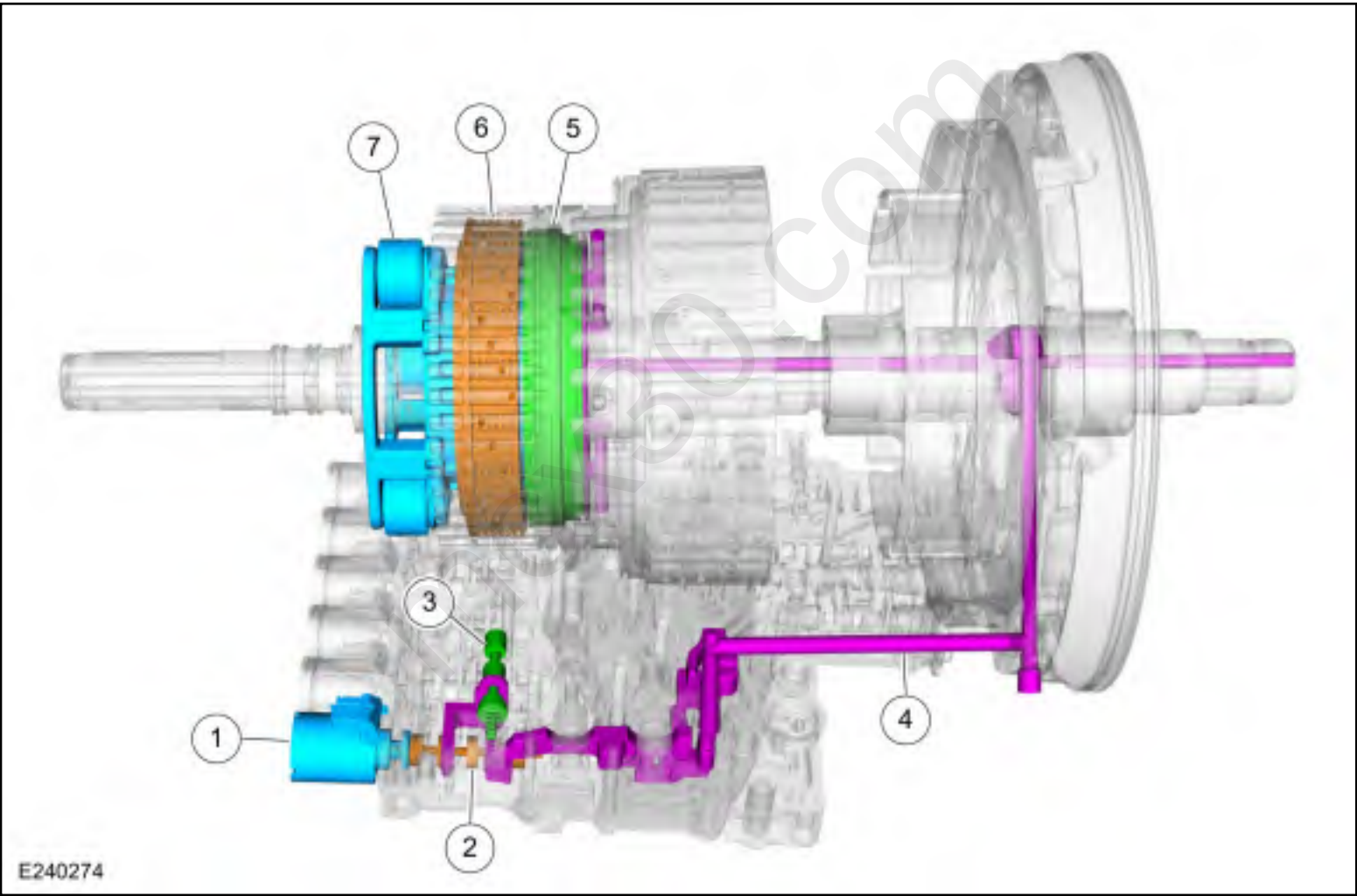


D Clutch

Overview

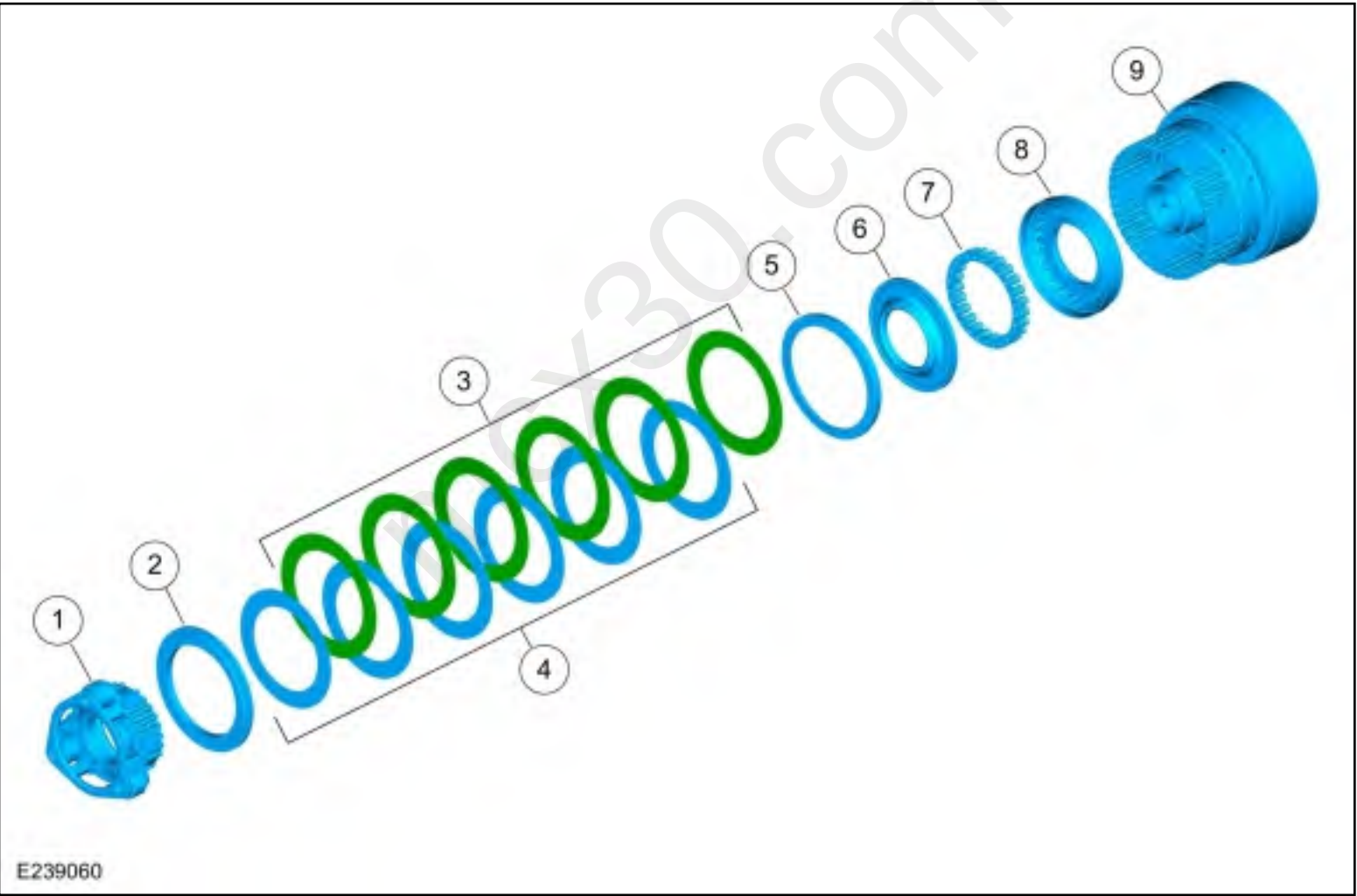


Item	Description
1	SSD
2	D clutch control valve

3	Clutch gain control valve
4	D clutch apply circuit
5	D clutch piston
6	D clutch assembly
7	Planetary carrier No. 3

Planetary carrier No. 3 is located in the CDF clutch and planetary carrier assembly. Planetary carrier No. 3 is connected to the D clutch. When the D clutch applies, the planetary carrier No. 3 may be connected to ring gear No. 2.

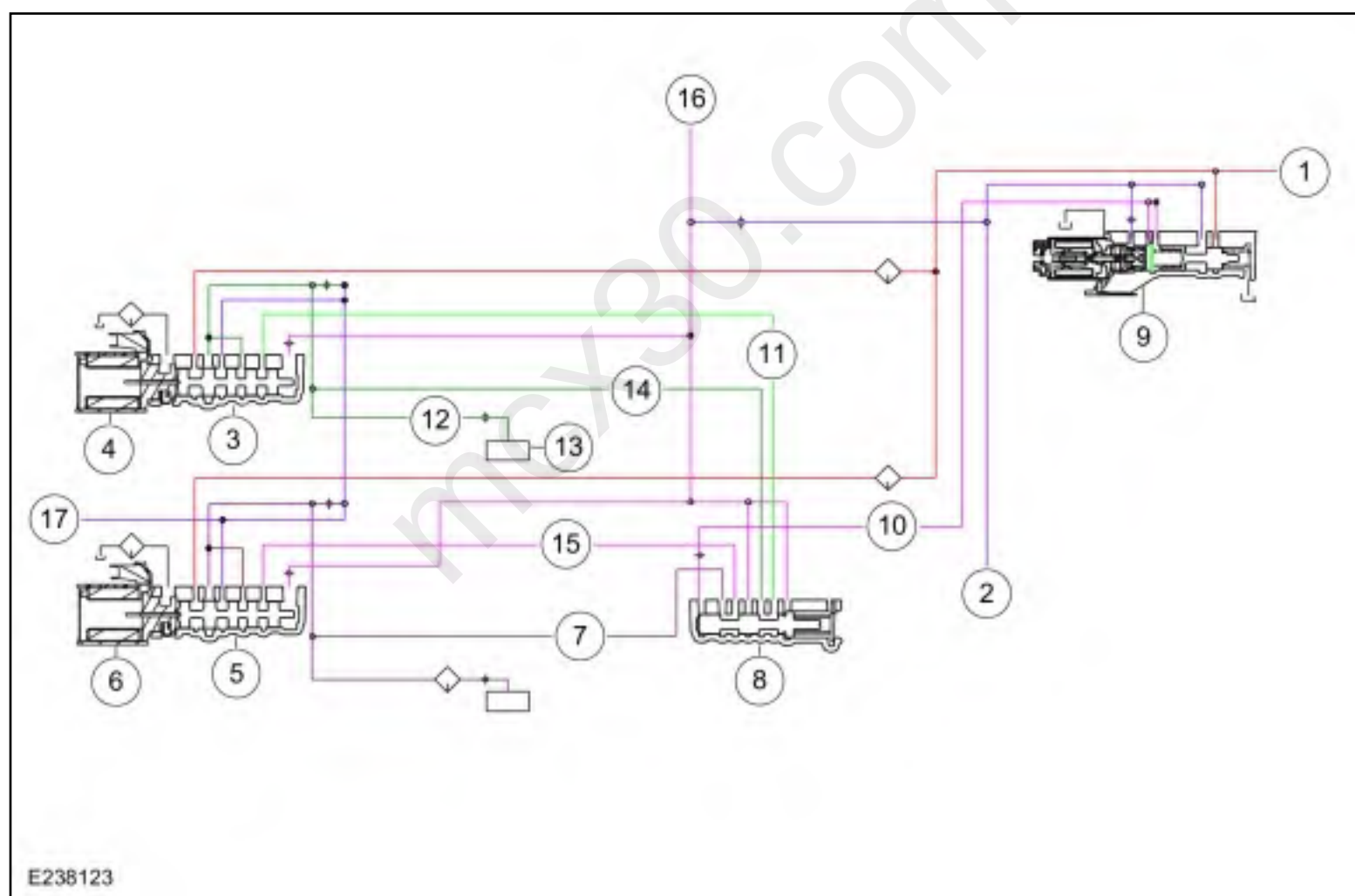
D Clutch Exploded View



Item	Description
1	Planetary carrier No. 3

2	D clutch pressure plate
3	D clutch steel plates
4	D clutch friction plates
5	D clutch apply ring </td
6	D clutch balance dam
7	D clutch piston return spring
8	D clutch piston
9	CDF clutch cylinder

D Clutch Hydraulic Circuits



Item	Description
1	Line pressure

2	Pump output
3	D clutch control valve
4	SSD
5	E clutch control valve
6	SSE
7	E clutch apply pressure to clutch gain control valve
8	Clutch gain control valve
9	LPC solenoid
10	LPC pressure
11	D clutch feedback pressure
12	Apply pressure to mechanical D clutch
13	Mechanical D clutch
14	D clutch apply pressure to clutch gain control valve
15	E clutch feedback pressure
16	Elevated exhaust pressure
17	Clutch exhaust

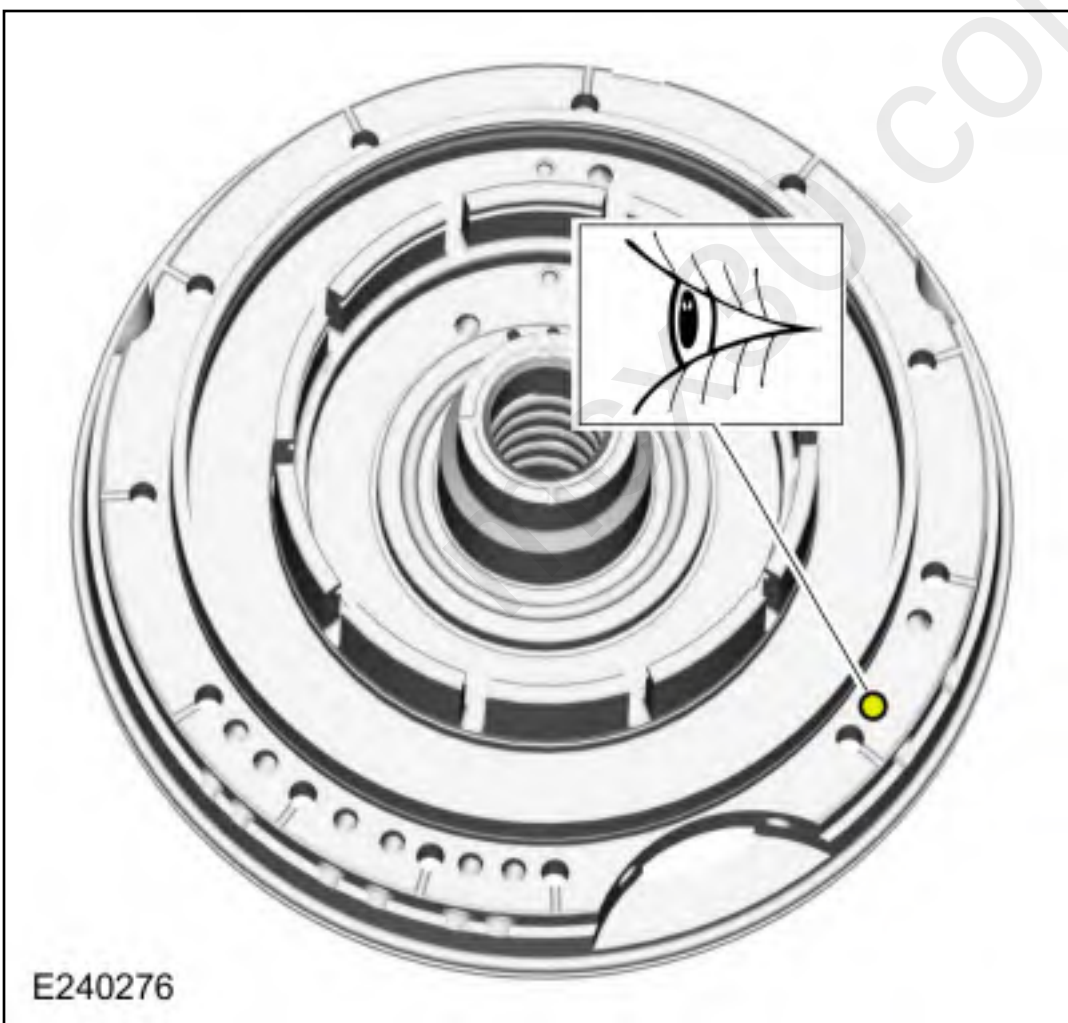
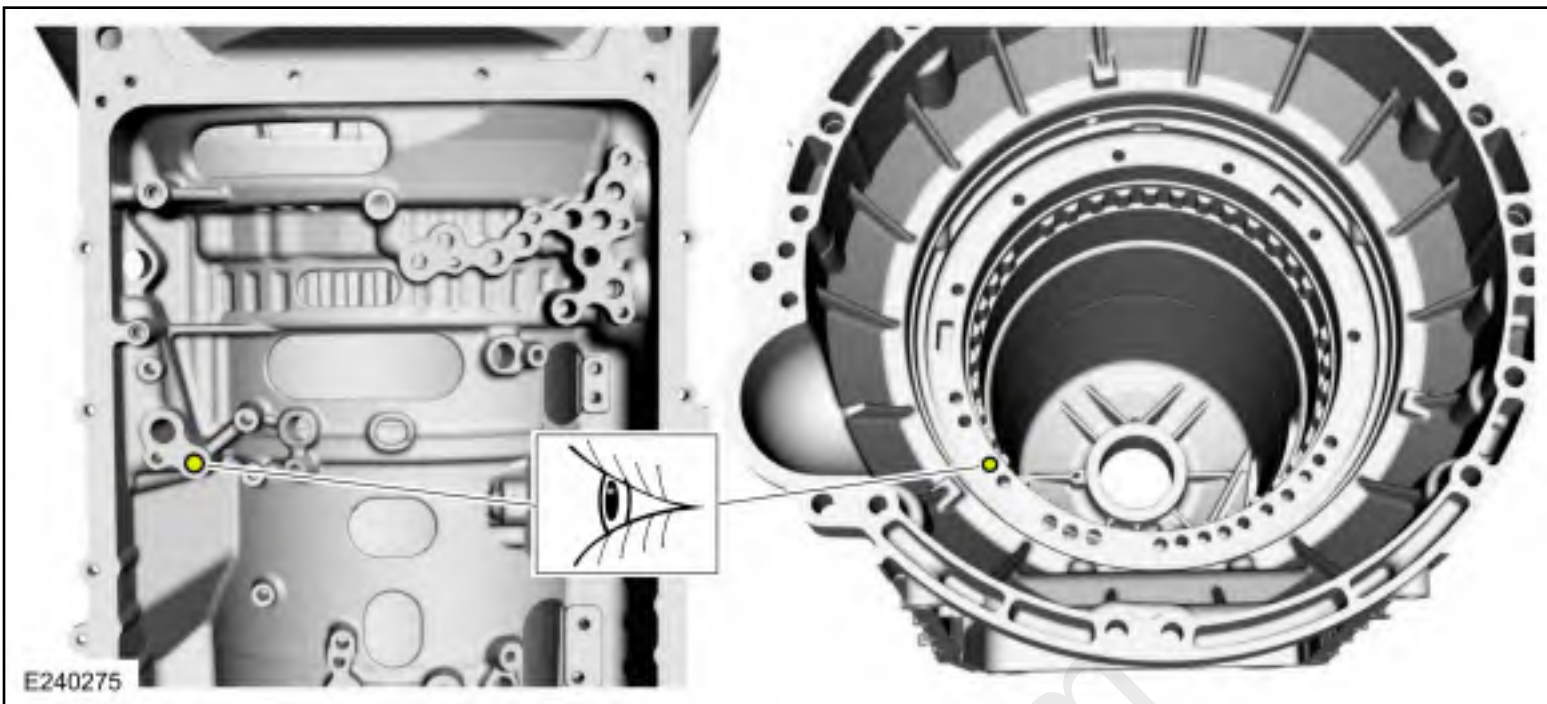
D Clutch Hydraulic Operation 5th-6th Shift

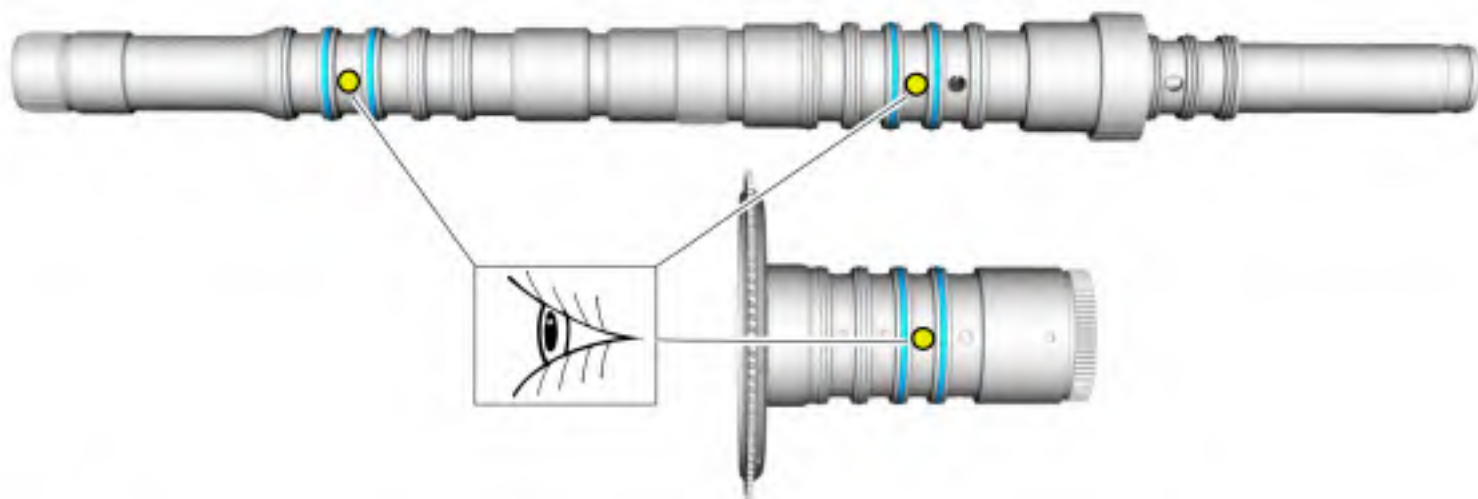
Line pressure is supplied to the D clutch control valve. LPC pressure is supplied to the gain control valve. LPC pressure positions the gain control valve to the right end of the valve bore. As SSD turns on, it moves the D clutch control valve allowing regulated line pressure to flow to the mechanical D clutch.

D Clutch Hydraulic Operation 2nd-3rd, 4th-5th, and 9th-10th Shifts

Line pressure is supplied to the D clutch control valve. LPC pressure is supplied to the gain control valve. The LPC pressure is low and the gain control valve stays in the default position at the left end of the valve bore. As SSD turns on, it moves the D clutch control valve allowing regulated line pressure to flow to the mechanical D clutch.

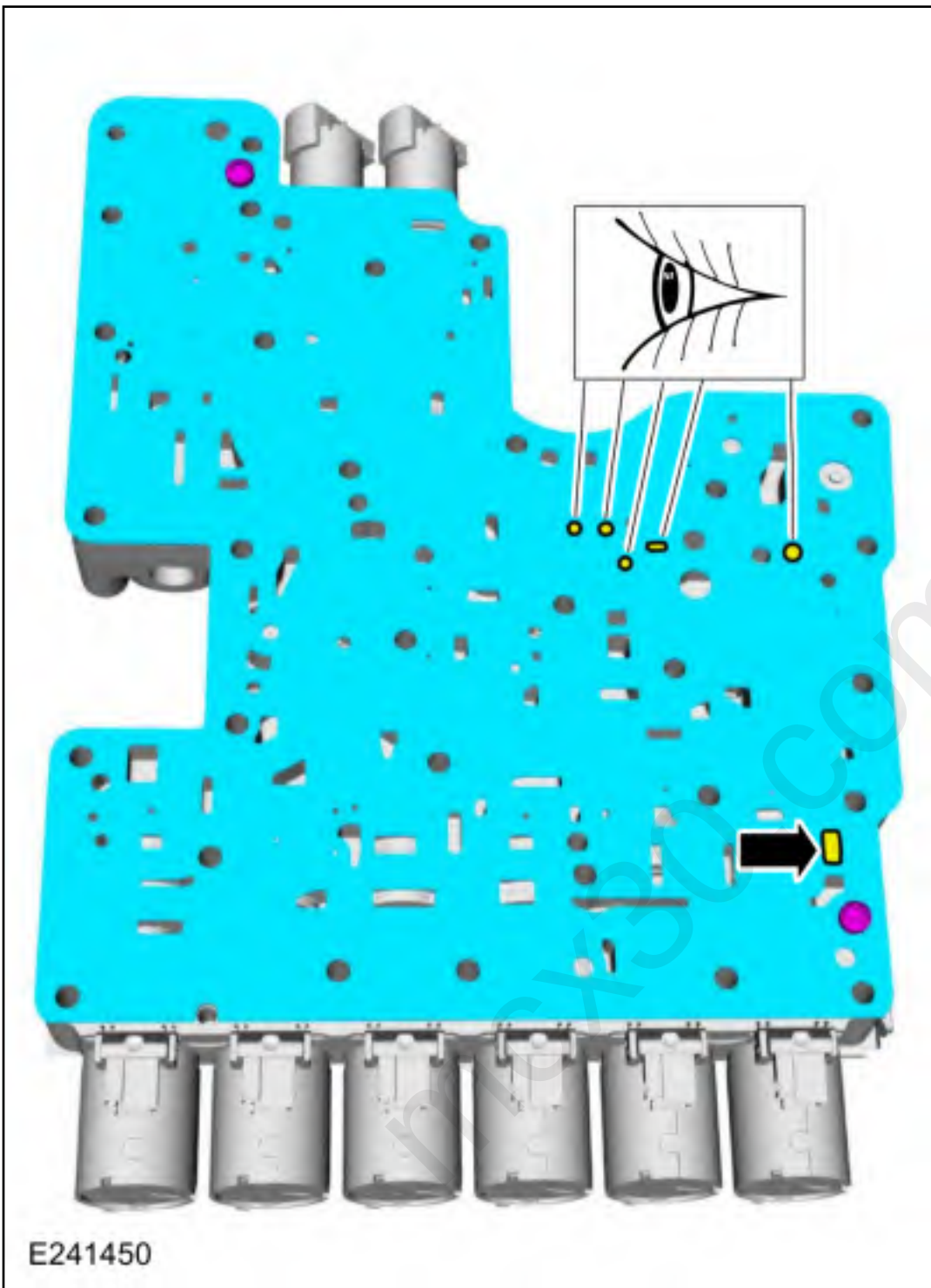
D Clutch Hydraulic Passages





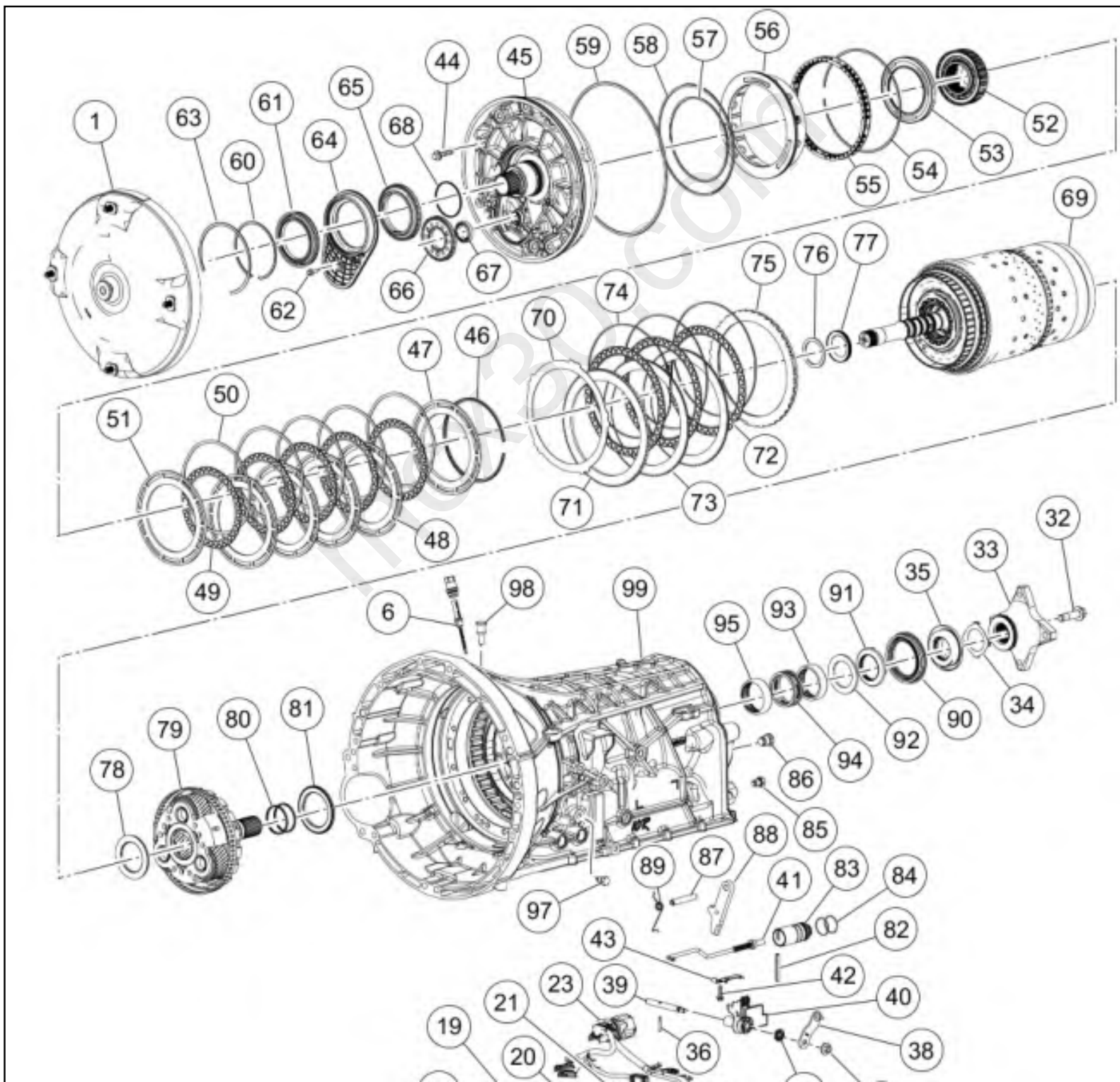
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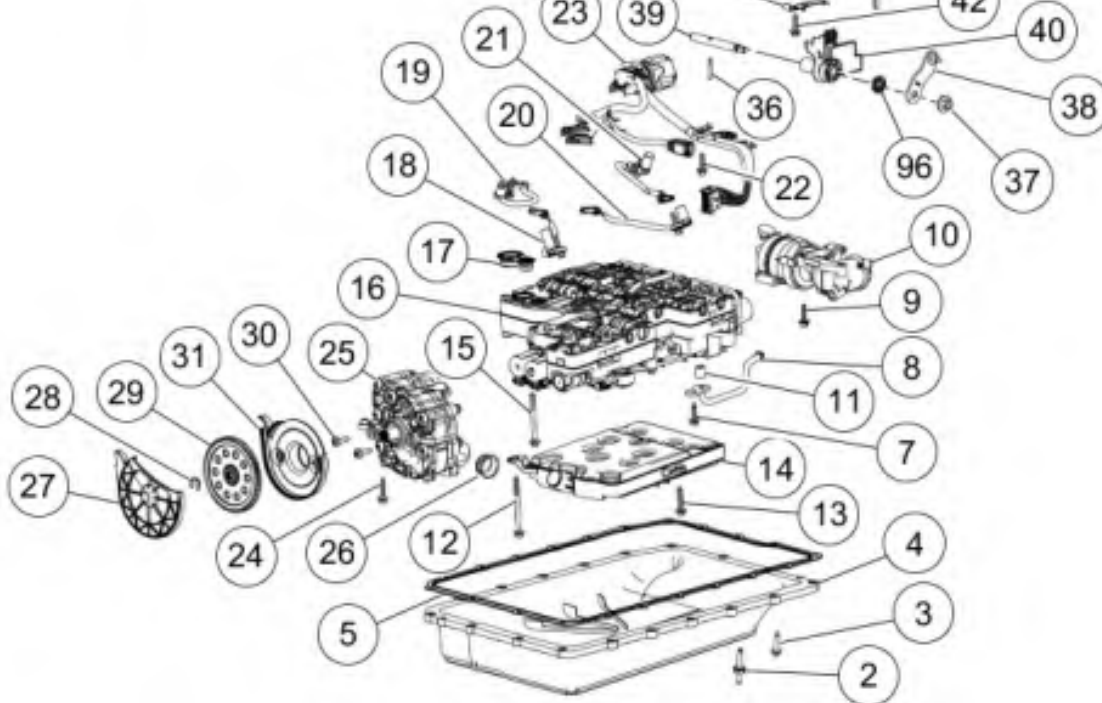
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Transmission Description

