

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus

2012-13 ENGINE**Engine - 2.0L Duratec-HE - Focus****SPECIFICATIONS****ENGINE SPECIFICATIONS**

Item	Specification
Displacement	2.0L (122 CID)
No. of cylinders	4
Bore/stroke	3.4-3.3 in (87.5-83.1 mm)
Firing order	1-3-4-2
Compression ratio	12:1
Engine weight - Automatic	235.0 lb (106.6 kg)
Engine weight - Manual	266.1 lb (120.7 kg)
Engine and automatic transmission weight	402.6 lb (182.6 kg)
Engine and manual transmission weight	380.7 lb (172.7 kg)

LUBRICANTS SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada)	XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)

ENGINE OIL CAPACITY SPECIFICATIONS

Item	Specification
Service fill including oil filter	4.54 qt (4.3 L)

OIL PRESSURE SPECIFICATIONS

Item	Specification
Oil pressure (hot @ 2,000 rpm)	29.0-38.8 psi (200-268 kPa)

CYLINDER BLOCK SPECIFICATIONS

Item	Specification
Cylinder bore diameter	3.445-3.446 in (87.5-87.52 mm)
Cylinder bore maximum out-of-round	0.0003 in (.008 mm)
Main bearing bore diameter	2.245-2.246 in (57.02-57.038 mm)
Head gasket surface flatness	0.1 mm/general 0.05 mm/200 x 200 (0.004 in/ general) (0.0019 in/7.87 x 7.87)

PISTON SPECIFICATIONS

Item	Specification
Piston diameter (single grade)	3.444-3.444 in (87.473-87.487 mm)

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Piston-to-bore clearance	0.001-0.002 in (.013-.047 mm)
Ring groove width - top	0.048-0.049 in (1.23-1.25 mm)
Piston ring groove width - compression (bottom)	0.048-0.049 in (1.23-1.25 mm)
Ring groove width - oil	0.080-0.081 in (2.03-2.05 mm)
Piston skirt coating thickness	0.0003-0.0007 in (.007-.017 mm)

PISTON PIN SPECIFICATIONS

Item	Specification
Diameter	0.827-0.827 in (20.997-21 mm)
Length	2.08-2.09 in (52.8-53.1 mm)
Piston-to-pin clearance	0.0002-0.0004 in (.004-.011 mm)
Piston pin-to-rod clearance	0.0001-0.0007 in (.003-.018 mm)

CYLINDER HEAD SPECIFICATIONS

Item	Specification
Cylinder head flatness	0.08 mm (0.0031 in) maxim overall, a maximum of 0.05 mm (0.0020 in) within 150 mm (5.9055 in) and a maximum of 0.025 mm (0.0010 in) within 25 mm (0.9843 in)
Valve lift @ zero lash (exhaust)	0.346 in (8.8 mm)
Valve lift @ zero lash (intake)	0.346 in (8.8 mm)
Valve guide diameter	0.217-0.218 in (5.509-5.539 mm)
Valve seat width - intake/exhaust	0.0551 ± 0.0591 in (1.4 ± 1.5 mm)
Valve seat angle	44.5
Valve seat runout	0.003 in (.075 mm)
Valve lash adjuster bore diameter	1.22-1.22 in (31-31.03 mm)
Cam bore diameter	0.985-0.986 in (25.015-25.04 mm)
Cam bore diameter - front journal	1.341-1.340 in (34.07-34.045 mm)

VALVE SPECIFICATIONS

Item	Specification
Valve head diameter - intake	1.372 ± 1.384 in (34.85 ± 35.15 mm)
Valve head diameter - exhaust	1.3136 ± 1.148 in (28.85 ± 29.15 mm)
Valve stem diameter - intake	0.2154 ± 0.2159 in (5.47 ± 5.485 mm)
Valve stem diameter - exhaust	0.2152 ± 0.2157 in (5.465 ± 5.48 mm)
Valve stem-to-guide clearance - intake	0.0012-0.0028 in (.03-.07 mm)
Valve stem-to-guide clearance - exhaust	0.0012-0.0028 in (.03-.07 mm)
Valve face runout	0.002 in (.05 mm)

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Valve face angle	45.25-45.75
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VALVE SPRING - COMPRESSION PRESSURE

Item	Specification
Intake and exhaust (installed)	37.478 lb (17 kg)
Intake (valve open) 9.2 mm (0.3622 in) of lift	85.979 lb (39 kg)
Exhaust (valve open) 9.2 mm (0.3622 in) of lift	85.979 lb (39 kg)
Free length	1.8701 in (47.5 mm)
Assembled height	1.4921 in (37.9 mm)

CRANKSHAFT SPECIFICATIONS

Item	Specification
Main bearing journal diameter	2.046-2.047 in (51.98-52 mm)
Production repair	2.036.614-2.037.402 in (51.73-51.75 m)
Main bearing clearance	0.0007-0.0014 in (.019-.035 mm)
Connecting rod journal diameter	1.850-1.850 in (46.98-47 mm)
End play	0.009-0.018 in (.22-.45 mm)

RINGS SPECIFICATIONS

Item	Specification
Width - top	0.461-0.0469 in (1.17-1.19 mm)
Width - bottom	0.0461-0.0469 in (1, 17-1, 19 mm)
Width - oil expander	0.0701-0.0776 in (1.78-1.97 mm)
Ring gap (in bore) - top	0.0067-0.0106 in (.17-.27 mm)
Ring gap (in bore) - bottom	0.0177-0.0256 in (.45-.65 mm)
Ring gap (in bore) - oil	0.0059-0.0177 in (.15-.45 mm)

VALVE TAPPET SPECIFICATIONS

Item	Specification
Diameter	1.219-1.219 in (30.97-30.964 mm)
Tappet-to-valve clearance - intake	0.009-0.013 in (.23-.33 mm)
Tappet-to-valve clearance - exhaust	0.012-0.016 in (.31-.41 mm)
Tappet-to-bore clearance	0.0008-0.0024 in (.02-.06 mm)

CAMSHAFT SPECIFICATIONS

Item	Specification
Lobe lift - intake	0.35 in (8.8 mm)
Lobe lift - exhaust	0.346 in (8.8 mm)
Runout	0.0012 in (.03 mm)
Thrust clearance	0.00-0.01 in (.115-.145 mm)
Journal diameter	0.9827-0.9835 in (24.96-24.98 mm)
Journal-to-bore clearance	0.0014-0.0031 in (.035-.08 mm)

CONNECTING ROD SPECIFICATIONS

Item	Specification
Connecting rod bearing-to-crankshaft clearance	0.0011-0.0020 in (.027-.052 mm)
Connecting rod bearing thickness	0.0589-0.0598 in (1.496-1.52 mm)
Connecting rod crankshaft bore diameter	1.969-1.970 in (50.025-50.045 mm)
Connecting rod pin bore diameter	0.827-0.827 in (21.003-21.015 mm)
Connecting rod length (center-to-center)	5.76 in (146.25 mm)
Connecting rod side clearance (assembled to crank)	0.1020-0.1453 in (2.59-3.69 mm)
Axial clearance	0.0055-0.0154 in (.139-.391 mm)

DESCRIPTION AND OPERATION**ENGINE - OVERVIEW****Overview**

The 2.0L Twin Independent Variable Cam Timing (Ti-VCT) Gasoline Direct Injection (GDI) 4-cylinder engine has the following features:

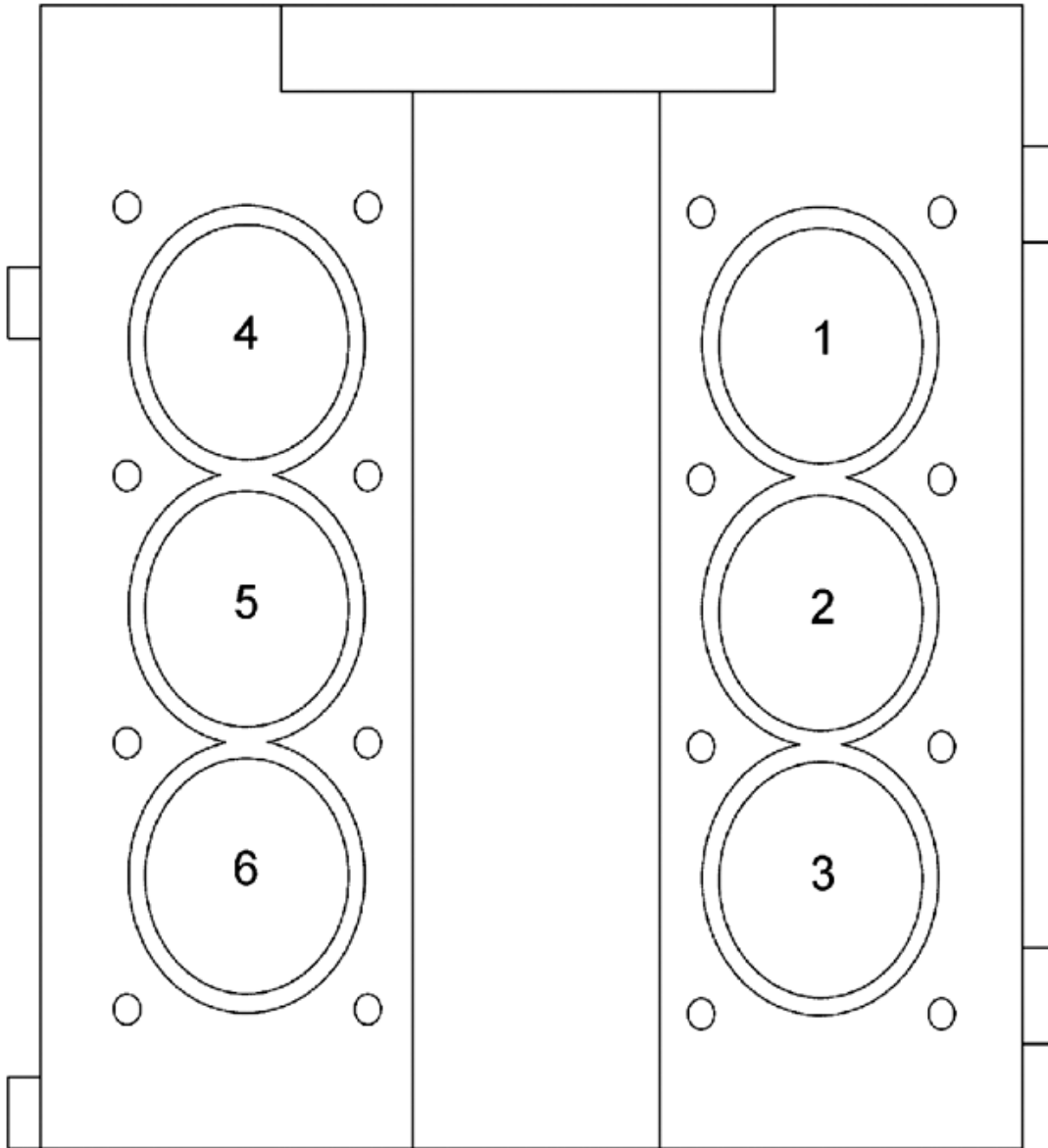
- Dual overhead camshafts
- Four valves per cylinder
- Composite intake manifold
- Aluminum cylinder head
- Gasoline Direct Injection (GDI)
- Twin Independent Variable Cam Timing (Ti-VCT)
- An electronic ignition system with 4 ignition coil-on-plugs

Engine Identification

Always refer to these labels when installation of new parts is necessary or when checking engine calibrations. The engine parts often differ within a CID family. Verification of the identification codes will make sure the correct parts are obtained. These codes contain all the pertinent information relating to the dates, optional equipment and revisions.

Engine Code Information Label

The engine code information label, located on the front cover, contains the following:



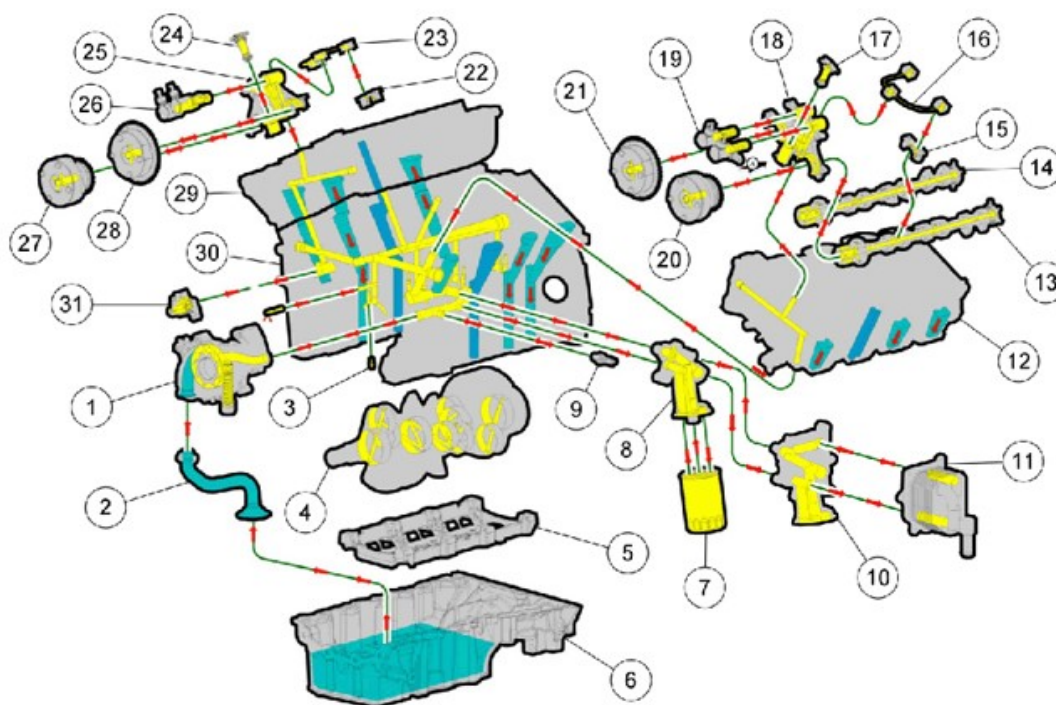
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Fig. 1: Identifying Engine Code Information Label
Courtesy of FORD MOTOR CO.

Item	Description

1	Engine part number
2	Bar code
3	Dearborn engine plant
4	Engine displacement
5	Bar code
6	Bar code
6	Running number
7	Engine build date (DDMMYY)
8	Plant shift line

Engine Cylinder Identification



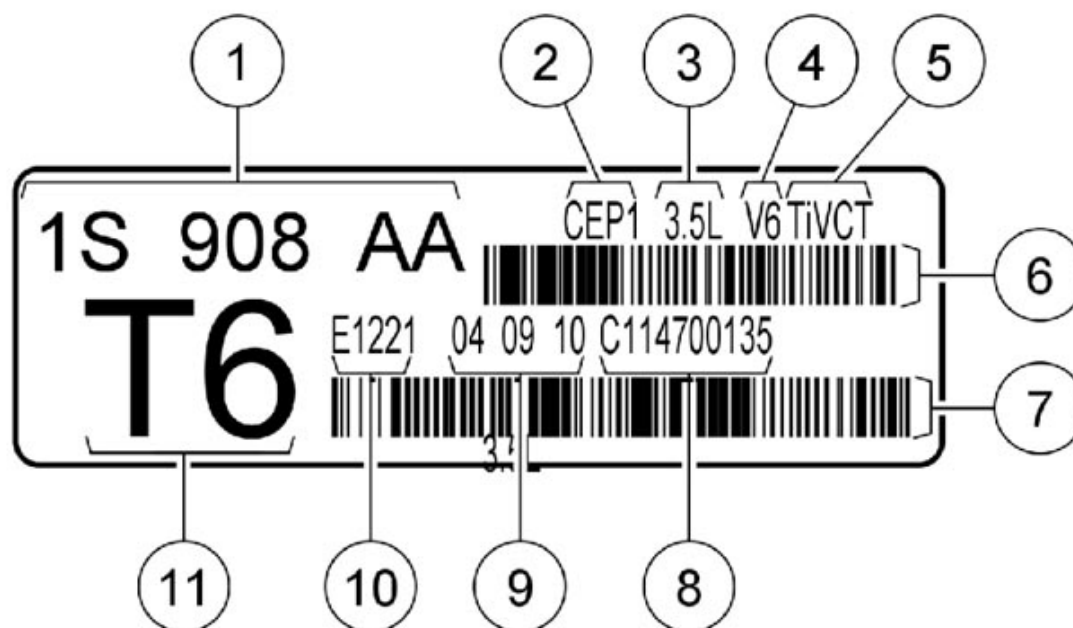
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Fig. 2: Identifying Engine Cylinder Identification
Courtesy of FORD MOTOR CO.

Oil Flow Diagram

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N0119146

Fig. 3: Oil Flow Diagram

Courtesy of FORD MOTOR CO.

Item	Service Part Number	Description
1	6622	Oil pump screen and pickup tube
2	6600	Oil pump
3	6K254	Timing chain tensioner
4	6010	Cylinder block
5	6C524	Intake VCT unit
6	6C525	Exhaust VCT unit
7	6A272	Exhaust camshaft
8	6B280	Camshaft front bearing cap
9	6B297	VCT oil control solenoid
10	6B284	Camshaft rear bearing cap
11	6A271	Intake camshaft
12	9A413	Fuel pump housing
13	6049	Cylinder head
14	6051	Head gasket
15	6A785	Crankcase vent oil separator
16	6A636	Oil filter adapter gasket
17	6884	Oil filter adapter
18	9278	Oil Pressure switch
19	6714	Oil filter
20	6303	Crankshaft

21

6675

Oil pan

System Operation**Valve Train**

The valve train uses Direct Acting Mechanical Buckets (DAMB). The camshaft lobes are positioned directly above mechanical buckets which are positioned on top of the valves.

Twin Independent Variable Cam Timing (Ti-VCT) System

The Twin Independent Variable Cam Timing (Ti-VCT) system allows variable control of intake valve closing which optimizes combustion at full load providing improved power and low speed torque (broadening the torque curve) which enables variable valve overlap which provides better fuel economy and emissions and provides optimized cold start operation with improved exhaust emissions.

PCV System

All engines are equipped with a closed-type Positive Crankcase Ventilation (PCV) system recycling the crankcase vapors to the intake manifold.

Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the crankshaft, connecting rod bearings, timing chain tensioners, camshaft bearing caps and VCT solenoids. The flow of oil to the valve tappets and valve train is controlled by a restricting orifice located in the cylinder head gasket.

The lubrication system is designed to provide optimum oil flow to critical components of the engine through its entire operating range.

The heart of the system is a positive displacement internal gear oil pump.

Generically, this design is known as a gerotor pump, which operates as follows:

- The oil pump is chain driven off of the crankshaft. The oil pump is chain driven off of the crankshaft.
- System pressure is limited by an integral, internally-vented relief valve which directs the bypassed oil back to the inlet side of the oil pump. System pressure is limited by an integral, internally-vented relief valve which directs the bypassed oil back to the inlet side of the oil pump.
- Oil pump displacement has been selected to provide adequate volume to make sure of correct oil pressure both at hot idle and maximum speed. Oil pump displacement has been selected to provide adequate volume to make sure of correct oil pressure both at hot idle and maximum speed.
- The relief valve calibration protects the system from excessive pressure during high-viscosity conditions. The relief valve calibration protects the system from excessive pressure during high-viscosity conditions.
- The relief valve is designed to provide adequate connecting rod bearing lubrication under high temperature and high-speed conditions. The relief valve is designed to provide adequate connecting rod bearing lubrication under high temperature and high-speed conditions.

ENGINE COMPONENT VIEW

Intake Manifold and Valve Train Exploded View

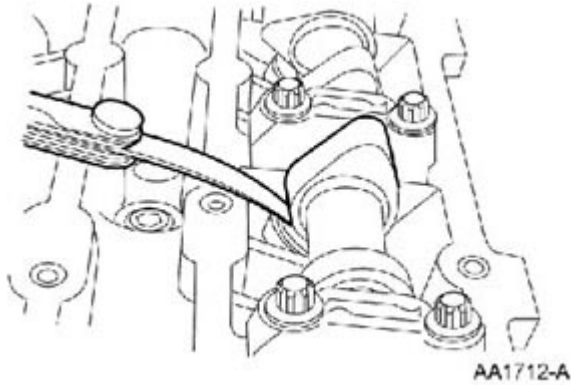


Fig. 4: Exploded View Of Intake Manifold And Valve Train
Courtesy of FORD MOTOR CO.

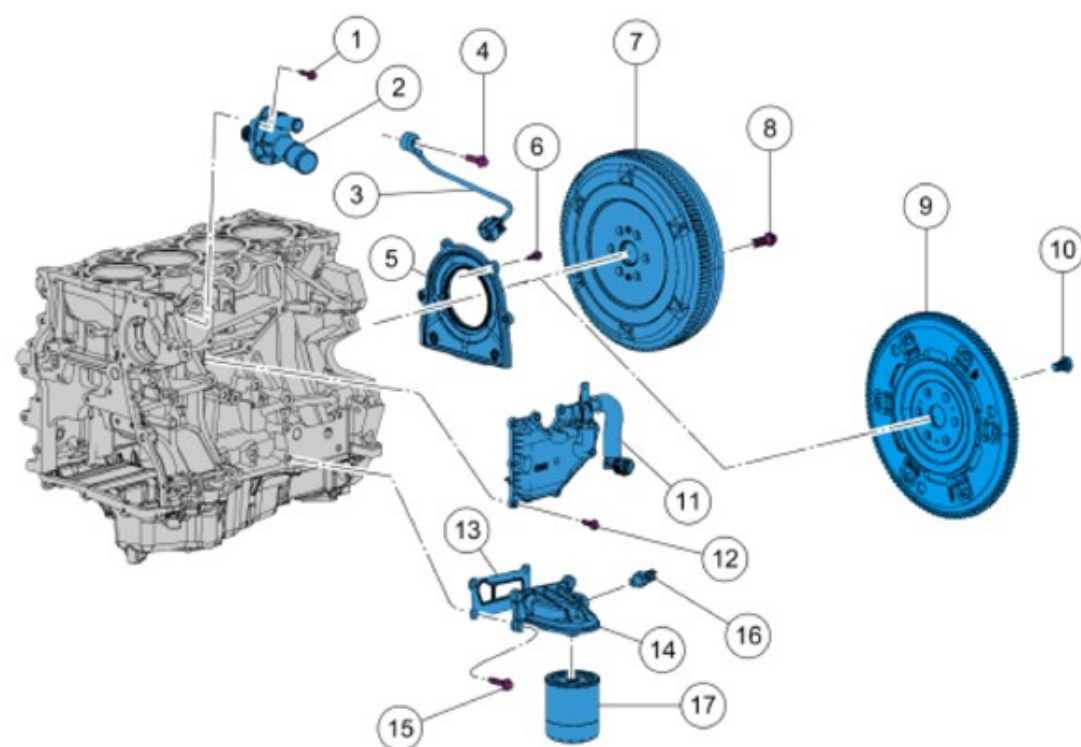
Item	Part Number	Description
1	6750	Oil level indicator
2	W500301	Ignition coil-on-plug bolt (4 required)
3	12A366	Ignition coil-on-plug (4 required)
4	12405	Spark plug (4 required)
5	6766	Oil fill cap
6	6N958	Engine appearance cover retainer
7	6M293	Valve cover
8	W701219	Camshaft position (CMP) sensor bolt (2 required)
9	12K073	CMP sensor (2 required)
10	W500213	Variable valve timing (VVT) unit oil control solenoid bolt (2 required)
11	6M280	VVT unit oil control solenoid (2 required)
12	W703383	Camshaft front bearing cap bolt (19 required)
13	6B280	Camshaft front bearing cap
14	W714885	Exhaust camshaft rear bearing cap bolt (2 required)
15	6B284	Exhaust camshaft rear bearing cap
16	6A284	Exhaust camshaft rear bearing cap (8 required)
17	6279	VVT unit bolt (2 required)
18	6C525	Exhaust VVT unit
19	6256	Intake VVT unit
20	6C262	Camshaft seal (4 required)
21	6A272	Exhaust camshaft
22	6A271	Intake camshaft
23	9K540	Fuel injection pump noise insulator shield
24	W503297	Fuel injection pump bolt (2 required)

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25	9D376	Fuel injection pump
26	9C587	Fuel injection pump roller tappet
27	9A413	Fuel injection pump cover
28	W714909	Fuel injection pump cover stud bolts (3 required)
29	9J332	High pressure fuel tube
30	W503281	Throttle body (TB) bolt (4 required)
31	9E926	TB
32	9424	Intake manifold
33	W500311	Intake manifold bolt (6 required)
34	8K556	Coolant outlet connector assembly
35	W500015	Coolant outlet connector assembly bolt (4 required)
36	9F972	FRP sensor
37	W500311	Fuel rail bolt (4 required)
38	6500	Valve tappet (16 required)
39	6065	Cylinder head bolt (10 required)
40	6518	Valve spring retainer key (32 required)
41	6514	Valve spring retainer (16 required)
42	6513	Valve spring (16 required)
43	6A517	Valve stem seal (16 required)
44	W500033	Rear engine lift bracket bolt
45	17K004	Rear engine lift bracket
46	6049	Cylinder head
47	6507	Intake valve (8 required)
48	6505	Exhaust valve (8 required)
49	6051	Cylinder head gasket
50	17A084	Front engine lift bracket
51	W500033	Front engine lift bracket bolt
52	9H487	Fuel rail
53	9U550	Fuel rail insulator
54	8A582	Coolant bypass hose

