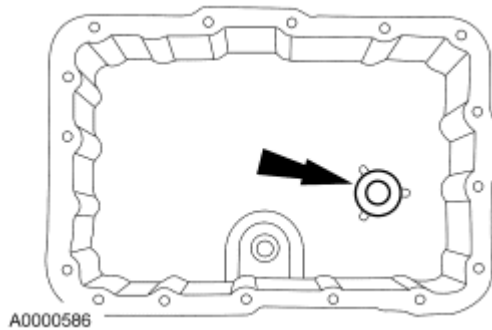


Fig. 92: Locating Transmission Fluid Pan Magnet
Courtesy of FORD MOTOR CO.

CAUTION: Lubricate the transmission fluid filter O-ring seals with clean automatic transmission fluid or the seals may be damaged.

NOTE: Make sure the transmission fluid filter seals are correctly seated on the filter.

2. Lubricate the seals and install the transmission fluid filter and screws.
 - Tighten to 10 Nm (89 lb-in).

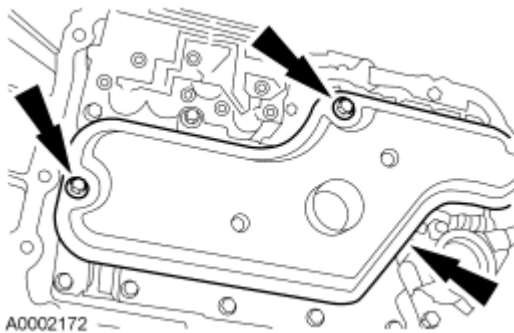


Fig. 93: Locating Transmission Fluid Filter And Screws
Courtesy of FORD MOTOR CO.

3. Install the fluid pan magnet in the transmission fluid pan.

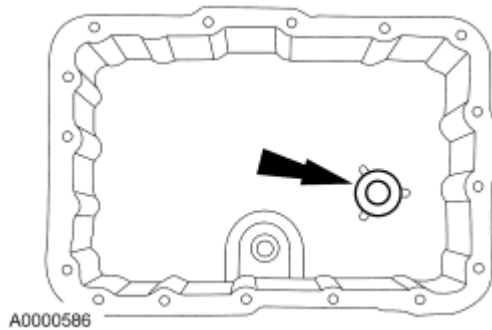


Fig. 94: Locating Transmission Fluid Pan Magnet
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

4. Install the transmission fluid pan and gasket and loosely install the screws.

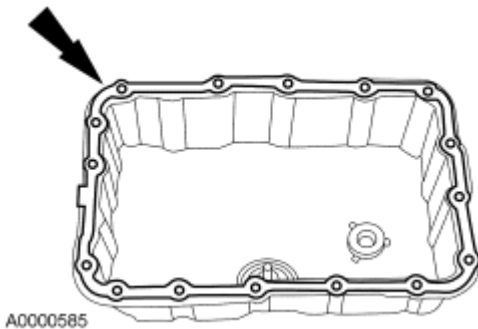


Fig. 95: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

5. Tighten the screws in a crisscross sequence.
 - Tighten to 11 Nm (8 lb-ft).

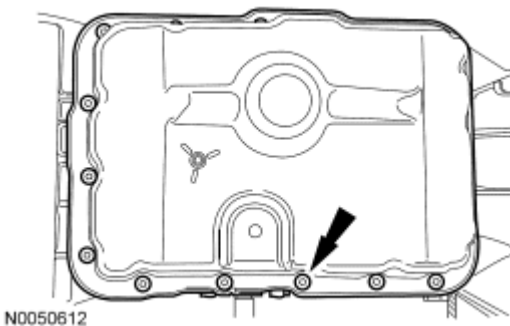


Fig. 96: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

6. Install the HO2S connector to the front of the transmission pan rail.

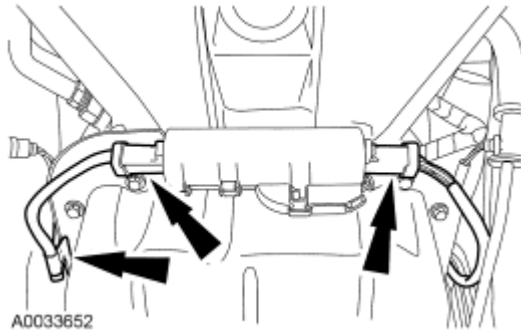


Fig. 97: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

7. Connect the HO2S connector and install the sensor wire retaining clip to the RH side of the transmission pan rail.

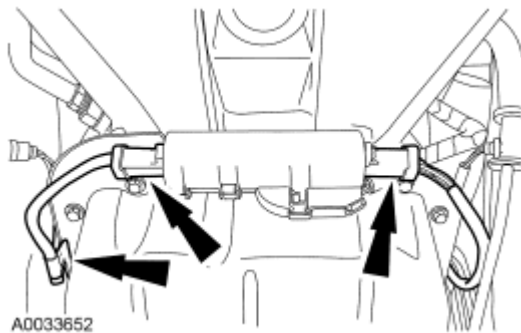


Fig. 98: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

8. Install the drain plug.
- Install a new gasket onto the drain plug assembly.
 - Tighten to 26 Nm (19 lb-ft).

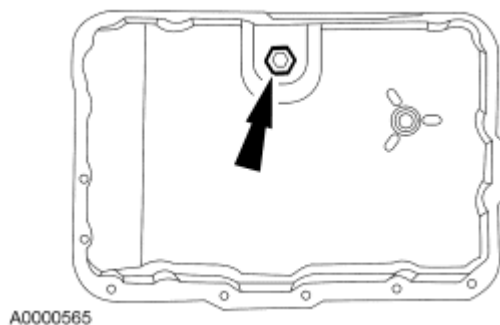


Fig. 99: Locating Drain Plug

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Courtesy of FORD MOTOR CO.

NOTE: It will be necessary to hold the drain plug with a wrench when removing the fluid level indicator plug.

NOTE: Use a 3/16-inch Allen key to remove the fluid level indicator plug.

9. Remove the fluid level indicator plug.

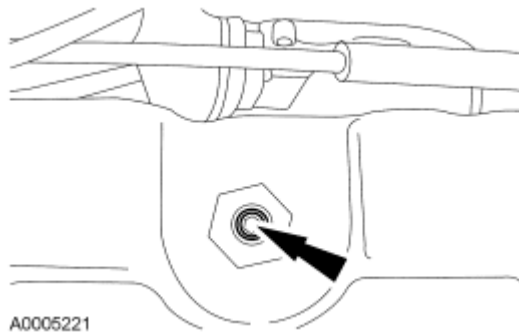


Fig. 100: Locating Fluid Level Indicator Plug
Courtesy of FORD MOTOR CO.

10. Carry out the fluid level check. Refer to **Transmission Fluid Level Check**.

TRANSMISSION FILTER - IN LINE

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

NOTE: Use the following guidelines for installing the transmission fluid inline filter:

- If the transmission was overhauled and the vehicle was equipped with an inline fluid filter, install a new inline fluid filter.
- If the transmission was overhauled and the vehicle was not equipped with an inline fluid filter, install a new inline fluid filter kit.
- If the transmission is being installed for a non-internal repair, do not install an inline filter or filter kit.
- If installing a new or a Ford-authorized remanufactured transmission, install the inline transmission fluid filter that is supplied.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.

2. Cut a section of the upper transmission fluid cooler hose to allow installation of the transmission fluid inline filter.

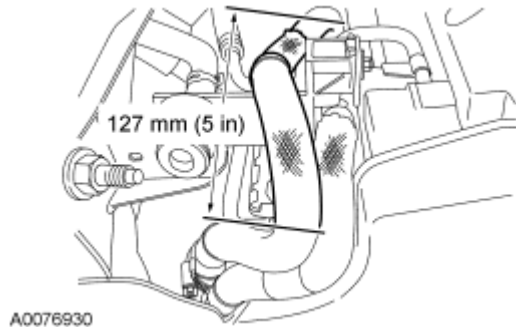


Fig. 101: Identifying Cut Section Of Rubber Hose (With Torque Specifications)

Courtesy of FORD MOTOR CO.

CAUTION: The filter has a bypass valve in it. The red arrow on the filter indicates the direction of the fluid flow through the filter. The filter must be installed in the fluid cooler return line with the red arrow on the filter pointing away from the transmission fluid cooler and toward the transmission (the return line has fluid coming out of the cooler going to the transmission). If the fluid filter is not installed correctly, it will cause internal transmission damage.

CAUTION: Do not install any rubber hoses or steel tubing with a bend entering the filter greater than 60 degrees.

3. Install the one end of the filter into the rubber hose with a clamp, then install the other end of the filter into the rubber hose.
 - Install and tighten the 2 hose clamps.

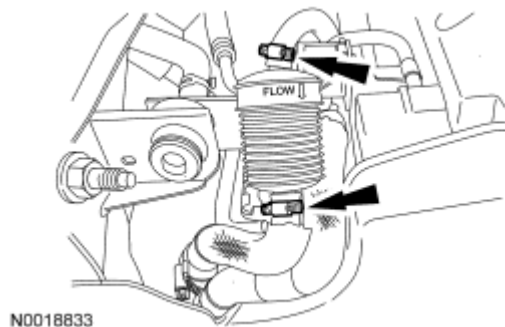


Fig. 102: Locating Hose Clamps

Courtesy of FORD MOTOR CO.

4. Clean a visible section of the transmission fluid pan and install the sticker indicating that the vehicle is equipped with an inline filter.

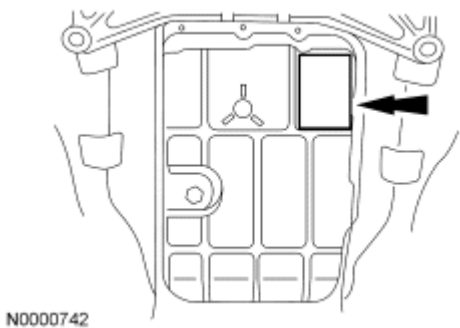


Fig. 103: Locating Transmission Fluid Pan Sticker
 Courtesy of FORD MOTOR CO.

5. Fill the transmission with clean automatic transmission fluid.
 - Verify for correct operation.
 - Check the filter for leaks.

MAIN CONTROL VALVE BODY

Special Tools

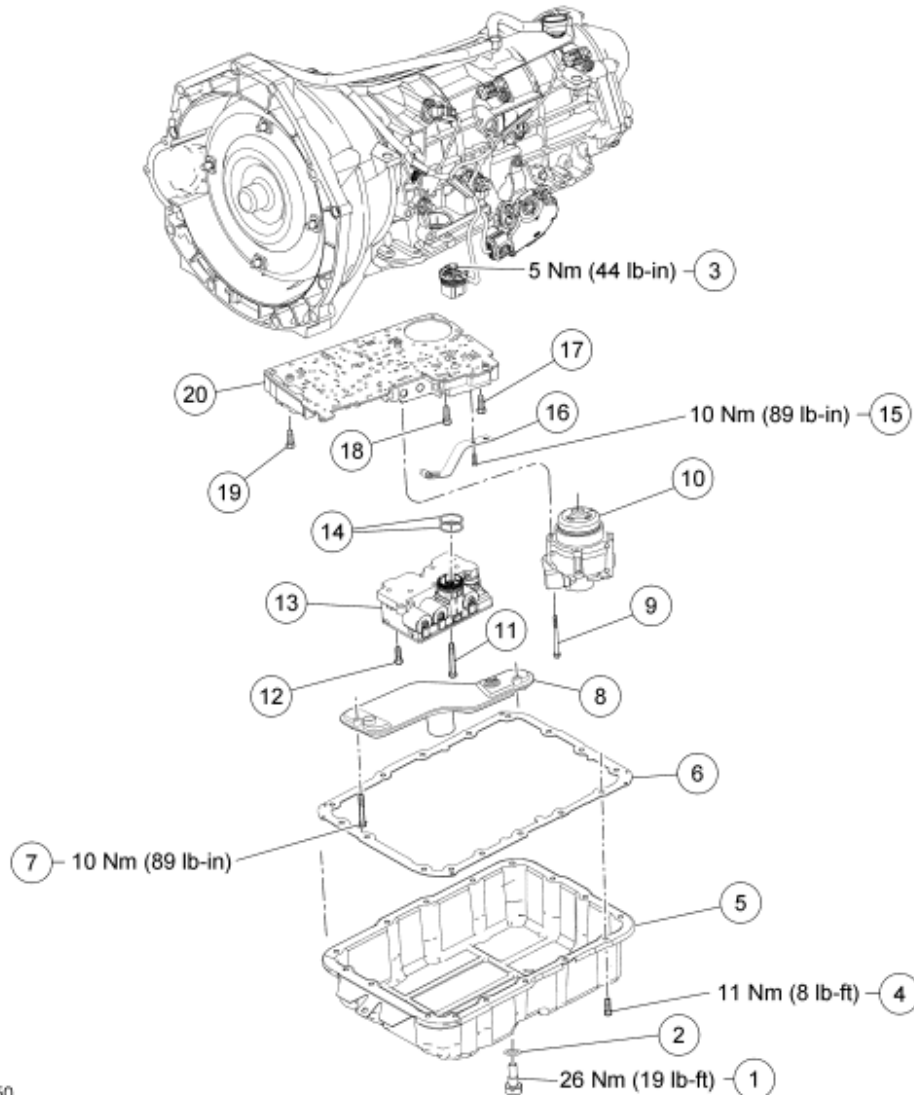
Illustration	Tool Name	Tool Number
 ST1639-A	Aligner, Valve Body (2 required)	307-334 (T95L-70010-C)

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



N0076350

Fig. 104: Exploded View Of Main Control Valve Body With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A010	Transmission fluid pan drain plug assembly
2	6734	Transmission fluid pan drain plug gasket
3	-	Solenoid body electrical connector screw
4	W500213	Transmission fluid pan-to-case screw (16 required)
5	7A194	Transmission fluid pan
6	7A191	Transmission fluid pan gasket
7	W705559	Transmission fluid filter screw (2 required)

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

8	7A098	Transmission fluid filter
9	W702359	Reverse servo screw (4 required)
10	7B193	Reverse servo assembly
11	W703189	Solenoid body screw (7 required)
12	W702921	Solenoid body screw
13	7G391	Solenoid body
14	W705928	Solenoid body O-rings
15	W500100	Manual valve detent spring screw
16	7E332	Manual valve detent spring
17	W500102	Main control valve body screw (18 required)
18	W702791	Main control valve body screw
19	W706672	Main control valve body screw
20	7A100	Main control valve body assembly

REMOVAL

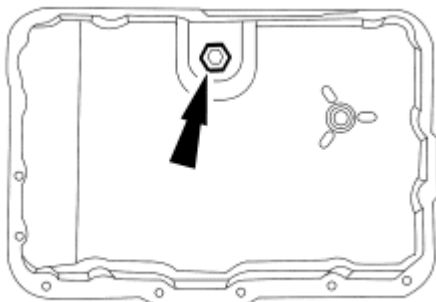
CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

NOTE: Clean the area around the solenoid body connector to prevent contamination.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect for damage. If not damaged, the gasket should be reused.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the drain plug and drain the transmission fluid.
 - Discard the drain plug gasket.



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Fig. 105: Locating Drain Plug

Courtesy of FORD MOTOR CO.

NOTE: Clean the area around the solenoid body connector to prevent contamination.

3. Disconnect the solenoid body harness electrical connector.

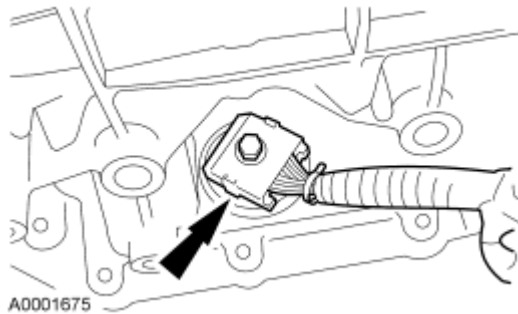


Fig. 106: Locating Transmission Solenoid Electrical Connector
Courtesy of FORD MOTOR CO.

4. Disconnect the heated oxygen sensor (HO2S) connectors and retaining clip from the RH pan rail and then position the connectors aside.

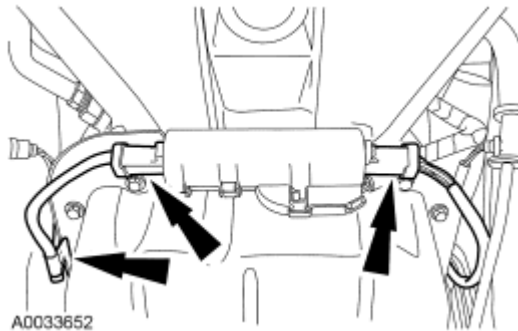
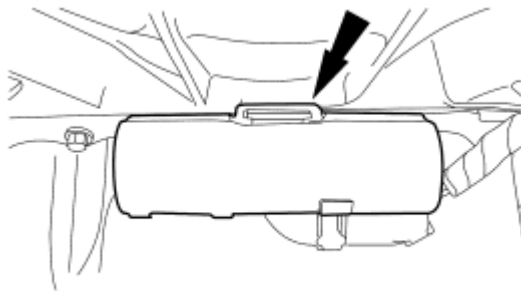


Fig. 107: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

5. Remove the HO2S connector from the front of the transmission pan rail.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

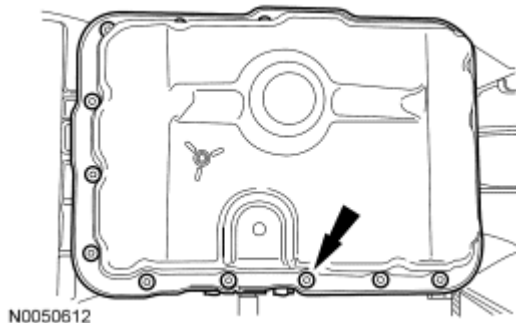


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Fig. 108: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect the gasket for damage. If not damaged, the gasket should be reused.

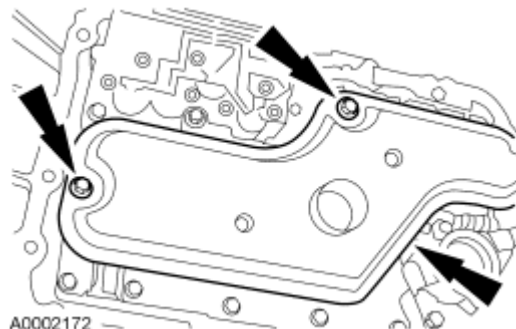
6. Remove the transmission fluid pan and gasket.



N0050612

Fig. 109: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

7. Remove the transmission fluid filter.



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Fig. 110: Locating Transmission Fluid Filter And Screws
Courtesy of FORD MOTOR CO.

8. Remove the 4 screws attaching the reverse servo to the transmission case and remove the servo.

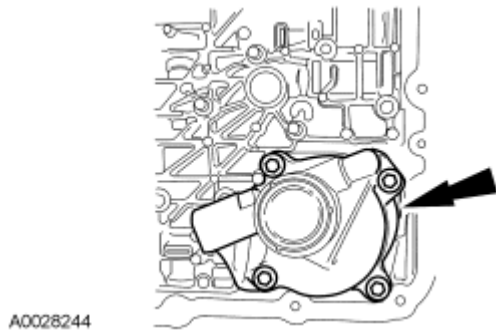


Fig. 111: Locating Reverse Servo Assembly
Courtesy of FORD MOTOR CO.

9. Remove the screws and the solenoid body.

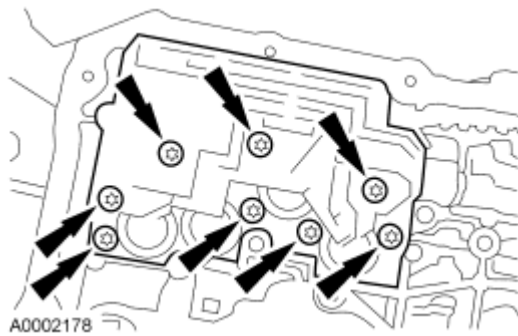


Fig. 112: Locating Solenoid Body Mounting Screws
Courtesy of FORD MOTOR CO.

10. Remove the manual control valve detent spring.

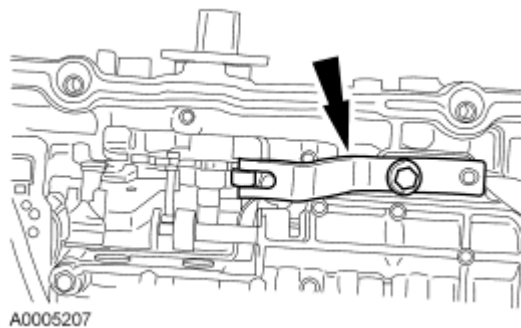


Fig. 113: Locating Manual Control Valve Detent Spring
Courtesy of FORD MOTOR CO.

11. Remove the main control valve body screws and the main control valve body assembly.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

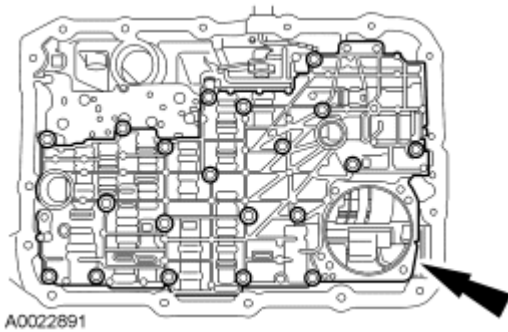


Fig. 114: Locating Main Control Valve Body Bolts & Main Control Valve Body
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Install the special tools into the transmission case.

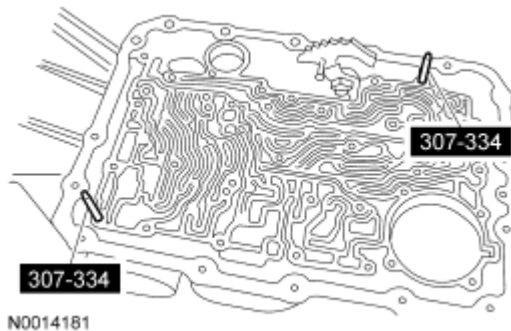


Fig. 115: Installing Special Tool (307-334) Into Transmission Case
Courtesy of FORD MOTOR CO.

2. Using the special tools, install the main control valve body and loosely install the screws.
 1. Install the short screw.
 2. Install the screw with the larger head.
 3. Install the remaining screws.

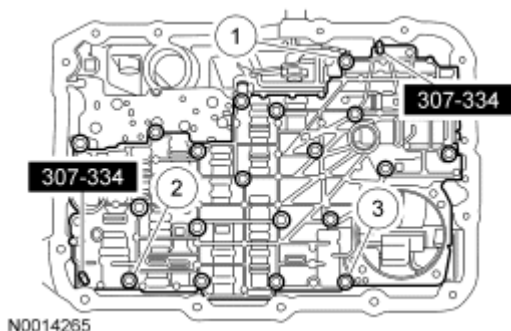


Fig. 116: Locating Main Control Valve Body & Special Tool (307-334)
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

3. Remove the special tool and loosely install the screw.

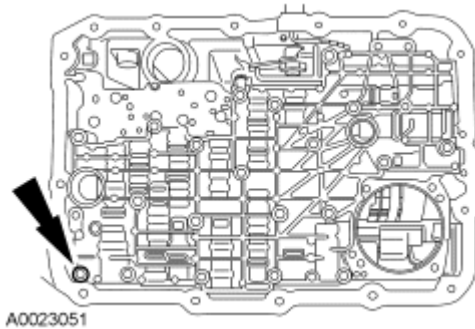


Fig. 117: Locating Screw
Courtesy of FORD MOTOR CO.

4. Tighten the screws in the sequence shown.
 - Tighten to 10 Nm (89 lb-in).

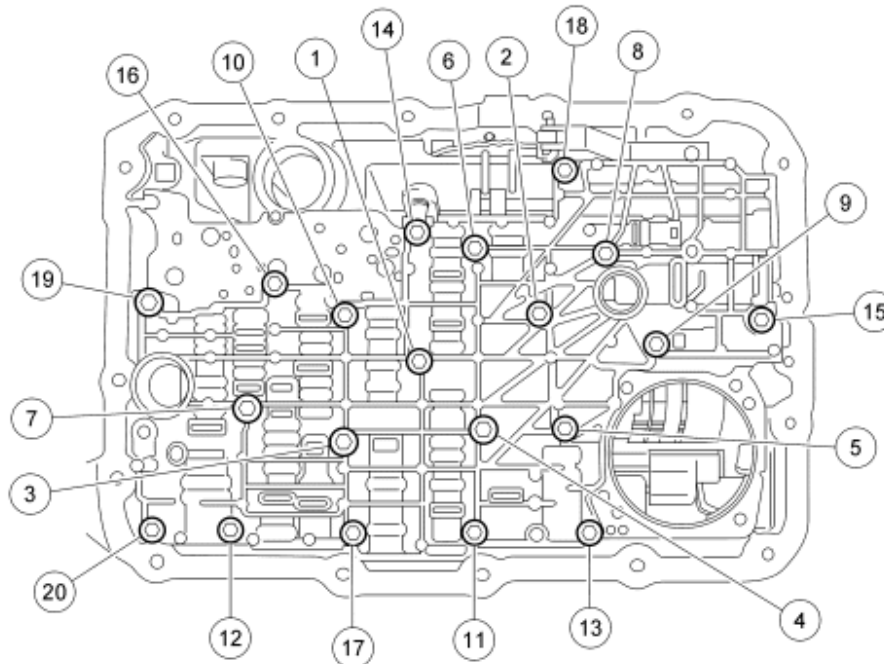


Fig. 118: Identifying Tightening Sequence Of Main Control Valve Body Screws
Courtesy of FORD MOTOR CO.

5. Install the manual control valve detent spring.
 - Tighten to 10 Nm (89 lb-in).

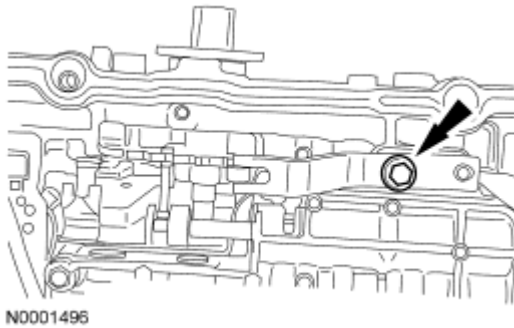


Fig. 119: Locating Manual Control Valve Detent Spring
Courtesy of FORD MOTOR CO.

6. Install the reverse servo and the 4 screws. Tighten the screws in sequence in 2 stages.
 - Stage 1: Tighten to 5 Nm (44 lb-in).
 - Stage 2: Tighten to 11 Nm (8 lb-ft).

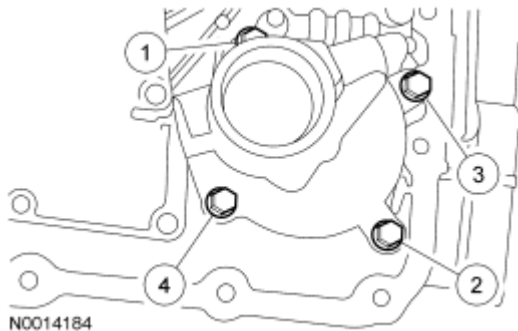


Fig. 120: Installing Reverse Servo And Screws In Sequence
Courtesy of FORD MOTOR CO.

7. Install new O-ring seals on the solenoid body connector. Lubricate the O-ring seals with clean automatic transmission fluid.

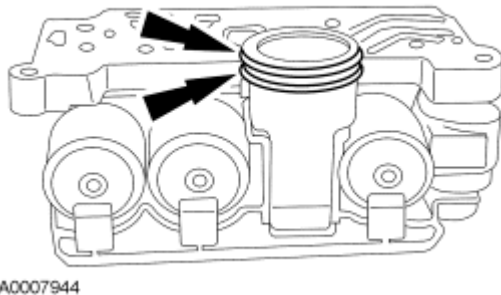


Fig. 121: Locating O-Ring Seals On Solenoid Body Connector
Courtesy of FORD MOTOR CO.

CAUTION: Inspect the transmission case bore to make sure it is free of foreign material and not damaged. If it is damaged, transmission leak may occur.

8. Install the solenoid body. Tighten the screws in the sequence shown.
 - Tighten to 8 Nm (71 lb-in).

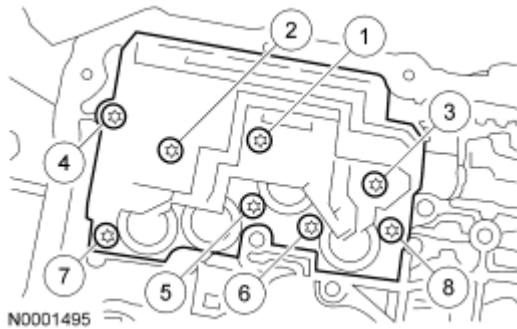


Fig. 122: Identifying Solenoid Body Screw Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

9. Lubricate the seals and install the transmission fluid filter.
 - Tighten to 10 Nm (89 lb-in).

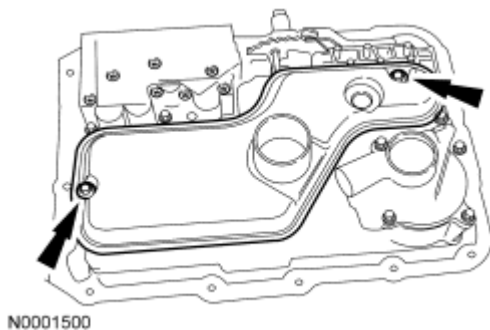


Fig. 123: Locating Transmission Fluid Filter Bolts
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

10. Install the transmission fluid pan and gasket and loosely install the screws.

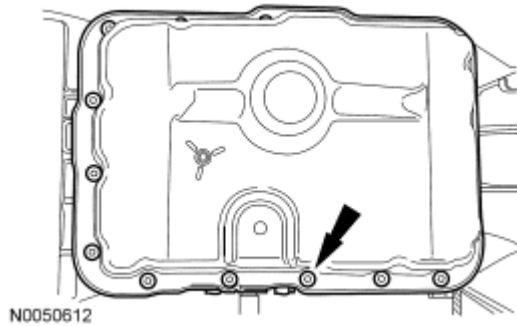


Fig. 124: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

11. Tighten the screws in a crisscross sequence.
 - Tighten to 11 Nm (8 lb-ft).

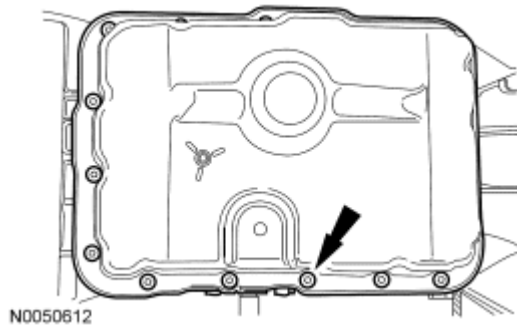


Fig. 125: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

12. Install the drain plug.
 - Install a new gasket onto the drain plug assembly.
 - Tighten to 26 Nm (19 lb-ft).

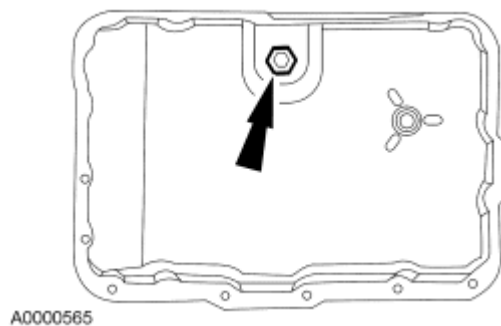
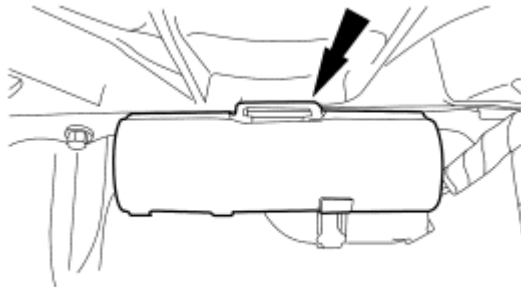


Fig. 126: Locating Drain Plug
Courtesy of FORD MOTOR CO.

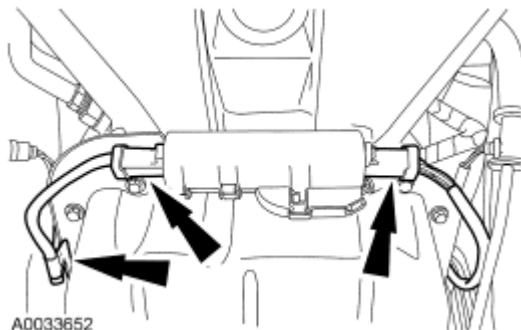
13. Install the HO2S connector to the front of the transmission pan rail.



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Fig. 127: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

14. Connect the HO2S connector and install the sensor wire retaining clip to the RH side of the transmission pan rail.



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Fig. 128: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

CAUTION: Damage will occur to the solenoid body assembly if the screw is tightened above specification.

NOTE: Always install new O-ring seals on the vehicle harness connector.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

NOTE: Use petroleum jelly to lubricate the O-ring seals to aid in the installation process.

15. Install and lubricate new O-ring seals on the transmission connector and connect the connector.
- Tighten to 5 Nm (44 lb-in).

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

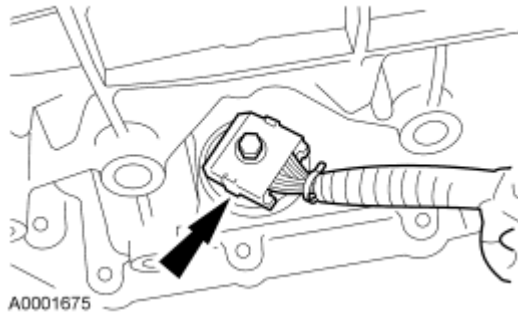
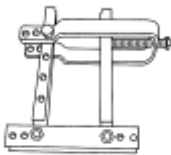
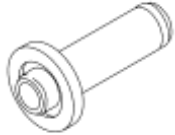


Fig. 129: Locating Transmission Solenoid Electrical Connector
Courtesy of FORD MOTOR CO.

16. Fill the transmission to the correct level. For additional information, refer to **Transmission Fluid Drain and Refill - Without Torque Converter Drain Plug**.

EXTENSION HOUSING SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST1185-A	Slide Hammer	100-001 (T50T-100-A)
 ST1758-A	Remover, Torque Converter Fluid Seal	307-309 (T94P-77001-BH)
 ST2498-A	Installer, Drive Pinion Oil Seal	205-115
 ST2440-A	Installer, Drive Pinion Flange	205-479
	Installer, Output Shaft Flange	307-404

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

 ST2416-A		
 ST2937A	Remover, Output Shaft Flange	307-523

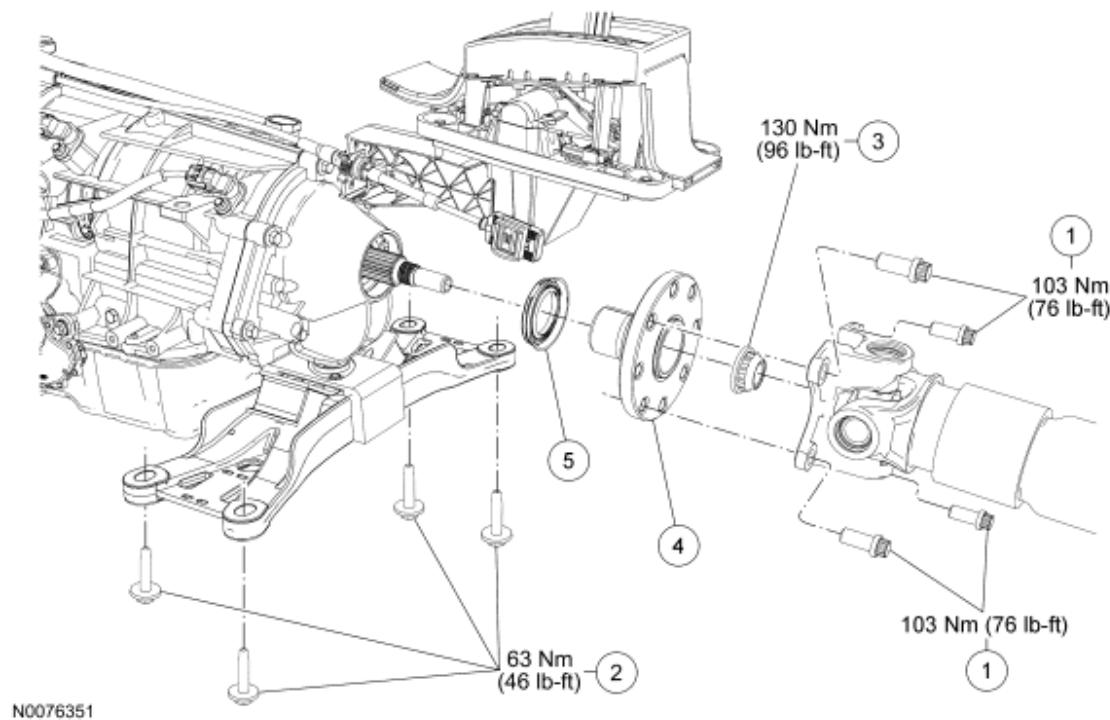


Fig. 130: Exploded View Of Extension Housing Seal With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701357	Transmission output shaft flange coupler bolts (4 required)
2	W704971	Transmission crossmember-to-floor pan screws
3	W701357	Transmission output shaft flange nut
4	7089	Transmission output shaft flange
5	7052	Extension housing seal

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** article.
3. Using a suitable transmission jack, support the transmission.
4. Remove the 4 transmission crossmember-to-floor pan screws only and lower the transmission enough to gain access to the extension housing seal.

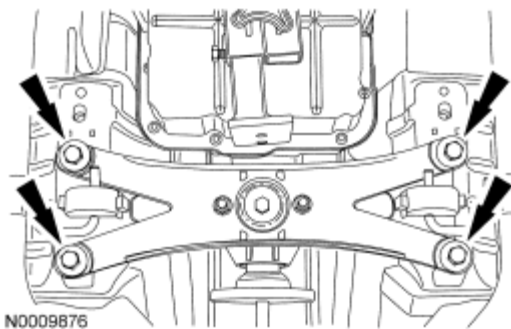


Fig. 131: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

5. Remove and discard the nut.

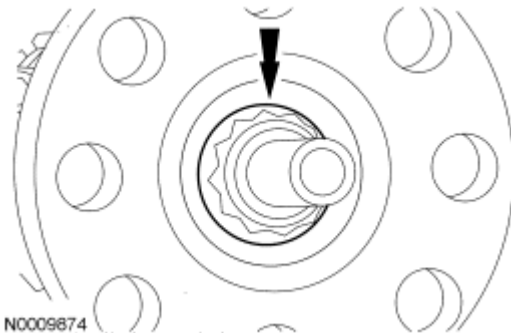


Fig. 132: Removing Driveshaft Nut
Courtesy of FORD MOTOR CO.

6. Using the special tool, remove the output shaft flange.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

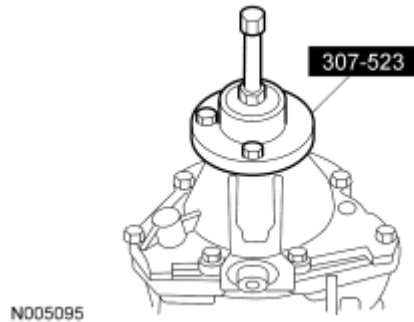


Fig. 133: Removing Output Shaft Flange Using Special Tool (307-523)
Courtesy of FORD MOTOR CO.

7. Using the special tools, remove and discard the extension housing seal.

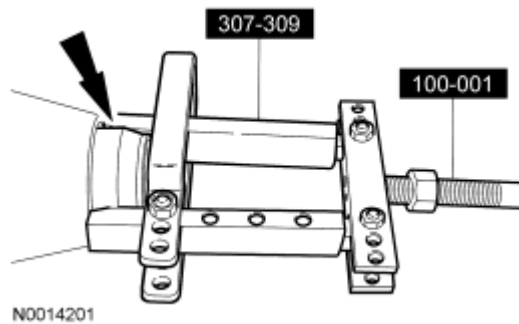


Fig. 134: Identifying Special Tool (307-309), (100-001) And Extension Housing Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Make sure the extension housing seal is correctly installed onto the special tool and the garter spring is in the correct position.

1. Using the special tool, install the new extension housing seal.

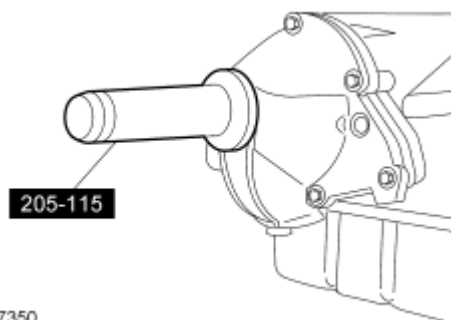


Fig. 135: Identifying Special Tool (205-115)
Courtesy of FORD MOTOR CO.

2. Using the special tools, install the output flange.

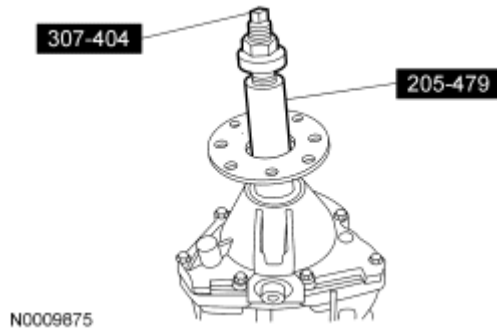


Fig. 136: Installing Output Shaft Flange Using Special Tools (307-404) & (205-479)
Courtesy of FORD MOTOR CO.

3. Install a new nut.
 - Tighten to 130 Nm (96 lb-ft).

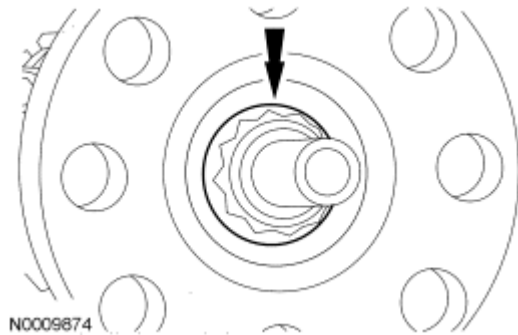


Fig. 137: Removing Driveshaft Nut
Courtesy of FORD MOTOR CO.

4. Install the 4 transmission crossmember-to-floor pan screws only.
 - Tighten to 63 Nm (46 lb-ft).

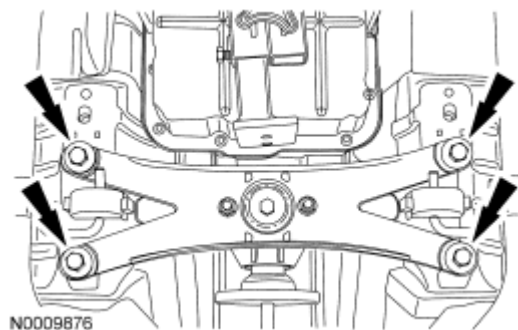


Fig. 138: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

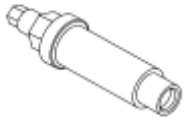
2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

5. Install the driveshaft. For additional information, refer to **DRIVESHAFT** article.
6. Check the transmission fluid level. For additional information, refer to **Transmission Fluid Level Check**.

EXTENSION HOUSING GASKET

Special Tools

Illustration	Tool Name	Tool Number
 ST2440-A	Installer, Drive Pinion Flange	205-479
 ST2416-A	Installer, Output Shaft Flange	307-404
 ST2937A	Remover, Output Shaft Flange	307-523

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

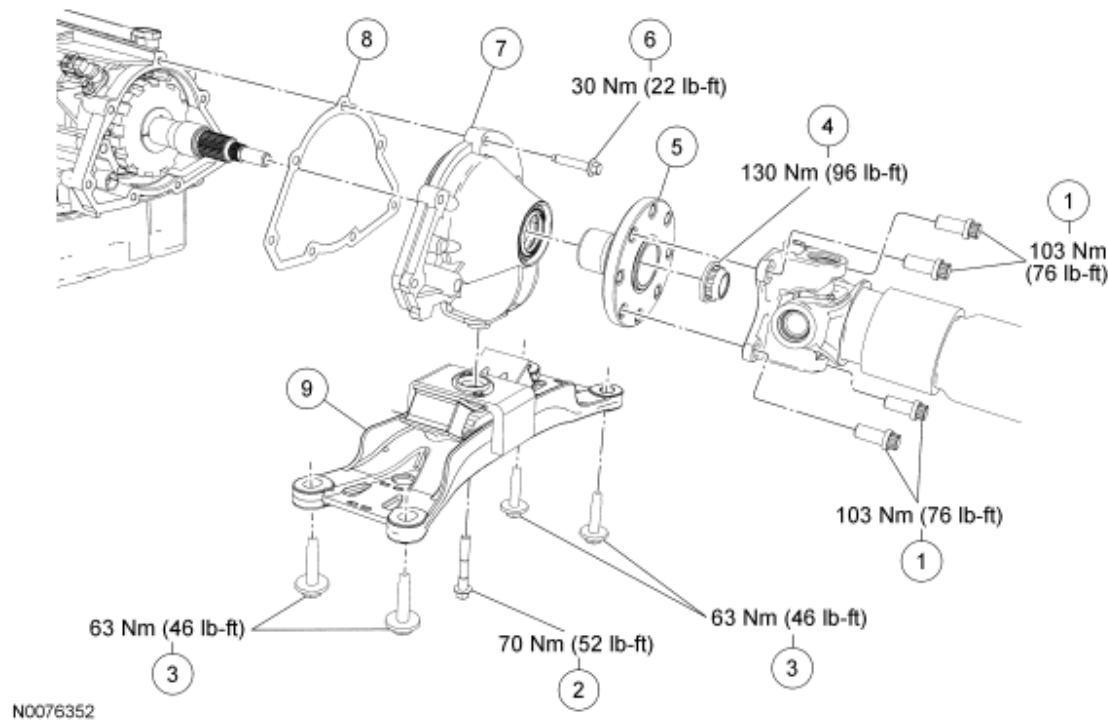


Fig. 139: Exploded View Of Extension Housing Gasket With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701357	Transmission output shaft flange coupler bolt (4 required)
2	W705966	Transmission insulator-to-extension housing center screw
3	W704971	Transmission crossmember-to-floor pan screws
4	W701357	Transmission output shaft flange nut
5	7089	Transmission output shaft flange
6	W500311	Extension housing-to-case screw (7 required)
7	7A039	Extension housing
8	7086	Extension housing gasket
9	-	Crossmember

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** article.
3. Remove the catalytic converter assembly. For additional information, refer to **EXHAUST SYSTEM** article.

NOTE: Use a suitable transmission jack to support the transmission.

4. Remove the 4 transmission crossmember-to-floor pan screws.

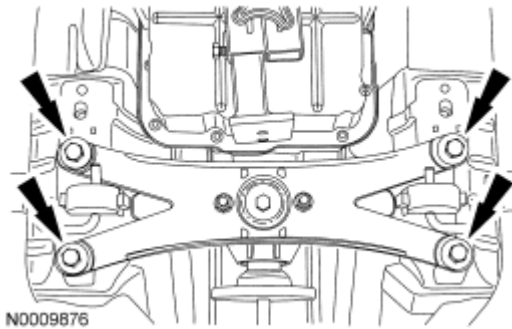


Fig. 140: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

5. Remove the transmission insulator-to-extension housing center screw and remove the transmission crossmember.

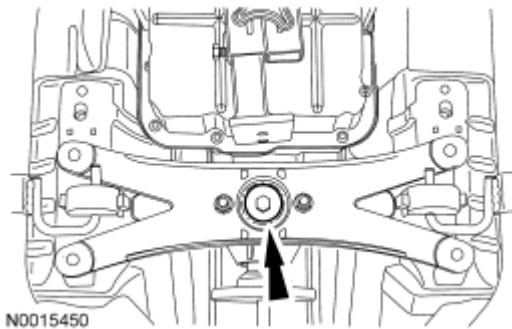


Fig. 141: Locating Transmission Mount Center Screw
Courtesy of FORD MOTOR CO.

6. Remove and discard the nut.

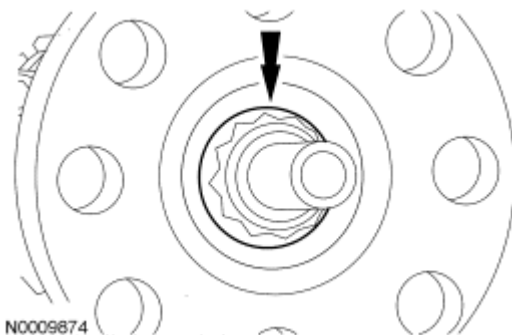


Fig. 142: Removing Driveshaft Nut
Courtesy of FORD MOTOR CO.