Transmission Assembly





E233603

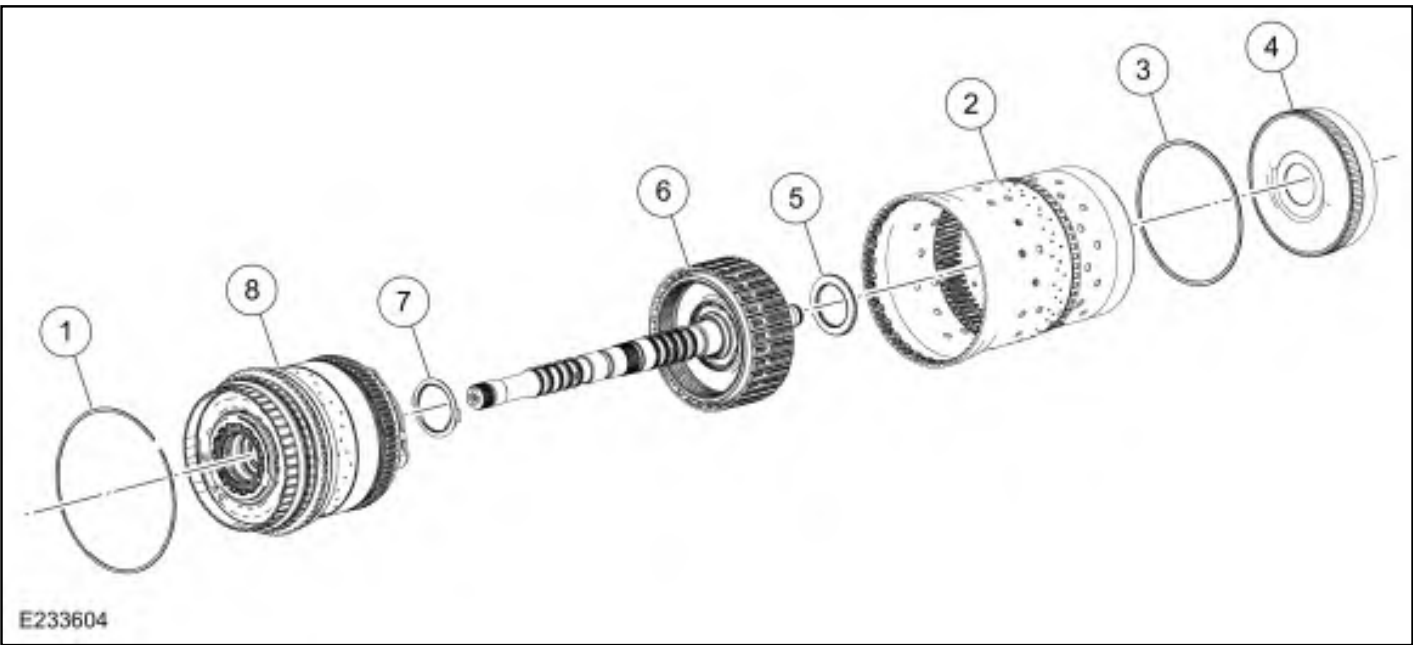
Item	Part Number	Description
1	7902	Torque converter
2	W714629	Transmission fluid pan stud bolts (6 required)
3	W500215	Transmission fluid pan bolts (12 required)
4	7A194	Transmission fluid pan
5	7A191	Transmission fluid pan gasket
6	7E389	Transmission fluid level indicator and plug assembly
7	W708500	Transmission fluid auxiliary pump tube bolt
8	7J441	Transmission fluid auxiliary pump tube
9	W718548	Transmission fluid auxiliary pump bolts (3 required)
10	7P086	Transmission fluid auxiliary pump
11	7J135	Transmission fluid auxiliary pump tube seal
12	W700123	Transmission fluid filter bolt (71 mm length)
13	W500214	Transmission fluid filter bolt (20 mm length)
14	7G186	Transmission fluid filter
15	W708500	Main control-to-transmission case bolts (68 mm length) (8 required)
16	7A100	Main control assembly
17	7N265	Main control-to-transmission fluid pump seal
18	7M183	Intermediate Speed A (ISSA) sensor
19	7M101	Turbine Shaft Speed (TSS) sensor

20	7H103	Intermediate Speed B (ISSB) sensor
21	7H103	Output Shaft Speed (OSS) sensor
22	W500213	Transmission internal wiring harness bolts (2 required)
23	7G276	Transmission internal wiring harness
24	W500215	Transmission fluid pump bolts (3 required)
25	7A103	Transmission fluid pump
26	7Z302	Transmission fluid pump seal
27	6658	Transmission fluid pump driven gear outer cover
28	W718158	Transmission fluid pump retaining ring
29	7A080	Transmission fluid pump driven gear
30	W504755	Transmission fluid pump driven gear inner cover bolts (2 required)
31	6658	Transmission fluid pump driven gear inner cover
32	7N134	Output shaft flange bolt (RWD only)
33	7K177	Output shaft flange (RWD only)
34	7N135	Output shaft flange anti-ting ring (RWD only)
35	7085	Output shaft nut (RWD only)
36	7G100	Manual control shaft-to-Transmission Range (TR) sensor roll pin
37	W718322	Manual control lever nut
38	7A256	Manual control lever (model dependent)
39	7C493	Manual control shaft
40	7H557	Transmission Range (TR) sensor (model dependent)
41	7D410	Park pawl actuator rod
42	W716607	Transmission Range (TR) sensor detent spring bolt
43	7E332	Transmission Range (TR) sensor detent spring
44	7N134	Front support assembly bolts (12 required)
45	7F363	Front support assembly
46	7M157 -C-C	B clutch (overdrive) snap ring
47	7C576	B clutch (overdrive) pressure plate
48	7B442 -A-A	B clutch (overdrive) steel plates (quantity model dependent)

49	7B164	B clutch (overdrive) friction plates (quantity model dependent)
50	7J402	B clutch (overdrive) separating springs (quantity model dependent)
51	7B442 -B-B	B clutch (overdrive) apply plate
52	7G206	One-Way Clutch (OWC)
53	7G418	B clutch (overdrive) piston
54	7N169	A clutch (intermediate) piston return spring snap ring
55	7G297	A clutch (intermediate) piston return spring
56	7J015	A clutch (intermediate) piston
57	7F225	A clutch (intermediate) piston inner seal
58	7F224	A clutch (intermediate) piston outer seal
59	7B031	Front support-to-case seal
60	7M157 -J-J	Torque converter hub seal snap ring
61	7A248	Torque converter hub seal
62	7N134 -C-C	Front support cover and seal assembly bolt
63	7M157	Front support cover and seal assembly snap ring
64	7570	Front support cover and seal assembly
65	7F073	Transmission fluid pump drive gear
66	6651	Transmission fluid pump idler gear
67	7Z426	Transmission fluid pump idler gear bearing
68	7G090	Stator support seal
69	—	Clutch and planetary assembly
70	7P080	A clutch (intermediate) wave spring
71	7A406	A clutch (intermediate) apply plate (select fit)
72	7F219	A clutch (intermediate) friction plates (quantity model dependent)
73	7F220	A clutch (intermediate) steel plates (quantity model dependent)
74	7G159	A clutch (intermediate) separating springs (quantity model dependent)
75	7B437	A clutch (intermediate) pressure plate
76	7J300	Selective shim
77	7H032	Thrust bearing (T3)

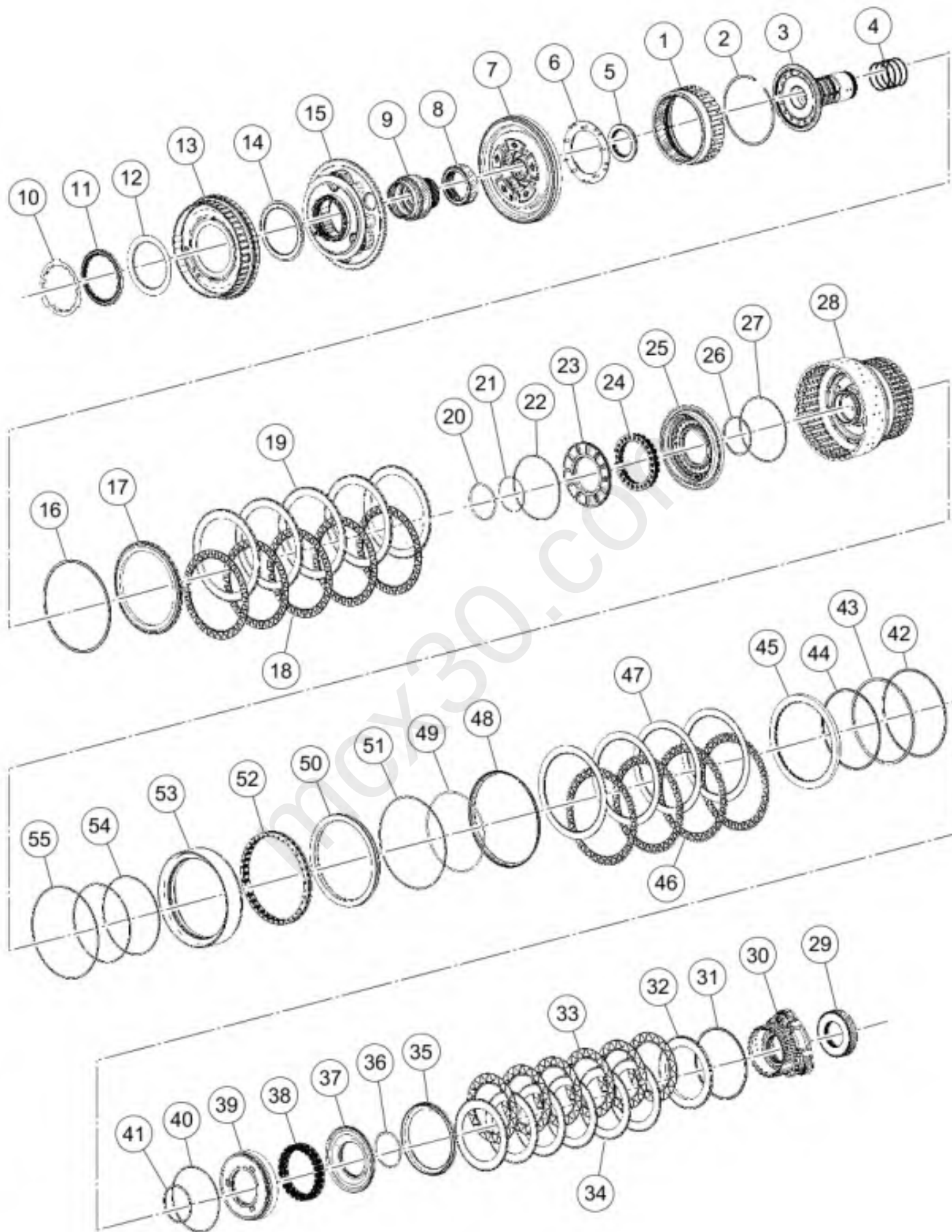
78	7M152 -A-A	Thrust bearing (T9)
79	7P198	Output shaft and planetary carrier No. 4 assembly (model dependent)
80	7D019	Output shaft seals (2 required)
81	7D146	Thrust bearing (T10)
82	W717404	Park pawl actuator rod sleeve roll pin
83	2N613	Park pawl actuator rod sleeve
84	2D330	Park pawl actuator rod sleeve seals (2 required)
85	W715937	Plug assembly transmission case
86	W716240	Plug assembly park pawl shaft
87	7D071	Park pawl shaft
88	7A441	Park pawl
89	7D070	Park pawl return spring
90	7052	Output shaft seal (model dependent)
91	7G355	Thrust bearing (T11) (RWD only)
92	7A433	Thrust washer (RWD only)
93	7A415 -B-B	Output shaft bearing (outer)
94	7B314	Fluid passage sleeve
95	7A415 -A-A	Output shaft bearing (inner)
96	7F337	Manual control shaft seal
97	W715937	Plug (line pressure tap)
98	7G063	Transmission case vent assembly
99	7006	Transmission case

Clutch and planetary assembly



Item	Part Number	Description
1	7H579	Planetary carrier No.1 snap ring
2	7B177	Cylinder (clutch and planetary container)
3	7B002	Ring gear No. 4 snap ring
4	7D163	Ring gear No. 4
5	7M152	Thrust bearing (T8)
6	—	E clutch and input shaft assembly
7	7F373	Thrust bearing (T6)
8	—	CDF clutch and planetary carrier assembly

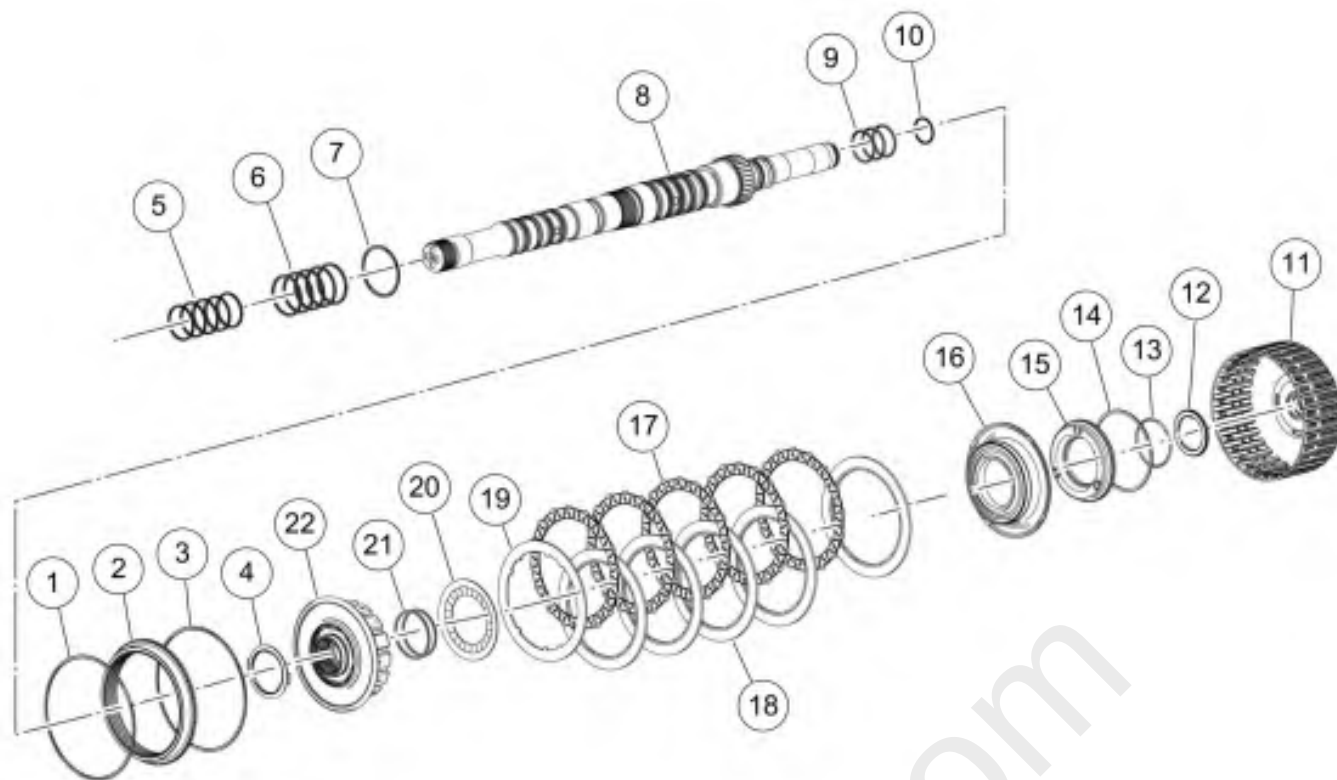
CDF Clutch and planetary carrier assembly



Item	Part Number	Description
1	7D392	Ring gear No. 2
2	7H379	Ring gear No. 2 snap ring
3	7D159	Shaft (sun gear No 3)
4	7B399	Shaft (sun gear No 3) Teflon® seals (4 required)
5	7D283	Thrust bearing (T5)
6	7H578	Fluid collector
7	7A398	Planetary carrier No. 2
8	7H580	Sun gear No. 2
9	7G230	Sun gear No. 1
10	1195	Ring gear No. 1 bearing support locking ring
11	7P074	Ring gear No. 1 bearing support
12	7C096	Ring gear No. 1 bearing
13	7P136	Ring gear No. 1
14	7C096	Ring gear No. 1 bearing
15	7G218	Planetary carrier No. 1
16	7H076	C clutch (direct) snap ring
17	7B477	C clutch (direct) pressure plate
18	7H095	C clutch (direct) friction plates (quantity model dependent)
19	7F238	C clutch (direct) steel plates (quantity model dependent)
20	7B492	C clutch (direct) balance dam retainer
21	7F234	C clutch (direct) balance dam inner seal
22	7C000	C clutch (direct) balance dam outer seal
23	7H359	C clutch (direct) balance dam
24	7B488	C clutch (direct) piston return spring
25	7C117	C clutch (direct) piston
26	7G444	C clutch (direct) piston inner seal
27	7C000	C clutch (direct) piston outer seal
28	7P182	CDF clutch cylinder

29	7D063	Sun gear No. 3
30	7D006	Planetary carrier No. 3
31	7B421	D clutch (low) snap ring
32	7G486	D clutch (low) pressure plate
33	7E312	D clutch (low) friction plates (quantity model dependent)
34	7G474	D clutch (low) steel plates (quantity model dependent)
35	7P176	D clutch (low) apply ring
36	7B492	D clutch (low) balance dam retainer
37	7D343	D clutch (low) balance dam
38	7D405	D clutch (low) piston return spring
39	7D402	D clutch (low) piston
40	7G445	D clutch (low) piston outer seal
41	7G444	D clutch (low) piston inner seal
42	7P200	F clutch (high) keeper snap ring
43	7H318	F clutch (high) snap ring keeper
44	7P174	F clutch (high) snap ring
45	7A450	F clutch (high) pressure plate
46	7E313	F clutch (high) friction plates (quantity model dependent)
47	7E316	F clutch (high) steel plates (quantity model dependent)
48	7P175	F clutch (high) apply ring
49	7P172	F clutch (high) balance dam retainer
50	7P171	F clutch (high) balance dam
51	7A590	F clutch (high) balance dam outer seal
52	7C295	F clutch (high) piston return spring
53	7R247	F clutch (high) piston
54	7A590 -B-B	F clutch (high) piston and balance dam seals (2 required)
55	7A590 -A-A	F clutch (high) piston seal

E Clutch and input shaft assembly

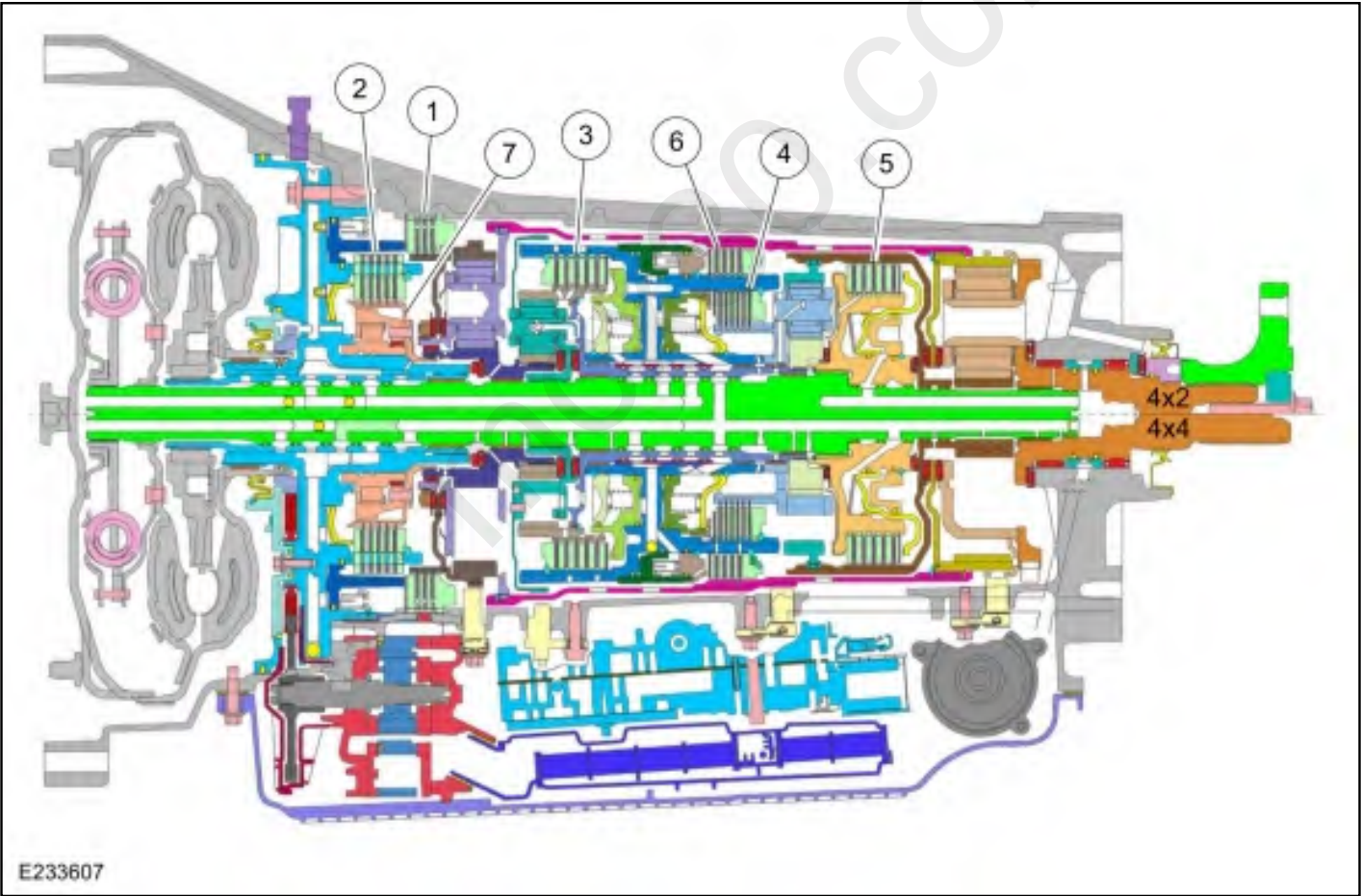


E233605

Item	Part Number	Description
1	7H361	Ring gear No. 3 outer snap ring
2	7H053	Ring gear No. 3
3	7H361	Ring gear No. 3 inner snap ring
4	7F373	Thrust bearing (T6)
5	7G091 -A-A	Input shaft front Teflon® seals (5 required)
6	7G091 -B-B	Input shaft-to-sun gear No 3 shaft Teflon® seals (5 required)
7	7J410	Input shaft snap ring
8	7015	Input shaft
9	7G242	Input shaft D-ring seals (3 required)
10	7G091	Input shaft Teflon® seal
11	7D062	Shell and sun gear No. 4
12	7G008	Thrust bearing (T7)
13	7H365	E clutch (forward) balance dam retainer
14	7F227	E clutch (forward) balance dam outer seal

15	7P169	E clutch (forward) balance dam
16	7A262	E clutch (forward) piston
17	7H091	E clutch (forward) friction plates (quantity model dependent)
18	7H089	E clutch (forward) steel plates (quantity model dependent)
19	7B066	E clutch (forward) pressure plate (select fit)
20	7B070	E clutch (forward) piston return spring
21	7G242	E clutch (forward) piston and balance dam inner seals (2 required)
22	7P211	E clutch (forward) hub

Component Location



Item	Part Number	Description
1	—	A clutch assembly

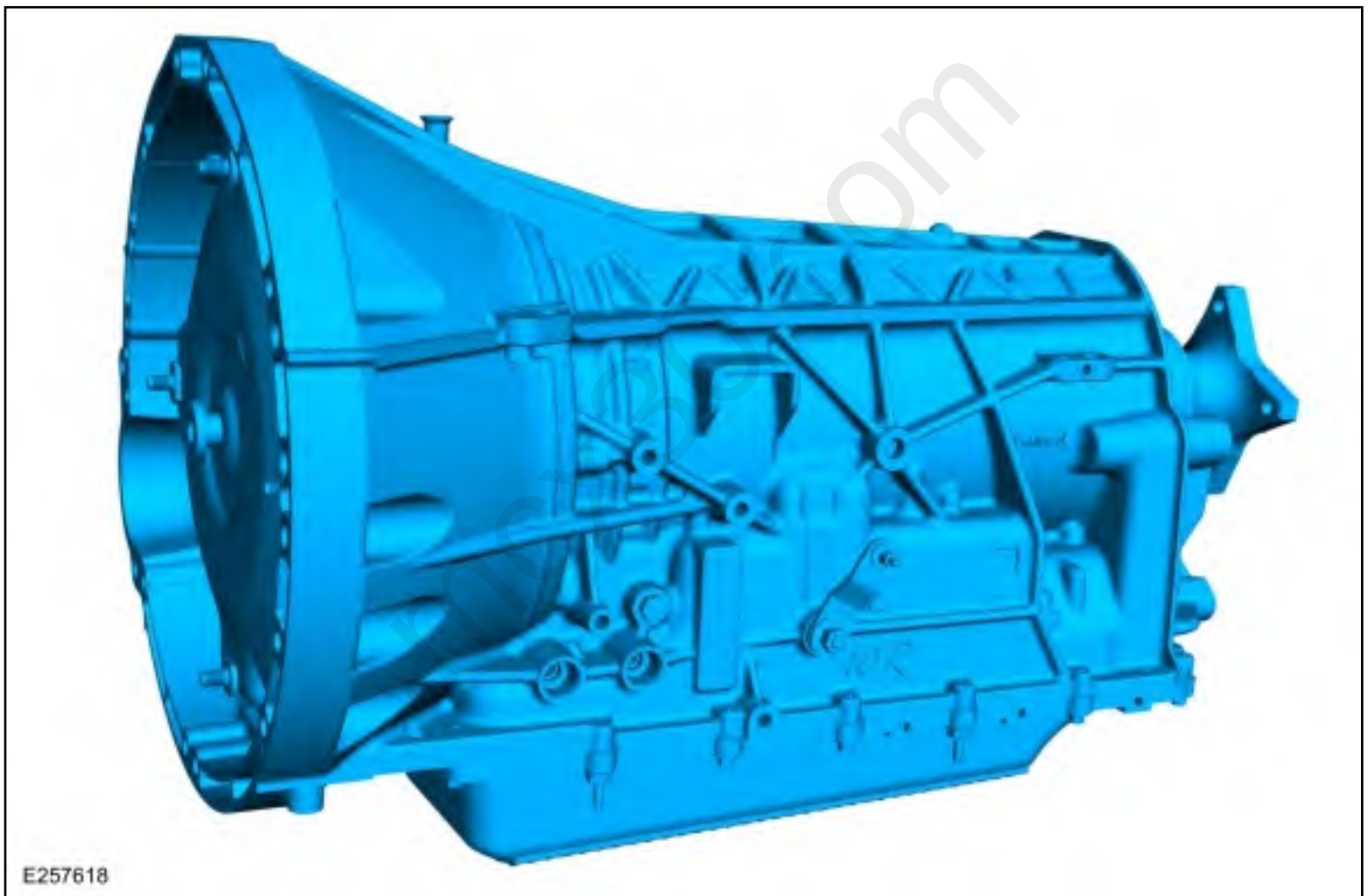
2	—	B clutch assembly
3	—	C clutch assembly
4	—	D clutch assembly
5	—	E clutch assembly
6	—	F clutch assembly
7	—	One-Way Clutch (OWC)

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Transmission Description - Overview

Overview



This transmission is a 10-speed electronically controlled transmission which uses planetary gears. Gear selection is achieved by the electronic control of transmission fluid flow to operate various internal clutches.