Rear Engine Components Exploded View

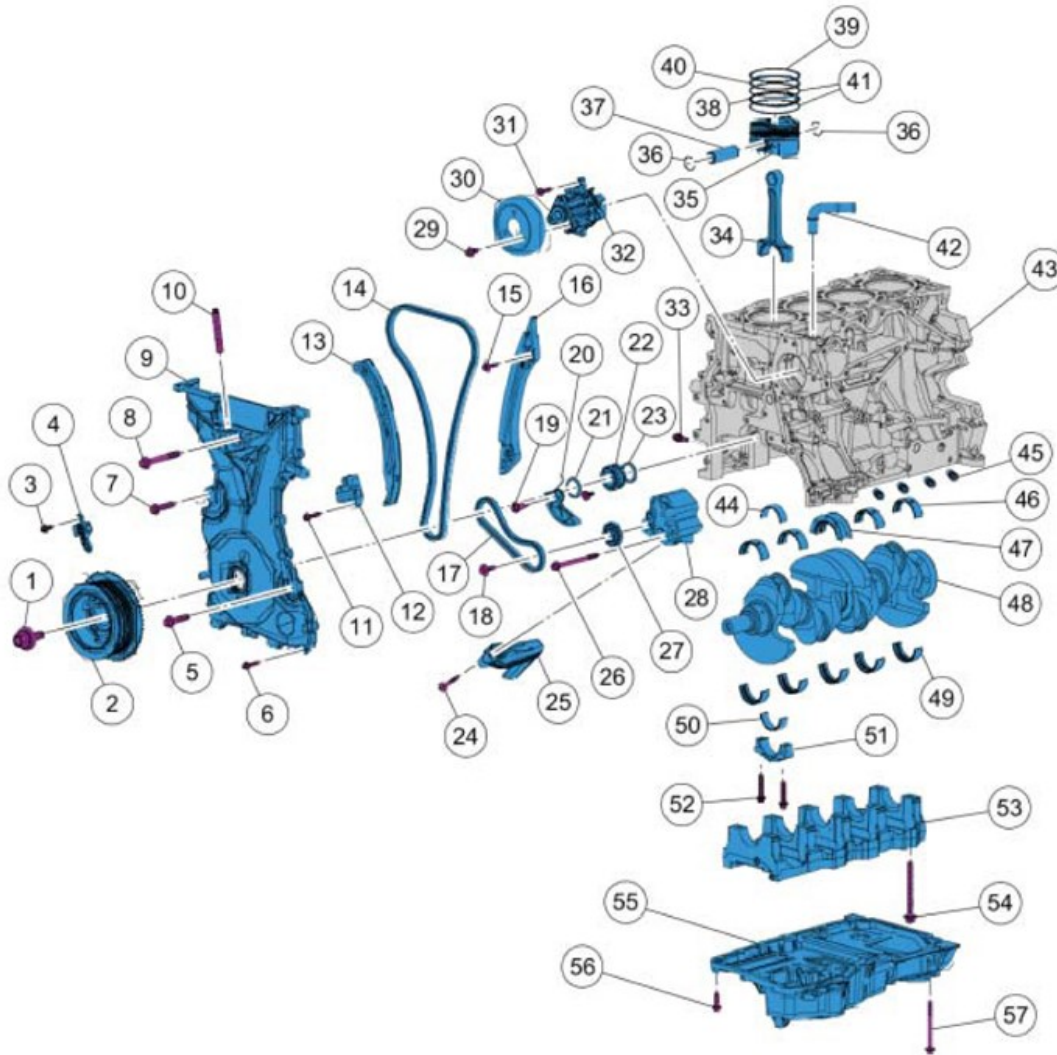


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Fig. 5: Exploded View Of Rear Engine Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W500015	Thermostat housing bolt (3 required)
2	8592	Thermostat housing
3	12A699	Knock sensor (KS) (2 required)
4	W500025	KS bolt (2 required)
5	6K318	Crankshaft rear seal and retainer
6	6N958	Crankshaft rear seal retainer bolt (6 required)
7	6477	Dual mass flywheel
8	6379	Dual mass flywheel bolt (6 required)
9	6375	Flexplate - dual clutch
10	6379	Flexplate bolt (6 required)
11	6A785	PCV oil separator assembly
12	W500214	PCV oil separator assembly bolt (8 required)
13	6A636	Oil filter adapter gasket
14	6884	Oil filter adapter
15	W500225	Oil filter adapter bolt (4 required)
16	9278	Oil pressure switch
17	6714	Oil filter

Timing Drive and Lower Engine Components Exploded View



E150026

Fig. 6: Exploded View Of Timing Drive And Lower Engine Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K340	Crankshaft pulley bolt and washer
2	6316	Crankshaft pulley
3	W701219	Crankshaft position (CKP) sensor bolt
4	6C315	CKP sensor
5	W500320	Engine front cover bolt
6	W500215	Engine front cover bolt (17 required)
7	W500311	Engine front cover bolt
8	W500328	Engine front cover bolt (3 required)

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9	6C086	Engine front cover
10	W708873	Engine front cover stud (2 required)
11	6K282	Timing chain tensioner bolt (2 required)
12	6K254	Timing chain tensioner
13	6K255	Timing chain tensioner arm
14	6268	Timing chain
15	W703643	Timing chain guide bolt (2 required)
16	6K297	Timing chain guide
17	6A895	Oil pump drive chain
18	W704397	Oil pump drive sprocket bolt
19	W703651	Oil pump drive chain tensioner bolt and spacer
20	6C271	Oil pump drive chain tensioner
21	6378	Crankshaft pulley washer
22	6306	Crankshaft sprocket
23	6378	Crankshaft pulley washer
24	W706282	Oil pump screen and pickup tube bolt (2 required)
25	6622	Oil pump screen and pickup tube
26	W712022	Oil pump bolt (4 required)
27	6652	Oil pump drive sprocket
28	6600	Oil pump
29	W500221	Coolant pump bolt (3 required)
30	8509	Coolant pump pulley
31	W500015	Coolant pump bolt (3 required)
32	8501	Coolant pump
33	W700115	Crankshaft timing hole plug
34	6200	Connecting rod (4 required)
35	6110	Piston (4 required)
36	6140	Piston pin retainer (8 required)
37	6135	Piston pin (4 required)
38	6161	Piston oil control ring (4 required)
39	6150	Piston upper compression rings (4 required)
40	6152	Piston lower compression rings (4 required)
41	6159	Piston oil control rings (8 required)
42	8597	Coolant bypass tube
43	6010	Cylinder block
44	6211	Connecting rod upper bearing (4 required)
45	6K868	Piston oil cooler (4 required)
46	6333	Crankshaft main bearing (4 required)
47	6337	Crankshaft main thrust bearing
48	6303	Crankshaft
49	6A338	Crankshaft lower main bearing (5 required)
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	6211	Connecting rod lower bearing (4 required)
51	6100	Connecting rod cap (4 required)
52	6214	Connecting rod bolt (8 required)
53	9D047	Main bearing beam
54	6345	Main bearing beam bolt (10 required)
55	6675	Oil pan
56	W500224	Oil pan bolt (11 required)
57	W706284	Oil pan bolt (2 required)

DIAGNOSIS AND TESTING

ENGINE

For basic engine mechanical concerns.

REFER to: **ENGINE** .

For driveability symptoms. INTRODUCTION - GASOLINE MODELS

GENERAL PROCEDURES

VALVE CLEARANCE CHECK

Special Tool(s) / General Equipment

Feeler Gauge

Check

1. Refer to: **Valve Cover** .

NOTE: Turn the engine clockwise only, and only use the crankshaft bolt.

NOTE: Before removing the camshafts, measure the clearance of each valve at base circle, with the lobe pointed away from the tappet. Failure to measure all clearances prior to removing the camshafts will necessitate repeated removal and installation and wasted labor time.

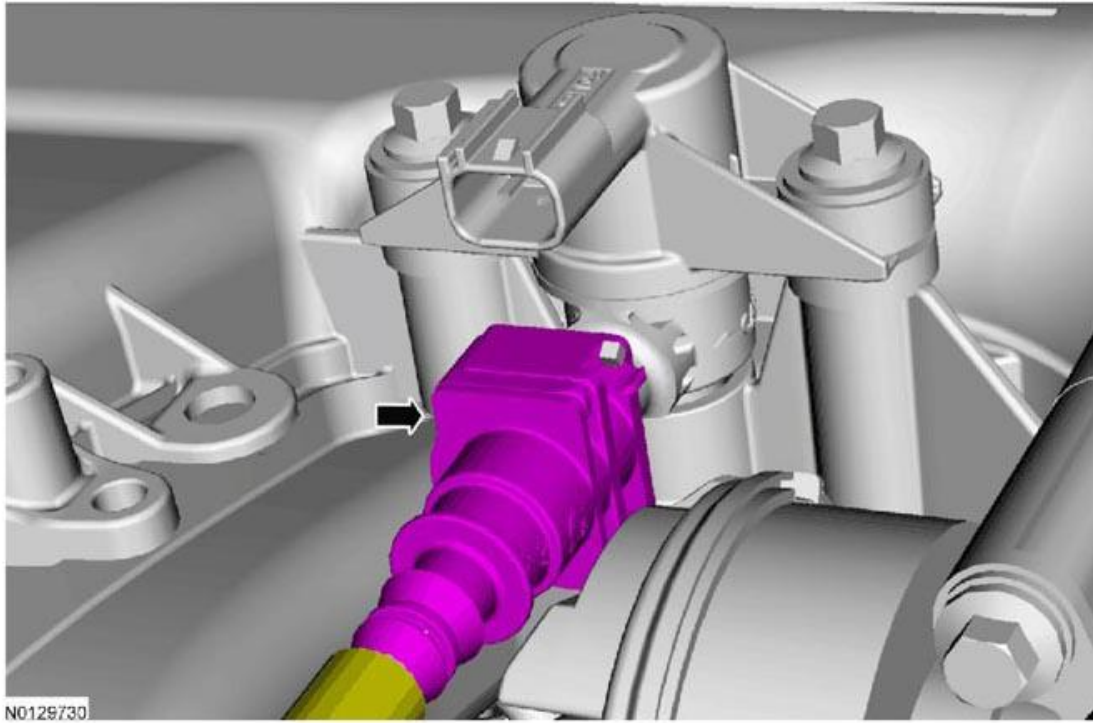


Fig. 7: Measuring Clearance Of Valve
Courtesy of FORD MOTOR CO.

2. Measure the clearance of each valve and record its location. A midrange clearance is the most desirable.

General Equipment : Feeler Gauge

NOTE: The number on the valve tappet reflects the thickness of the valve tappet. For example, a tappet with the number 3.310 has the thickness of 3.31 mm (0.1303 in).

3. **NOTE:** The number on the valve tappet reflects the thickness of the valve tappet. For example, a tappet with the number 3.310 has the thickness of 3.31 mm (0.1303 in).

- Intake: 0.23 mm (0.0091 in) - 0.33 mm (0.0130 in).
- Exhaust: 0.31 mm (0.0122 in) - 0.41 mm (0.0161 in).

4. If any of the valve clearances are out of specification, select new tappets using this formula: tappet thickness = measured clearance + the base tappet thickness - most desirable thickness. Select the tappets and mark the installation location.
5. If any tappets do not measure within specifications, install new tappets in these locations.

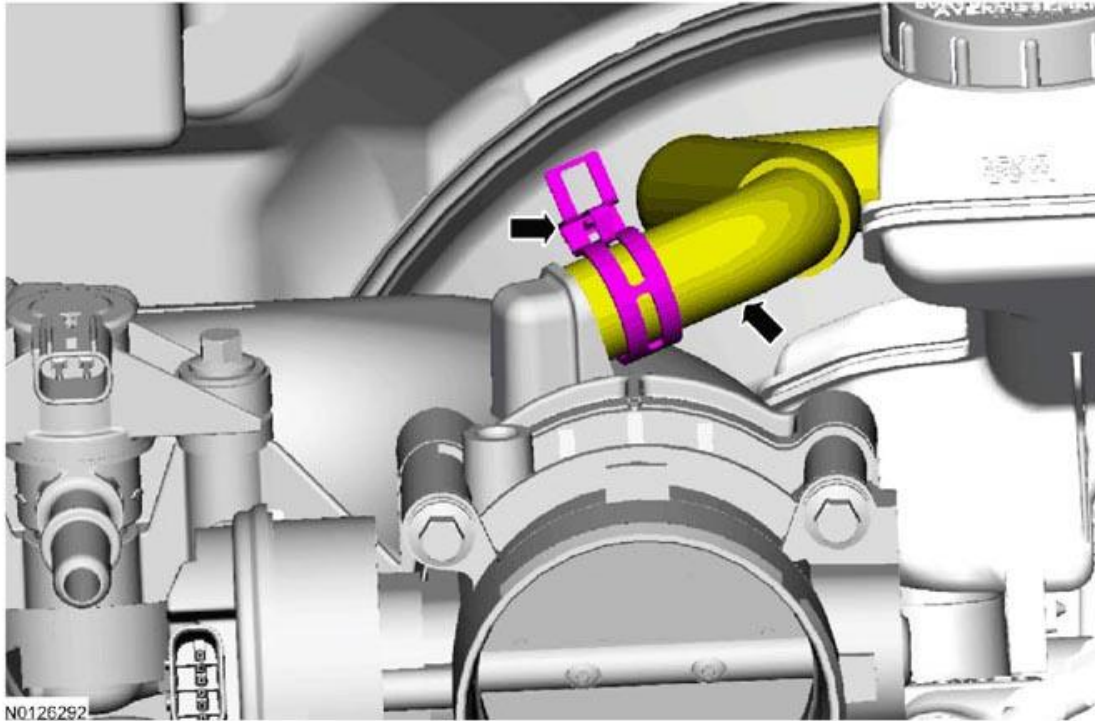
Refer to: **Valve Tappets** .

REMOVAL AND INSTALLATION

INTAKE MANIFOLD

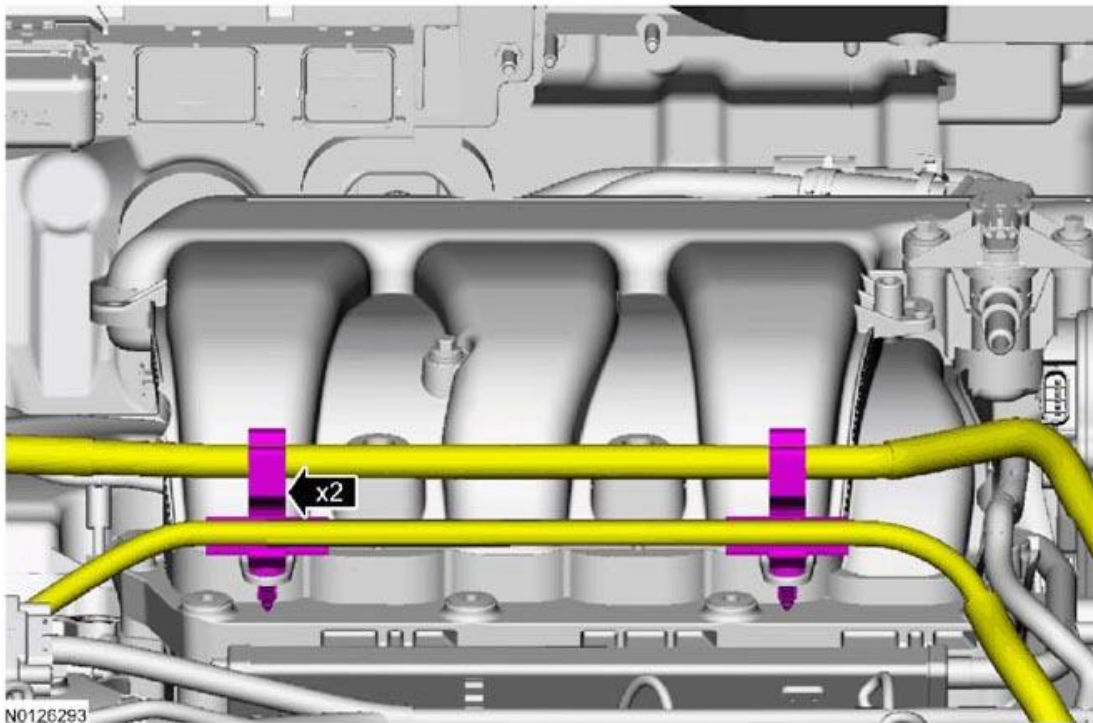
Removal

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Refer to: **BATTERY DISCONNECT AND CONNECT** .



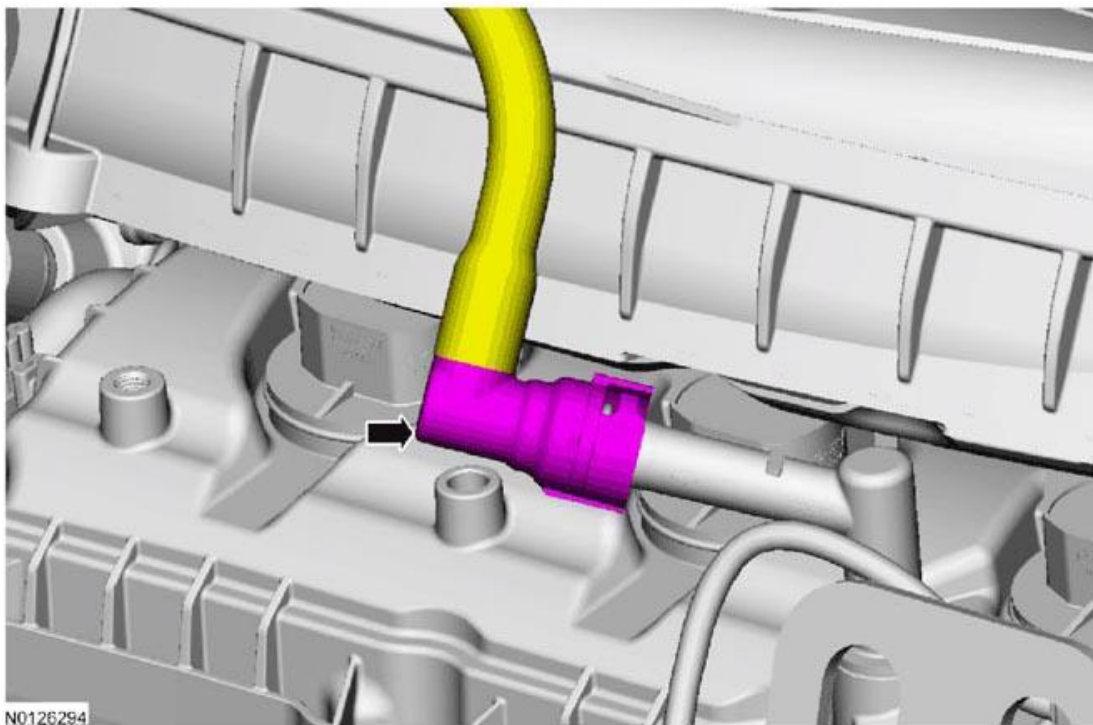
3.

Fig. 8: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.



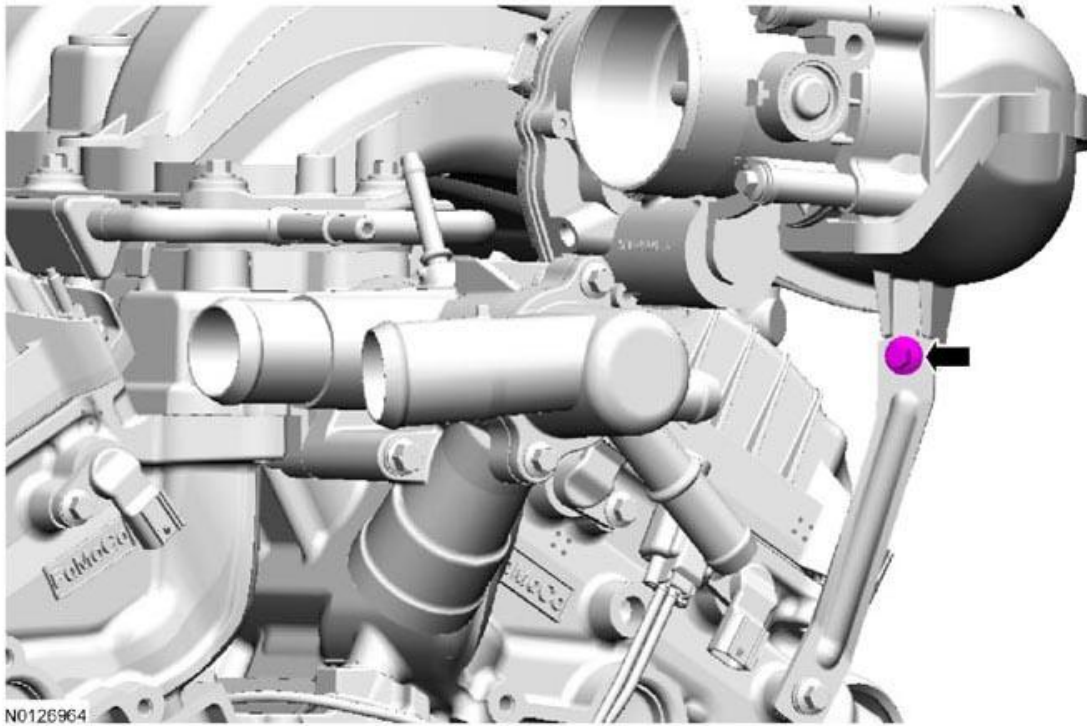
4.

Fig. 9: Locating Harness Retainer
Courtesy of FORD MOTOR CO.



5.

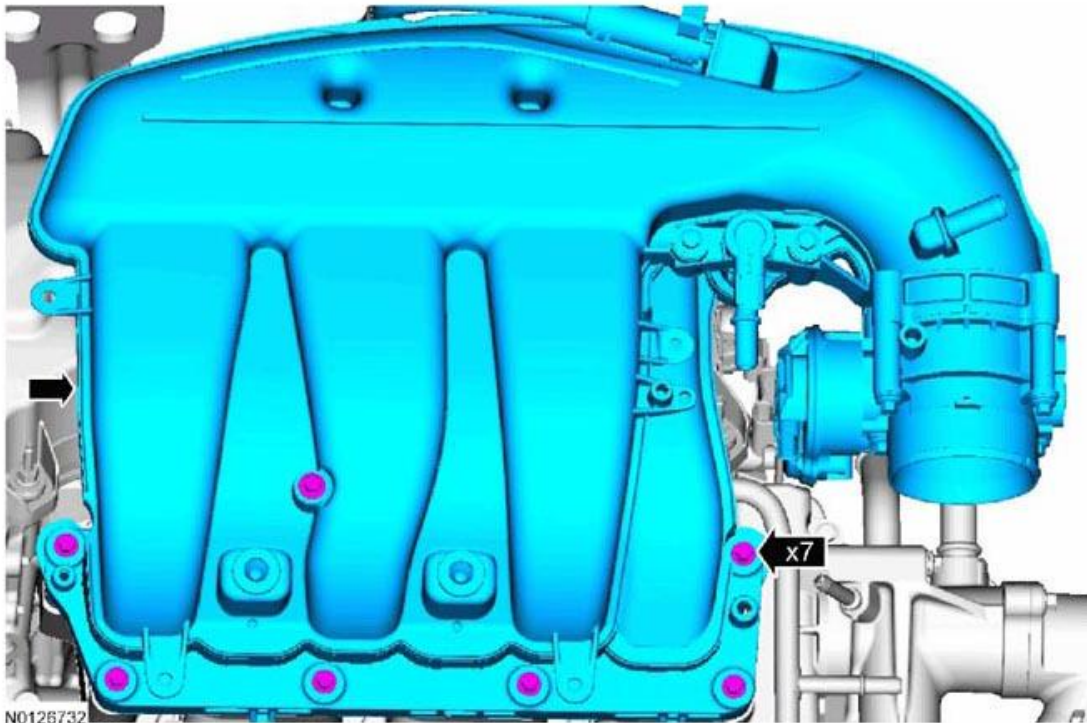
Fig. 10: Locating Intake Manifold Bolt
Courtesy of FORD MOTOR CO.



6.

Fig. 11: Locating Harness Retainer
Courtesy of FORD MOTOR CO.

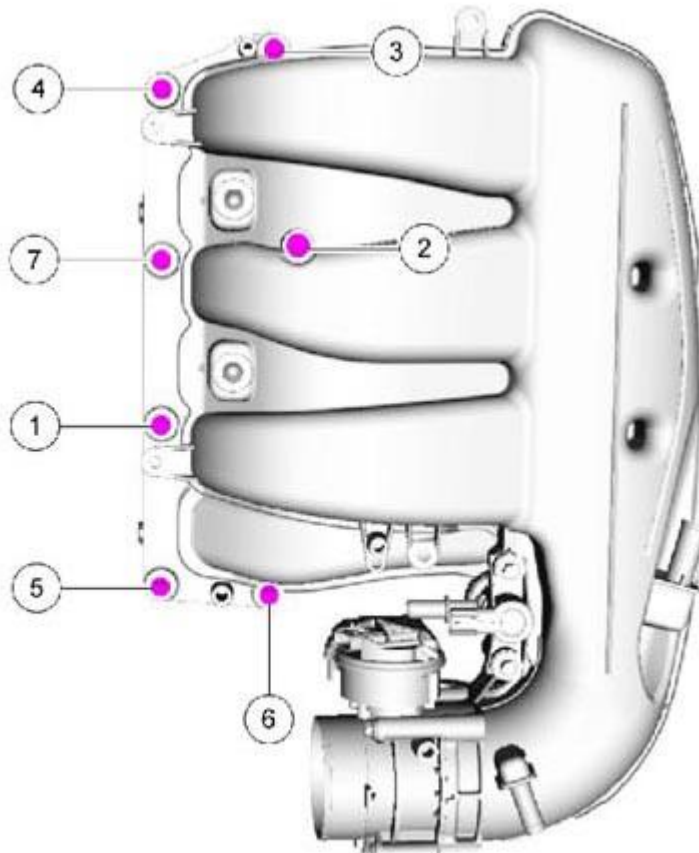
7. Refer to: **AIR CLEANER OUTLET PIPE** .



8.

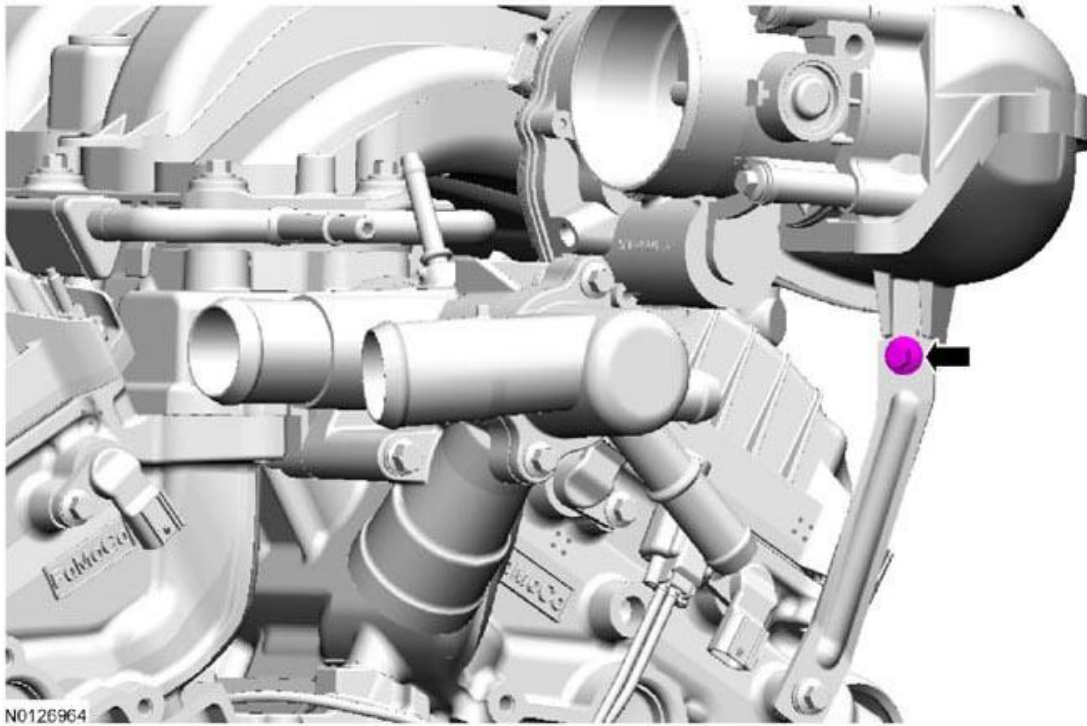
Fig. 12: Locating Harness Retainer And Connector
Courtesy of FORD MOTOR CO.