7. Using the special tool, remove the output shaft flange.

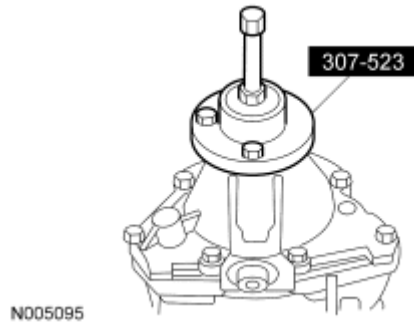


Fig. 143: Removing Output Shaft Flange Using Special Tool (307-523)
Courtesy of FORD MOTOR CO.

CAUTION: The parking pawl, parking pawl return and parking pawl shaft may fall out during removal of the extension housing.

8. Remove the 7 extension housing screws and the extension housing.

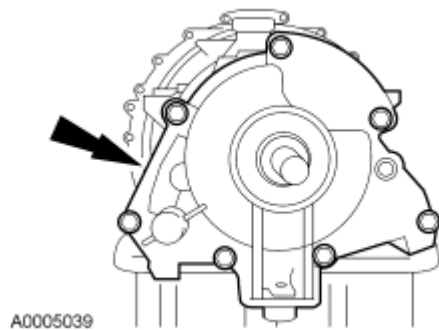


Fig. 144: Locating Extension Housing And Mounting Screws
Courtesy of FORD MOTOR CO.

9. Remove and discard the extension housing gasket.

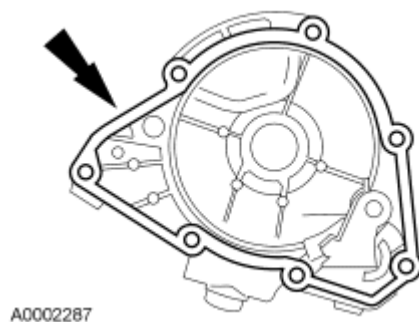
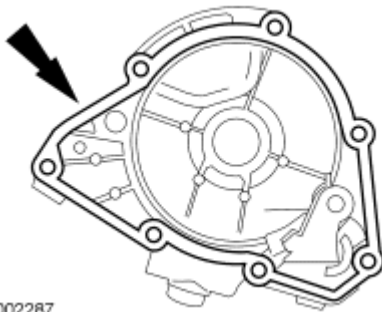


Fig. 145: Locating Extension Housing Gasket
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

1. Clean the extension housing and install a new extension housing gasket. Make sure the park pawl is installed correctly.



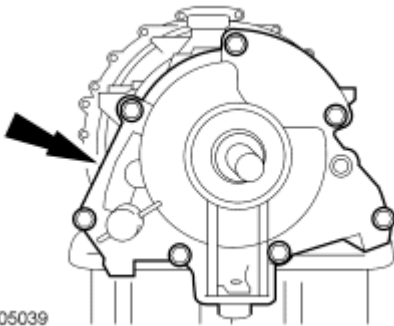
A0002287

Fig. 146: Locating Extension Housing Gasket

Courtesy of FORD MOTOR CO.

NOTE: Make sure the parking lever actuating rod is correctly seated into the case parking rod guide cup.

2. Install the extension housing and screws.
 - Tighten to 30 Nm (22 lb-ft).

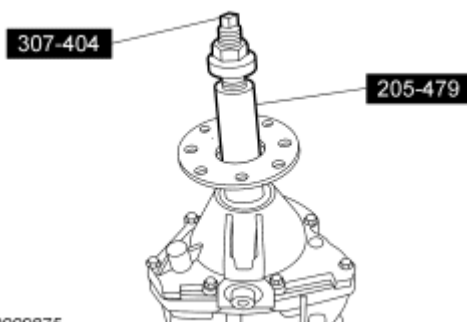


A0005039

Fig. 147: Locating Extension Housing And Mounting Screws

Courtesy of FORD MOTOR CO.

3. Using the special tools, install the output flange.



N0009875

Fig. 148: Installing Output Shaft Flange Using Special Tools (307-404) & (205-479)
Courtesy of FORD MOTOR CO.

4. Install a new nut.
 - Tighten to 130 Nm (96 lb-ft).

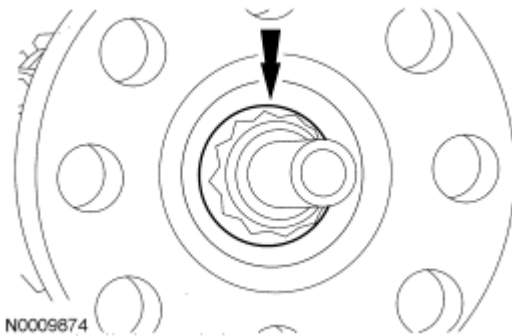


Fig. 149: Removing Driveshaft Nut
Courtesy of FORD MOTOR CO.

5. Loosely install the transmission insulator-to-extension housing center screw.

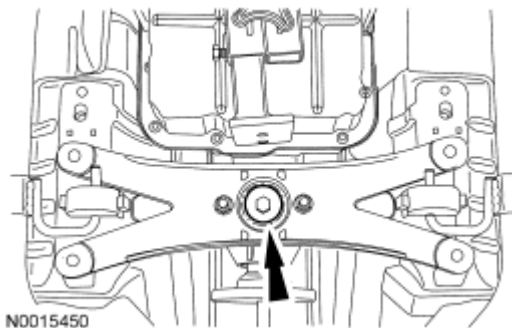


Fig. 150: Locating Transmission Mount Center Screw
Courtesy of FORD MOTOR CO.

6. Position the transmission crossmember in the vehicle and loosely install the transmission crossmember-to-floor pan screws.

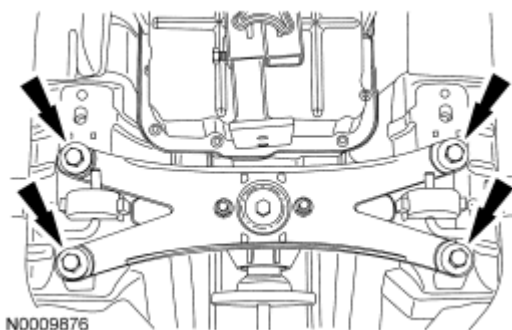


Fig. 151: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

NOTE: The transmission support insulator must be neutralized.

7. Slide the transmission support insulator forward, rearward and side-to-side until the gaps between the transmission support insulator snubber and crossmember are equal.
8. With the transmission support insulator neutralized, tighten the transmission crossmember-to-floor pan screws.
 - Tighten to 63 Nm (46 lb-ft).

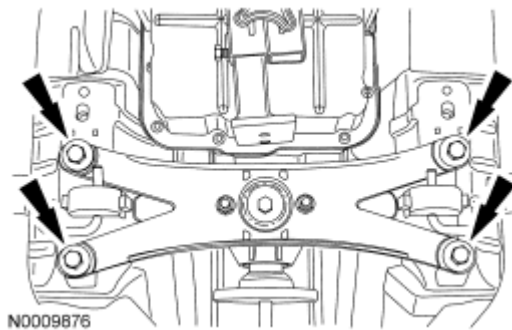


Fig. 152: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

9. With the transmission support insulator neutralized, tighten the transmission insulator-to-extension housing center screw.
 - Tighten to 70 Nm (52 lb-ft).

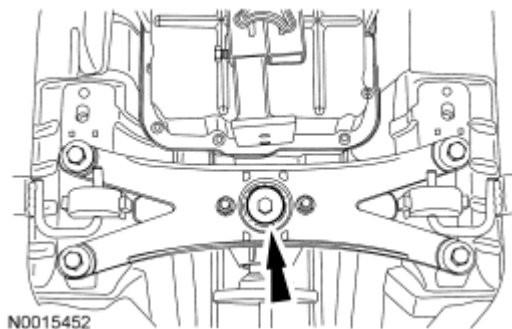


Fig. 153: Locating Transmission Mount Center Bolt
Courtesy of FORD MOTOR CO.

10. Install the catalytic converter assembly. For additional information, refer to **EXHAUST SYSTEM** article.
11. Install the driveshaft. For additional information, refer to **DRIVESHAFT** article.
12. Check the transmission fluid level. For additional information, refer to **Transmission Fluid Level Check**.

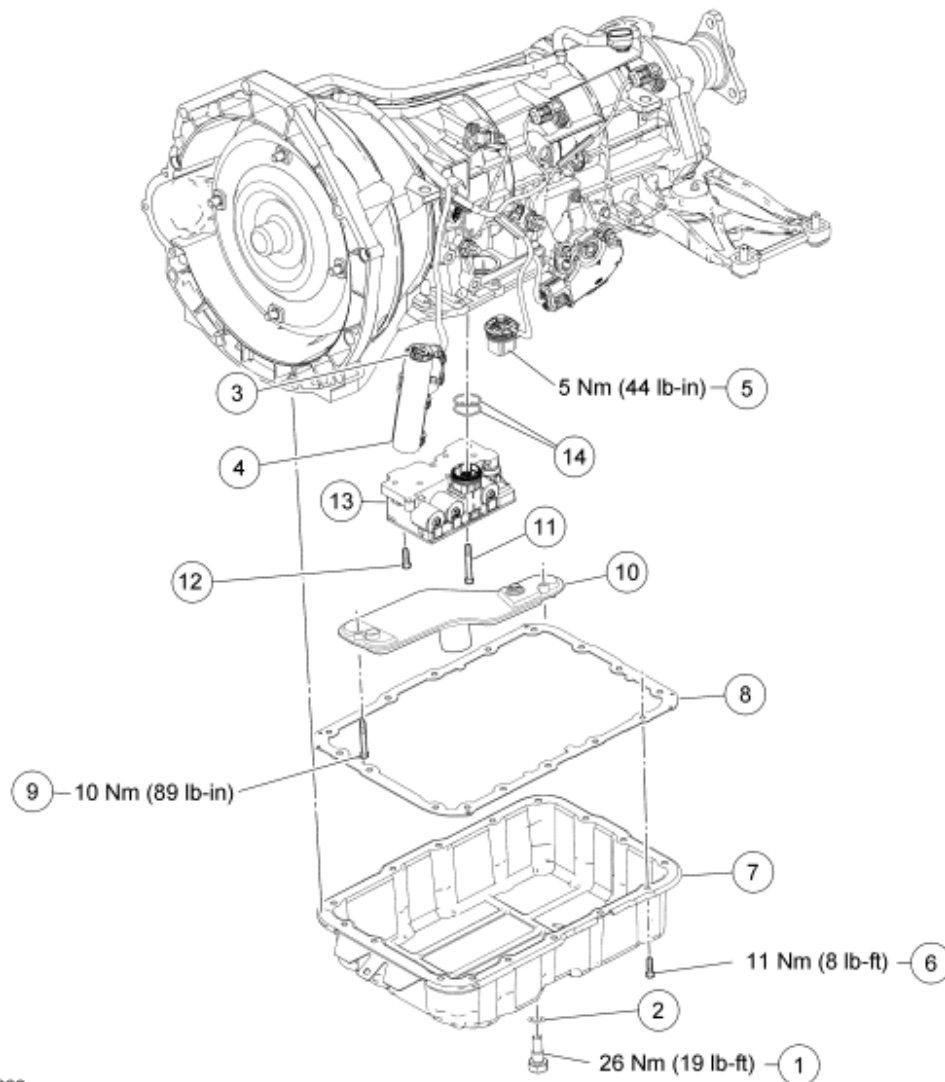
2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

SOLENOID BODY ASSEMBLY

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V



N0076366

Fig. 154: Exploded View Of Solenoid Body Assembly With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A010	Transmission fluid pan drain plug assembly
2	6734	Transmission fluid pan drain plug gasket

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

3	-	Heated oxygen sensor (HO2S) electrical connector (part of 9F472)
4	-	HO2S electrical connector retainer
5	7E395	Solenoid body harness electrical connector
6	W500213	Transmission fluid pan screw
7	7A194	Transmission fluid pan
8	7A191	Transmission fluid pan gasket
9	W70559	Transmission fluid pan filter screw
10	7A098	Transmission fluid pan filter
11	W703189	Solenoid body screw
12	W702921	Solenoid body screw
13	7G391	Solenoid body
14	W705928	Solenoid body O-ring seals

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the drain plug and drain the transmission fluid.
 - Discard the drain plug gasket.

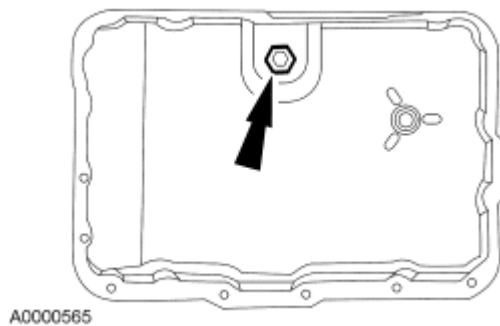


Fig. 155: Locating Drain Plug
Courtesy of FORD MOTOR CO.

3. Disconnect the heated oxygen sensor (HO2S) connectors and retaining clip from the RH pan rail and then position the connectors aside.

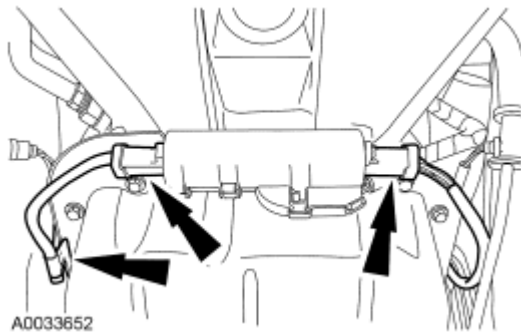


Fig. 156: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

4. Remove the HO2S connector from the front of the transmission pan rail.

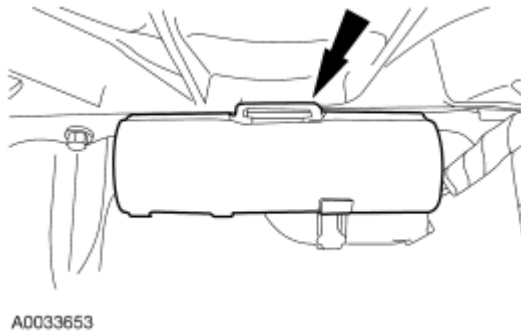


Fig. 157: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

5. Remove the transmission fluid pan screws, gasket and fluid pan.

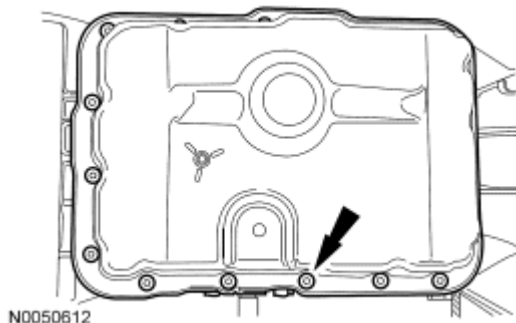


Fig. 158: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

NOTE: Clean the area around the solenoid body connector to prevent

contamination.

6. Disconnect the solenoid body harness electrical connector.

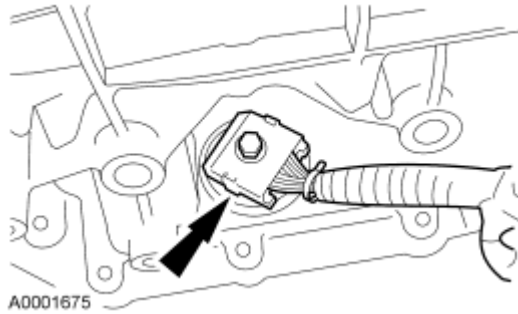


Fig. 159: Locating Transmission Solenoid Electrical Connector
Courtesy of FORD MOTOR CO.

7. Remove the screws and the transmission fluid filter.

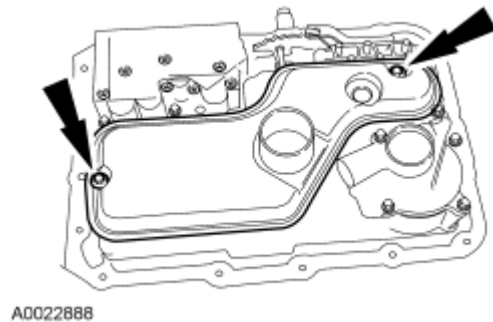


Fig. 160: Identifying Transmission Fluid Filter Mounting Screws
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the solenoid body connector pins.

8. Remove the solenoid body screws and remove the solenoid body by lifting on the body and pushing the connector from the other side of the case.

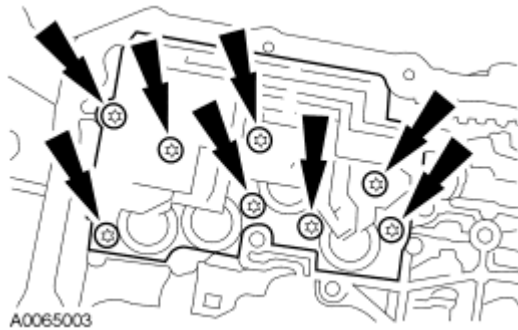


Fig. 161: Locating Solenoid Body Screws
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Install new O-ring seals on the solenoid body connector. Lubricate the O-ring seals with clean automatic transmission fluid.

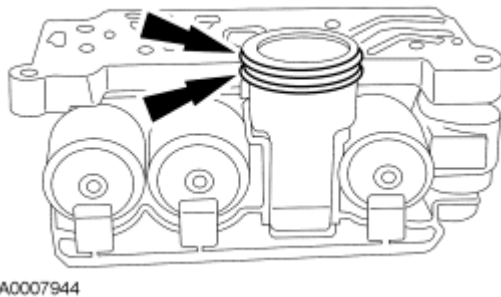


Fig. 162: Locating O-Ring Seals On Solenoid Body Connector
Courtesy of FORD MOTOR CO.

CAUTION: Inspect the transmission case bore to make sure it is free of foreign material and not damaged. If it is damaged, transmission leaks may occur.

2. Install the solenoid body. Tighten the screws in the sequence shown.
 - Tighten to 8 Nm (71 lb-in).

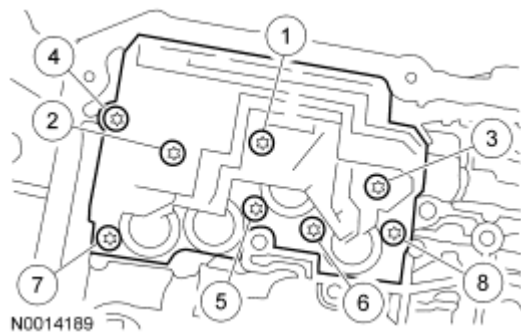


Fig. 163: Identifying Tightening Sequence Of Solenoid Body Screws
Courtesy of FORD MOTOR CO.

CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure the fluid filter seals are correctly seated on the filter.

3. Lubricate the seals and install the transmission fluid filter.
 - Tighten to 10 Nm (89 lb-in).

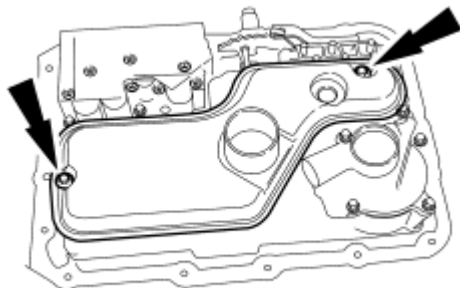


Fig. 164: Identifying Transmission Fluid Filter Mounting Screws
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable, clean and inspect for damage. If not damaged, the gasket should be reused.

4. Install the transmission fluid pan and gasket and loosely install the screws.

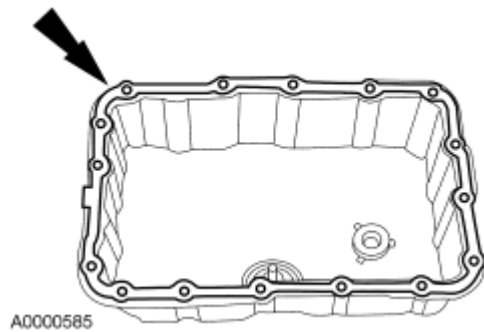


Fig. 165: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

5. Tighten the screws in a crisscross sequence.
 - Tighten to 11 Nm (8 lb-ft).

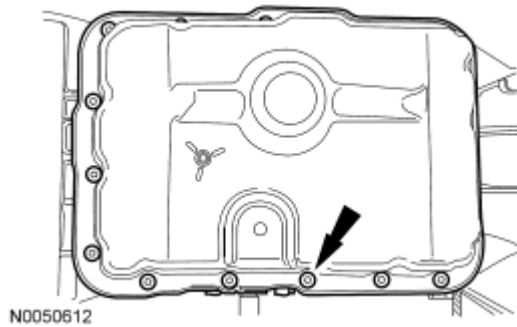


Fig. 166: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

6. Install the drain plug.
 - Install a new gasket onto the drain plug assembly.
 - Tighten to 26 Nm (19 lb-ft).

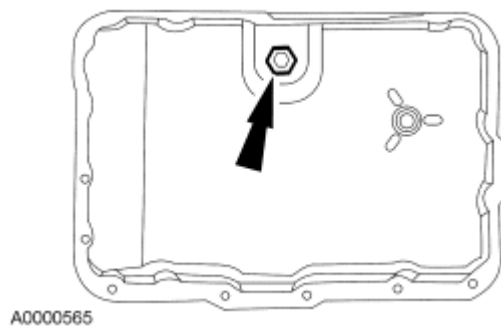


Fig. 167: Locating Drain Plug
Courtesy of FORD MOTOR CO.

CAUTION: Damage will occur to the solenoid body assembly if the screw is tightened above specification.

NOTE: Always install new O-ring seals on the vehicle harness connector.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

NOTE: Use petroleum jelly to lubricate the O-ring seals to aid in the installation process.

7. Install and lubricate new O-ring seals on the transmission connector and connect the connector.
 - Tighten to 5 Nm (44 lb-in).

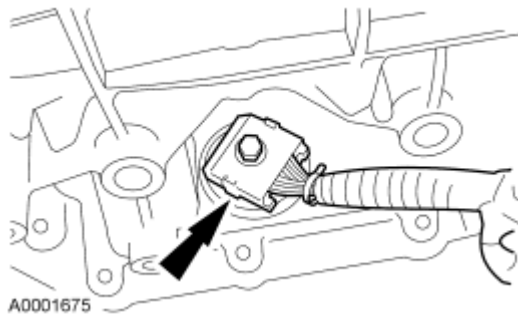


Fig. 168: Locating Transmission Solenoid Electrical Connector
Courtesy of FORD MOTOR CO.

8. Install the HO2S connector to the front of the transmission pan rail.

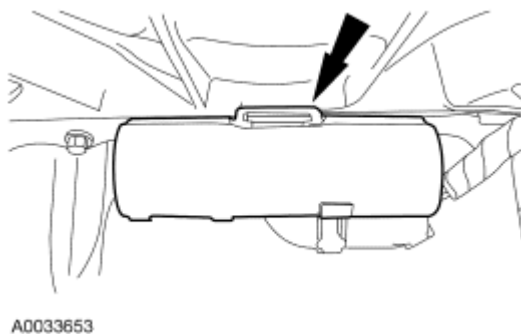


Fig. 169: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

9. Connect the HO2S connector and install the sensor wire retaining clip to the RH side of the transmission pan rail.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

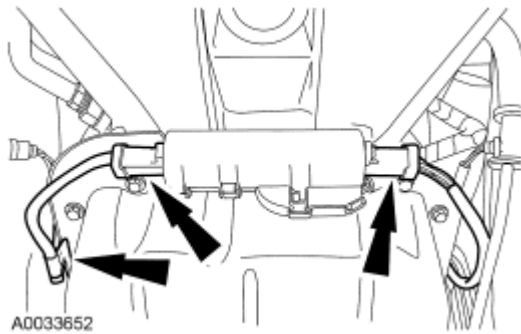


Fig. 170: Locating Heated Oxygen Sensor (HO2S) Connectors
Courtesy of FORD MOTOR CO.

10. Fill the transmission. For additional information, refer to **Transmission Fluid Drain and Refill - Automated Equipment** or **Transmission Fluid Level Check**.

DIGITAL TRANSMISSION RANGE (TR) SENSOR

Special Tools

Illustration	Tool Name	Tool Number
 ST1633-A	Alignment Gauge, TR Sensor	307-351 (T97L-70010-A)

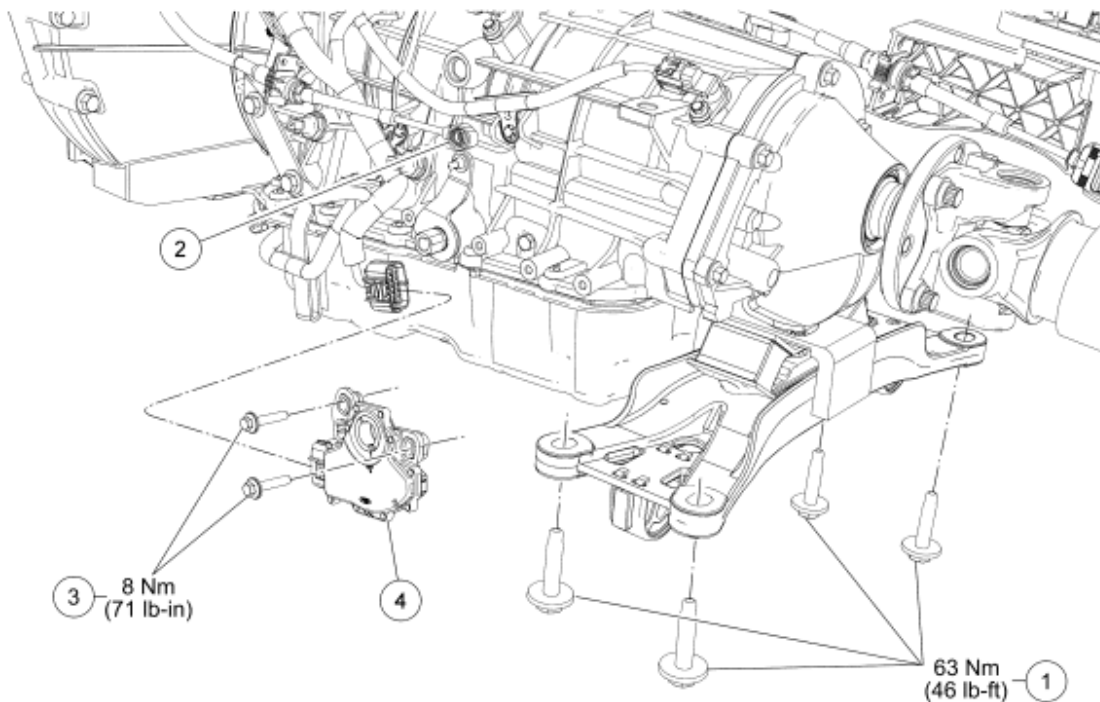


Fig. 171: Exploded View Of Digital Transmission Range (TR) Sensor With Torque Specifications
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W704971	Transmission crossmember-to-floor pan screws
2	7E395	Transmission selector lever cable
3	W500015	Digital transmission range (TR) sensor screws
4	7F293	Digital TR sensor

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
- WARNING:** Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.
2. Using a suitable transmission jack, support the transmission.
 3. Remove the transmission crossmember-to-floor pan screws and lower the transmission enough to gain access to the digital transmission range (TR) sensor.

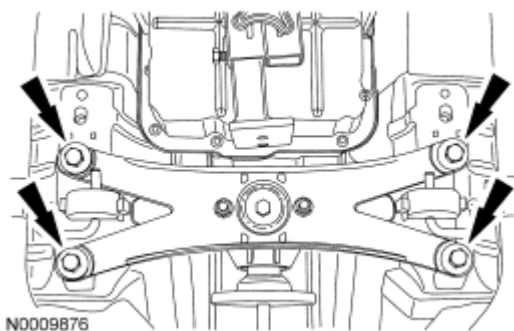


Fig. 172: Locating Transmission Crossmember-To-Floor Pan Screws
 Courtesy of FORD MOTOR CO.

4. Disconnect the digital TR sensor connector.

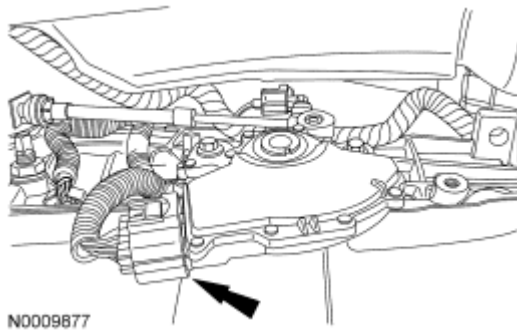


Fig. 173: Locating Digital Transmission Range (TR) Sensor Connector
Courtesy of FORD MOTOR CO.

5. Disconnect the transmission selector lever cable from the manual control lever.

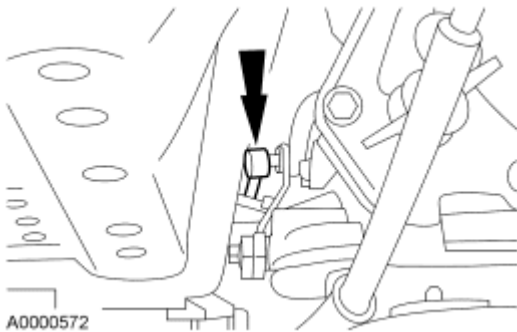


Fig. 174: Locating Shift Cable Eyelet At Manual Control Lever
Courtesy of FORD MOTOR CO.

6. Remove the digital TR sensor screws and remove the digital TR sensor.

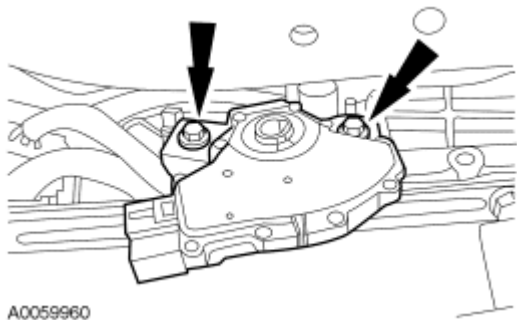


Fig. 175: Locating Digital TR Sensor Screws
Courtesy of FORD MOTOR CO.

INSTALLATION

CAUTION: The digital transmission range (TR) sensor must fit flush against the boss on the case to prevent damage to the sensor.

1. Install the digital TR sensor and loosely install the screws.

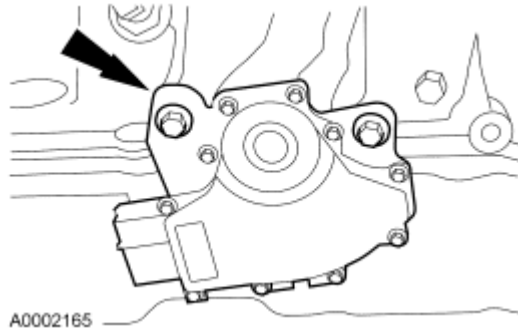


Fig. 176: Locating Transmission Range (TR) Sensor
Courtesy of FORD MOTOR CO.

CAUTION: Tightening one screw before tightening the other may cause the sensor to bind or become damaged.

NOTE: The manual lever must be in the NEUTRAL position.

2. Using the special tool, align the digital TR sensor and tighten the screws in an alternating sequence.
 - Tighten 8 Nm (71 lb-in).

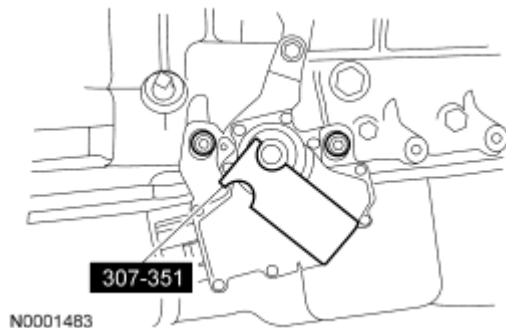


Fig. 177: Identifying Special Tool (307-351)
Courtesy of FORD MOTOR CO.

3. Connect the transmission selector lever cable to the manual control lever.

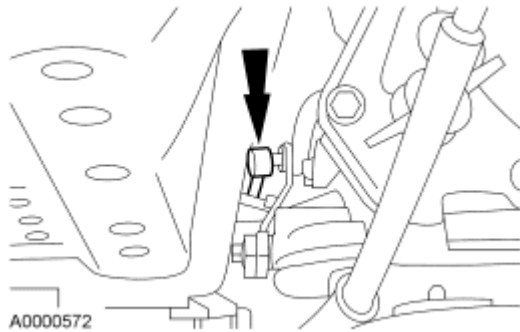


Fig. 178: Locating Shift Cable Eyelet At Manual Control Lever
Courtesy of FORD MOTOR CO.

4. Connect the digital TR sensor connector.

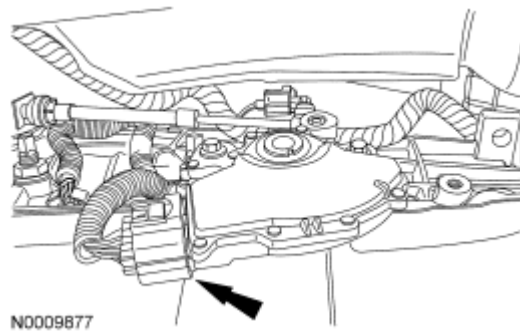


Fig. 179: Locating Digital Transmission Range (TR) Sensor Connector
Courtesy of FORD MOTOR CO.

5. Install the transmission crossmember-to-floor pan screws.
 - Tighten to 63 Nm (46 lb-ft).

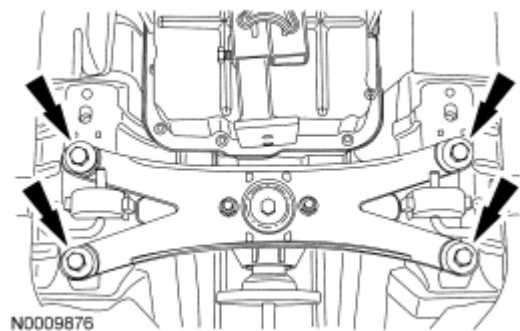
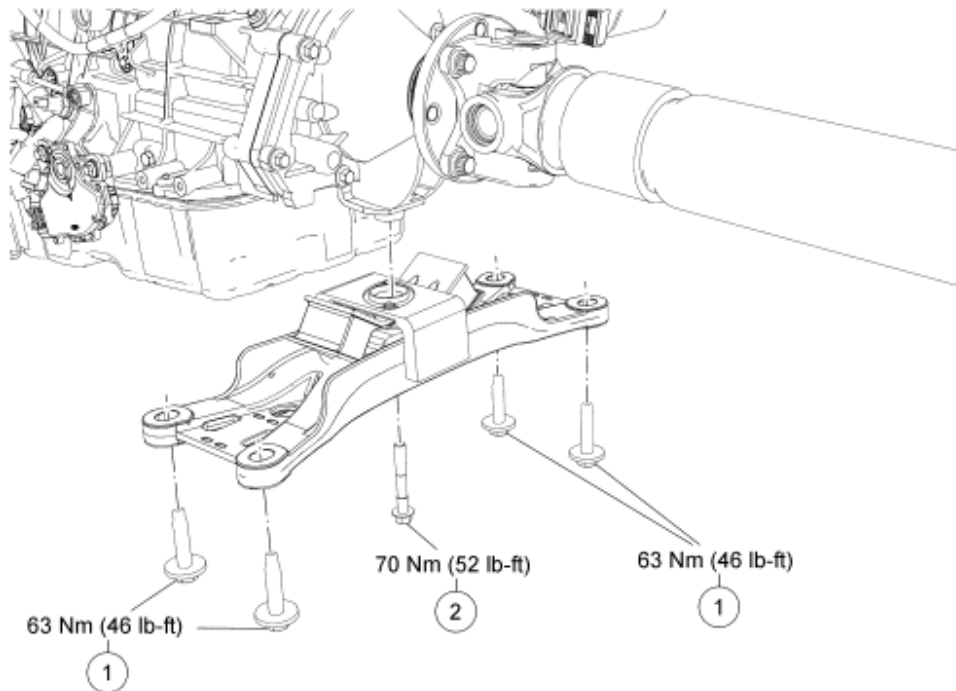


Fig. 180: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

6. Verify that the selector lever cable is adjusted correctly. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.

TRANSMISSION SUPPORT CROSSMEMBER

N0042405

Fig. 181: Exploded View Of Transmission Support Crossmember With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Transmission crossmember-to-floor pan screws
2	-	Transmission insulator-to-extension housing center screw

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
3. Support the transmission with a transmission jack.
4. Remove the transmission crossmember-to-floor pan screws.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

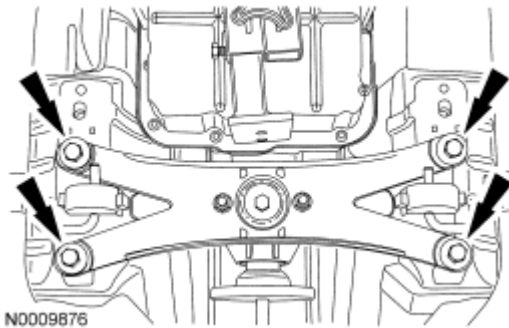


Fig. 182: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

5. Remove the transmission insulator-to-extension housing center screw.

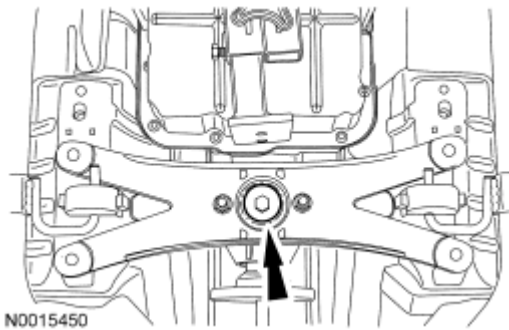


Fig. 183: Locating Transmission Mount Center Screw
Courtesy of FORD MOTOR CO.

6. Remove the transmission crossmember.

INSTALLATION

1. Position the transmission crossmember in the vehicle and loosely install the transmission insulator-to-extension housing center screw.

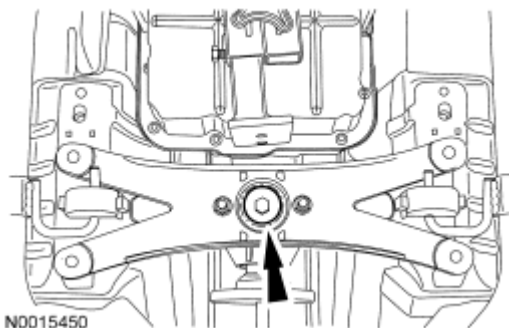


Fig. 184: Locating Transmission Mount Center Screw
Courtesy of FORD MOTOR CO.

2. Loosely install the transmission crossmember-to-floor pan screws.

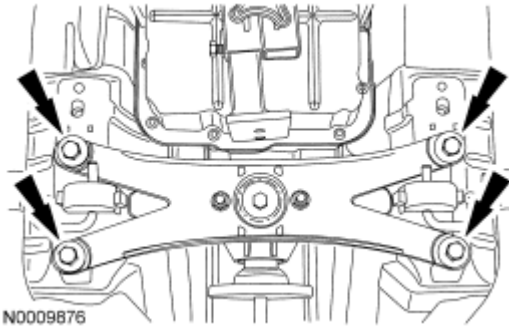


Fig. 185: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

NOTE: The transmission support insulator must be neutralized.

3. Slide the transmission support insulator forward, rearward and side-to-side until the gaps between the transmission support insulator snubber and crossmember are equal.
4. With the transmission support insulator neutralized, tighten the transmission crossmember-to-floor pan screws.
 - Tighten to 63 Nm (46 lb-ft).

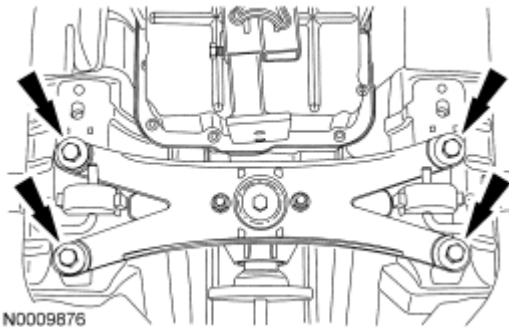


Fig. 186: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

5. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
6. With the transmission support insulator neutralized, tighten the transmission insulator-to-extension housing center screw.
 - Tighten to 70 Nm (52 lb-ft).

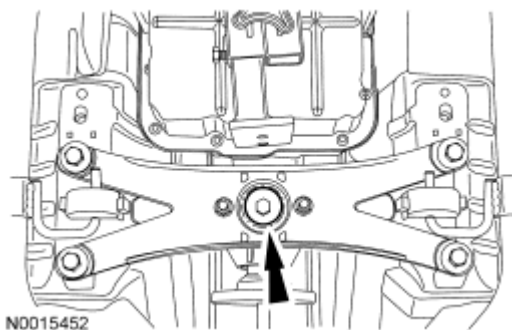


Fig. 187: Locating Transmission Mount Center Bolt
Courtesy of FORD MOTOR CO.

REMOVAL

TRANSMISSION

Special Tools

Illustration	Tool Name	Tool Number
 ST1636-A	Retainer, Torque Converter	307-346 (T97T-7902-A)

All vehicles

WARNING: Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

NOTE: When the battery has been disconnected and reconnected, some abnormal drive symptoms can occur while the vehicle relearns its adaptive strategy. The customer needs to be notified that they can experience slightly different upshifts (either soft or firm) and that this is a temporary condition and will eventually return to normal operating condition.

NOTE: If transmission disassembly or installation of a new transmission is necessary, drain the transmission fluid. Install the drain plug when finished.

NOTE: If the transmission is to be removed for an extended period of time, support the engine with a safety stand and a word block.

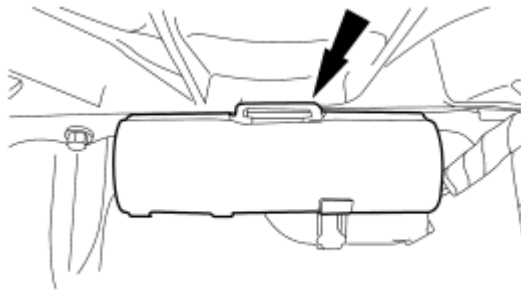
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING**

AND LIFTING article.

2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
4. Remove the driveshaft. For additional information, refer to **DRIVESHAFT** article.

WARNING: Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

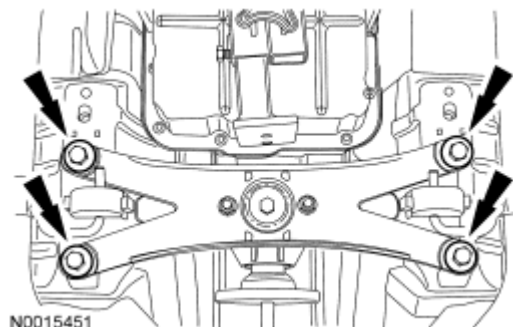
5. Using a suitable transmission jack, support the transmission.
6. Remove the heated oxygen sensor (HO2S) connector from the front of the transmission pan rail.



A0033653

Fig. 188: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

7. Remove the rear transmission crossmember-to-floor pan screws.



N0015451

Fig. 189: Locating Rear Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

8. Remove the rear transmission insulator-to-extension housing center screw and remove the transmission crossmember.

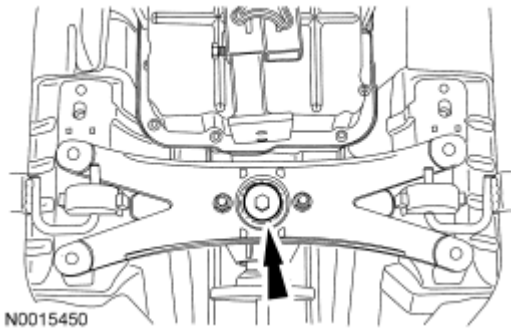


Fig. 190: Locating Transmission Mount Center Screw
Courtesy of FORD MOTOR CO.

9. Remove the selector lever cable from the transmission manual lever.

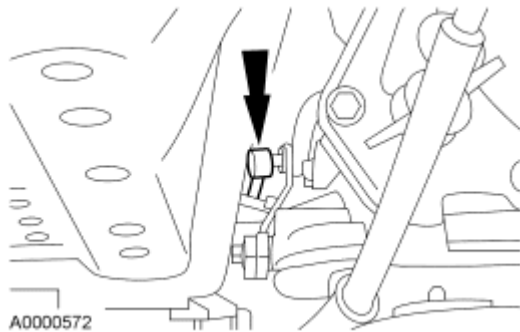


Fig. 191: Locating Shift Cable Eyelet At Manual Control Lever
Courtesy of FORD MOTOR CO.

10. Remove the 2 transmission selector lever cable bracket bolts from the transmission and remove the bracket.

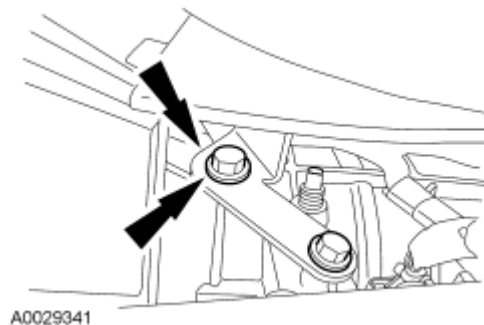


Fig. 192: Locating Transmission Shift Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

4.6L engine

11. Remove the electrical connector cover.

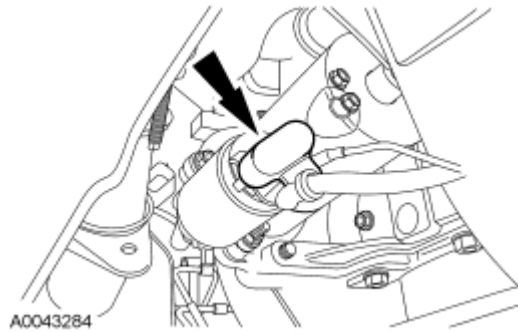


Fig. 193: Locating Starter Motor Electrical Connector Cover
Courtesy of FORD MOTOR CO.

12. Remove the starter wire and positive battery cable.

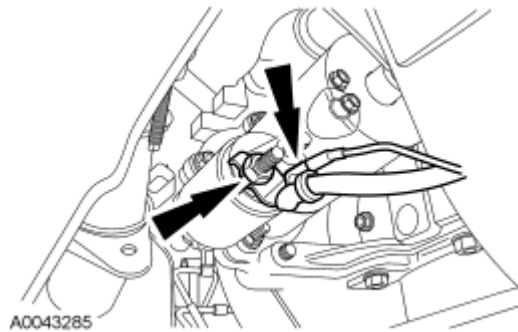


Fig. 194: Locating Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

13. Remove the starter motor bolts and starter.

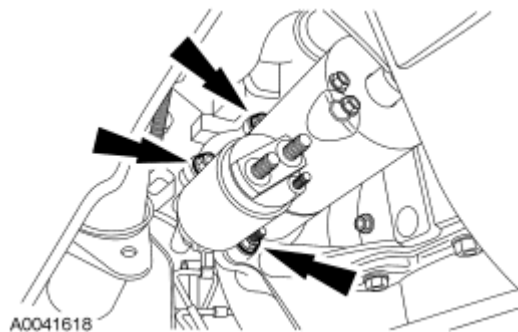


Fig. 195: Locating Starter Motor Bolts And Starter
Courtesy of FORD MOTOR CO.

14. Remove the flexplate cover.

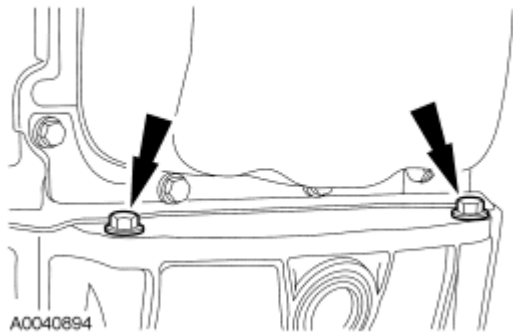


Fig. 196: Locating Flexplate Cover And Bolts
Courtesy of FORD MOTOR CO.

15. Remove the access cover.

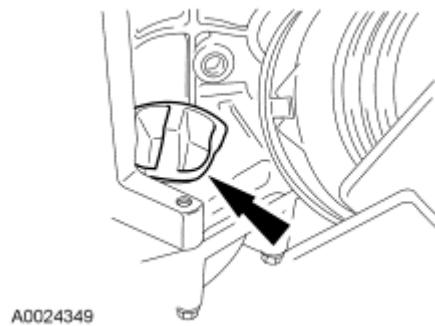


Fig. 197: Locating Access Cover
Courtesy of FORD MOTOR CO.

16. Remove the 4 torque converter nuts.

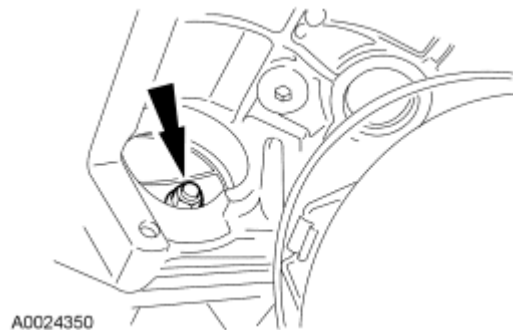


Fig. 198: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

4.0L engine

17. Remove the starter and position aside.

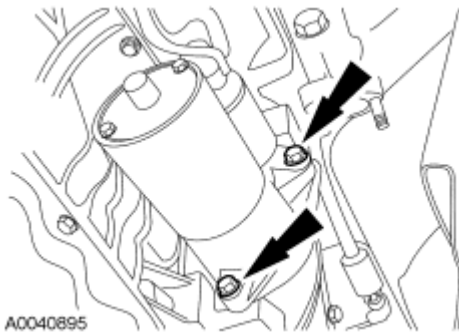


Fig. 199: Locating Starter Motor Bolts
Courtesy of FORD MOTOR CO.