This transmission includes:

- Torque converter with an integral converter clutch
- Electronic shift and pressure controls
- Four planetary gearsets
- Two multi-disc holding clutches
- Four multi-plate drive clutches
- One one way holding clutch
- Main control valve body unit

The main control consists of a valve body assembly with solenoids inside the transmission and is controlled by a PCM or a TCM with 3.5L EcoBoost engines. The PCM or TCM operates the electrical components to provide refined engagement feel, shift feel, and shift scheduling.

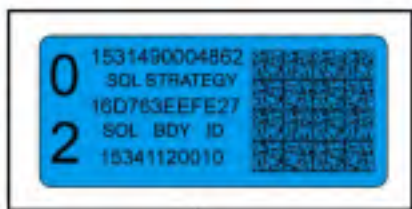
Engine power reaches the transmission by a torque converter with an integral clutch. The 10 forward gears and one reverse gear are obtained from 4 planetary gearsets.

This automatic transmission is a 10-speed electronically controlled transmission with a main control valve body unit with 8 solenoids and a torque converter. Gear selection is achieved by the control of transmission fluid to operate various internal clutches. The PCM or TCM operates the electrical components and provides control of gear selection, shift pressure and torque converter slip.

Identification Tags

Identification Tag Location

1



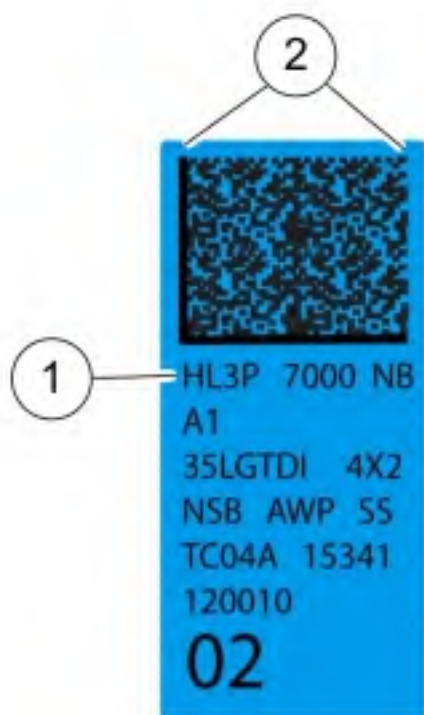
2



E239315

Item	Description
1	Solenoid body identification tag
2	Transmission identification tag

Transmission identification tag

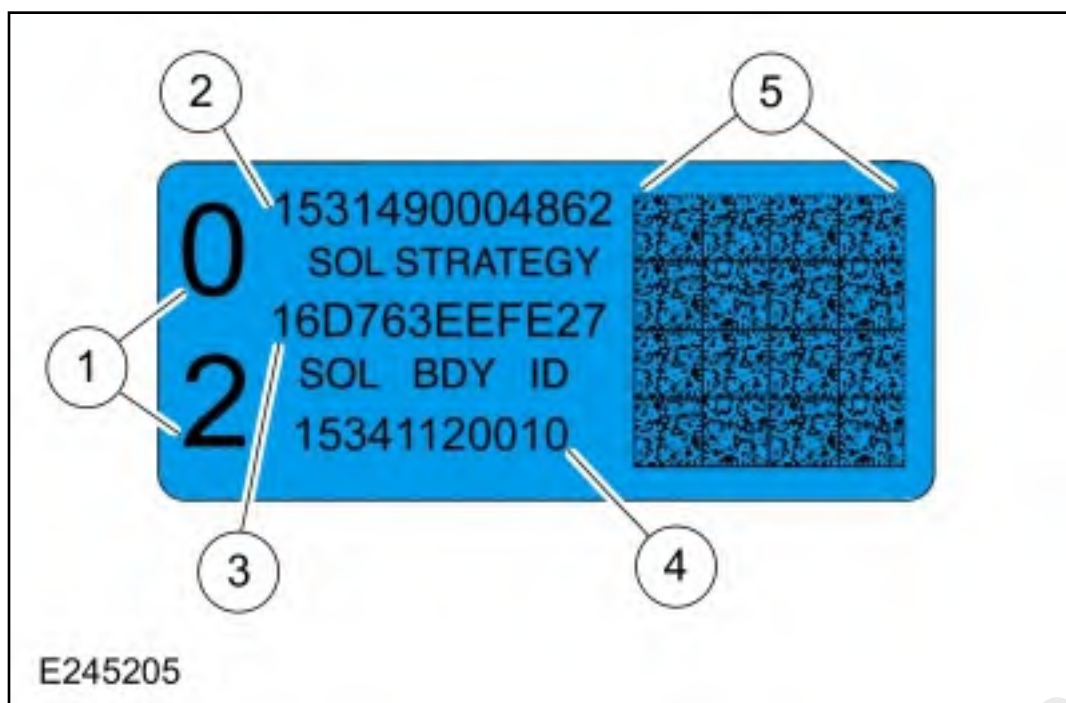


E246768

Item	Description
1	Transmission part number
2	Two-dimensional matrix barcode

When servicing the transmission, use the transmission identification tag located on the right side of the transmission case.

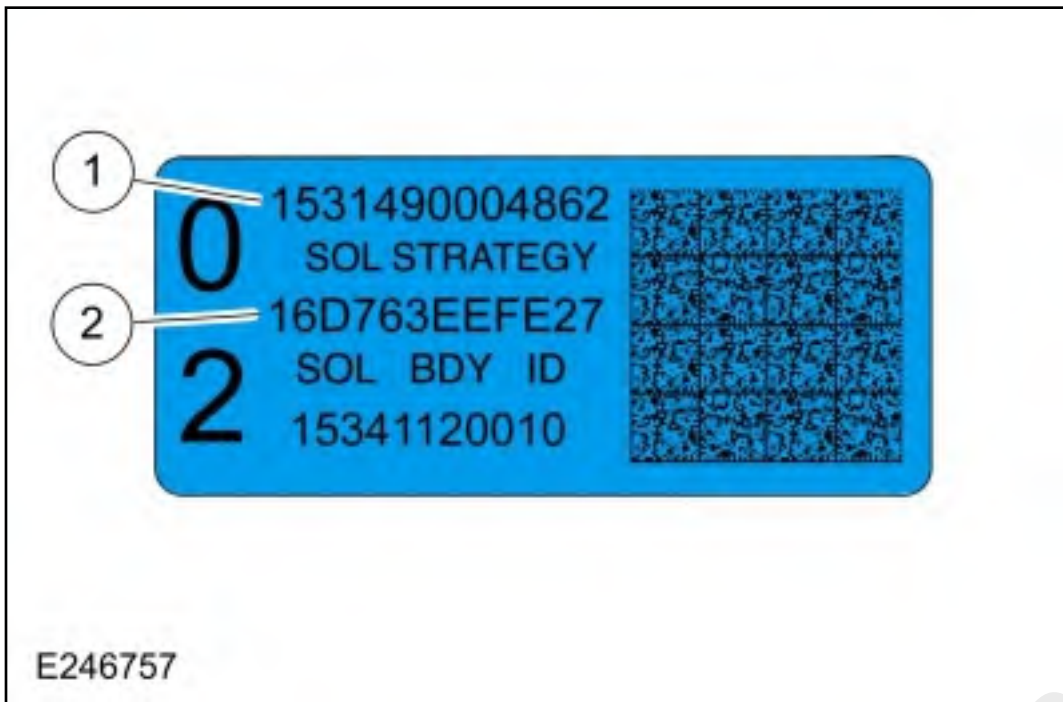
Original Solenoid Body Tag



Item	Description
1	Two-digit transmission model code
2	Thirteen-digit solenoid body strategy
3	Twelve-digit solenoid body identification
4	Eleven-digit transmission unique running number
5	Two-dimensional matrix barcode with TRID transmission characterization data

The solenoid body strategy is a file programmed into the PCM or the TCM with 3.5L EcoBoost engines to control the shift, LPC and TCC solenoids to improve shift quality. The solenoid body tag on the transmission case contains the 13-digit solenoid body strategy and the 12-digit solenoid body identification.

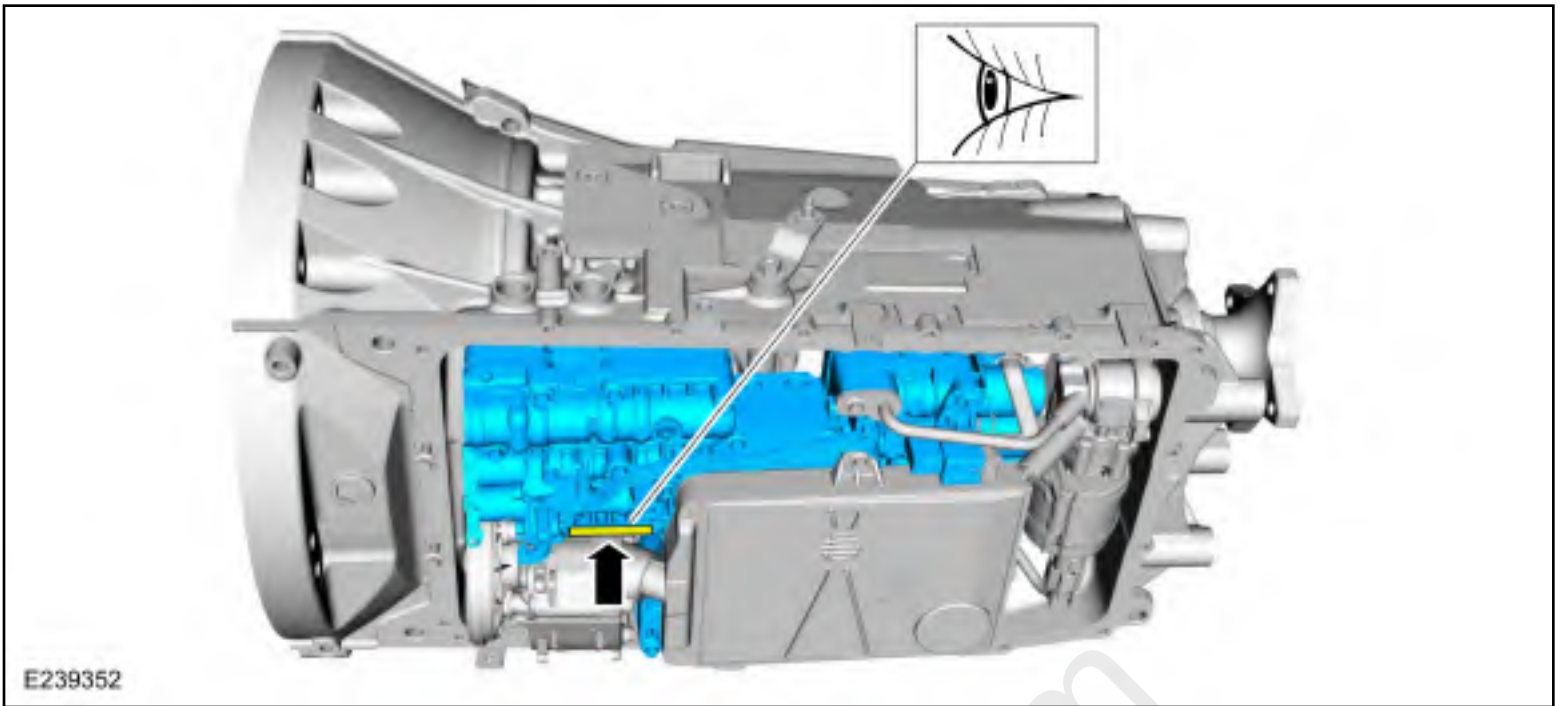
Replacement Solenoid Body Tag



Item	Description
1	Thirteen-digit solenoid body strategy
2	Twelve-digit solenoid body identification

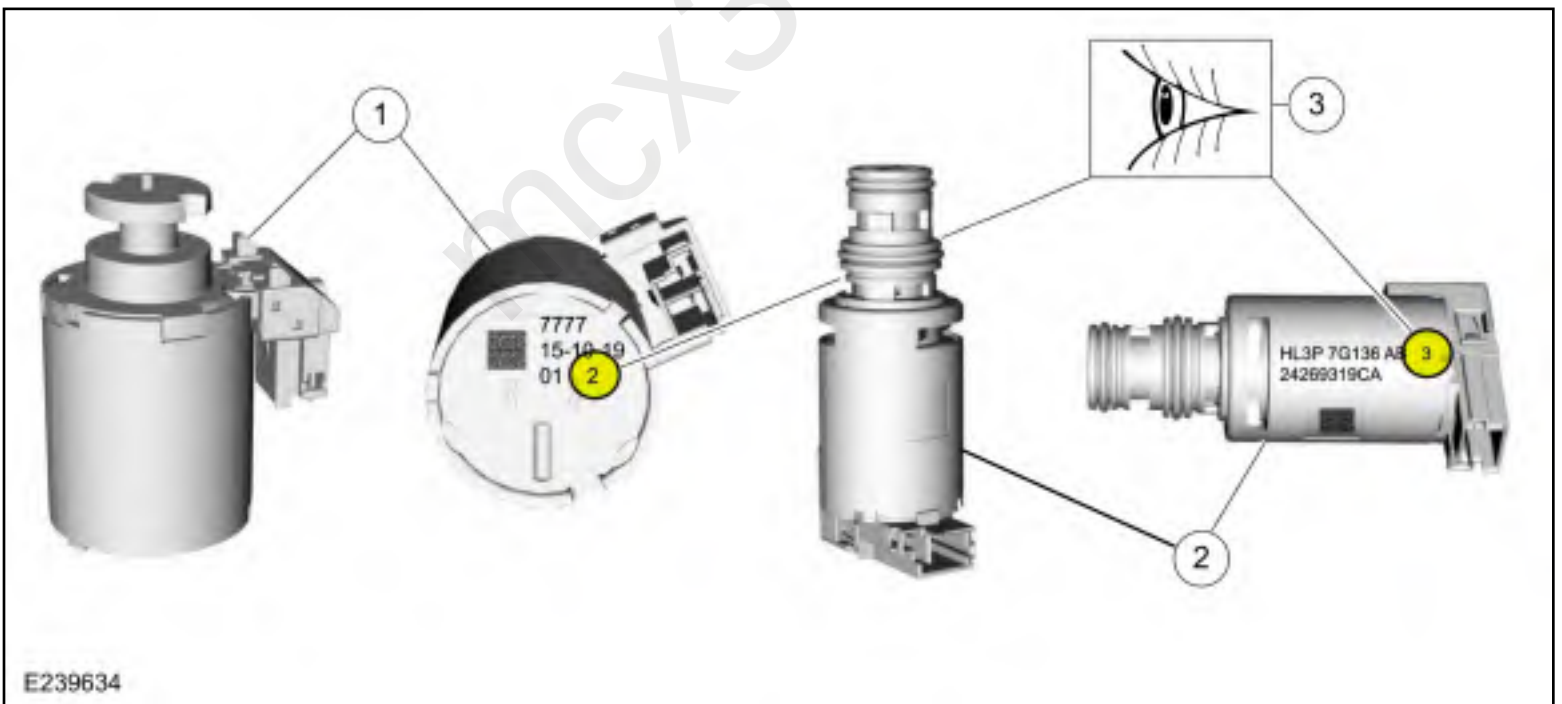
Anytime a new main control is installed, a new solenoid body strategy file is downloaded into the PCM or the TCM with 3.5L EcoBoost engines using the scan tool. A replacement solenoid body tag is supplied with the new solenoid body which contains the 13-digit solenoid body strategy and the 12-digit solenoid body identification. The new tag is placed over the original solenoid body tag.

Solenoid Body Identification and Strategy



If the solenoid body strategy etched on the main control does not match what the scan tool displays, the solenoid body strategy must be downloaded into the PCM or the TCM with 3.5L EcoBoost engines or harsh shifts will result.

Solenoid Band Number



Item	Description

1	CIDAS (casting integrated direct acting solenoid)
2	VFS (variable force solenoids)
3	Band number

The solenoids are calibrated from the factory and are not all the same. There are 2 types of VFS (variable force solenoids), normally high and normally low solenoids. The CIDASs are all normally low solenoids. The solenoids can be replaced separately, but only with the same type of solenoid. The replacement solenoid band number must match the band number of the solenoid being replaced. The band number is printed on the solenoids in the location shown and will be a 1, 2, 3, 4 or 5.

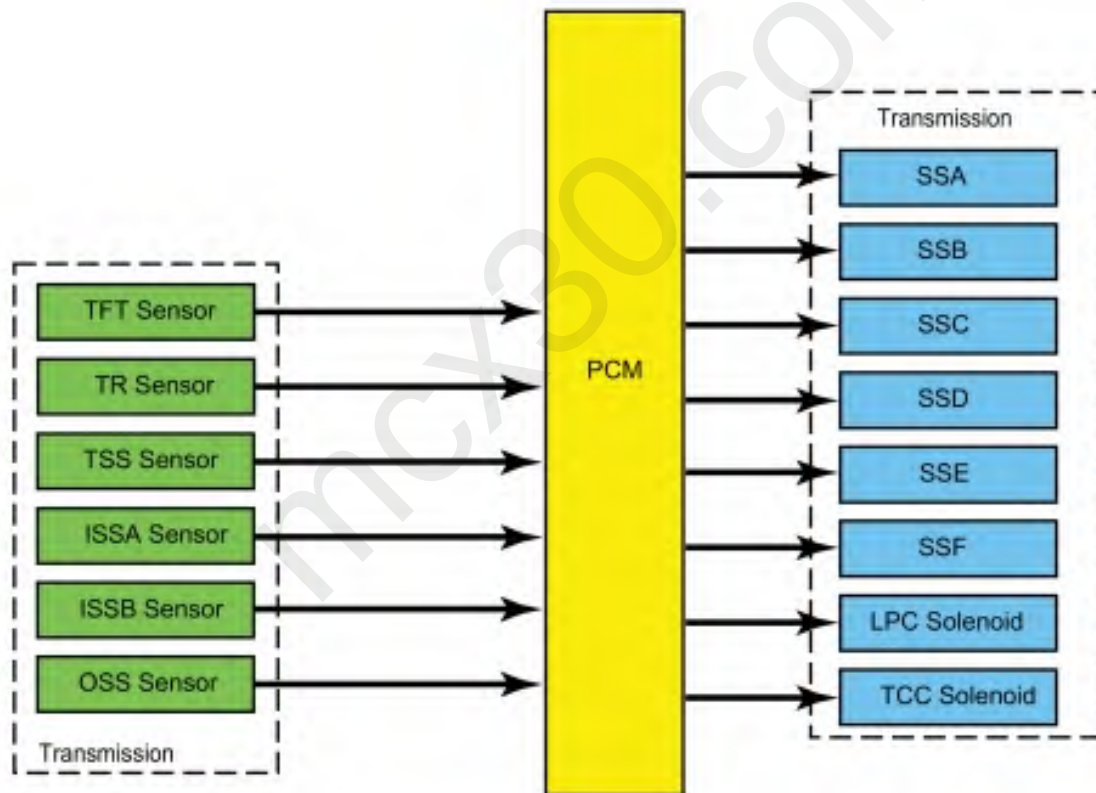
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Transmission Description - System Operation and Component Description

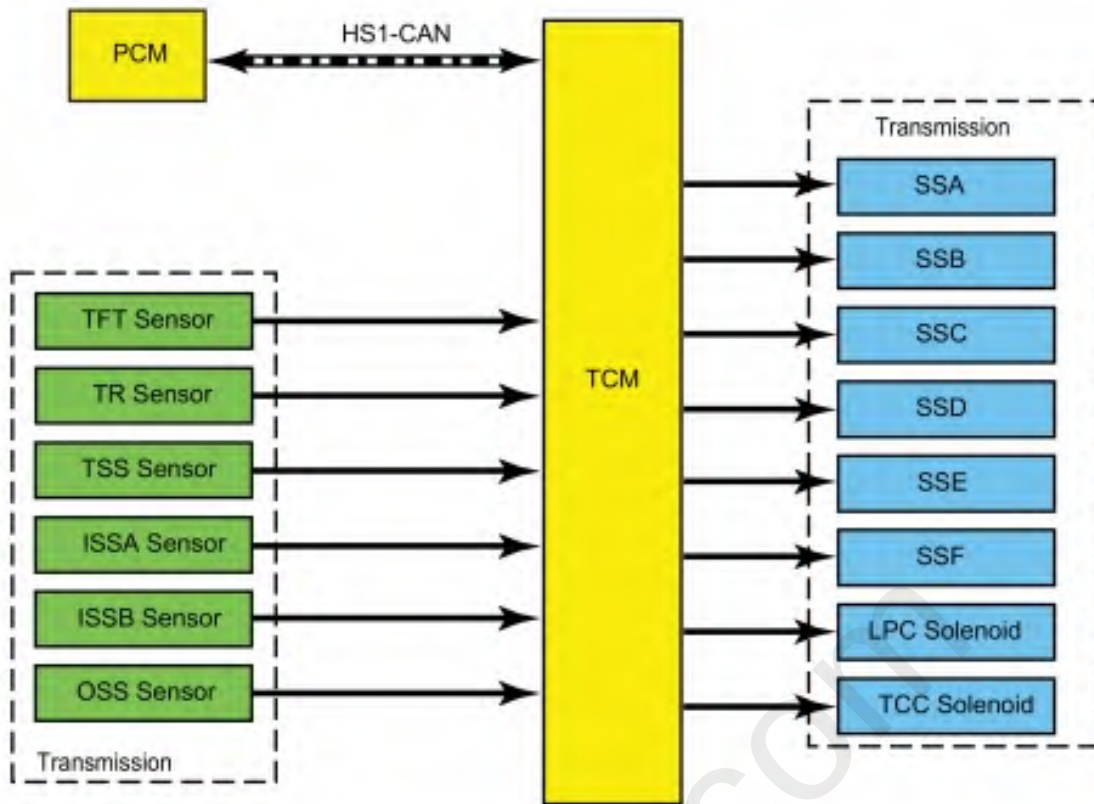
System Diagram

2.7L EcoBoost and 5.0L 32V Ti-VCT Engines



E259531

3.5L EcoBoost Engines



E241728

Network Message Chart

Broadcast Message	Originating Module	Message Purpose
Engine Speed	TCM	Directly affects shift scheduling, TCC control, line pressure and transmission diagnostics. Indirectly affects shift pressure control.
Engine torque estimate	TCM	Directly affects shift pressure control, TCC control and transmission diagnostics. Indirectly affects shift scheduling and TCC scheduling.
APP	PCM	Directly affects shift scheduling, TCC scheduling and transmission diagnostics. Indirectly affects TCC control and shift control.
Commanded engine torque	PCM	Directly affects shift scheduling, TCC scheduling and transmission diagnostics. Indirectly affects shift control.

System Operation

The 10R80 transmission is a 10-speed, step ratio rear wheel drive transmission that is controlled by a PCM or a TCM with 3.5L EcoBoost engines. The 10R80 has ten forward speeds, one reverse speed, four planetary gear sets, one mechanical One-Way Clutch or OWC, six friction clutches, an upper valve body, a lower valve body with

eight solenoids, and PCM or TCM controlled electronics. The 10R80 utilizes six shift (A-F) solenoids that are linear force solenoids. Unlike previous shift solenoids they are mechanical in nature in that no transmission fluid passes through them. CIDASs use a armature/pin assembly that moves a control valve in the main control valve body to control and apply hydraulic fluid pressure. Each clutch (A-F) is controlled by a corresponding shift solenoid (A-F). These solenoids are directly proportional in that zero current equals zero pressure and maximum current equals maximum pressure. If the power circuit to the transmission solenoids fails open, then all solenoids are failed electrically OFF, none of the clutch packs are able to engage and there is no fail safe operation.

Upshift Gear Sequence

At times the 10-speed transmission may **skip** gears when the vehicle starts from a complete stop. This is **normal** and desired **behavior**.

At part pedal when acceleration is brisk, single step upshifts would result in very frequent shift events (very short time in gear). Double step upshifts results when a longer time is spent in gear.

However, at light pedal or road load, single step upshifts **will** occur. The small 10-speed gear steps allow the engine speed to drop to lower values than it would in the 6-speed transmission; providing for the best fuel economy. In contrast, when the 10-speed transmission is at heavy or max pedal, the small steps keep the engine closer to the horsepower peak for best performance.

Down shift Gear Sequence

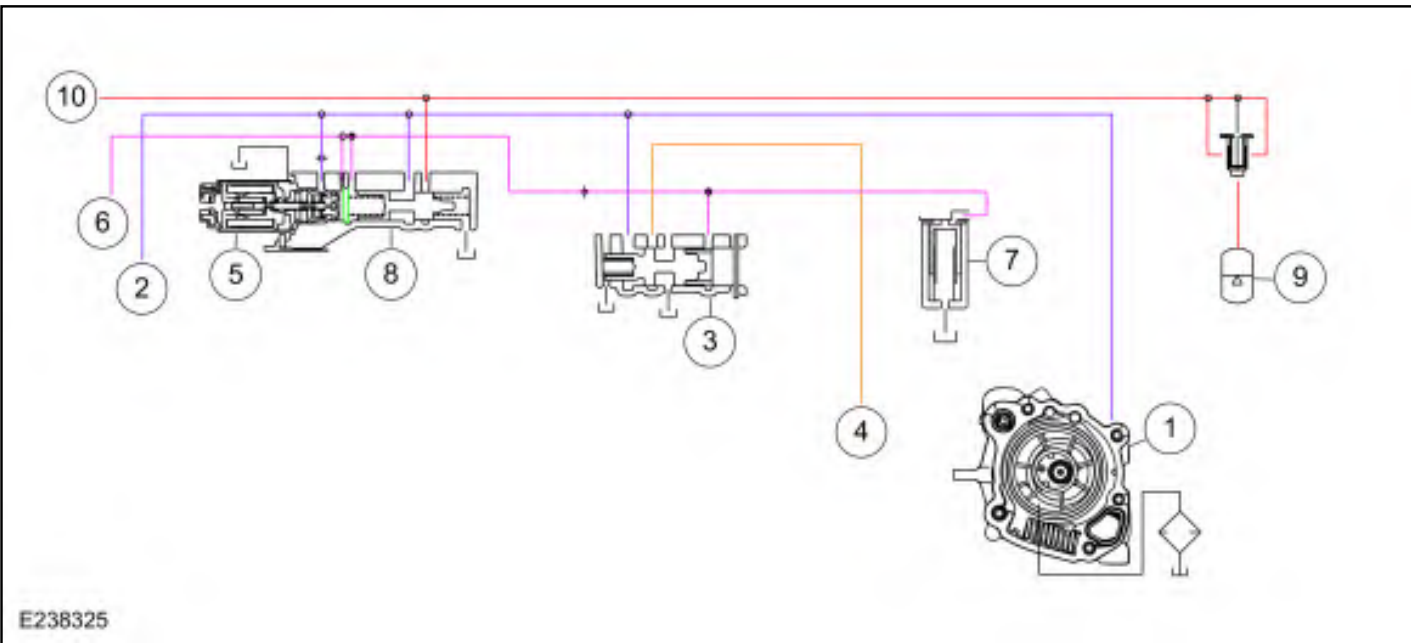
At times the 10-speed transmission may **skip** gears when the vehicle down shifts to a complete stop. This is **normal** and desired **behavior**.