9. Refer to: **QUICK RELEASE COUPLING** .



N0129729

Fig. 13: Locating Quick Release Coupling
Courtesy of FORD MOTOR CO.



10.

Fig. 14: Locating Tube Connection
Courtesy of FORD MOTOR CO.

NOTE: Position back the intake manifold to allow access to disconnect the crankcase ventilation oil separator tube from the intake manifold.

11.

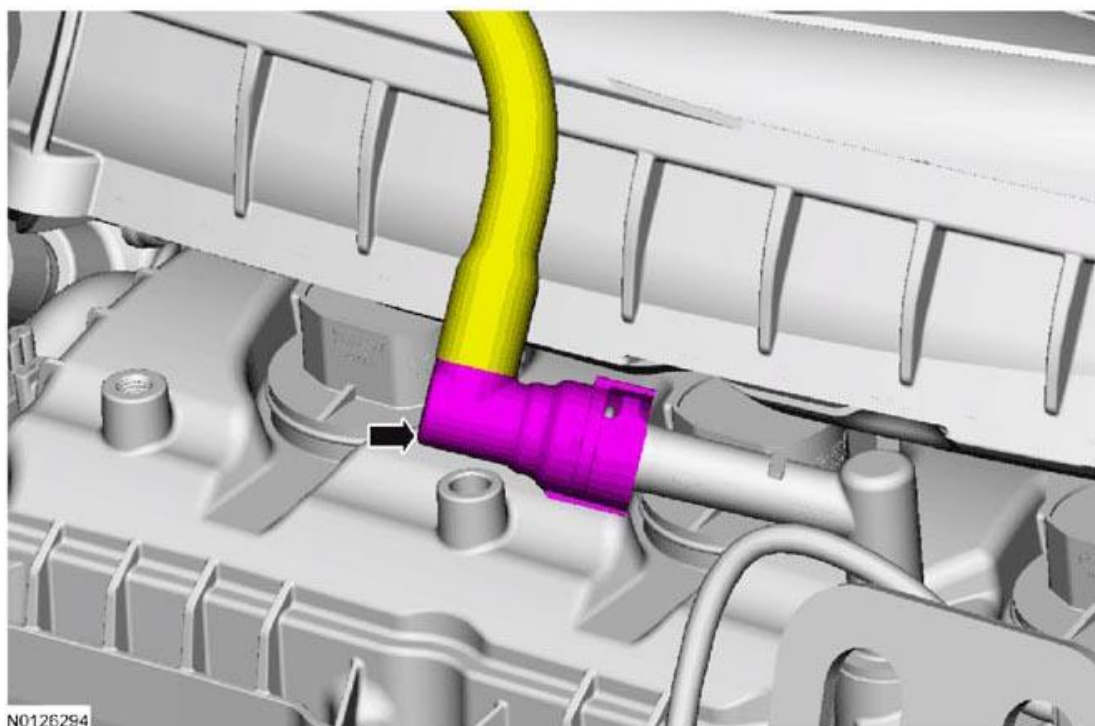


Fig. 15: Locating Crankcase Ventilation Oil Separator Tube And Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

Installation

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

1. **NOTE:** Install new intake manifold gaskets if necessary.

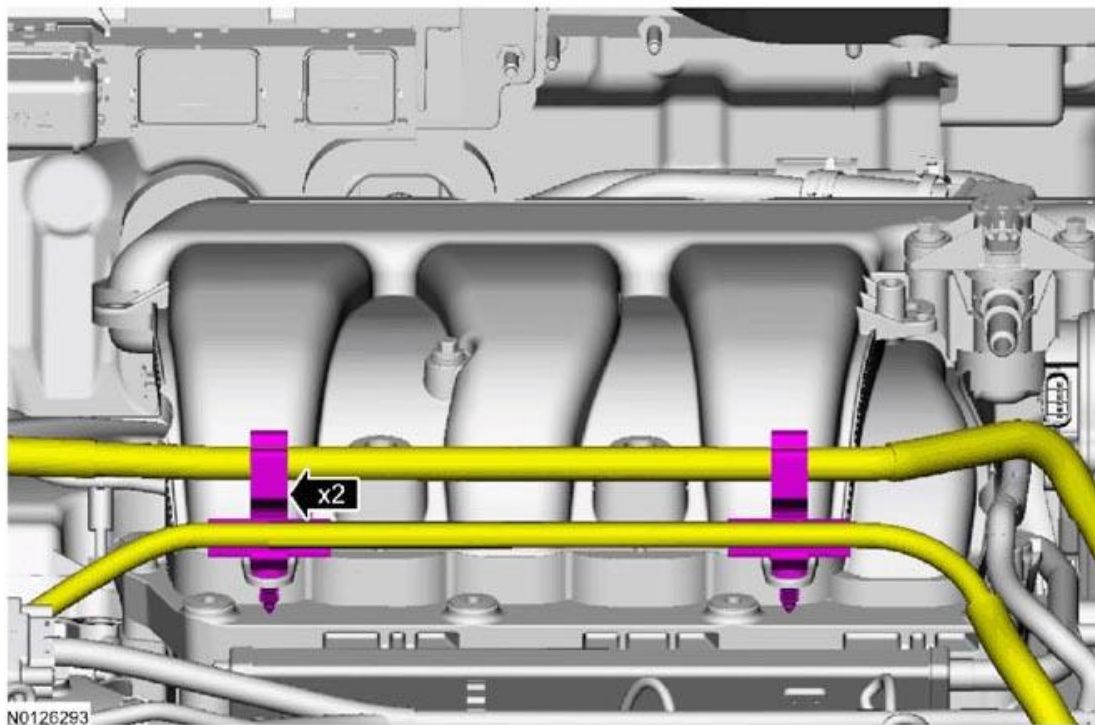


Fig. 16: Inspecting Intake Manifold Gaskets
Courtesy of FORD MOTOR CO.

2. Finger tight.

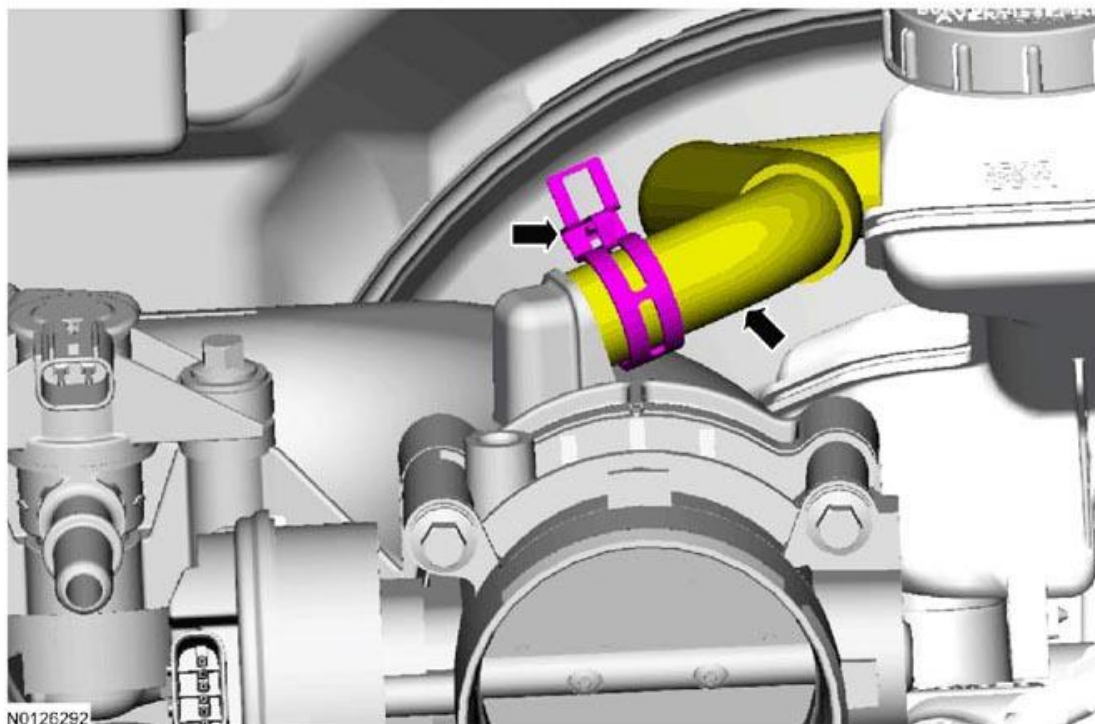


Fig. 17: Locating Crankcase Ventilation Oil Separator Tube And Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

3. Finger tight.

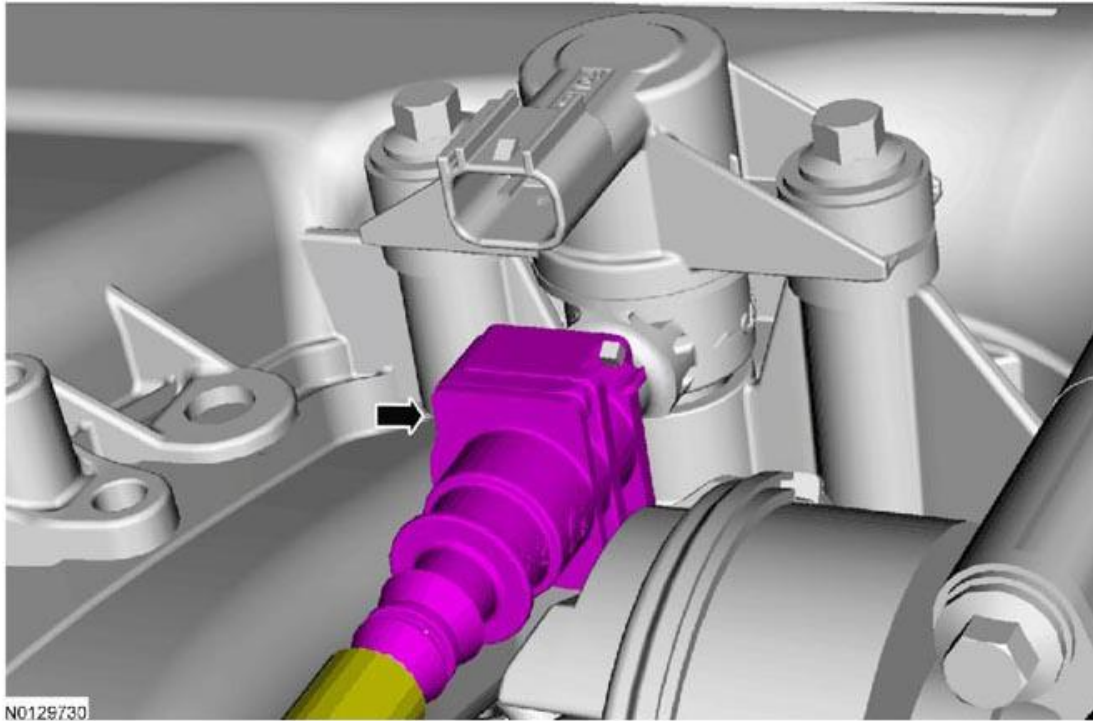


Fig. 18: Locating Intake Manifold Bolt
Courtesy of FORD MOTOR CO.

4. *Torque : 20 Nm*

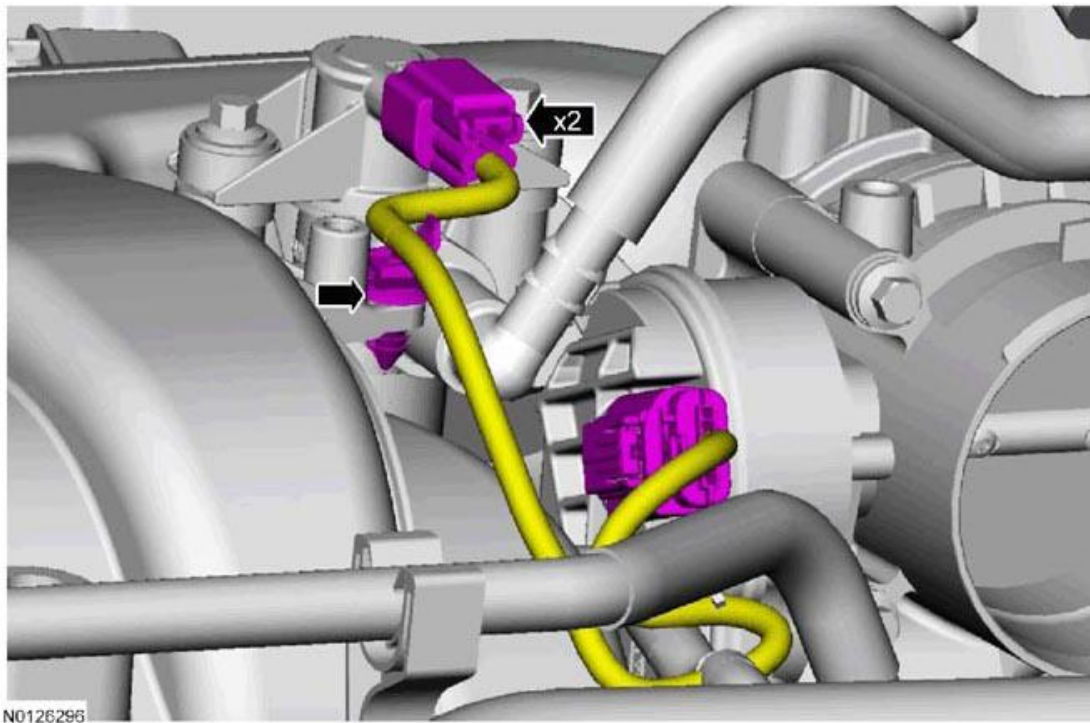
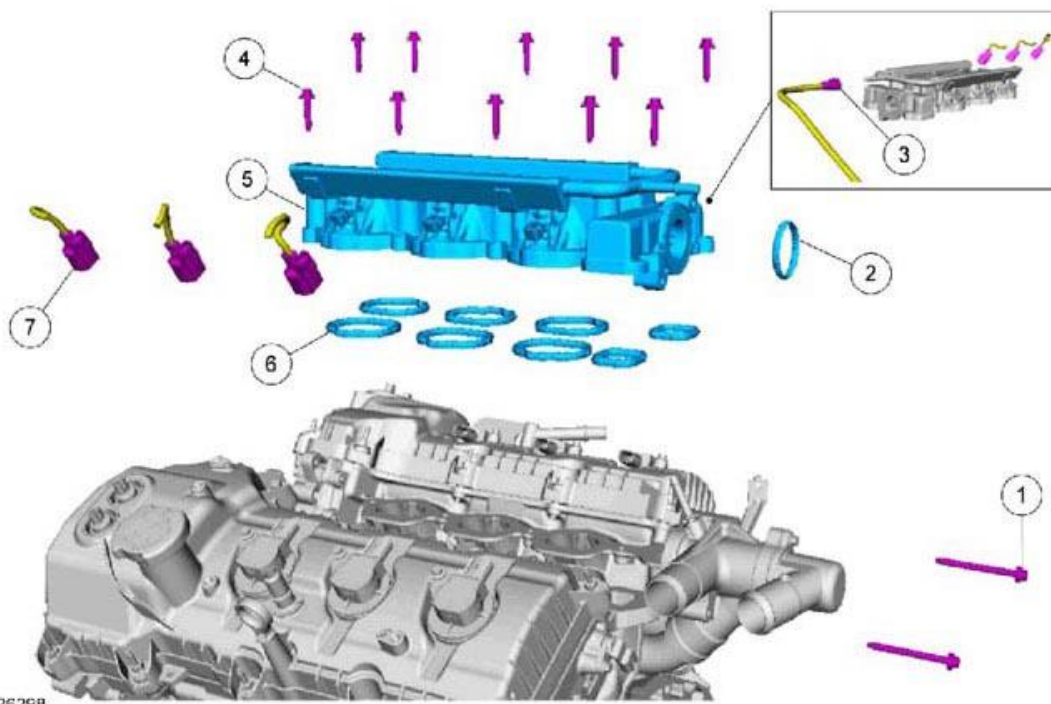


Fig. 19: Identifying Intake Manifold Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.



5.

Fig. 20: Locating Tube Connection
Courtesy of FORD MOTOR CO.

6. Refer to: **QUICK RELEASE COUPLING** .

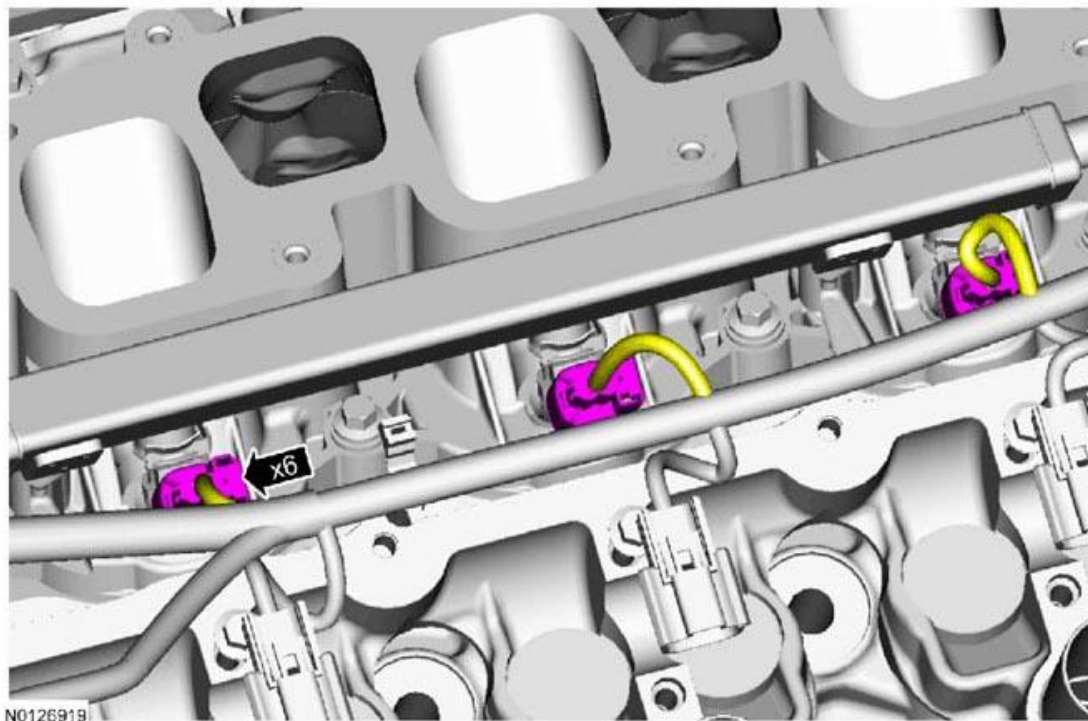
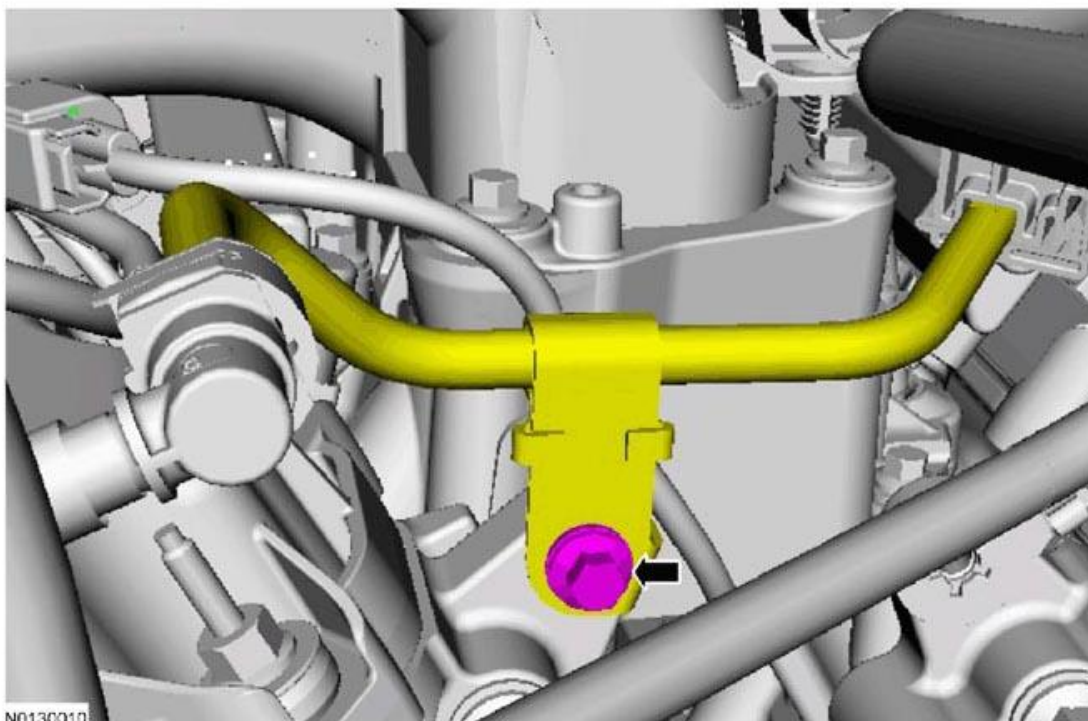


Fig. 21: Locating Quick Release Coupling
Courtesy of FORD MOTOR CO.

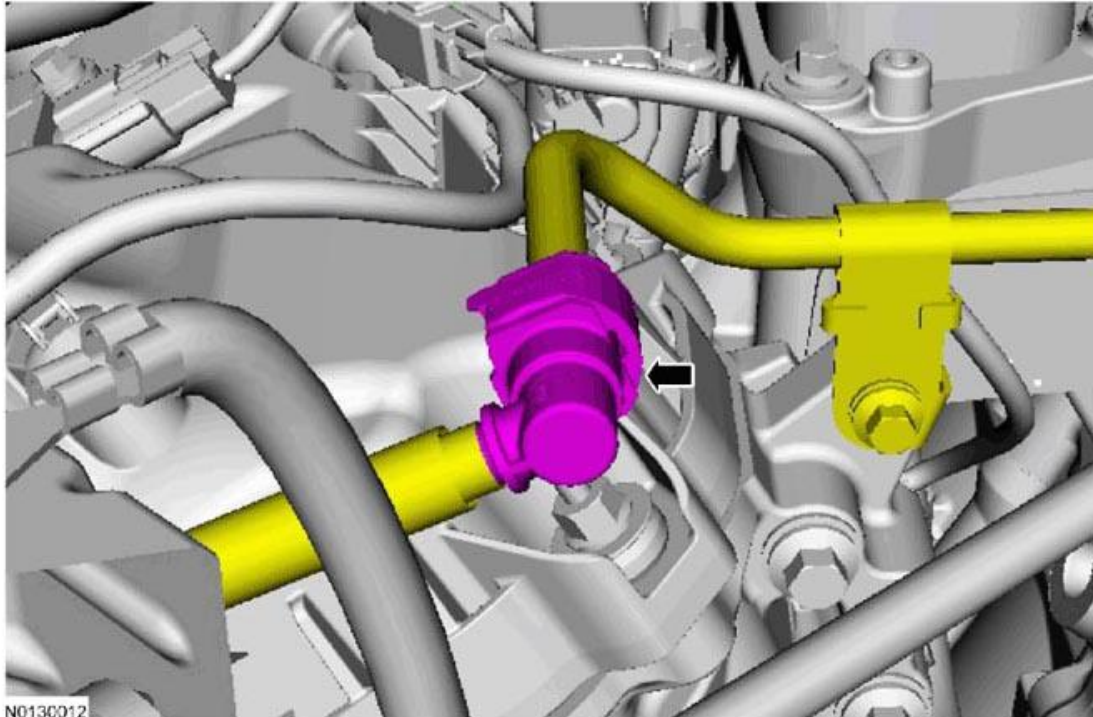


- 7.

Fig. 22: Locating Harness Retainer And Connector

Courtesy of FORD MOTOR CO.

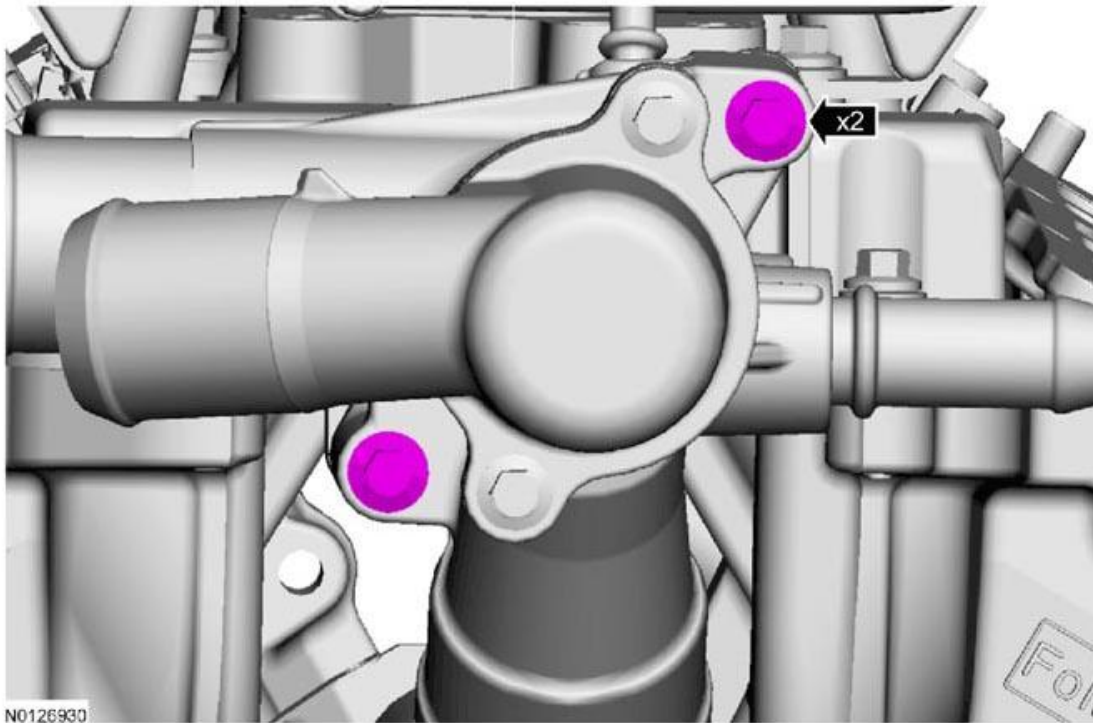
8. Refer to: **AIR CLEANER OUTLET PIPE** .