18. Remove and discard the 4 torque converter nuts.

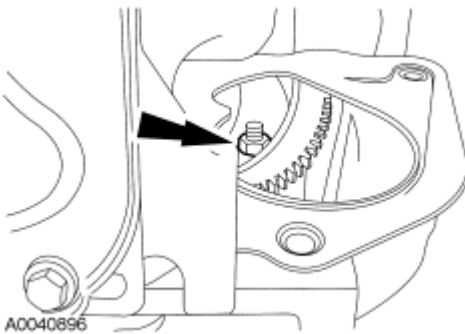


Fig. 200: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

19. Remove the lower transmission retaining bolts.

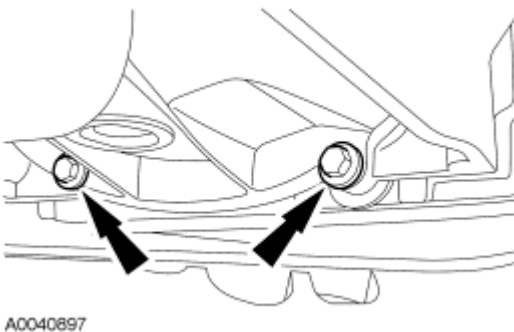


Fig. 201: Locating Lower Transmission Retaining Bolts
Courtesy of FORD MOTOR CO.

All vehicles

20. Lower the transmission to gain access to the sensor connectors and the transmission bolts.
21. Disconnect the digital transmission range (TR) sensor connector.

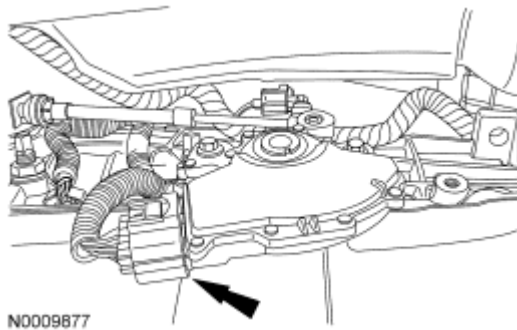


Fig. 202: Locating Digital Transmission Range (TR) Sensor Connector
Courtesy of FORD MOTOR CO.

22. Disconnect the turbine shaft speed (TSS) sensor, output shaft speed (OSS) sensor and intermediate shaft speed sensor electrical connectors.

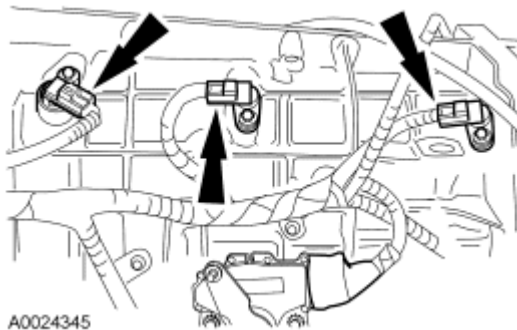


Fig. 203: Locating Electrical Connectors
Courtesy of FORD MOTOR CO.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

23. Remove the screw from the solenoid body connector and disconnect the connector.

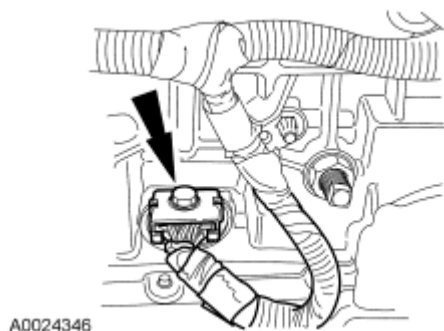


Fig. 204: Identifying Solenoid Body Electrical Connector
Courtesy of FORD MOTOR CO.

24. Disconnect the harness retainers.

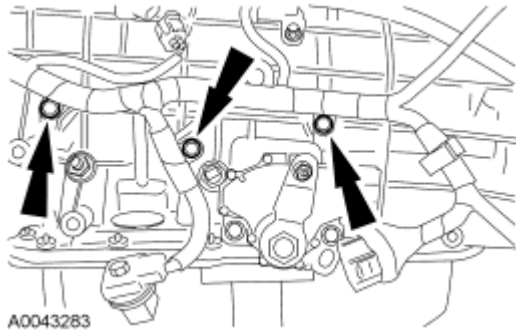


Fig. 205: Locating Harness Retainers
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the cooler tubes.

25. Disconnect the transmission cooler tubes.

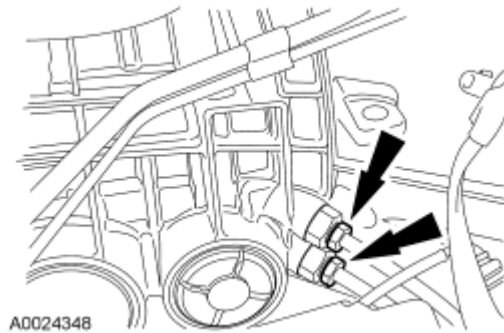


Fig. 206: Locating Transmission Cooler Tubes
Courtesy of FORD MOTOR CO.

26. Remove the nut and position aside the transmission cooler tube bracket.

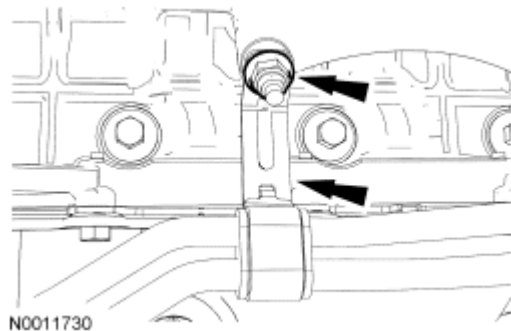


Fig. 207: Locating Transmission Cooler Tube Bracket And Nut

Courtesy of FORD MOTOR CO.

4.6L engine

27. Remove the 7 engine-to-transmission retaining bolts.

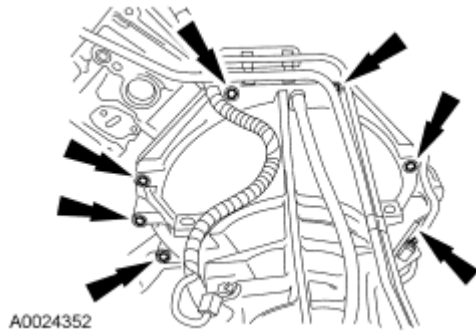


Fig. 208: Locating Engine-To-Transmission Retaining Bolts
Courtesy of FORD MOTOR CO.

4.0L engine

28. Remove the 6 engine-to-transmission retaining bolts and position the fuel line bracket aside.

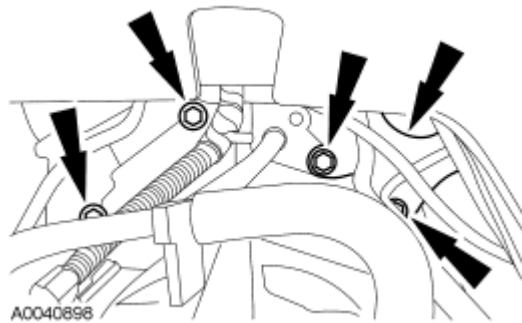


Fig. 209: Locating Engine-To-Transmission Retaining Bolts
Courtesy of FORD MOTOR CO.

All vehicles

29. Lower the transmission assembly from the vehicle.
30. Install the special tool.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

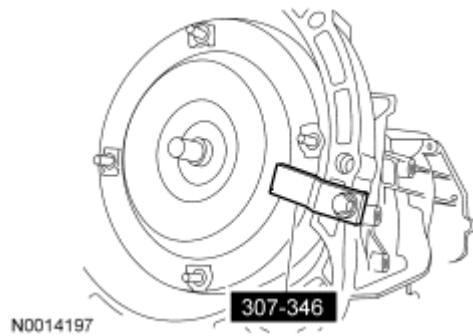


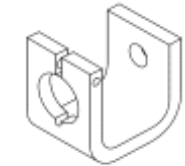
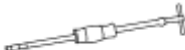
Fig. 210: Identifying Special Tool (307-346)
Courtesy of FORD MOTOR CO.

31. Carry out the transmission fluid cooler backflushing and cleaning if the transmission is being overhauled or installing a new or remanufactured transmission. For additional information, refer to **Transmission Fluid Cooler Backflushing and Cleaning**.

DISASSEMBLY

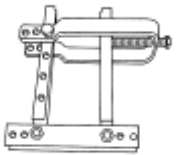
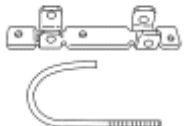
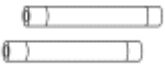
TRANSMISSION

Special Tools

Illustration	Tool Name	Tool Number
 ST2417-A	Remover, Input Shaft Oil Seal	308-375
 ST2418-A	Remover, Transmission Fluid Pump	307-397
 ST1185-A	Holding Fixture, Transmission	307-003 (T57L-500-B)
 ST1185-A	Slide Hammer	100-001 (T50T-100-A)

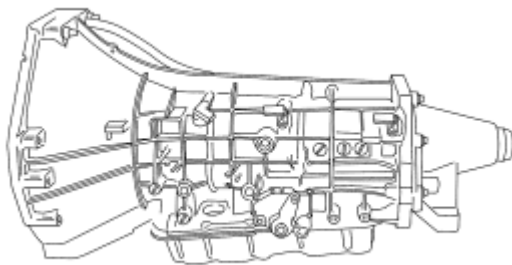
2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

 ST1758-A	Remover, Torque Converter Fluid Seal	307-309 (T94P-77001-BH)
 ST2393-A	Compressor, Servo Cover	307-402
 ST1631-A	Handle, Torque Converter	307-091 (T81P-7902-C)
 ST2937A	Remover, Output Shaft Flange	307-523

NOTE: Tag and identify all parts for reassembly.

1. Place the transmission on a bench.



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Fig. 211: Identifying Transmission View
Courtesy of FORD MOTOR CO.

WARNING: Secure the torque converter in the transmission during removal or installation. The torque converter is heavy and may result in injury if it falls out of the transmission. Failure to follow this instruction may result in serious personal injury.

NOTE: If not installing a new torque converter, leave the adapter plate screwed to the torque converter.

2. Using the special tools, remove the torque converter and adapter plate as an assembly.

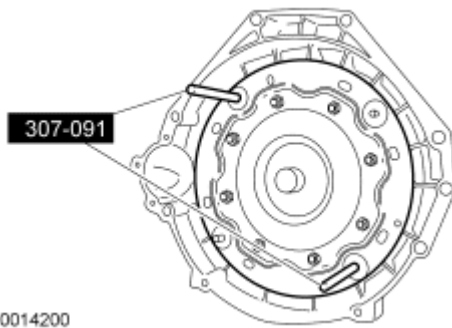


Fig. 212: Identifying Special Tool (307-091)
Courtesy of FORD MOTOR CO.

3. If the vehicle is equipped, and installation of a new or remanufactured torque converter is necessary, remove the torque converter adapter plate.

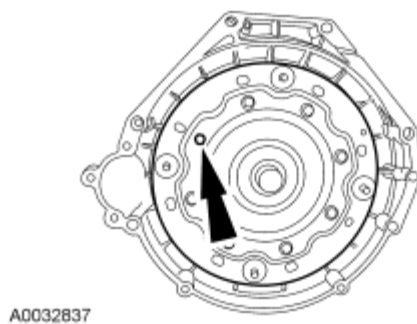


Fig. 213: Locating Torque Converter Adapter Plate
Courtesy of FORD MOTOR CO.

4. If the adapter plate has been removed, use the special tools to remove the torque converter.

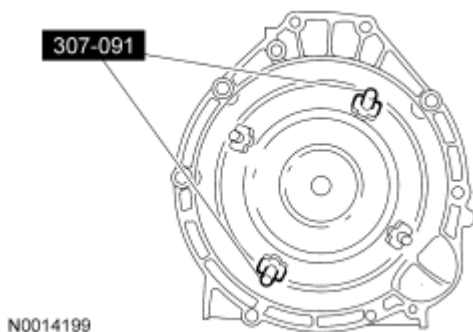


Fig. 214: Identifying Special Tool (307-091)

Courtesy of FORD MOTOR CO.

5. Remove the input shaft.

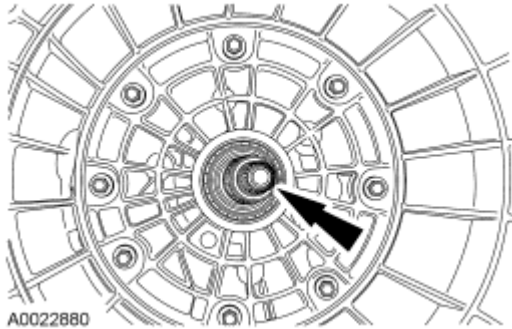


Fig. 215: Locating Input Shaft
Courtesy of FORD MOTOR CO.

6. Using the special tool, install the transmission into the bench with the torque converter housing facing up.

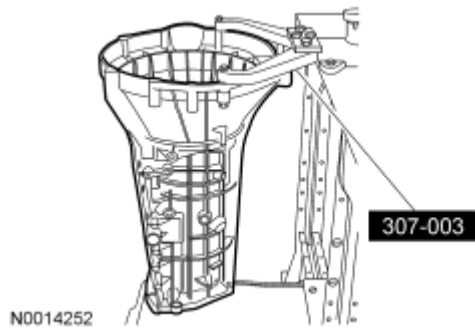


Fig. 216: Identifying Special Tool (307-003)
Courtesy of FORD MOTOR CO.

7. Remove the transmission sensors.

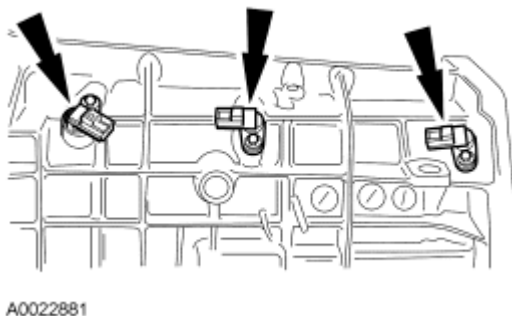


Fig. 217: Locating Transmission Sensors
Courtesy of FORD MOTOR CO.

8. Remove the transmission range (TR) sensor.

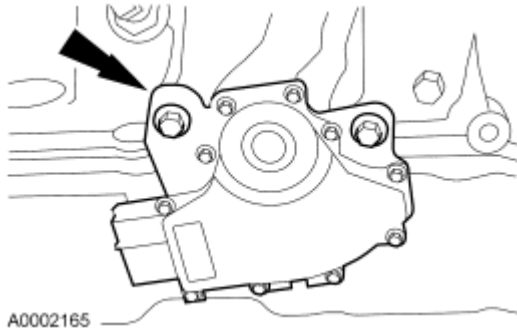


Fig. 218: Locating Transmission Range (TR) Sensor
Courtesy of FORD MOTOR CO.

9. Remove and discard the nut.

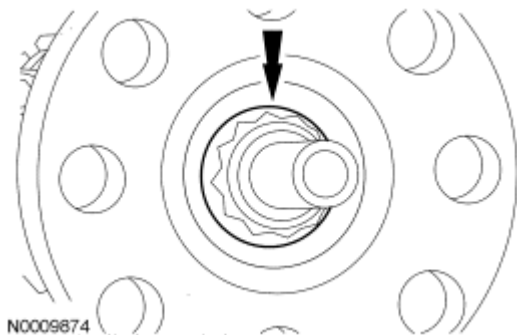


Fig. 219: Removing Driveshaft Nut
Courtesy of FORD MOTOR CO.

10. Using the special tool, remove the output shaft flange.

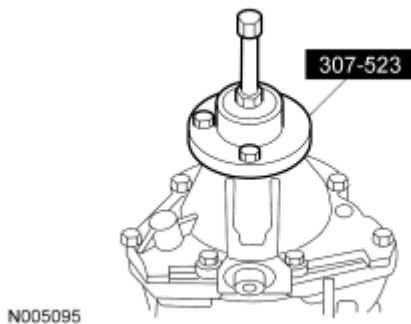


Fig. 220: Removing Output Shaft Flange Using Special Tool (307-523)
Courtesy of FORD MOTOR CO.

11. Using the special tools, remove the extension housing seal.

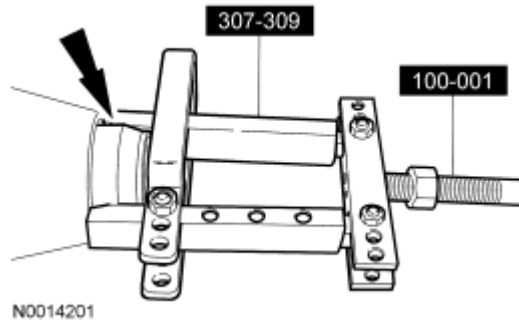


Fig. 221: Identifying Special Tool (307-309), (100-001) And Extension Housing Seal
Courtesy of FORD MOTOR CO.

NOTE: The parking pawl, parking pawl return spring and parking pawl shaft may fall out during removal of the extension housing.

12. Remove the extension housing.

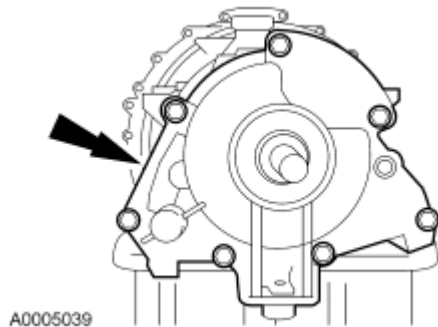


Fig. 222: Locating Extension Housing And Mounting Screws
Courtesy of FORD MOTOR CO.

13. Remove the parking pawl assembly and discard the gasket.
 1. Remove the parking pawl shaft.
 2. Remove the parking pawl.
 3. Remove the parking pawl return spring.
 4. Remove and discard the gasket.

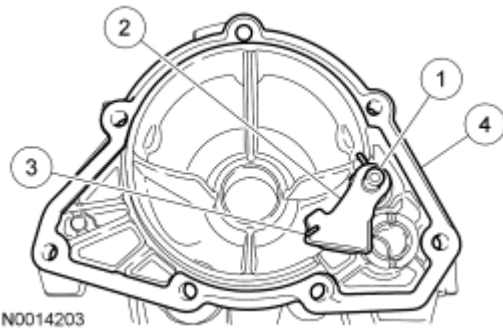


Fig. 223: Identifying Parking Pawl Assembly
Courtesy of FORD MOTOR CO.

14. Remove the drain plug and discard the gasket.

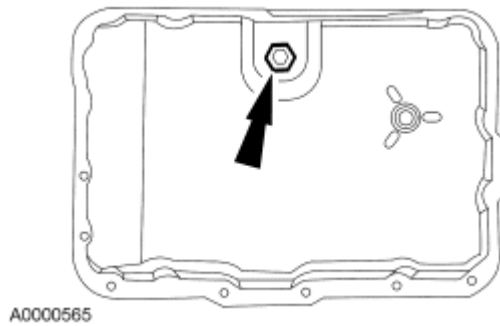


Fig. 224: Locating Drain Plug
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect the gasket for damage. If the gasket is not damaged, the gasket should be reused.

15. Remove the 16 transmission fluid pan screws, transmission fluid pan and gasket.

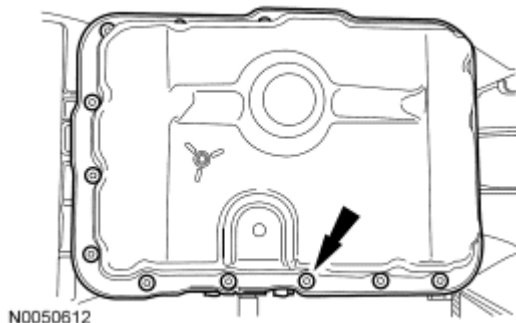
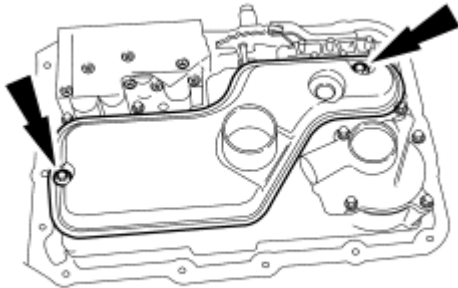


Fig. 225: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

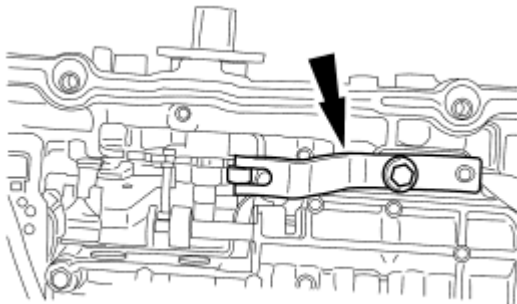
16. Remove the transmission fluid filter and discard.



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Fig. 226: Identifying Transmission Fluid Filter Mounting Screws
Courtesy of FORD MOTOR CO.

17. Remove the manual control valve detent spring.

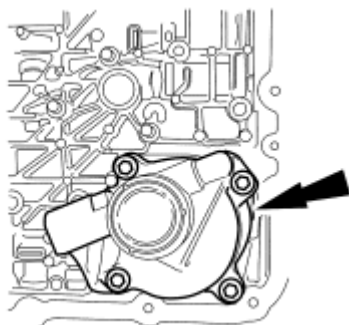


A0005207

Fig. 227: Locating Manual Control Valve Detent Spring
Courtesy of FORD MOTOR CO.

WARNING: Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

18. Remove the reverse servo assembly.



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Fig. 228: Locating Reverse Servo Assembly
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage solenoid body connector pins.

19. Remove the solenoid body assembly by lifting on the body and pushing the connector from the other side of the case.

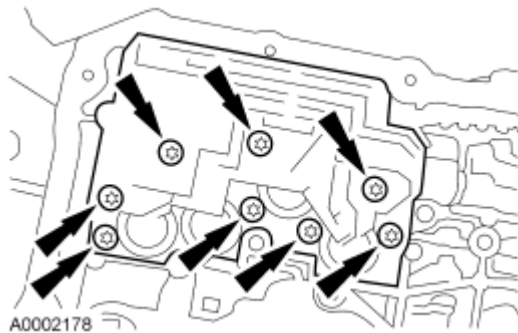


Fig. 229: Locating Solenoid Body Mounting Screws
Courtesy of FORD MOTOR CO.

20. Remove the main control valve body, separator plate and gasket.

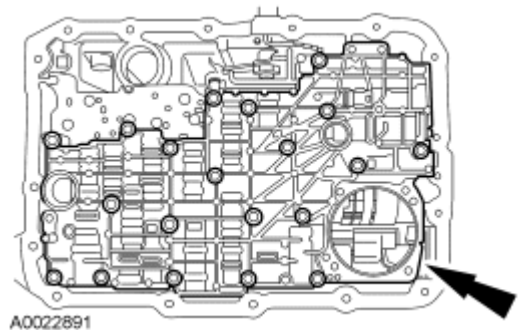


Fig. 230: Locating Main Control Valve Body Bolts & Main Control Valve Body
Courtesy of FORD MOTOR CO.

21. Using the special tools, remove the converter hub seal.

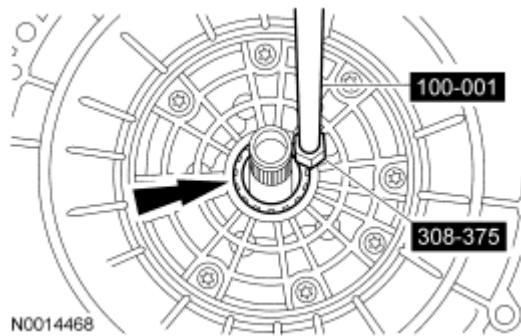


Fig. 231: Identifying Special Tool (100-001), (303-375) And Converter Hub Seal
Courtesy of FORD MOTOR CO.

CAUTION: Failure to loosen the overdrive band adjusting screw prior to pump removal may cause damage to the pump and overdrive band.

NOTE: Throw the lock nuts away. The lock nuts are not reusable for assembly.

22. Remove and discard the lock nuts, and loosen the overdrive/intermediate band adjusting screw.

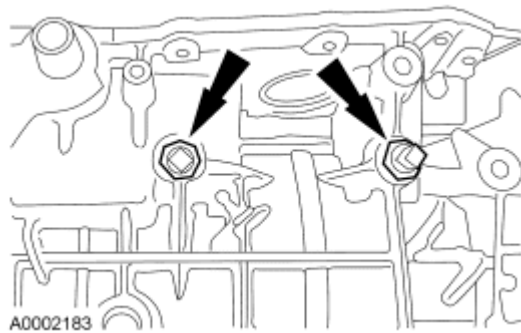


Fig. 232: Locating Overdrive And Intermediate Band Adjusting Screw
Courtesy of FORD MOTOR CO.

23. Remove and tag part for assembly.

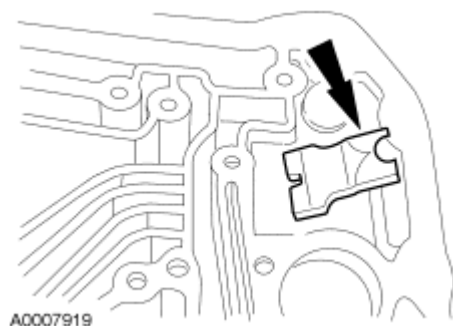


Fig. 233: Identifying Tag Part Assembly

Courtesy of FORD MOTOR CO.

CAUTION: The screws are not reusable for assembly. Discard the screws. If the screws are reused, the housing may become separated from the transmission.

24. Remove and discard the screws.

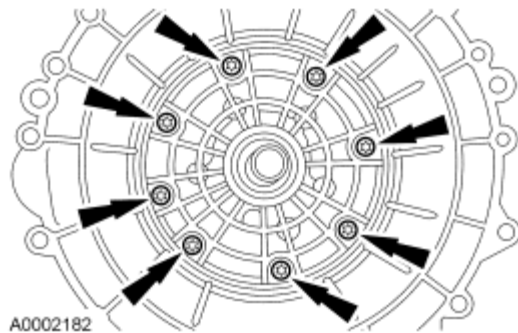


Fig. 234: Locating Transmission Housing Screws
Courtesy of FORD MOTOR CO.

25. Install the special tool.

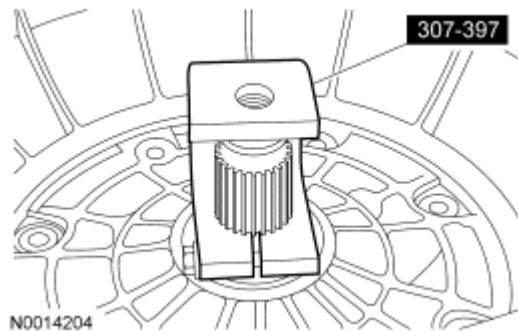


Fig. 235: Identifying Special Tool (307-397)
Courtesy of FORD MOTOR CO.

26. Using the special tools, remove the pump.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

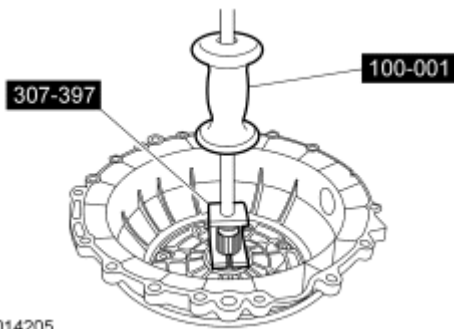


Fig. 236: Identifying Special Tool (100-001, 307-397) & Pump
Courtesy of FORD MOTOR CO.

WARNING: Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

27. Using the special tool, remove the intermediate servo cover retaining ring.

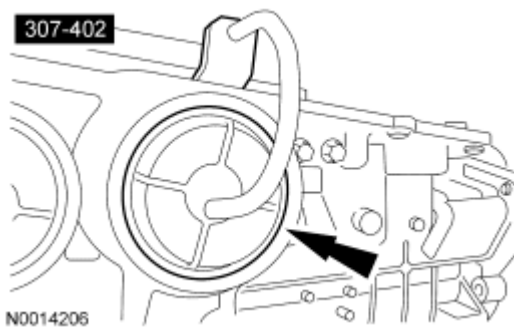


Fig. 237: Identifying Special Tool (307-402)
Courtesy of FORD MOTOR CO.

28. Remove the intermediate band servo piston and spring.

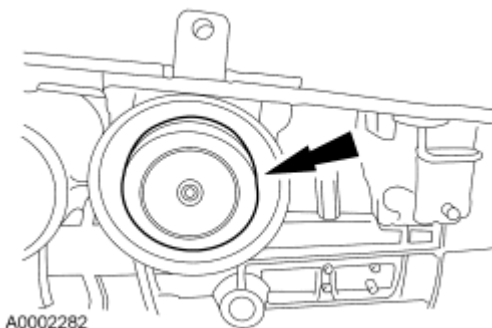


Fig. 238: Locating Intermediate Band Servo Piston And Spring
Courtesy of FORD MOTOR CO.

WARNING: Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

29. Using the special tool, remove the overdrive servo cover retaining ring and cover.

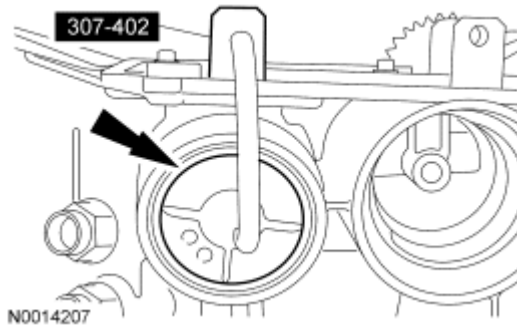


Fig. 239: Removing Overdrive Servo Cover Retaining Ring & Cover Using Special Tool (307-402)
Courtesy of FORD MOTOR CO.

30. Remove the front band servo piston and spring.

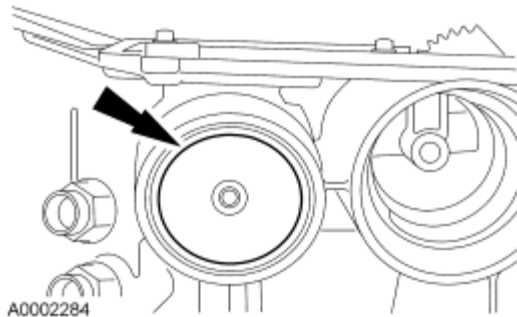


Fig. 240: Locating Front Band Servo Piston And Spring
Courtesy of FORD MOTOR CO.

31. Remove the screw.

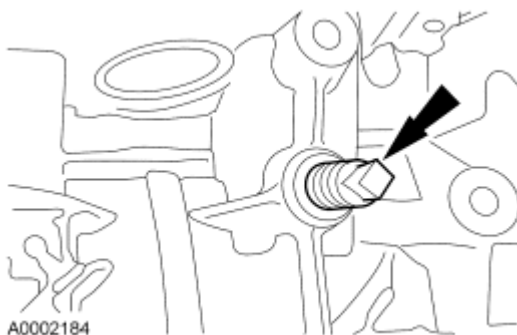


Fig. 241: Locating Screw

Courtesy of FORD MOTOR CO.

NOTE: Tag and identify parts for reassembly.

32. Compress the overdrive band and remove the apply strut.

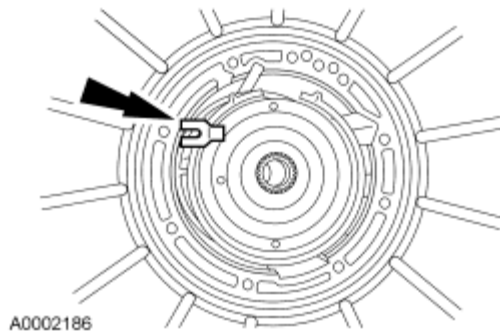


Fig. 242: Identifying Apply Strut

Courtesy of FORD MOTOR CO.

NOTE: Identify the anchor and apply ends of the overdrive band.

NOTE: The new overdrive band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

33. Remove and inspect the overdrive band. Check the following conditions for installing a new band:

- Inspect for glazing.
- Inspect for missing friction material.
- Inspect for material flaking.
- Inspect for damage to the anchor pins.

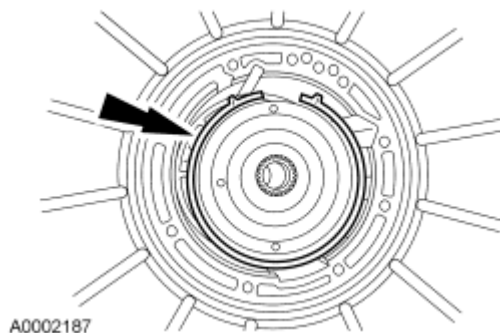


Fig. 243: Locating Overdrive Band

Courtesy of FORD MOTOR CO.

34. Remove the overdrive brake and coast clutch drum.

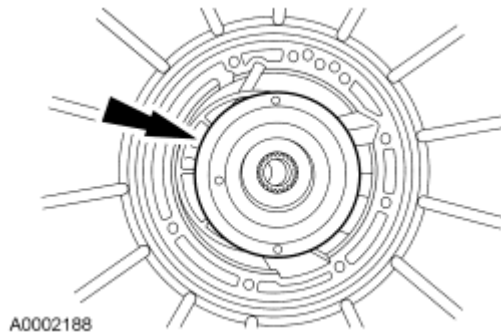


Fig. 244: Locating Overdrive Brake And Coast Clutch Drum
Courtesy of FORD MOTOR CO.

CAUTION: Do not bend the trigger wheel.

NOTE: The No. 12 thrust bearing is in this assembly.

35. Remove the planetary gear overdrive carrier.

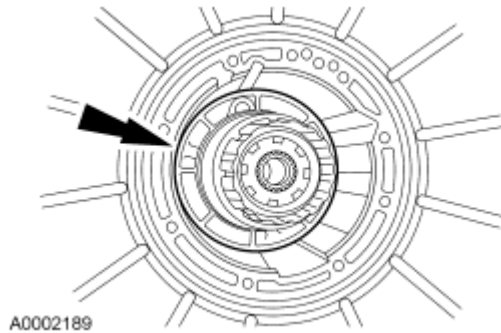


Fig. 245: Locating Planetary Gear Overdrive Carrier
Courtesy of FORD MOTOR CO.

36. Remove the No. 2 overdrive planet thrust bearing.

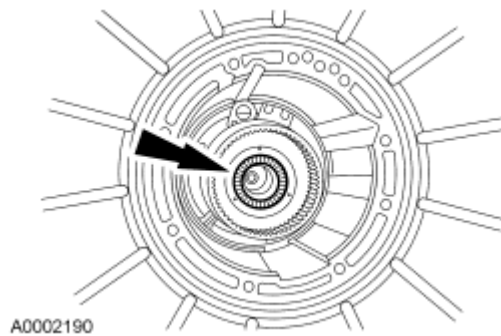


Fig. 246: Locating Overdrive Planet Thrust Bearing
Courtesy of FORD MOTOR CO.

37. Remove the overdrive ring gear, overdrive one-way clutch assembly and center shaft as an assembly.

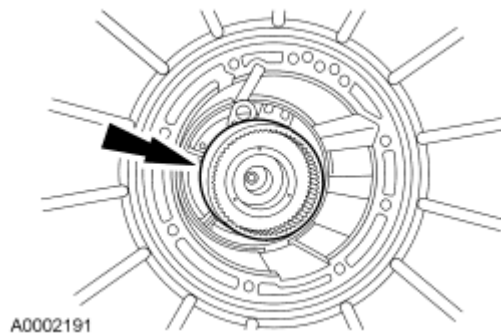


Fig. 247: Locating Overdrive Ring Gear
Courtesy of FORD MOTOR CO.

NOTE: Tag and identify the center shaft thrust bearing No. 3 for reassembly.

38. Remove the No. 3 center shaft thrust bearing.

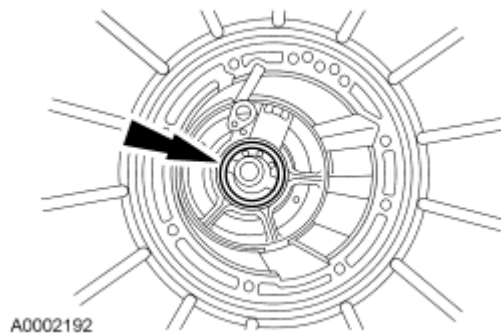


Fig. 248: Locating Center Shaft Thrust Bearing
Courtesy of FORD MOTOR CO.

NOTE: The center support lock nut could fall into the remaining assembly if not removed.

39. Remove the bolt.

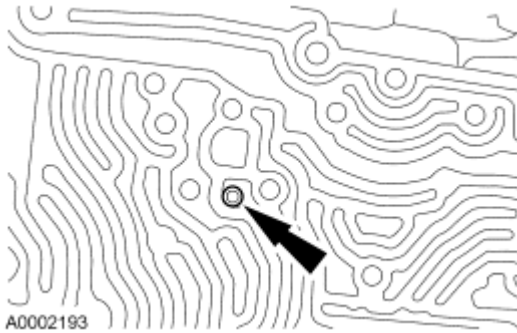


Fig. 249: Locating Center Support Locknut Bolt
Courtesy of FORD MOTOR CO.

40. Remove the lock nut and cage.

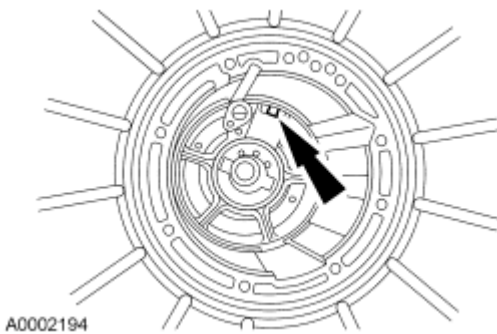


Fig. 250: Locating Locknut And Cage
Courtesy of FORD MOTOR CO.

41. Remove the center support retaining ring.

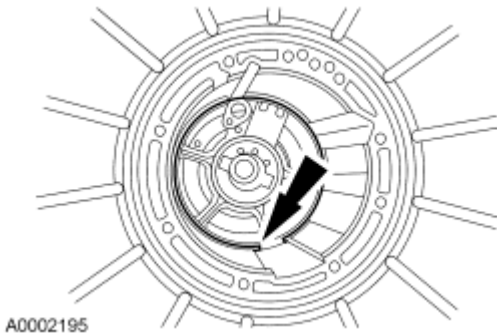


Fig. 251: Locating Center Support Retaining Ring
Courtesy of FORD MOTOR CO.

NOTE: The center support is repaired as an assembly. Any damage requires installing a new component.

NOTE: When removing the center support, pull evenly around the center support web.

42. Remove the center support.

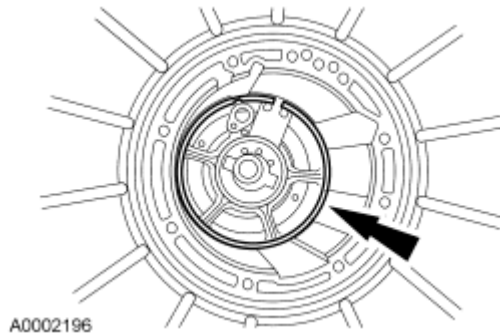


Fig. 252: Identifying Center Support
Courtesy of FORD MOTOR CO.

43. Inspect the center support assembly for wear or damage.
1. Inspect the thrust surfaces for wear or damage.
 2. Inspect the center support sealing surface.
 3. Inspect the fluid passage for blockage or damage.

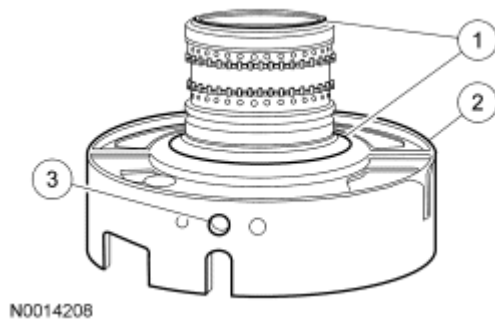
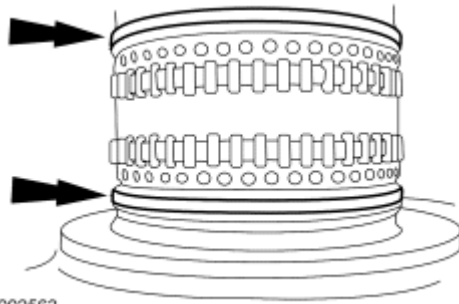


Fig. 253: Inspecting Fluid Passage For Blockage
Courtesy of FORD MOTOR CO.

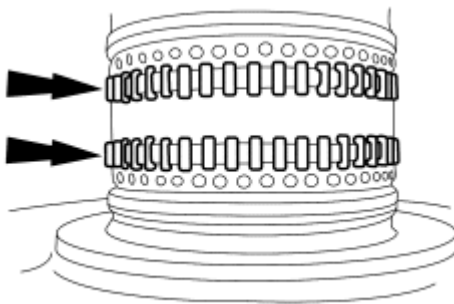
44. Inspect the seal rings for damage.



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Fig. 254: Locating Seal Rings
Courtesy of FORD MOTOR CO.

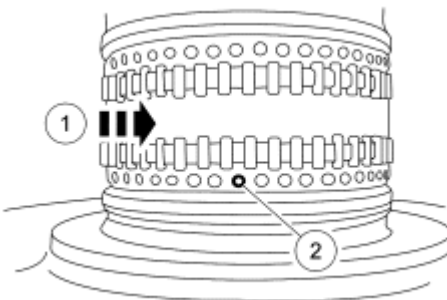
45. Inspect the bearing for missing rollers or damage.



A0002564

Fig. 255: Inspecting Bearing For Missing Rollers Or Damage
Courtesy of FORD MOTOR CO.

46. Inspect the direct clutch feed hole for blockage or damage.
1. Rotate the center support bearing to locate the direct clutch feed hole.
 2. Inspect the direct clutch feed hole for blockage or damage.



N0014209

Fig. 256: Inspecting Direct Clutch Feed Hole For Blockage Or Damage
Courtesy of FORD MOTOR CO.

NOTE: Tag and identify the No. 4 intermediate clutch drum thrust bearing.

47. Remove the intermediate brake drum thrust bearing (No. 4).

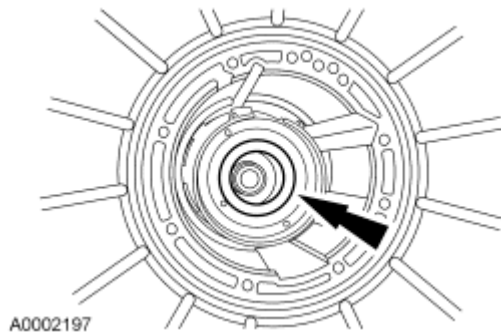


Fig. 257: Locating Intermediate Brake Drum Thrust Bearing
Courtesy of FORD MOTOR CO.

48. Remove, tag and identify the band anchor strut for assembly.



Fig. 258: Identifying Intermediate Band Anchor Strut
Courtesy of FORD MOTOR CO.

NOTE: Identify the anchor and apply ends of the intermediate band.

NOTE: The new intermediate band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

49. Remove and inspect the intermediate band. Check the following conditions when installing a new band:
- Inspect for glazing.
 - Inspect for missing friction material.
 - Inspect for material flaking.
 - Inspect for damage to the anchor pins.

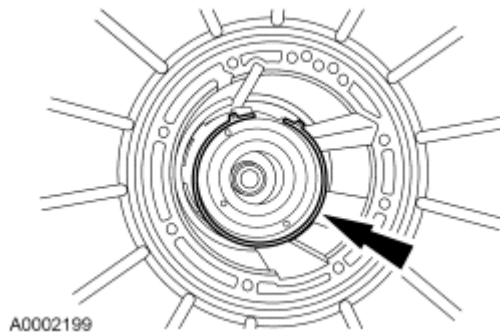


Fig. 259: Identifying Intermediate Band
Courtesy of FORD MOTOR CO.

50. Remove, tag and identify the band apply strut.

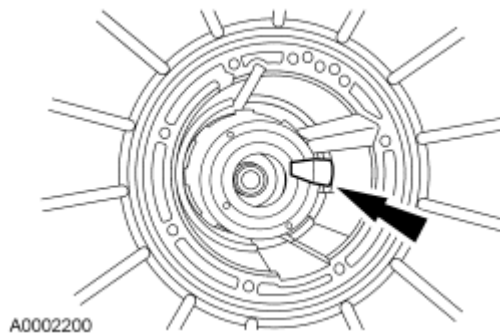


Fig. 260: Locating Intermediate Band Apply Strut
Courtesy of FORD MOTOR CO.

51. Remove the screw.

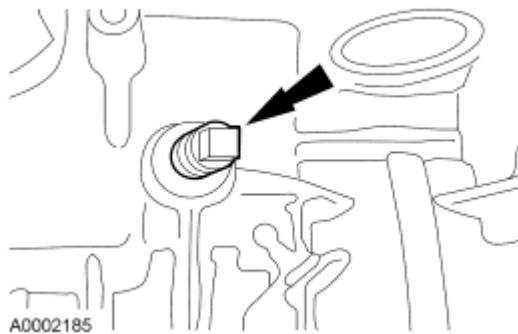


Fig. 261: Locating Screw
Courtesy of FORD MOTOR CO.

NOTE: The No. 5 forward clutch cylinder thrust bearing may come out with the intermediate brake and direct clutch drum.

52. Remove the direct clutch drum.

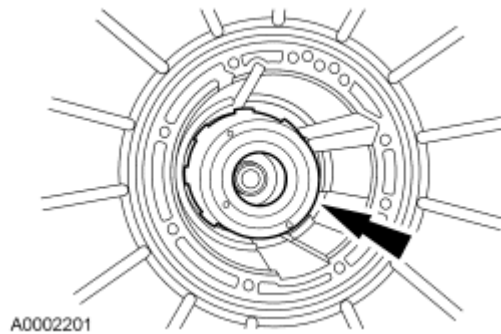


Fig. 262: Locating Direct Clutch Drum
Courtesy of FORD MOTOR CO.

53. Remove the No. 5 forward clutch cylinder thrust bearing, tag and identify.

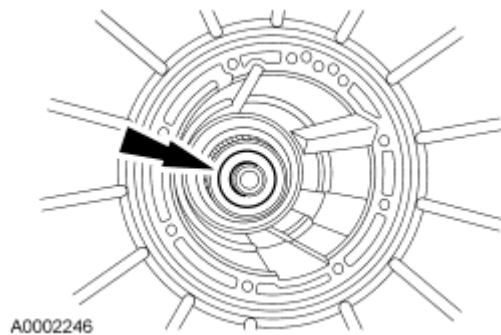


Fig. 263: Locating No. 5 Forward Clutch Cylinder Thrust Bearing
Courtesy of FORD MOTOR CO.

NOTE: The No. 6A thrust bearing may come out with the cylinder. Tag and identify for reassembly.

54. Remove the forward clutch cylinder.

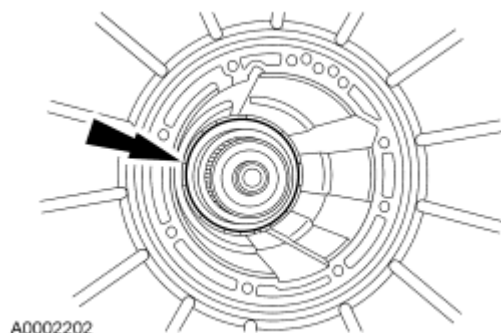


Fig. 264: Locating Forward Clutch Cylinder
Courtesy of FORD MOTOR CO.

NOTE: The No. 6A forward ring gear hub thrust bearing may have come out with

the forward clutch cylinder.

55. Remove the No. 6A forward ring gear hub thrust bearing.

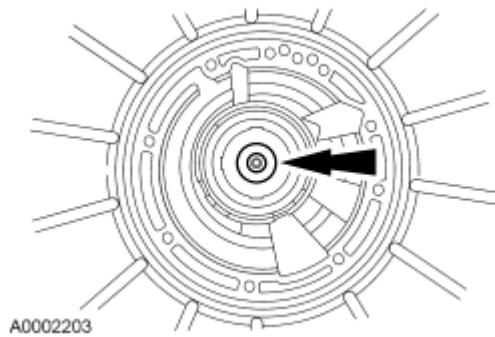


Fig. 265: Locating Forward Ring Gear Hub Thrust Bearing
Courtesy of FORD MOTOR CO.

NOTE: The No. 7 forward planet thrust bearing may come out with the forward ring gear and hub assembly.