The same **skip** shift strategy that is used for the upshift may be applied during down shift.

Component Description

Hydraulic Circuits

Line Pressure Hydraulic Circuits



Item	Description
1	Mechanical pump
2	Pump output
3	Main regulator valve
4	Pump output decreased
5	LPC solenoid
6	LPC pressure
7	Isolator valve
8	Anti-backflow valve
9	Transmission fluid auxiliary pump
10	Line pressure

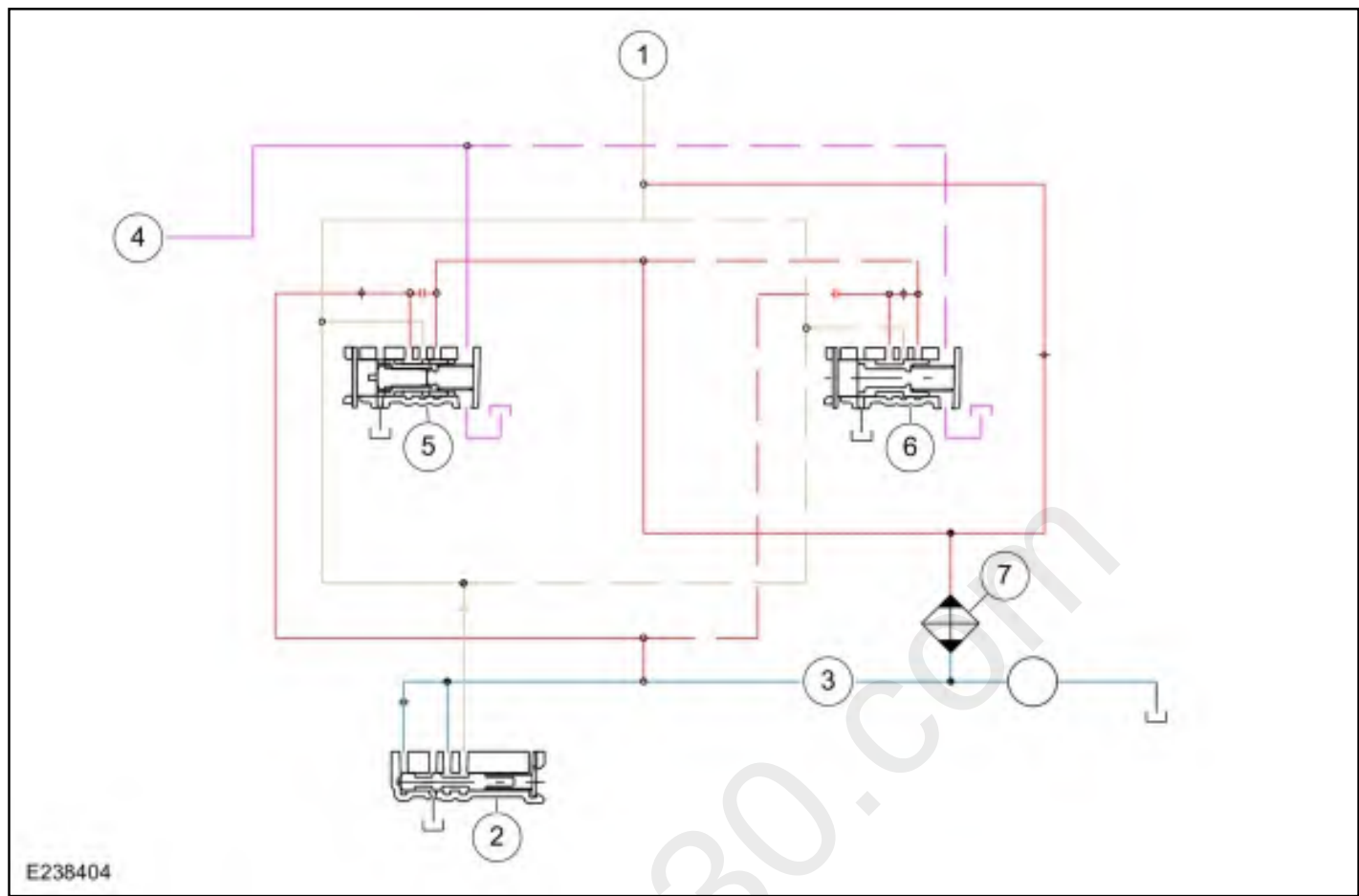
The PCM or the TCM with a 3.5L EcoBoost engine controls line pressure with the LPC solenoid. Varying pressure from the LPC solenoid effects shift feel while allowing sufficient pressure for clutch application.

When the engine is running, the pump supplies pressure to the main regulator valve through the pump output circuit. Pressure from the LPC solenoid through the LPC pressure circuit controls the position of the main regulator valve.

The main regulator valve varies pressure in the pump output circuit.

The transmission fluid auxiliary pump, an electronic pump in turned on before an engine stop event to maintain line pressure, allowing the transmission to stay engaged during the stop event. This allows quick response on the engine restart because the transmission is already in gear.

Lubrication Hydraulic Circuits



Item	Description
1	Fluid from torque converter
2	Lube control valve
3	Lube fluid circuit
4	Elevated exhaust pressure
5	Thermal bypass valve without active warm up
6	Bypass valve with active warm up
7	Fluid cooler

A small amount of hot fluid from the torque converter is routed through a small orifice in the separator plate to the transmission fluid cooler or transmission fluid warmer/cooler. This fluid purges the cooler or warmer/cooler of air and keeps the cooler or warmer/cooler full of fluid when the vehicle is running.

On vehicles without active warm up, most of the hot fluid from the torque converter is routed to the thermal bypass valve. When TFT is below a specified temperature, the thermal bypass valve directs the fluid to the lube circuit.

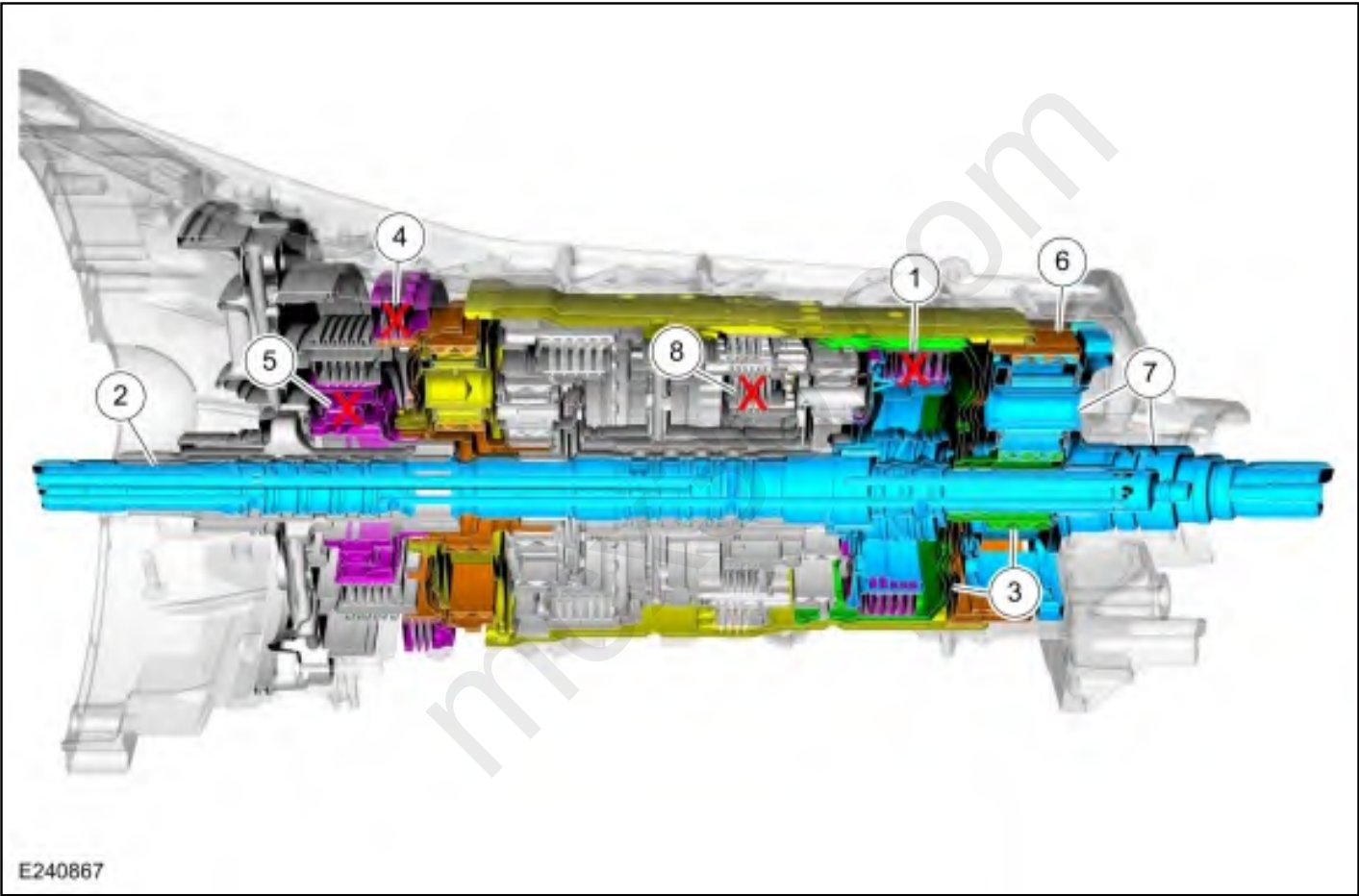
When TFT is above a specified temperature, the thermal bypass valve directs fluid to the transmission fluid cooler. Cold fluid from the transmission fluid cooler is routed to the lube circuit.

On vehicles with active warm up, most of the hot fluid from the torque converter is routed through the bypass valve to the transmission fluid warmer/cooler. Cold fluid from the transmission fluid cooler is routed to the lube circuit.

Fluid in the lube circuit enters the input shaft through the front support assembly and flows through passages in the input shaft and output shaft to provide lubrication for the transmission.

Powerflows

1st Gear

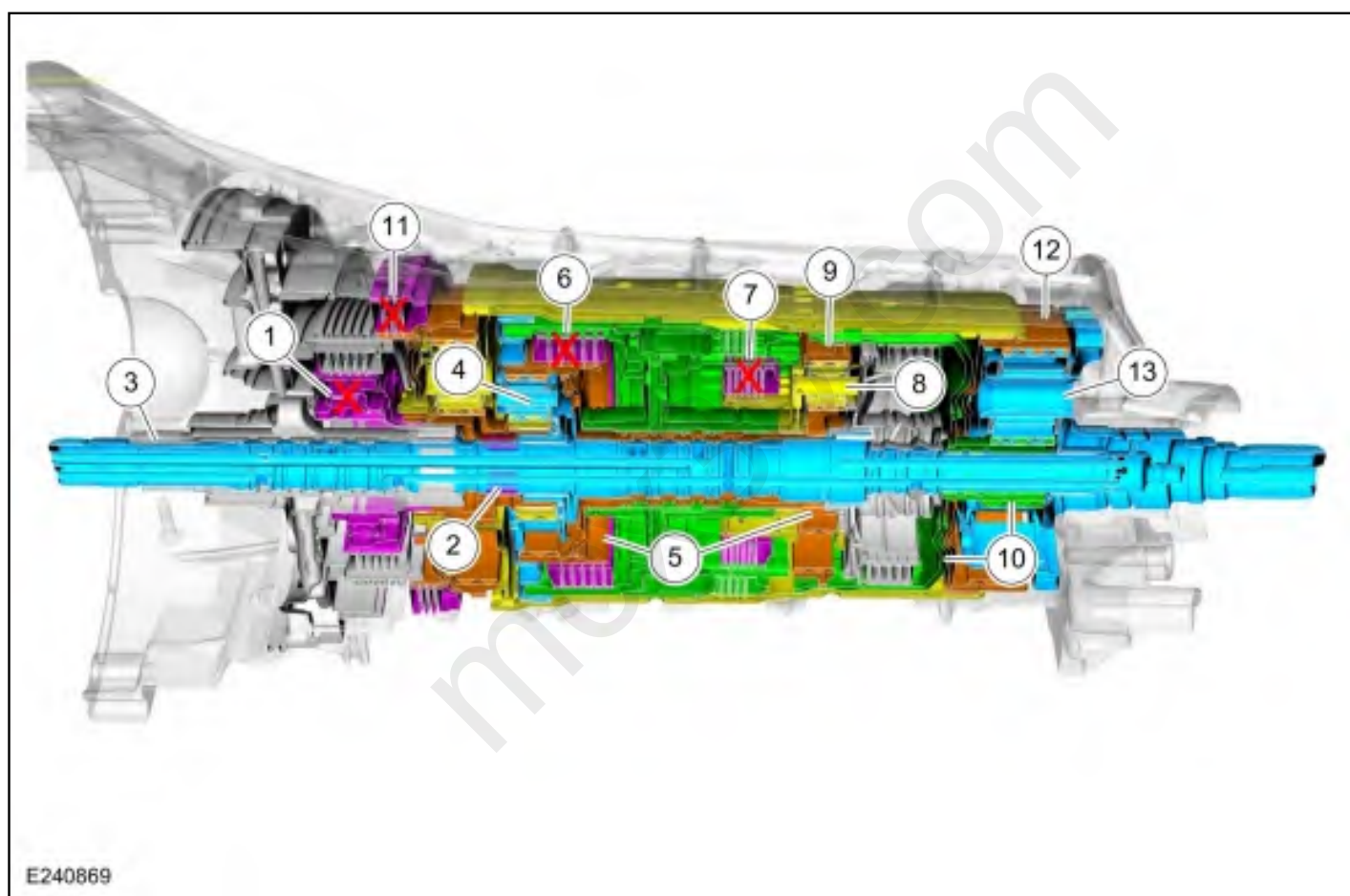


Item	Description
1	E clutch
2	Input shaft
3	Shell and sun gear No. 4
4	A clutch
5	One-Way Clutch (OWC)

6	Ring gear No. 4
7	Output shaft and planetary carrier No. 4
8	D clutch

The E clutch is applied allowing torque to be transferred from the input shaft to the shell and sun gear No. 4. The A clutch and the One-Way Clutch (OWC) are both applied to hold the ring gear No. 4 stationary on acceleration. The shell and sun gear No. 4 drives the pinions of the output shaft and planetary carrier No. 4 in a 4.69 reduction gear ratio. The D clutch is applied to reduce frictional losses from a released clutch, but does not contribute to powerflow.

2nd Gear

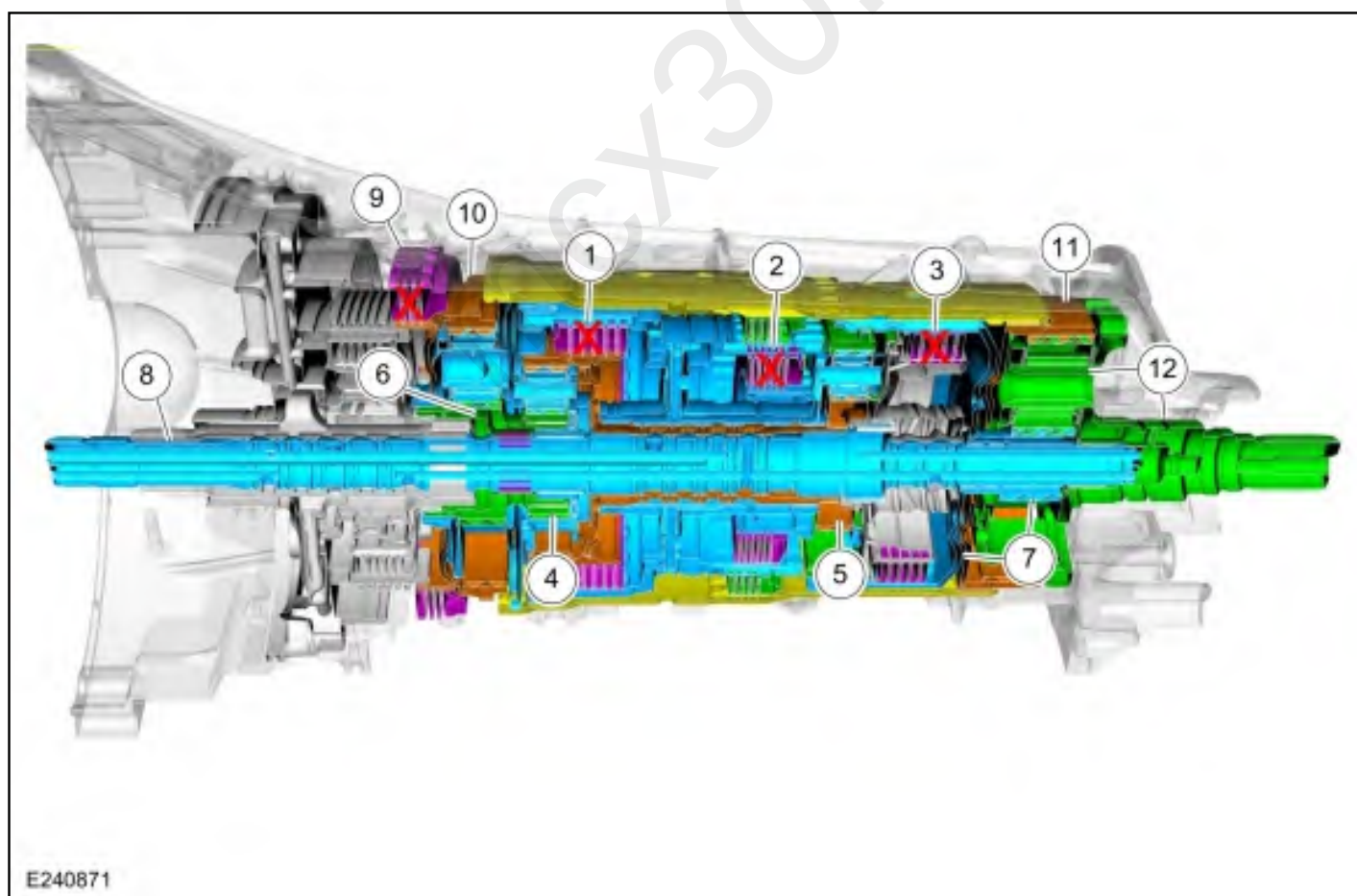


Item	Description
1	One-Way Clutch (OWC)
2	Sun gear No. 2
3	Input shaft
4	Planetary carrier No. 2
5	Ring gear No. 2 and sun gear No. 3

6	C clutch
7	D clutch
8	Planetary carrier No. 3
9	Ring gear No. 3
10	Shell and sun gear No. 4
11	A clutch
12	Ring gear No. 4
13	Output shaft and planetary carrier No. 4

The One-Way Clutch (OWC) holds the sun gear No. 2 stationary on acceleration. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 and sun gear No. 3 to rotate at a 0.63 overdrive ratio. The C clutch and the D clutch are applied allowing torque to be transferred from the ring gear No. 2 to the planetary carrier No. 3 at a 0.63 overdrive gear ratio. The 2 inputs to the 3rd planetary gear set cause the ring gear No. 3 and the planetary carrier No. to rotate at a 0.63 overdrive ratio. The A clutch and the One-Way Clutch (OWC) are both applied to hold the ring gear No. 4 stationary on acceleration. The shell and sun gear No. 4 drives the pinions of the output shaft and planetary carrier No. 4 in a 2.98 reduction gear ratio.

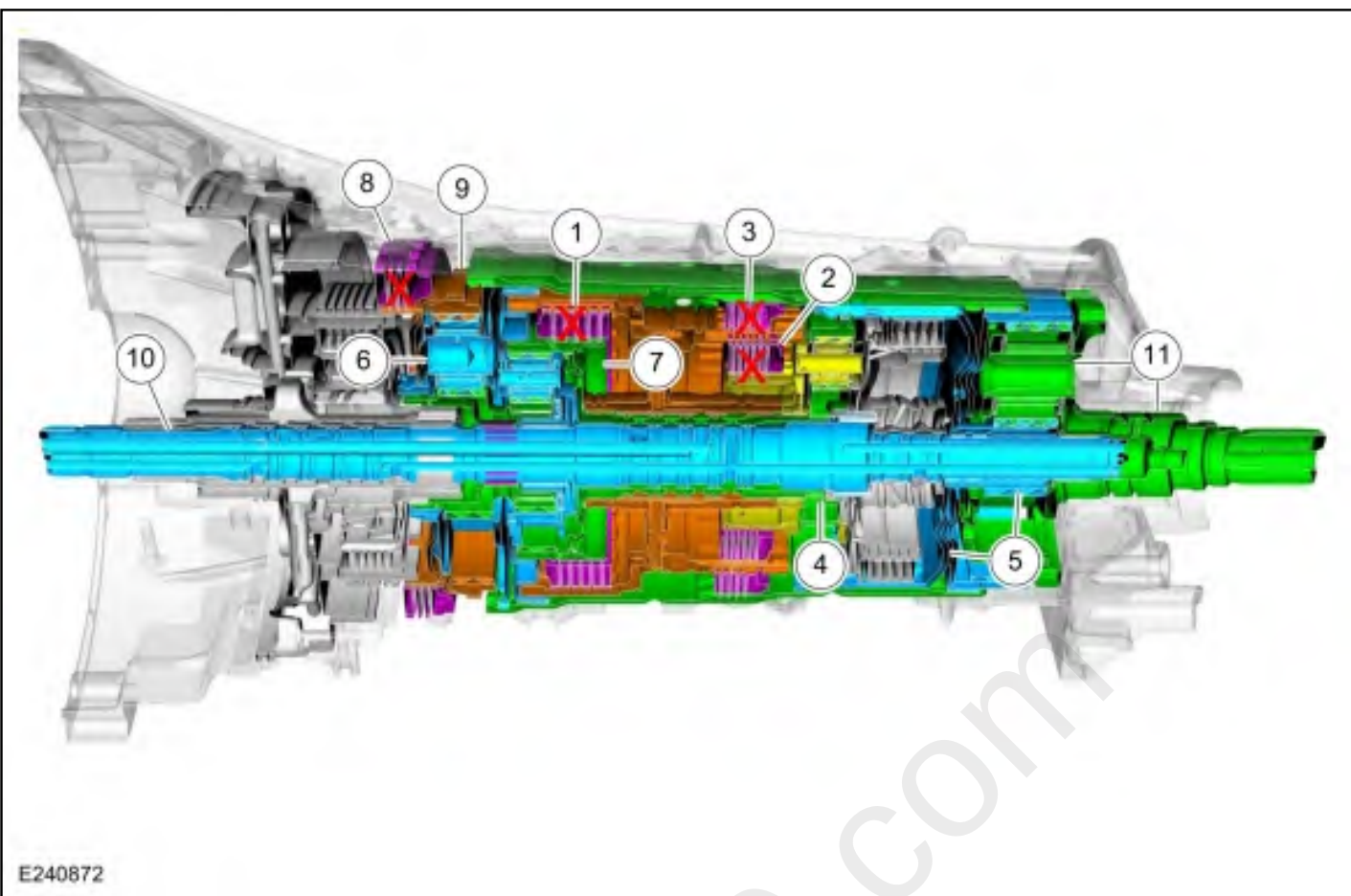
3rd Gear



Item	Description
1	C clutch
2	D clutch
3	E clutch
4	Planetary gear set No. 2
5	Planetary gear set No. 3
6	Sun gear No. 1
7	Shell and sun gear No. 4
8	Input shaft
9	A clutch
10	Ring gear No. 1
11	Ring gear No. 4
12	Output shaft and planetary carrier No. 4

The C clutch, D clutch, and the E clutch are applied to provide multiple inputs at the same speed to the 2nd and 3rd planetary gears sets. These inputs effectively lock the 2nd and 3rd planetary gears sets and cause sun gear No. 1 and the shell and sun gear No. 4 to rotate at a 1:1 ratio with the input shaft. The A clutch is holding the ring gear No. 1 stationary causing the planetary carrier No. 1 and the ring gear No. 4 to rotate at a 3.11 reduction ratio. The 2 inputs to the 4th planetary gear set cause the output shaft and planetary carrier No. 4 to rotate at a 2.15 ratio.

4th Gear

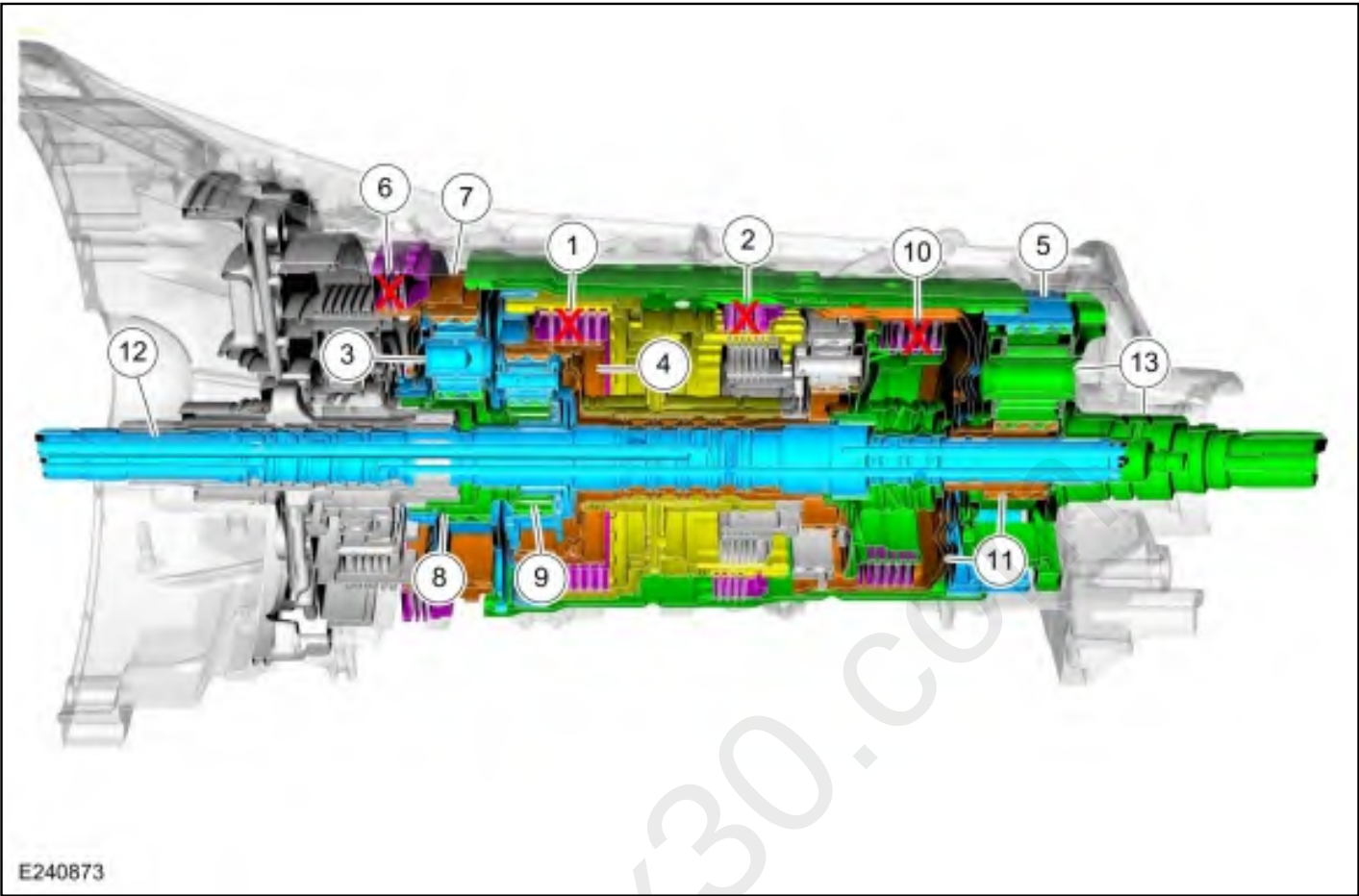


Item	Description
1	C clutch
2	D clutch
3	F clutch
4	Planetary gear set No. 3
5	Planetary gear set No. 4
6	Planetary carrier No. 1
7	Ring gear No. 2
8	A clutch
9	Ring gear No. 1
10	Input shaft
11	Output shaft and planetary carrier No. 4

The C clutch, D clutch, and F clutch are applied effectively locking the 3rd and 4th planetary gear sets, the planetary carrier No. 1, and the ring gear No. 2 together. The A clutch is holding the ring gear No. 1. The 2 inputs to the planetary gear set No. 1 cause the sun gear No. 1 and the sun gear No. 2 to rotate at a 0.56 overdrive ratio. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 and the 4th planetary gear set to

rotate at a 1.77 ratio.