- 9.

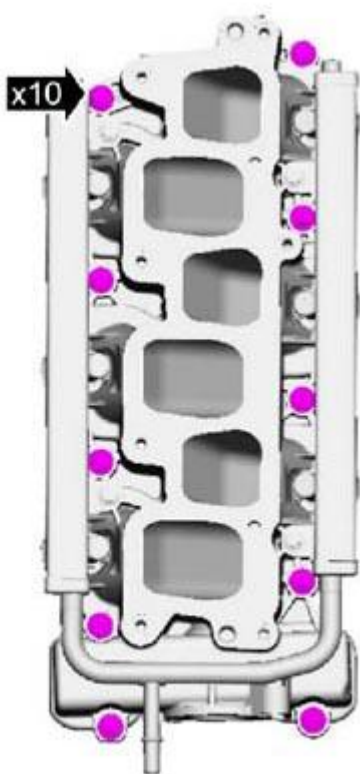
Fig. 23: Locating Harness Retainer

Courtesy of FORD MOTOR CO.



10.

Fig. 24: Locating Harness Retainer
Courtesy of FORD MOTOR CO.



N0126947

11.

Fig. 25: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.

12. Refer to: **BATTERY DISCONNECT AND CONNECT** .

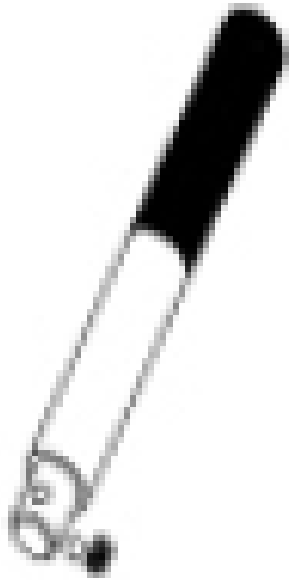
VALVE COVER

SPECIAL TOOL(S) / GENERAL EQUIPMENT

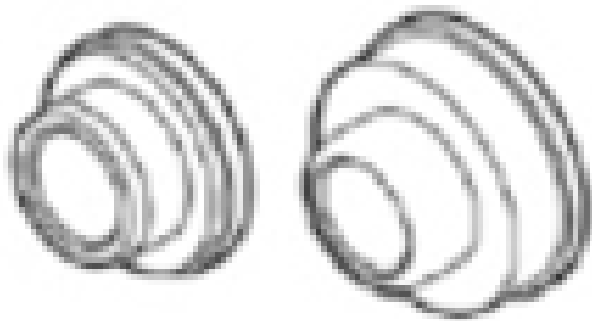
205-153
Handle

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



E133913



303-1247/1

Remover, VCT Spark Plug Tube Seal



303-1247/2

Installer, VCT Spark Plug Tube Seal

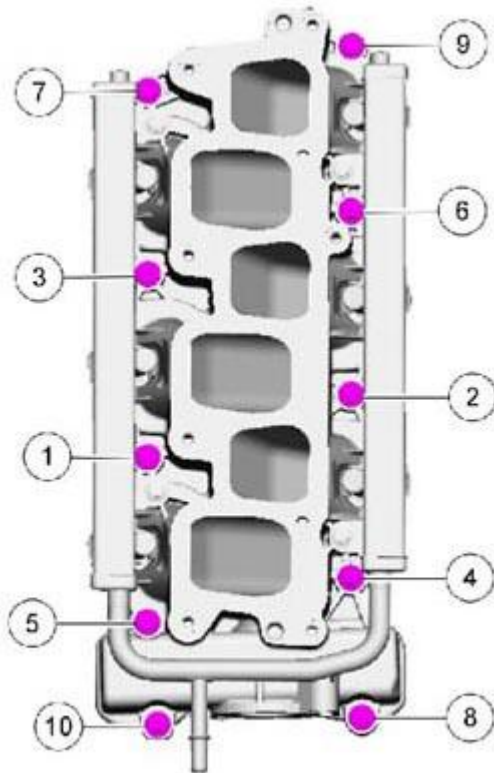
MATERIALS SPECIFICATIONS

Name	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

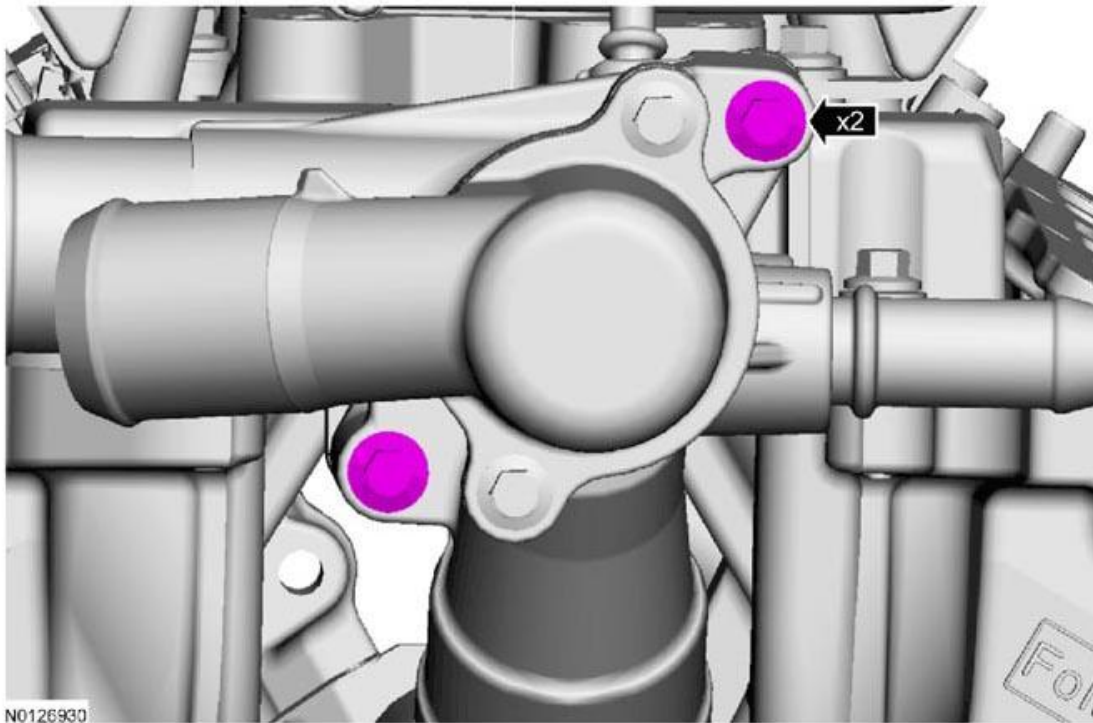
1. Refer to: IGNITION COIL-ON-PLUG .



N0126297

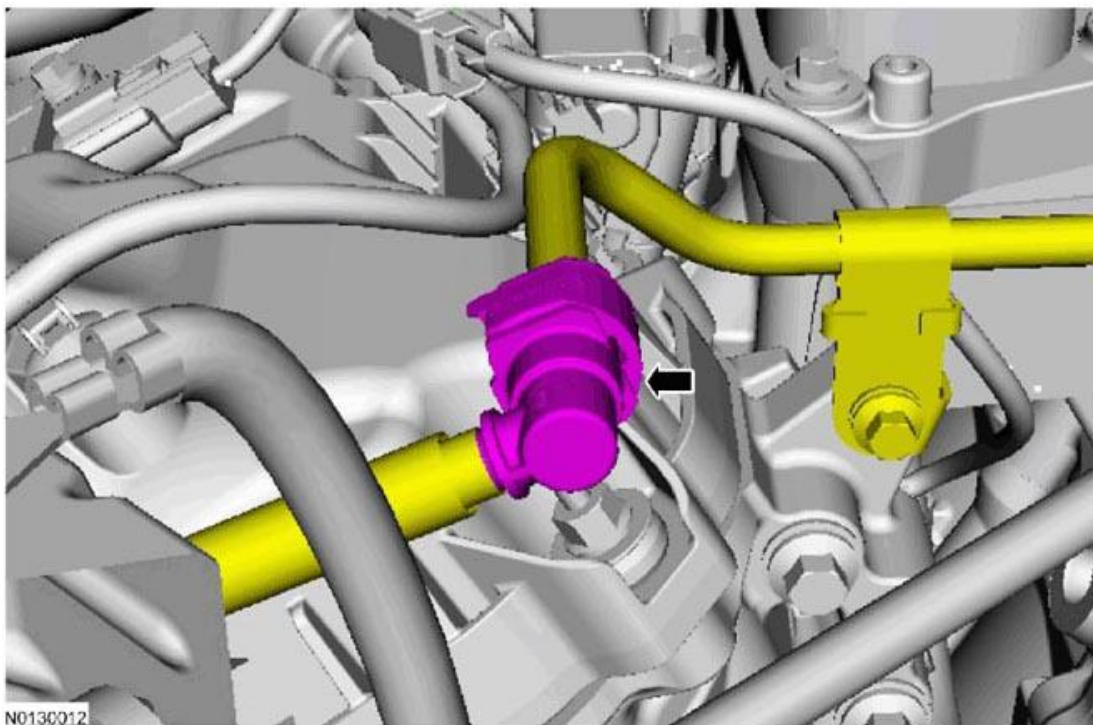
- 2.

Fig. 26: Locating Harness Connector
Courtesy of FORD MOTOR CO.



3.

Fig. 27: Locating Harness Connector
Courtesy of FORD MOTOR CO.



4.

Fig. 28: Locating Valve Cover Studs And Nuts
Courtesy of FORD MOTOR CO.

5. Refer to: **QUICK RELEASE COUPLING** .

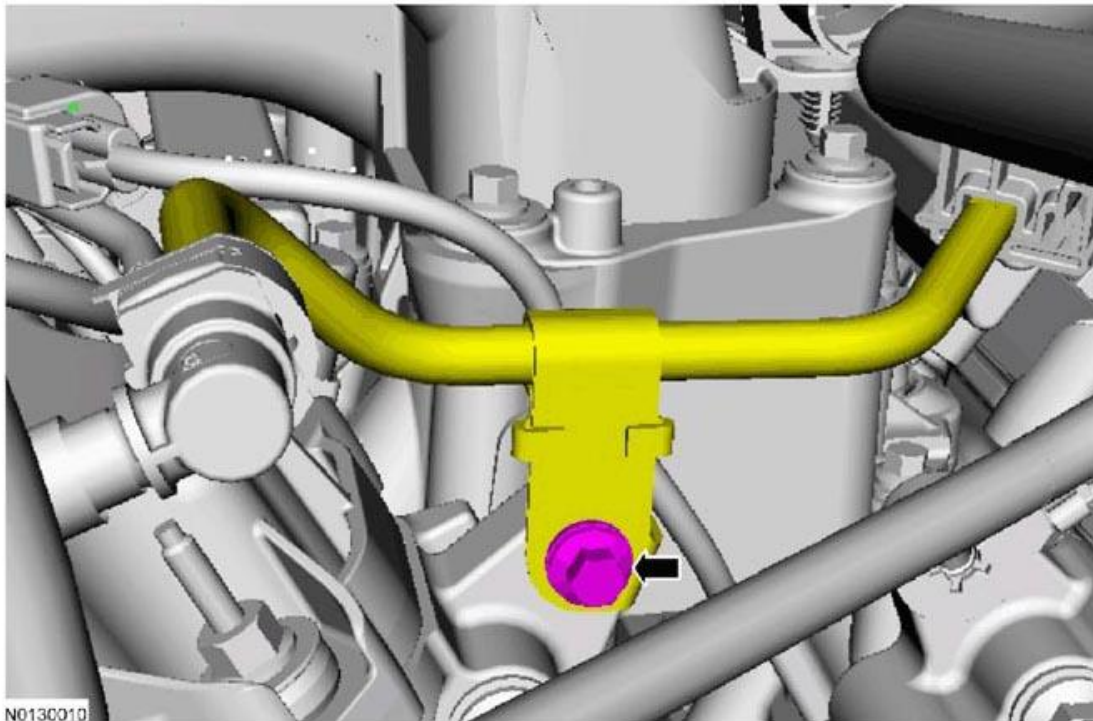
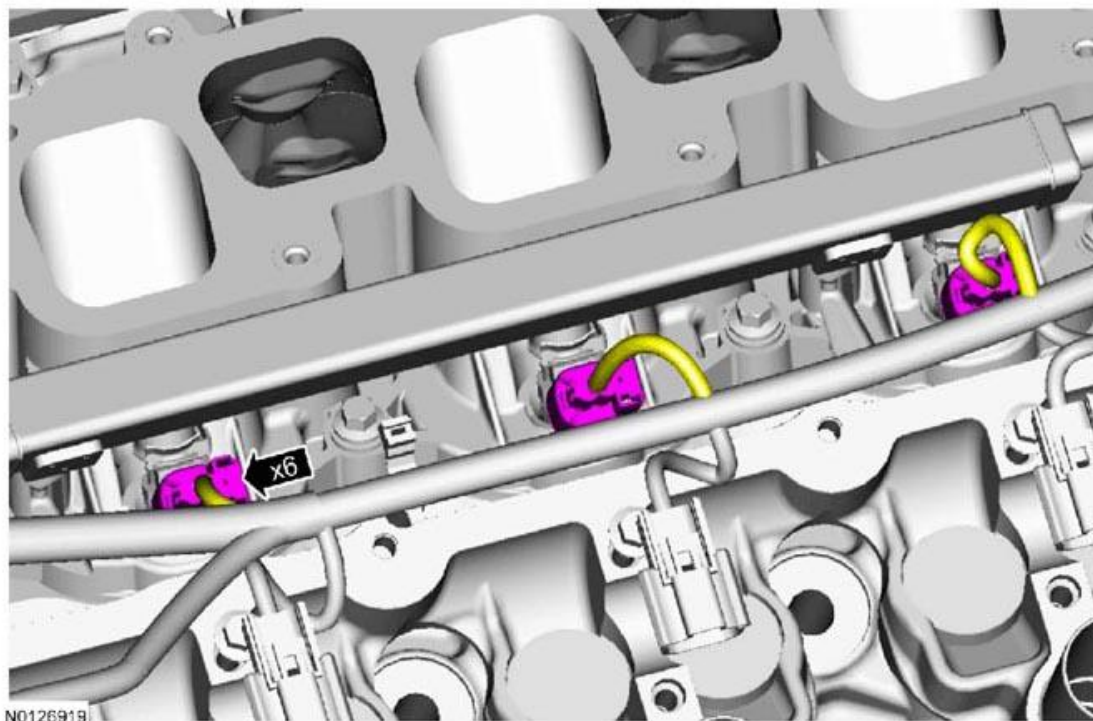
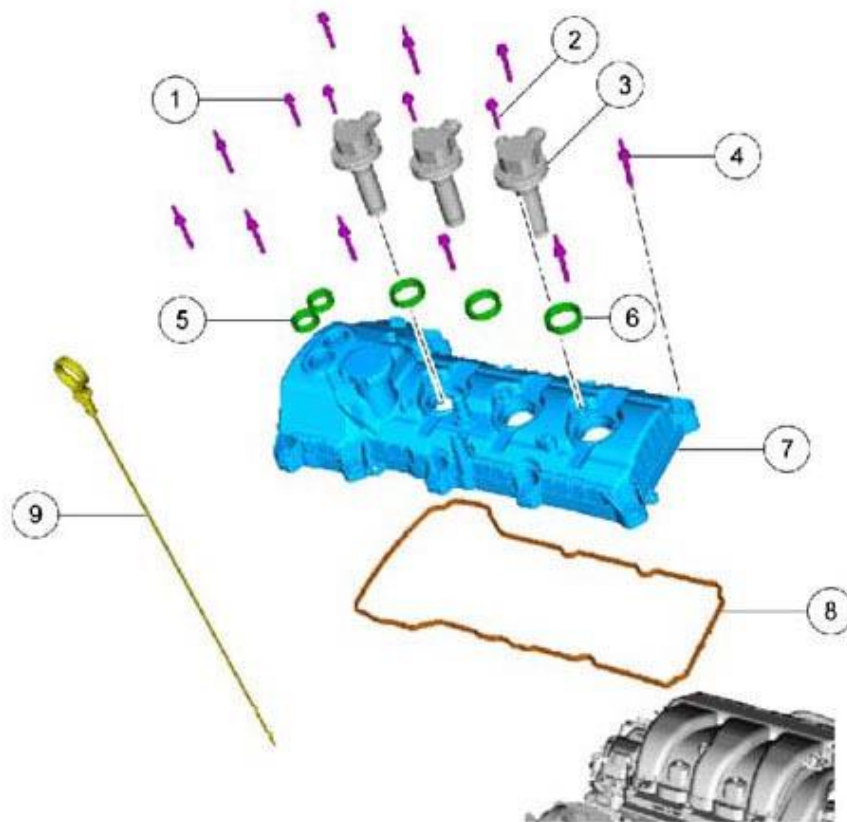


Fig. 29: Identifying Quick Release Coupling
Courtesy of FORD MOTOR CO.



- 6.

Fig. 30: Locating Bracket And Bolt
Courtesy of FORD MOTOR CO.



N0129731

7.

Fig. 31: Locating Oil Dipstick
Courtesy of FORD MOTOR CO.

8. If equipped.

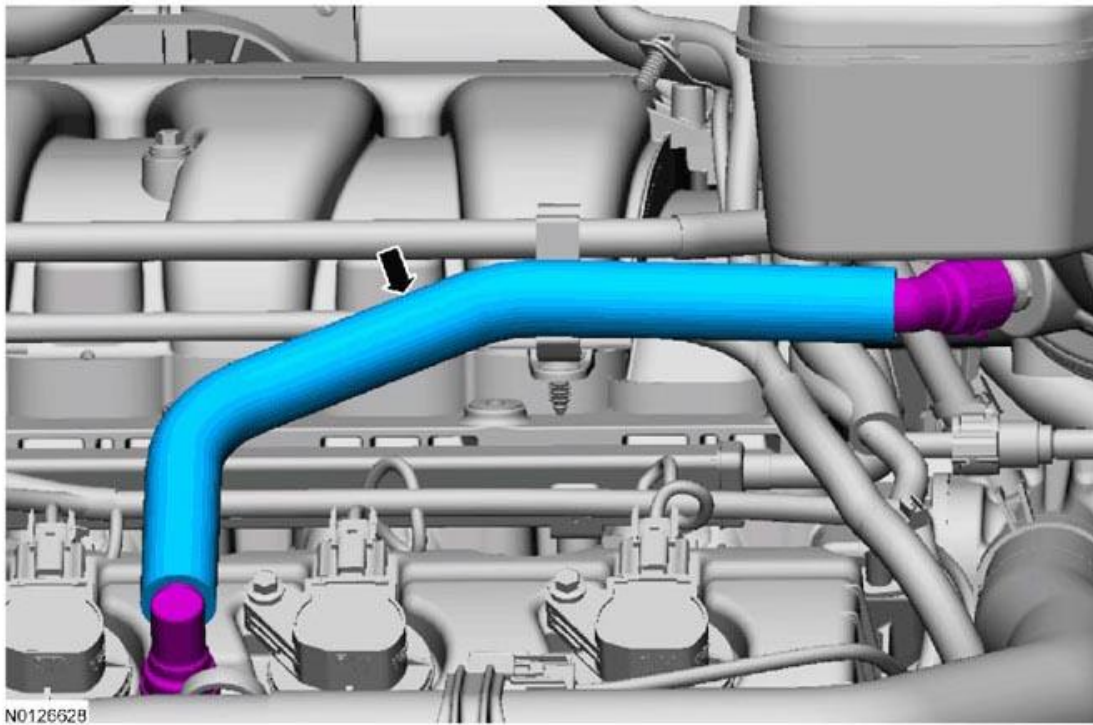


Fig. 32: Locating Stud Bolts
Courtesy of FORD MOTOR CO.

9. **NOTE:** Discard the valve cover gasket.

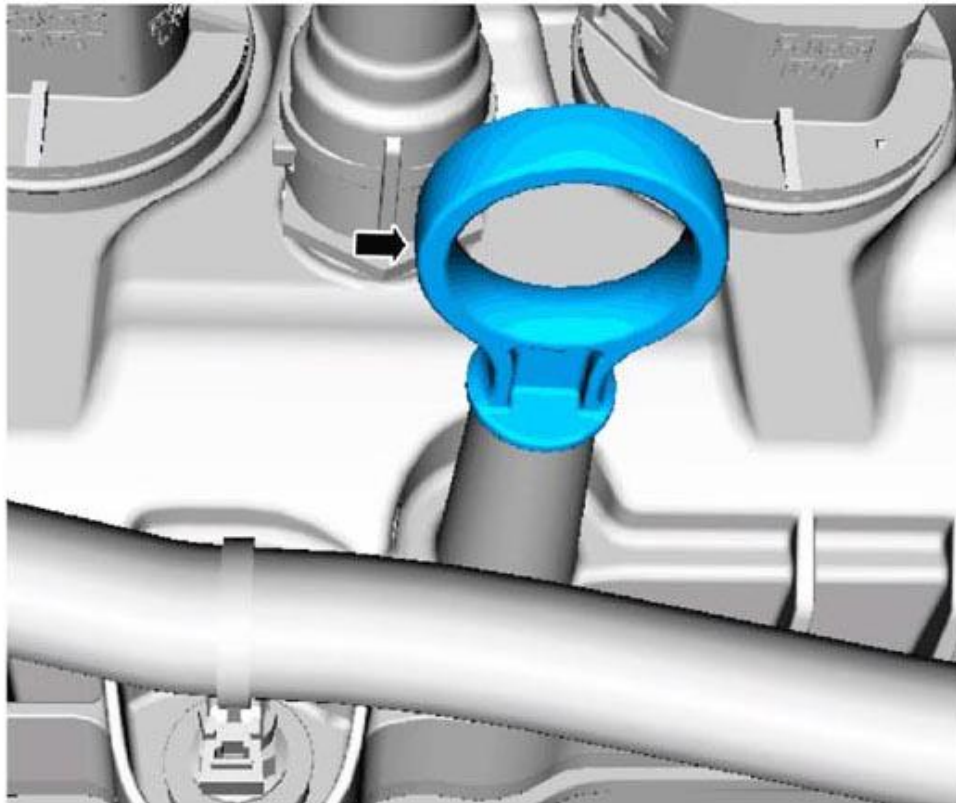


Fig. 33: Locating Valve Cover Bolts
Courtesy of FORD MOTOR CO.

NOTE: The Variable Camshaft Timing (VCT) solenoid seals should only be replaced if they are damaged.

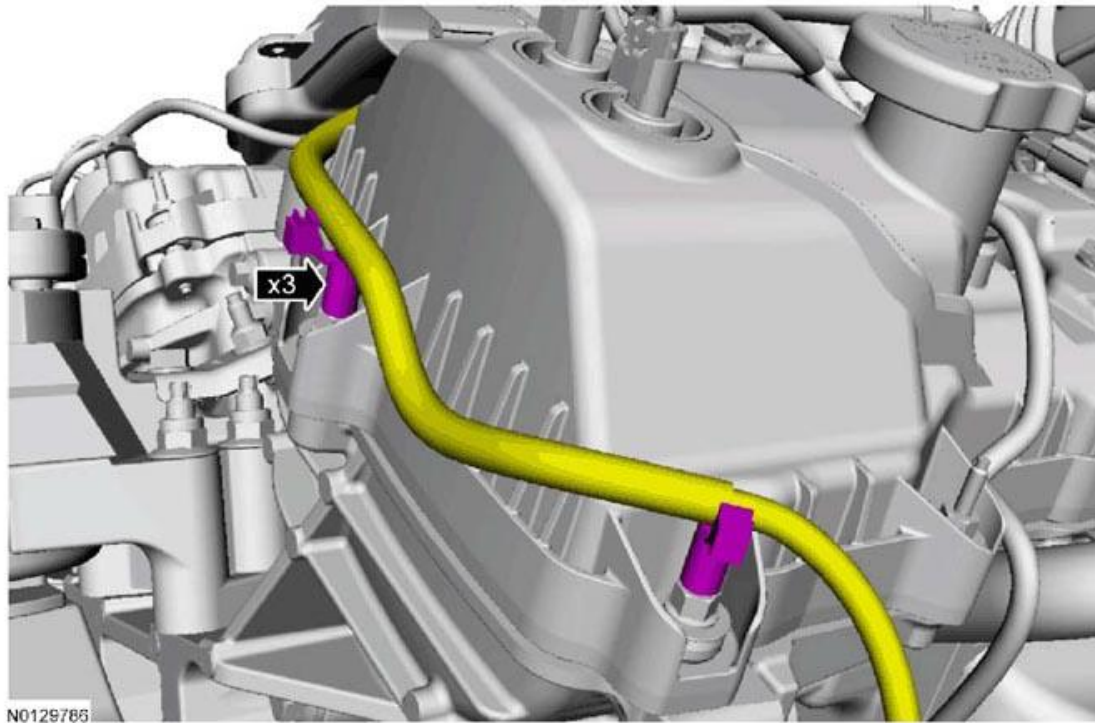


Fig. 34: Removing VCT Spark Plug Tube Seal Using 205-153 (Handle) And 303-1247/1
Courtesy of FORD MOTOR CO.

10. *Special Tool(s)* : 205-153 (Handle) , 303-1247/1 (Remover, VCT Spark Plug Tube Seal)

Installation

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

1. Clean and inspect the sealing surfaces.

NOTE: Installation of new seals is only required if damaged seals were removed during removal of the valve cover.