56. Remove the forward ring gear and hub as an assembly.

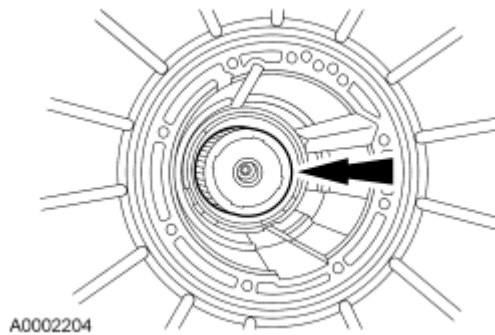


Fig. 266: Locating Forward Ring Gear And Hub
Courtesy of FORD MOTOR CO.

57. Remove the No. 6B forward clutch thrust washer from the forward ring gear hub.

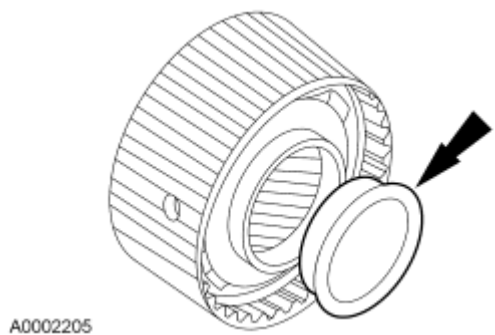


Fig. 267: Identifying No. 6B Forward Clutch Thrust Washer
Courtesy of FORD MOTOR CO.

NOTE: The No. 7 forward planet thrust bearing may come out with the forward ring gear and hub assembly.

58. Remove the No. 7 forward planet thrust bearing.

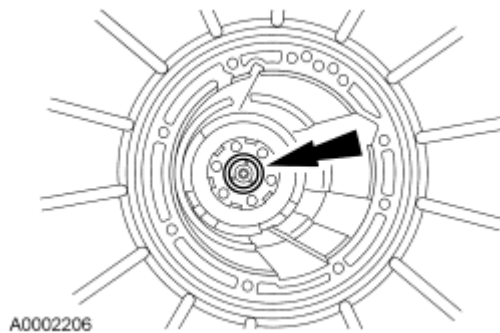


Fig. 268: Identifying No. 7 Forward Planet Thrust Bearing
Courtesy of FORD MOTOR CO.

59. Remove the forward planetary assembly.

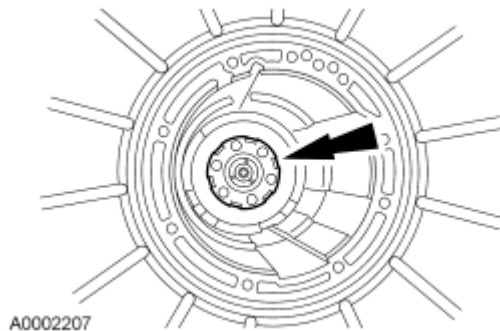


Fig. 269: Locating Forward Planetary Assembly
Courtesy of FORD MOTOR CO.

60. Remove the input shell and sun gear assembly.

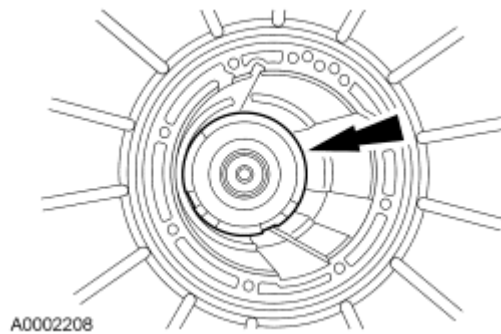


Fig. 270: Locating Input Shell And Sun Gear Assembly
Courtesy of FORD MOTOR CO.

61. Remove the spacer.

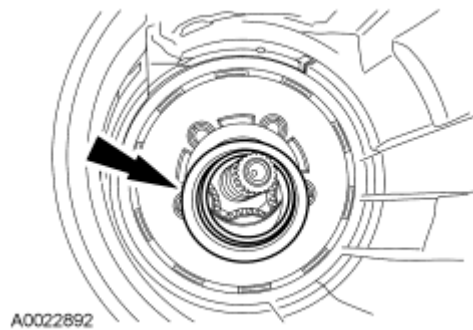


Fig. 271: Locating Spacer
Courtesy of FORD MOTOR CO.

NOTE: Tag and identify the No. 8 low/reverse planetary carrier thrust bearing.

62. Remove the thrust bearing.

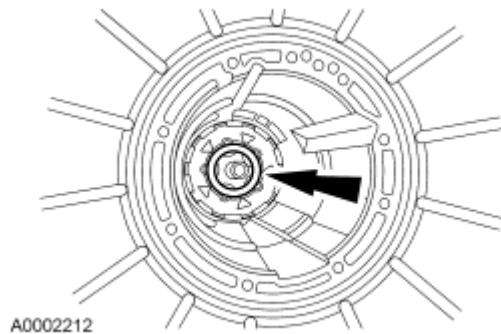


Fig. 272: Identifying Thrust Bearing
Courtesy of FORD MOTOR CO.

63. Remove the retaining ring.

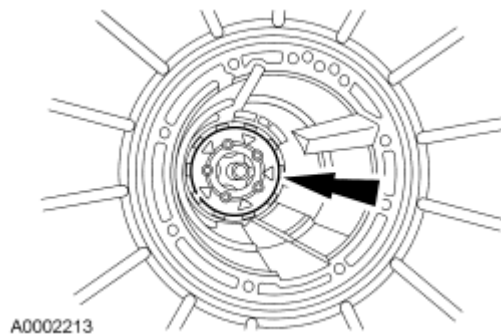


Fig. 273: Identifying Retaining Ring
Courtesy of FORD MOTOR CO.

64. Remove the low/reverse planetary assembly.

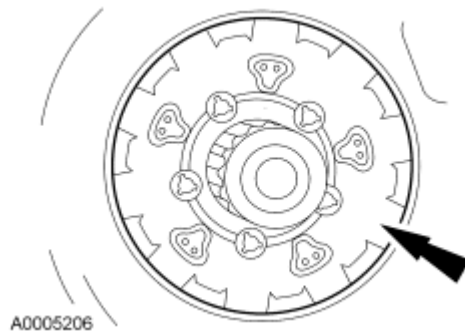


Fig. 274: Locating Low/Reverse Planetary Assembly
Courtesy of FORD MOTOR CO.

NOTE: Tag and identify the No. 9 low/reverse planetary carrier thrust bearing.

65. Remove the thrust bearing.

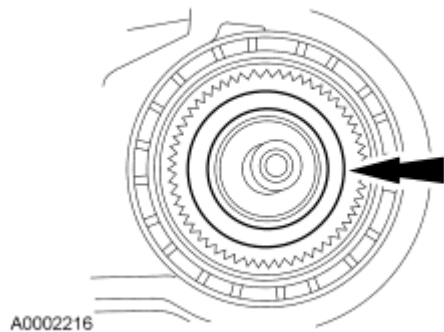


Fig. 275: Locating Thrust Bearing
Courtesy of FORD MOTOR CO.

NOTE: Use slots located around the outside of the sleeve.

66. Using a small pick, remove the output shaft sleeve.

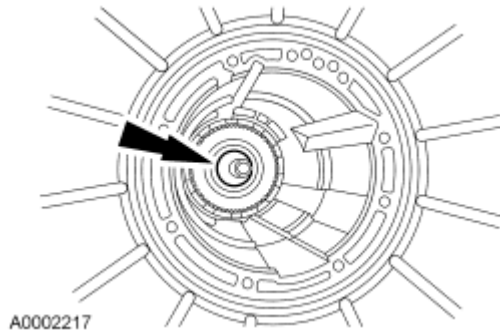


Fig. 276: Locating Output Shaft Sleeve
Courtesy of FORD MOTOR CO.

WARNING: Hold onto the output shaft so it does not fall out after removing the snap ring. Failure to follow this instruction may result in serious personal injury.

CAUTION: Discard the output shaft retaining ring. A new retaining ring must be used for assembly, otherwise transmission damage can occur.

67. While holding the output shaft, remove and discard the output shaft retaining ring.

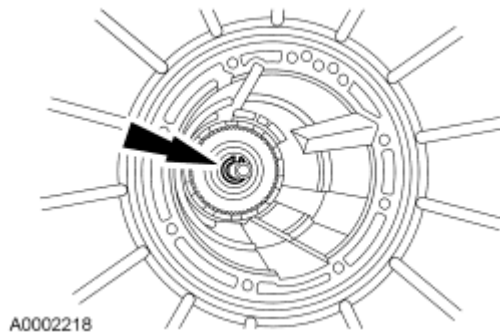


Fig. 277: Locating Output Shaft Retaining Ring
Courtesy of FORD MOTOR CO.

68. Remove the output shaft ring gear and hub.

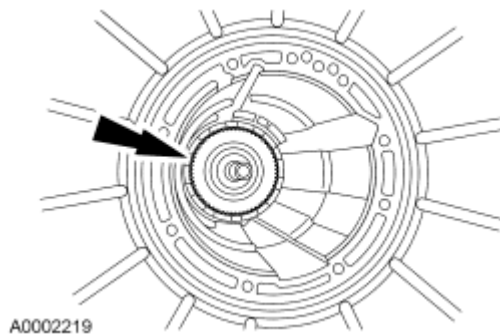


Fig. 278: Locating Output Shaft Ring Gear
Courtesy of FORD MOTOR CO.

69. Remove the No. 10 low/intermediate sun gear bearing.

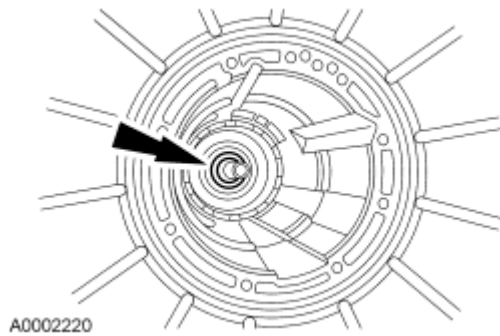


Fig. 279: Identifying No. 10 Low Intermediate Sun Gear Bearing
Courtesy of FORD MOTOR CO.

CAUTION: Do not pry on the outer edge of the case. Damage to the gasket sealing surface may occur.

NOTE: It may be necessary to grind flat spots on the edges of the reverse band actuating lever shaft in order to remove it.

70. Using a pair of vise grips, hold the flat spots on the reverse band actuating lever shaft, wiggle it back and forth and remove the reverse band actuating lever shaft.

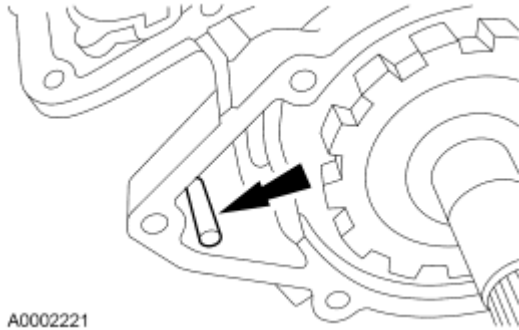


Fig. 280: Identifying Reverse Band Actuating Lever Shaft
Courtesy of FORD MOTOR CO.

71. Remove the reverse band actuating lever assembly.

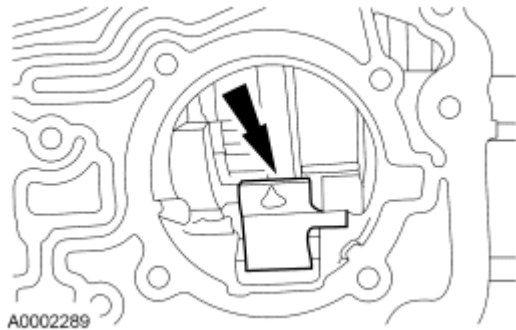


Fig. 281: Identifying Reverse Band Actuating Lever
Courtesy of FORD MOTOR CO.

NOTE: The inner race of the rear one-way clutch is not removable. It is repaired in the case.

72. Remove the low/reverse brake drum and one-way clutch assembly by rotating it clockwise.

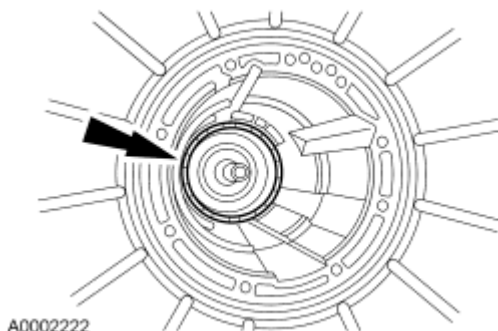


Fig. 282: Locating Low/Reverse Brake Drum
Courtesy of FORD MOTOR CO.

NOTE: The reverse one-way clutch is part of the reverse brake drum assembly.

Install a new reverse brake drum as an assembly only.

73. Inspect the reverse brake drum assembly and install a new reverse brake drum assembly if damaged.
1. Inspect the reverse brake drum sprags.
 2. Inspect the reverse brake drum rollers.
 3. Inspect the reverse brake drum.

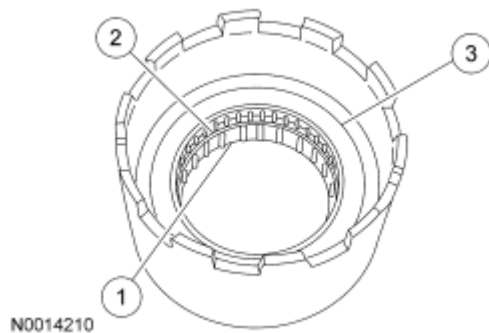


Fig. 283: Identifying Reverse Brake Drum Assembly Inspecting Areas
Courtesy of FORD MOTOR CO.

74. Remove the reverse band.

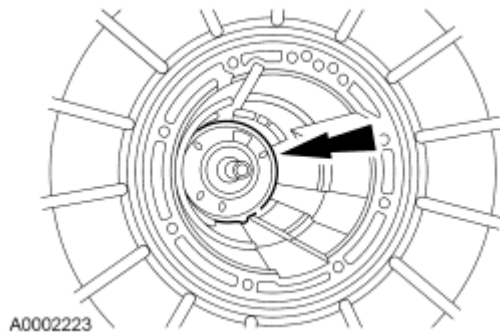
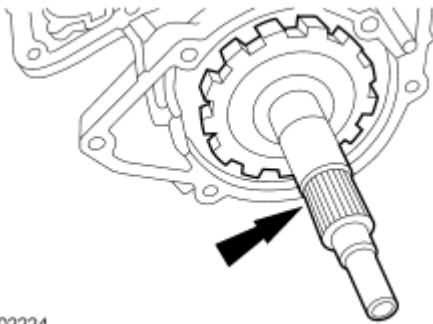


Fig. 284: Locating Reverse Band
Courtesy of FORD MOTOR CO.

75. Remove the output shaft and park gear.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



A0002224

Fig. 285: Locating Output Shaft And Park Gear
Courtesy of FORD MOTOR CO.

NOTE: Tag and identify the No. 11 output shaft thrust washer.

76. Remove the output shaft thrust washer.

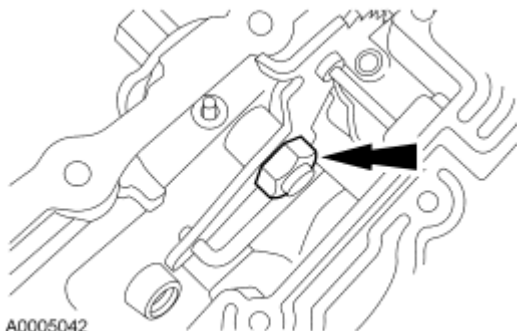


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Fig. 286: Locating Output Shaft Thrust Washer
Courtesy of FORD MOTOR CO.

CAUTION: To avoid damage, make sure the wrench does not strike the manual valve inner lever pin.

77. Remove the nut.



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Fig. 287: Locating Nut

Courtesy of FORD MOTOR CO.

78. Remove the manual shaft retaining pin.

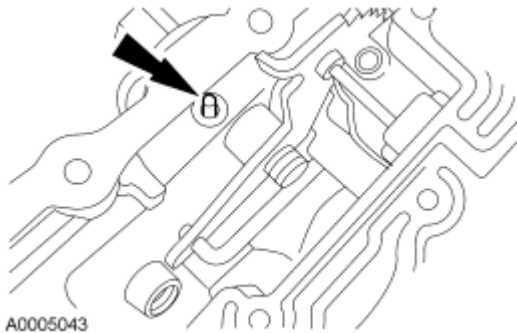


Fig. 288: Locating Manual Shaft Retaining Pin
Courtesy of FORD MOTOR CO.

79. Remove the manual control lever shaft.

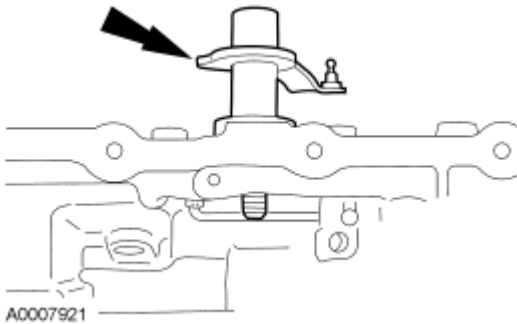


Fig. 289: Removing Manual Control Lever Shaft
Courtesy of FORD MOTOR CO.

80. Disconnect the manual valve inner lever from the parking lever actuating rod.

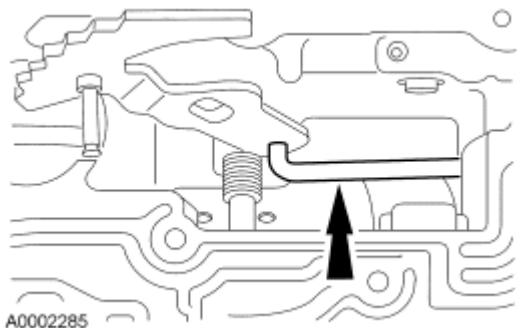


Fig. 290: Locating Manual Valve Inner Lever At Parking Lever Actuating Rod
Courtesy of FORD MOTOR CO.

81. Remove the manual valve inner lever.

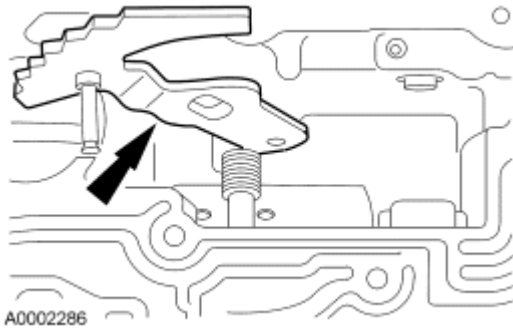


Fig. 291: Identifying Manual Control Valve Inner Lever
Courtesy of FORD MOTOR CO.

82. Remove the parking lever actuating rod.

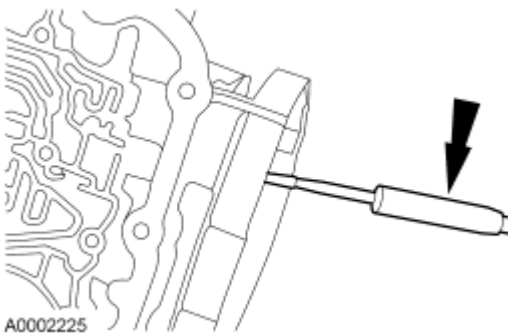


Fig. 292: Identifying Parking Lever Actuating Rod
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the bore.

83. Remove the manual control lever seal.

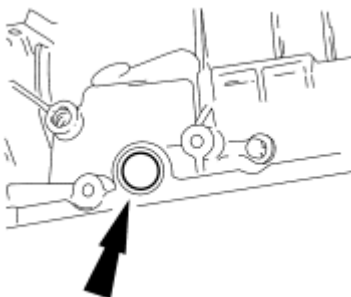


Fig. 293: Locating Manual Control Lever Seal

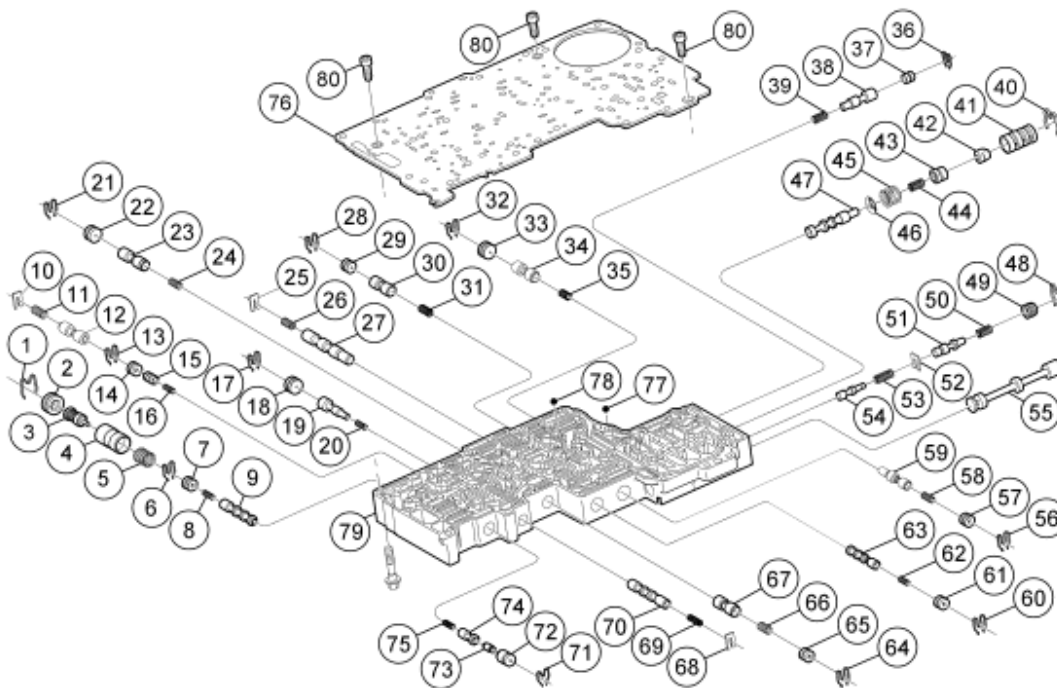
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

MAIN CONTROL VALVE BODY

Special Tools

Illustration	Tool Name	Tool Number
 ST1639-A	Aligner, Valve Body (2 required)	307-334 (T95L-70010-C)



A0028226

Fig. 294: Exploded View Of Main Control Valve Body
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Clip - retainer
2	-	Plug - retainer
3	-	Valve assembly - thermo
4	-	Valve - fluid cooler bypass
5	-	Spring - fluid cooler bypass
6	-	Clip - retainer

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

7	-	Plug - retainer
8	-	Spring - converter clutch control valve
9	-	Valve - converter clutch control
10	-	Plate
11	-	Spring - coast clutch control
12	-	Valve - coast clutch control
13	-	Clip - retainer
14	-	Plug - retainer
15	-	Valve - converter clutch back pressure
16	-	Spring - converter clutch back pressure
17	-	Clip - retainer
18	-	Plug - retainer
19	-	Valve - VFS2 modulator
20	-	Spring - VFS2 modulator valve
21	-	Clip - retainer
22	-	Plug - retainer
23	-	Valve - intermediate servo release
24	-	Spring - intermediate servo release valve
25	-	Plate
26	-	Spring - high clutch control
27	-	Valve - high clutch control
28	-	Plug - retainer
29	-	Clip - retainer
30	-	Valve - reverse modulator
31	-	Spring - reverse modulator valve
32	-	Clip - retainer
33	-	Plug - retainer
34	-	Valve - reverse engagement
35	-	Spring - reverse engagement valve
36	-	Clip - retainer
37	-	Plug - retainer
38	-	Valve - VFS1 modulator
39	-	Spring - VFS1 modulator valve
40	-	Clip - retainer
41	-	Sleeve
42	-	Valve - booster
43	-	Valve - booster
44	-	Spring - inner
45	-	Spring - outer
46	-	Spring - retainer
47	-	Valve - main regulator

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	-	Clip - retainer
49	-	Plug - retainer
50	-	Spring - converter limit
51	-	Valve - converter limit
52	-	Plate
53	-	Spring - solenoid regulator valve
54	-	Valve - solenoid regulator
55	-	Valve - manual
56	-	Clip - retainer
57	-	Plug - retainer
58	-	Spring - rear servo control valve
59	-	Valve - rear servo control
60	-	Clip - retainer
61	-	Plug - retainer
62	-	Spring - RS ISA select valve
63	-	Valve - RS ISA select
64	-	Clip - retainer
65	-	Plug - retainer
66	-	Spring - forward engagement control valve
67	-	Valve - forward engagement control
68	-	Plate
69	-	Spring - Overdrive servo control
70	-	Valve - Overdrive servo control
71	-	Retainer - clip
72	-	Sleeve - converter clutch modulator control
73	-	Valve - converter clutch modulator control
74	-	Valve - converter clutch modulator
75	-	Spring - converter clutch modulator control
76	7Z490	Plate assembly - main control valve body separator
77	7E195	Ball - lubrication check
78	7E195	Ball - shuttle valve
79	7A101	Body - control valve lower
80	W701099	Screws - separator plate

DISASSEMBLY**NOTE: The valve body separator plate has a bonded gasket. Do not reuse.**

Discard the plate.

1. Remove and discard the valve body separator plate.

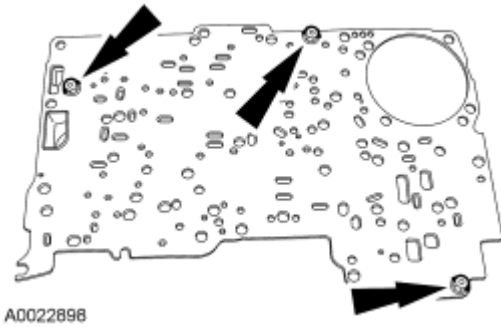


Fig. 295: Locating Valve Body Separator Plate
Courtesy of FORD MOTOR CO.

2. Remove the check balls.

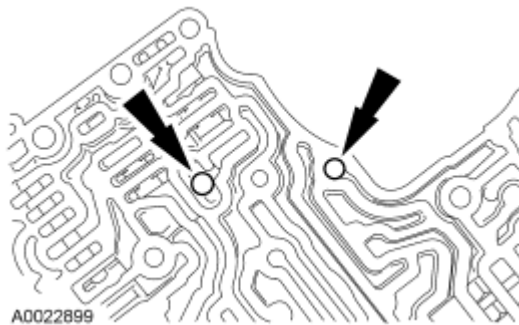


Fig. 296: Locating Main Control Valve Body Check Balls
Courtesy of FORD MOTOR CO.

NOTE: Refer to the disassembled view.

3. Disassemble the main control valve body only if cleaning is required.

ASSEMBLY

1. Thoroughly clean all parts in solvent and blow dry with moisture-free compressed air.

CAUTION: Do not stone, file or sand the valves. This will remove the anodized finish and may result in further main control or transmission damage.

2. After cleaning the main control valve body, carry out the following:
 - Inspect all valve and plug bores for scoring or burrs.

- Check all fluid passages for obstructions.
 - Inspect all valves and plugs for burrs.
 - Inspect all mating surfaces for burrs or distortion.
 - Inspect all springs for distortion.
 - Check all valves and plugs for free movement in their respective bores.
 - Valves and plugs, when dry, must fall from their own weight into their respective bores.
 - Roll the manual valve on a flat surface to check for a bent condition.
3. Assemble the main control valve body.
 4. Install the main control valve body check balls.

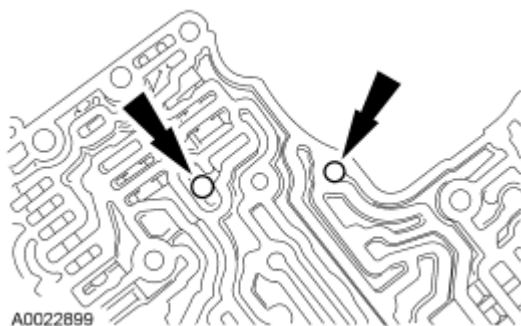


Fig. 297: Locating Main Control Valve Body Check Balls
Courtesy of FORD MOTOR CO.

NOTE: Use a new valve body separator plate for main control valve body installation.

5. Using the special tools, install a new main control valve body separator plate.
 - Tighten to 7 Nm (62 lb-in).

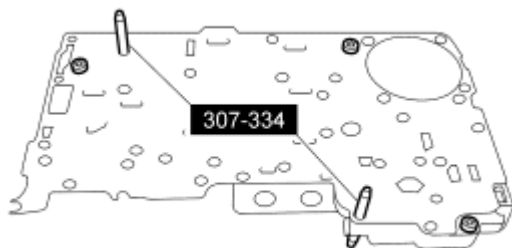
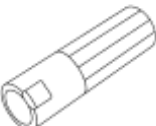


Fig. 298: Identifying Special Tool (307-334)
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Special Tools

Illustration	Tool Name	Tool Number
 ST1833-A	Installer, Torque Converter Fluid Seal	307-349 (T97T-77000-A)
 ST1817-A	Alignment Set, Fluid Pump	307-S039 (T74P-77103-X)
 ST2532-A	Aligner, Fluid Pump Handle	307-431
 ST2533-A	Aligner, Fluid Pump Pilot	307-432
 ST1826-A	Sizer, Piston Seal	307-338 (T95L-70010-G)
 ST2419-A	Alignment Pins, Transmission Pump	307-398
 ST2684-A	Transmission Fluid Pump Seal Aligner	307-451/1
	Transmission Fluid Pump Seal Sizer	307-451/2

 ST2685-A		
 ST2686-A	Transmission Fluid Pump Seal Installer	307-451/3

Material

Item	Specification
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

DISASSEMBLY

1. Remove the fluid pump gasket, fluid pump seal ring and the No. 1 thrust washer.
 1. Remove and discard the fluid pump gasket.
 2. Remove and discard the fluid pump seal ring (square cut).
 3. Remove and tag the No. 1 thrust washer.

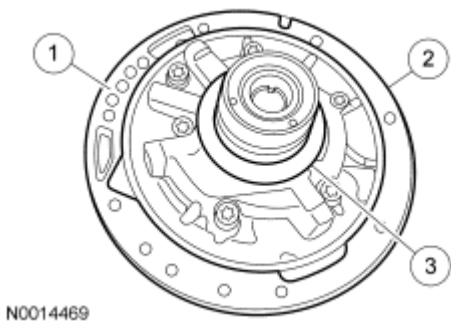


Fig. 299: Identifying Fluid Pump Gasket, Fluid Pump Seal Ring, And No. 1 Thrust Washer
Courtesy of FORD MOTOR CO.

2. Remove the fluid pump support seal ring.

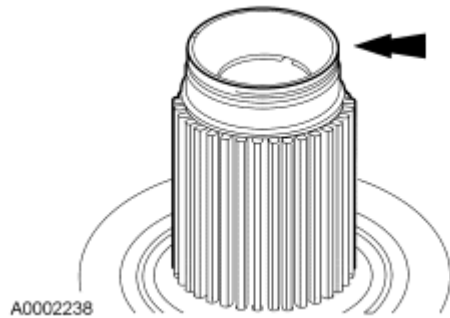


Fig. 300: Locating Fluid Pump Support Seal Ring
Courtesy of FORD MOTOR CO.

3. Remove the seal rings.

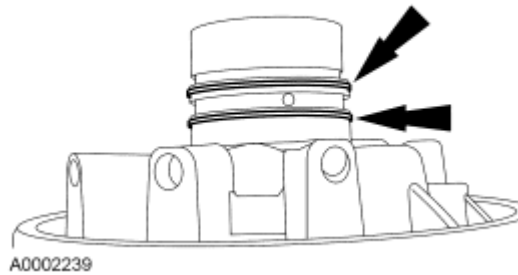


Fig. 301: Locating Seal Rings
Courtesy of FORD MOTOR CO.

4. Remove the fluid pump housing.

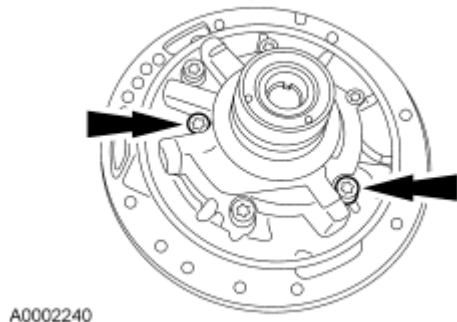


Fig. 302: Locating Fluid Pump Housing Retaining Screws
Courtesy of FORD MOTOR CO.

NOTE: A rough casting on the pump surface crescent is not a flaw.

NOTE: The fluid pump gears are part of the pump assembly and are not repaired separately.

5. Remove the fluid pump gears.

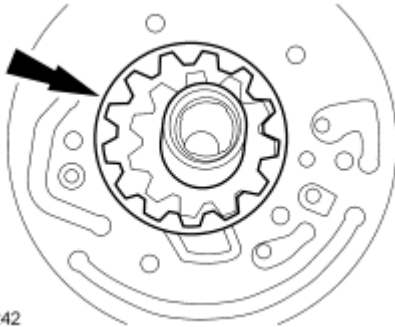


Fig. 303: Locating Fluid Pump Gears
Courtesy of FORD MOTOR CO.

6. Remove the drive gear O-ring seal and discard. Inspect the fluid pump gears for cracks and scoring.

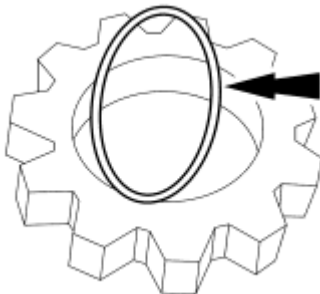


Fig. 304: Locating Fluid Pump Drive Gear O-Ring Seal
Courtesy of FORD MOTOR CO.

7. Inspect the overdrive pump.
- Inspect the overdrive pump support gear pockets for scoring and wear.
 - Clean and inspect the overdrive and rear input shaft bushings.

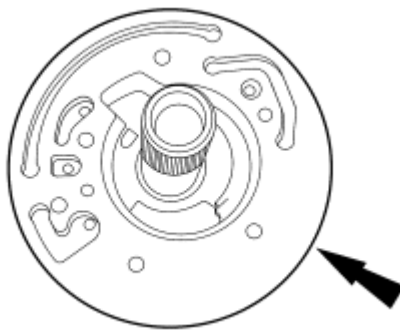
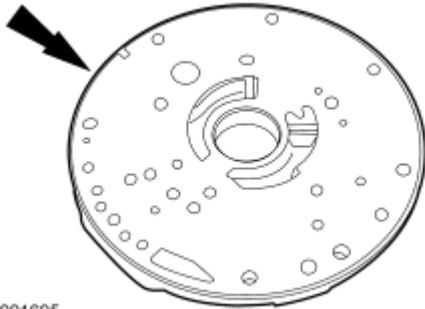


Fig. 305: Locating Overdrive Pump
Courtesy of FORD MOTOR CO.

8. Inspect the fluid pump adapter plate for scoring and wear.



A0001695

Fig. 306: Identifying Fluid Pump Adapter Plate
Courtesy of FORD MOTOR CO.

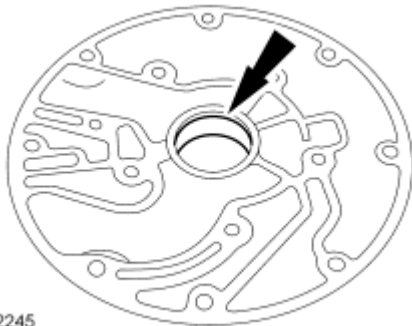
9. Remove and discard the valve.



A0022900

Fig. 307: Locating Valve
Courtesy of FORD MOTOR CO.

10. Inspect the fluid pump to converter housing bushing.



A0002245

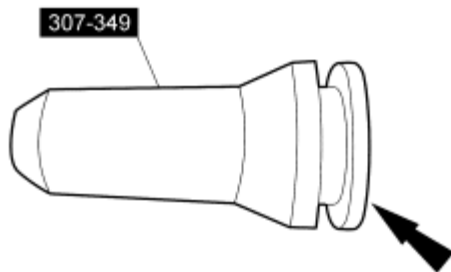
Fig. 308: Locating Fluid Pump-To-Converter Housing Bushing
Courtesy of FORD MOTOR CO.

NOTE: Minor burrs and scoring may be removed with crocus cloth. If damage is found, install a new assembly.

1. Inspect the fluid pump components for the following:
 - Pump body and case for burrs.
 - Fluid passages for obstructions.

NOTE: Check and make sure that the garter spring in the seal has not popped off of the converter hub seal.

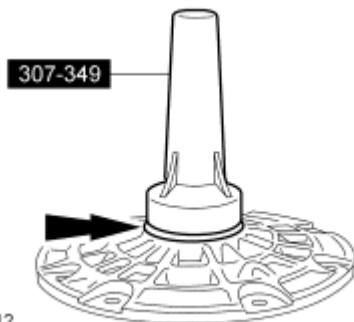
2. Install a new seal onto the special tool.



N0014211

Fig. 309: Installing Seal Onto Special Tool (307-349)
Courtesy of FORD MOTOR CO.

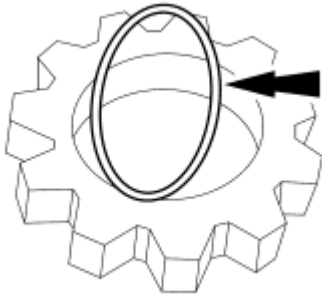
3. Using the special tool, install the converter hub seal.



N0014212

Fig. 310: Installing Converter Hub Seal Using Special Tool (307-349)
Courtesy of FORD MOTOR CO.

4. Install a new O-ring seal in the fluid pump drive gear.

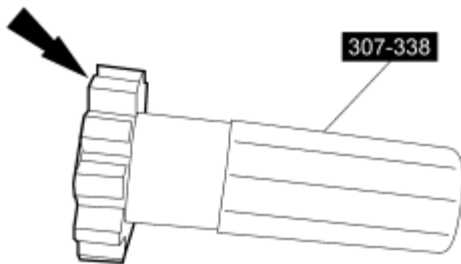


A0002243

Fig. 311: Locating Fluid Pump Drive Gear O-Ring Seal
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the special tool with multi-purpose grease.

5. Using the special tool, seat the O-ring seal in the pump gear.

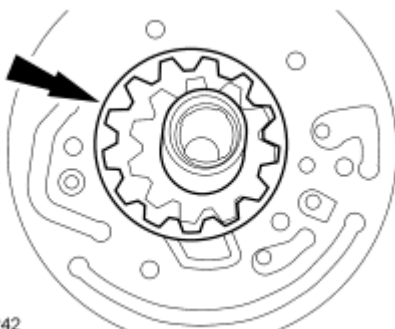


N0014213

Fig. 312: Identifying Special Tool (307-338)
Courtesy of FORD MOTOR CO.

NOTE: The chamber on the inside edge of the small gear must be UP when in the pump housing gear pocket. The dimple on the larger gear must be DOWN when in the pump housing gear pocket.

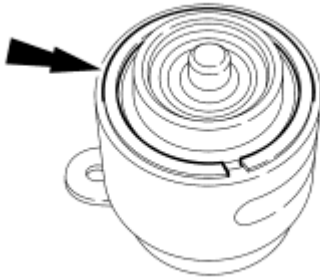
6. Install the pump gears into the fluid pump housing. Apply multi-purpose grease to the pump gear to prevent scoring at start up.



A0002242

Fig. 313: Locating Fluid Pump Gears
Courtesy of FORD MOTOR CO.

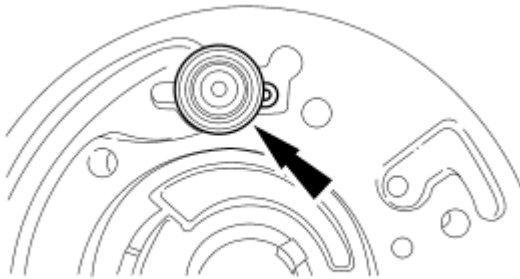
7. Install a new seal on the new valve.



A0022901

Fig. 314: Installing New Seal On Valve
Courtesy of FORD MOTOR CO.

8. Install a new valve with the tab facing down.



A0022902

Fig. 315: Installing Valve With Tab Facing Down
Courtesy of FORD MOTOR CO.

9. First, install the fluid pump adapter plate, then install the alignment pins in their correct location.



N0014214

Fig. 316: Identifying Special Tool (307-398)
Courtesy of FORD MOTOR CO.

CAUTION: The special tools must be used to correctly align the pump with the adapter plate to reduce gear noise, bushing failure and leakage.

10. Using the special tool, align the fluid pump to the adapter plate.

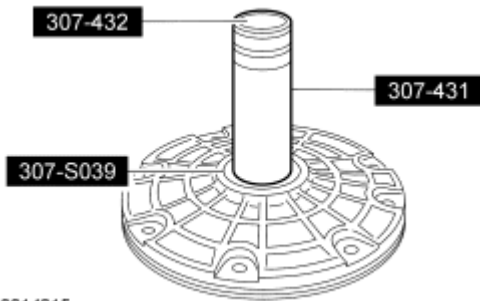


Fig. 317: Identifying Special Tools (307-432), (307-431) & (307-S039)
Courtesy of FORD MOTOR CO.

11. Using the special tools, assemble the pump.

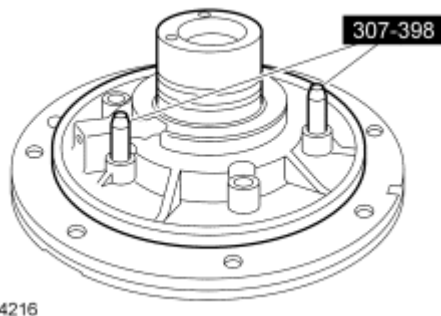


Fig. 318: Identifying Special Tool (307-398)
Courtesy of FORD MOTOR CO.

12. Loosely install the fluid pump housing screws in their correct location and remove the special tools.

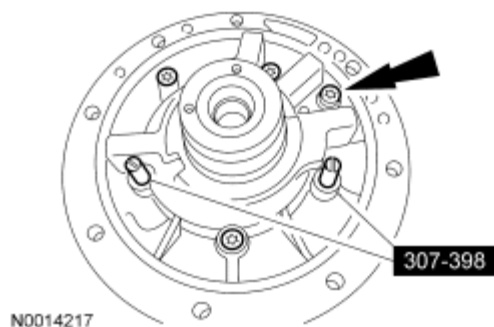
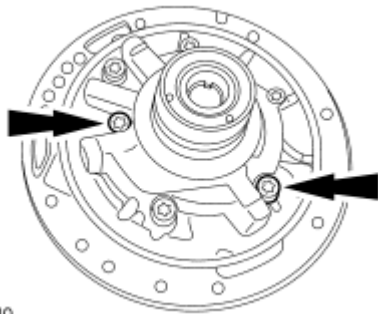


Fig. 319: Identifying Special Tool (307-398) And Fluid Pump Housing Screws

Courtesy of FORD MOTOR CO.

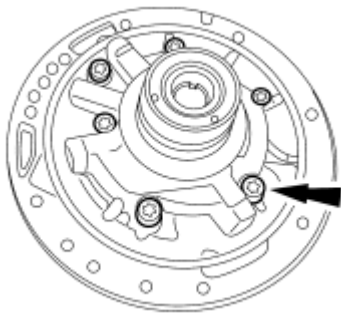
13. Install the 2 remaining screws.



A0002240

Fig. 320: Locating Fluid Pump Housing Retaining Screws
Courtesy of FORD MOTOR CO.

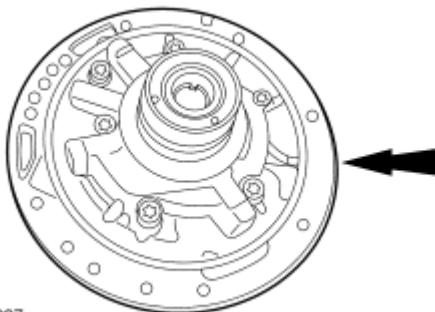
14. Tighten all of the fluid pump screws in a star pattern.
- Tighten to 22 Nm (16 lb-ft).



N0001482

Fig. 321: Tightening Fluid Pump Screws In Star Pattern
Courtesy of FORD MOTOR CO.

15. Install a new fluid pump seal ring.



A0002227

Fig. 322: Identifying Fluid Pump Seal Ring
Courtesy of FORD MOTOR CO.

16. Install the 2 new seal rings.

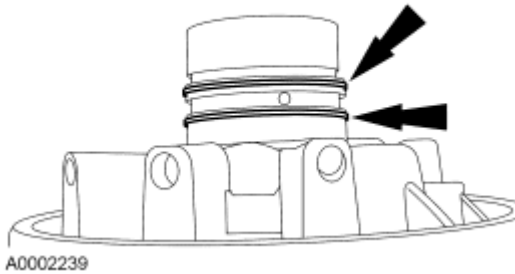


Fig. 323: Locating Seal Rings
Courtesy of FORD MOTOR CO.

CAUTION: Be careful not to overstretch the seal ring past the seal ring groove.
Damage to the seal will occur.

17. Using the special tools, install the fluid pump seal ring.

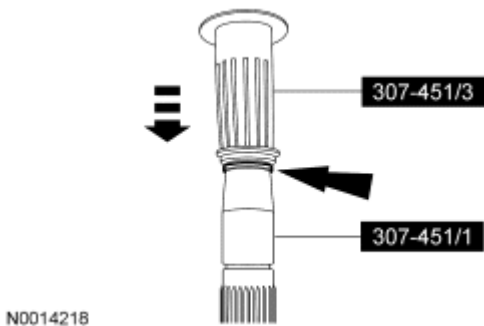


Fig. 324: Installing Fluid Pump Seal Ring Using Special Tools (307-451/3) & (307-451/1)
Courtesy of FORD MOTOR CO.

NOTE: Verify correct seal installation. Make sure seal grooves are clean and free of burrs.

NOTE: Make sure seal grooves are clean and free of burrs. Make sure that the seal is seated into the groove.

18. Verify the seal is installed correctly.

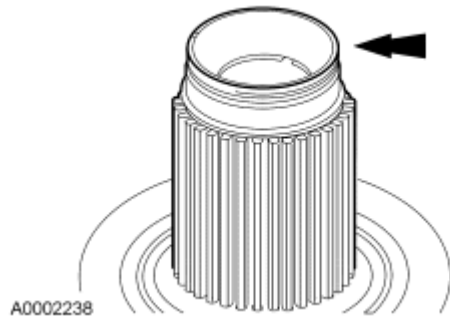


Fig. 325: Locating Fluid Pump Support Seal Ring
Courtesy of FORD MOTOR CO.

CAUTION: Failure to correctly size the seal will cause damage to the seal when the torque converter is installed.

19. Using the special tool, size the seal to the correct size. Leave the special tool on the seal ring for 2 minutes to obtain the correct seal size.

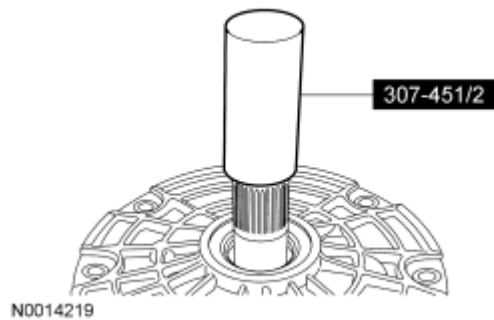


Fig. 326: Identifying Special Tool (307-451/2)
Courtesy of FORD MOTOR CO.

OVERDRIVE BRAKE AND COAST CLUTCH DRUM ASSEMBLY

Special Tools

Illustration	Tool Name	Tool Number
ST1190-A	Compressor, Clutch Spring	307-015 (T65L-77515-A)
	Protector, Piston Seal	307-049 (T74P-77404-A)

2008 Ford Mustang

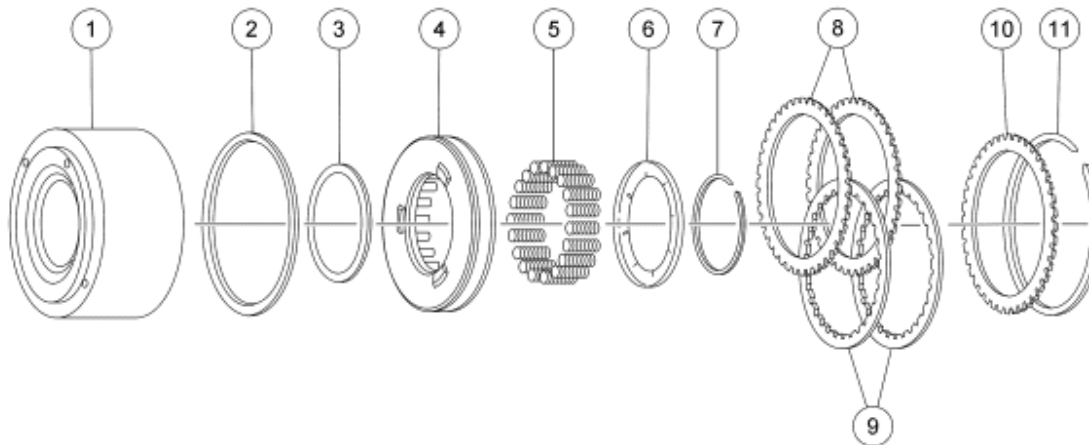
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



ST2431-A

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V



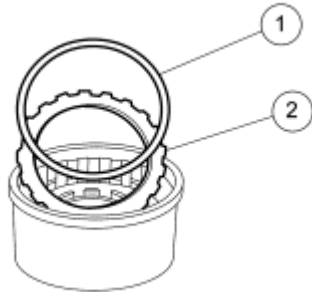
N0014220

Fig. 327: Exploded View Of Overdrive Brake & Coast Clutch Drum Assembly
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7L669	Coast clutch drum
2	7A548	Overdrive piston outer seal ring
3	7D404	Overdrive piston inner seal ring
4	7A262	Overdrive clutch piston
5	7A480	Overdrive piston spring (20 required)
6	7A527	Coast clutch piston spring retainer
7	E860125-S	Retaining ring
8	7B442	Coast clutch external plates - steel (2 required)
9	7B164	Coast clutch internal plates - friction (2 required)
10	7B066	Coast clutch pressure plate
11	E860126S/129S	Retaining ring (select fit)

DISASSEMBLY

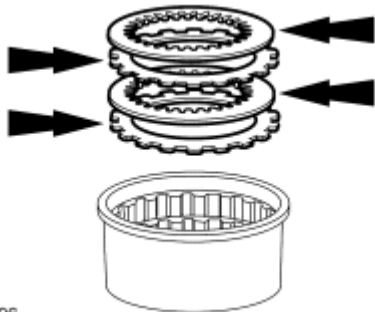
1. Remove the coast clutch pressure plate.
 1. Remove the coast clutch retaining ring.
 2. Remove the coast clutch pressure plate.