5th Gear

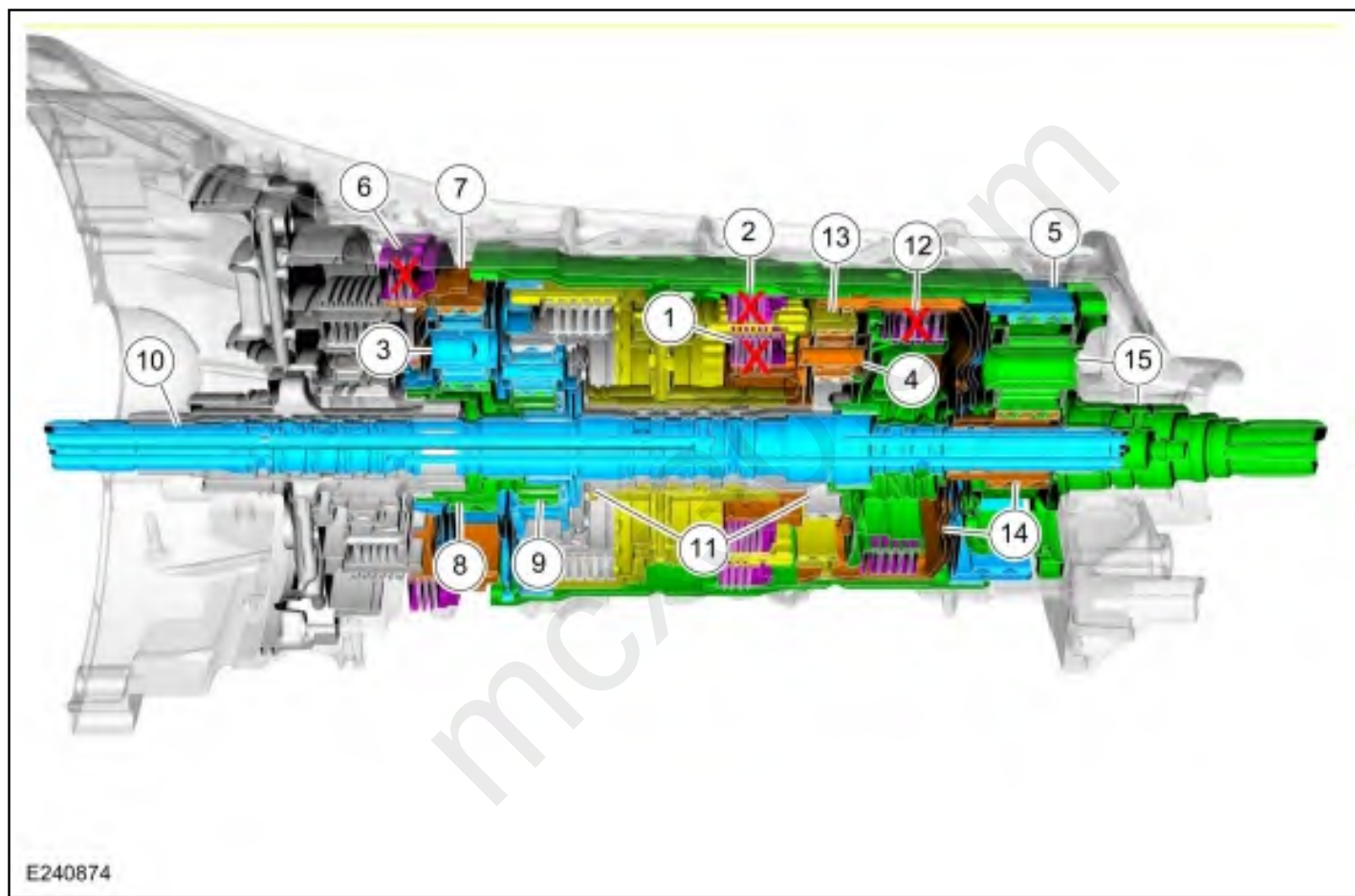


Item	Description
1	C clutch
2	F clutch
3	Planetary carrier No. 1
4	Ring gear No. 2
5	Ring gear No. 4
6	A clutch
7	Ring gear No. 1
8	Sun gear No. 1
9	Sun gear No. 2
10	E clutch
11	Shell and sun gear No. 4

12	Input shaft
13	Output shaft and planetary carrier No. 4

The C clutch and F clutch are applied effectively locking the planetary carrier No. 1, the ring gear No. 2, and ring gear No. 4 together at a 1.77 ratio. The A clutch is holding the ring gear No. 1. The 2 inputs to the planetary gear set No. 1 cause the sun gear No. 1 and the sun gear No. 2 to rotate at a 0.56 overdrive ratio. The E clutch is applied to transfer torque to the sun gear No. 4. The 2 inputs to the 4th planetary gear set cause the output shaft and planetary carrier No. 4 to rotate at a 1.52 ratio.

6th Gear

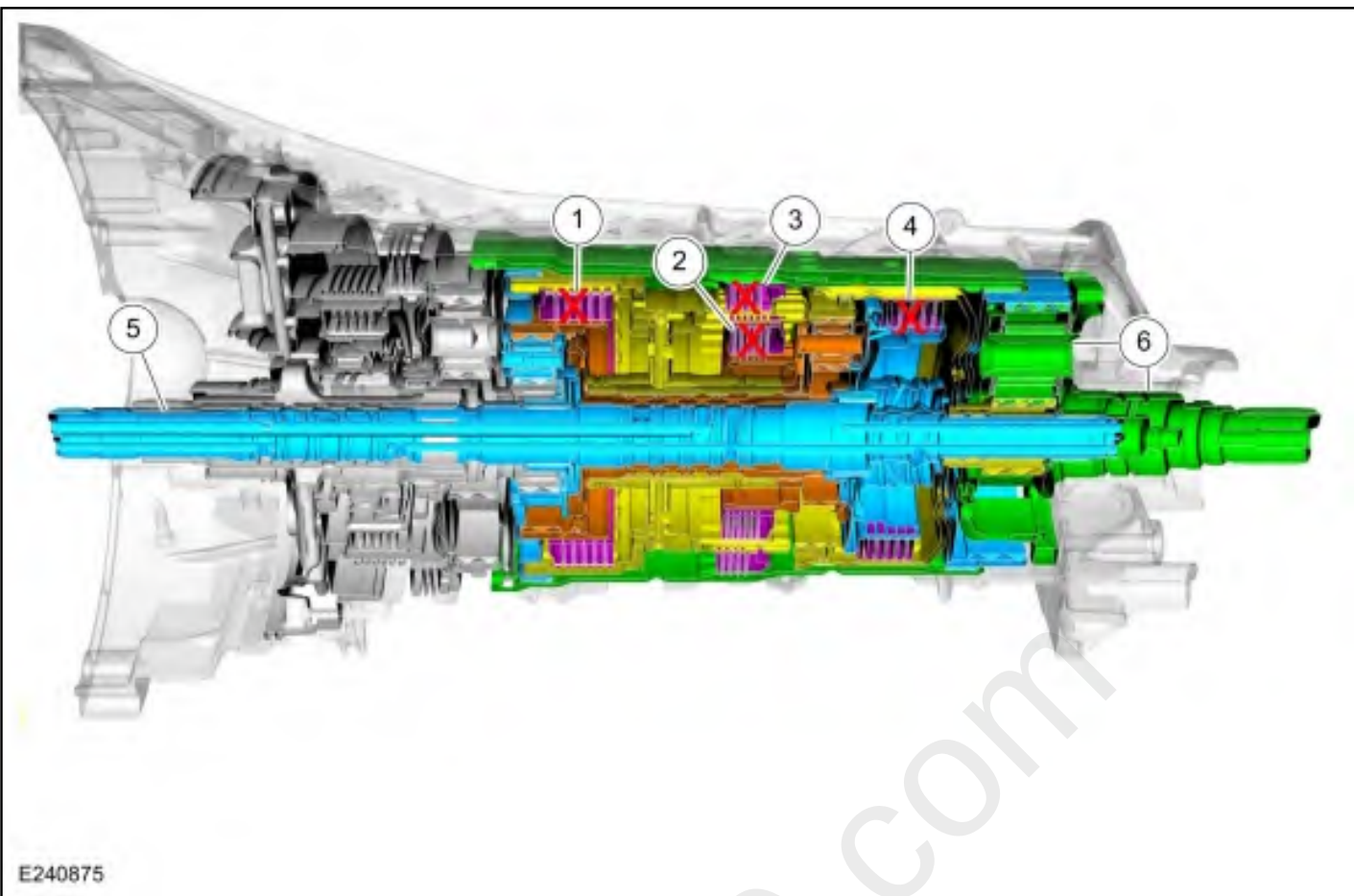


Item	Description
1	D clutch
2	F clutch
3	Planetary carrier No. 1
4	Planetary carrier No. 3
5	Ring gear No. 4
6	A clutch

7	Ring gear No. 1
8	Sun gear No. 1
9	Sun gear No. 2
10	Input shaft
11	Ring gear No. 2 and sun gear No. 3
12	E clutch
13	Ring gear No. 3
14	Shell and sun gear No. 4
15	Output shaft and planetary carrier No. 4

The D clutch and F clutch are applied effectively locking the planetary carrier No. 1, the planetary carrier No. 3, and the ring gear No. 4 together. The A clutch is holding the ring gear No. 1. The 2 inputs to the planetary gear set No. 1 cause the sun gear No. 1 and the sun gear No. 2 to rotate at a 0.44 overdrive ratio. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 and sun gear No. 3 to rotate at a 3.58 ratio. The E clutch is applied to transfer torque from the input shaft to the ring gear No. 3 and the shell and sun gear No. 4. The 2 inputs to the 3rd planetary gear set cause the planetary carrier No. 3 and ring gear No. 4 to rotate at a 1.38 ratio. The 2 inputs to the 4th planetary gear set cause the output shaft and planetary carrier No. 4 to rotate at a 1.28 ratio.

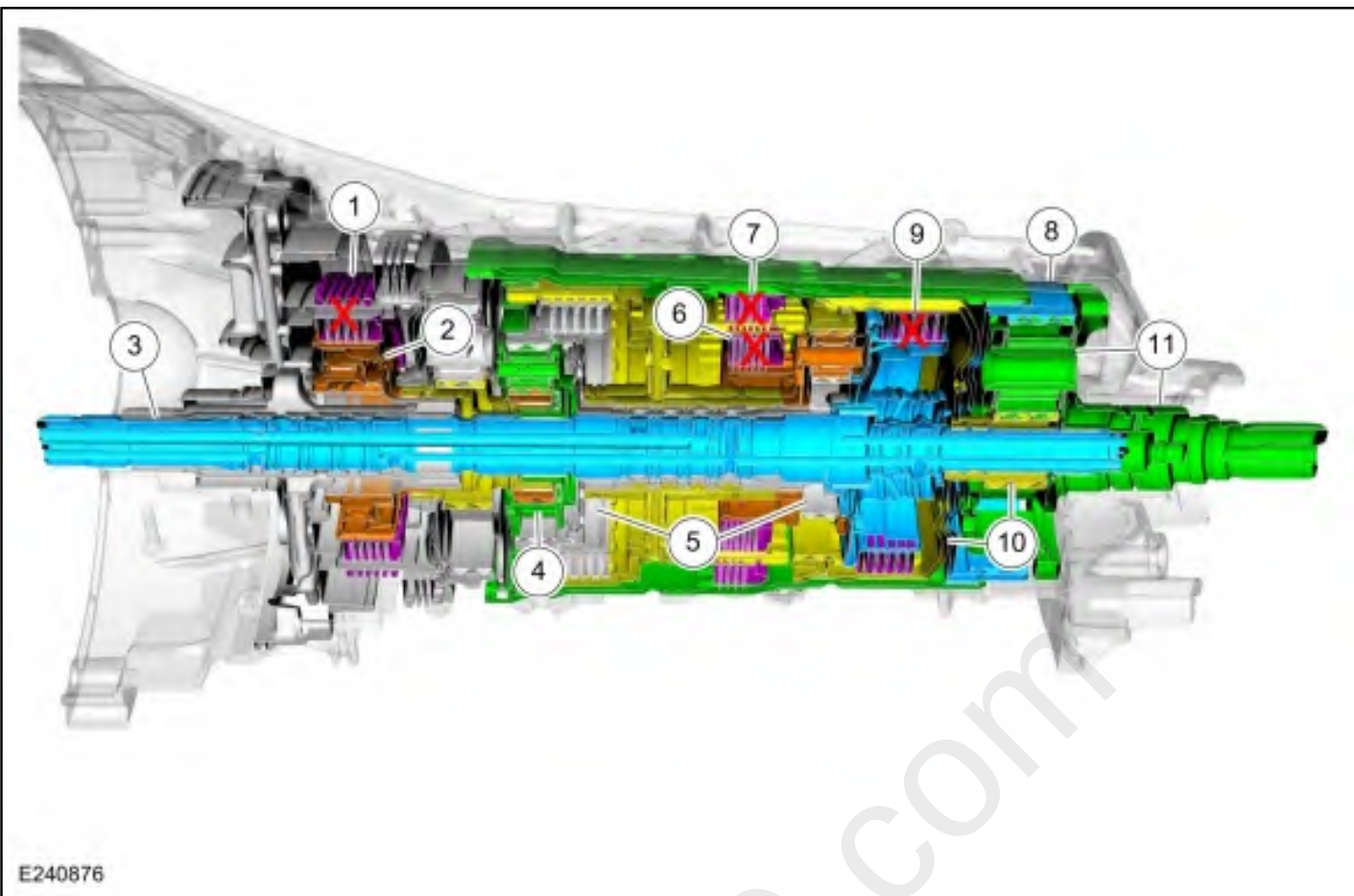
7th Gear



Item	Description
1	C clutch
2	D clutch
3	F clutch
4	E clutch
5	Input shaft
6	Output shaft and planetary carrier No. 4

The C clutch, D clutch, F clutch and the E clutch are applied to provide multiple inputs at the same speed to all four planetary gears sets. These inputs effectively lock all four planetary gears sets causing the output shaft and planetary carrier No. 4 to rotate at a 1:1 ratio with the input shaft.

8th Gear

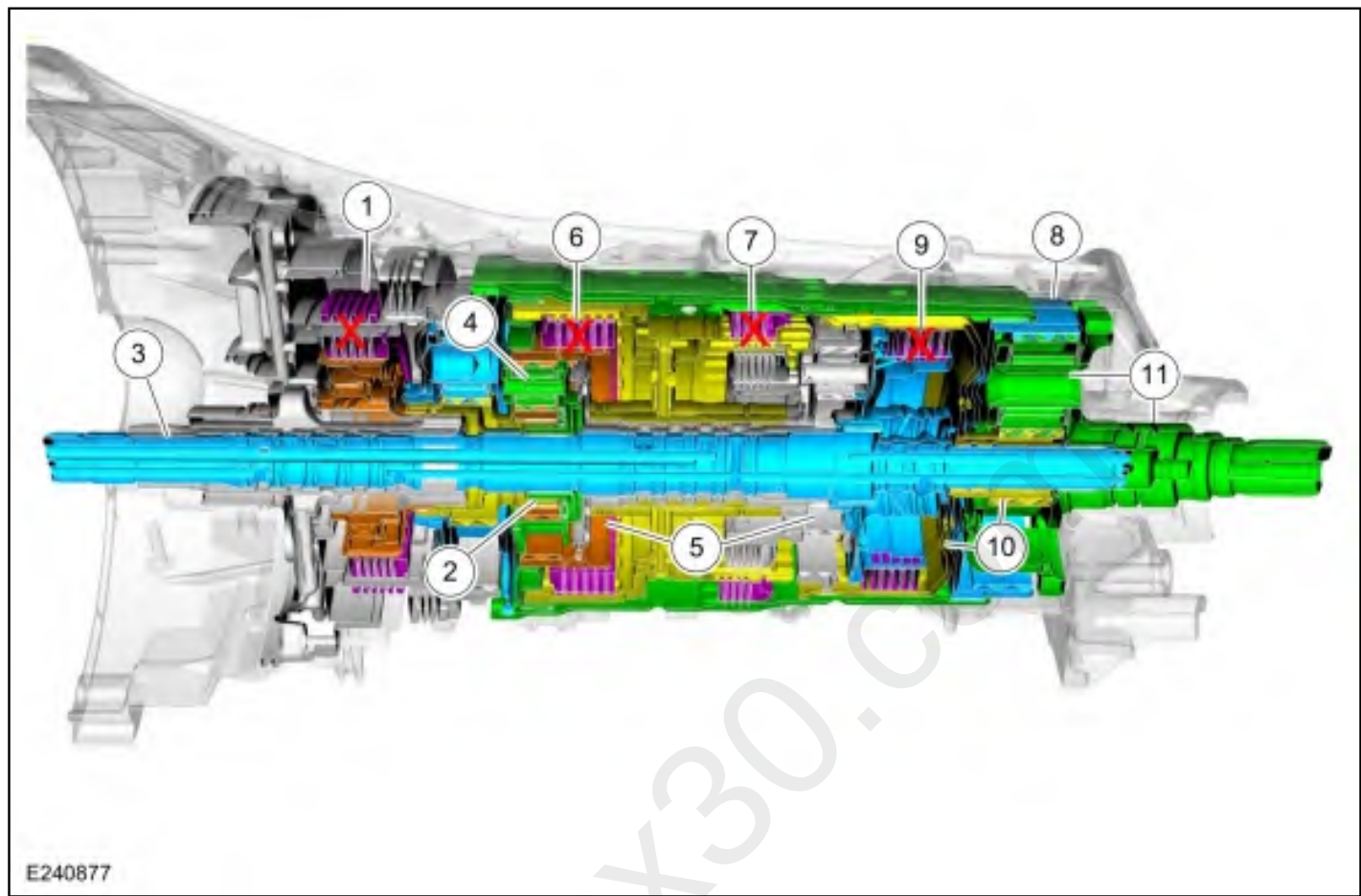


Item	Description
1	A clutch
2	One-Way Clutch (OWC)
3	Input shaft
4	Sun gear No. 2
5	Ring gear No. 2 and sun gear No. 3
6	D clutch
7	F clutch
8	Ring gear No. 4
9	E clutch
10	Shell and sun gear No. 4
11	Output shaft and planetary carrier No. 4

The B clutch is holding the sun gear No. 2 stationary. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 and sun gear No. 3 to rotate at a 0.63 overdrive ratio. The D clutch and F clutch are applied allowing torque to be transferred from the planetary No. 3 to the ring gear No. 4 at a 0.82 overdrive gear ratio. The E clutch is applied allowing torque to be transferred from the input shaft to the shell and sun gear No. 4 at a 1:1

ratio. The 2 inputs to the 4th planetary gear set cause the output shaft and planetary carrier No. 4 to rotate at a 0.85 ratio.

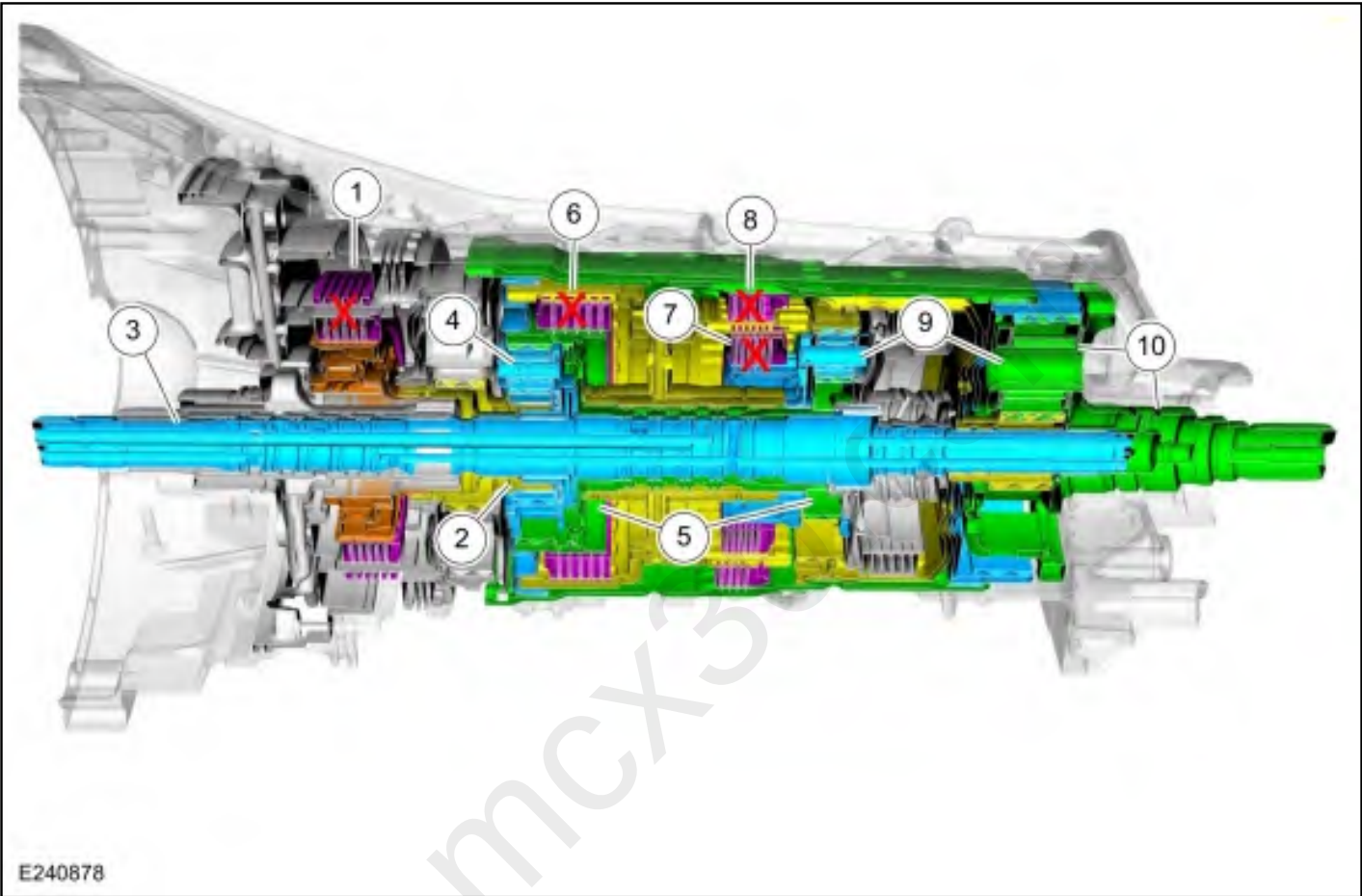
9th Gear



Item	Description
1	B clutch
2	Sun gear No. 2
3	Input shaft
4	Planetary carrier No. 2
5	Ring gear No. 2 and sun gear No. 3
6	C clutch
7	F clutch
8	Ring gear No. 4
9	E clutch
10	Shell and sun gear No. 4
11	Output shaft and planetary carrier No. 4

The B clutch is holding the sun gear No. 2 stationary. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 to rotate. The C clutch and F clutch are applied allowing torque to be transferred from the ring gear No. 2 to the ring gear No. 4 at a 0.63 overdrive gear ratio. The E clutch is applied allowing torque to be transferred from the input shaft to the shell and sun gear No. 4 at 1:1 ratio. The 2 inputs to the 4th planetary gear set cause the output shaft and planetary carrier No. 4 to rotate at a 0.69 ratio.

10th Gear

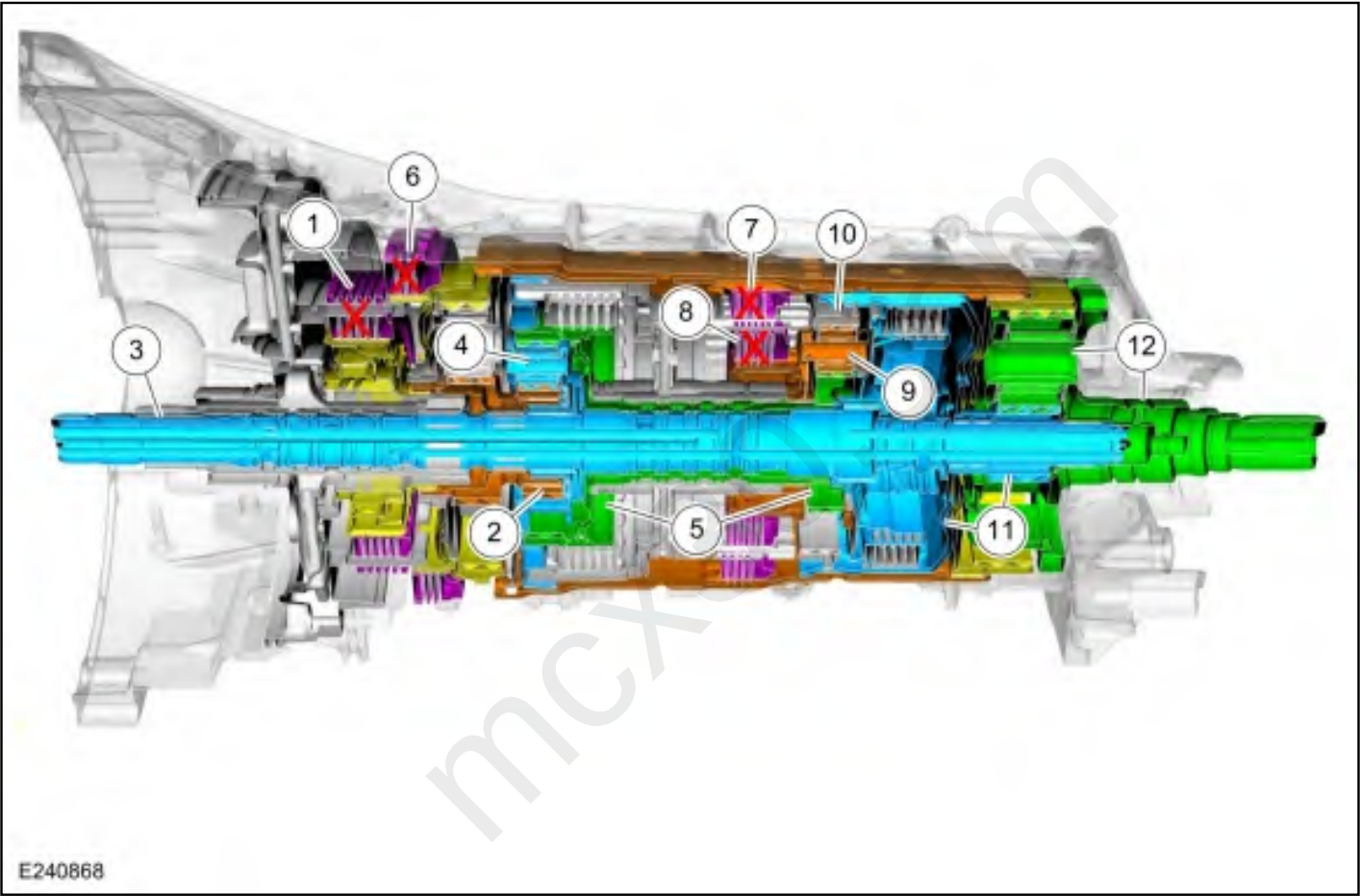


Item	Description
1	B clutch
2	Sun gear No. 2
3	Input shaft
4	Planetary carrier No. 2
5	Ring gear No. 2 and sun gear No. 3
6	C clutch
7	D clutch
8	F clutch

9	Planetary gear set No. 3 and planetary gear set No. 4
10	Output shaft and planetary carrier No. 4

The B clutch is holding the sun gear No. 2 stationary. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 and sun gear No. 3 to rotate. The C clutch, D clutch, and the F clutch are applied to provide torque input from the ring gear No. 2 at an overdrive ratio of 0.56. This torque input effectively locks the 3rd and 4th planetary gears sets causing the output shaft and planetary carrier No. 4 to rotate at a 0.64 ratio.