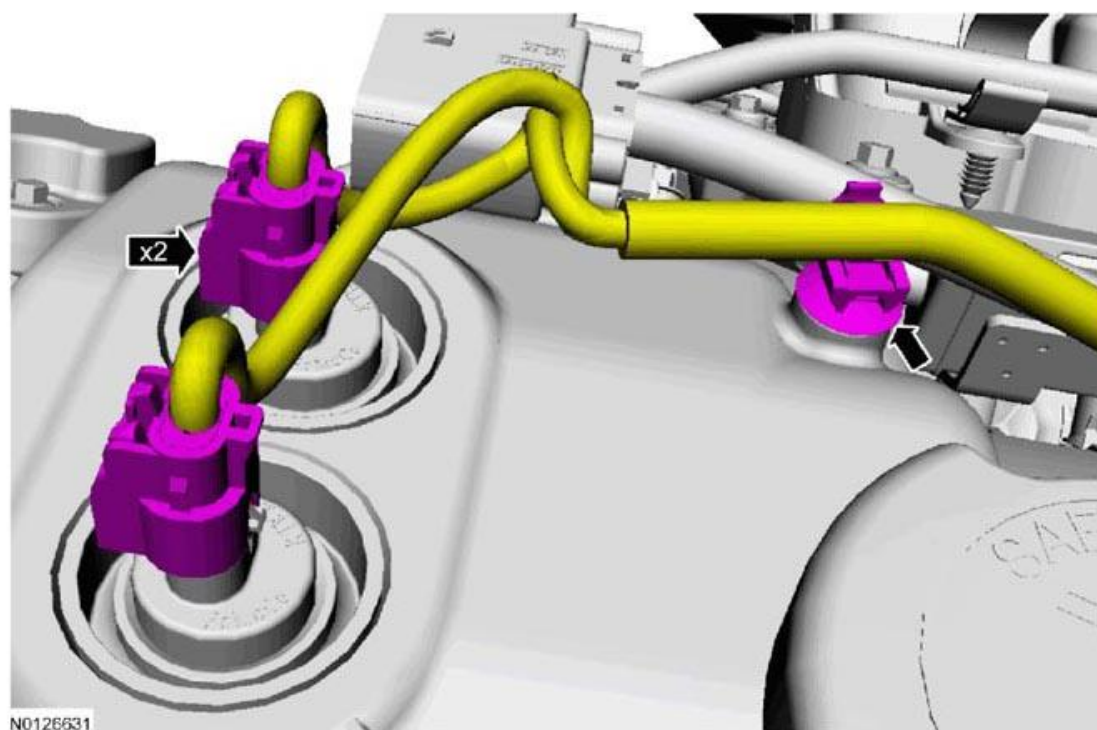


Fig. 35: Installing VCT Spark Plug Tube Seal Using 205-153 (Handle) And 303-1247/1
Courtesy of FORD MOTOR CO.

2. *Special Tool(s)* : 205-153 (Handle) , 303-1247/2 (Installer, VCT Spark Plug Tube Seal)

NOTE: The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

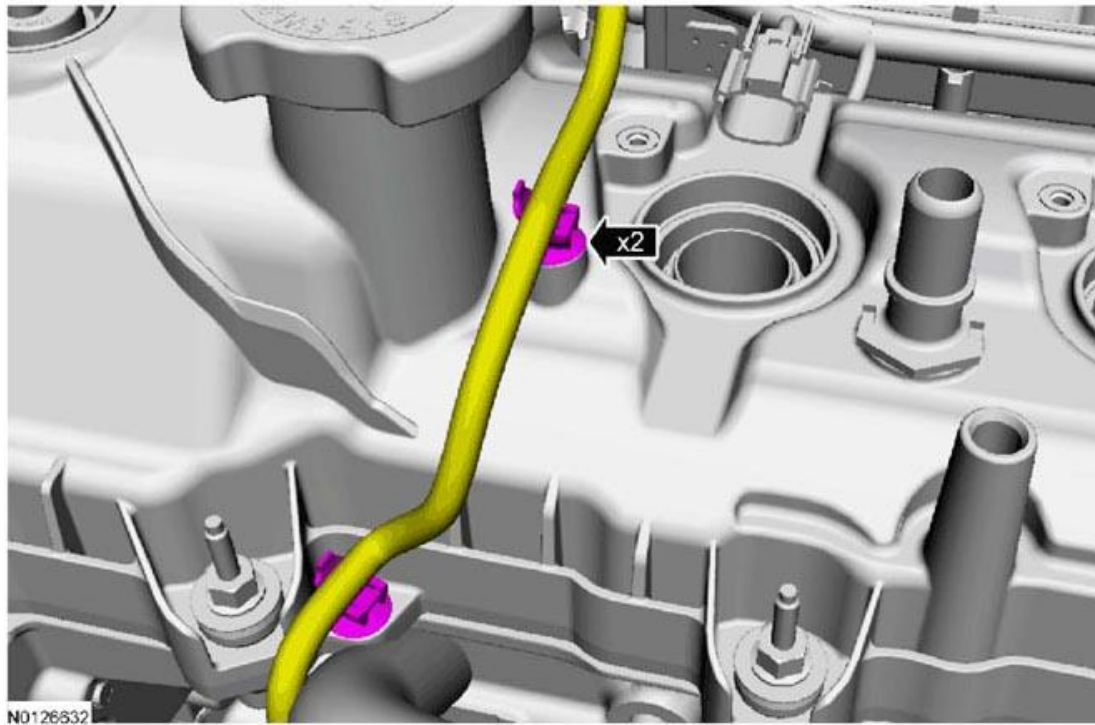


Fig. 36: Applying Sealant On Sealing Area
Courtesy of FORD MOTOR CO.

3. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

NOTE: **Install a new valve cover gasket.**

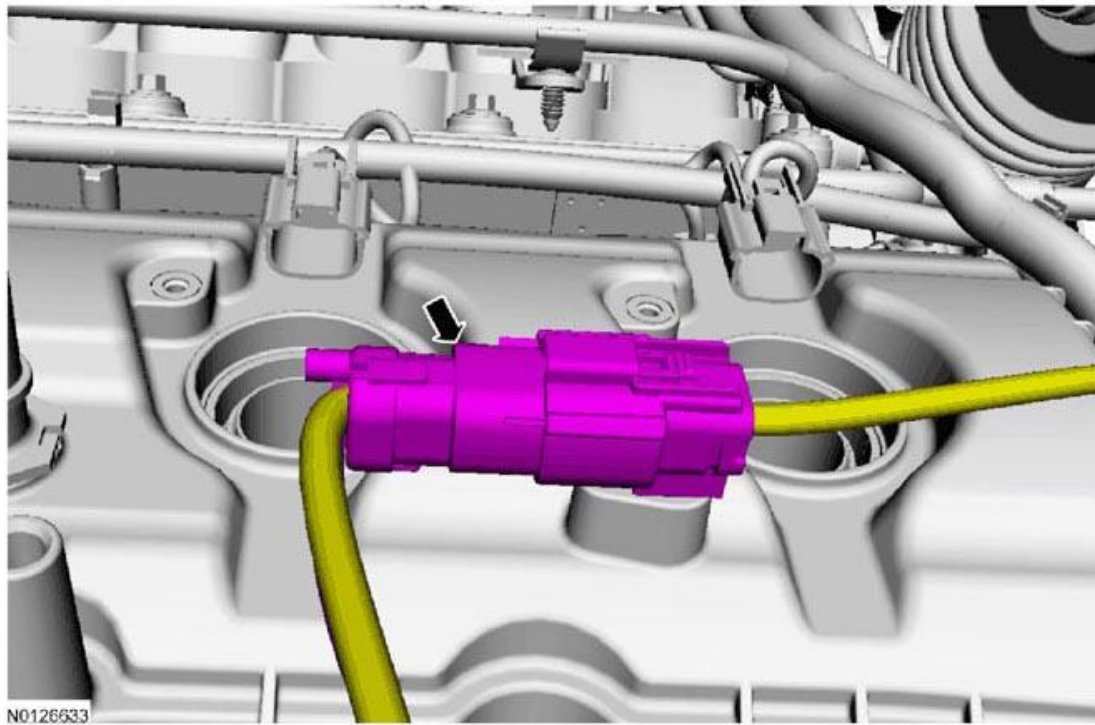


Fig. 37: Identifying Valve Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. *Torque* : 10 Nm
5. If equipped.

Torque : 3 Nm

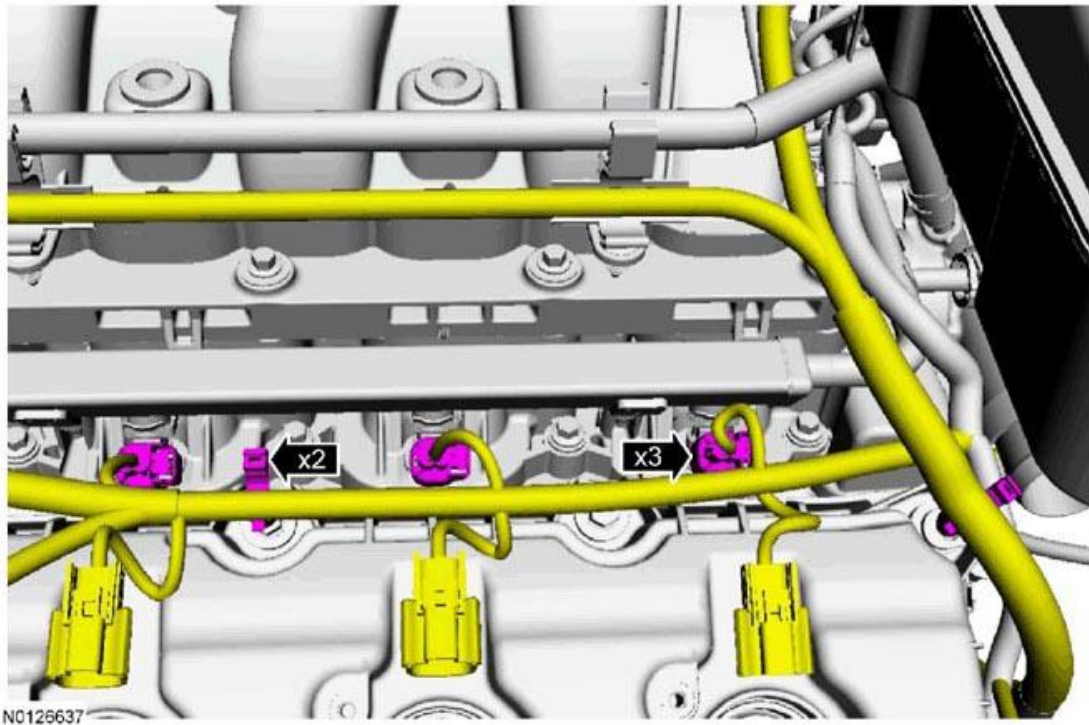
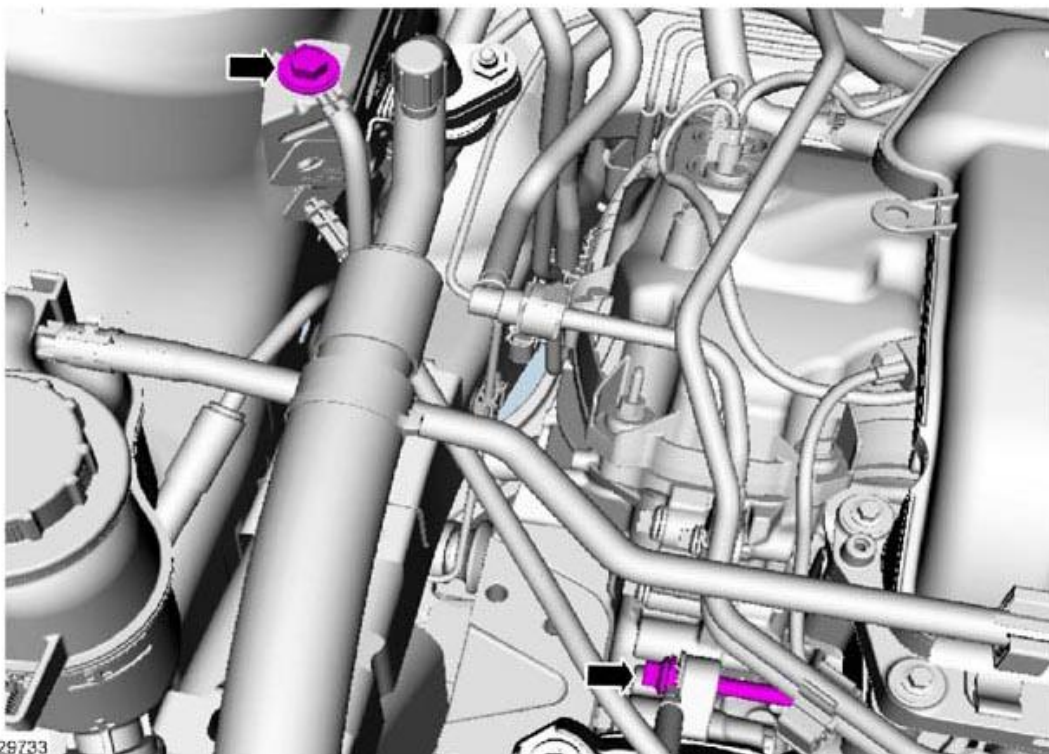


Fig. 38: Locating Stud Bolts
Courtesy of FORD MOTOR CO.



6.

Fig. 39: Locating Oil Dipstick

Courtesy of FORD MOTOR CO.

7. *Torque* : 10 Nm

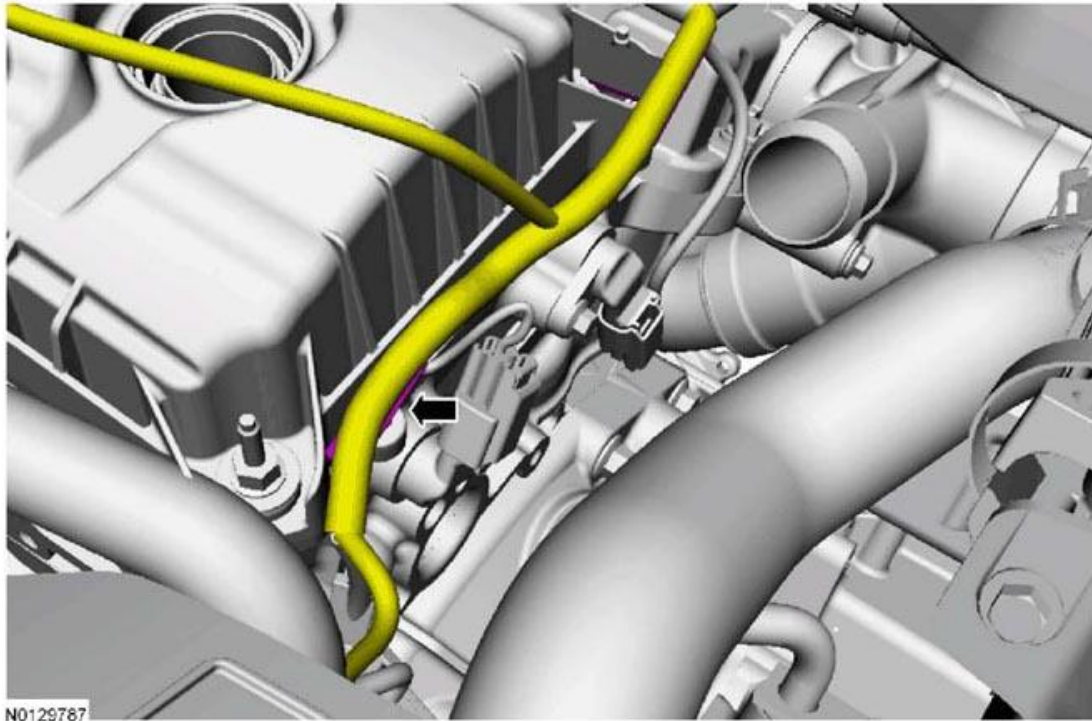
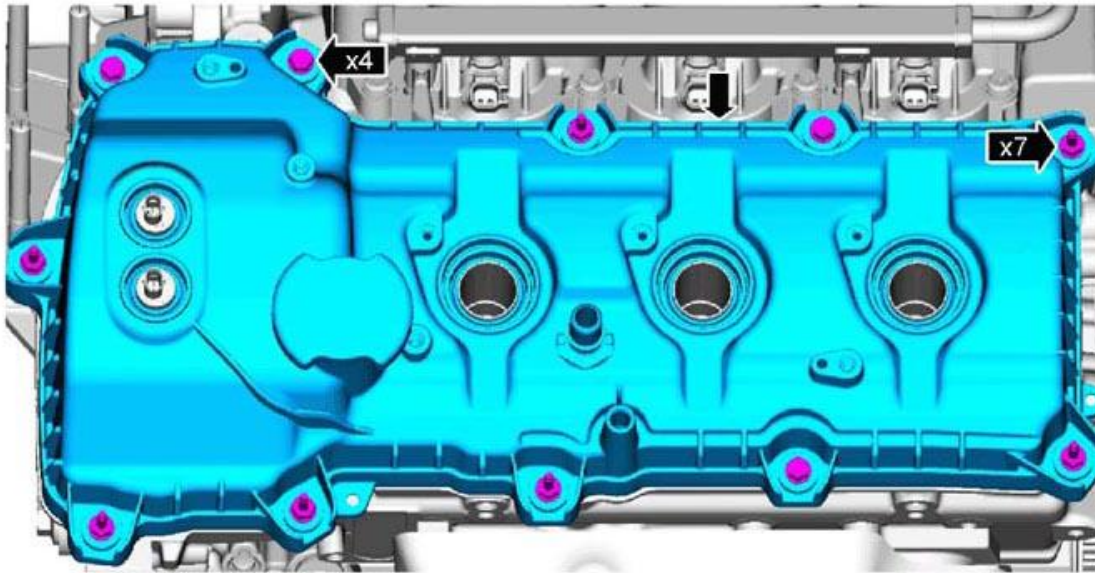


Fig. 40: Locating Bracket And Bolt
Courtesy of FORD MOTOR CO.

8. Refer to: **QUICK RELEASE COUPLING** .



N0126731

Fig. 41: Identifying Quick Release Coupling
Courtesy of FORD MOTOR CO.



N0119608

9.

Fig. 42: Locating Valve Cover Studs And Nuts
Courtesy of FORD MOTOR CO.



10.

Fig. 43: Locating Harness Connector
Courtesy of FORD MOTOR CO.



11.

Fig. 44: Locating Harness Connector
Courtesy of FORD MOTOR CO.

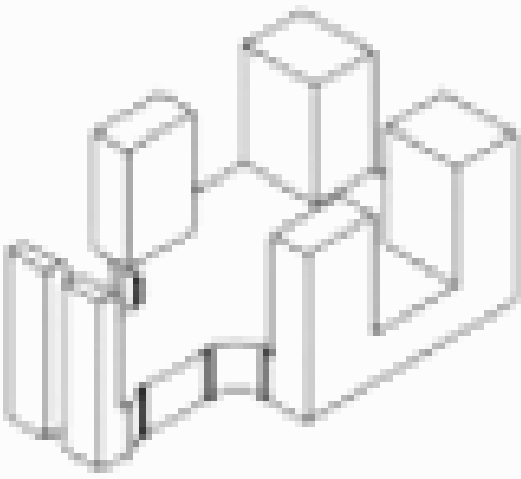
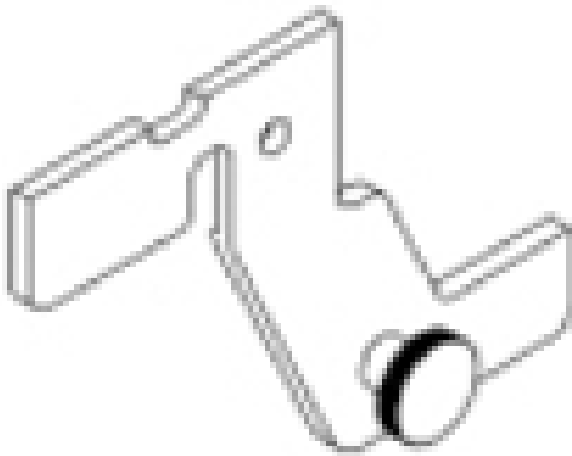
12. Refer to: **IGNITION COIL-ON-PLUG** .

CRANKSHAFT PULLEY

SPECIAL TOOL(S) / GENERAL EQUIPMENT

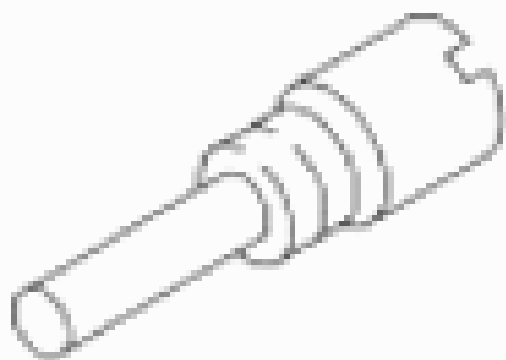
303-1521

Alignment Tool, Crankshaft Position Sensor

**E121926****E133912****303-1565**
Alignment Tool, Camshaft**303-507**
Timing Peg, Crankshaft TDC

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



PZ21210

TKIT-2001N-FLM



303-D055

303-D055
Strap Wrench

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

Removal

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond

washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

NOTE: Early build engines have a 6-rib crankshaft pulley, late build engines have a 4-rib crankshaft pulley. Early built shown in illustration.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .



- 2.

Fig. 45: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.

3. Remove the following items:
 1. Remove the RH front fender splash shield.

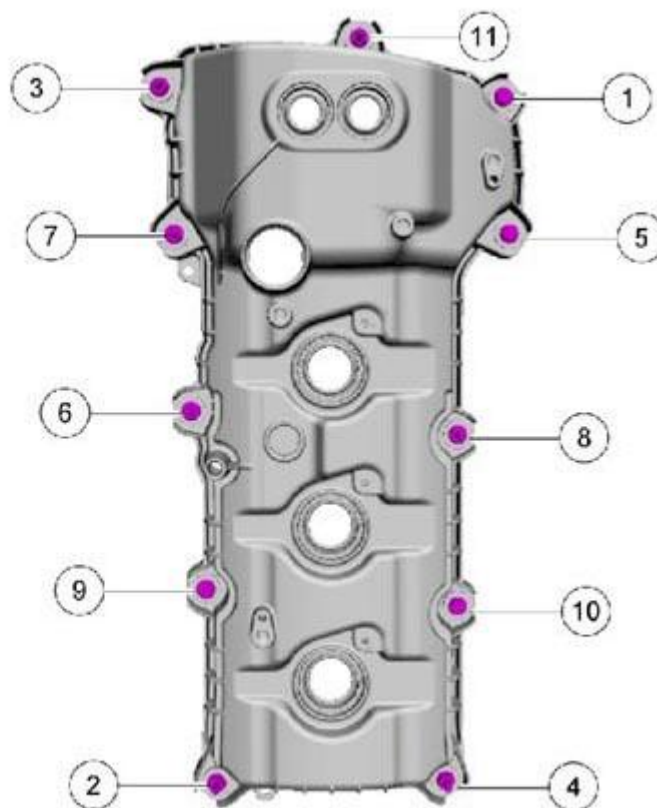
Refer to: **FENDER SPLASH SHIELD** .

2. Refer to: AIR CLEANER OUTLET PIPE .
3. Refer to: ACCESSORY DRIVE BELT .
4. Refer to: Valve Cover .



4.

Fig. 46: Locating CKP Sensor Connector
Courtesy of FORD MOTOR CO.



5.

Fig. 47: Locating CKP Sensor Bolts
Courtesy of FORD MOTOR CO.

6. Turn the crankshaft until piston No. 1 is 45 degrees before TDC by using the guide holes on the engine

front cover and the crankshaft pulley.

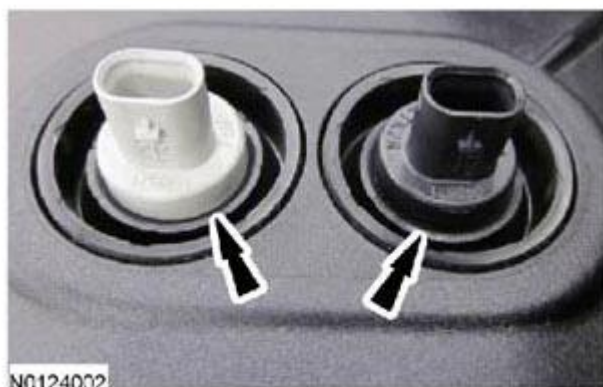
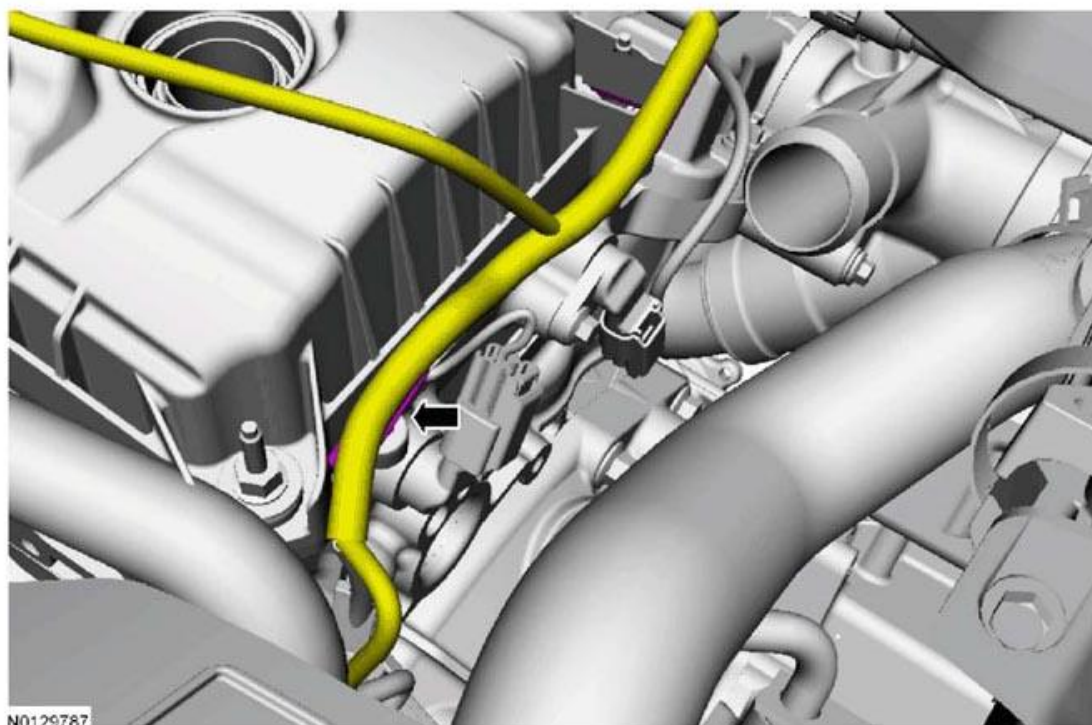


Fig. 48: Turning Crankshaft Until Piston No. 1 Is 45 Degrees
Courtesy of FORD MOTOR CO.



7.

Fig. 49: Locating Plug
Courtesy of FORD MOTOR CO.

NOTE: The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.