N0014221

Fig. 328: Identifying Coast Clutch Pressure Plate And Coast Clutch Retaining Ring
Courtesy of FORD MOTOR CO.

2. Remove the coast clutch disc pack.
 - Inspect for wear, install a new pack as necessary.



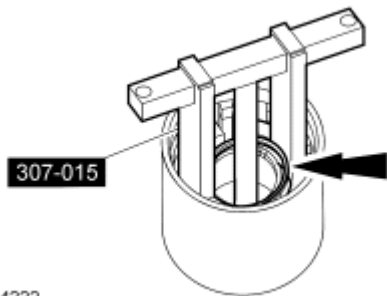
A0002296

Fig. 329: Locating Coast Clutch Disc Pack
Courtesy of FORD MOTOR CO.

WARNING: While removing or installing the retaining ring, slowly release tool pressure on clutch piston springs. Failure to follow this instruction may cause the assembly to separate forcefully, resulting in serious personal injury.

CAUTION: Do not fully compress the special tool or damage to the spring retainer may occur.

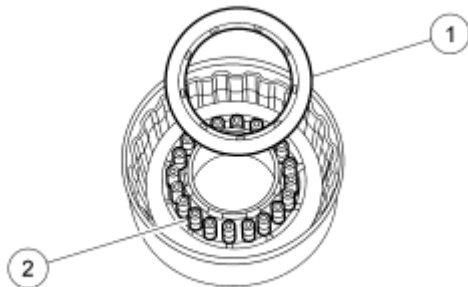
3. Using the special tool, remove the coast clutch piston retaining ring.



N0014222

Fig. 330: Identifying Special Tool (307-015) And Coast Clutch Piston Retaining Ring
Courtesy of FORD MOTOR CO.

4. Relieve the coast clutch spring tension and remove the special tool.
5. Remove the coast clutch piston springs.
 1. Remove the coast clutch piston retainer.
 2. Remove the clutch piston springs.



N0014223

Fig. 331: Identifying Coast Clutch Piston Springs And Coast Clutch Piston Retainer
Courtesy of FORD MOTOR CO.

WARNING: When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

6. Remove the coast clutch piston.
 - Apply air pressure to the hole in the drum to remove the coast clutch piston while blocking the other hole with a finger.

2008 Ford Mustang

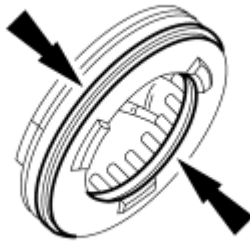
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



A0026258

Fig. 332: Applying Air Pressure To Hole In Drum While Blocking Other Hole With Finger
Courtesy of FORD MOTOR CO.

7. Remove and discard the coast clutch piston inner seal and the coast clutch piston outer seal.



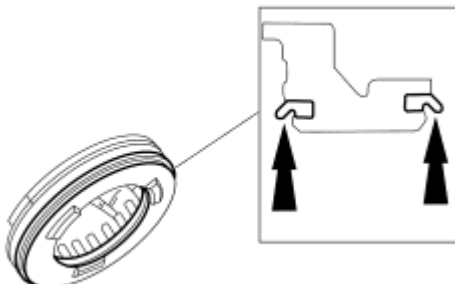
A0002260

Fig. 333: Locating Coast Clutch Piston Inner And Outer Seals
Courtesy of FORD MOTOR CO.

ASSEMBLY

CAUTION: The lip seals must be positioned as shown. Care must be taken to prevent rollover of the lip seal.

1. Install the new coast clutch piston inner and outer seal.



N0014224

Fig. 334: Locating Coast Clutch Piston Inner And Outer Seal
Courtesy of FORD MOTOR CO.

2. Verify the check ball is free to move.

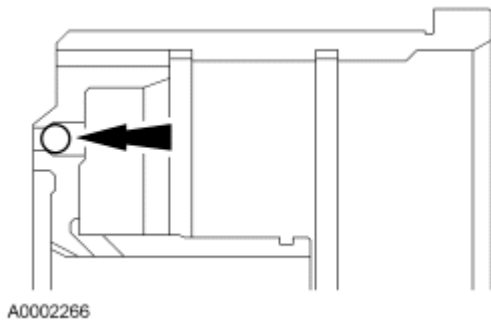
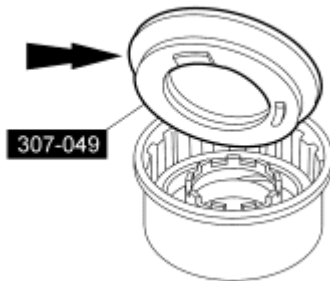


Fig. 335: Locating Check Ball
Courtesy of FORD MOTOR CO.

CAUTION: Care must be taken to prevent damage to the seals during installation.

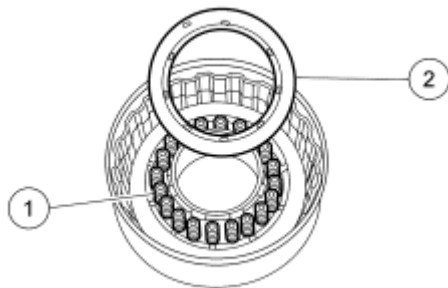
3. Using the special tool, install the coast clutch piston.
 - Lubricate the seals with transmission fluid.



N0014225

Fig. 336: Identifying Special Tool (307-049) And Coast Clutch Piston
Courtesy of FORD MOTOR CO.

4. Install the coast clutch piston springs.
 1. Install the coast clutch piston springs.
 2. Install the coast clutch spring retainer.

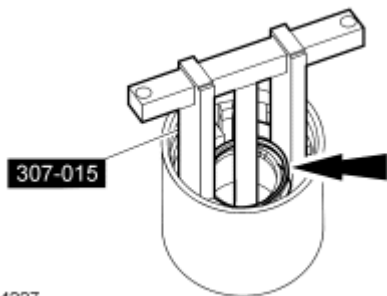


N0014226

Fig. 337: Identifying Coast Clutch Piston Springs
Courtesy of FORD MOTOR CO.

CAUTION: Do not fully compress the special tool or damage to the coast clutch piston spring retainer may occur.

5. Using the special tool, install the coast clutch piston spring retainer ring.



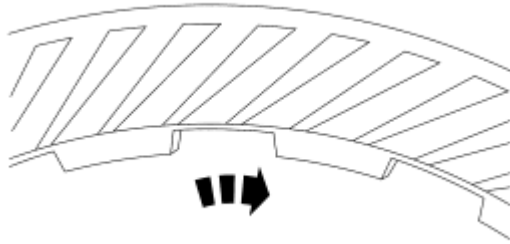
N0014227

Fig. 338: Identifying Special Tool (307-015) And Coast Clutch Piston Spring Retainer Ring
Courtesy of FORD MOTOR CO.

CAUTION: Coast clutch friction plates are directional and must be installed with grooves clockwise (ID to OD). The word TOP should face up, otherwise transmission damage can occur.

CAUTION: If new clutch plates are being used, they should be soaked in clean automatic transmission fluid before assembly, otherwise transmission damage can occur.

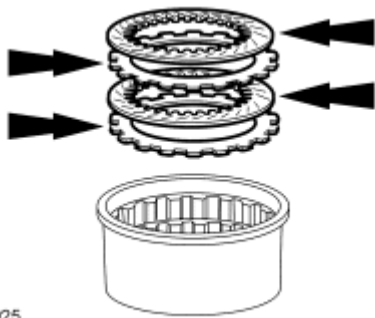
6. When installing friction plates, the word TOP should face up. If reusing plates, grooves must be installed clockwise. Install the coast clutch disc pack.



A0002230

Fig. 339: Rotating Coast Clutch Disc Pack Clockwise
Courtesy of FORD MOTOR CO.

7. Install the 2 steel clutch plates and 2 friction clutch plates in alternating order starting with a steel clutch plate.

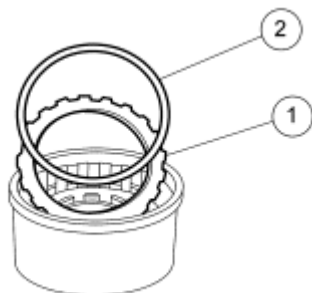


A0007925

Fig. 340: Locating Steel Clutch Plates And Friction Clutch Plates
Courtesy of FORD MOTOR CO.

NOTE: The retaining ring is select fit.

8. Install the coast clutch pressure plate.
 1. Install the coast clutch pressure plate.
 2. Install the original coast clutch retaining ring.



N0014228

Fig. 341: Identifying Original Coast Clutch Retaining Ring And Coast Clutch Pressure Plate

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Courtesy of FORD MOTOR CO.

WARNING: When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

9. Air check the assembly.
 - Apply air pressure to the hole in the drum while blocking the other hole with a finger.



Fig. 342: Applying Air Pressure To Hole In Drum While Blocking Other Hole With Finger
Courtesy of FORD MOTOR CO.

10. Check the coast clutch disc pack free play.
 1. Push down on the coast pressure plate.
 2. Check clearance between the coast clutch retaining ring and coast pressure plate. Clearance should be 1.3-2.0 mm (0.051-0.079 in). If clearance is not within the specification, install a correct coast clutch retaining ring that will provide the correct free play adjustment.

Part Number	Thickness		Diameter	
	mm	Inch	mm	Inch
E860126-S	1.37	0.0539	130.1	5.122
E860127-S	1.73	0.0681	130.1	5.122
E860128-S	2.08	0.0819	130.1	5.122
E860129-S	2.44	0.0961	130.1	5.122

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

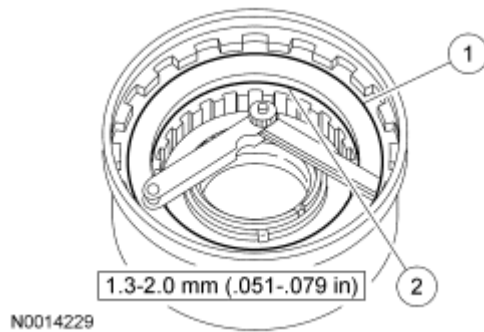
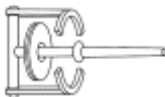


Fig. 343: Checking Clearance Between Coast Clutch Retaining Ring And Coast Pressure Plate
Courtesy of FORD MOTOR CO.

DIRECT CLUTCH DRUM ASSEMBLY

Special Tools

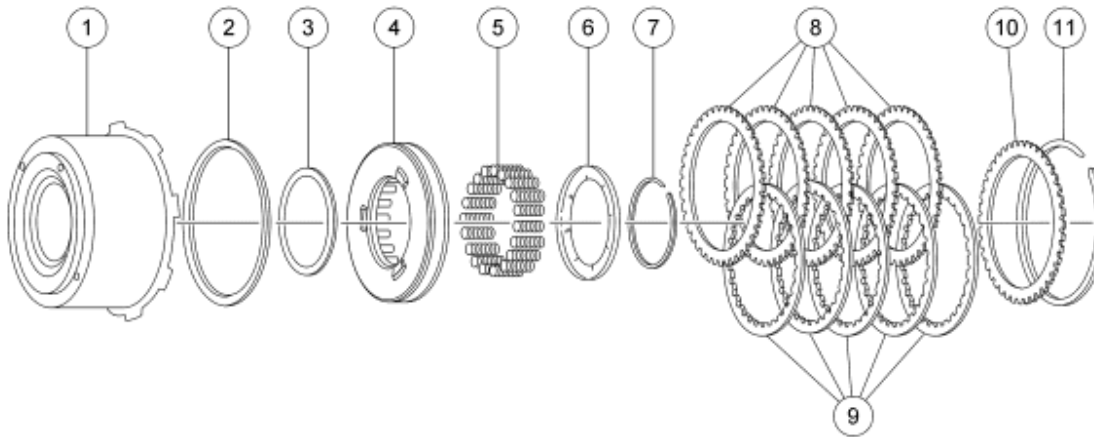
Illustration	Tool Name	Tool Number
 ST1190-A	Compressor, Clutch Spring	307-015 (T65L-77515-A)
 ST2431-A	Protector, Piston Seal	307-049 (T74P-77404-A)

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



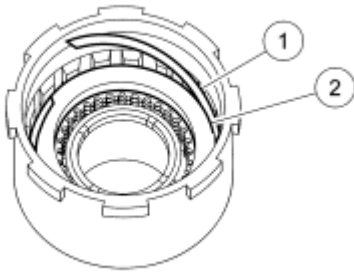
N0014230

Fig. 344: Exploded View Of Direct Clutch Drum Assembly
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7D044	Intermediate brake drum assembly
2	7A548	Direct piston outer seal ring
3	7D404	Direct piston inner seal ring
4	7A262	Direct clutch piston
5	7A480	Direct piston spring (20 required)
6	7A527	Direct clutch piston spring retainer
7	E860125-S	Retaining ring
8	7B442	Direct clutch external spline plates
9	7B164	Direct clutch internal spline plates
10	7B066	Direct clutch pressure plate
11	E860126S/129S	Retaining ring (select fit)

DISASSEMBLY

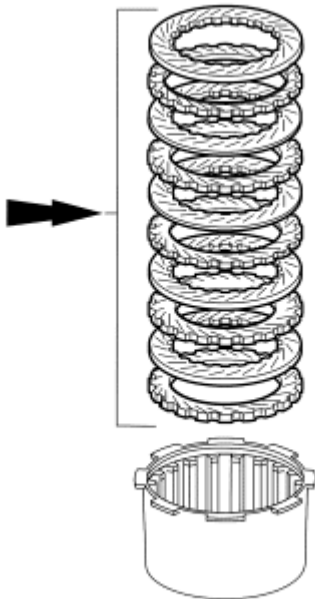
1. Remove the direct clutch retaining ring and the direct clutch pressure plate.
 1. Remove the direct clutch retaining ring.
 2. Remove the direct clutch pressure plate.



N0014231

Fig. 345: Identifying Direct Clutch Pressure Plate & Clutch Retaining Ring
Courtesy of FORD MOTOR CO.

2. Remove the direct clutch disc pack.
 - Inspect and install new friction plates if worn, damaged or overheated.



A0007927

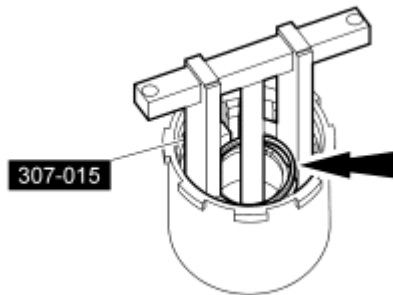
Fig. 346: Locating Direct Clutch Disc Pack
Courtesy of FORD MOTOR CO.

WARNING: While removing or installing the retaining ring, slowly release tool pressure on clutch piston springs. Failure to follow this instruction may cause the assembly to separate forcefully, resulting in serious personal injury.

CAUTION: Do not fully compress the special tool or damage to the spring

retainer may occur.

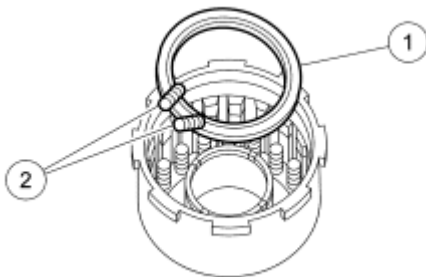
3. Using the special tool, remove the direct clutch piston retaining ring.



N0014232

Fig. 347: Identifying Special Tool (307-015) And Direct Clutch Piston Retaining Ring
Courtesy of FORD MOTOR CO.

4. Relieve the direct clutch spring tension and remove the special tool.
5. Remove the direct clutch piston spring retainer and the direct clutch piston springs.
 1. Remove the direct clutch piston spring retainer.
 2. Remove the direct clutch piston springs.



N0014233

Fig. 348: Identifying Direct Clutch Piston Spring Retainer On Direct Clutch Piston Springs
Courtesy of FORD MOTOR CO.

WARNING: When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

6. Using compressed air, remove the direct clutch piston from the direct clutch drum.
 - Apply air pressure to the hole in the drum while blocking the other hole with a finger.

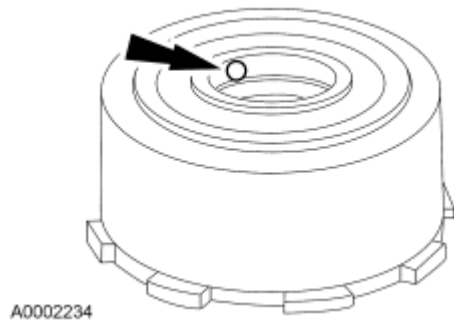


Fig. 349: Locating Drum Air Pressure Apply Hole
Courtesy of FORD MOTOR CO.

7. Remove and discard the direct clutch piston inner and outer seal.
 1. Remove and discard the direct clutch piston inner seal.
 2. Remove and discard the direct clutch piston outer seal.
 3. Clean the components as necessary.

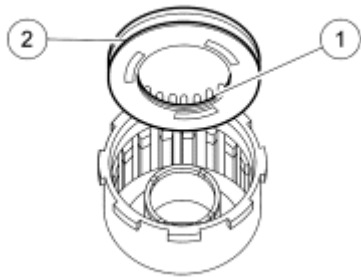


Fig. 350: Identifying Direct Clutch Piston Inner & Outer Seal
Courtesy of FORD MOTOR CO.

ASSEMBLY

1. Inspect the clutch components for damage or wear. Install new components as necessary.
 - Inspect the drum surface for damage.
 - Inspect the clutch piston bore and piston.
 - Check the fluid passages for obstructions. All fluid passages must be clean and free of obstructions.
 - Inspect the clutch plates for damage.
 - Inspect the clutch springs.

CAUTION: The lip seals must be positioned as shown. Care must be taken to prevent rollover of the lip seal.

NOTE: Use new seals to help prevent seal failures.

2. Install the new direct clutch piston inner seal and the direct clutch piston outer seal.

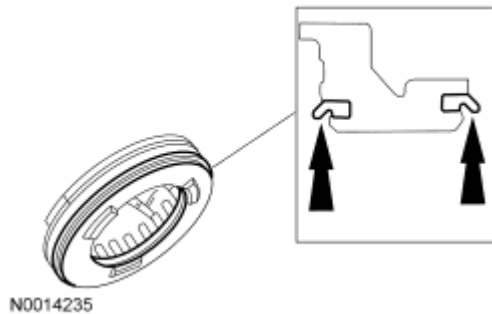


Fig. 351: Locating Direct Clutch Piston Inner Seal And Direct Clutch Piston Outer Seal
Courtesy of FORD MOTOR CO.

3. Verify the check ball is free to move.

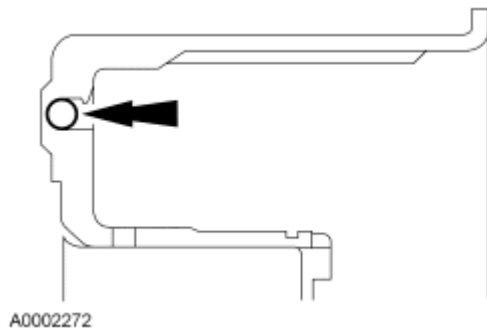


Fig. 352: Locating Check Ball
Courtesy of FORD MOTOR CO.

CAUTION: Care must be taken to prevent damage to the seals during installation.

4. Using the special tool, install the direct clutch piston.
 - Lubricate the seals with transmission fluid before installing.

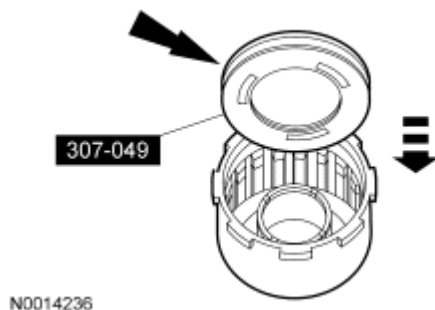
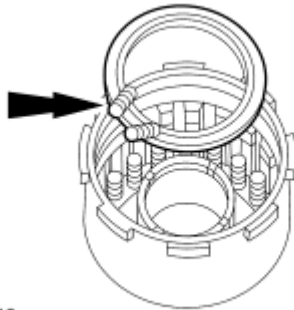


Fig. 353: Installing Direct Clutch Piston Using Special Tool (307-049)
Courtesy of FORD MOTOR CO.

5. Install the direct clutch piston springs and the retainer.



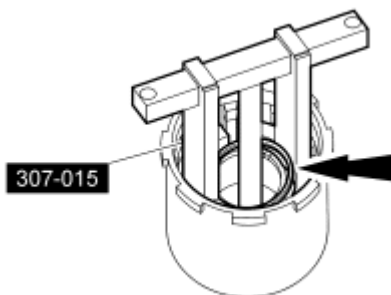
A0016119

Fig. 354: Locating Direct Clutch Piston Springs And Retainer
Courtesy of FORD MOTOR CO.

WARNING: While removing or installing the retaining ring, slowly release tool pressure on clutch piston springs. Failure to follow this instruction may cause the assembly to separate forcefully, resulting in serious personal injury.

CAUTION: Do not fully compress the special tool or damage to the spring retainer may occur.

6. Using the special tool, install the direct clutch piston retaining ring.



N0014232

Fig. 355: Identifying Special Tool (307-015) And Direct Clutch Piston Retaining Ring
Courtesy of FORD MOTOR CO.

CAUTION: The direct clutch friction plates are directional and must be installed correctly. Alternate the internally splined (clockwise) and the externally splined (counterclockwise) clutch plates, otherwise transmission damage can occur.

CAUTION: If new plates are used, they should be soaked in clean automatic transmission fluid before assembly, otherwise transmission damage can occur.

7. When installing friction plates, alternate the internally splined (clockwise) and the externally splined (counterclockwise) clutch plates. Install the direct clutch disc pack.

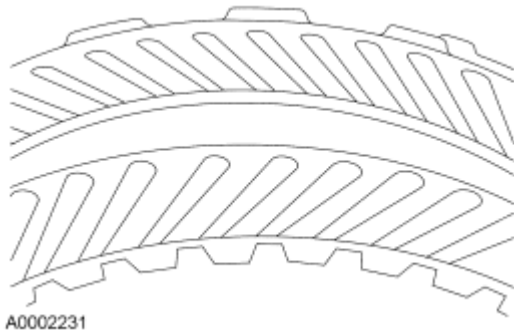


Fig. 356: Alternating Direct Clutch Disc Pack Plates
Courtesy of FORD MOTOR CO.

8. Install the friction plates alternating the internally splined (clockwise) and the externally splined (counterclockwise) clutch plates starting with an externally splined (counterclockwise) clutch plate.

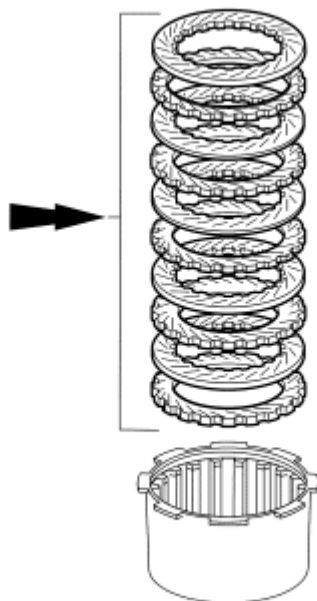
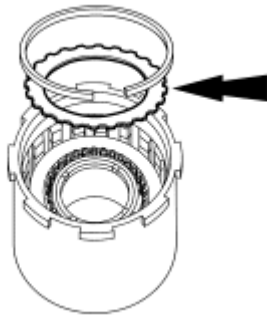


Fig. 357: Locating Direct Clutch Disc Pack
Courtesy of FORD MOTOR CO.

NOTE: The retaining ring is a select fit.

9. Install the direct clutch pressure plate using the original direct clutch retaining ring.

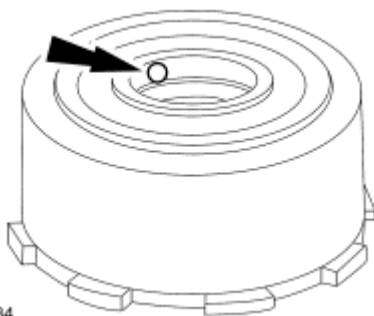


A0002233

Fig. 358: Identifying Direct Clutch Pressure Plate And Direct Clutch Retaining Ring
Courtesy of FORD MOTOR CO.

WARNING: When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

10. Air check the assembly.
- Apply air pressure to the hole in the drum while blocking the other hole with a finger.



A0002234

Fig. 359: Locating Drum Air Pressure Apply Hole
Courtesy of FORD MOTOR CO.

11. Push down on the direct clutch disc pack and check the gap between the direct clutch retaining ring and the direct clutch pressure plate with a feeler gauge.
- If the specifications do not match, use a select fit direct clutch retaining ring to match specifications and verify with a feeler gauge.

DIRECT CLUTCH

Part Number	Thickness	Diameter

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	mm	Inch	mm	Inch
E860126-S	1.37	0.0539	130.1	5.122
E860127-S	1.73	0.0681	130.1	5.122
E860128-S	2.08	0.0819	130.1	5.122
E860129-S	2.44	0.0961	130.1	5.122

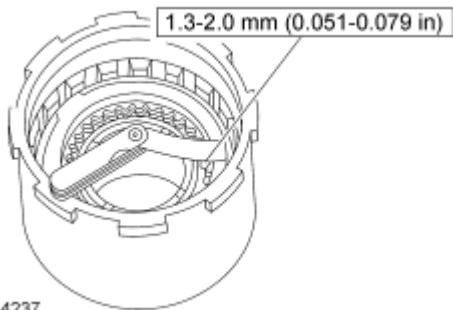


Fig. 360: Checking Gap Between Direct Clutch Retaining Ring And Direct Clutch Pressure Plate (With Specifications)

Courtesy of FORD MOTOR CO.

FORWARD CLUTCH

Special Tools

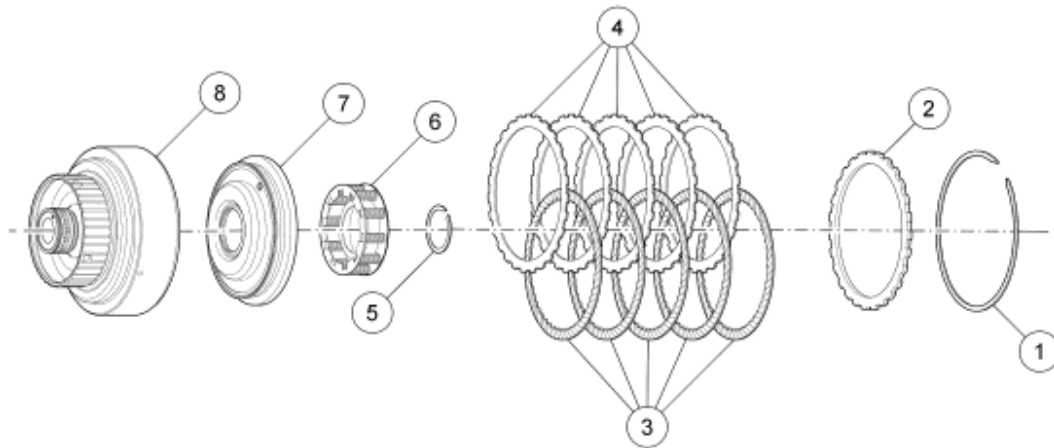
Illustration	Tool Name	Tool Number
 ST1190-A	Compressor, Clutch Spring	307-015 (T65L-77515-A)
 ST1813-A	Protector, Piston Seal	307-051 (T74P-77548-A)
 ST2534-A	Gauge, Forward Clutch Seal	307-434

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V



N0001485

Fig. 361: Exploded View Of Forward Clutch Assembly
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7D483	Forward clutch retaining ring (select fit)
2	7B066	Forward clutch pressure plate
3	7B164	Forward clutch internal plates - friction (vehicle-dependent)
4	7B442	Forward clutch external plates - steel (vehicle-dependent)
5	E860109	Forward clutch retaining ring
6	7G229	Forward clutch spring assembly
7	7A262	Forward clutch piston
8	7A360	Forward clutch cylinder assembly

DISASSEMBLY

1. Remove the pressure plate.
 1. Remove the forward clutch retaining ring.
 2. Remove the pressure plate.

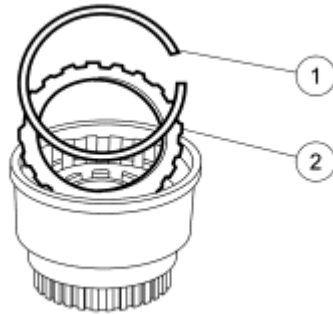


Fig. 362: Identifying Forward Clutch Retaining Ring And Pressure Plate
Courtesy of FORD MOTOR CO.

2. Remove the forward clutch disc pack.
 - Inspect the forward clutch plates for wear, damage or overheating.

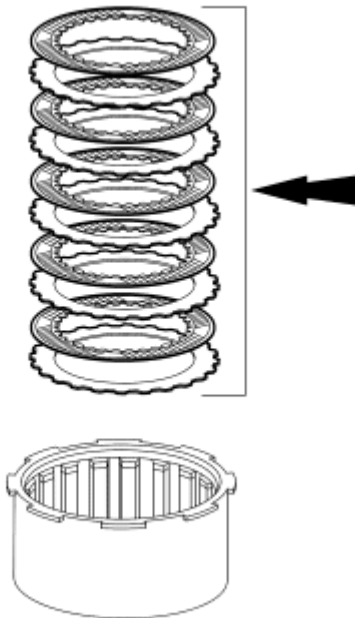


Fig. 363: Locating Steel Clutch Plates And Friction Clutch Plates
Courtesy of FORD MOTOR CO.

WARNING: While removing or installing the retaining ring, slowly release tool pressure on clutch piston springs. Failure to follow this instruction may cause the assembly to separate forcefully, resulting in serious personal injury.

CAUTION: Do not fully depress the special tool or damage to the spring retainer

may occur.

3. Using the special tool, remove the forward clutch piston retaining ring.

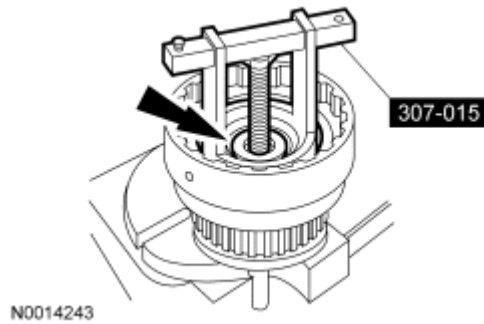


Fig. 364: Identifying Special Tool (307-015) And Forward Clutch Piston Spring Retaining Ring
Courtesy of FORD MOTOR CO.

4. Relieve the forward clutch spring tension and remove the tool.
5. Remove the forward clutch piston spring assembly.

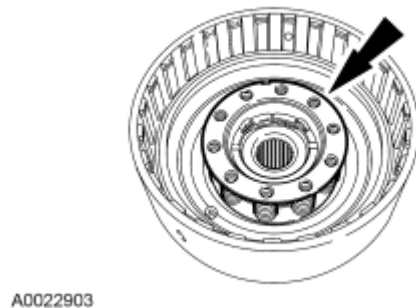


Fig. 365: Locating Forward Clutch Piston Spring Assembly
Courtesy of FORD MOTOR CO.

WARNING: When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

6. Remove the forward clutch piston.
 1. Place the forward clutch cylinder with forward clutch piston facing down.
 2. Install the center support on the forward clutch cylinder.
 3. Apply air pressure to the left port of the center support.

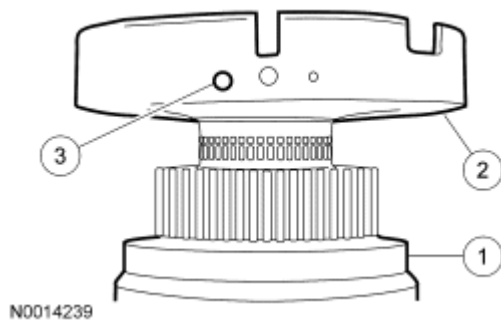


Fig. 366: Identifying Center Support On Forward Clutch Cylinder
Courtesy of FORD MOTOR CO.

ASSEMBLY

1. Inspect the clutch components for damage or wear. Install new components as necessary.
 - Check the fluid passages for obstructions. All fluid passages must be clean and free of obstructions.
 - Inspect the clutch plates for damage.
 - Inspect the clutch springs.
 - Inspect the needle bearing and seal rings for damage.
 - Check clutch hub thrust surfaces for damage.
 - Check clutch plates for flatness and fit on the clutch hub serrations.

NOTE: If the seals on the forward clutch piston show any signs of damage, a new forward clutch piston will need to be installed.

2. Inspect the forward clutch piston and seals.

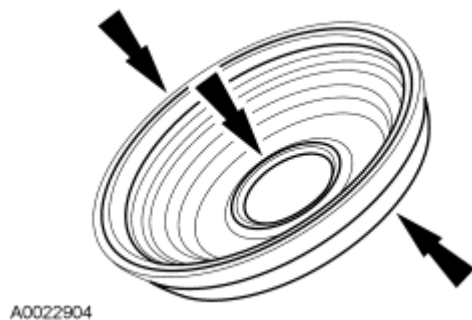
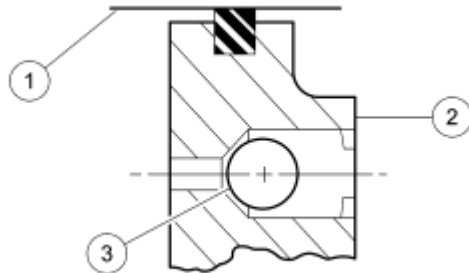


Fig. 367: Inspecting Forward Clutch Piston And Seals
Courtesy of FORD MOTOR CO.

3. Inspect the forward clutch drum assembly.
 1. Inspect the forward clutch cylinder surfaces for scores or burrs.
 2. Inspect the forward clutch piston for scores or burrs.
 3. Verify the check ball is free to move in the piston.

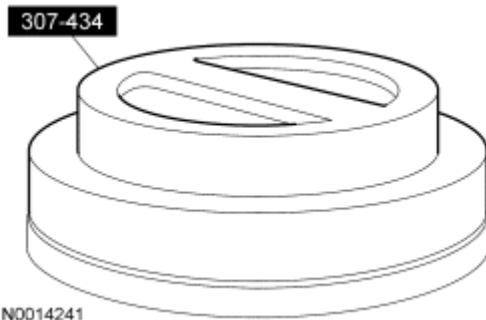


N0014240

Fig. 368: Inspecting Forward Clutch Piston For Scores Or Burrs
Courtesy of FORD MOTOR CO.

NOTE: The special tool must be installed on the forward clutch piston for a couple of minutes prior to installing it into the forward clutch cylinder.

4. Install the special tool on the forward clutch piston.



N0014241

Fig. 369: Identifying Special Tool (307-434)
Courtesy of FORD MOTOR CO.

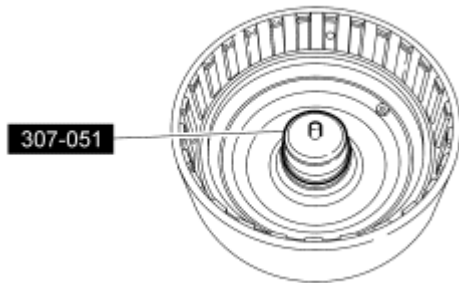
CAUTION: Care must be taken to prevent damage to the seals.

NOTE: Lubricate the forward clutch piston inner and outer seal with clean automatic transmission fluid.

5. Using the special tool, install the forward clutch piston assembly into the forward clutch cylinder.

2008 Ford Mustang

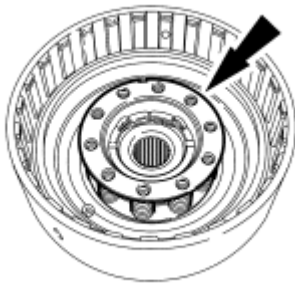
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



N0014242

Fig. 370: Identifying Special Tool (307-051)
Courtesy of FORD MOTOR CO.

6. Install the forward clutch piston spring assembly.

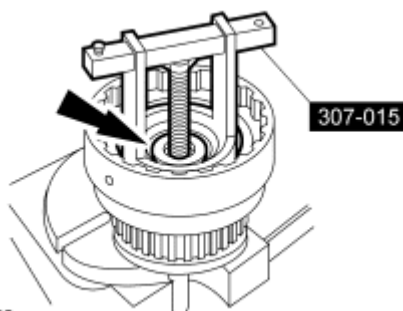


A0022903

Fig. 371: Locating Forward Clutch Piston Spring Assembly
Courtesy of FORD MOTOR CO.

CAUTION: Do not fully depress the clutch spring compressor or damage to the spring retainer may occur.

7. Using the special tool, install the forward clutch piston spring retaining ring.



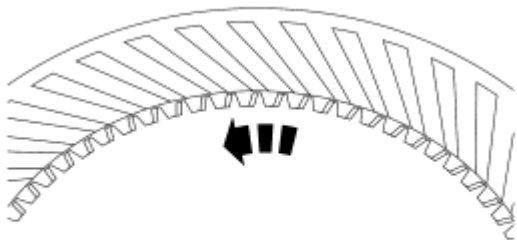
N0014243

Fig. 372: Identifying Special Tool (307-015) And Forward Clutch Piston Spring Retaining Ring
Courtesy of FORD MOTOR CO.

CAUTION: The forward clutch friction plates are directional and must be installed with grooves pointing counterclockwise, otherwise transmission damage can occur.

CAUTION: If new plates are used, they should be soaked in clean automatic transmission fluid before assembly, otherwise transmission damage can occur.

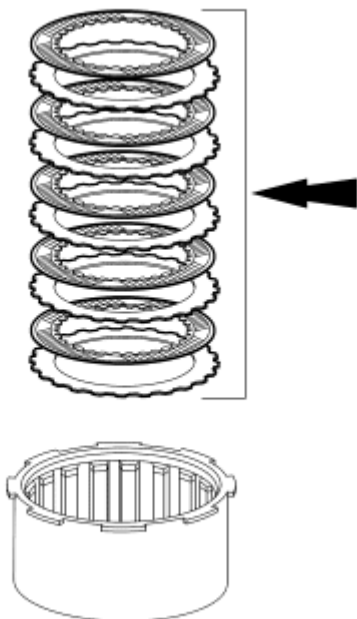
8. If reusing plates, grooves must be installed counterclockwise. Install the direct clutch disc pack.



A0002556

Fig. 373: Rotating Direct Clutch Disc Pack Counterclockwise
Courtesy of FORD MOTOR CO.

9. Install the steel clutch plates and friction clutch plates in alternating order starting with a steel clutch plate.

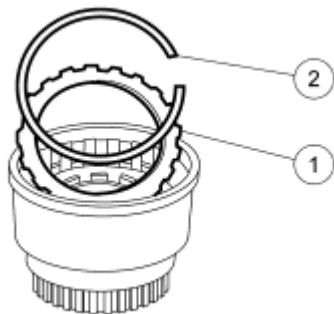


A0002268

Fig. 374: Locating Steel Clutch Plates And Friction Clutch Plates
Courtesy of FORD MOTOR CO.

NOTE: The retaining ring is a select fit.

10. Install the original selective retaining ring.
 1. Install the forward clutch pressure plate.
 2. Install the original selective retaining ring.

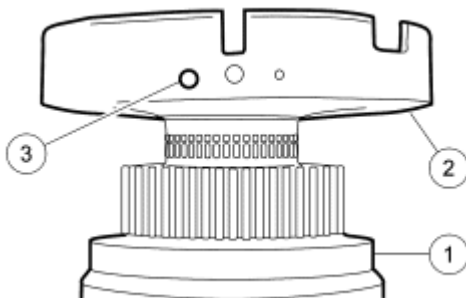


N0014244

Fig. 375: Identifying Forward Clutch Pressure Plate & Original Selective Retaining Ring
Courtesy of FORD MOTOR CO.

WARNING: When using compressed air, never let air pressure exceed 138 kPa (20 psi) and always wear safety glasses. Compressed air may cause foreign material or parts to become airborne. Failure to follow this instruction may result in serious personal injury.

11. Air check the forward clutch piston.
 1. Place the forward clutch cylinder with the forward clutch piston facing down.
 2. Install the transmission center support on the forward clutch cylinder.
 3. Apply air pressure to the left port of the center support.



N0014245

Fig. 376: Identifying Forward Clutch Piston, Forward Clutch Cylinder And Left Port
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

12. Check the forward clutch disc pack free play.
 1. Press down on the forward clutch disc pack.
 2. Using a feeler gauge, check the gap between the forward clutch retaining ring and the forward clutch pressure plate.
 3. If the clearance is not within specifications, install the correct size retaining ring.

Part Number	Thickness		Diameter	
	mm	Inch	mm	Inch
XW4Z-7D483-AB	1.73	0.0681	141.45	5.65
XW4Z-7D483-AC	2.08	0.0819	141.45	5.65
XW4Z-7D483-AD	2.44	0.0961	141.45	5.65

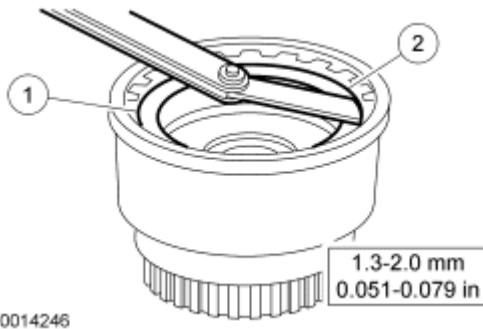


Fig. 377: Checking Gap Between Forward Clutch Retaining Ring And Forward Clutch Pressure Plate

Courtesy of FORD MOTOR CO.

OVERDRIVE PLANETARY AND ONE-WAY CLUTCH ASSEMBLY

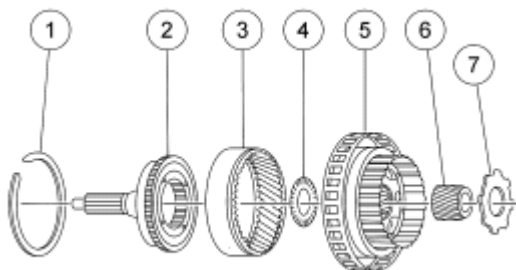


Fig. 378: Exploded View Of Overdrive Planetary & One-Way Clutch Assembly

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

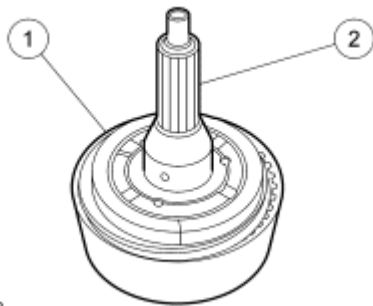
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W702037	Retaining ring
2	7A658	Center shaft
3	7A153	Overdrive ring gear
4	7L495	No. 2 overdrive planetary thrust bearing
5	7B446	Overdrive planetary gear carrier assembly
6	7D063	Overdrive sun gear
7	7660	Coast clutch adapter

DISASSEMBLY

NOTE: The overdrive one-way clutch is serviced with the center shaft assembly.

1. Remove the center shaft from the overdrive ring gear.
 1. Remove the overdrive center shaft retaining ring.
 2. While rotating counterclockwise remove the center shaft from the ring gear.



N0014248

Fig. 379: Identifying Overdrive Center Shaft Retaining Ring And Center Shaft From Ring Gear
Courtesy of FORD MOTOR CO.

CAUTION: Do not remove the overdrive one-way clutch. Damage to the clutch may occur if it is removed.

2. Clean and inspect the overdrive one-way clutch and center shaft.
 - Inspect for cracks in the roller cage and wear on the roller clutch, and the press fit of the one-way clutch to the center shaft.

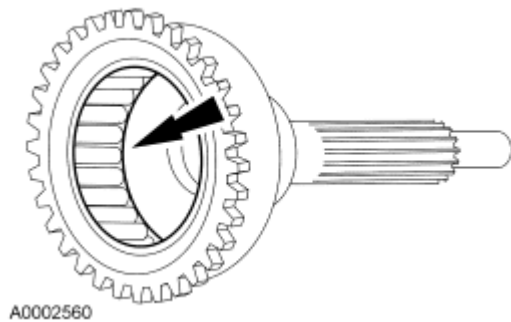


Fig. 380: Inspecting For Cracks In Roller Cage And For Wear On Roller Clutch
Courtesy of FORD MOTOR CO.

3. Inspect the one-way clutch.
 - Temporarily insert the overdrive planetary gear carrier assembly into the one-way clutch rollers for verification of the one-way clutch.
 - The planetary gear must rotate counterclockwise and hold when rotated clockwise.
 - Remove the planetary gear carrier assembly.

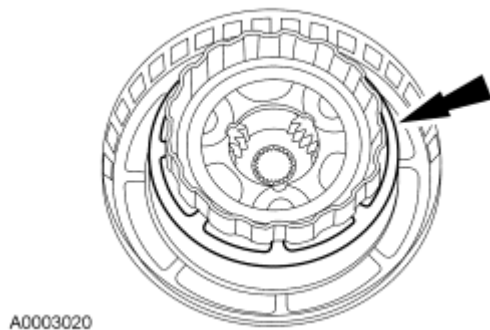
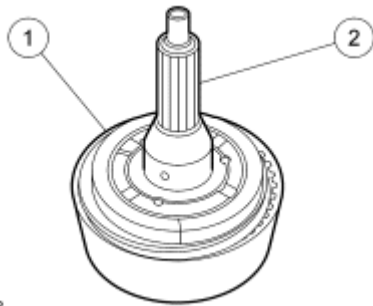


Fig. 381: Locating Planetary Gear Carrier Assembly
Courtesy of FORD MOTOR CO.

ASSEMBLY

1. Install the center shaft and one-way clutch.
 1. Install the center shaft and one-way clutch.
 2. Install the center shaft retaining ring.



N0014248

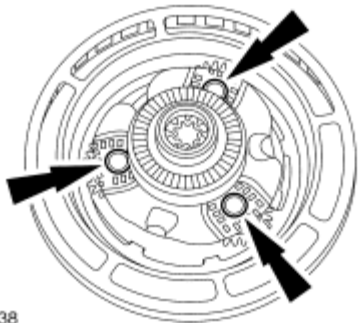
Fig. 382: Identifying Overdrive Center Shaft Retaining Ring And Center Shaft From Ring Gear
Courtesy of FORD MOTOR CO.

OVERDRIVE PLANETARY GEARS

DISASSEMBLY

NOTE: Individual parts of the planetary carriers are not serviceable.

1. Before installing a planetary assembly, the shaft retaining pins should be checked for adequate staking. Check the pins and shafts in the planetary assemblies for loose fit and/or complete disengagement. Install a new planetary assembly if necessary.



A0002638

Fig. 383: Locating Planetary Assembly Mounting Bolts
Courtesy of FORD MOTOR CO.

2. Inspect the pinion gears for damaged or excessively worn teeth and for free rotation.

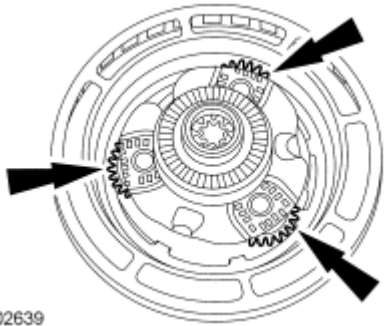


Fig. 384: Locating Pinion Gears
Courtesy of FORD MOTOR CO.

3. Inspect the overdrive one-way clutch inner race and the inner and outer races for scored or damaged surface areas where the rollers contact the races.

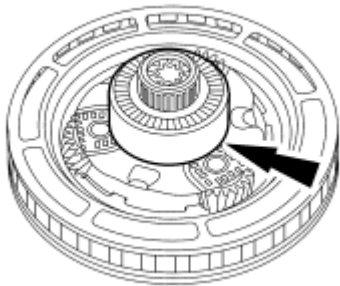


Fig. 385: Locating Overdrive One-Way Clutch Inner Race
Courtesy of FORD MOTOR CO.