Reverse



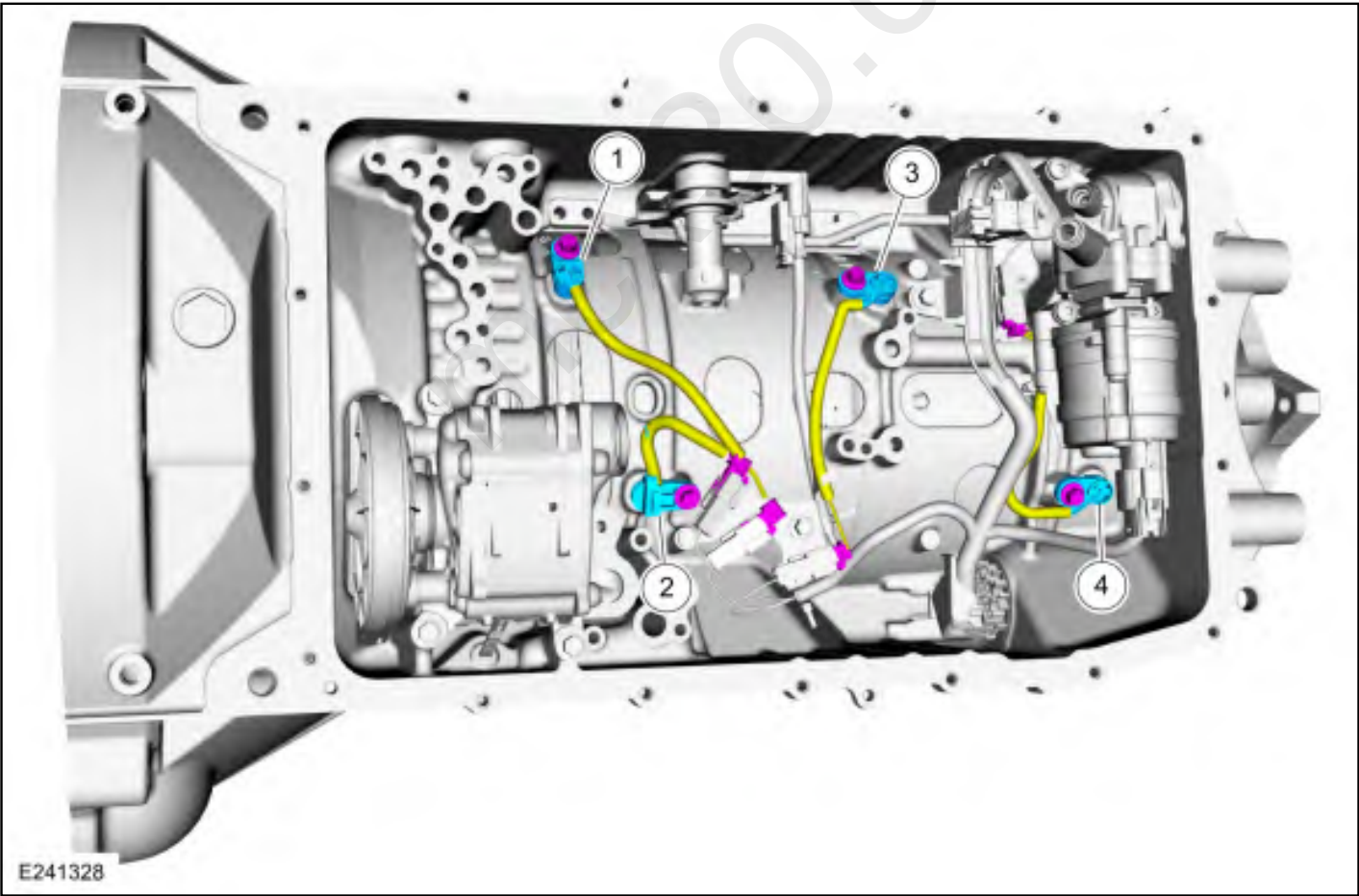
Item	Description
1	B clutch
2	Sun gear No. 2
3	Input shaft
4	Planetary carrier No. 2
5	Ring gear No. 2 and sun gear No. 3
6	A clutch

7	F clutch
8	D clutch
9	Planetary carrier No. 3
10	Ring gear No. 3
11	Shell and sun gear No. 4
12	Output shaft and planetary carrier No. 4

The B clutch is applied to hold the sun gear No. 2 stationary. The input shaft turns the planetary carrier No. 2 and causes the ring gear No. 2 and the sun gear No. 3 to rotate at a 0.63 overdrive ratio. The A clutch, F clutch, and the D clutches are applied to hold the planetary carrier No. 3 stationary. The 2 inputs to the 3rd planetary gearset cause the ring gear No. 3 and the planetary carrier No. 4 to rotate at a 1.03 ratio in the reverse direction. The A clutch and F clutch are applied to hold the ring gear No. 4 stationary. The 2 inputs to the 4th planetary gearset cause the output shaft and planetary carrier No. 4 to rotate at a 4.85 reduction ratio in the reverse direction.

Component Description

Transmission Sensors



Item	Description

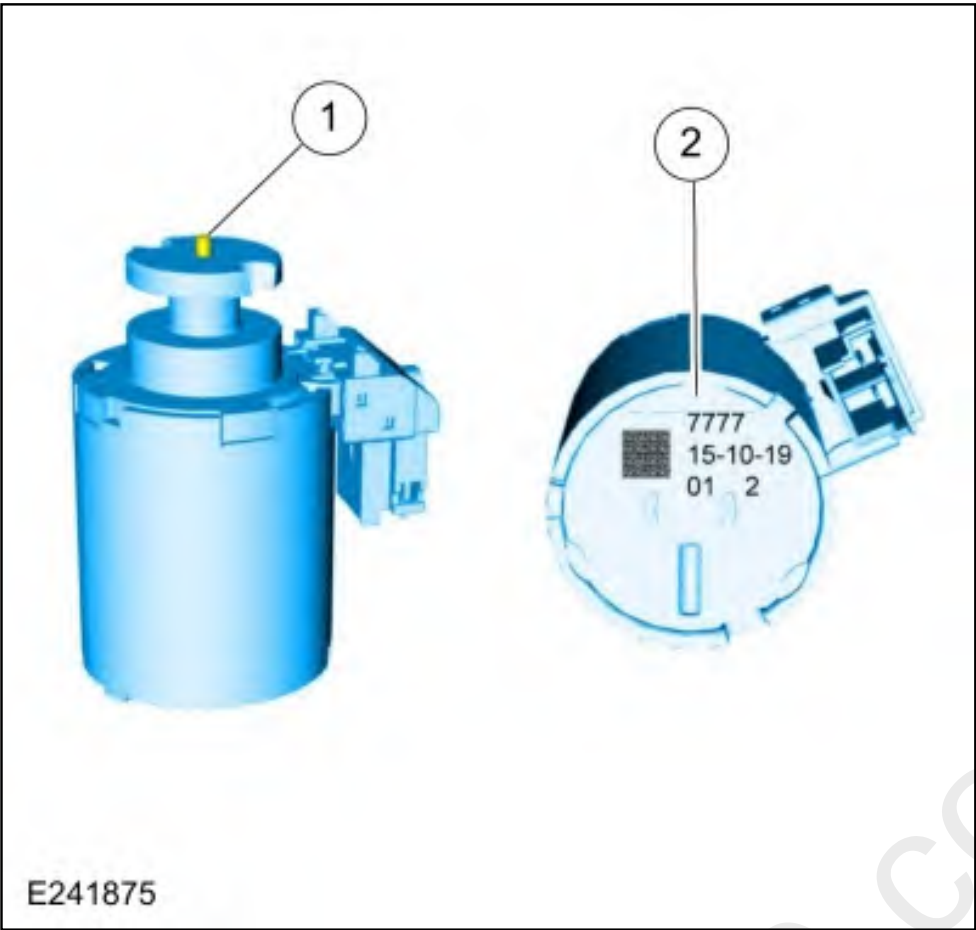
1	Intermediate speed sensor A
2	TSS sensor
3	Intermediate speed sensor B
4	OSS sensor

The PCM or the TCM with a 3.5L EcoBoost engine controls the electronic functions of this transmission. The PCM or TCM receives input signals from engine and transmission sensors and uses these inputs to control line pressure, shift time, TCC and shift solenoids.

Item	Description
TFT Sensor	The TFT sensor is located in the transmission main control valve body. It is a temperature-sensitive device called a thermistor. The resistance value of the TFT sensor will vary with temperature change. The PCM or the TCM with a 3.5L EcoBoost engine monitors the voltage across the TFT sensor to determine the temperature of the transmission fluid. The PCM or TCM uses this initial signal to determine whether a cold start shift schedule is necessary. The cold start shift schedule allows delayed shifts when the transmission fluid is cold to help warm the transmission fluid. The PCM or TCM also inhibits TCC operation at low transmission fluid temperatures and adjusts line pressure for temperature.
TR Sensor	The TR sensor is composed of a dual set of TR sensors. The manual shifter engages and disengages Park and the shifter position is detected by reading TR sensors A and B. There is no manual valve, the PCM or the TCM with a 3.5L EcoBoost engine provides forward or reverse based on the dual TR sensor inputs. The 10R80 transmission uses a dual PWM output (at 125 Hz) TR sensors where: TR sensor A increases as the shifter is moved from Park to Sport and TR sensor B decreases as the shifter is moved from Park to Sport, together the sum of the two signals should add up to 100%. The 10R80 transmission mechanical shifter variant is range by wire with mechanical Park. The dual TR sensor's signals are used to determine customer selected range (P, R, N, D, S). PIDs, TR_A_DC and TR_B_DC may be utilized to monitor the TR sensor duty cycles.
TSS Sensor	The TSS sensor is a 2-Wire Hall-effect type sensor that provides a TSS signal to the PCM or the TCM with 3.5L EcoBoost engines that changes in frequency as the magnetic trigger wheel part of the planetary carrier No. 2 varies in speed or direction. The TSS information is compared to engine rpm to determine TSS performance. TSS is also compared to OSS to determine shift quality and clutch performance. The TSS sensor is mounted to the transmission case.

OSS Sensor	The OSS sensor is a 2-Wire Hall-effect type sensor that provides a OSS signal to the PCM or the TCM with 3.5L EcoBoost engines that changes in frequency as the trigger wheel part of the output shaft and planetary carrier No. 4 varies in speed or direction. The OSS is used for shift scheduling. OSS is also compared to TSS to determine shift quality and clutch performance. The OSS sensor is mounted to the transmission case.
Intermediate Speed Sensor A	The intermediate speed sensor A (ISSA), is a 2-Wire Hall-effect type sensor that provides a intermediate speed sensor A (ISSA) signal to the PCM or the TCM with 3.5L EcoBoost engines that changes in frequency as the trigger wheel part of the No. 1 ring gear varies in speed or direction. The intermediate speed sensor A (ISSA) is used to monitor clutch states for transmission fault detection and diagnostics. The intermediate speed sensor A (ISSA) is mounted to the transmission case.
Intermediate Speed Sensor B	The intermediate speed sensor B (ISSB), is a 2-Wire Hall-effect type sensor that provides a intermediate speed sensor B (ISSB) signal to the PCM or the TCM with 3.5L EcoBoost engines that changes in frequency as the trigger wheel part of the clutch and planetary container cylinder varies in speed or direction. The intermediate speed sensor B (ISSB) is used to monitor clutch states for transmission fault detection and diagnostics. The intermediate speed sensor B (ISSB) is mounted to the transmission case.

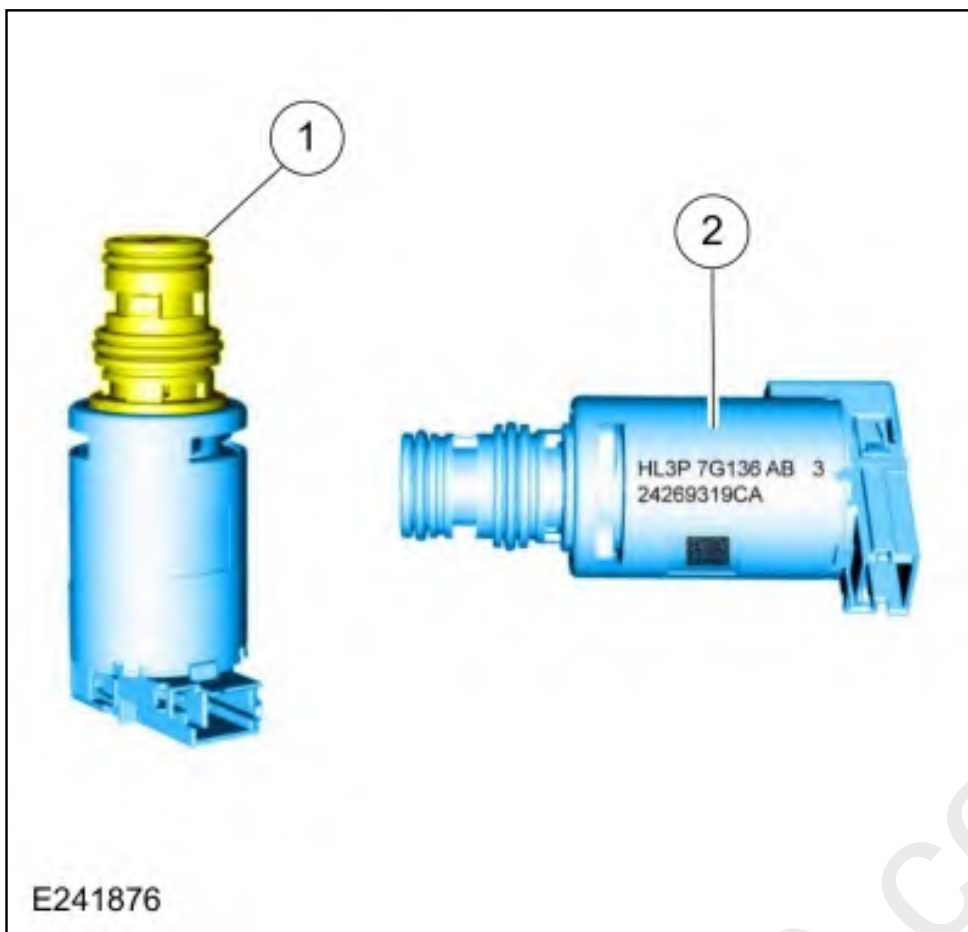
Shift Solenoids



Item	Description
1	Armature/pin assembly
2	Part information

The 10R80 utilizes six shift (A-F) solenoids that are linear force solenoids. Unlike previous shift solenoids they are mechanical in nature in that no transmission fluid passes through them. CIDASs use a armature/pin assembly that moves a control valve in the main control valve body to control and apply hydraulic fluid pressure. Each clutch (A-F) has a corresponding shift solenoid (A-F) that is directly proportional in that zero current equals zero pressure and maximum current equals maximum pressure. Since there is no pressure with zero current if the power is interrupted to the shift solenoids none of the clutch packs are able to engage.

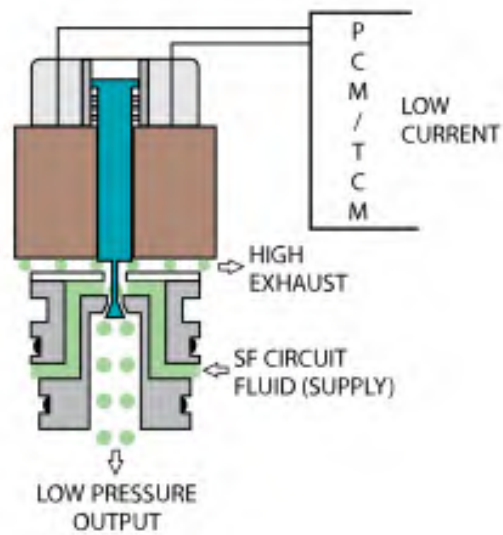
Torque Converter Clutch (TCC) Proportional (VFS)



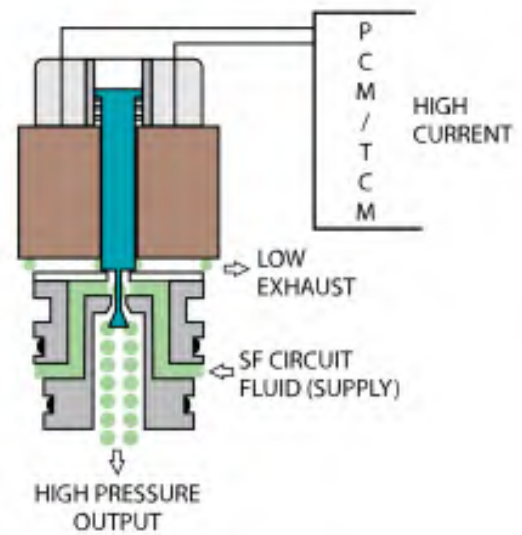
Item	Description
1	Solenoid nozzle
2	Part information

The TCC solenoid is a variable force solenoid that varies hydraulic pressure by actuating a hydraulic valve. The TCC solenoid uses proportional operation. As the current from the PCM or the TCM with a 3.5L EcoBoost engine decreases, the pressure from the solenoid decreases. As the current from the PCM or the TCM increases, the pressure from the solenoid increases.

Normally Low Solenoid

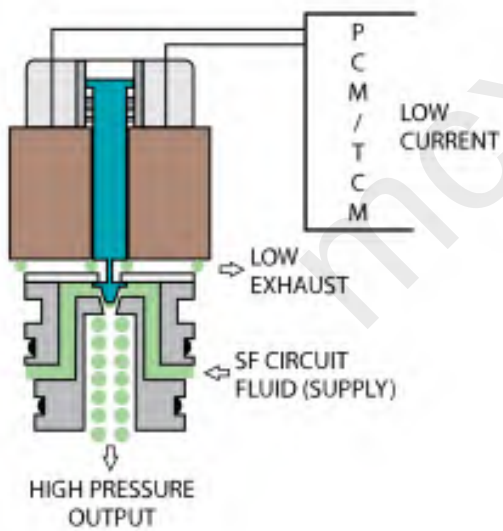


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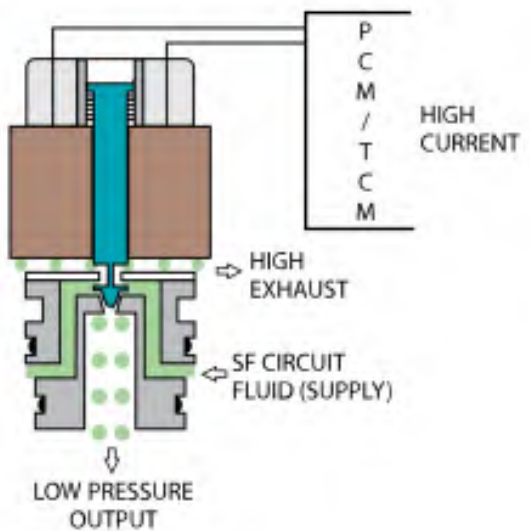


Line Pressure Control (LPC) Solenoid (Inversely-Proportional (VFS))

Normally High Solenoid



E215790



Normally high solenoids provide pressure inversely-proportional to supplied current. Normally high solenoids provide full output of pressure with low or no current (50 mA) and very low pressure with high current (850 mA). The LPC solenoid is a normally high solenoid so if power is lost to the solenoid the pressure is at full output.

Transmission External Sealing

The front support cover and seal assembly has a bonded rubber seal around the outside that seals to the front support housing. A removable rubber seal on the inside of the front support cover seals the area around the front support cover bolt. A torque converter hub seal is held into the front support cover with a snap ring and is serviced as an assembly.

The front support assembly uses a large rubber seal that seals the support housing to the transmission case.

The transmission fluid cooler tubes use 2 rubber seals with plastic backing rings to seal the tubes to the transmission case.

On the left side of the transmission case, there is a line pressure tap plug.

The manual control shaft has a lip seal that is pressed in the transmission case.

The transmission fluid pan has a reusable gasket.

The output shaft uses a lip-type seal that seals to the transmission case and output shaft nut. The output shaft nut has a bonded rubber O-ring on the inside that seals to the shaft threads.

The large transmission case housing plug provides access to the park pawl shaft and has an O-ring seal.

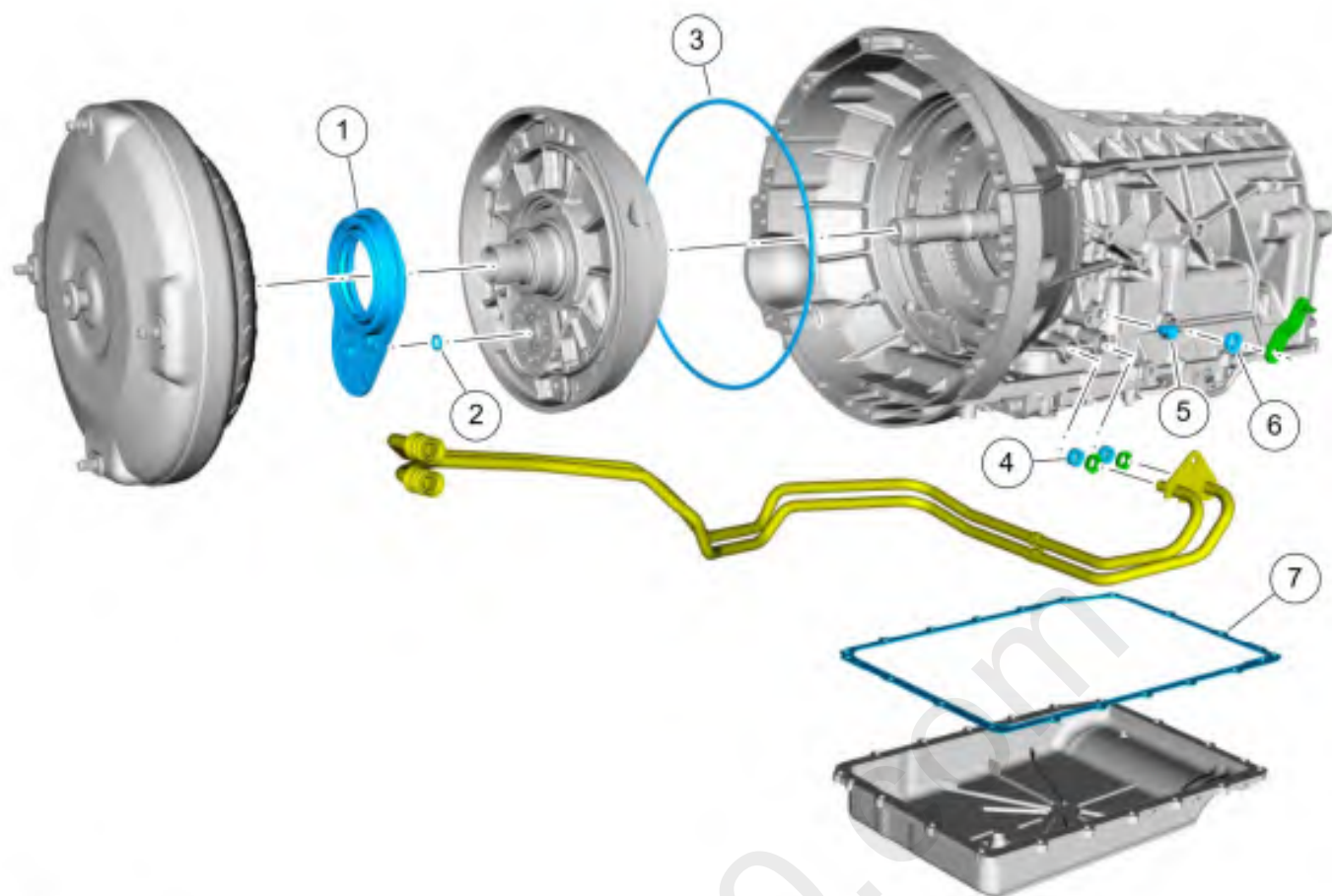
The park pawl actuator sleeve has 2 O-ring seals that seal to the transmission case.

A plug seals the E clutch fluid passage in the rear of the transmission case.

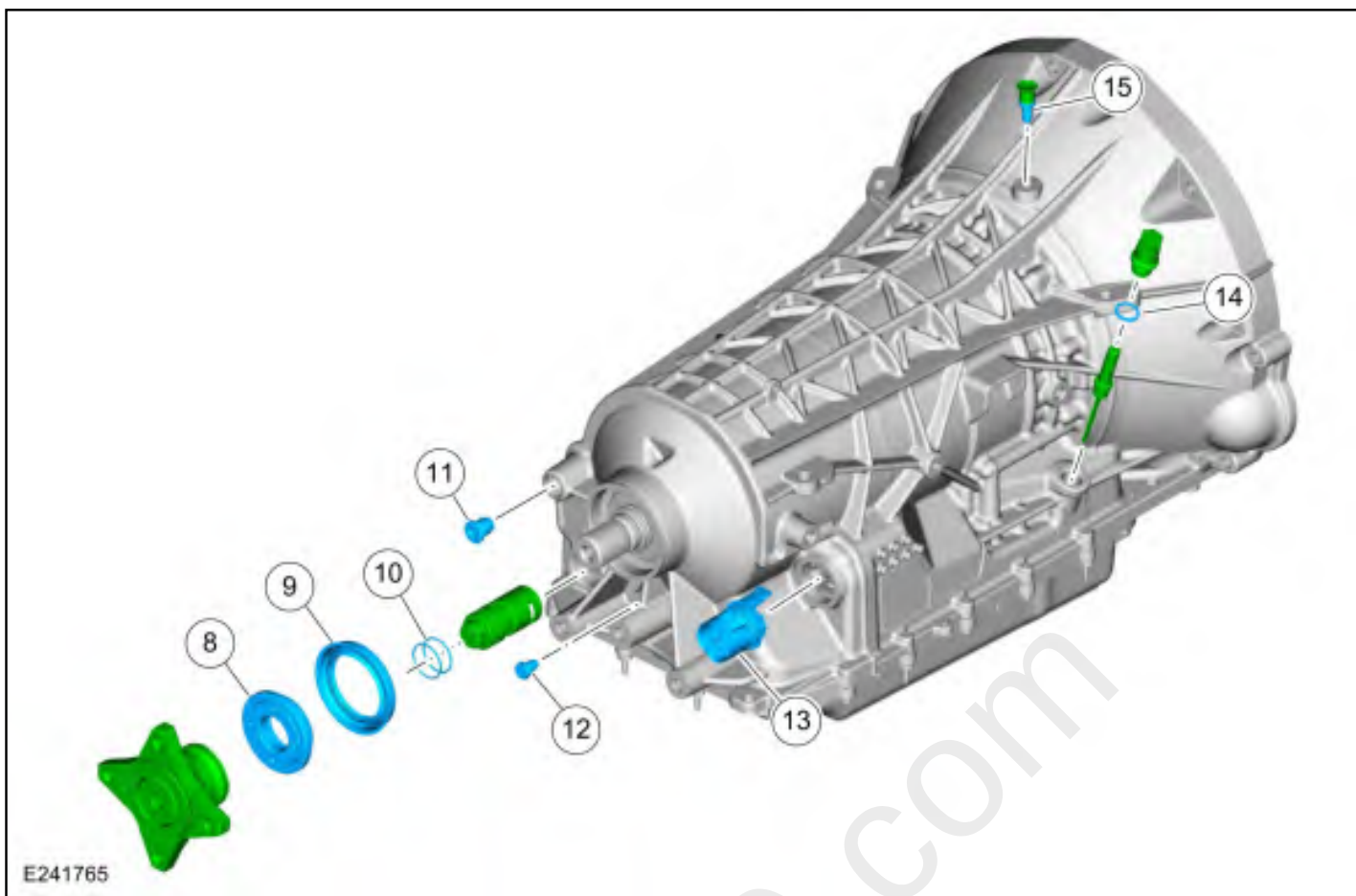
The internal wiring harness bulkhead connector has 2 O-ring seals for the transmission case bore.

The transmission fluid level indicator plug uses an O-ring seal.

The transmission vent tube is pressed into the transmission case.