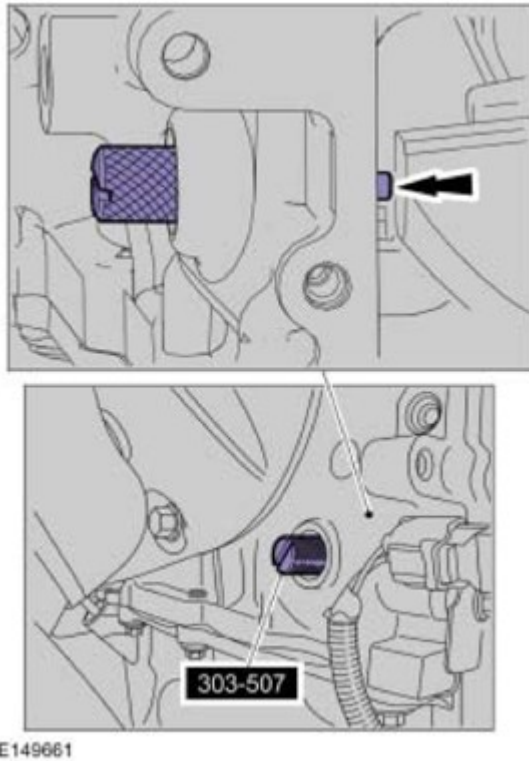


Fig. 50: Identifying 303-507 Timing Peg
Courtesy of FORD MOTOR CO.

8. Install the special tool and using the crankshaft pulley bolt, turn the crankshaft clockwise slowly until contact is made with the special tool.

Special Tool(s) : 303-507 (Timing Peg, Crankshaft TDC)

NOTE: The special tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

NOTE: The camshaft timing slots are offset. If the special tool cannot be installed, remove the special tool and rotate the crankshaft three-fourths of a revolution clockwise and repeat the previous step of this procedure.

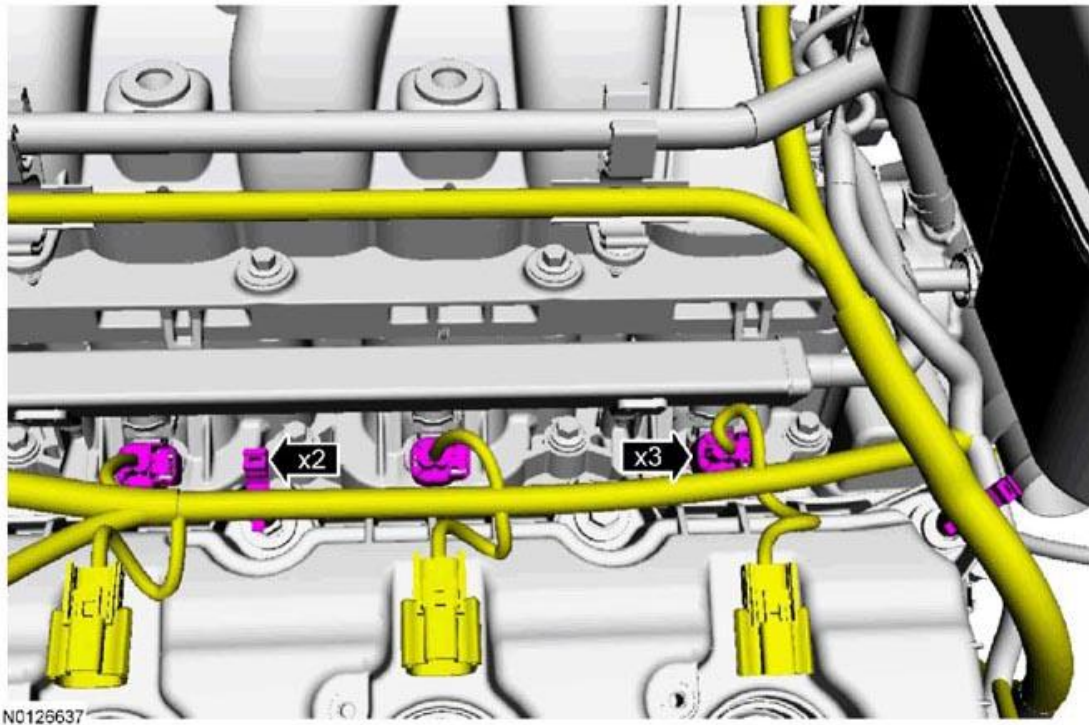


Fig. 51: Identifying 303-1565 Alignment Tool

Courtesy of FORD MOTOR CO.

9. Rotate the special tool so the tool number faces down and install into the rear of the intake camshaft slot as shown in illustration.

Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)

NOTE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer must be replaced. Remove and discard the diamond washer. If the diamond washer is not installed, engine damage may occur.

10.

NOTE: The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool, and the crankshaft pulley bolt should be removed using an air impact wrench (1/2-in drive minimum).

- Use the special tool to hold the crankshaft pulley. Use an air impact wrench to remove the crankshaft pulley bolt.

Special Tool(s) : 303-D055 (Strap Wrench)

- Remove and discard the crankshaft pulley bolt and washer.

- Remove the crankshaft pulley.

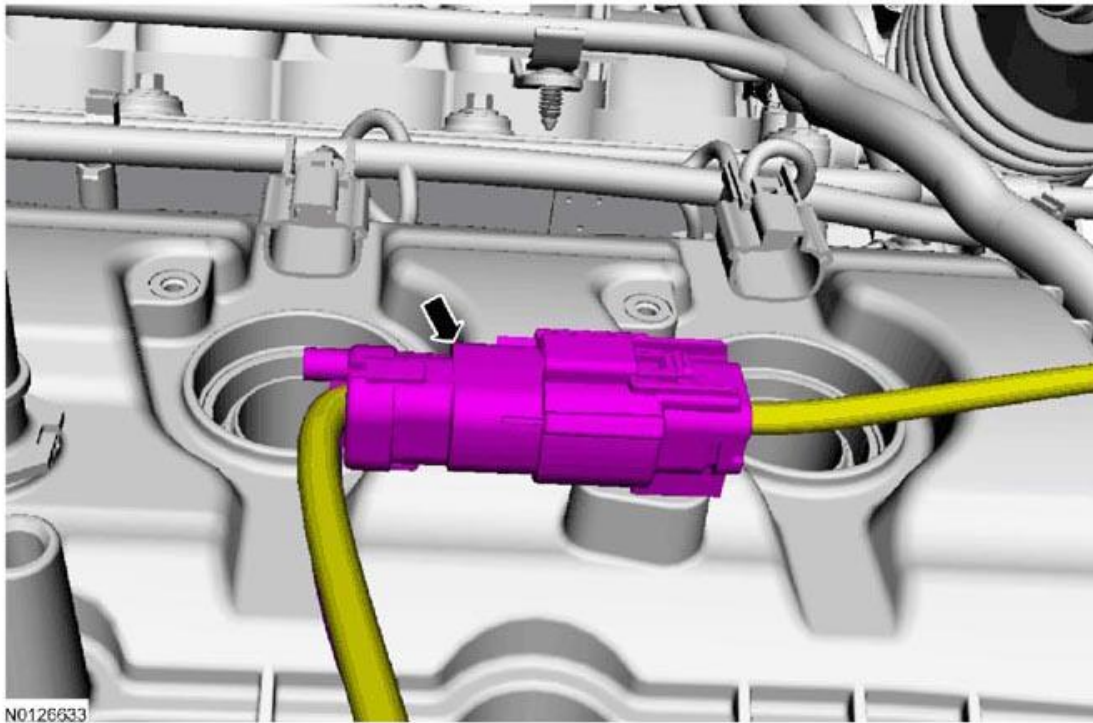


Fig. 52: Holding Crankshaft Pulley Using 303-D055 Strap Wrench
Courtesy of FORD MOTOR CO.

11. Remove the diamond washer and discard.

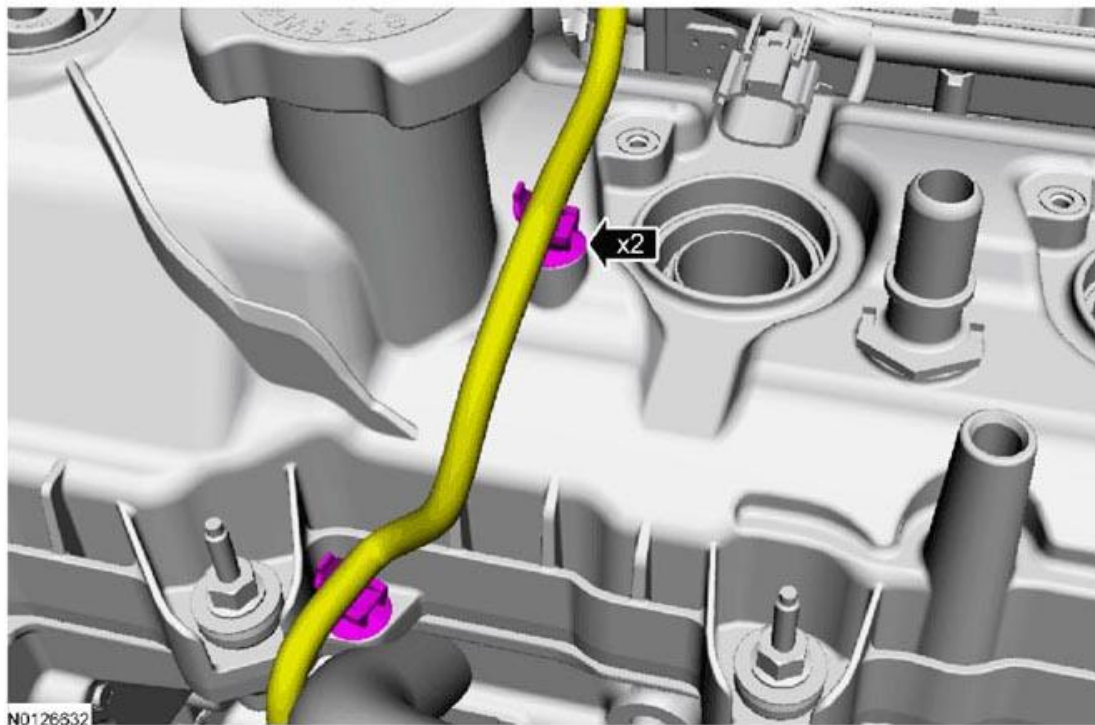


Fig. 53: Locating Diamond Washer
Courtesy of FORD MOTOR CO.

Installation

1. Install a new diamond washer onto the crankshaft.

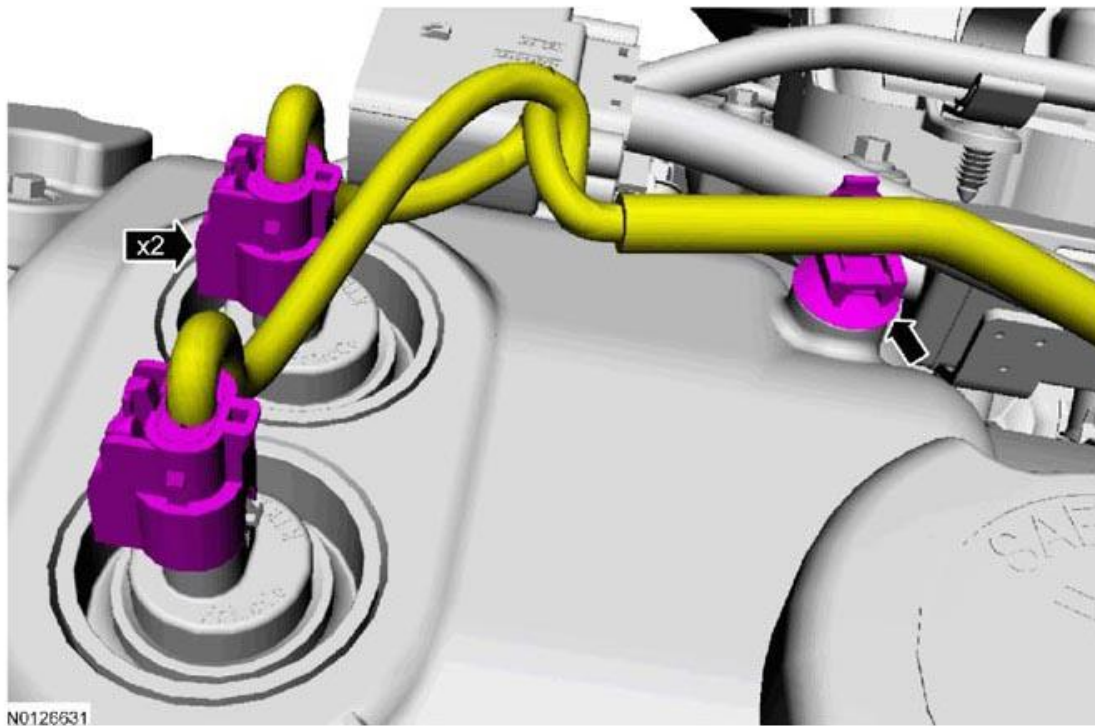


Fig. 54: Locating Diamond Washer
Courtesy of FORD MOTOR CO.

NOTE: Do not install the crankshaft pulley bolt at this time.

NOTE: Apply clean engine oil on the seal area before installing.

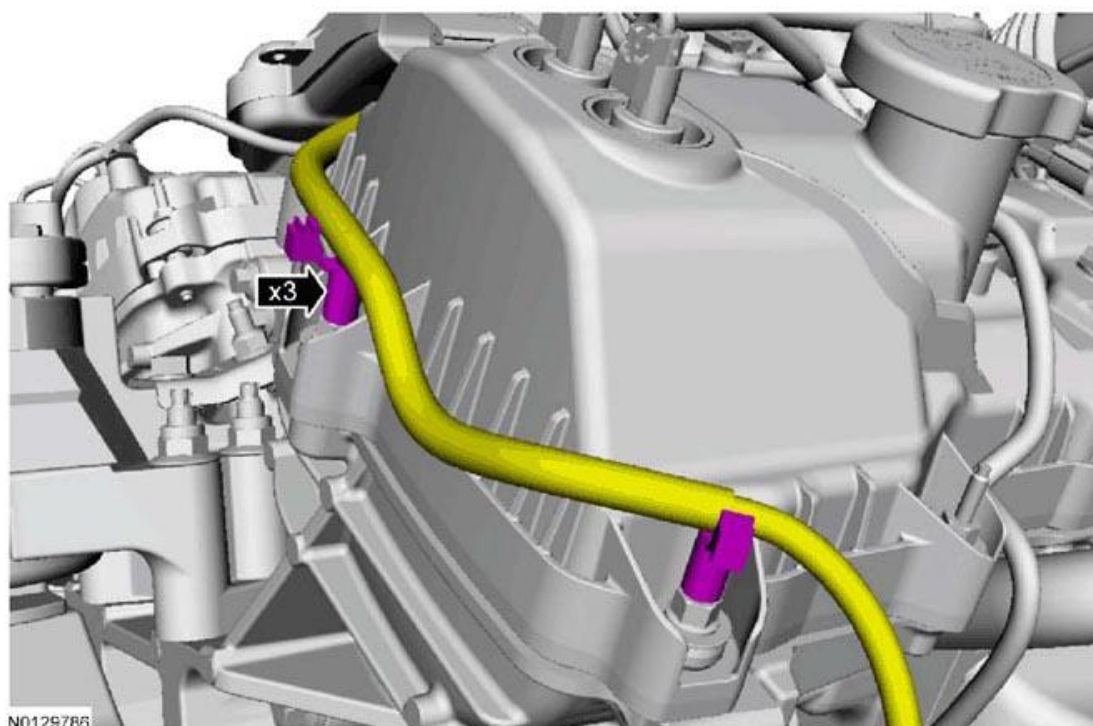


Fig. 55: Positioning Crankshaft Pulley Onto Crankshaft With Crankshaft Pulley TDC Guide Hole At 6 O'Clock Position
Courtesy of FORD MOTOR CO.

2. Position the crankshaft pulley onto the crankshaft with the crankshaft pulley TDC guide hole at the 6 o'clock position.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

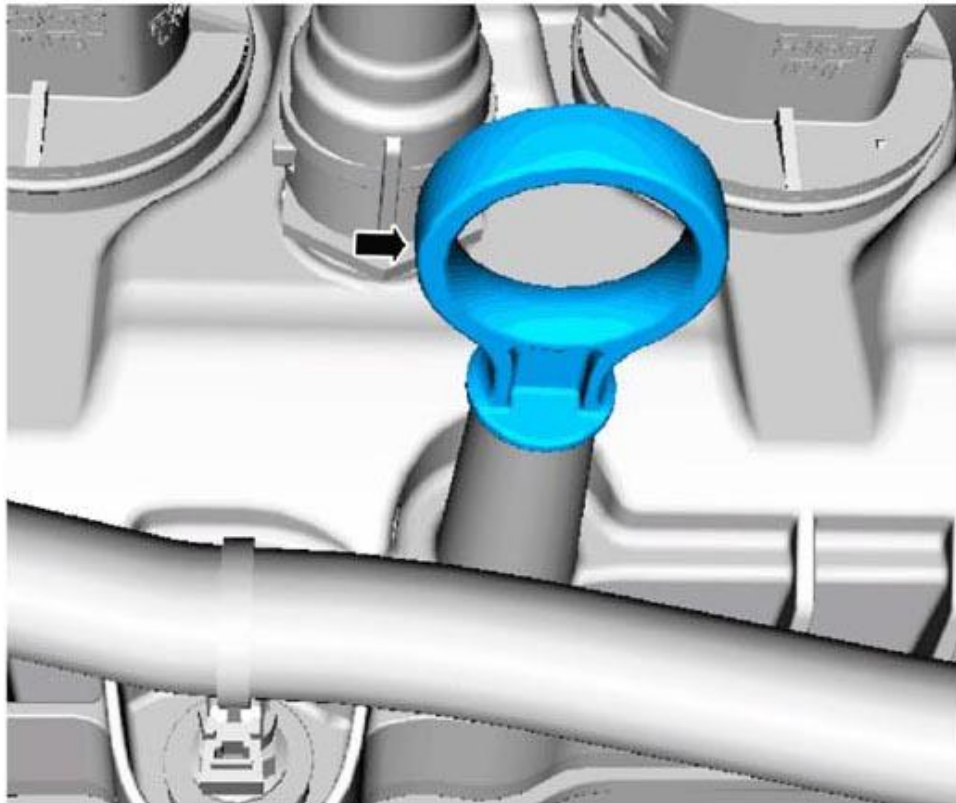


Fig. 56: Installing Standard Bolt Through Crankshaft Pulley TDC Guide Hole And Into Engine Front Cover TDC Guide Hole
Courtesy of FORD MOTOR CO.

3. Install a standard bolt through the crankshaft pulley TDC guide hole and into the engine front cover TDC guide hole.

NOTE: The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool and a new bolt should be installed using hand tools only.

NOTE: Do not reuse the crankshaft pulley bolt.

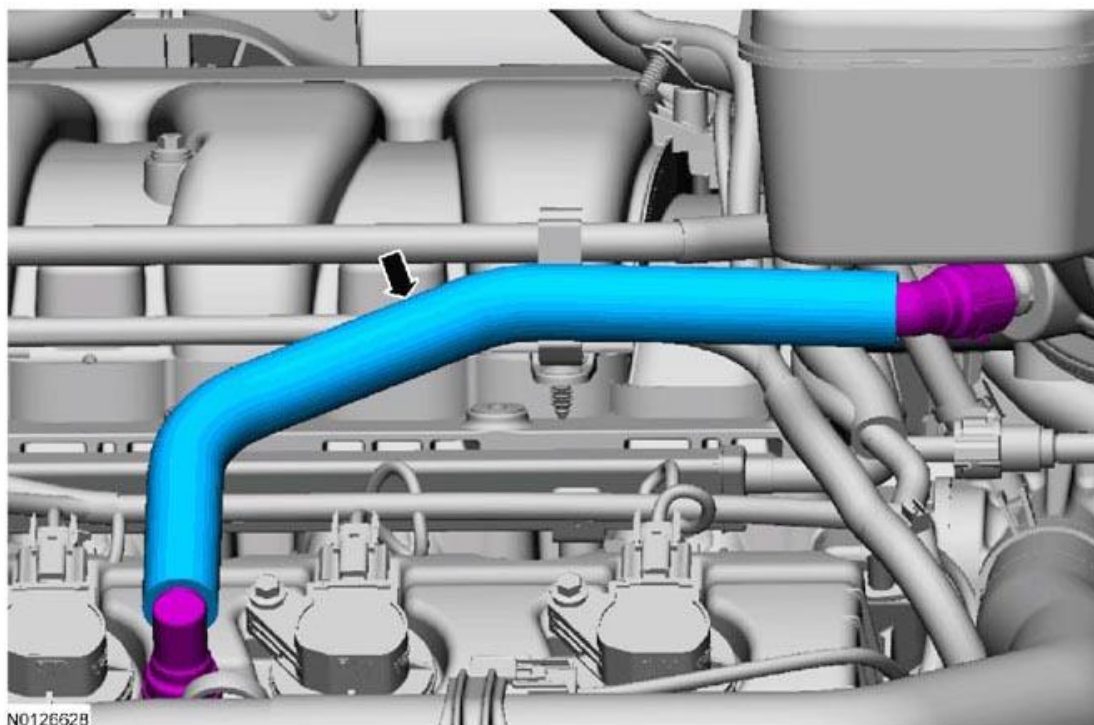


Fig. 57: Holding Crankshaft Pulley Using 303-D055 Strap Wrench
Courtesy of FORD MOTOR CO.

4. Install a new crankshaft pulley bolt. Use the special tool to hold the crankshaft pulley, tighten the crankshaft pulley bolt in 2 stages:

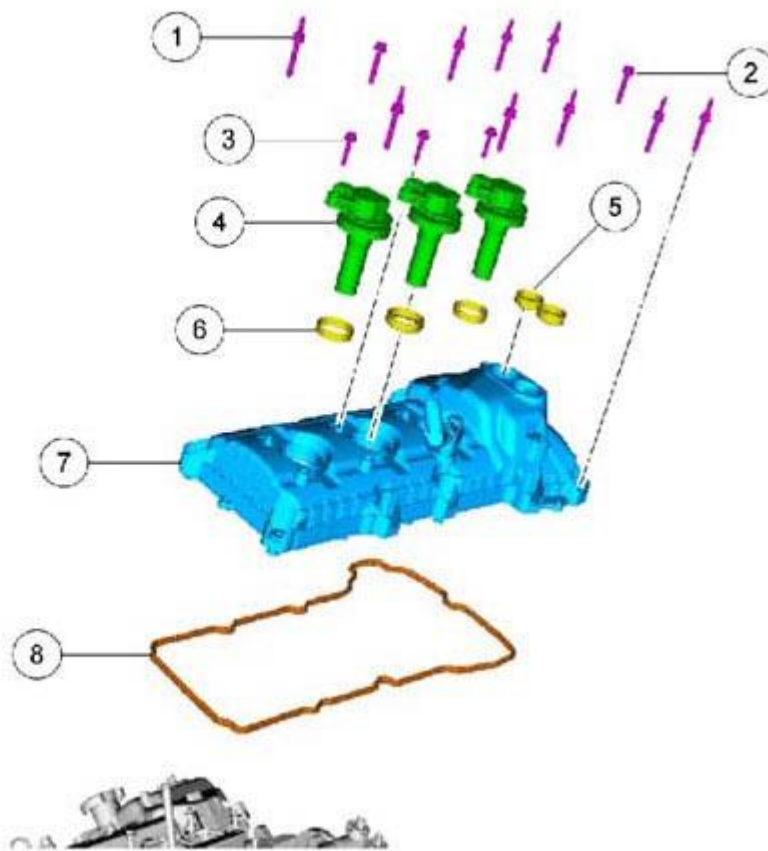
Special Tool(s) : **303-D055 (Strap Wrench)**

Torque :

Stage 1: 100 Nm

Stage 2: Tighten an additional 90°

5. Remove.



N0129734

Fig. 58: Removing Standard Bolt From Crankshaft Pulley TDC Guide Hole And On Engine Front Cover TDC Guide Hole
Courtesy of FORD MOTOR CO.

6. Do not tighten the bolts at this time.

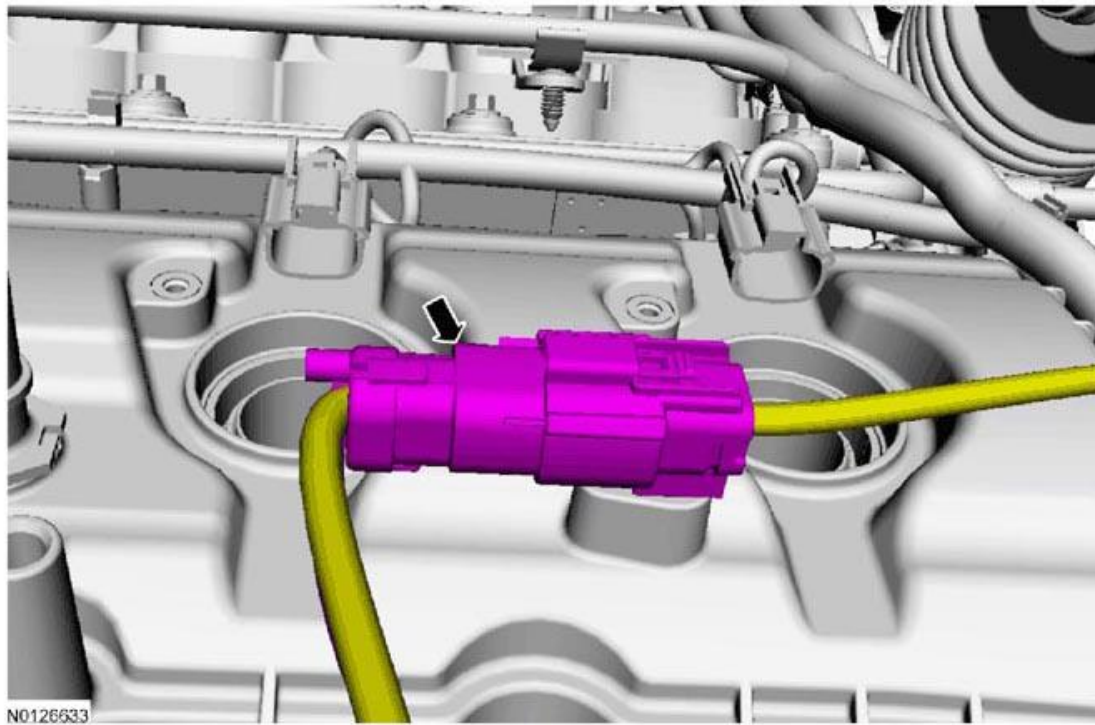


Fig. 59: Locating CKP Sensor Bolts
Courtesy of FORD MOTOR CO.