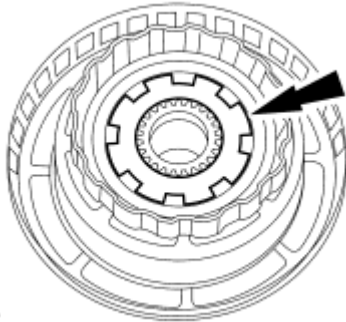
4. Remove and inspect the No. 2 overdrive planetary thrust bearing on the nose of the overdrive planetary gear carrier assembly.



Fig. 386: Locating Overdrive Planetary Thrust Bearing
Courtesy of FORD MOTOR CO.

NOTE: Inspect the sun gear for damaged or worn teeth.

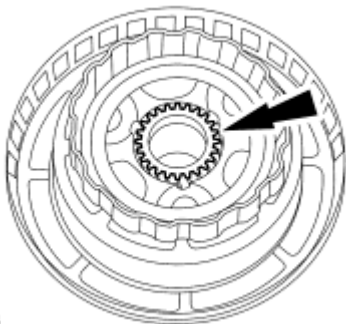
5. Remove the coast clutch-to-overdrive carrier adapter.



A0002642

Fig. 387: Locating Coast Clutch-To-Overdrive Carrier Adapter
Courtesy of FORD MOTOR CO.

6. Remove and inspect the overdrive sun gear.

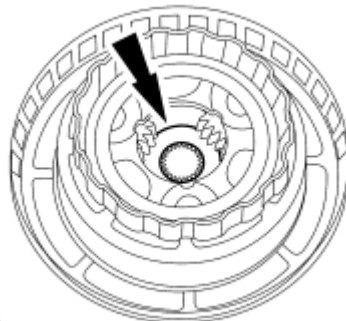


A0002643

Fig. 388: Locating Overdrive Sun Gear
Courtesy of FORD MOTOR CO.

CAUTION: Do not attempt to remove the No. 12 bearing from behind the pinion gears or transmission damage can occur.

7. Inspect the No. 12 bearing for damage.



A0002644

Fig. 389: Identifying No. 12 Bearing

Courtesy of FORD MOTOR CO.

ASSEMBLY

NOTE: Thoroughly clean all parts and blow dry with moisture-free compressed air.

NOTE: Use petroleum jelly to hold the No. 2 overdrive planetary thrust bearing in place.

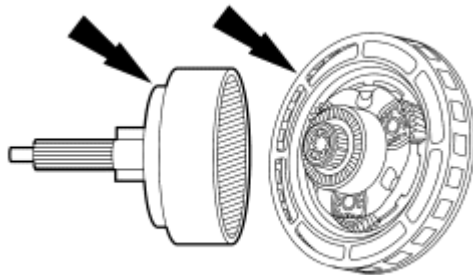
1. Install the No. 2 overdrive planetary thrust bearing.



A0002641

Fig. 390: Locating Overdrive Planetary Thrust Bearing
Courtesy of FORD MOTOR CO.

2. Install the overdrive planetary gear carrier into the center shaft and overdrive.



A0002645

Fig. 391: Locating Overdrive Planetary Gear Carrier, Center Shaft And Overdrive
Courtesy of FORD MOTOR CO.

NOTE: Make sure that the No. 12 bearing is in place in the overdrive planetary prior to installing the overdrive sun gear.

3. Install the overdrive sun gear with the recessed gear teeth facing toward the adapter.

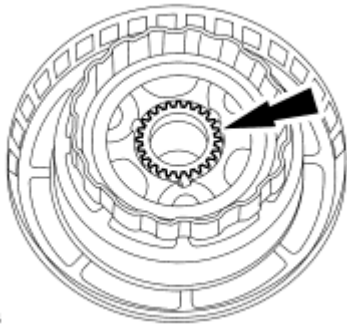


Fig. 392: Locating Overdrive Sun Gear
Courtesy of FORD MOTOR CO.

NOTE: Adapter part number must not be visible after installation.

NOTE: Inspect the sun gear for damaged or worn teeth.

4. Install the coast clutch-to-overdrive carrier adapter.

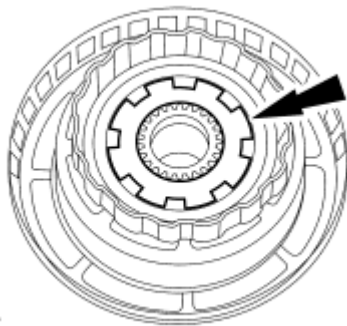


Fig. 393: Locating Coast Clutch-To-Overdrive Carrier Adapter
Courtesy of FORD MOTOR CO.

OUTPUT SHAFT RING GEAR AND HUB SHAFT ASSEMBLY

DISASSEMBLY

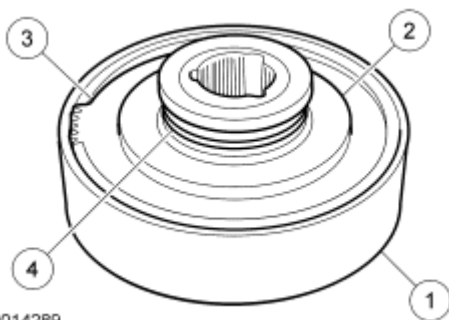


Fig. 394: Exploded View Of Output Shaft Ring Gear

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7A153	Output shaft ring gear
2	7D164	Output shaft hub
3	7C122	Retaining ring
4	7D019	Output shaft hub seal

1. Inspect the output shaft ring gear and hub shaft assembly for damage. If repair is necessary, use the following procedure.
2. Remove the seal.

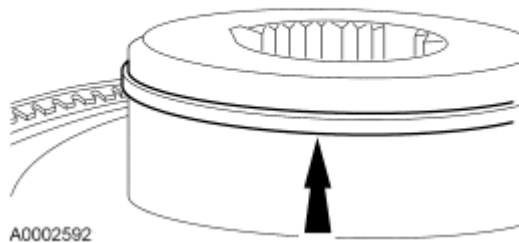


Fig. 395: Identifying Seal
Courtesy of FORD MOTOR CO.

3. Remove the output shaft ring gear from the output shaft hub.
 1. Remove the retaining ring.
 2. Remove the output shaft ring gear.

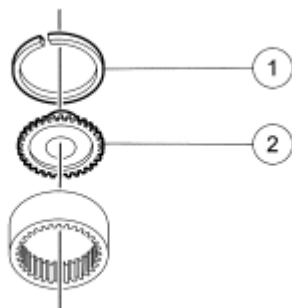
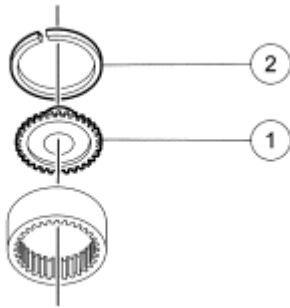


Fig. 396: Identifying Output Shaft Ring Gear And Retaining Ring
Courtesy of FORD MOTOR CO.

ASSEMBLY

1. Install the output shaft ring gear onto the output shaft hub.

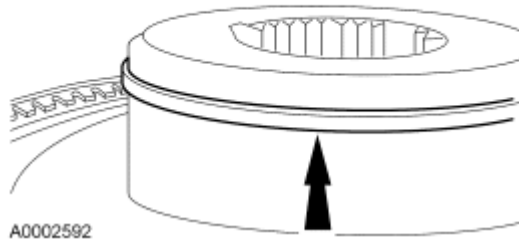
1. Install the output shaft ring gear.
2. Install the retaining ring.



N0014251

Fig. 397: Installing Output Shaft Ring Gear Onto Output Shaft Hub
Courtesy of FORD MOTOR CO.

2. Install the seal.



A0002592

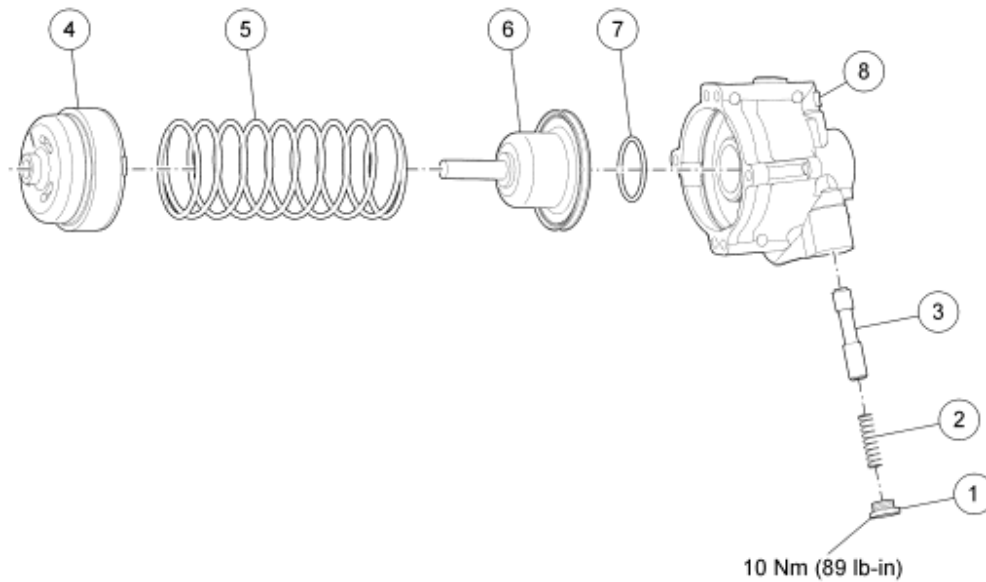
Fig. 398: Identifying Seal
Courtesy of FORD MOTOR CO.

REVERSE SERVO ASSEMBLY

DISASSEMBLY

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

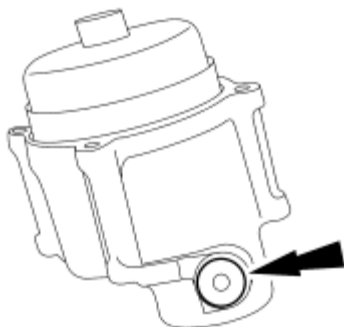


N0005098

Fig. 399: Exploded View Of Reverse Servo Assembly With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7D321	Control valve spring retainer
2	7A270	Fluid pressure regulator valve spring
3	7D488	Reverse servo check valve
4	7D372	Reverse servo plate
5	7D466	Reverse servo accumulator spring
6	7D189	Reverse servo piston and seal
7	7423	Reverse servo piston O-ring
8	7D036	Reverse servo cover

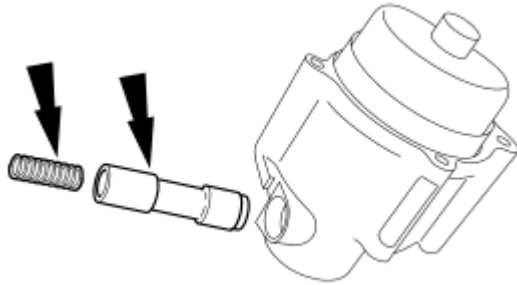
1. Remove the control valve spring retainer.



A0020505

Fig. 400: Locating Control Valve Spring Retainer
Courtesy of FORD MOTOR CO.

2. Remove the reverse servo spring and check valve.



A0036191

Fig. 401: Locating Reverse Servo Spring And Check Valve
Courtesy of FORD MOTOR CO.

WARNING: Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

NOTE: Tabs on servo plate mate with slots on cover every 120 degrees.

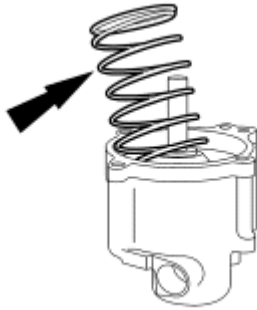
3. Remove the reverse servo plate by turning in either direction to release.
 - Align the arrow on the servo plate with any slot on the cover.



A0020506

Fig. 402: Aligning Arrow On Servo Plate With Any Slot On Cover
Courtesy of FORD MOTOR CO.

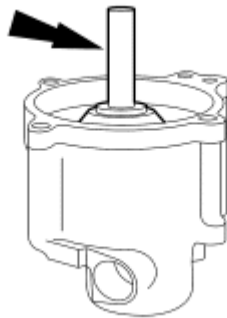
4. Remove the reverse servo spring.



A0002576

Fig. 403: Locating Reverse Servo Spring
Courtesy of FORD MOTOR CO.

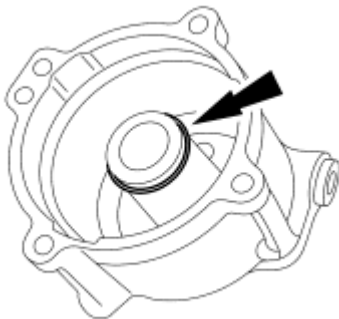
5. Remove the reverse servo piston and seal assembly.
 - Inspect the seal for damage, install a new reverse servo piston if necessary.



A0002577

Fig. 404: Locating Reverse Servo Piston
Courtesy of FORD MOTOR CO.

6. Remove and discard the reverse servo piston seal.



A0002578

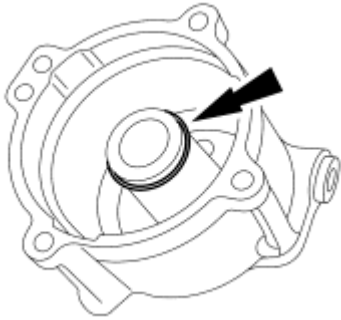
Fig. 405: Locating Reverse Servo Piston Seal
Courtesy of FORD MOTOR CO.

ASSEMBLY

CAUTION: Try not to roll the seal onto the housing when installing the seal or

damage to the seal may occur.

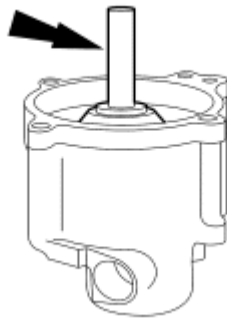
1. Lubricate and install a new reverse servo piston seal.



A0002578

Fig. 406: Locating Reverse Servo Piston Seal
Courtesy of FORD MOTOR CO.

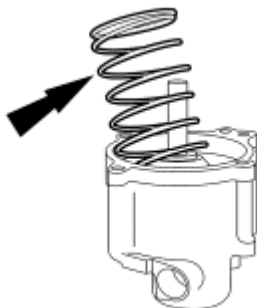
2. Lubricate and install the reverse servo piston and seal assembly.



A0002577

Fig. 407: Locating Reverse Servo Piston
Courtesy of FORD MOTOR CO.

3. Install the reverse servo spring.



A0002576

Fig. 408: Locating Reverse Servo Spring
Courtesy of FORD MOTOR CO.

WARNING: Follow the specified procedure when using the tool to remove the servo cover. The servo and servo cover are under high spring force and can separate forcefully, which may result in serious personal injury.

NOTE: The arrow on the servo plate must be aligned evenly between any 2 slots on the cover.

4. Install the reverse servo plate.

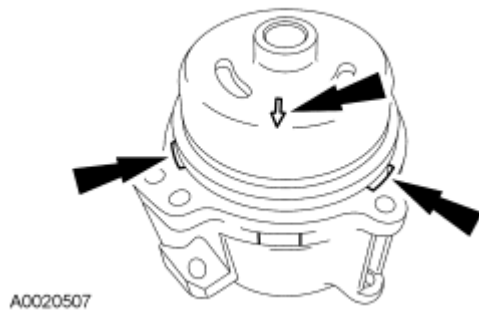


Fig. 409: Locating Reverse Servo Plate
Courtesy of FORD MOTOR CO.

5. Install the reverse servo spring and check valve.

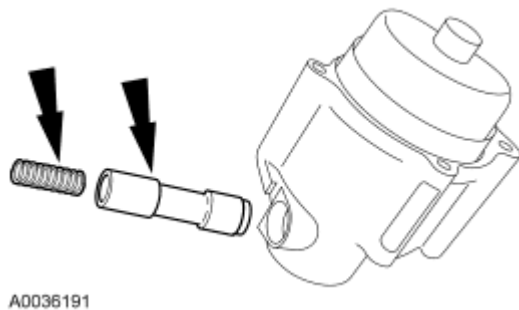


Fig. 410: Locating Reverse Servo Spring And Check Valve
Courtesy of FORD MOTOR CO.

6. Install the control valve spring retainer.
 - Tighten to 10 Nm (89 lb-in).

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



Fig. 411: Locating Control Valve Spring Retainer
Courtesy of FORD MOTOR CO.

ASSEMBLY

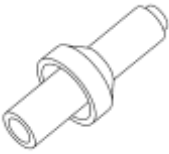
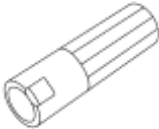
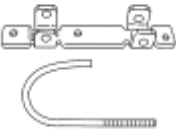
TRANSMISSION

Special Tools

Illustration	Tool Name	Tool Number
 ST1792-A	Adjustment Set, Transmission Band	307-S022 (T71P-77370-A)
 ST1186-A	Holding Fixture, Transmission	307-003 (T57L-500-B)
 ST1274-A	Depth Micrometer	303-D026 (D80P-4201-A) or equivalent
 ST1633-A	Alignment Gauge, TR Sensor	307-351 (T97L-70010-A)
	Installer, Transmission Extension Housing Oil Seal	307-038 (T74P-77052-A)

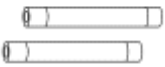
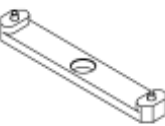
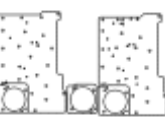
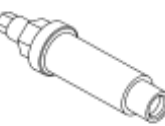
2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

 ST1188-A		
 ST1826-A	Sizer, Piston Seal	307-338 (T95L-70010-G)
 ST1817-A	Alignment Set, Fluid Pump	307-S039 (T74P-77103-X)
 ST2532-A	Aligner, Fluid Pump Handle	307-431
 ST2533-A	Aligner, Fluid Pump Pilot	307-432
 ST2432-A	Gauge Bar	307-400
 ST2393-A	Compressor, Servo Cover	307-402
 ST1199-A	Installer, Shift Shaft Fluid Seal	307-050 (T74P-77498-A)

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

 ST1631-A	Handle, Torque Converter	307-091 (T81P-7902-C)
 ST2424-A	Compressor, Cushion Spring	307-401
 ST1639-A	Aligner, Valve Body	307-334 (T95L-70010-C)
 ST2433-A	Alignment Pins, Transmission Pump	307-399
 ST2426-A	Aligner, Flex Plate	307-403
 ST2538-A	Air Test Plate and Gaskets, Transmission	307-433-01, 307-433-2, 307-433-3
 ST2440-A	Installer, Drive Pinion flange	205-479
 ST2416-A	Installer, Output Shaft Flange	307-404

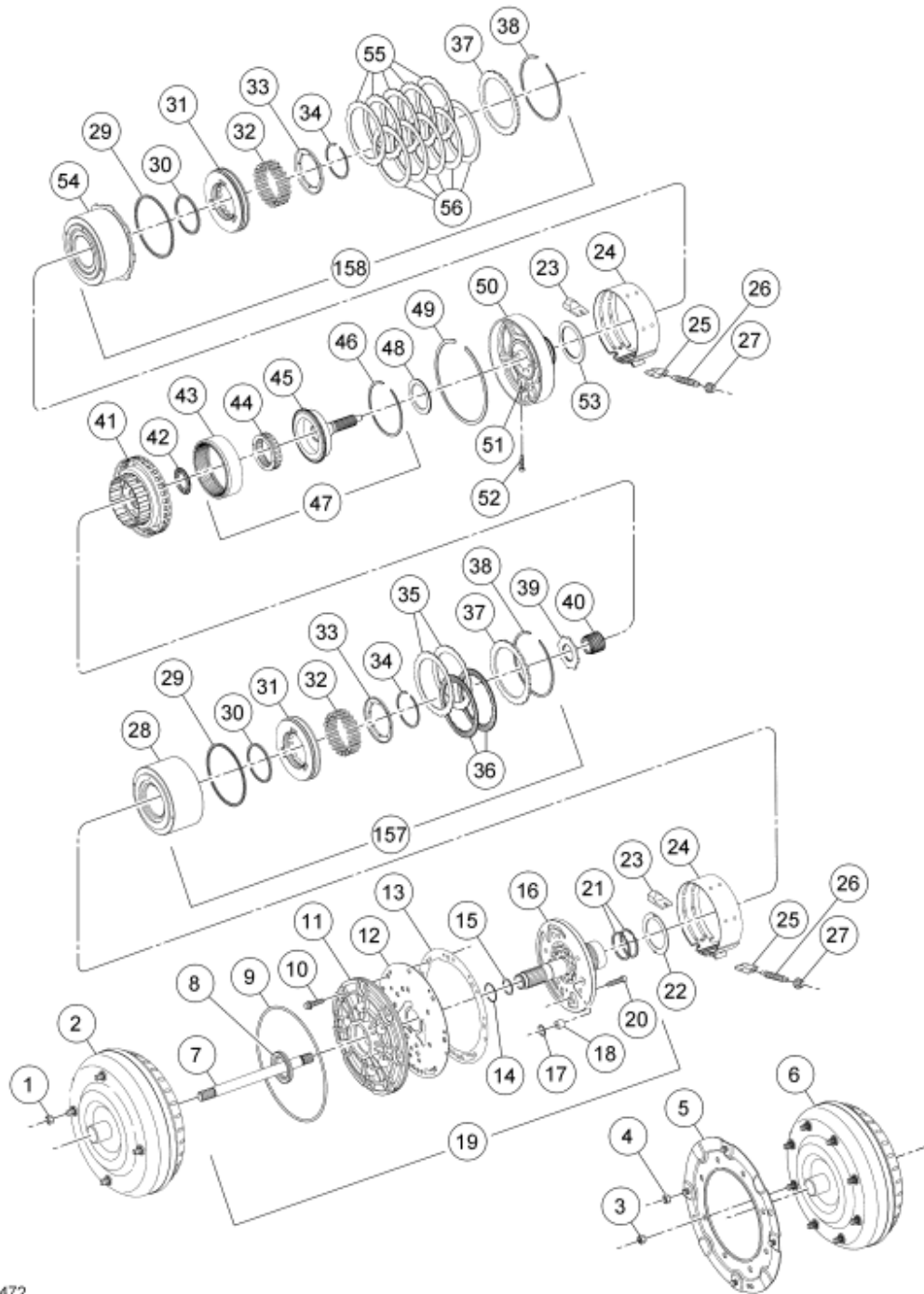
2008 Ford Mustang
2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

Material

Item	Specification
MERCON® V Automatic Transmission Fluid XT-5-QM (or XT-5-QMC) (US); CXT-5-LM12 (Canada)	MERCON® V
Multi-Purpose Grease XG-4 and/or XL-5	ESB-M1C93-B

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

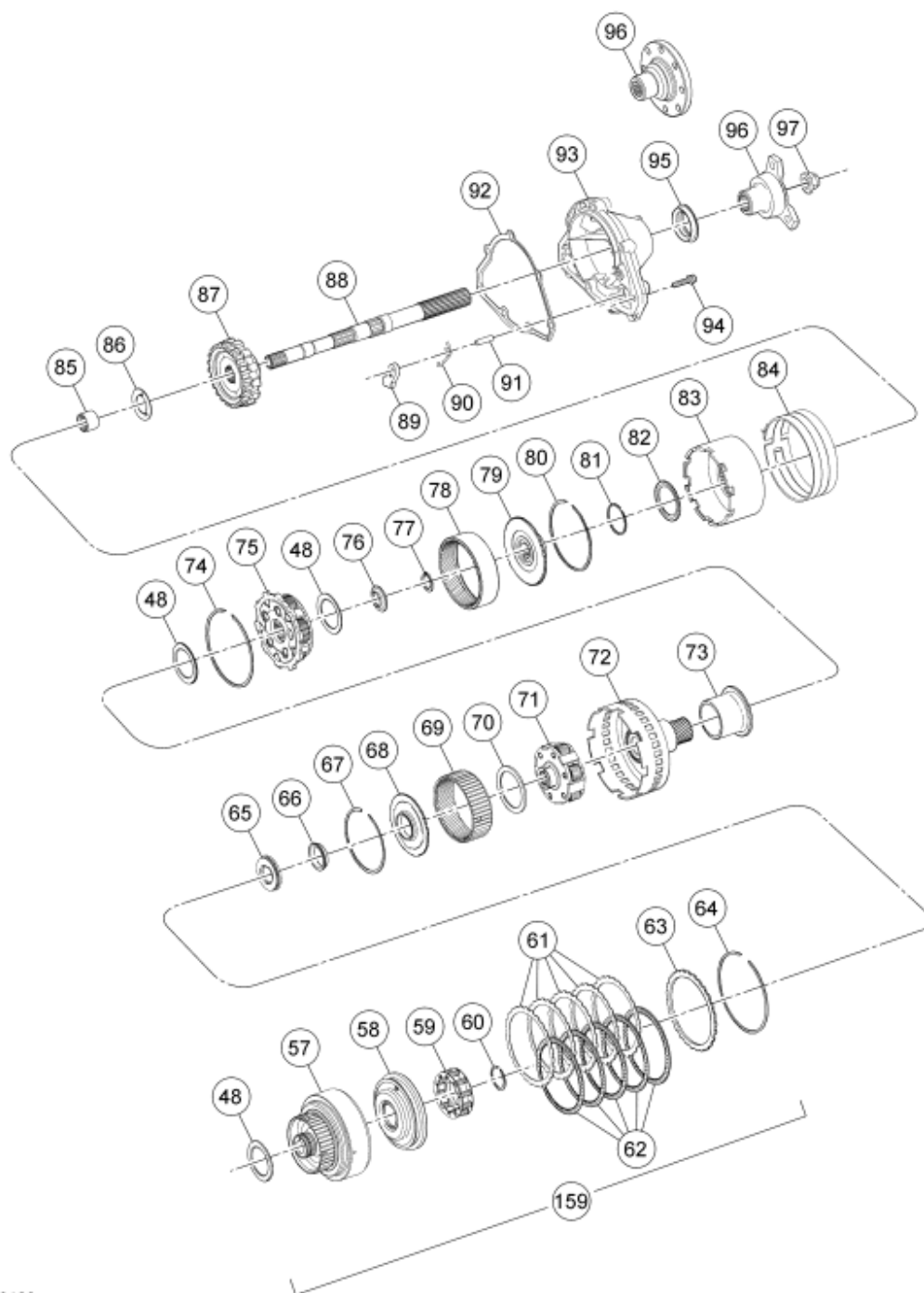


N0051472

Fig. 412: Exploded View Of Transmission Assembly (1 Of 3)
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

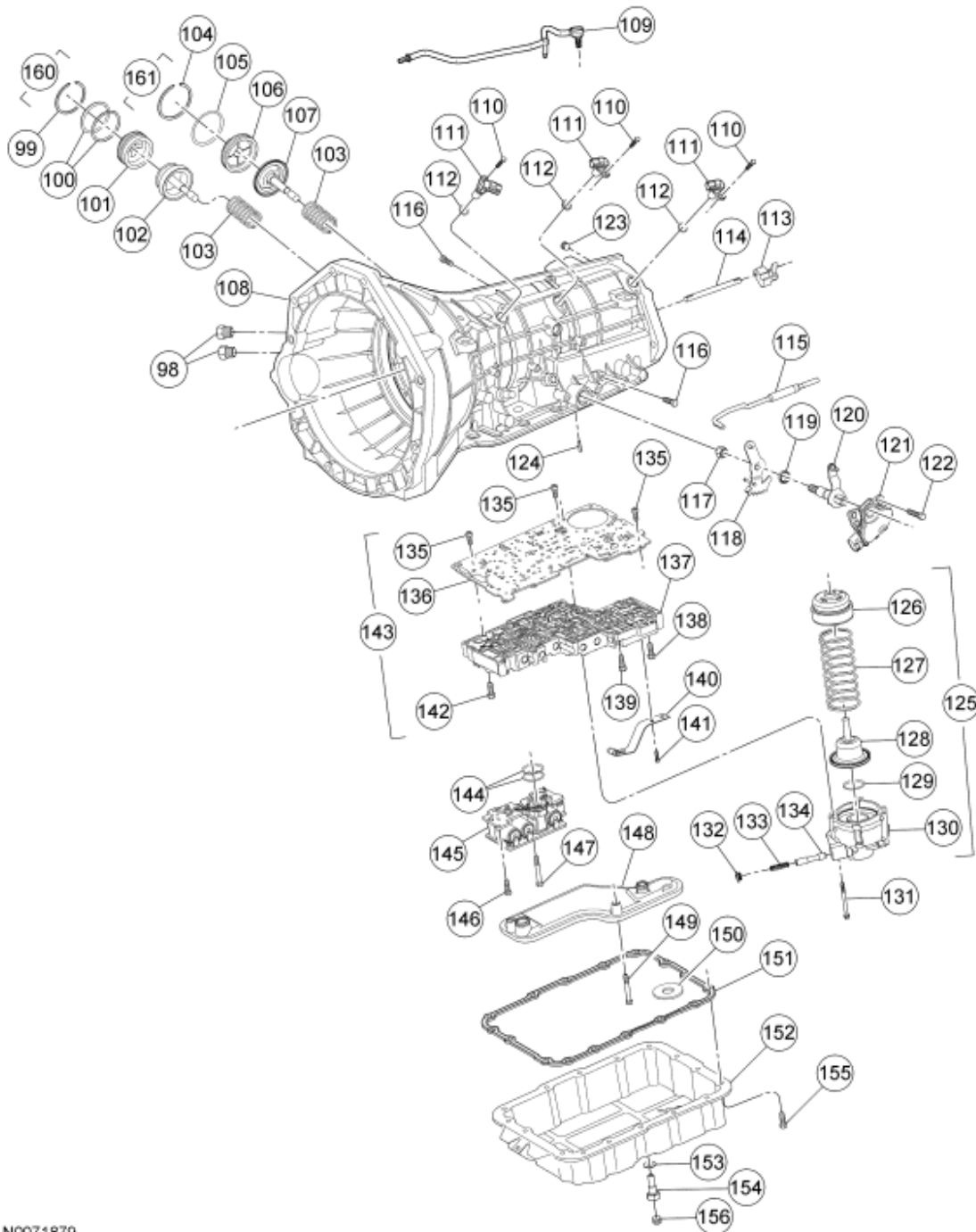


N0049169

Fig. 413: Exploded View Of Transmission Assembly (2 Of 3)
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang



N0071879

Fig. 414: Exploded View Of Transmission Assembly (3 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	7045	Converter-to-flexplate nut (attaches the converter assembly to the flexplate) (4.0L only)
2	7902	Converter assembly

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

3	N800750	Converter-to-adapter plate nut (attaches the converter assembly to the adapter plate) (8 required) (4.6L only)
4	N800750	Adapter plate-to-flexplate nut (attaches adapter plate to the flexplate) (4 required) (4.6L only)
5	6K374	Adapter plate assembly (4.6L only)
6	7902	Converter assembly
7	7017	Input shaft
8	7A248	Front fluid pump seal assembly
9	7A248	Front fluid pump seal
10	W704892	Screw and washer assembly - M8 x 35 internal lobe (attaches pump to case) (8 required)
11	7G178	Fluid pump cover assembly
12	7B472	Fluid pump adapter plate
13	7A136	Front fluid pump gasket
14	W701431	Fluid pump shaft-to-inner gear O-ring seal (also in pump assembly)
15	7L323	Stator support seal
16	7A108	Front pump support assembly
17	7H416	O-ring
18	7H411	Fluid pump control valve
19	7A103	Fluid pump assembly
20	W701429	M8 x 1 x 35 internal lobe screw (attaches pump support to pump assembly) (6 required)
21	7D025	Overdrive brake drum seals
22	7D014	Fluid pump input thrust washer No. 1
23	7D029	Intermediate and overdrive brake band anchor struts (2 required)
24	7D034	Intermediate and overdrive brake bands (2 required)
25	7D029	Intermediate and overdrive brake band apply struts (2 required)
26	7C492	Overdrive/intermediate band adjusting screws
27	71000	Overdrive/intermediate locking nuts
28	7L669	Overdrive brake band drum assembly
29	7A548	Direct and overdrive piston outer seals
30	7D404	Direct and overdrive piston inner seals
31	7A262	Direct and overdrive clutch pistons
32	7A480	Direct and overdrive clutch piston springs
33	7A527	Clutch piston spring retainers (2 required)
34	E860125	Retaining rings (retains 7D041 to drum) (2 required)
35	7B442	Coast clutch external splined plates (steel) (2 required)
36	7B164	Coast clutch internal splined friction plates (2 required)
37	7B066	Coast and direct clutch pressure plate (2 required)
38	E860126 - E860129	Coast and direct clutch plates retaining ring (select fit) (2 required)

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

39	7660	Coast clutch to overdrive carrier adapter
40	7D063	Overdrive sun gear
41	7B446	Overdrive planetary gear carrier (with trigger wheel)
42	7L495	Overdrive planet thrust bearing No. 2
43	7A153	Overdrive ring gear
44	7A089	Center shaft one-way clutch assembly
45	7A658	Overdrive center shaft
46	W702037	Retaining ring (retains 7686 to 7653)
47	7L678	Hub and ring gear assembly (includes 7C109, 7A153, 7A658, W702037)
48	7M153	Center shaft and forward clutch cylinder bearing assembly No. 3, No. 5, No. 8 and No. 9 (4 required)
49	W702465	Retaining ring
50	7A130	Center support assembly
51	E826160	Nut and cage assembly (attaches center support to case)
52	W705407	Bolt
53	7D014	Intermediate clutch drum bearing No. 4
54	7D044	Intermediate brake drum assembly
55	7B442	Direct clutch external splined steel plates (5 required)
56	7B164	Direct clutch internal splined friction plates (5 required)
57	7A360	Forward clutch cylinder
58	7A262	Forward clutch piston assembly
59	7G299	Forward clutch support and spring assembly
60	E860109	Forward clutch piston and spring retaining ring in forward clutch cylinder
61	7B442	Forward clutch external spline steel plates (5 required)
62	7B164	Forward clutch internally spline friction plates (5 required)
63	7B066	Forward clutch pressure plate
64	7D483	Retaining ring 141.45 x 1.37 internal (select fit)
65	7D234	Forward ring gear hub thrust bearing No. 6A
66	7D090	Forward clutch thrust washer No. 6B
67	7G375	Forward clutch hub retainer ring
68	7B067	Forward ring gear hub
69	7D392	Forward ring gear
70	7F374	Forward planet thrust bearing No. 7
71	7A398	Forward planetary
72	7A019	Shell and sun gear assembly
73	7C167	Low and reverse spacer gear
74	W702775	Reverse carrier drum snap ring
75	7D006	Reverse planet assembly
76	7B176	Output shaft sleeve
77	E860527	External retainer ring
78	7A153	Output shaft ring gear

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

79	7D164	Output shaft hub
80	7C122	Output shaft ring gear retaining ring
81	7D019	Output shaft hub seal
82	7H027	Low/intermediate sun gear bearing assembly
83	7C498	Reverse brake drum and clutch assembly (includes OWC)
84	7D095	Low/reverse band assembly
85	7R205	Output shaft bearing
86	7B368	Output shaft thrust washer No.11
87	7A233	Transmission parking gear assembly
88	7060	Output shaft
89	7A441	Parking pawl
90	7D070	Parking pawl return spring
91	7D071	Parking pawl shaft
92	7086	Extension housing gasket
93	7A039	Extension housing
94	W500311	M8 x 1.25 extension housing-to-case screw (5 required)
95	7052	Extension housing seal
96	7089	Output shaft flange
97	W701357	Output shaft flange nut
98	7D273	Fluid tube connector assembly (2 required)
99	7H074	Ring overdrive servo retainer
100	W703119	Overdrive servo cover seals (2 required)
101	7D027	Overdrive servo cover
102	7D021	Overdrive servo piston and rod
103	7D028	Intermediate/overdrive servo piston springs (2 required)
104	W702777	Ring intermediate servo retainer
105	W702969	Intermediate servo cover seal
106	7D027	Intermediate servo cover
107	7D021	Intermediate servo piston and rod
108	7005	Case assembly
109	7034	Case vent assembly
110	W708389	Speed sensor-to-case screws (M6 x 19)
111	7H103	Output shaft speed, turbine shaft speed and intermediate shaft speed sensors
112	W702981	Speed sensor-to-case O-ring seals
113	7A179	Reverse brake drum lever
114	7D433	Reverse band actuating lever shaft
115	7A232	Parking pawl actuating rod
116	390318	Pipe plug
117	W703001	Manual lever shaft outer and inner nut
118	7A115	Manual valve inner lever
119	7B498	Manual control lever seal

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

	7A256	Manual control lever
121	7F293	Digital transmission range (TR) sensor
122	W500015	Digital TR sensor screw and washer (2 required)
123	6026	Fluid fill plug
124	7B210	Manual lever shaft pin retainer
125	7B193	Reverse servo assembly
126	7D372	Reverse servo plate
127	7D466	Reverse servo accumulator spring
128	7D189	Reverse servo piston and seal
129	7423	Reverse servo piston O-ring seal
130	7D036	Reverse servo cover
131	W702359	Reverse servo piston-to-case screw (4 required)
132	7D321	Control valve spring retainer
133	7A270	Main fluid pressure spring regulator valve
134	7D488	Reverse servo check valve
135	W701099	Main control valve body separating plate screws
136	7Z490	Main control valve body separating plate (bonded)
137	7A101	Lower main control valve body
138	W500102	Main control valve body screws (18 required)
139	W702791	Main control valve body screw
140	7E332	Manual valve detent spring
141	W500100	Screw detent spring
142	W706672	Main control valve body screw
143	7A100	Main control valve body
144	W705928	Solenoid body connector O-ring seals
145	7G391	Transmission control solenoid body
146	W702921	Transmission control solenoid body screw
147	W703189	Transmission control solenoid body screws (7 required)
148	7A098	Transmission fluid pan filter
149	W705559	Transmission fluid pan filter screws
150	7L027	Transmission fluid pan magnet
151	7A191	Transmission fluid pan gasket
152	7A194	Transmission fluid pan
153	6734	Transmission fluid pan drain plug gasket
154	7A010	Transmission fluid pan drain plug
155	W500213	Transmission fluid pan screw
156	W707919	Transmission fluid pan drain tube plug (short hex)
157	-	Overdrive/coast clutch assembly
158	-	Direct clutch assembly
159	-	Forward clutch assembly
160	-	Overdrive servo

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

- Intermediate servo

1. Thoroughly clean the transmission case and extension housing in solvent and blow dry with compressed air.
2. Inspect the transmission case for the following:
 - Stripped bolt hole threads.
 - Gasket and mating surfaces for burrs or nicks.
 - Obstructions to vent and fluid passages.
 - Cracks or warpage.

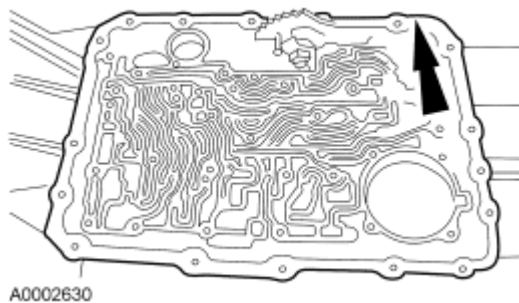


Fig. 415: Locating Transmission Case
Courtesy of FORD MOTOR CO.

3. Inspect the extension housing for cracks, burrs or warpage.

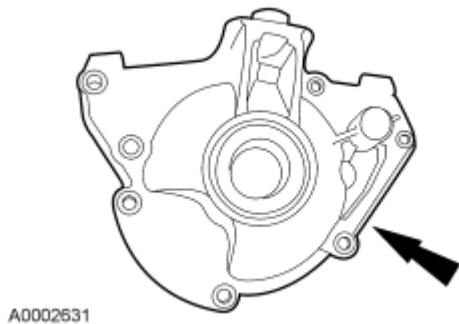


Fig. 416: Locating Extension Housing
Courtesy of FORD MOTOR CO.

4. Inspect the case bearing for damage. If damage to the case bearing is indicated, install a new case.



A0002593

Fig. 417: Identifying Case Bearing
Courtesy of FORD MOTOR CO.

WARNING: Always verify that the lock pin on the bench-mounted holding fixture is correctly secured to help prevent unexpected component rotation. Failure to follow this instruction may result in serious personal injury.

5. Using the special tool, install the transmission into the bench with the converter housing facing up.

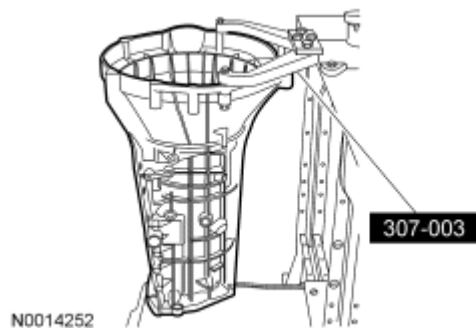


Fig. 418: Identifying Special Tool (307-003)
Courtesy of FORD MOTOR CO.

6. Using the special tool, install the manual control lever shaft seal and lubricate it with petroleum jelly.

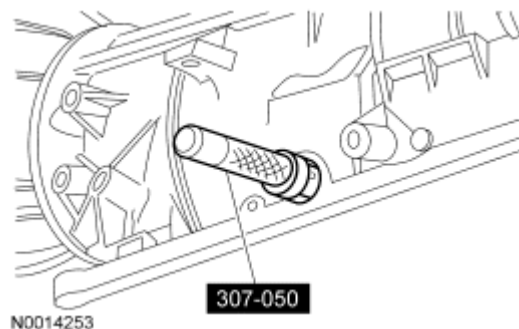


Fig. 419: Installing Manual Control Lever Shaft Seal Using Special Tool (307-050)
Courtesy of FORD MOTOR CO.

7. Install the parking lever rod.

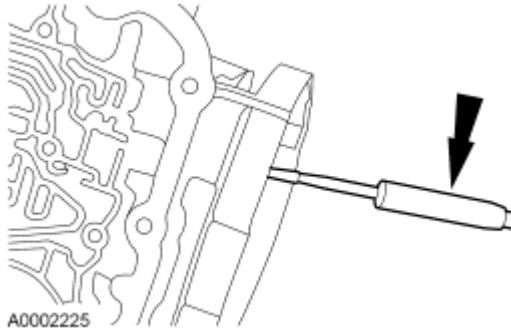


Fig. 420: Identifying Parking Lever Actuating Rod
Courtesy of FORD MOTOR CO.

8. Install the manual control lever.

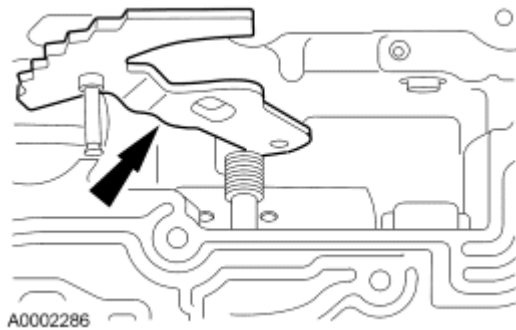


Fig. 421: Identifying Manual Control Valve Inner Lever
Courtesy of FORD MOTOR CO.

9. Assemble the manual valve inner lever and parking lever actuating rod as shown.

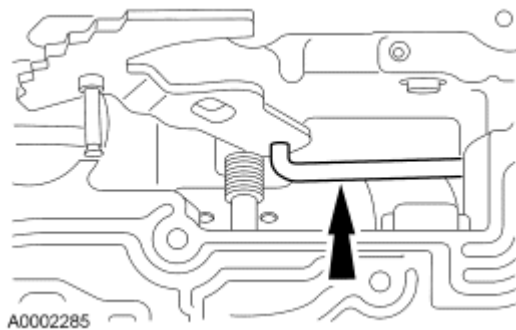


Fig. 422: Locating Manual Valve Inner Lever At Parking Lever Actuating Rod
Courtesy of FORD MOTOR CO.

NOTE: Align the flats on the manual valve inner lever with the flats on the manual control lever shaft.

10. Install the manual control lever shaft.

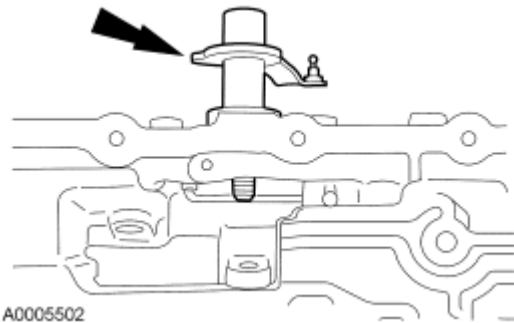


Fig. 423: Identifying Manual Control Lever Shaft
Courtesy of FORD MOTOR CO.

11. Install the manual valve inner lever onto the manual shaft and loosely install the nut.

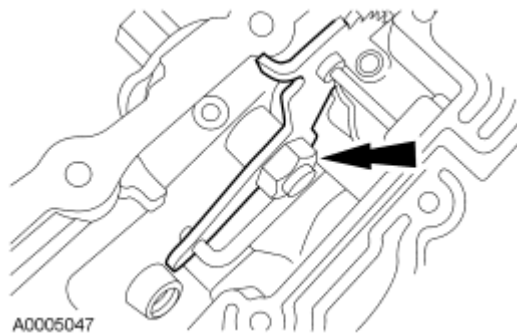


Fig. 424: Locating Manual Valve Inner Lever And Mounting Nut
Courtesy of FORD MOTOR CO.

CAUTION: Use care not to damage the fluid pan rail surface when installing the retaining pin.

NOTE: Align the manual control lever shaft alignment groove with the manual control lever shaft spring pin bore in the transmission case.

12. Install the manual control lever shaft spring pin.
 - Tap the manual control lever shaft spring pin into the transmission case.

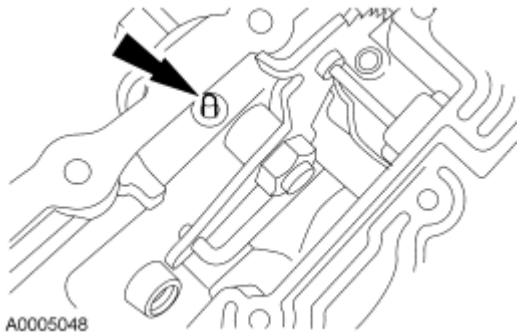


Fig. 425: Locating Manual Control Lever Shaft Spring Pin
Courtesy of FORD MOTOR CO.

CAUTION: To avoid damage, do not allow the wrench to strike the manual valve inner lever pin.

13. Tighten the nut.
 - Tighten to 48 Nm (35 lb-ft).

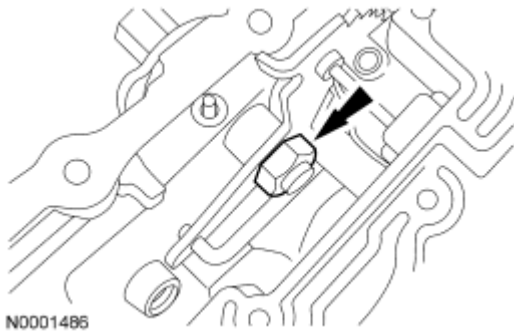
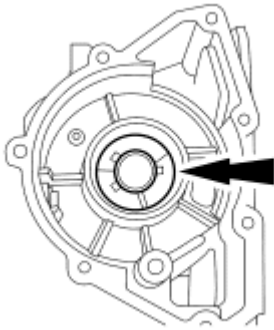


Fig. 426: Tightening Nut
Courtesy of FORD MOTOR CO.

CAUTION: The tabs on the output shaft thrust washer (No. 11) point into the case. Make sure the thrust washer is correctly seated or damage may occur.

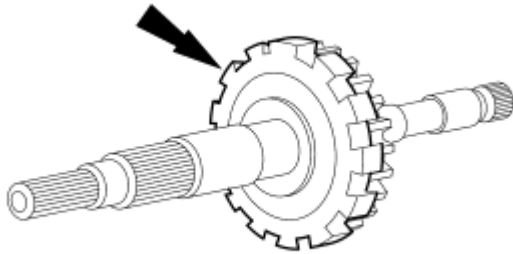
14. Install the output shaft thrust washer (No. 11).
 - Coat the output shaft thrust washer with petroleum jelly.



A0007920

Fig. 427: Locating Output Shaft Thrust Washer
Courtesy of FORD MOTOR CO.

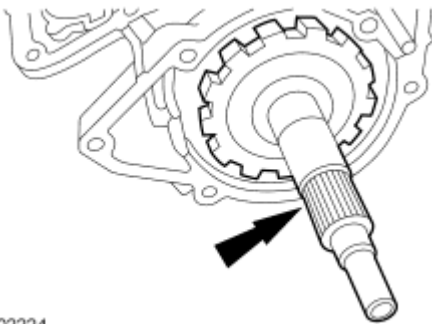
15. Install the park gear on the output shaft.



A0002599

Fig. 428: Locating Park Gear On Output Shaft
Courtesy of FORD MOTOR CO.

16. Install the output shaft and park gear.



A0002224

Fig. 429: Locating Output Shaft And Park Gear
Courtesy of FORD MOTOR CO.