E241764



Item	Description
1	Front support cover and seal assembly
2	Seal part of front support cover and seal assembly
3	Front support-to-case seal
4	Transmission fluid cooler tube seals (2 required)
5	Line pressure tap plug
6	Manual control shaft seal
7	Transmission fluid pan gasket
8	Output shaft nut
9	Output shaft seal
10	Park pawl actuator rod sleeve seals (2 required)
11	Park pawl shaft plug
12	Transmission case plug
13	Internal wiring harness bulkhead connector O-rings
14	Transmission fluid level indicator plug O-ring

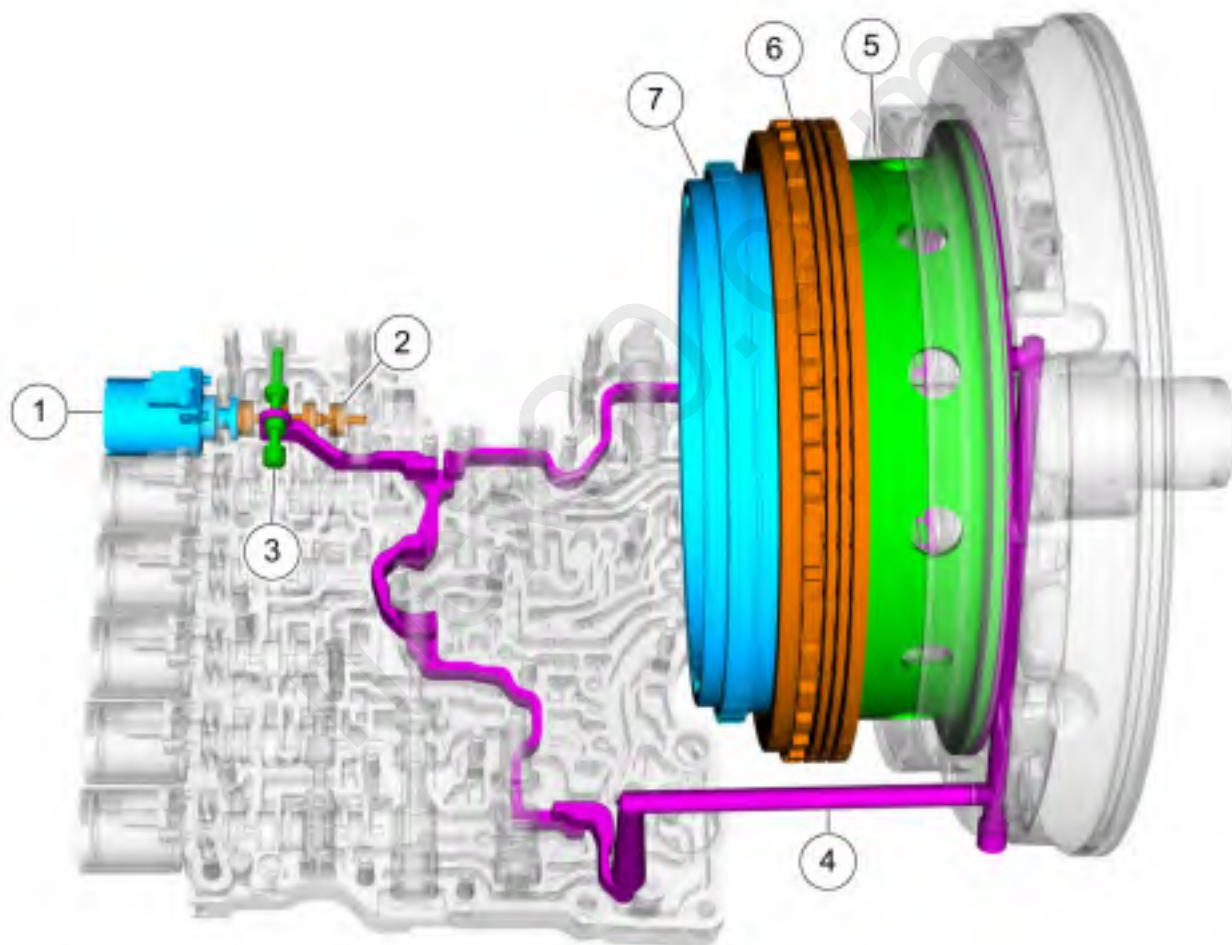
15	Transmission vent tube
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A Clutch

Overview



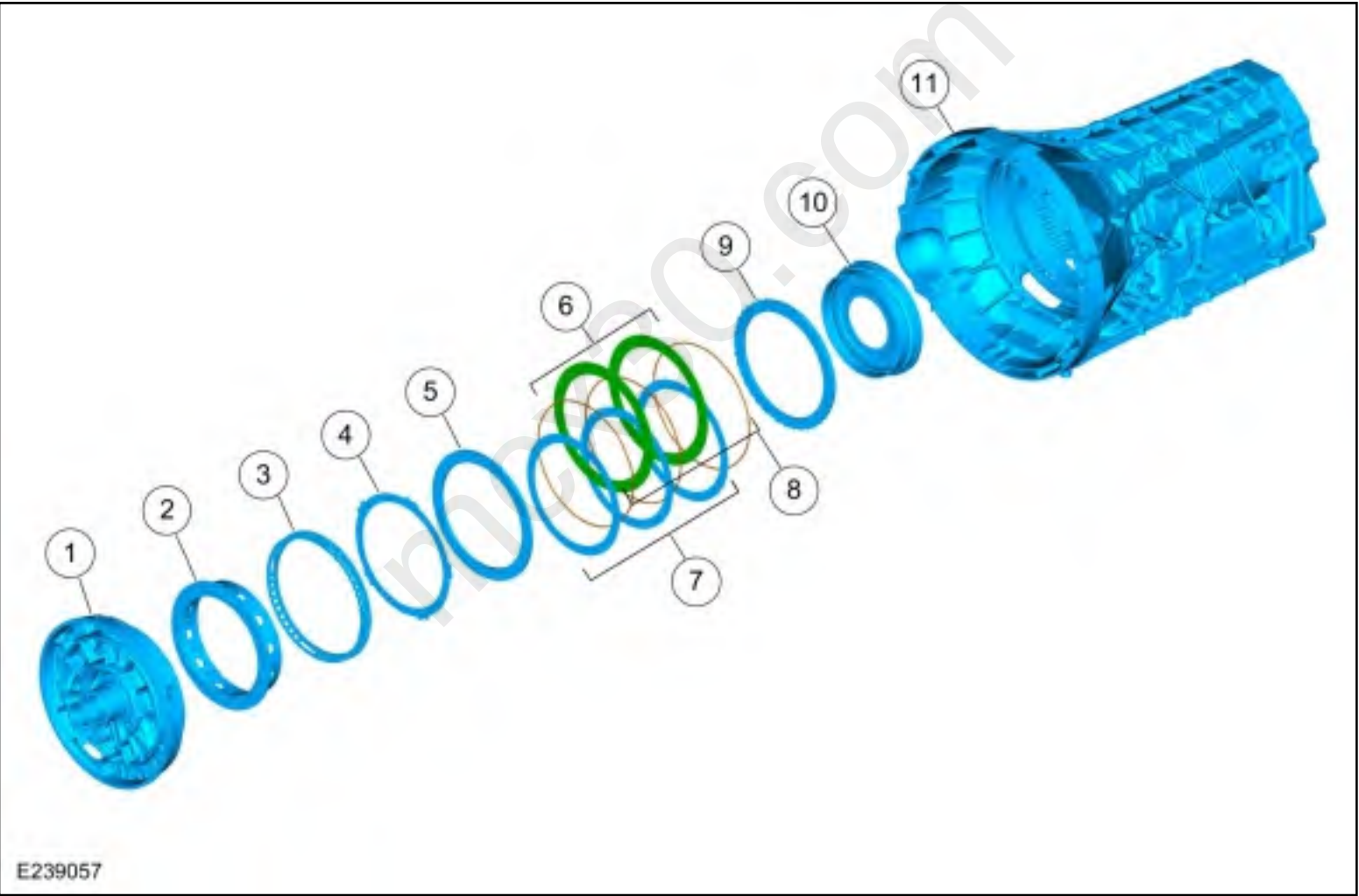
E240067

Item	Description
1	SSA
2	A clutch control valve

3	A clutch latch valve
4	A clutch apply circuit
5	A clutch piston
6	A clutch assembly
7	Ring gear No. 1

Ring gear No. 1 is connected to the A clutch. When the A clutch applies, it holds the ring gear No. 1 stationary.

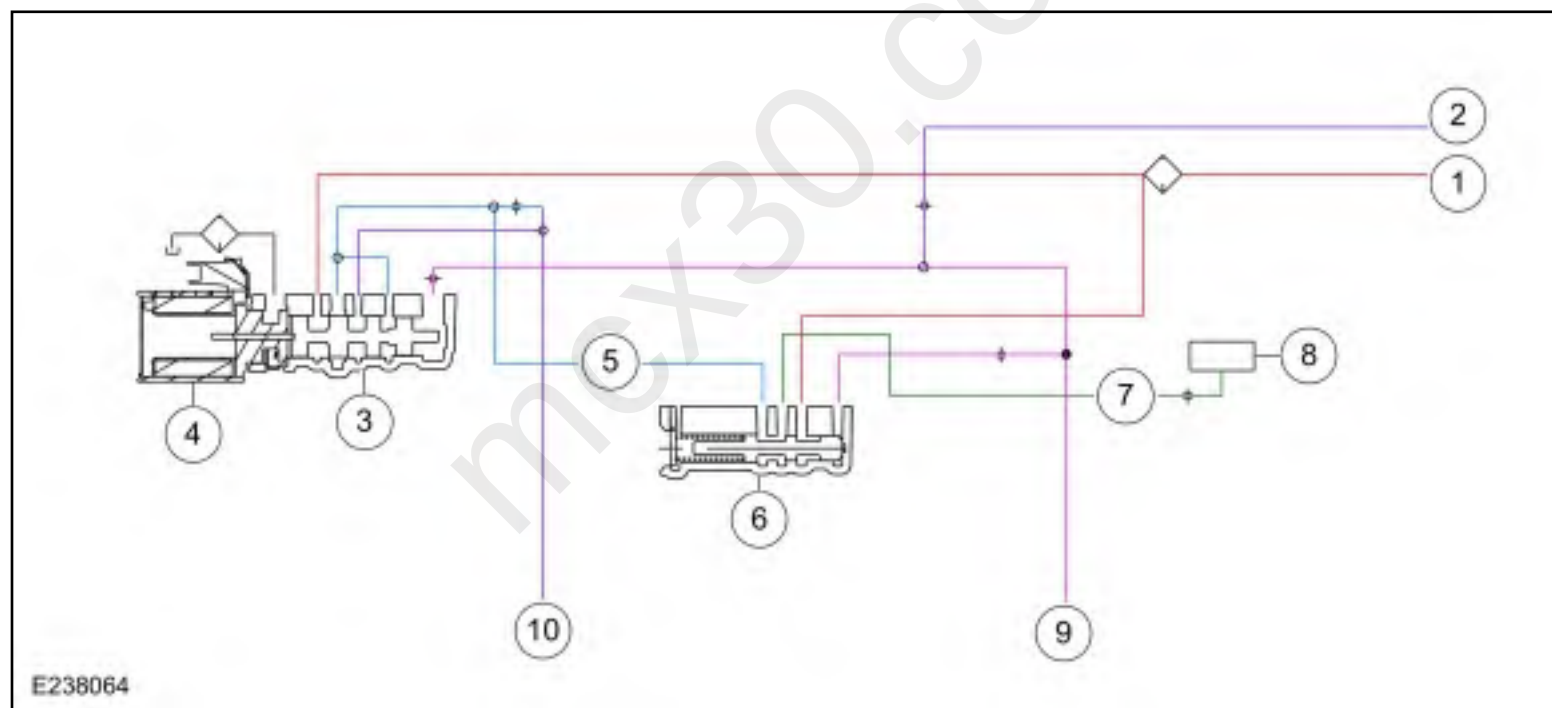
A Clutch Exploded View



Item	Description
1	Front support assembly

2	A clutch piston
3	A clutch piston return spring
4	A clutch wave spring
5	A clutch apply plate
6	A clutch steel plates
7	A clutch friction plates
8	A clutch separating springs
9	A clutch pressure plate
10	Ring gear No. 1
11	Transmission case

A Clutch Hydraulic Circuits



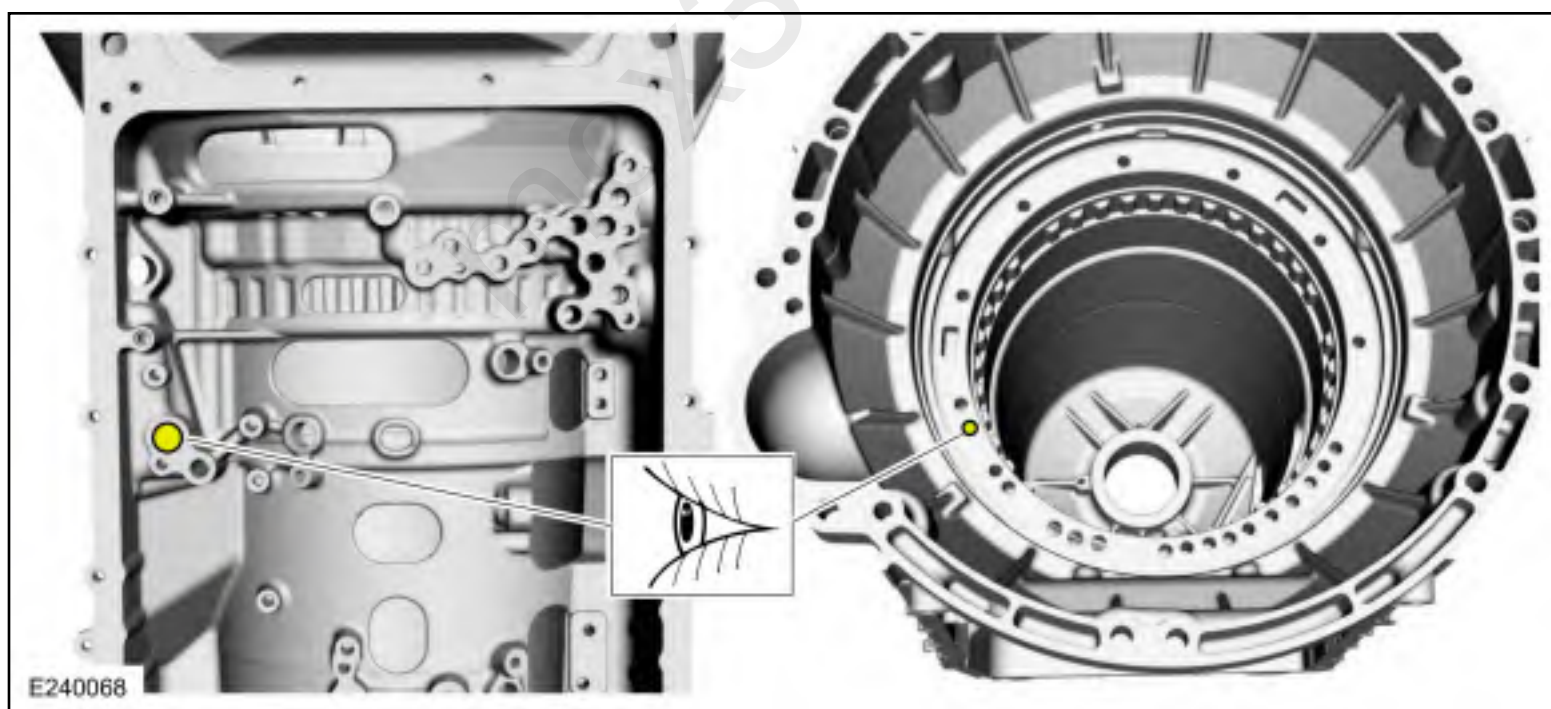
Item	Description
1	Line pressure
2	Pump output
3	A clutch control valve

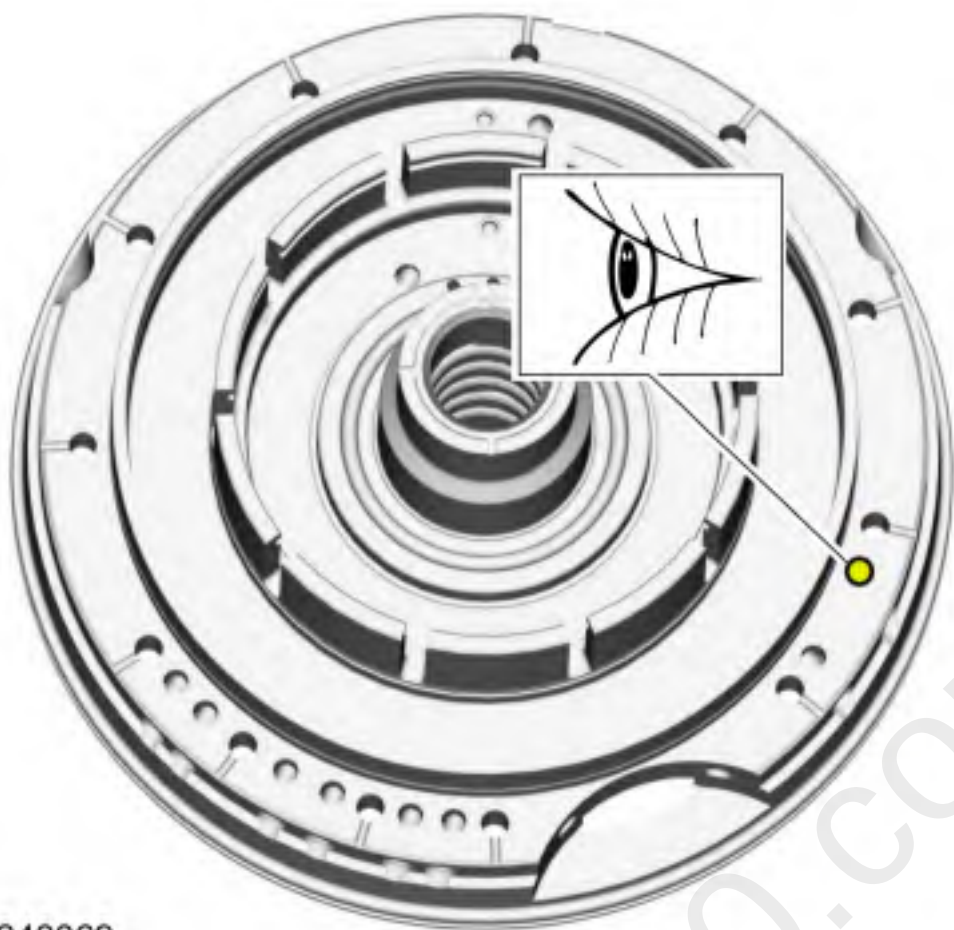
4	SSA
5	Control pressure to latch valve
6	A clutch latch valve
7	Apply pressure to mechanical A clutch
8	Mechanical A clutch
9	Elevated exhaust pressure
10	Clutch exhaust

A Clutch Hydraulic Operation

Line pressure is supplied to the A clutch control valve and the A clutch latch valve. As SSA turns on, it moves the control valve allowing regulated line pressure to flow to the A clutch latch valve and then to the mechanical A clutch. When the regulated line pressure in the A clutch control circuit reaches approximately 100 psi, the mechanical A clutch is fully applied. The pressure in the A clutch control circuit moves the A clutch latch valve to the left which allows line pressure to hold the mechanical A clutch applied.

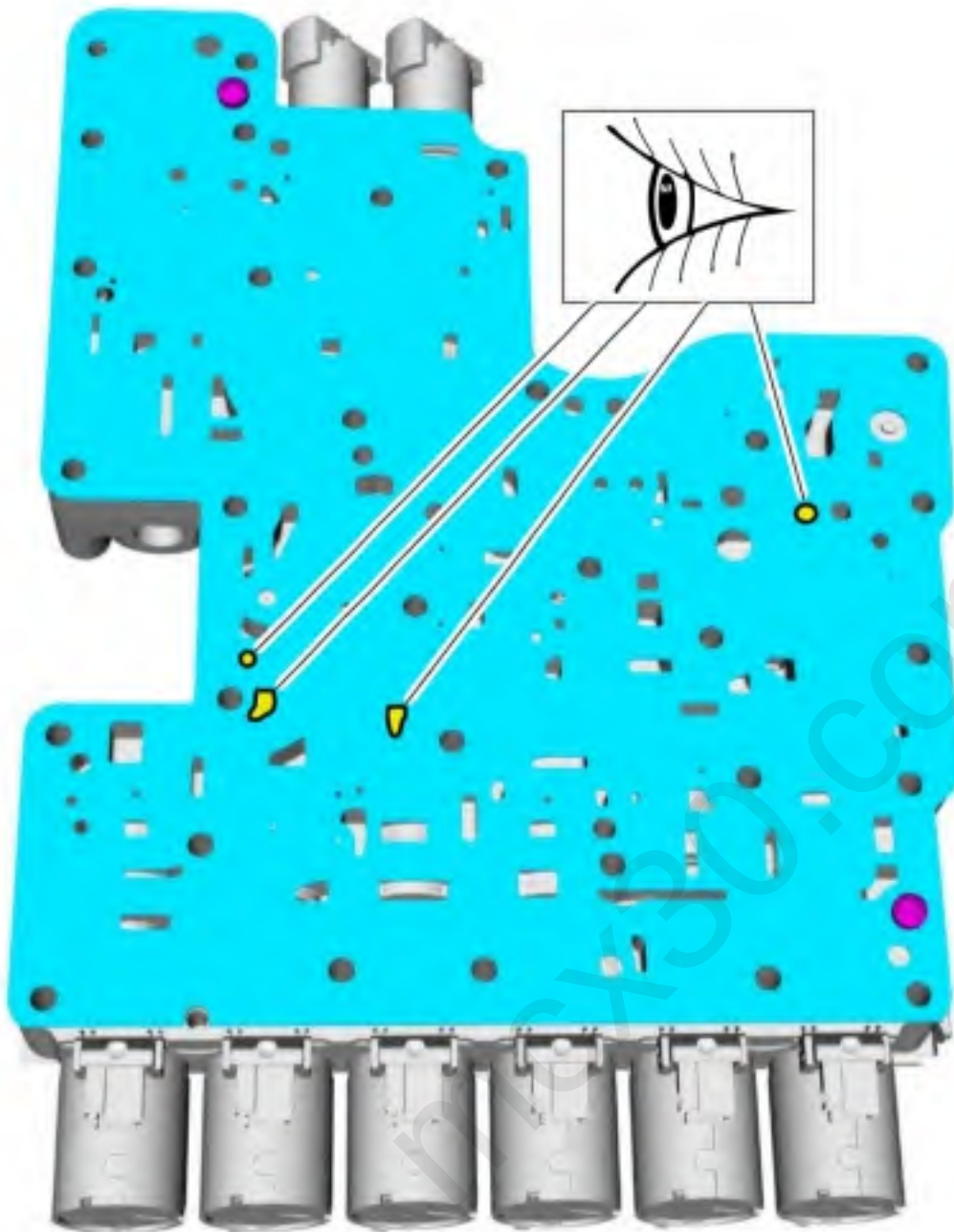
A Clutch Hydraulic Passages





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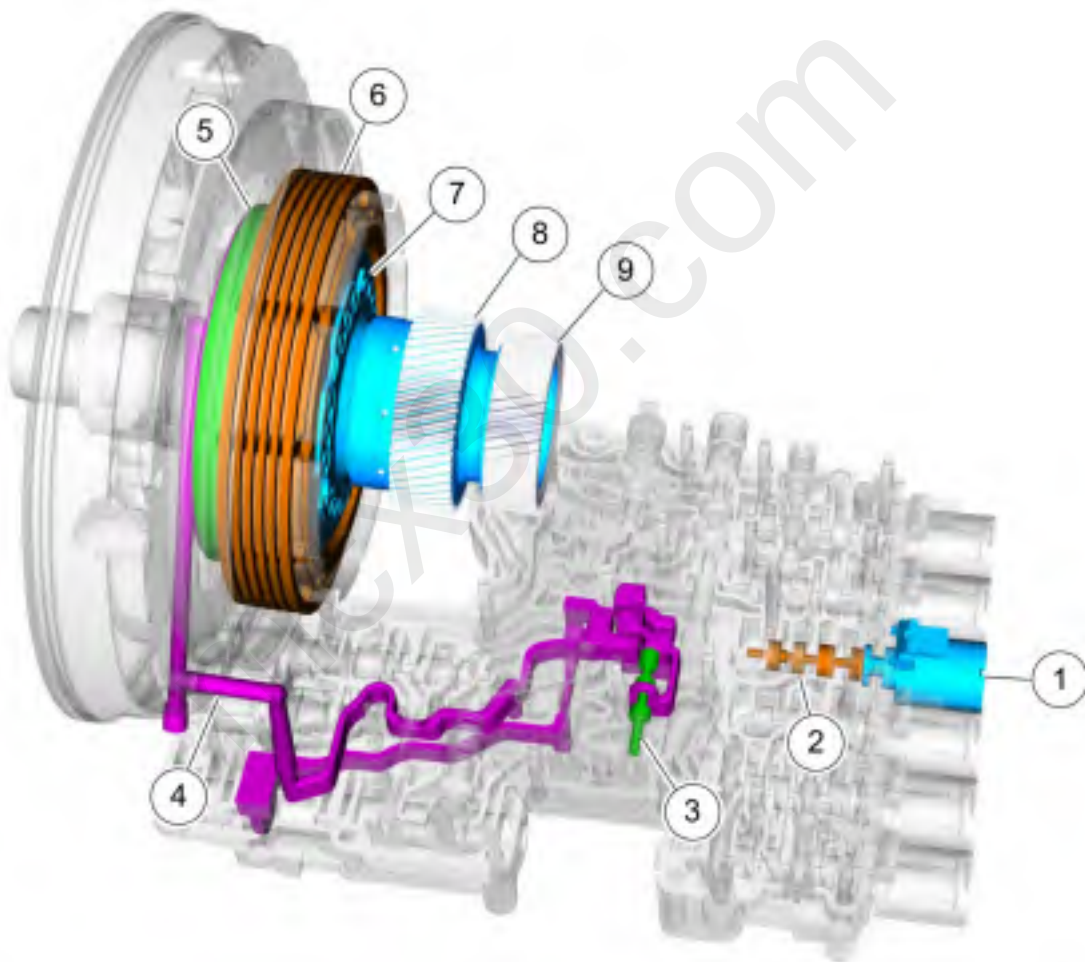
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E240870

B Clutch

Overview

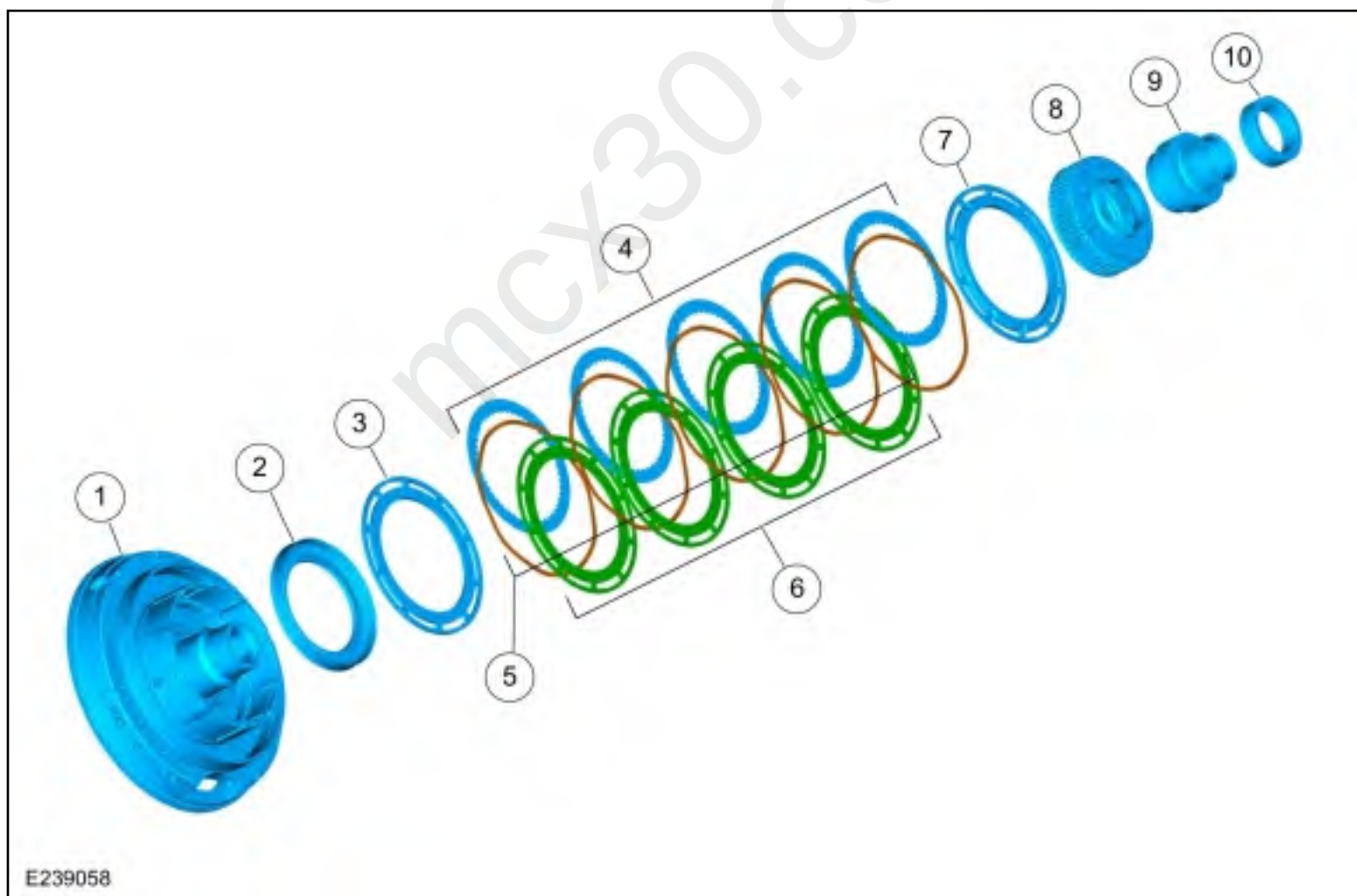


Item	Description
1	SSB
2	B clutch control valve

3	B clutch latch valve
4	B clutch apply circuit
5	B clutch piston
6	B clutch assembly
7	One-Way Clutch (OWC)
8	Sun gear No. 1
9	Sun gear No. 2

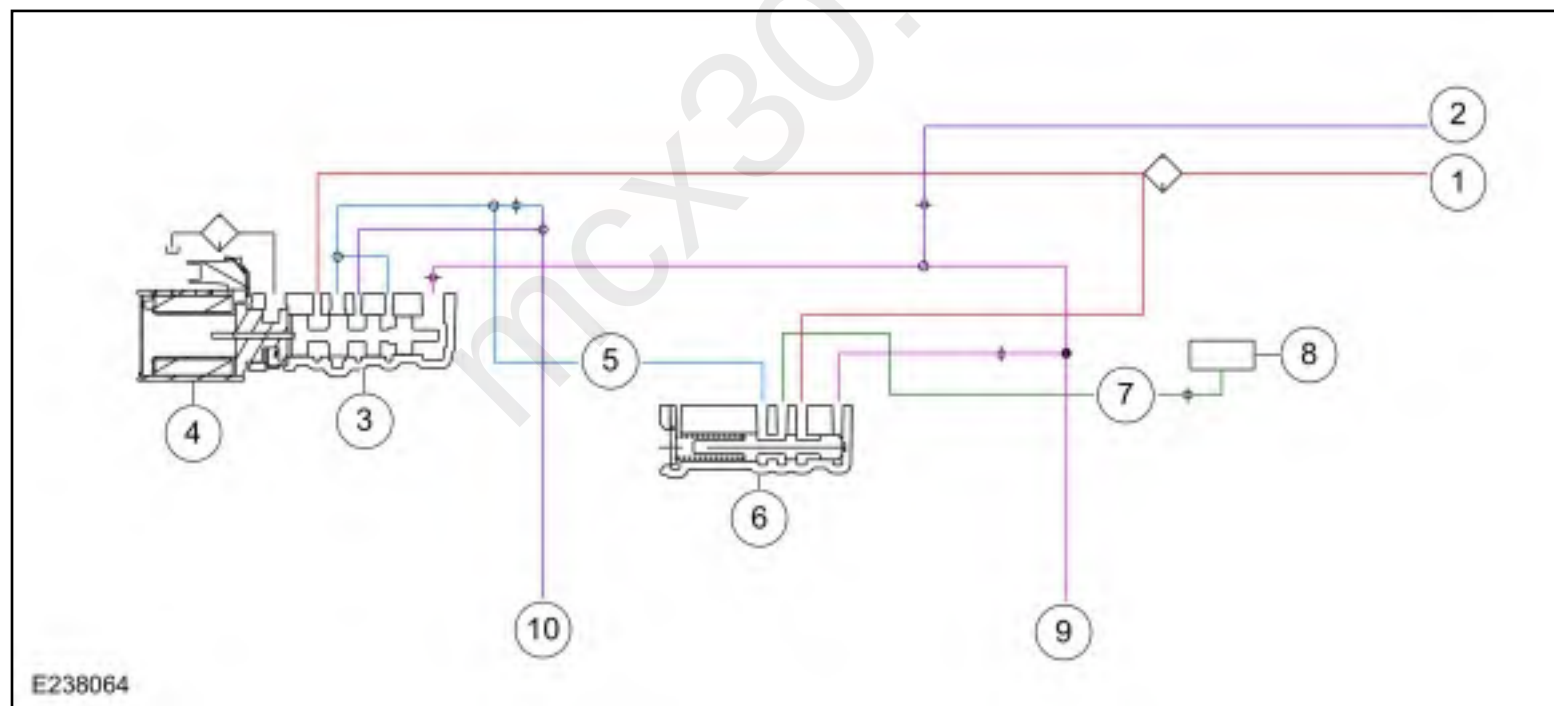
Sun gear No. 1 is mechanically connected to sun gear No. 2. Sun gear No. 1 is also connected to the B clutch. When the B clutch applies, it holds the sun gear No. 1 and sun gear No. 2 stationary. The One Way Clutch (OWC) also holds the sun gear No. 1 and sun gear No. 2 stationary during acceleration in first and second gear when the shifter is in the D position.