7. Install the special tool to set the CKP sensor position and tighten the 2 bolts.

Special Tool(s) : 303-1521 (Alignment Tool, Crankshaft Position Sensor)

Torque : 7 Nm

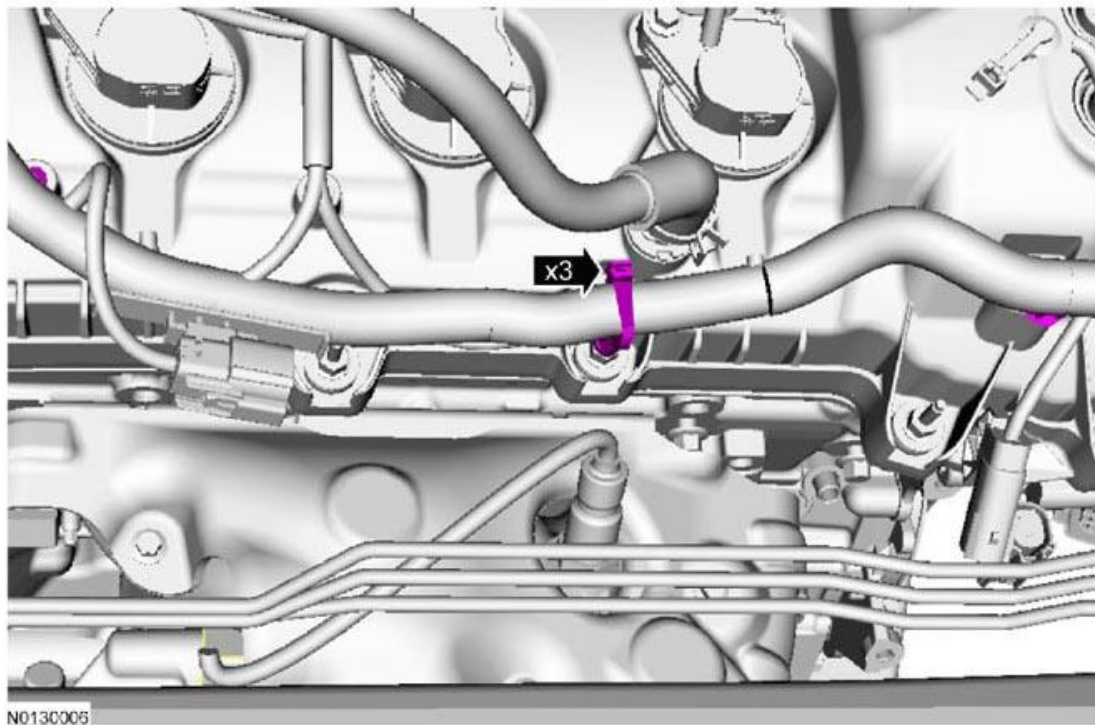
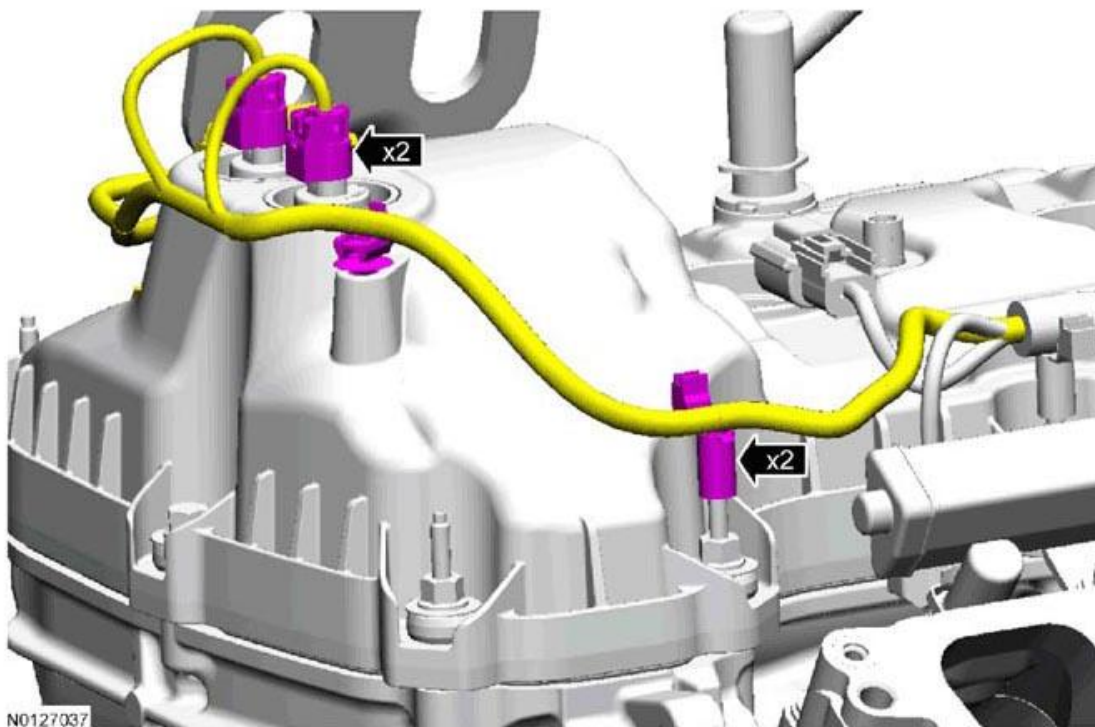


Fig. 60: Locating CKP Sensor Bolts And 303-1521 Alignment Tool
Courtesy of FORD MOTOR CO.



8.

Fig. 61: Locating CKP Sensor Connector
Courtesy of FORD MOTOR CO.

9. *Torque* : 20 Nm

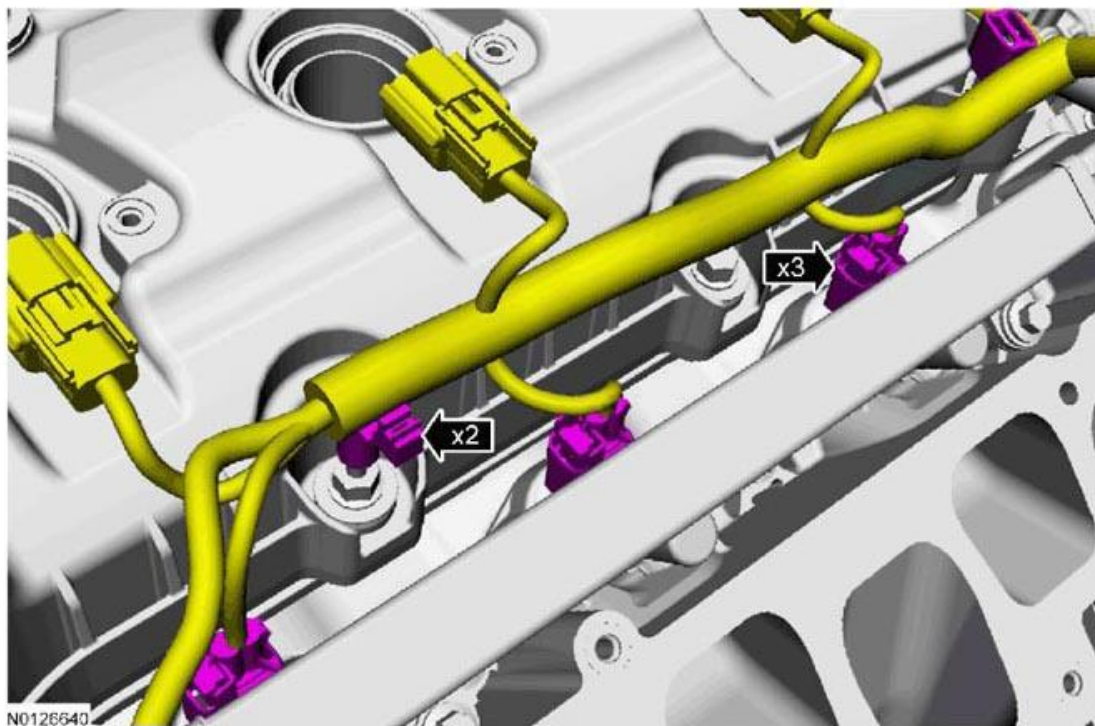


Fig. 62: Locating Plug
Courtesy of FORD MOTOR CO.

10. *Remove the Special Tool(s)* : 303-1565 (Alignment Tool, Camshaft)

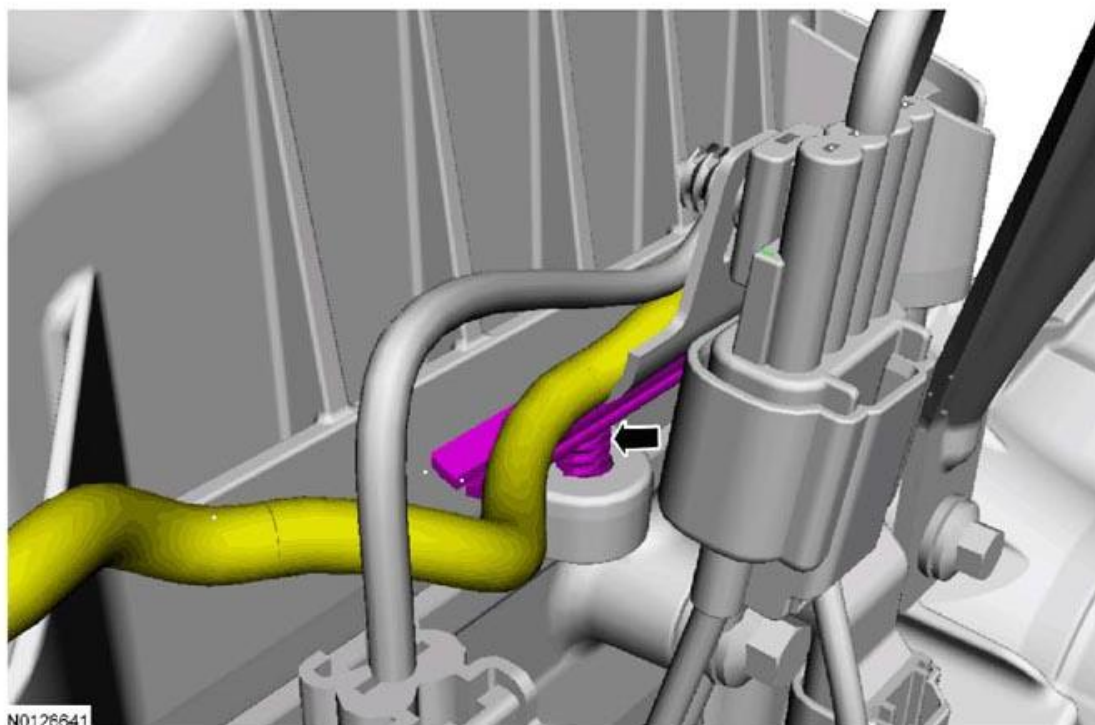
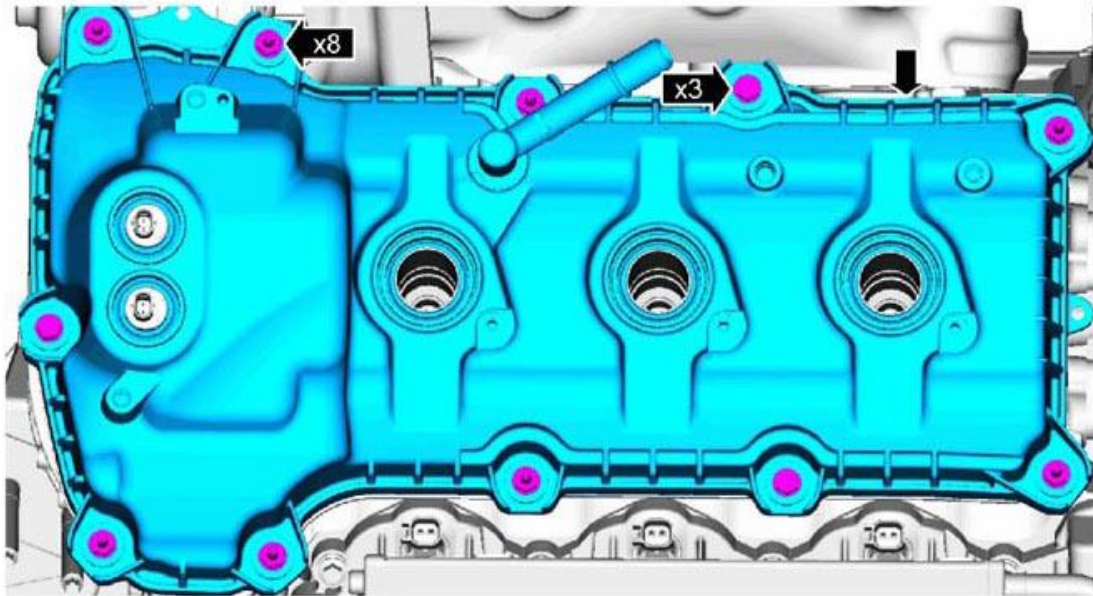


Fig. 63: Identifying 303-1565 Alignment Tool
Courtesy of FORD MOTOR CO.

11. Install the following items:

1. Refer to: **Valve Cover** .
2. Refer to: **AIR CLEANER OUTLET PIPE** .
3. Refer to: **ACCESSORY DRIVE BELT** .
4. Install the RH fender splash shield.

Refer to: **FENDER SPLASH SHIELD** .



12. N0126733

Fig. 64: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.

CRANKSHAFT FRONT SEAL

SPECIAL TOOL(S) / GENERAL EQUIPMENT



303-096

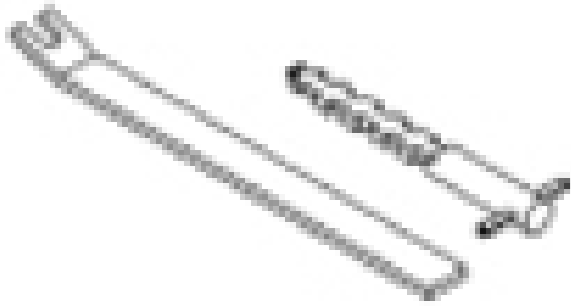
Installer, Camshaft Front Oil Seal
TKIT-2009TC-F

303-409

Remover, Crankshaft Seal
TKIT-1992-FH/FMH/FLMH

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



E134603

TKIT-1993-LMH/MH

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

Removal

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. Refer to: Crankshaft Pulley .

NOTE: Use care not to damage the crankshaft or the engine front cover when removing the seal.



Fig. 65: Removing Crankshaft Seal From Engine Front Cover Using 303-409 Remover
Courtesy of FORD MOTOR CO.

2. *Special Tool(s)* : 303-409 (Remover, Crankshaft Seal)

Installation

NOTE: Remove the through-bolt from the special tool.



Fig. 66: Installing Camshaft Front Oil Seal Using 303-096 Installer
Courtesy of FORD MOTOR CO.

1. *Special Tool(s)* : 303-096 (Installer, Camshaft Front Oil Seal)

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

2. Refer to: **Crankshaft Pulley** .

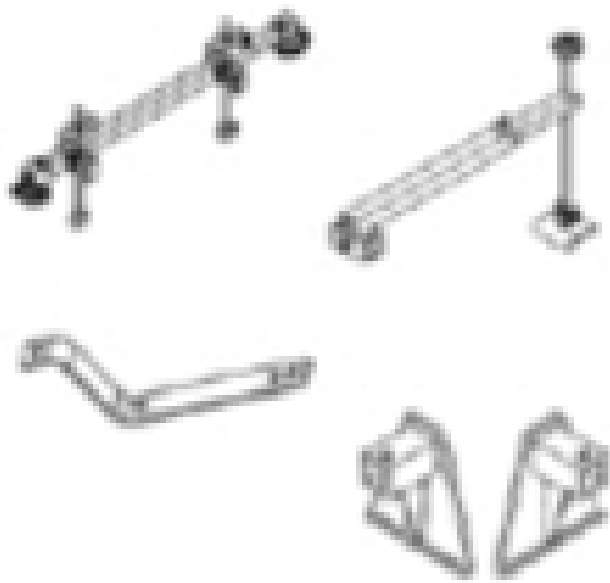
ENGINE FRONT COVER

SPECIAL TOOL(S) / GENERAL EQUIPMENT

303-F072
Support Bar, Engine

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30	-
Motorcraft® Metal Surface Prep ZC-31-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

1. Refer to: **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING** .



2.

Fig. 67: Locating Reservoir Tank
Courtesy of FORD MOTOR CO.

3. Loosen.



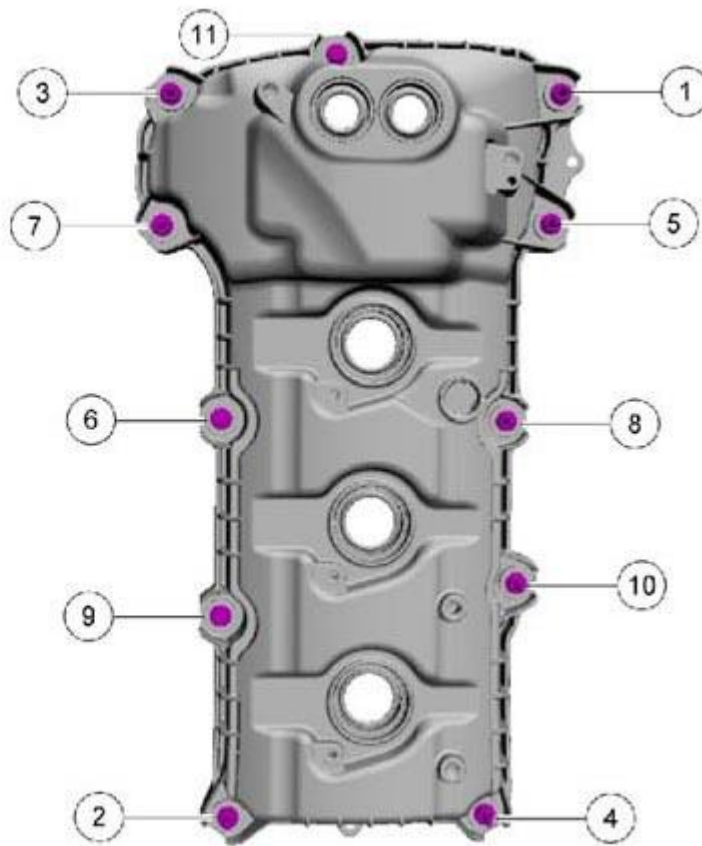
Fig. 68: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.

4. Refer to: **COWL PANEL GRILLE** .
5. *Install the Special Tool(s) : 303-F072 (Support Bar, Engine)*



Fig. 69: Identifying 303-F072 Support Bar On Engine
Courtesy of FORD MOTOR CO.

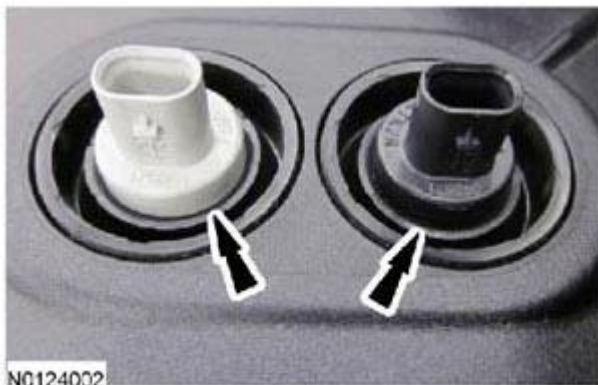
6. Refer to: **Crankshaft Front Seal** .



N0130007

7.

Fig. 70: Locating Pulley Bracket Bolts
Courtesy of FORD MOTOR CO.



N0124002

8.

Fig. 71: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.

9. **NOTE:** Discard the O-ring seal.

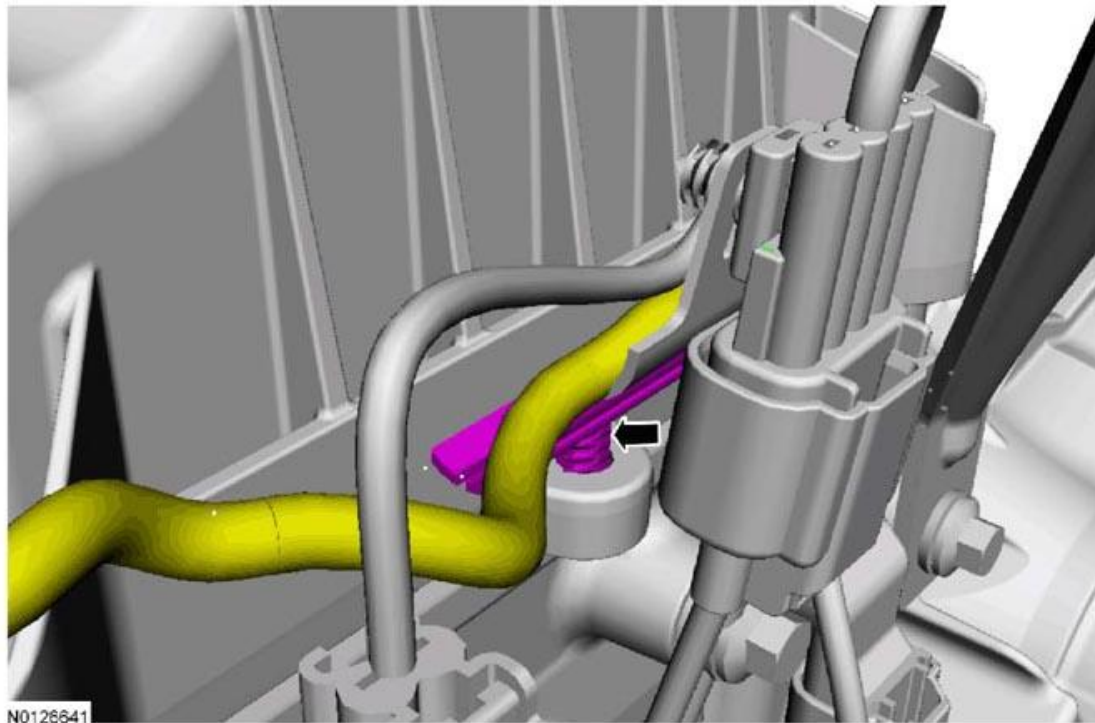
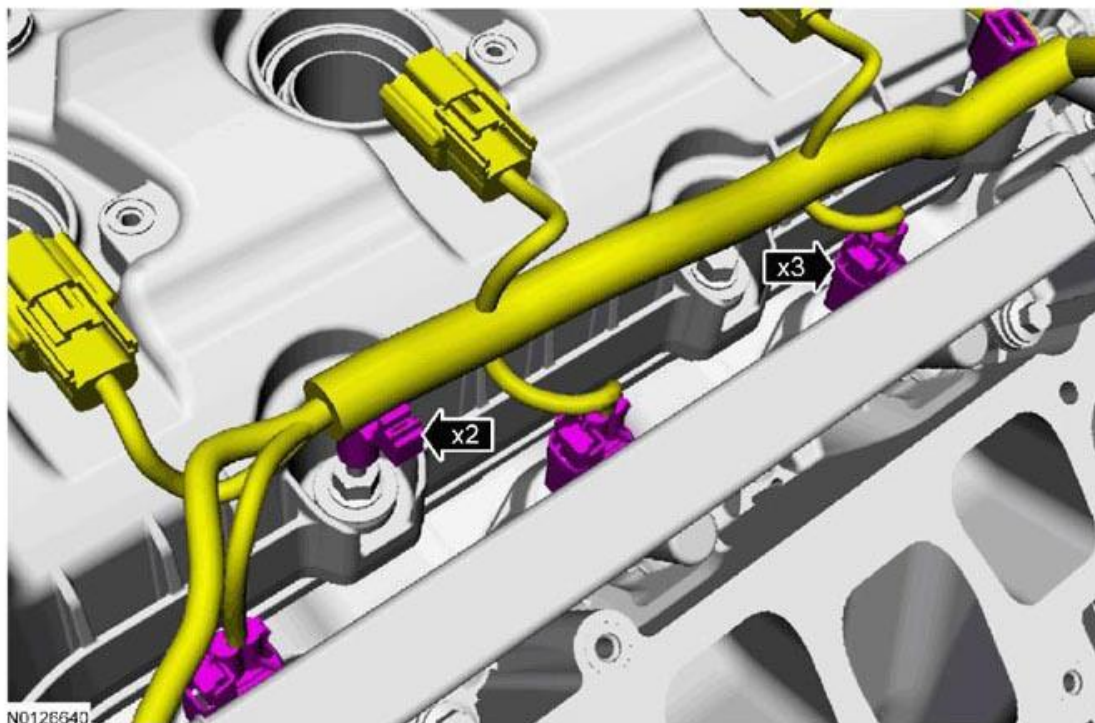
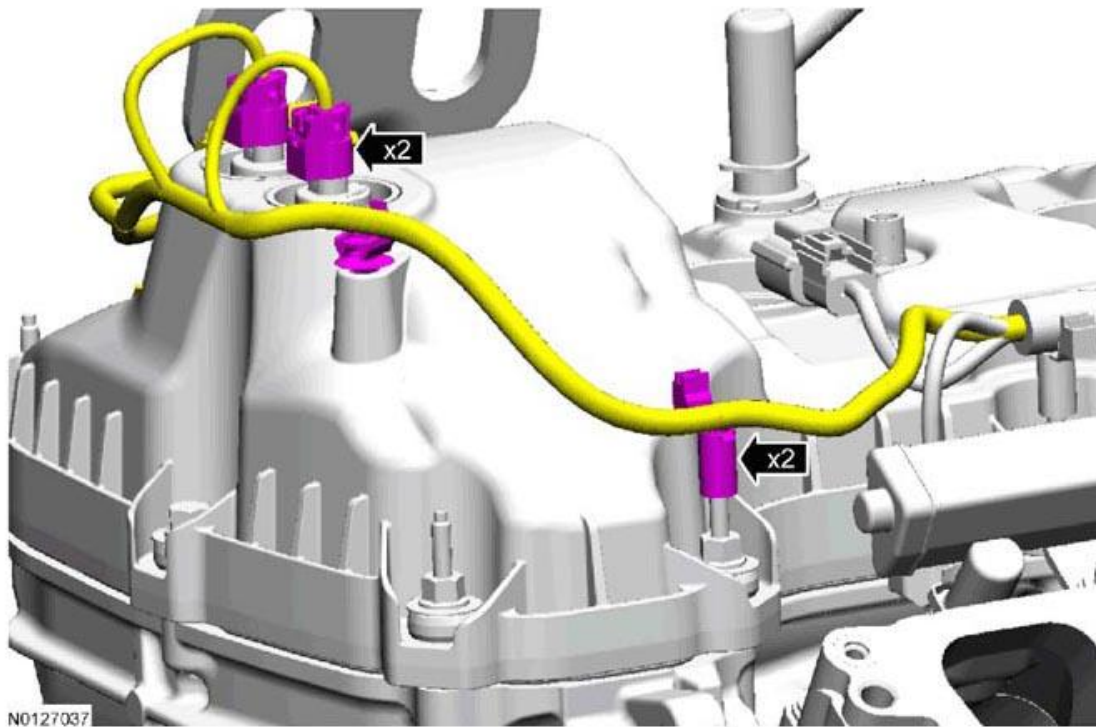


Fig. 72: Locating AC Pipe Nut And O-Ring Seal
Courtesy of FORD MOTOR CO.