17. Install the low/reverse brake drum.
 - Rotate the low/reverse brake drum clockwise to install.

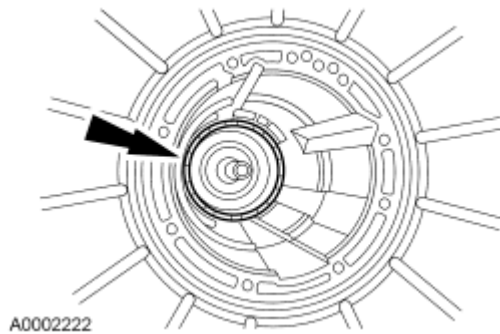


Fig. 430: Locating Low/Reverse Brake Drum
Courtesy of FORD MOTOR CO.

NOTE: Make sure band is resting on the 2 anchor pins in the case.

18. Install the low/reverse band over the reverse drum.

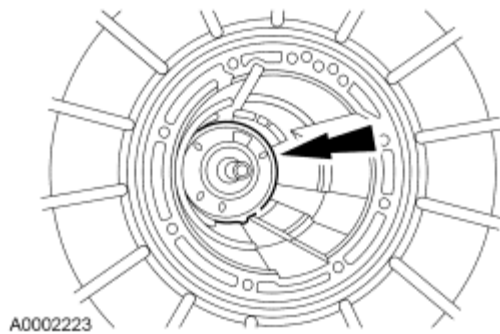


Fig. 431: Locating Reverse Band
Courtesy of FORD MOTOR CO.

NOTE: The reverse band actuating lever must fit into the notches in the band.

19. Install the reverse band actuating lever into the reverse band.

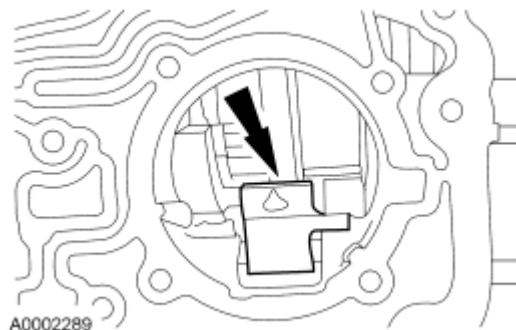


Fig. 432: Identifying Reverse Band Actuating Lever
Courtesy of FORD MOTOR CO.

20. Install the reverse band actuating lever shaft into the case and into the reverse band actuating lever.

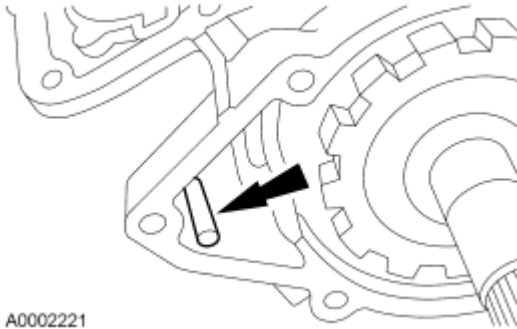


Fig. 433: Identifying Reverse Band Actuating Lever Shaft
Courtesy of FORD MOTOR CO.

21. Install the No. 10 needle bearing into the case.

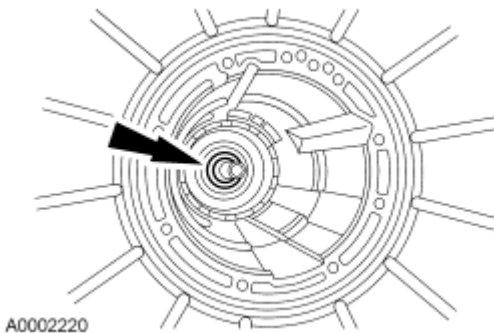


Fig. 434: Identifying No. 10 Low Intermediate Sun Gear Bearing
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the seal against the case during assembly.

22. Install the output shaft ring gear, hub and seal.

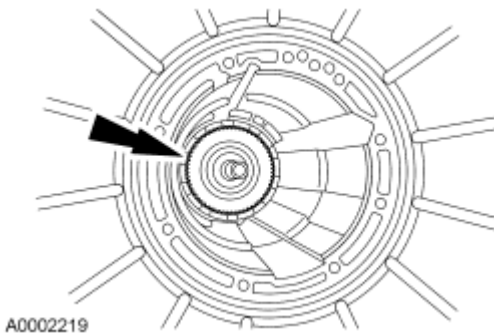


Fig. 435: Locating Output Shaft Ring Gear

Courtesy of FORD MOTOR CO.

CAUTION: Always install a new output shaft retaining ring, otherwise transmission damage can occur.

23. Install a new output shaft retaining ring.

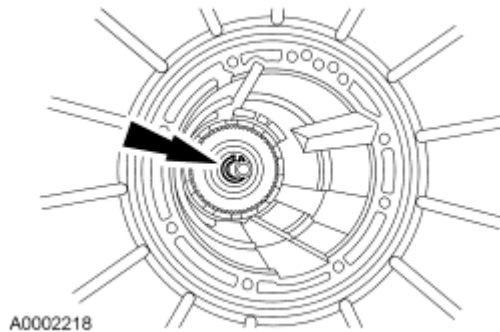


Fig. 436: Locating Output Shaft Retaining Ring
Courtesy of FORD MOTOR CO.

NOTE: Install the output shaft sleeve with the cone facing up. This sleeve will snap into place when correctly installed.

24. Install the output shaft sleeve.

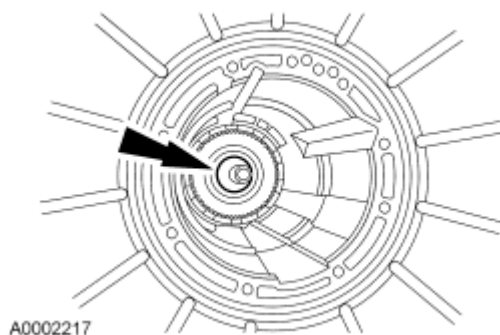


Fig. 437: Locating Output Shaft Sleeve
Courtesy of FORD MOTOR CO.

25. Install low/reverse planetary carrier needle bearing (No. 9) onto the output shaft ring gear and hub assembly.

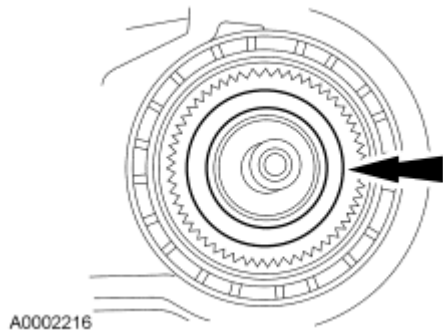


Fig. 438: Locating Thrust Bearing
Courtesy of FORD MOTOR CO.

CAUTION: Make sure the needle bearings stay in place or damage may occur.

26. Install the low/reverse planetary assembly.

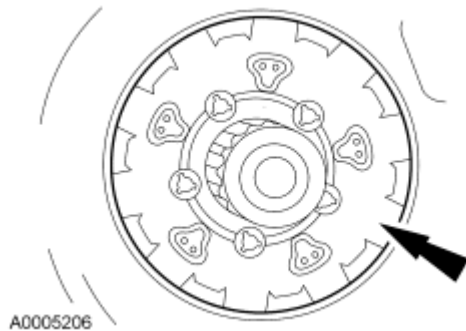


Fig. 439: Locating Low/Reverse Planetary Assembly
Courtesy of FORD MOTOR CO.

NOTE: The low/reverse brake drum must be pulled forward to install the low/reverse planet retaining ring.

27. Install the retaining ring.

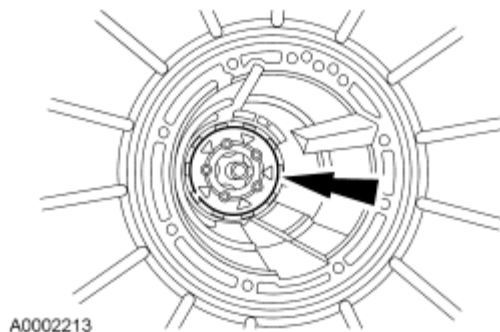


Fig. 440: Identifying Retaining Ring
Courtesy of FORD MOTOR CO.

28. Install the No. 8 thrust bearing.

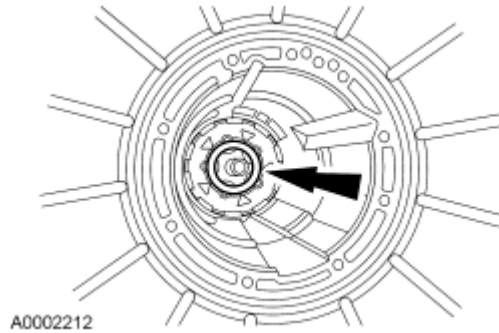


Fig. 441: Identifying Thrust Bearing
Courtesy of FORD MOTOR CO.

29. Install the spacer on the input shell, using petroleum jelly to hold it in place.

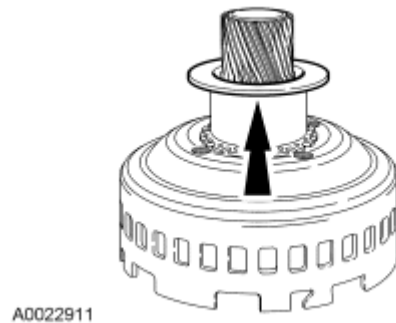


Fig. 442: Locating Spacer On Input Shell
Courtesy of FORD MOTOR CO.

30. Install the input shell and sun gear assembly.

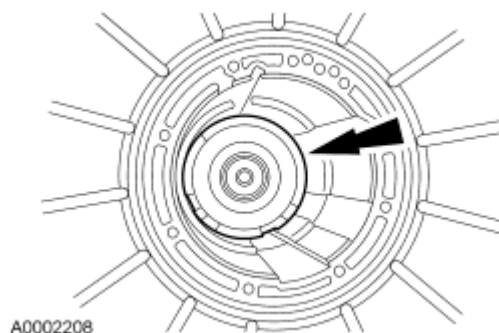


Fig. 443: Locating Input Shell And Sun Gear Assembly
Courtesy of FORD MOTOR CO.

NOTE: The No. 13 bearing must be correctly seated in the forward planet assembly so the sun gear can be installed correctly.

31. Install the forward planetary assembly.

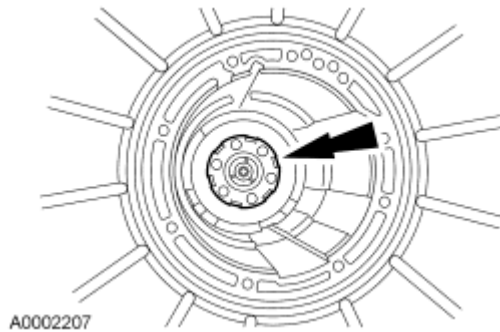


Fig. 444: Locating Forward Planetary Assembly
Courtesy of FORD MOTOR CO.

32. Install the No. 7 forward planet thrust bearing into the forward ring gear and hub assembly. Use petroleum jelly to hold the bearing in place.

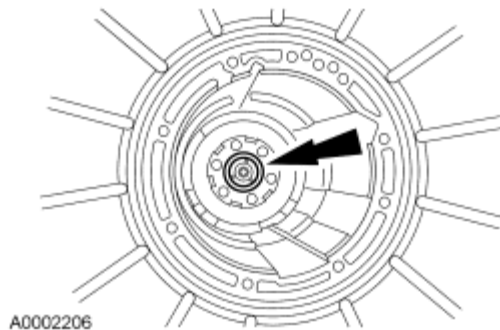


Fig. 445: Identifying No. 7 Forward Planet Thrust Bearing
Courtesy of FORD MOTOR CO.

33. Install the No. 6B forward clutch thrust washer onto the forward ring gear hub.

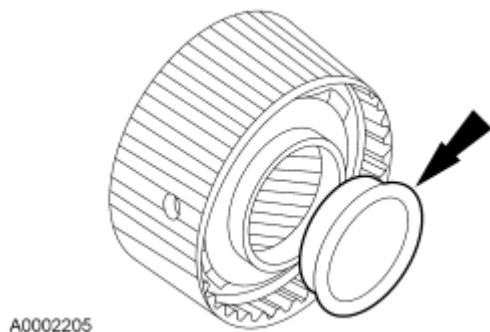


Fig. 446: Identifying No. 6B Forward Clutch Thrust Washer

Courtesy of FORD MOTOR CO.

34. Install the forward ring gear and hub as an assembly.

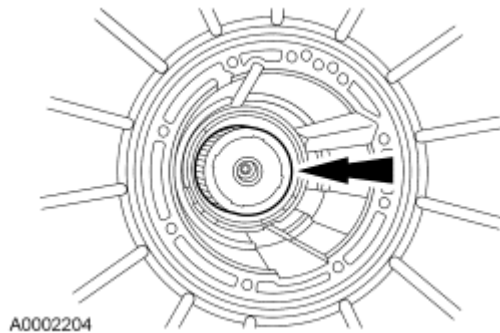


Fig. 447: Locating Forward Ring Gear And Hub
Courtesy of FORD MOTOR CO.

35. Install the No. 6A forward ring gear hub thrust bearing into the forward ring gear and hub.

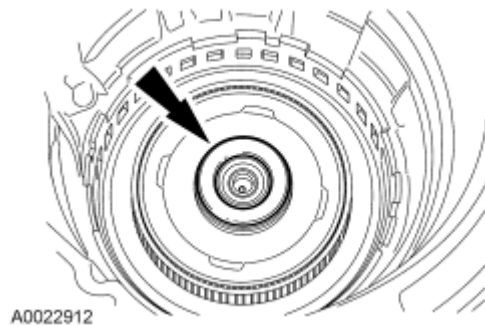


Fig. 448: Locating No. 6A Forward Ring Gear Hub Thrust Bearing
Courtesy of FORD MOTOR CO.

36. Install the forward clutch cylinder.

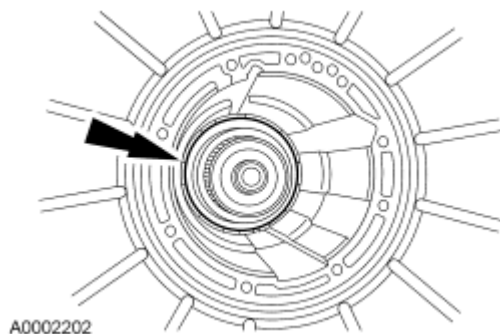


Fig. 449: Locating Forward Clutch Cylinder
Courtesy of FORD MOTOR CO.

37. Install the No. 5 thrust bearing.

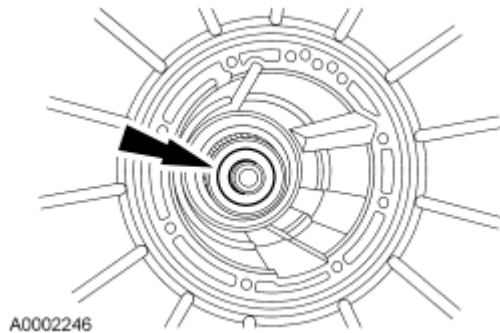


Fig. 450: Locating No. 5 Forward Clutch Cylinder Thrust Bearing
Courtesy of FORD MOTOR CO.

38. Install the intermediate servo piston and spring.
- Lubricate the servo bore with clean automatic transmission fluid.

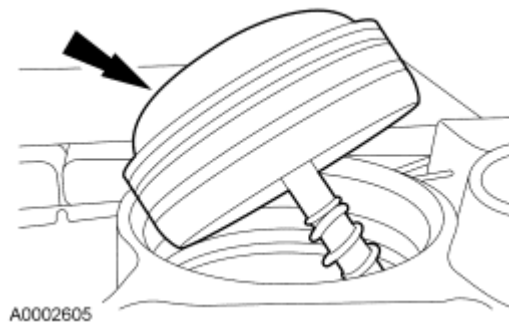


Fig. 451: Locating Intermediate Servo Piston And Spring
Courtesy of FORD MOTOR CO.

39. Using the special tool, install the retaining ring.

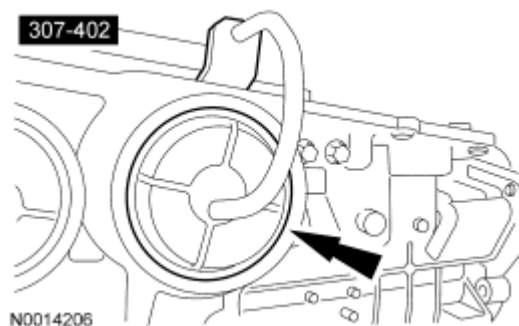


Fig. 452: Identifying Special Tool (307-402)
Courtesy of FORD MOTOR CO.

40. Install the direct clutch drum.

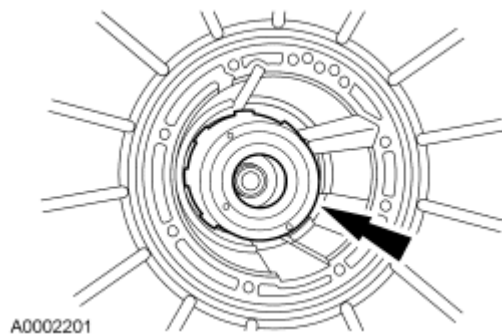


Fig. 453: Locating Direct Clutch Drum
Courtesy of FORD MOTOR CO.

41. Using a depth micrometer with an 8-inch extension, measure from the top of the gauge bar to center support ledge in the case at 4 places 90 degrees apart.
- Add the 4 measurements, divide by 4, and record as dimension A.

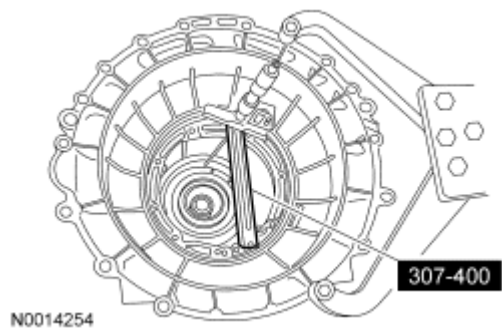


Fig. 454: Identifying Special Tool (307-400)
Courtesy of FORD MOTOR CO.

CAUTION: The torque specifications are critical for this procedure. Failure to use the correct torque specifications may cause transmission damage.

42. Install the special tool.
1. Install the special tool and the bolts using the 2 pump screw locations at approximately 6 and 12 o'clock positions.
 - Tighten to 15 Nm (11 lb-ft).
 2. Tighten the center screw.
 - Tighten to 1.13 Nm (10 lb-in).

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

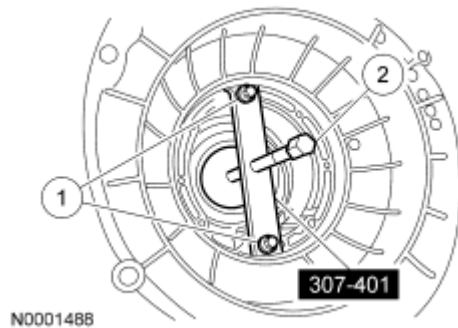


Fig. 455: Identifying Special Tool (307-401)
Courtesy of FORD MOTOR CO.

NOTE: Align the disc holes on special tool with the slot in gauge bar for correct measurement.

43. Measure the distance from the top of the gauge bar to the drum bearing surface through the hole in the disc and record as dimension B. Repeat the measurement 180 degrees on the opposite side of the special tool and record as dimension C.

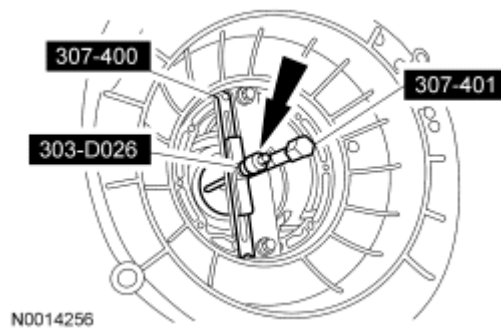


Fig. 456: Identifying Special Tools (307-400), (303-D026) & (307-401)
Courtesy of FORD MOTOR CO.

44. Add dimension B to C, divide by 2, and record as dimension D.
45. Subtract A from D and record as dimension E.
46. Select bearing from the following chart, using dimension E.

Dimension E	Service Part Number (7D014)	Bearing Thickness	Identification (Notches)
1.69-1.87 mm (0.066-0.074 in)	XW4Z-CA	2.65-2.80 mm (0.104-0.110 in)	None
1.88-2.04 mm (0.073-0.080 in)	XW4X-DA	2.83-2.98 mm (0.111-0.116 in)	One
2.05-2.22 mm (0.081- 0.088 in)	XW4Z-EA	3.01-3.16 mm (0.118-0.124 in)	Two

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

2.23-2.43 mm (0.088-0.096 in)	XW4Z-FA	3.21-3.36 mm (0.126-0.132 in)	Three
----------------------------------	---------	----------------------------------	-------

- NOTE:** Make sure that the intermediate band apply strut is aligned with the band notch.
- NOTE:** If the intermediate band is reused, it must be installed in the same position as when removed.
- NOTE:** The new intermediate band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

47. Install the intermediate band.

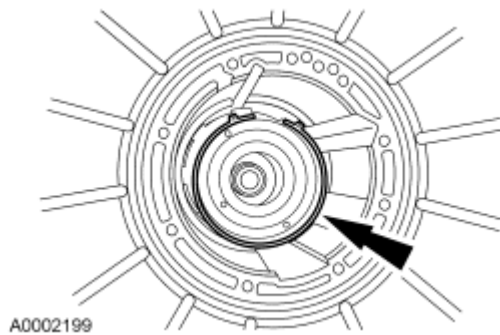


Fig. 457: Identifying Intermediate Band
Courtesy of FORD MOTOR CO.

CAUTION: To avoid a "fall-out" condition of the strut from the screw during assembly and function, the small "U" shaped notch should be toward the band/case side and the large "U" shaped notch toward the main control side.

48. Install the intermediate band anchor strut.
1. Band/case side of the anchor (small U notch).
 2. Main control side of the anchor (large U notch).

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

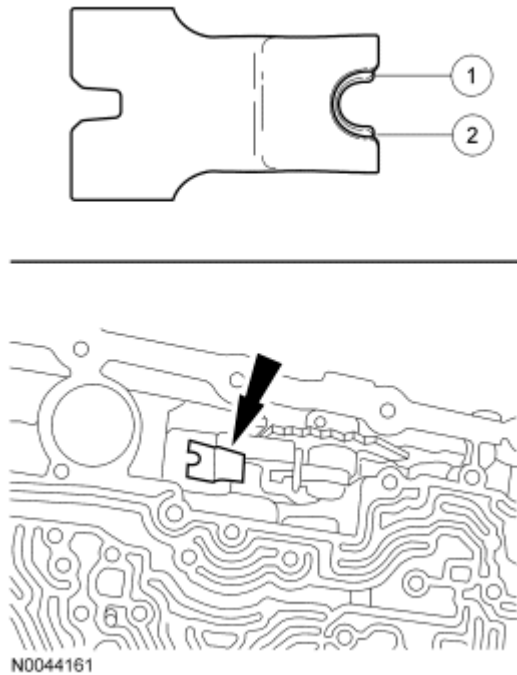


Fig. 458: Locating Intermediate Band Anchor Strut
Courtesy of FORD MOTOR CO.

CAUTION: If the strut is installed incorrectly, transmission damage will occur.

49. Check to make sure that the intermediate band anchor strut is installed in the correct orientation to the case and adjustment screw.

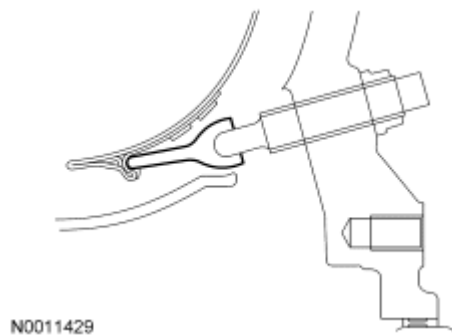


Fig. 459: Checking Intermediate Band Anchor Strut Installation
Courtesy of FORD MOTOR CO.

50. Loosely install the screw.

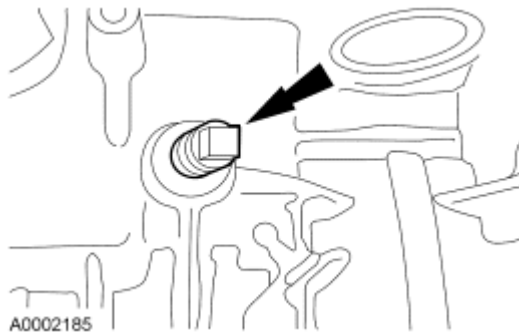


Fig. 460: Locating Screw
Courtesy of FORD MOTOR CO.

51. Install the intermediate band apply strut.

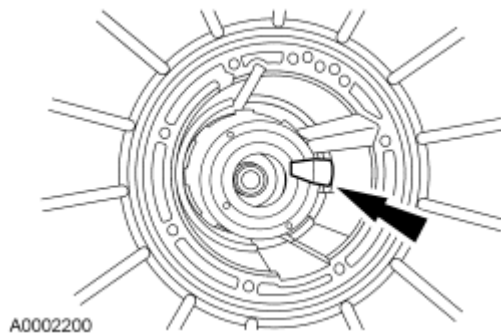


Fig. 461: Locating Intermediate Band Apply Strut
Courtesy of FORD MOTOR CO.

CAUTION: If the strut is installed incorrectly, transmission damage will occur.

52. Check to make sure that the intermediate band apply strut is installed in the correct orientation to the case and piston rod.

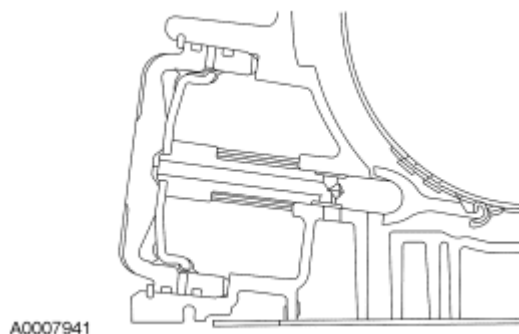


Fig. 462: Identifying Band Apply Strut Installed In Correct Orientation To Case And Piston Rod
Courtesy of FORD MOTOR CO.

53. Install the selected No. 4 thrust washer on the direct clutch drum.
- Coat the thrust washer with petroleum jelly.

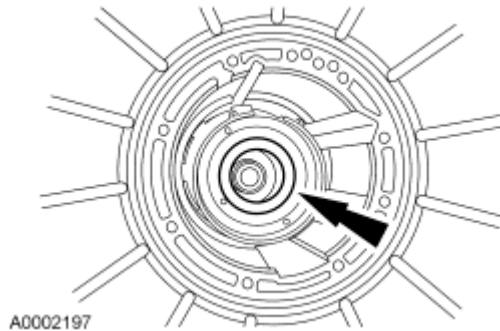


Fig. 463: Locating Intermediate Brake Drum Thrust Bearing
Courtesy of FORD MOTOR CO.

NOTE: Align the center support screw hole with correct case hole.

54. Install the center support.

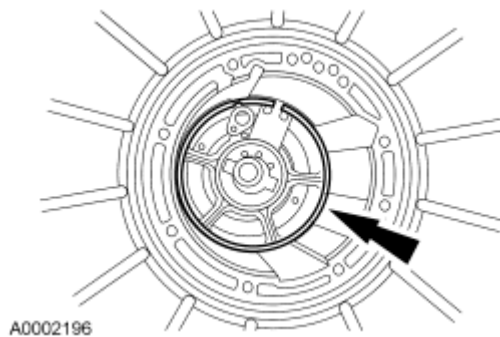


Fig. 464: Identifying Center Support
Courtesy of FORD MOTOR CO.

55. Install the center support lock nut and cage.

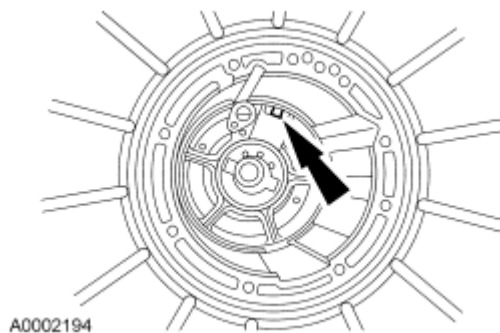


Fig. 465: Locating Locknut And Cage

Courtesy of FORD MOTOR CO.

56. Loosely install the screw.

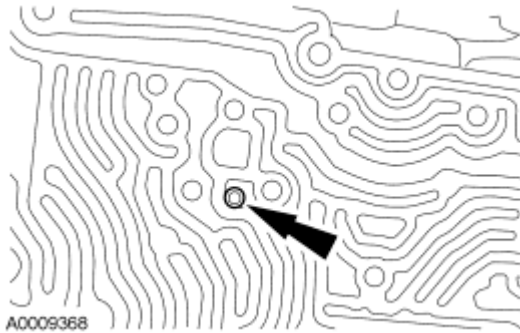


Fig. 466: Locating Center Support Screw
Courtesy of FORD MOTOR CO.

CAUTION: Install the center support retaining ring with the tapered side facing up or damage may occur.

CAUTION: Make sure the notch opening is not obstructed by the center support retaining ring or damage may occur.

57. Install the center support retaining ring.

1. Make sure the center support retaining ring is installed with the tapered side facing up.
2. Make sure the opening of the center support retaining ring is positioned correctly.

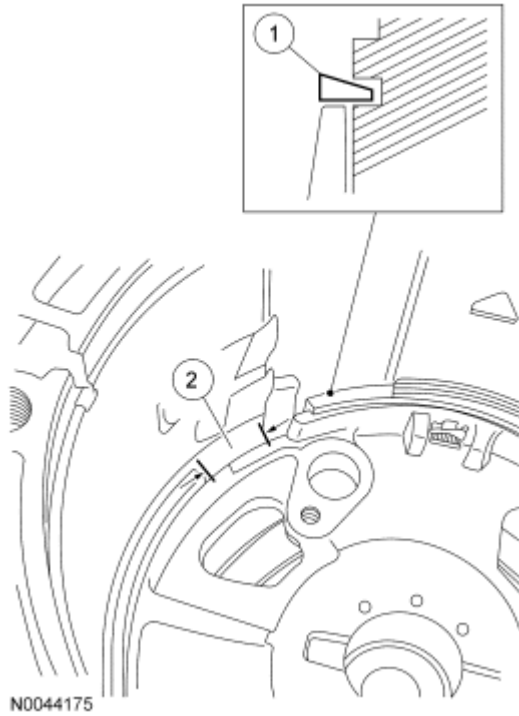


Fig. 467: Identifying Center Support Retaining Ring With Tapered Side Facing Up
Courtesy of FORD MOTOR CO.

58. Install the center shaft thrust bearing (No. 3).

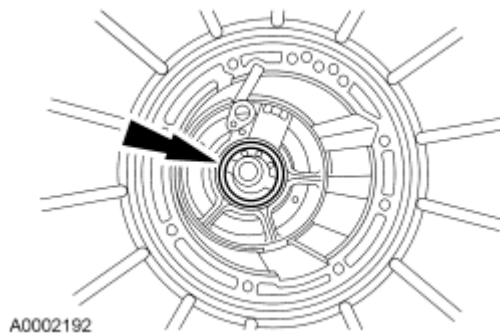


Fig. 468: Locating Center Shaft Thrust Bearing
Courtesy of FORD MOTOR CO.

59. Install the overdrive ring gear, overdrive one-way clutch and center shaft assembly.

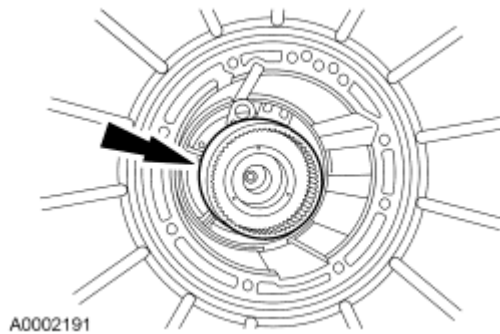


Fig. 469: Locating Overdrive Ring Gear
Courtesy of FORD MOTOR CO.

CAUTION: Do not bend the trigger wheel. Make sure that the No. 2 thrust bearing is in this assembly.

60. Install the planetary gear overdrive carrier.

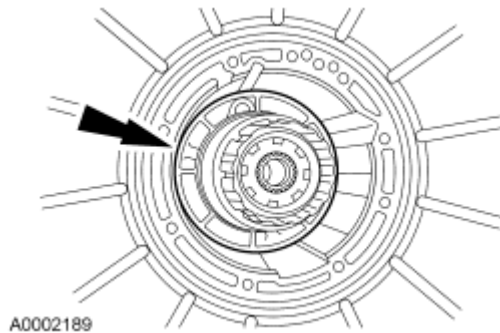


Fig. 470: Locating Planetary Gear Overdrive Carrier
Courtesy of FORD MOTOR CO.

61. Install the overdrive brake drum and coast clutch drum assembly.

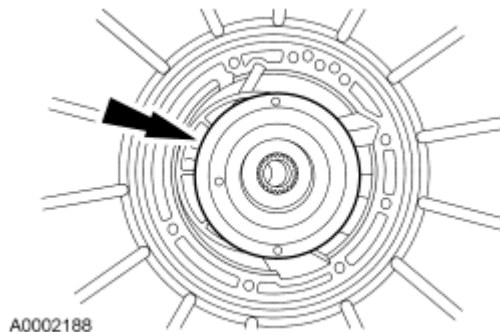


Fig. 471: Locating Overdrive Brake And Coast Clutch Drum
Courtesy of FORD MOTOR CO.

62. Install the overdrive band servo piston and spring.
- Lubricate the servo bore with clean automatic transmission fluid.

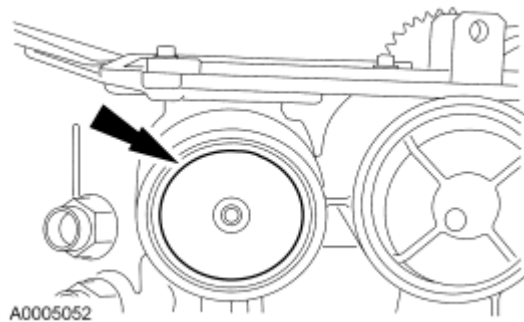


Fig. 472: Locating Overdrive Band Servo Piston
Courtesy of FORD MOTOR CO.

63. Using the special tools, install the retaining ring.

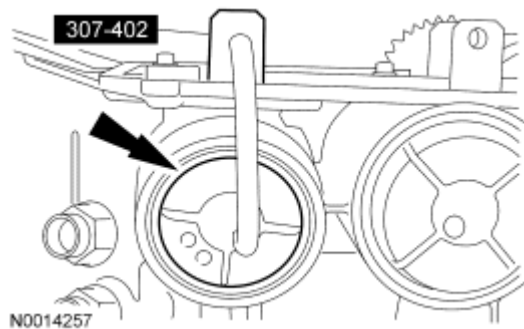


Fig. 473: Installing Retaining Ring Using Special Tool (307-402)
Courtesy of FORD MOTOR CO.

- NOTE:** If the overdrive band is reused, it must be installed in the same position as when removed.
- NOTE:** Make sure that the overdrive band apply strut is aligned with the band notch.
- NOTE:** The new overdrive band is dark in color. This is a normal condition of the band. Hairline cracks in the band are also considered normal. Do not install a new band based solely on the color.

64. Install the overdrive band.

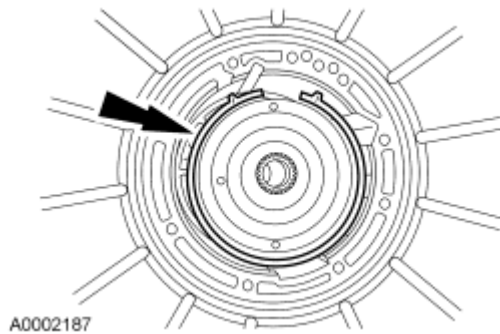


Fig. 474: Locating Overdrive Band
Courtesy of FORD MOTOR CO.

CAUTION: To avoid a fall-out condition of the strut from the screw during assembly and function, the small U shaped notch should be toward the band/case side and the large U shaped notch toward the main control side.

65. Install the overdrive band anchor strut.
1. Band/case side of the anchor (small U notch).
 2. Main control side of the anchor (large U notch).

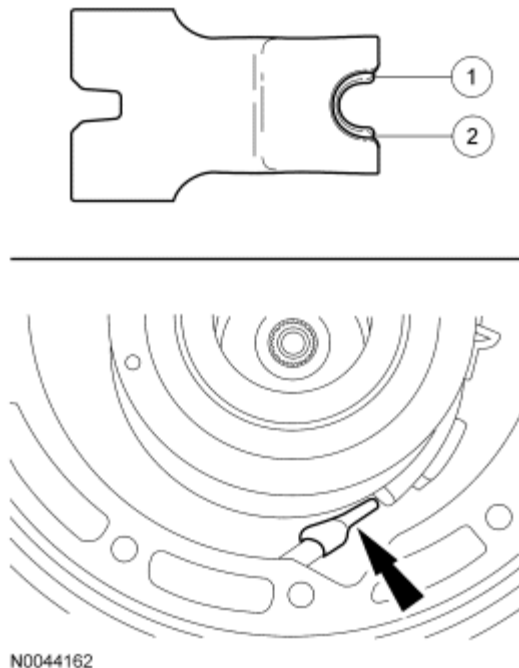


Fig. 475: Identifying Band/Case Side Of Anchor And Main Control Side Of Anchor
Courtesy of FORD MOTOR CO.

CAUTION: If the strut is installed incorrectly, transmission damage will occur.

66. Check to make sure that the intermediate band anchor strut is installed in the correct orientation to the case and adjustment screw.

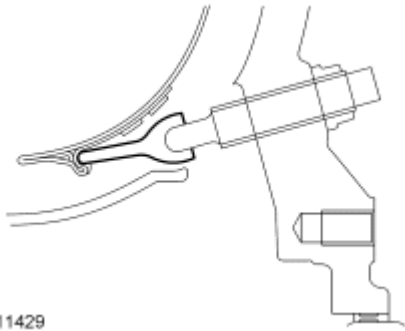


Fig. 476: Checking Intermediate Band Anchor Strut Installation
Courtesy of FORD MOTOR CO.

67. Loosely install the screw.

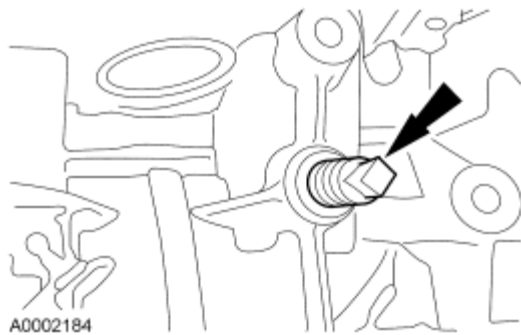


Fig. 477: Locating Screw
Courtesy of FORD MOTOR CO.

68. Install the overdrive apply strut.

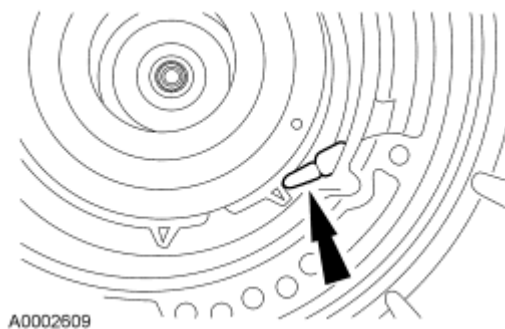


Fig. 478: Identifying Overdrive Apply Strut

Courtesy of FORD MOTOR CO.

CAUTION: If the strut is installed incorrectly, transmission damage will occur.

69. Check to make sure that the overdrive band apply strut is installed in the correct orientation to the case and piston rod.

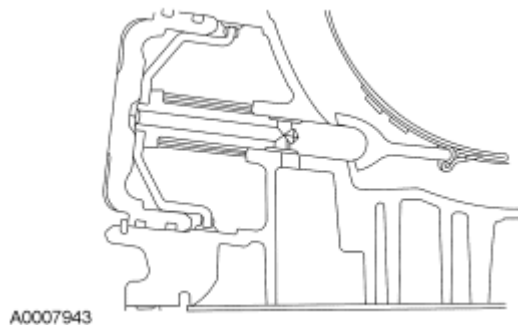


Fig. 479: Identifying Overdrive Band Applying Strut Position
Courtesy of FORD MOTOR CO.

CAUTION: The torque specifications are critical for this procedure. Failure to use the correct torque specifications may cause transmission damage.

70. Install the special tool.
1. Install the special tool and the bolts using the 2 pump screw locations at approximately 6 and 12 o'clock positions.
 - Tighten to 15 Nm (11 lb-ft).
 2. Tighten the center screw.
 - Tighten to 1 Nm (9 lb-in).

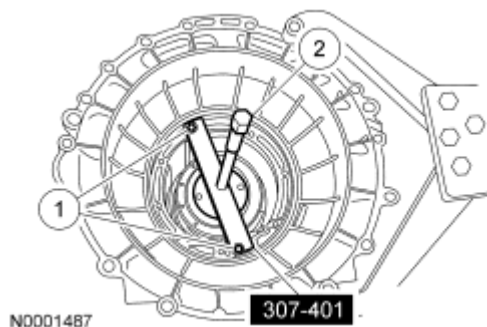


Fig. 480: Identifying Special Tool (307-401)
Courtesy of FORD MOTOR CO.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

NOTE: Align the disc holes on special tool with the slot in gauge bar for correct measurement.

71. Measure the distance from the top of the gauge bar to the drum bearing surface through the hole in the disc and record as dimension A. Repeat the measurement 180 degrees on the opposite side of the special tool and record as dimension B.

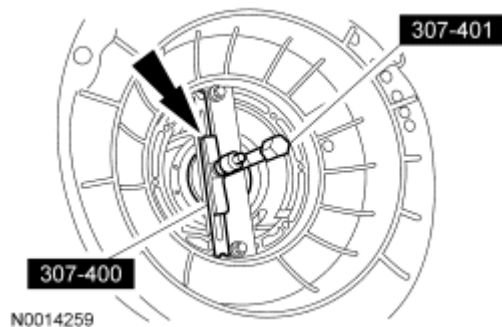
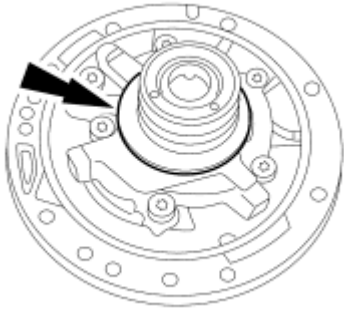


Fig. 481: Identifying Special Tool (307-400) And (307-401)
Courtesy of FORD MOTOR CO.

72. Add dimension A to B, divide by 2, and record as dimension C.
73. Subtract the thickness of the gauge bar 17.78 mm (0.70 in) from dimension C and record as dimension D.
74. Select the No. 1 thrust bearing from the following chart using dimension D.

Dimension D	Service Part Number (7D014)	Bearing Thickness	Identification (Color/ID)
38.05-38.13 mm (1.498-1.501 in)	F7TZ-TA	1.55-1.60 mm (0.061- 0.063 in)	White
38.14-38.28 mm (1.50-1.51 in)	F7TZ-MA	1.75-1.80 mm (0.069- 0.071 in)	Green
38.29-38.42 mm (1.507-1.513 in)	F7TZ-NA	1.85-1.90 mm (0.073- 0.075 in)	Red
38.43-38.61 mm (1.51-1.52 in)	F7TZ-RA	2.05-2.10 mm (0.081- 0.083 in)	Black
38.62-38.74 mm (1.52- 1.53 in)	F7TZ-SA	2.15-2.20 mm (0.095- 0.097 in)	Yellow

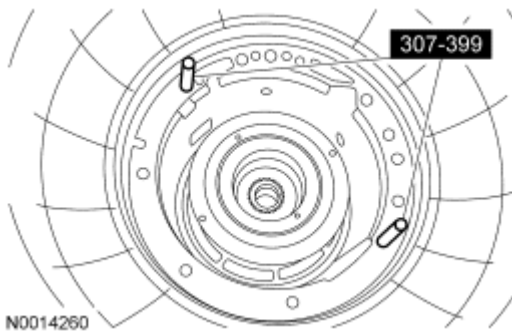
75. Install the selected No. 1 fluid pump input thrust washer.
- Coat the fluid pump input thrust washer with petroleum jelly.



A0007931

Fig. 482: Locating No. 1 Fluid Pump Input Thrust Washer
Courtesy of FORD MOTOR CO.

76. Install the special tools into the transmission case.



N0014260

Fig. 483: Identifying Special Tool (307-339)
Courtesy of FORD MOTOR CO.

77. Install the pump gasket.



A0002159

Fig. 484: Locating Pump Gasket
Courtesy of FORD MOTOR CO.

CAUTION: Make sure that the fluid pump inlet thrust washer (No. 1), selective thrust washer, fluid pump gasket and the fluid pump-to-case O-ring seal remain in the correct position throughout this step or damage may occur.

78. Install the fluid pump.

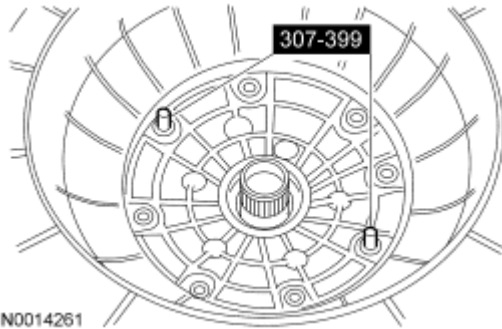


Fig. 485: Installing Fluid Pump Using Special Tool (307-399)
Courtesy of FORD MOTOR CO.

CAUTION: The special tools must be used to correctly align the pump with the adapter plate to reduce gear noise, bushing failure and leakage.

79. Using the special tool, align the fluid pump to the adapter plate.

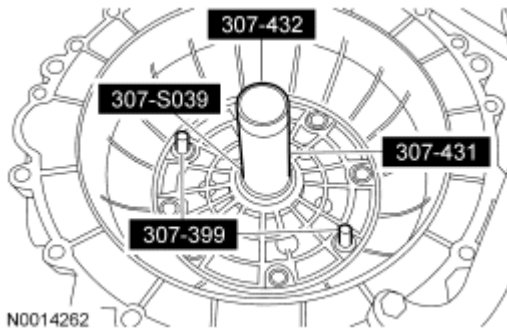


Fig. 486: Aligning Fluid Pump To Adapter Plate Using Special Tools
Courtesy of FORD MOTOR CO.

80. Install screws. Tighten the screws in a star pattern.

- Tighten to 25 Nm (18 lb-ft).

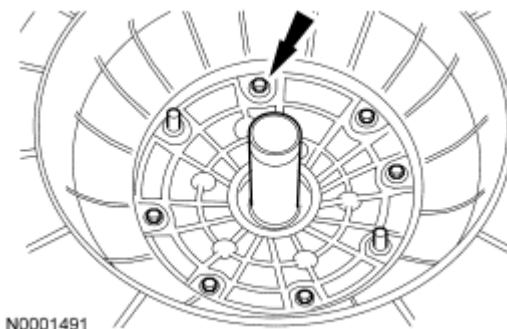


Fig. 487: Tightening Screws In Star Pattern
Courtesy of FORD MOTOR CO.

81. Remove the special tools and install the 2 remaining screws.
- Tighten to 25 Nm (18 lb-ft).

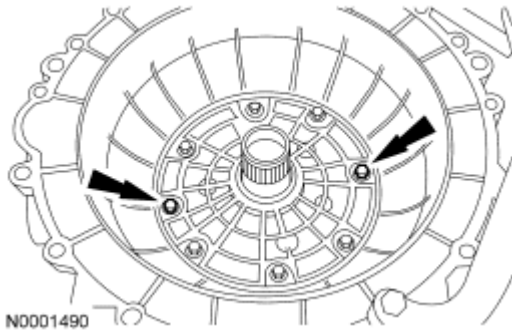


Fig. 488: Locating Remaining Screws
Courtesy of FORD MOTOR CO.

CAUTION: Do not allow overdrive band adjustment screw to back out. Band strut may fall out of position.

NOTE: Install, but do not tighten, a new lock nut on the band adjustment screw. Apply petroleum jelly to the lock nut seal.

82. Install a new lock nut on the band adjustment screw.

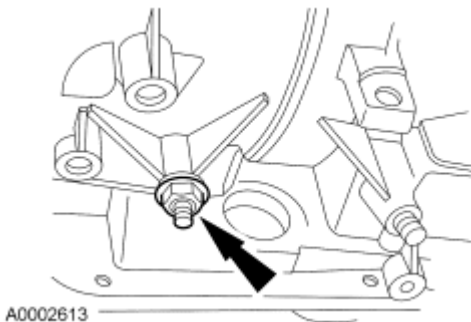


Fig. 489: Locating Lock nut On Band Adjustment Screw
Courtesy of FORD MOTOR CO.

CAUTION: The overdrive servo must be installed prior to band adjustment or damage may occur.

83. Using the special tool, tighten the overdrive band adjustment screw.
- Tighten to 14 Nm (10 lb-ft).

- Then back off the screw exactly 1.5 turns and hold that position.