B Clutch Exploded View



Item	Description
1	Front support assembly
2	B clutch piston
3	B clutch apply plate
4	B clutch friction plates
5	B clutch separating springs
6	B clutch steel plates
7	B clutch pressure plate
8	One-Way Clutch (OWC)
9	Sun gear No. 1
10	Sun gear No. 2

B Clutch Hydraulic Circuits



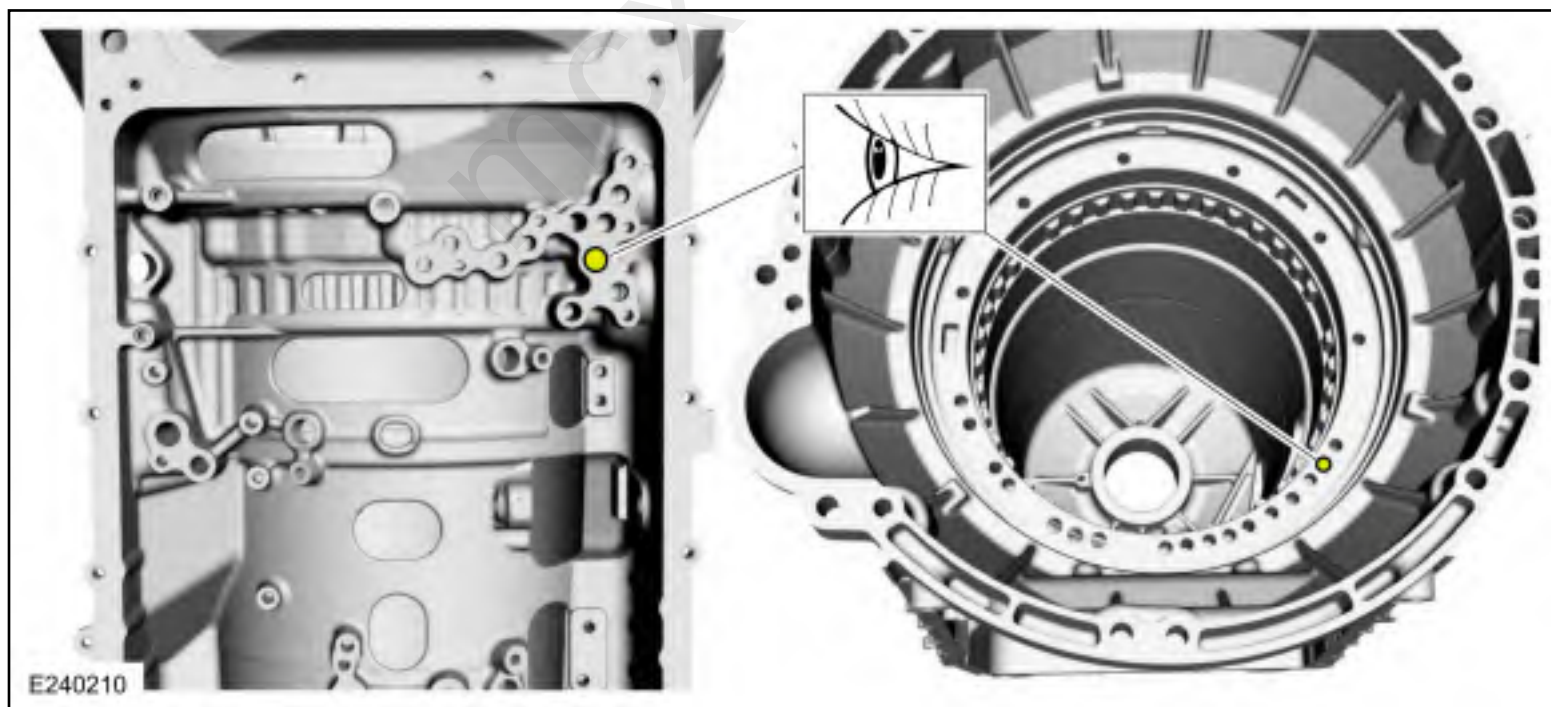
Item	Description
1	Line pressure
2	Pump output

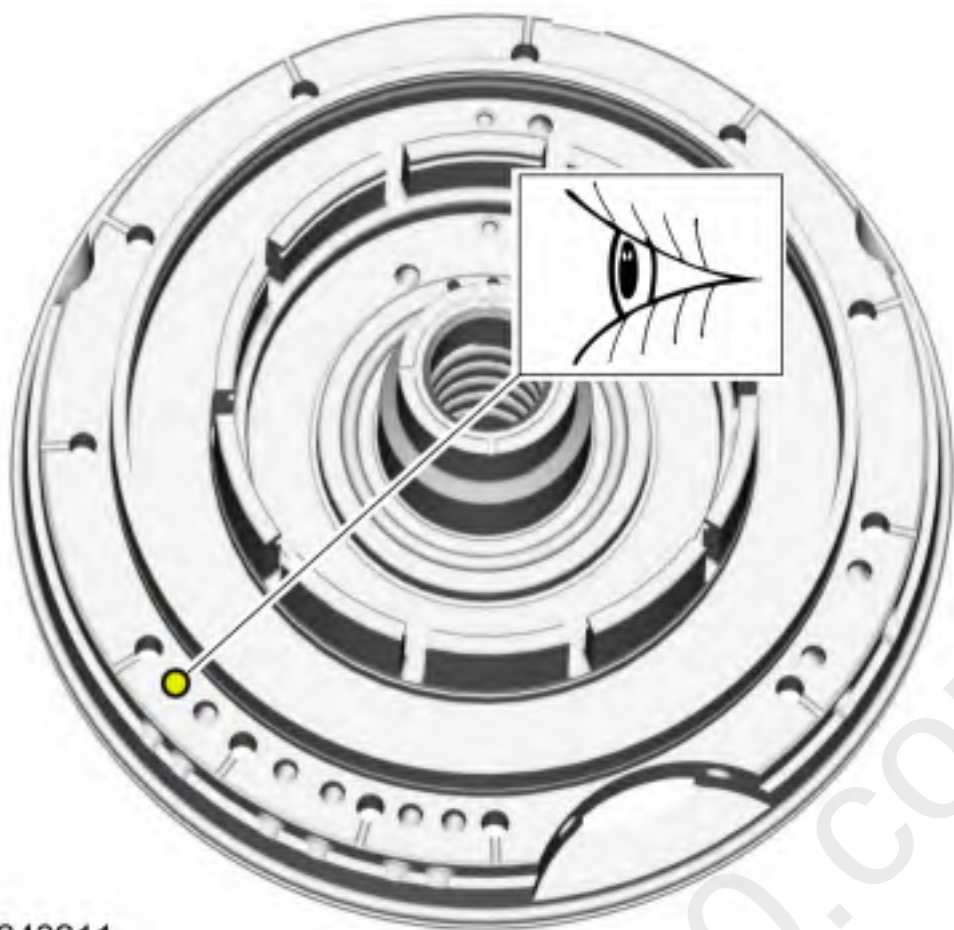
3	B clutch control valve
4	SSB
5	Control pressure to latch valve
6	B clutch latch valve
7	Apply pressure to mechanical B clutch
8	Mechanical B clutch
9	Elevated exhaust pressure
10	Clutch exhaust

B Clutch Hydraulic Operation

Line pressure is supplied to the B clutch control valve and the B clutch latch valve. As SSB turns on, it moves the control valve allowing regulated line pressure to flow to the B clutch latch valve and then to the mechanical B clutch. When the regulated line pressure in the B clutch control circuit reaches approximately 100 psi, the mechanical B clutch is fully applied. The pressure in the B clutch control circuit moves the B clutch latch valve to the left which allows line pressure to hold the mechanical B clutch applied.

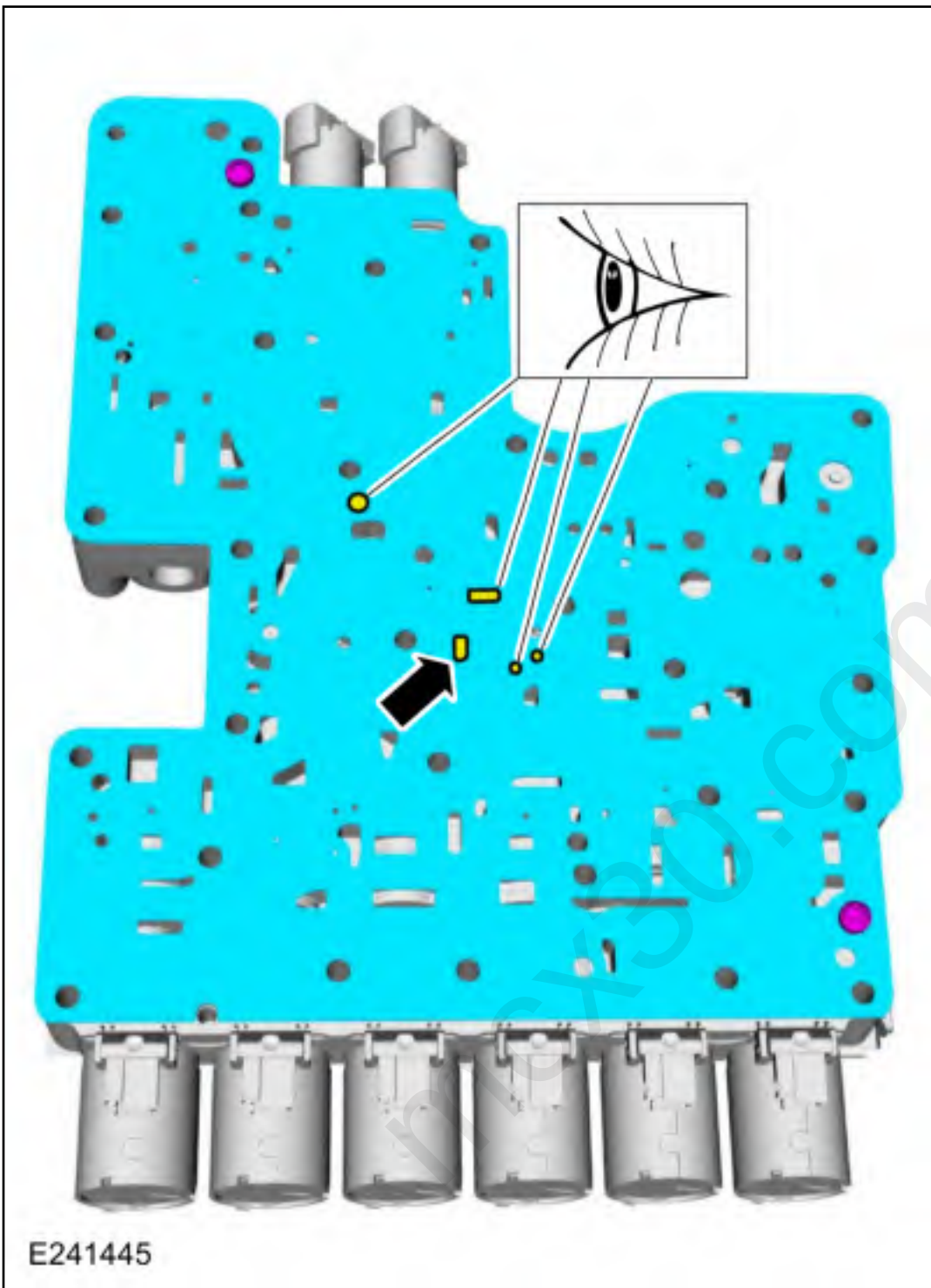
B Clutch Hydraulic Passages





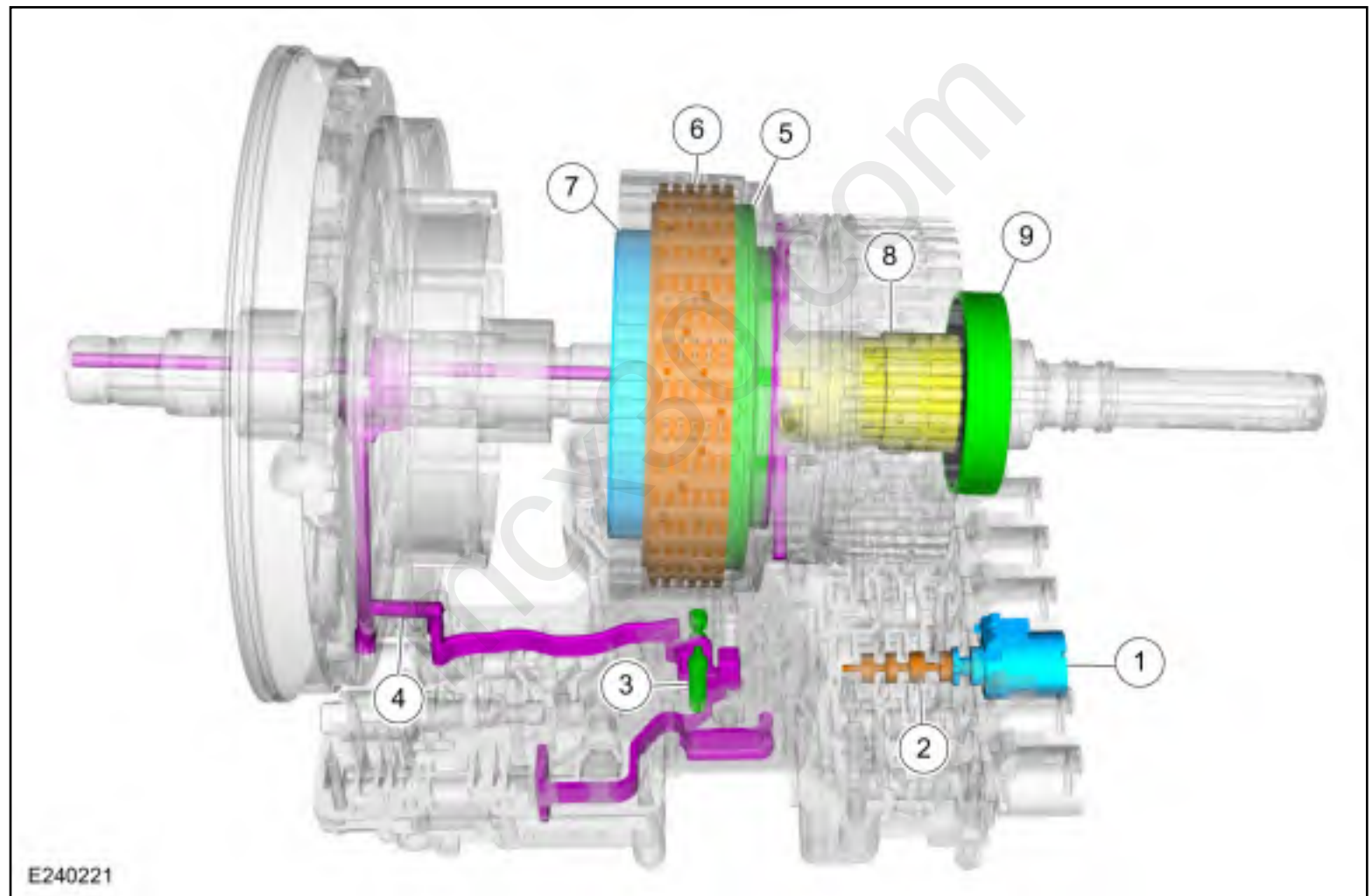
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C Clutch

Overview

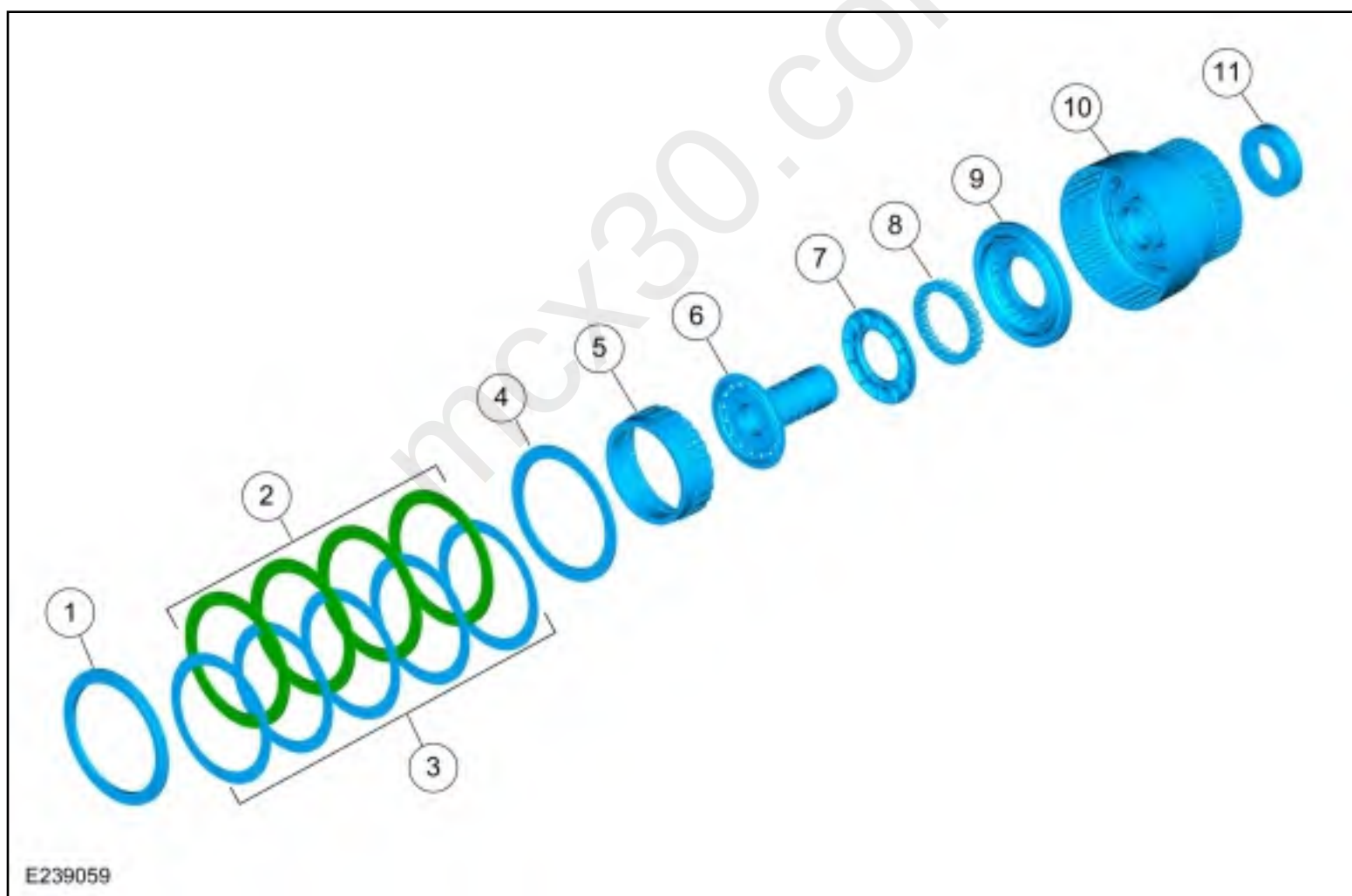


Item	Description
1	SSC
2	C clutch control valve

3	C clutch latch valve
4	C clutch apply circuit
5	C clutch piston
6	C clutch assembly
7	Ring gear No. 2
8	Shaft (sun gear No. 3)
9	Sun gear No. 3

Ring gear No. 2 is mechanically connected to sun gear No. 3 and is also connected to the C clutch. When the C clutch applies, torque from ring gear No. 2 may be applied the planetary carrier No. 3.

C Clutch Exploded View

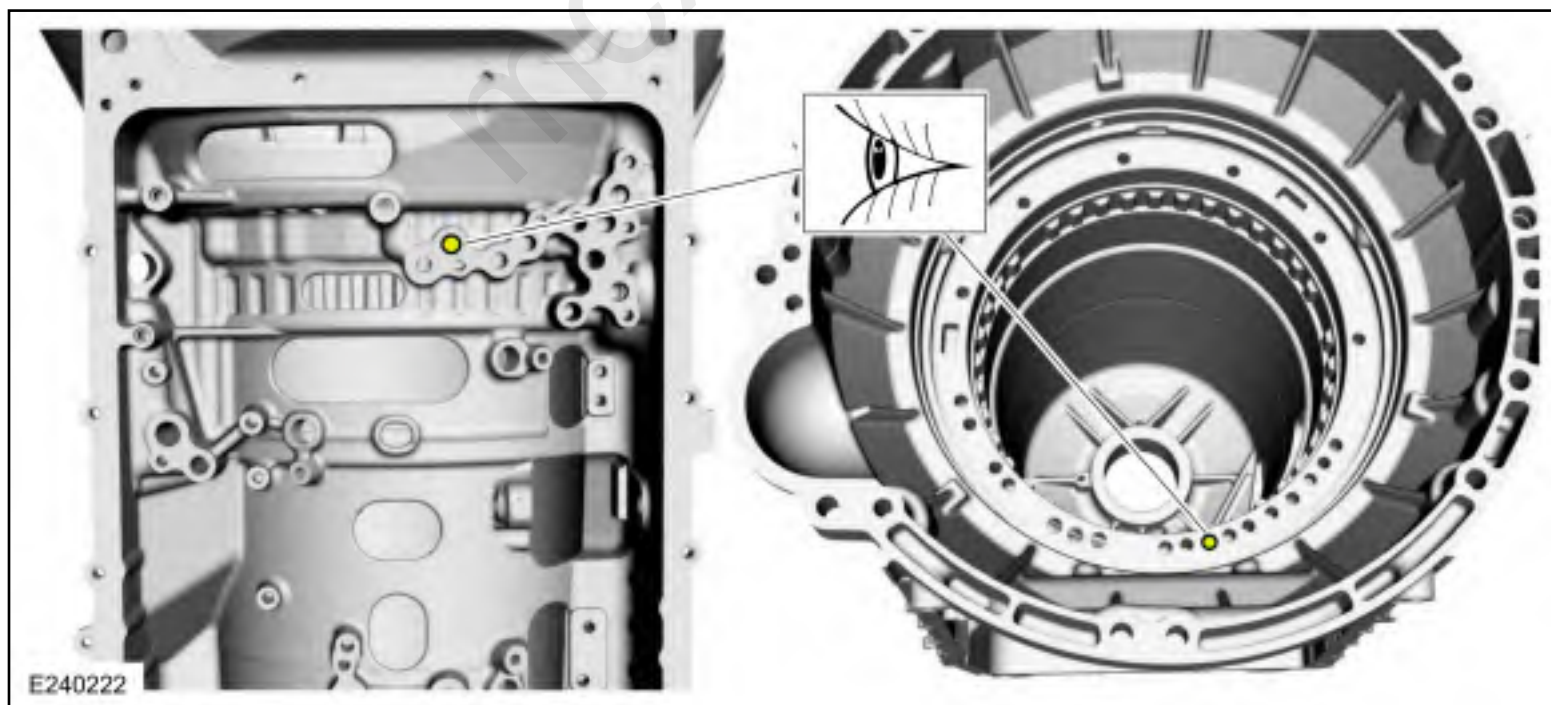


2	Pump output
3	C clutch control valve
4	SSC
5	Control pressure to latch valve
6	C clutch latch valve
7	Apply pressure to mechanical C clutch
8	Mechanical C clutch
9	Elevated exhaust pressure
10	Clutch exhaust

C Clutch Hydraulic Operation

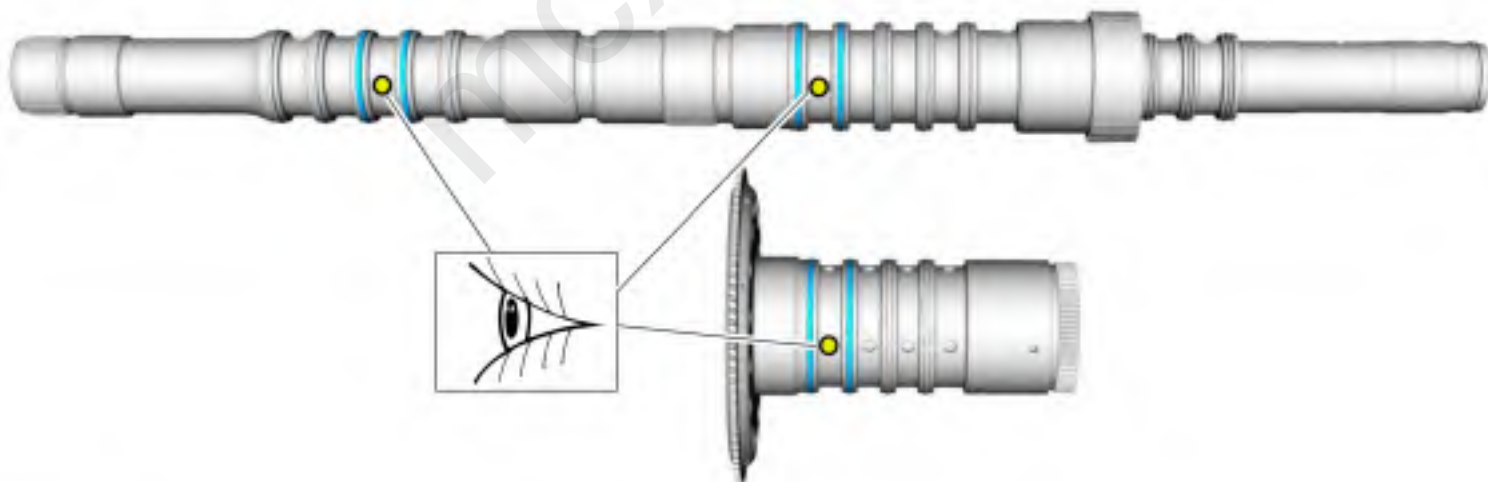
Line pressure is supplied to the C clutch control valve and the C clutch latch valve. As SSC turns on, it moves the control valve allowing regulated line pressure to flow to the C clutch latch valve and then to the mechanical C clutch. When the regulated line pressure in the C clutch control circuit reaches approximately 100 psi, the mechanical C clutch is fully applied. The pressure in the C clutch control circuit moves the C clutch latch valve to the left which allows line pressure to hold the mechanical C clutch applied.

C Clutch Hydraulic Passages





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