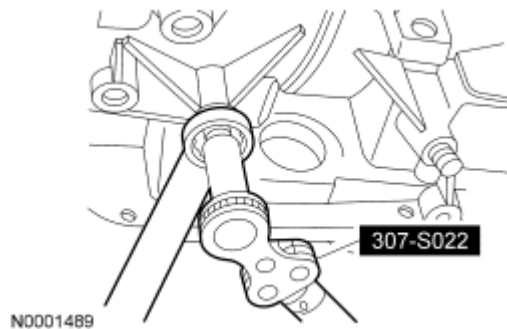


Fig. 490: Identifying Special Tool (307-S022)
Courtesy of FORD MOTOR CO.

84. Tighten the overdrive band lock nut.
 1. Hold the overdrive band adjustment screw stationary.
 2. Tighten the overdrive band lock nut.
 - Tighten to 54 Nm (40 lb-ft).

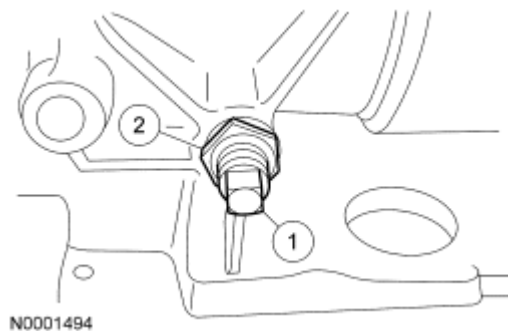


Fig. 491: Identifying Overdrive Band Adjustment Screw And Overdrive Band Lock nut
Courtesy of FORD MOTOR CO.

CAUTION: Do not allow the intermediate band adjusting screw to back out. Band strut could fall out of position.

NOTE: Install, but do not tighten, a new lock nut on the band adjustment screw.
Apply petroleum jelly to the lock nut seal.

85. Install new nut on the band adjustment screw.

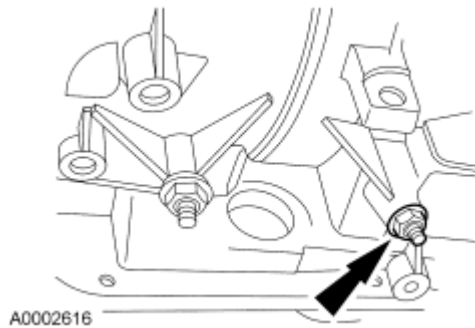


Fig. 492: Locating Lock nut On Band Adjustment Screw
Courtesy of FORD MOTOR CO.

CAUTION: The intermediate servo must be installed prior to band adjustment or damage may occur.

86. Using the special tool, tighten the intermediate band adjustment screw.
- Tighten to 14 Nm (10 lb-ft).
 - Then back off the screw exactly 1.5 turns and hold that position.

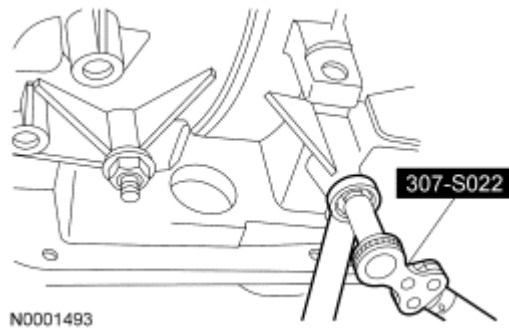


Fig. 493: Identifying Special Tool (307-S022)
Courtesy of FORD MOTOR CO.

87. Tighten the intermediate band lock nut.
1. Hold the intermediate band adjustment screw stationary.
 2. Tighten the intermediate band lock nut.
 - Tighten to 54 Nm (40 lb-ft).

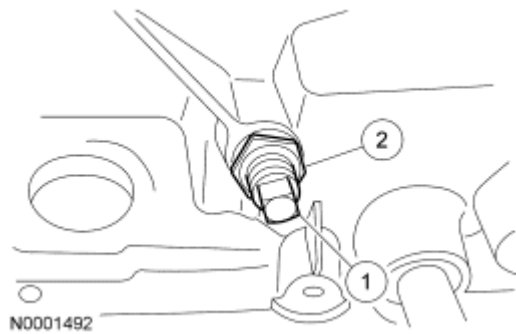


Fig. 494: Locating Intermediate Band Adjustment Screw And Intermediate Band Lock nut
Courtesy of FORD MOTOR CO.

88. Tighten the center support screw.
 - Tighten to 11 Nm (8 lb-ft).

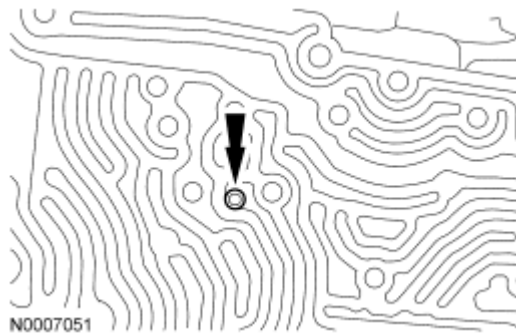


Fig. 495: Locating Center Support Screw
Courtesy of FORD MOTOR CO.

89. Using the special tools, carry out the **Air Pressure Tests**. For additional information, refer to **Special Testing Procedures**.

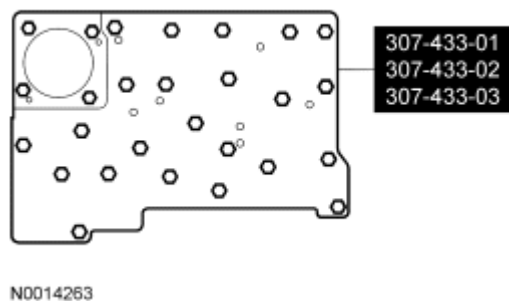


Fig. 496: Carrying Out Air Pressure Test
Courtesy of FORD MOTOR CO.

90. Install the special tools into the transmission case.

2008 Ford Mustang

2008 TRANSMISSIONS Automatic Transaxle/Transmission - 5R55S - Mustang

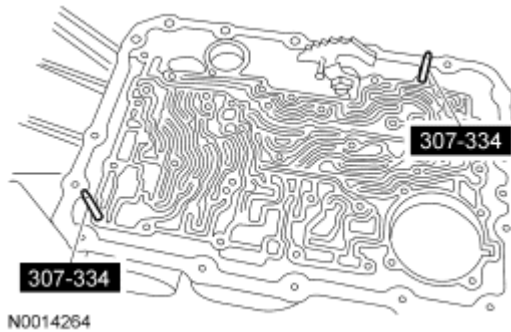


Fig. 497: Installing Special Tools (307-334) Into Transmission Case
Courtesy of FORD MOTOR CO.

91. Using the special tools, install the main control valve body and loosely install the screws.
 1. Install the short screw.
 2. Install the screw with the larger head.
 3. Install the remaining screws.

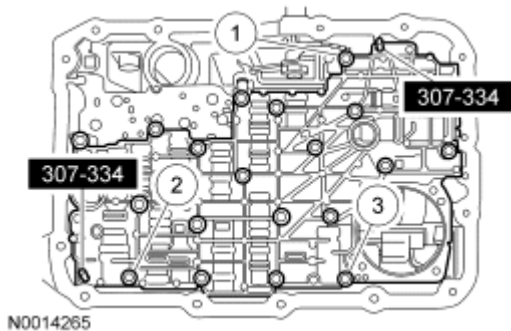


Fig. 498: Locating Main Control Valve Body & Special Tool (307-334)
Courtesy of FORD MOTOR CO.

92. Remove the special tools, and loosely install the screw.

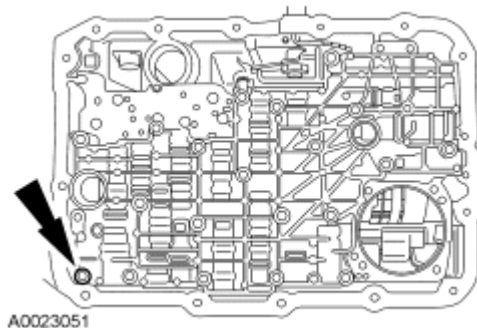
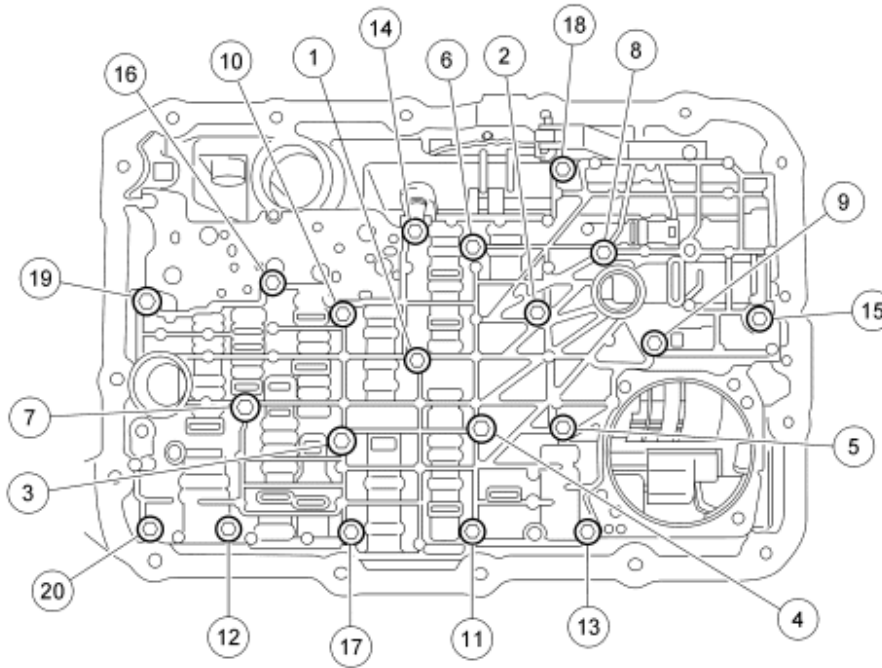


Fig. 499: Locating Screw
Courtesy of FORD MOTOR CO.

93. Tighten the screws in the sequence shown.

- Tighten to 10 Nm (89 lb-in).

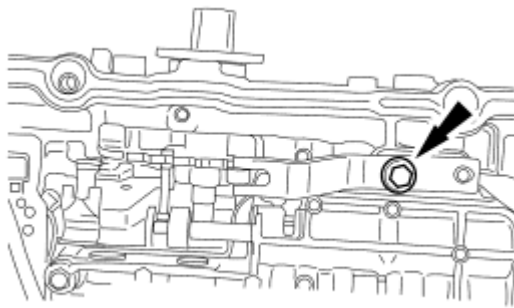


N0014183

Fig. 500: Identifying Tightening Sequence Of Main Control Valve Body Screws
Courtesy of FORD MOTOR CO.

94. With the manual lever in the NEUTRAL position, install the manual valve detent spring.

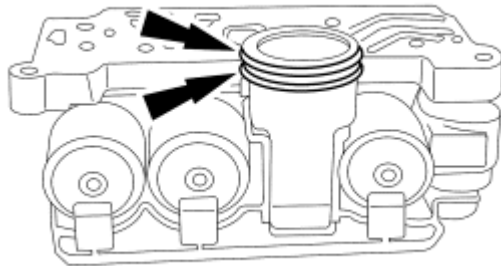
- Tighten to 10 Nm (89 lb-in).



N0001496

Fig. 501: Locating Manual Control Valve Detent Spring
Courtesy of FORD MOTOR CO.

95. Install new O-ring seals on the solenoid body connector. Lubricate the O-ring seals with clean automatic transmission fluid.

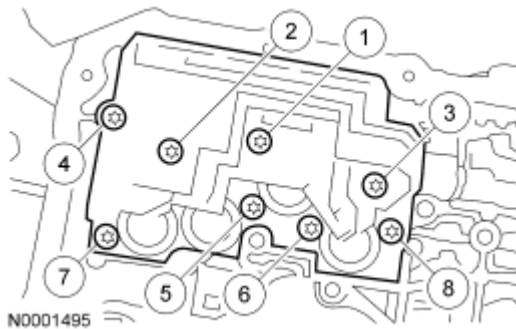


A0007944

Fig. 502: Locating O-Ring Seals On Solenoid Body Connector
Courtesy of FORD MOTOR CO.

CAUTION: Inspect the transmission case bore to make sure it is free of foreign material and not damaged. If damaged, transmission leak may occur.

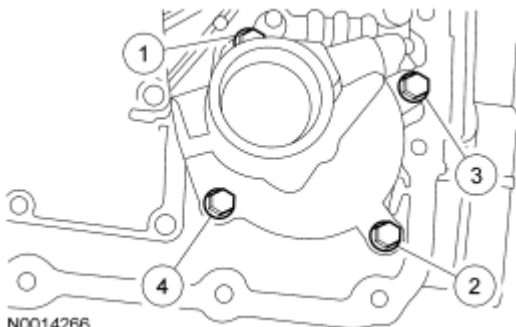
96. Install the solenoid body. Tighten the screws in the sequence shown.
- Tighten to 8 Nm (71 lb-in).



N0001495

Fig. 503: Identifying Solenoid Body Screw Tightening Sequence
Courtesy of FORD MOTOR CO.

97. Install the reverse servo. Tighten the bolts in the sequence shown in 2 stages.
- Stage 1: Tighten to 5 N.m (44 lb-in).
 - Stage 2: Tighten to 11 N.m (8 lb-ft).



N0014266

Fig. 504: Identifying Tightening Sequence For Reverse Servo Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Lubricate the fluid filter seals with clean automatic transmission fluid or they may be damaged.

NOTE: Make sure that the fluid filter seals are correctly seated on the filter.

98. Lubricate the seals and install the transmission fluid filter.
- Tighten to 10 Nm (89 lb-in).

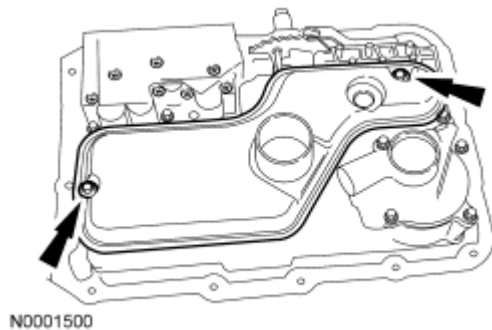


Fig. 505: Locating Transmission Fluid Filter Bolts
Courtesy of FORD MOTOR CO.

NOTE: The transmission fluid pan gasket is reusable. Clean and inspect for damage. If not damaged, the gasket should be reused.

99. Install the transmission fluid pan and gasket and loosely install the screws.

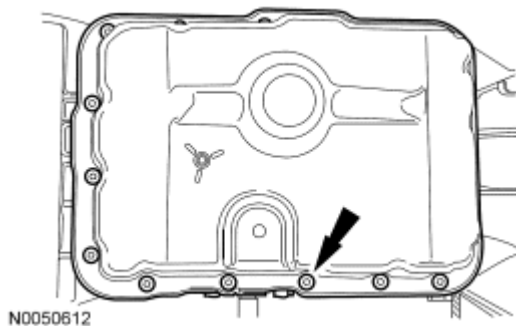


Fig. 506: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

100. Tighten the 16 screws in a crisscross sequence.
- Tighten to 11 Nm (8 lb-ft).

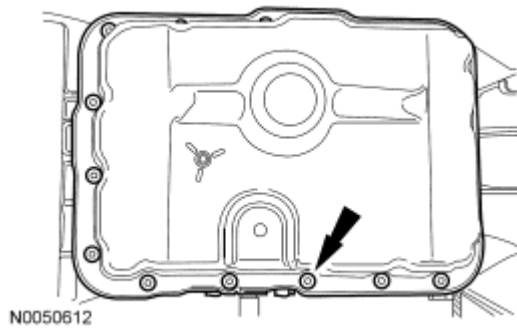


Fig. 507: Locating Transmission Fluid Pan Gasket
Courtesy of FORD MOTOR CO.

101. Install the drain plug.
- Install a new gasket onto the drain plug assembly.
 - Tighten to 26 Nm (19 lb-ft).

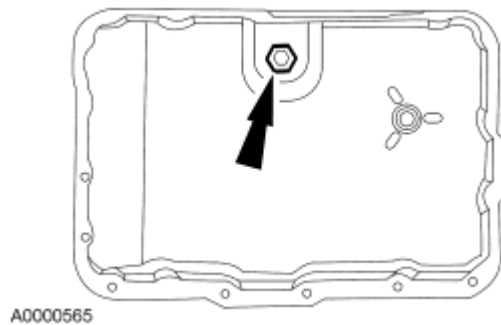


Fig. 508: Locating Drain Plug
Courtesy of FORD MOTOR CO.

102. Install the parking pawl assembly and gasket.
1. Install the parking pawl shaft.
 2. Install the parking pawl return spring.
 3. Install the parking pawl.
 4. Install a new gasket.

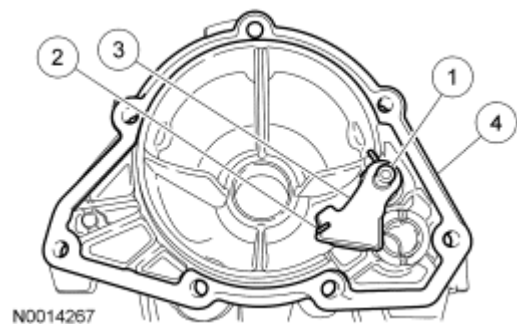


Fig. 509: Identifying Parking Pawl Shaft, Parking Pawl Return Spring, Parking Pawl And New Gasket

Courtesy of FORD MOTOR CO.

103. Install the extension housing.
- Tighten to 30 Nm (22 lb-ft).

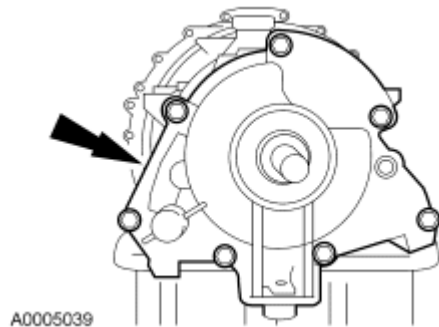


Fig. 510: Locating Extension Housing And Mounting Screws

Courtesy of FORD MOTOR CO.

104. Using the special tool, install the extension housing seal.

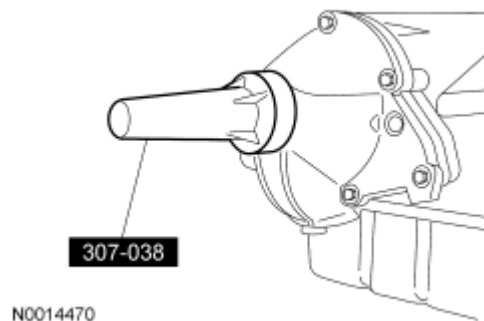


Fig. 511: Identifying Special Tool (307-038)

Courtesy of FORD MOTOR CO.

105. Using the special tools, install the output shaft flange.

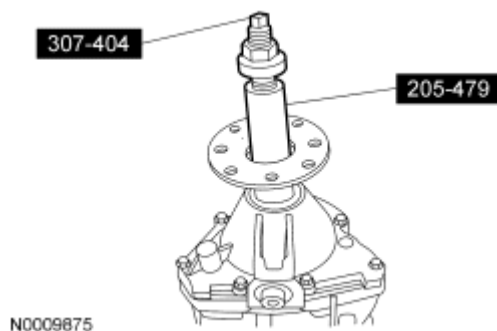


Fig. 512: Installing Output Shaft Flange Using Special Tools (307-404) & (205-479)
Courtesy of FORD MOTOR CO.

106. Install a new nut.
- Tighten to 130 Nm (96 lb-ft).

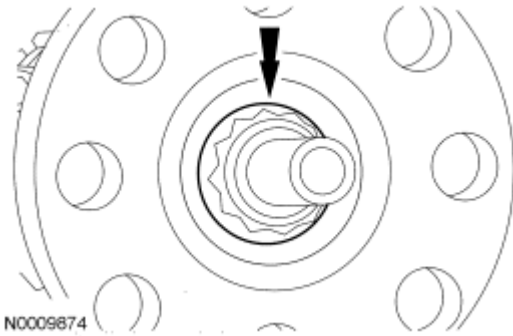


Fig. 513: Removing Driveshaft Nut
Courtesy of FORD MOTOR CO.

CAUTION: The digital transmission range (TR) sensor must fit flush against the boss on the case to prevent damage to the sensor.

107. Install the digital TR sensor and loosely install the screws.

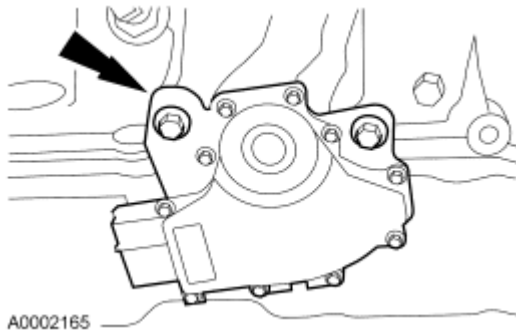


Fig. 514: Locating Transmission Range (TR) Sensor
Courtesy of FORD MOTOR CO.

CAUTION: Tightening one screw before tightening the other may cause the sensor to bind or become damaged.

NOTE: The manual lever must be in the NEUTRAL position.

108. Using the special tool, align the digital TR sensor and tighten the screws in an alternating sequence.
- Tighten 8 Nm (71 lb-in).

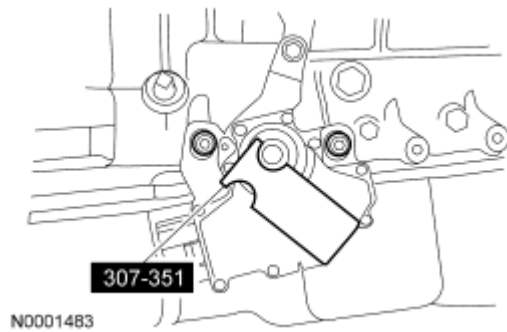


Fig. 515: Identifying Special Tool (307-351)
Courtesy of FORD MOTOR CO.

CAUTION: The splines of the input shaft are not the same length on both ends.
The shaft end with the shorter splines goes into the fluid pump or
damage may occur.

109. Install the input shaft.

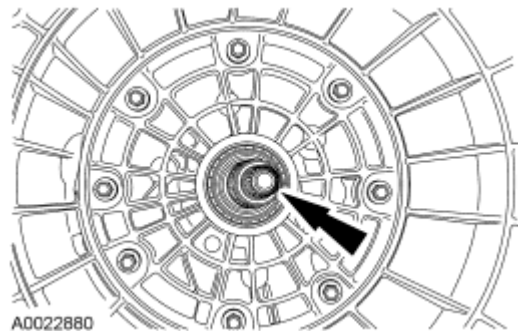


Fig. 516: Locating Input Shaft
Courtesy of FORD MOTOR CO.

110. Using the special tool, make sure that the fluid pump gear seal ring is fully seated.

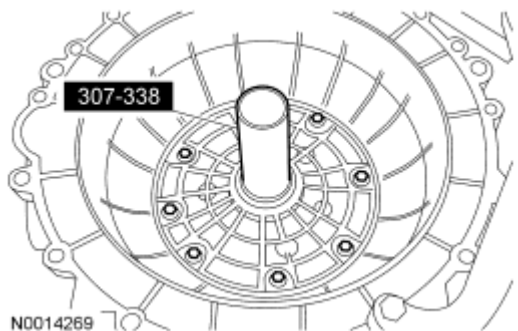


Fig. 517: Identifying Special Tool (307-338)
Courtesy of FORD MOTOR CO.

111. Remove the special tool.

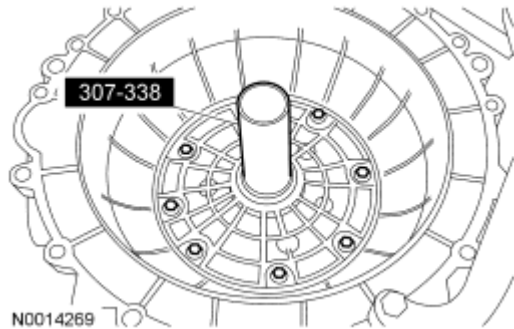


Fig. 518: Identifying Special Tool (307-338)
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the fluid pump gear O-ring seal when installing torque converter.

CAUTION: Make sure the converter hub is fully engaged in the pump support and gear and rotates freely. Do not damage the hub seal.

CAUTION: If the torque converter slides out, the hub seal may be damaged.

112. Lubricate the converter hub with clean automatic transmission fluid.

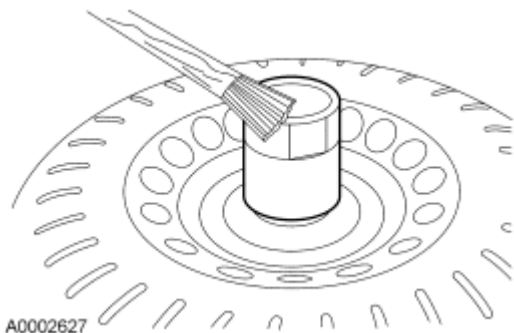


Fig. 519: Lubricating Converter Hub
Courtesy of FORD MOTOR CO.

WARNING: Secure the torque converter in the transmission during removal or installation. The torque converter is heavy and may result in injury if it falls out of the transmission. Failure to follow this instruction may result in serious personal injury.

113. Using the special tools, install the torque converter by pushing and rotating.

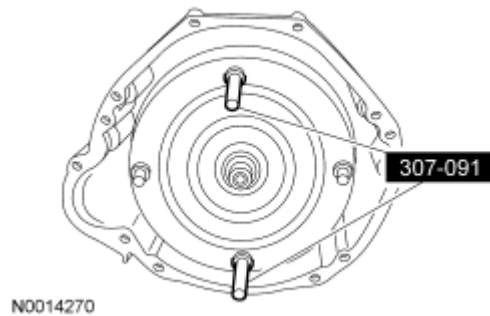


Fig. 520: Using Special Tool (307-091) To Install Torque Converter
Courtesy of FORD MOTOR CO.

114. Lubricate the torque converter pilot hub with multi-purpose grease.

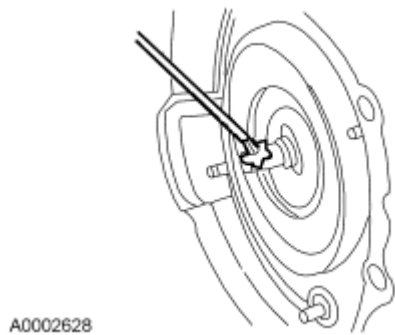


Fig. 521: Lubricating Torque Converter Pilot Hub With Multi-Purpose Grease
Courtesy of FORD MOTOR CO.

CAUTION: The special tool must be used to correctly align the adapter plate to the converter or transmission damage may occur. In order to correctly install the special service tool, it must be installed using 1 round and 1 oblong hole. Using 2 oblong holes will cause damage to the transmission.

NOTE: Position the adapter plate on the torque converter and identify the position of the orange or green paint daub on the converter face.

115. If the vehicle is equipped, use the special tool to install the torque converter flexplate adapter assembly and 8 nuts.
- Tighten to 44 Nm (32 lb-ft).

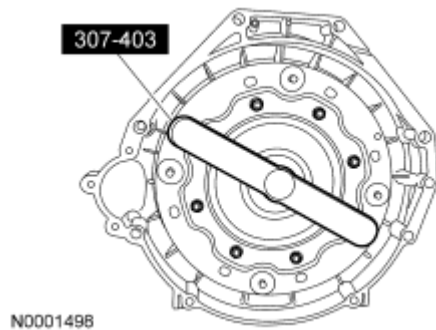


Fig. 522: Identifying Special Tool (307-403)
Courtesy of FORD MOTOR CO.

116. Remove the special tool and install the remaining torque converter flexplate adapter nuts.
- Tighten to 44 Nm (32 lb-ft).

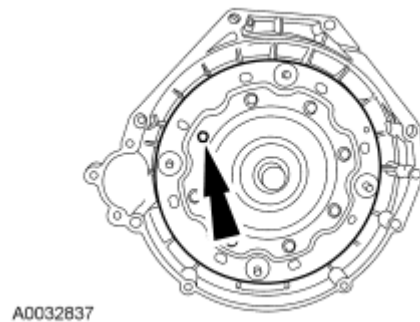


Fig. 523: Locating Torque Converter Adapter Plate
Courtesy of FORD MOTOR CO.

117. Using one of the speed sensor holes, fill the transmission with 8.5L (9 qt) of automatic transmission fluid.

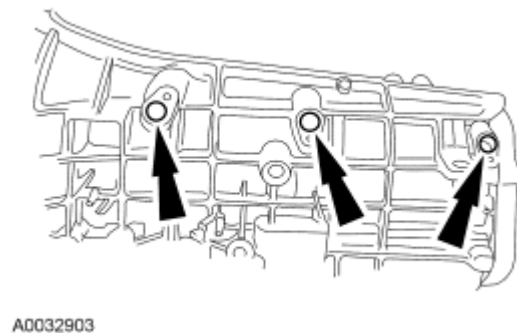


Fig. 524: Locating Speed Sensor Holes
Courtesy of FORD MOTOR CO.

NOTE: Inspect O-ring seals for damage. Install new O-ring seals if damaged. Lubricate the O-ring seals with petroleum jelly to prevent damage to the O-ring seals.

118. Install the sensors.

- Tighten to 14 Nm (10 lb-ft).



N0001499

Fig. 525: Locating Speed Sensor
Courtesy of FORD MOTOR CO.

INSTALLATION

TRANSMISSION

All vehicles

WARNING: Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

1. Secure the transmission to the transmission jack with a safety chain.
2. Rotate the torque converter and adapter plate so the orange or green paint daub on the torque converter is in the 12 o'clock location.
3. Raise and position the transmission to the back of the engine.

4.6L engine

4. Install the 7 engine-to-transmission retaining bolts.
 - Tighten to 48 Nm (35 lb-ft).

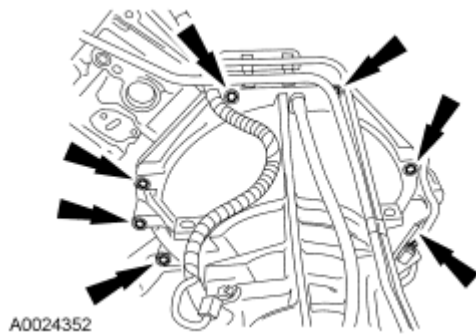


Fig. 526: Locating Engine-To-Transmission Retaining Bolts
Courtesy of FORD MOTOR CO.

5. Install the 4 new torque converter nuts.
 - Tighten to 44 Nm (32 lb-ft).

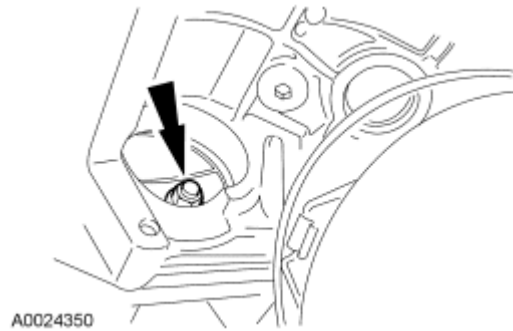


Fig. 527: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

6. Install the access cover.

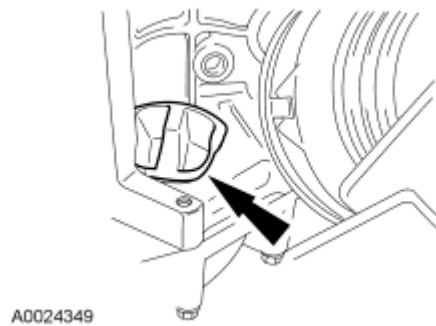


Fig. 528: Locating Access Cover
Courtesy of FORD MOTOR CO.

7. Install the flexplate cover.
 - Tighten to 35 Nm (26 lb-ft).

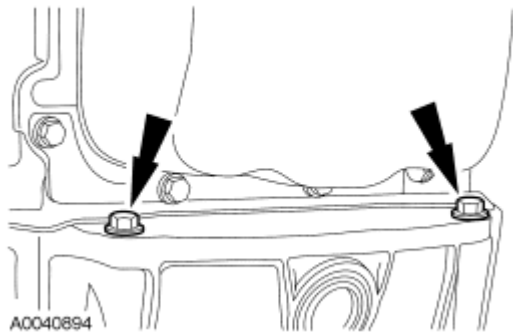


Fig. 529: Locating Flexplate Cover And Bolts
Courtesy of FORD MOTOR CO.

NOTE: Clean the starter motor mounting flange and mating surface of the starter motor to make sure there is a correct ground connection.

8. Install the starter.
 - Tighten to 25 Nm (18 lb-ft).

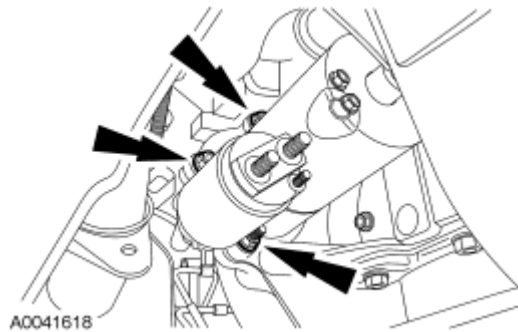


Fig. 530: Locating Starter Motor Bolts And Starter
Courtesy of FORD MOTOR CO.

9. Install the starter motor electrical connectors.
 - Tighten the cable to 13 Nm (10 lb-ft).
 - Tighten the wire to 6 Nm (53 lb-in).

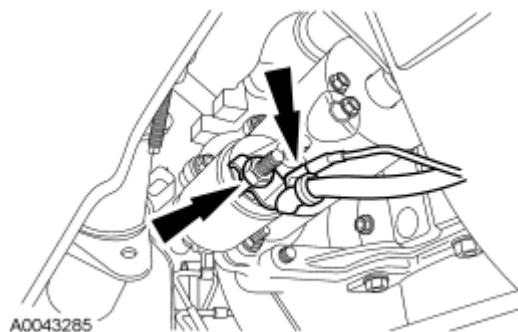


Fig. 531: Locating Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

10. Install the starter motor electrical connector cover.

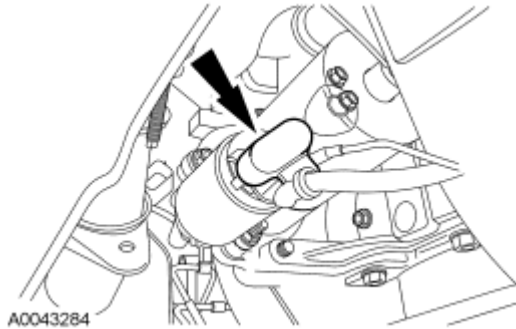


Fig. 532: Locating Starter Motor Electrical Connector Cover
Courtesy of FORD MOTOR CO.

4.0L engine

11. Position the fuel line bracket in place and install the 6 retaining bolts.
 - Tighten to 48 Nm (35 lb-ft).

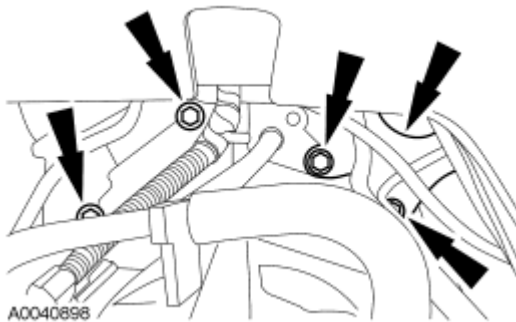


Fig. 533: Locating Engine-To-Transmission Retaining Bolts
Courtesy of FORD MOTOR CO.

12. Install the 4 new torque converter nuts.
 - Tighten to 44 Nm (32 lb-ft).

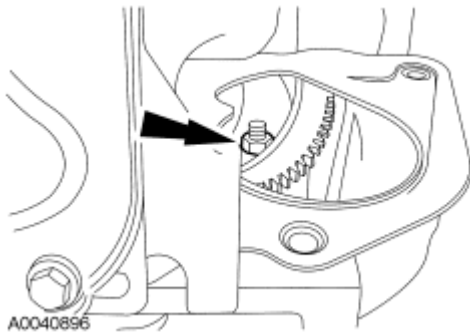


Fig. 534: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

NOTE: Clean the starter motor mounting flange and mating surface of the starter motor to make sure there is a correct ground connection.

13. Install the starter motor.
 - Tighten to 25 Nm (18 lb-ft).

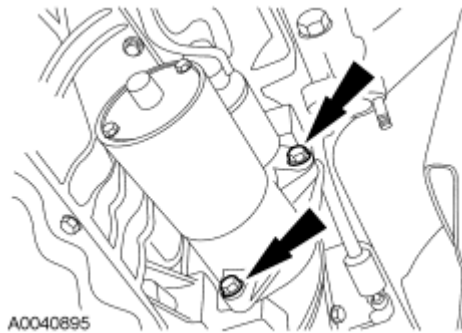


Fig. 535: Locating Starter Motor Bolts
Courtesy of FORD MOTOR CO.

14. Install the lower transmission retaining bolts.
 - Tighten to 48 Nm (35 lb-ft).

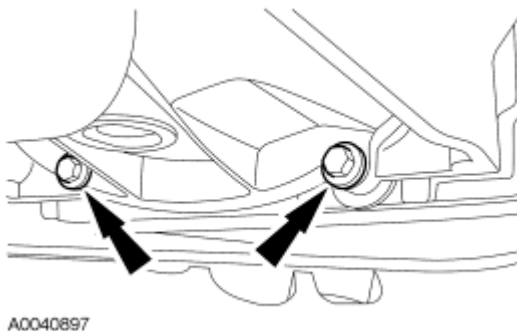


Fig. 536: Locating Lower Transmission Retaining Bolts

Courtesy of FORD MOTOR CO.

All vehicles

CAUTION: Use care not to bend or force the cooler tubes, otherwise, damage to the cooler tubes and the transmission may result.

15. Install the transmission fluid cooler tubes.
 - Tighten to 40 Nm (30 lb-ft).

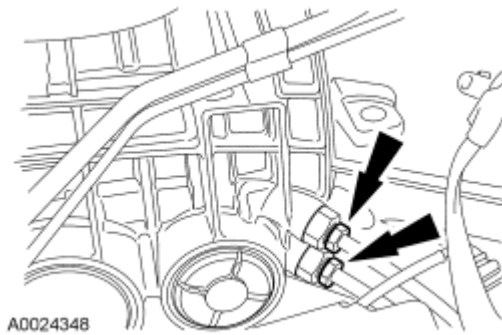


Fig. 537: Locating Transmission Cooler Tubes
Courtesy of FORD MOTOR CO.

16. Install the transmission cooler tube bracket and nut.
 - Tighten to 25 Nm (18 lb-ft).

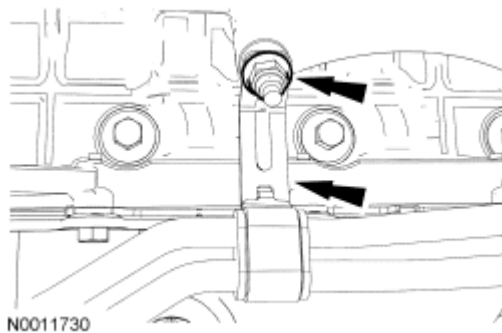


Fig. 538: Locating Transmission Cooler Tube Bracket And Nut
Courtesy of FORD MOTOR CO.

17. Connect the digital transmission range (TR) sensor connector.

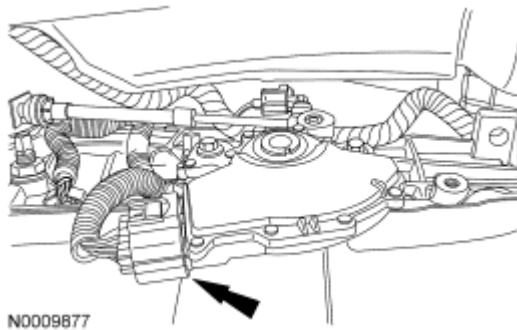


Fig. 539: Locating Digital Transmission Range (TR) Sensor Connector
Courtesy of FORD MOTOR CO.

18. Position the wire harness and install the retainers.

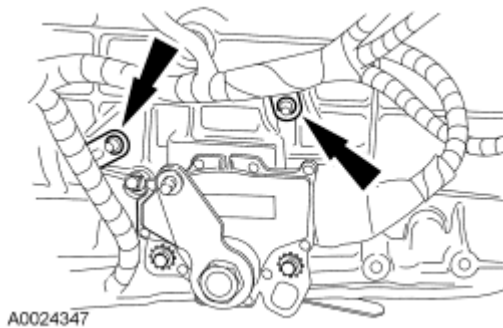


Fig. 540: Locating Wire Harness Retainers
Courtesy of FORD MOTOR CO.

CAUTION: Damage will occur to the solenoid body assembly if the screw is tightened above the specification.

NOTE: Always install new O-ring seals on the vehicle harness connector.

NOTE: Clean the area around the connector to prevent contamination of the solenoid body connector.

NOTE: Use petroleum jelly to lubricate the O-ring seals to aid in the installation process.

19. Install and lubricate new O-ring seals on the transmission connector and connect the connector.
 - Tighten to 5 Nm (44 lb-in).

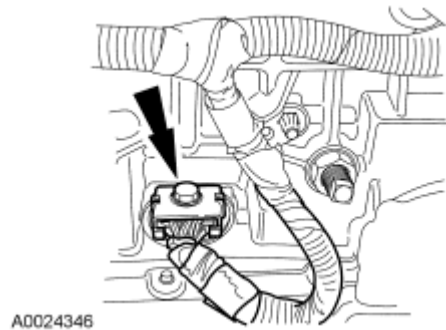


Fig. 541: Identifying Solenoid Body Electrical Connector
Courtesy of FORD MOTOR CO.

20. Connect the turbine shaft speed (TSS) sensor, output shaft speed (OSS) sensor and intermediate shaft speed sensor electrical connectors.

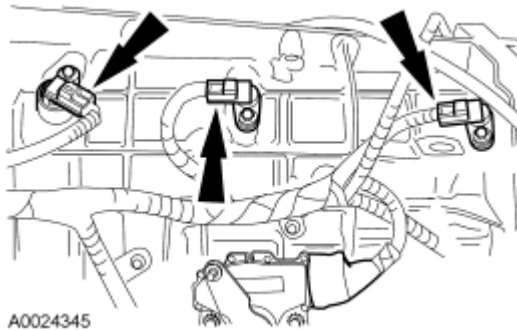


Fig. 542: Locating Electrical Connectors
Courtesy of FORD MOTOR CO.

21. Install the selector lever cable bracket and install the 2 bolts.
- Tighten to 28 Nm (21 lb-ft).

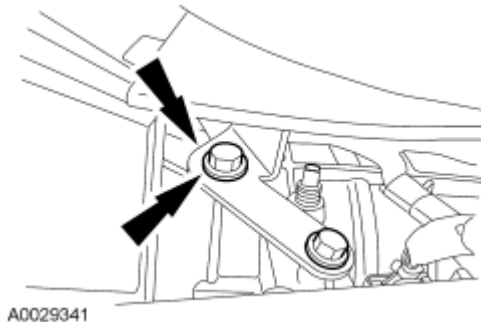


Fig. 543: Locating Transmission Shift Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

22. Install the selector lever cable eyelet onto the transmission manual lever.

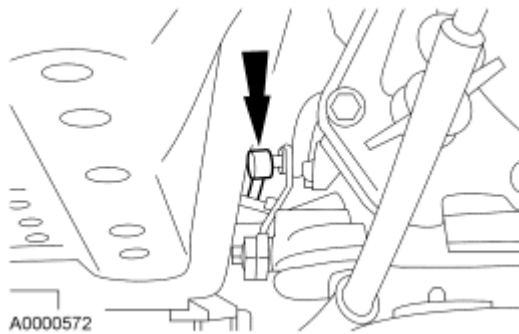


Fig. 544: Locating Shift Cable Eyelet At Manual Control Lever
Courtesy of FORD MOTOR CO.

23. Loosely install the transmission insulator-to-extension housing center screw.

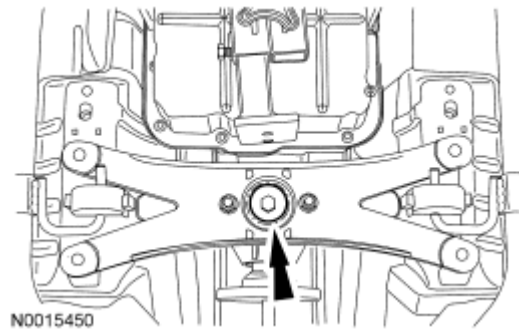


Fig. 545: Locating Transmission Mount Center Screw
Courtesy of FORD MOTOR CO.

24. Position the transmission crossmember in the vehicle and loosely install the transmission crossmember-to-floor pan screws.

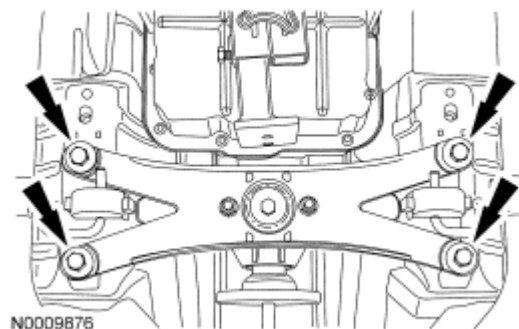


Fig. 546: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

NOTE: The transmission support insulator must be neutralized.

25. Slide the transmission support insulator forward, rearward and side-to-side until the gaps between the

transmission support insulator snubber and crossmember are equal.

26. With the transmission support insulator neutralized, tighten the transmission crossmember-to-floor pan screws.
- Tighten to 63 Nm (46 lb-ft).

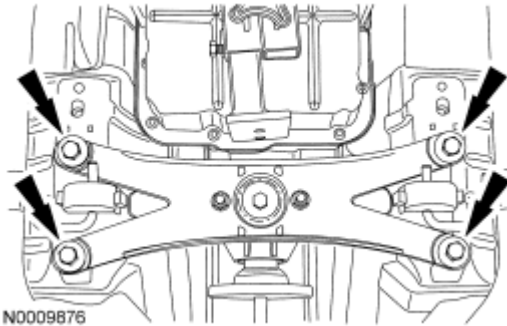


Fig. 547: Locating Transmission Crossmember-To-Floor Pan Screws
Courtesy of FORD MOTOR CO.

27. With the transmission support insulator neutralized, tighten the transmission insulator-to-extension housing center screw.
- Tighten to 70 Nm (52 lb-ft).

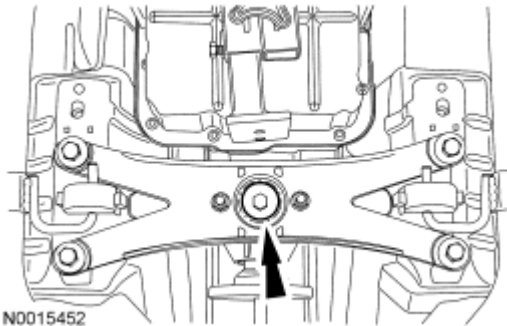


Fig. 548: Locating Transmission Mount Center Bolt
Courtesy of FORD MOTOR CO.

28. Install the heated oxygen sensor (HO2S) connector to the front of the transmission pan rail.

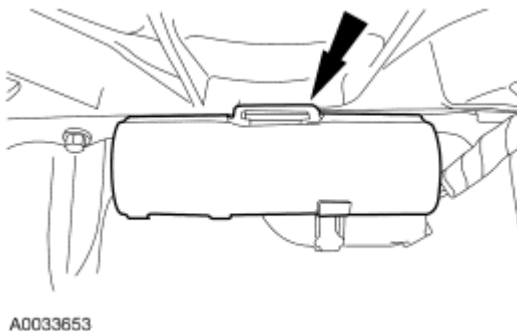


Fig. 549: Locating Heated Oxygen Sensor (HO2S) Connector To Front Of Transmission Pan Rail
Courtesy of FORD MOTOR CO.

29. Install the driveshaft. For additional information, refer to **DRIVESHAFT** article.
30. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
31. Use the following guidelines for installing the inline transmission fluid filter:
 - If the transmission was overhauled and the vehicle was equipped with an inline fluid filter, install a new inline fluid filter.
 - If the transmission was overhauled and the vehicle was not equipped with an inline fluid filter, install a new inline fluid filter kit.
 - If the transmission is being installed for a non-internal repair, do not install an inline filter or filter kit.
 - If installing a new or a Ford-authorized remanufactured transmission, install the inline transmission fluid filter that is supplied.
 - Prior to lowering the vehicle, install a new inline transmission filter or a filter kit. For additional information, refer to **Transmission Filter - In Line**.

NOTE: **When the battery has been disconnected and reconnected, some abnormal drive symptoms can occur while the vehicle relearns its adaptive strategy. The customer needs to be notified that they can experience slightly different upshifts (either soft or firm) and that this is a temporary condition and will eventually return to normal operating condition.**

32. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
33. Carry out the fluid level check. For additional information, refer to **Transmission Fluid Level Check**.
34. Verify that the shift cable is correctly adjusted. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION EXTERNAL CONTROLS** article.
35. Check the operation of the transmission and inspect for leaks.