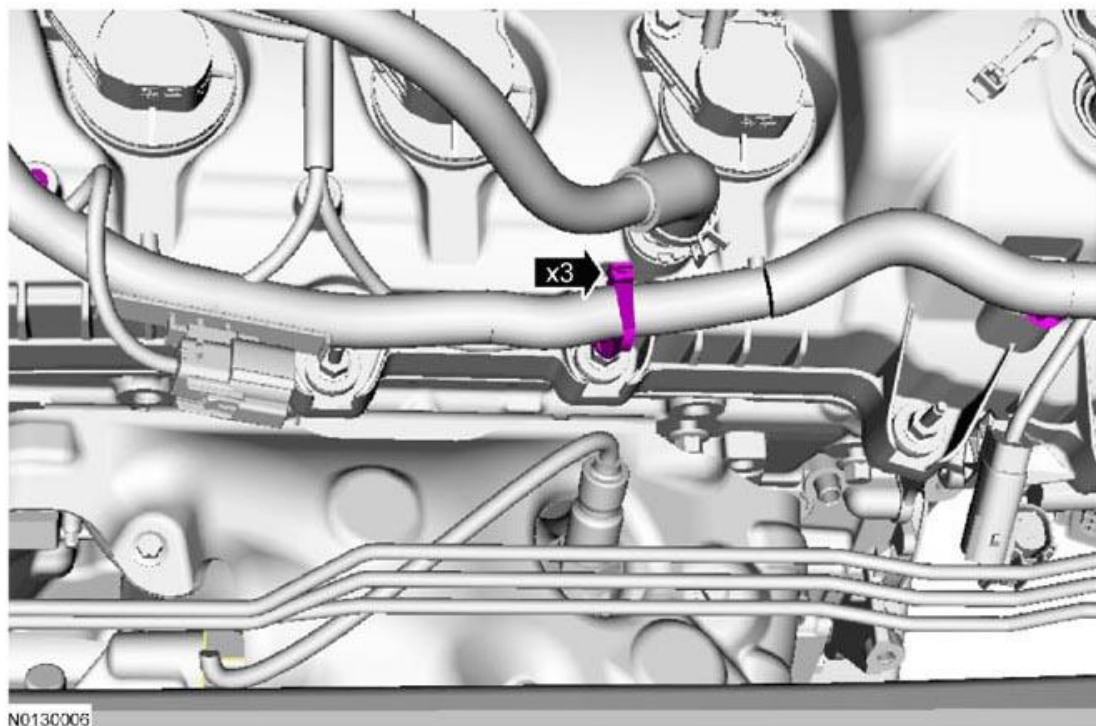
10.

Fig. 73: Locating AC Pipe Bracket
Courtesy of FORD MOTOR CO.



11.

Fig. 74: Locating Bolts And Nuts
Courtesy of FORD MOTOR CO.



12.

Fig. 75: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

Installation

NOTE: Do not use metal scrapers, wire brushes, power abrasive disks or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

1. Clean and inspect the mounting surfaces of the engine and the front cover.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

Material : Motorcraft® Metal Surface Prep / ZC-31-A

NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

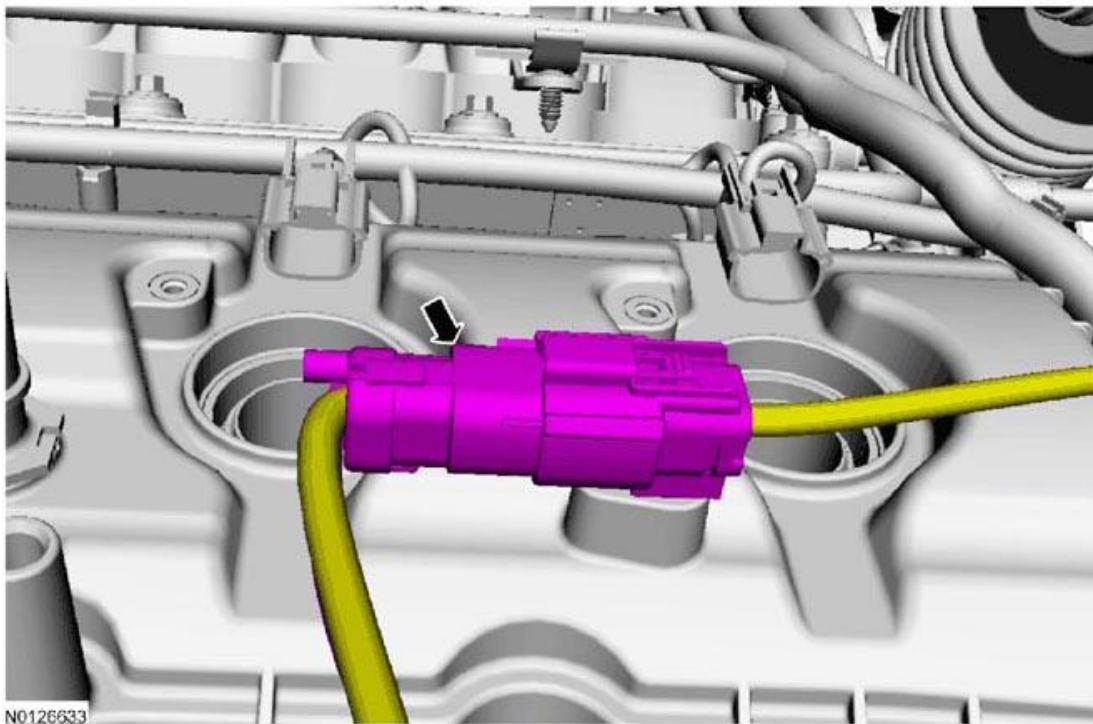
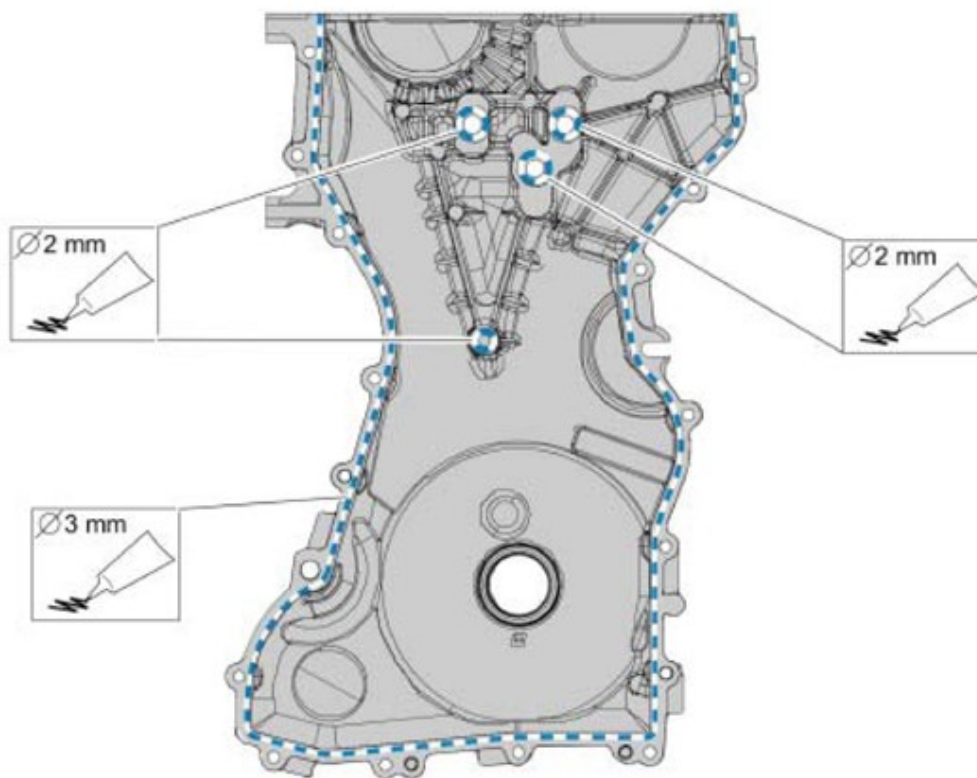


Fig. 76: Applying Sealant On Mounting Surfaces Of Engine And Front Cover
Courtesy of FORD MOTOR CO.

2. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with

Motorcraft Metal Surface Prep.



E149596

Fig. 77: Applying Sealant On Engine Front Cover
Courtesy of FORD MOTOR CO.

3. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

4.

- *Torque* : Tighten bolts 1 through 17 to 10 Nm
- *Torque* : Tighten bolts 19 through 21 to 48 Nm
- *Torque* : Tighten bolt 22 to 25 Nm
- *Torque* : Tighten bolt 18 to 48 Nm

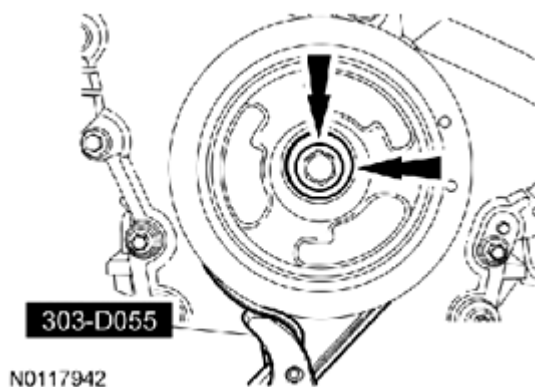


Fig. 78: Identifying Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

- 5.
6.
 - *Torque* : Tighten the 2 bolts to 90 Nm
 - *Torque* : Tighten the 2 nuts to 80 Nm

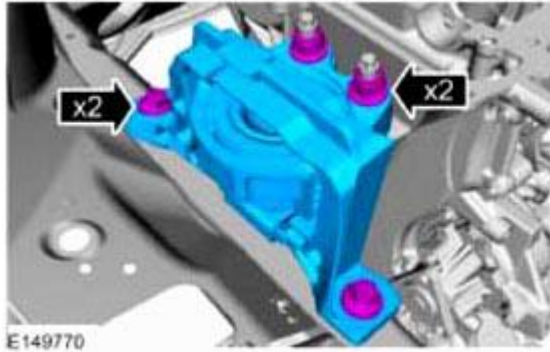
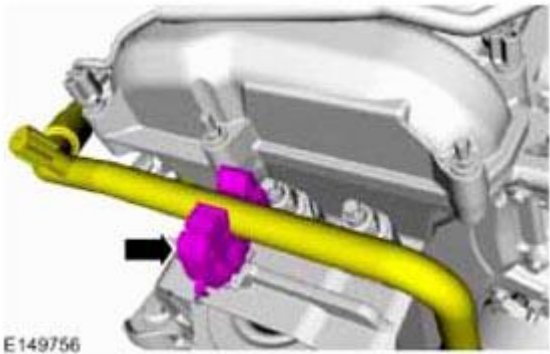


Fig. 79: Locating Bolts And Nuts
Courtesy of FORD MOTOR CO.



7.

Fig. 80: Locating AC Pipe Bracket
Courtesy of FORD MOTOR CO.

NOTE: Use a new O-ring seal.

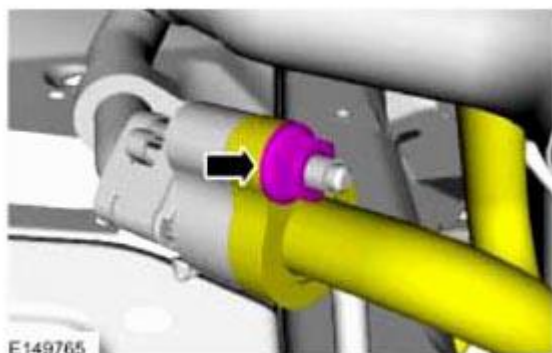


Fig. 81: Locating AC Pipe Nut And O-Ring Seal
Courtesy of FORD MOTOR CO.

8. Torque : 15 Nm
9. Finger tight.

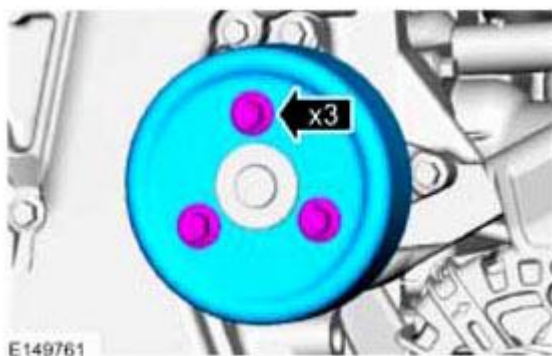


Fig. 82: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.

10. Torque : 25 Nm

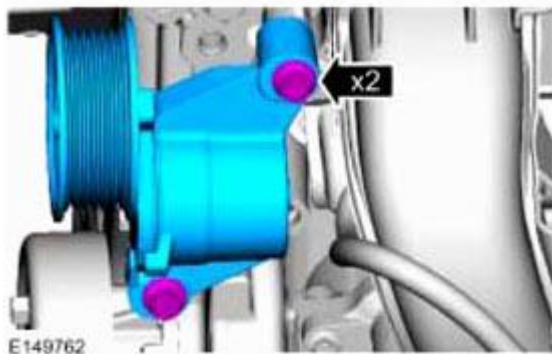


Fig. 83: Locating Pulley Bracket Bolts
Courtesy of FORD MOTOR CO.

11. Refer to: **Crankshaft Front Seal** .
12. *Remove the Special Tool(s) : 303-F072 (Support Bar, Engine)*

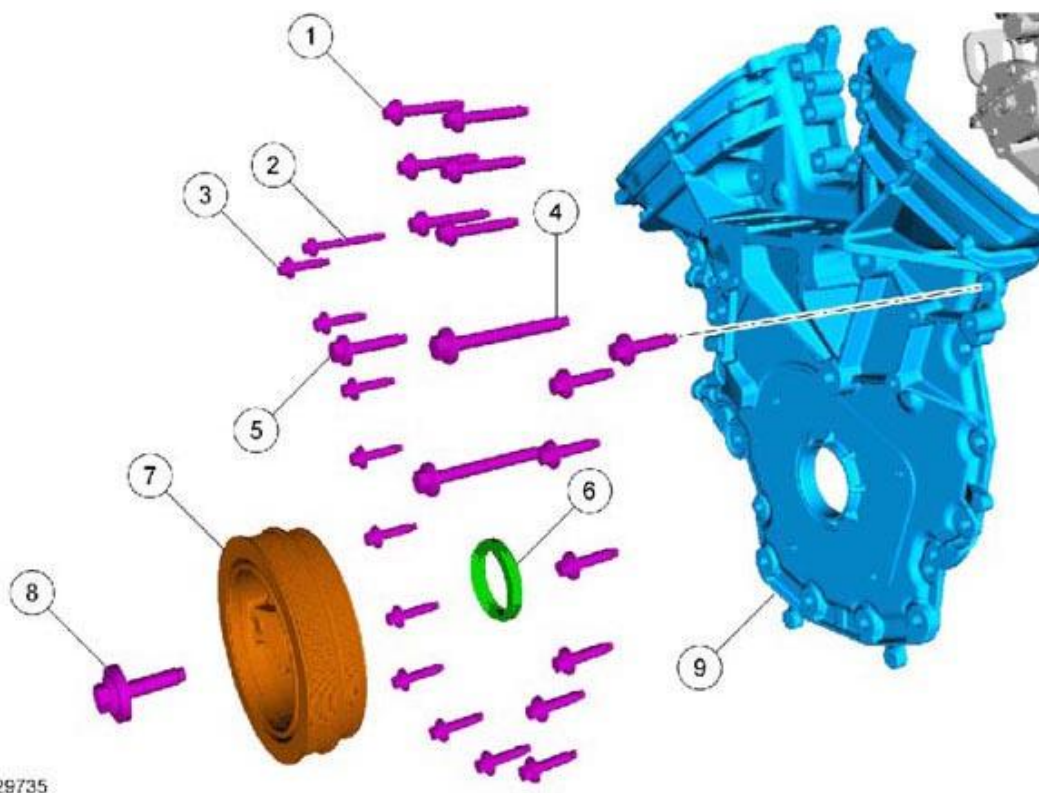


Fig. 84: Identifying 303-F072 Support Bar On Engine
 Courtesy of FORD MOTOR CO.

13. Refer to: **COWL PANEL GRILLE** .
14. *Torque : 20 Nm*

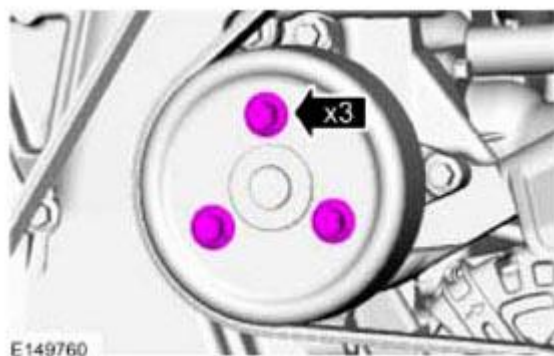
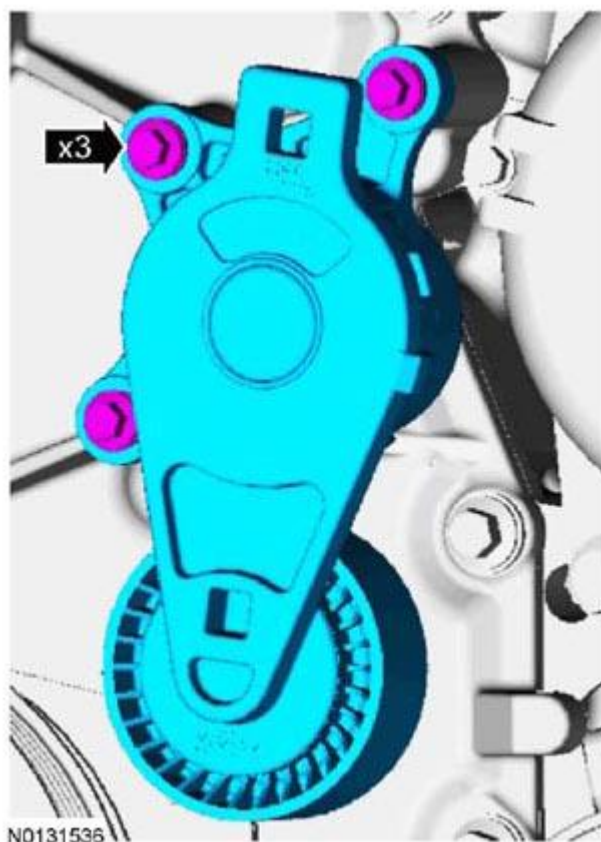


Fig. 85: Locating AC Clutch Pulley Bolts
 Courtesy of FORD MOTOR CO.



15.

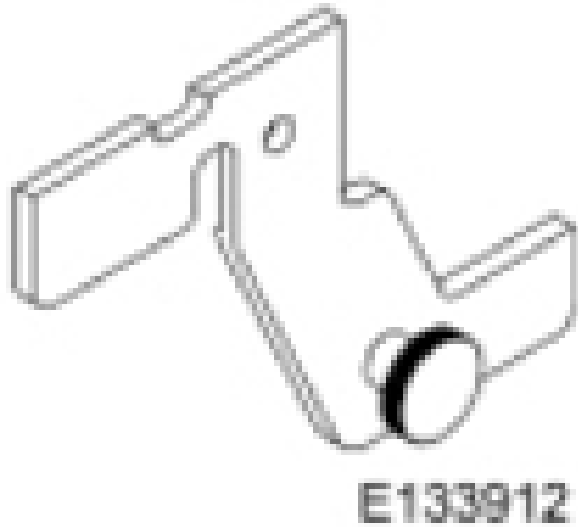
Fig. 86: Locating Reservoir Tank
Courtesy of FORD MOTOR CO.

16. Refer to: **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING** .

TIMING DRIVE COMPONENTS

SPECIAL TOOL(S) / GENERAL EQUIPMENT

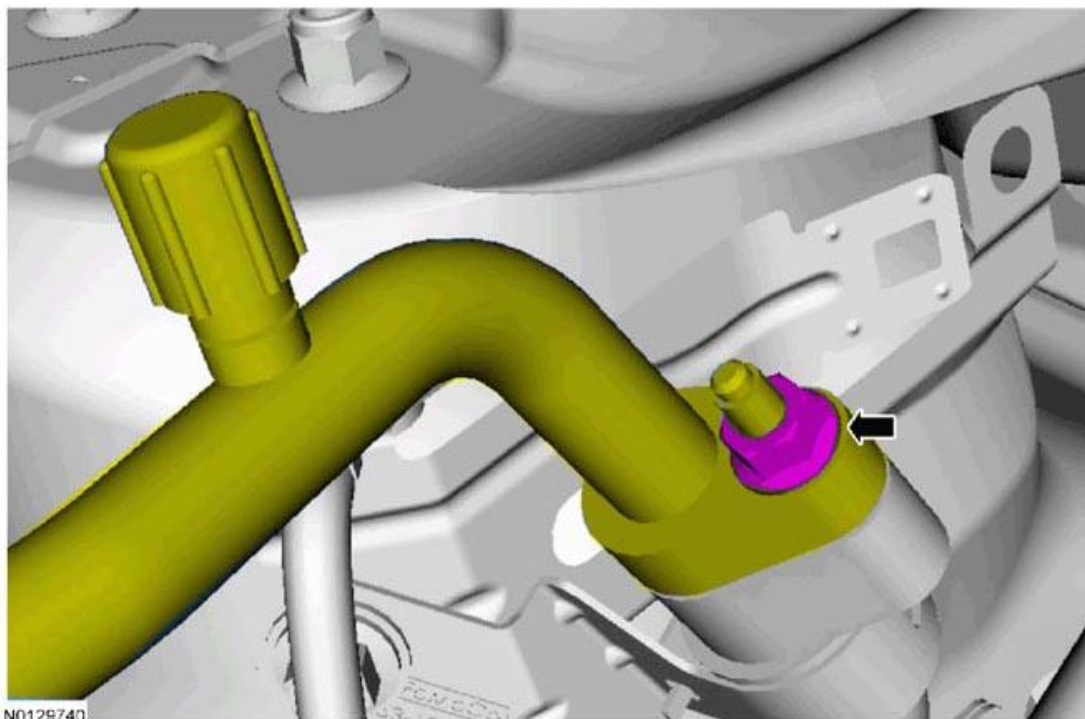
303-1565
Alignment Tool, Camshaft

**Removal**

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

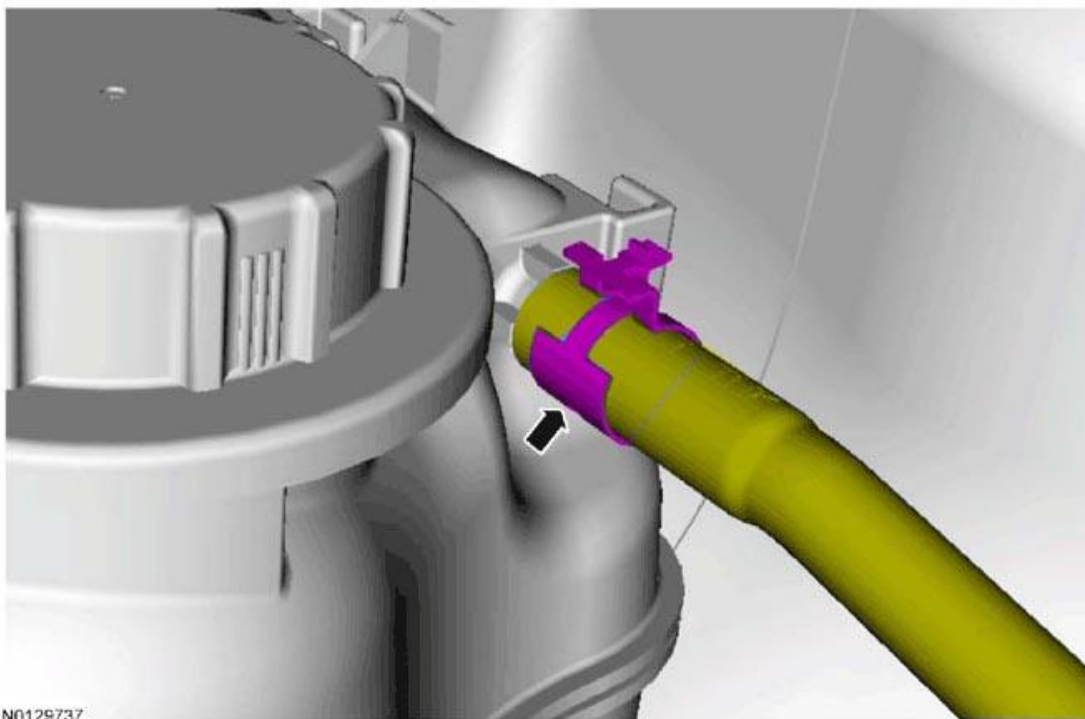
NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Remove the following items:
 1. Refer to: **FUEL INJECTION PUMP** .
 2. Refer to: **Engine Front Cover** .



3.

Fig. 87: Locating Fuel Injection Pump Bracket Nuts
Courtesy of FORD MOTOR CO.



4.

Fig. 88: Locating Fuel Injection Pump Cover Stud Bolts

Courtesy of FORD MOTOR CO.

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

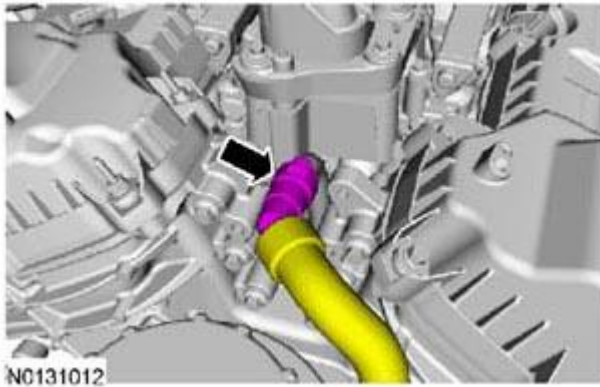


Fig. 89: Installing Camshaft Alignment Tool Into Rear Of Both Of Camshaft Slots
Courtesy of FORD MOTOR CO.

5. Install the Camshaft Alignment Tool into the rear of both of the camshaft slots as shown in illustration and tighten the retainer.

Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

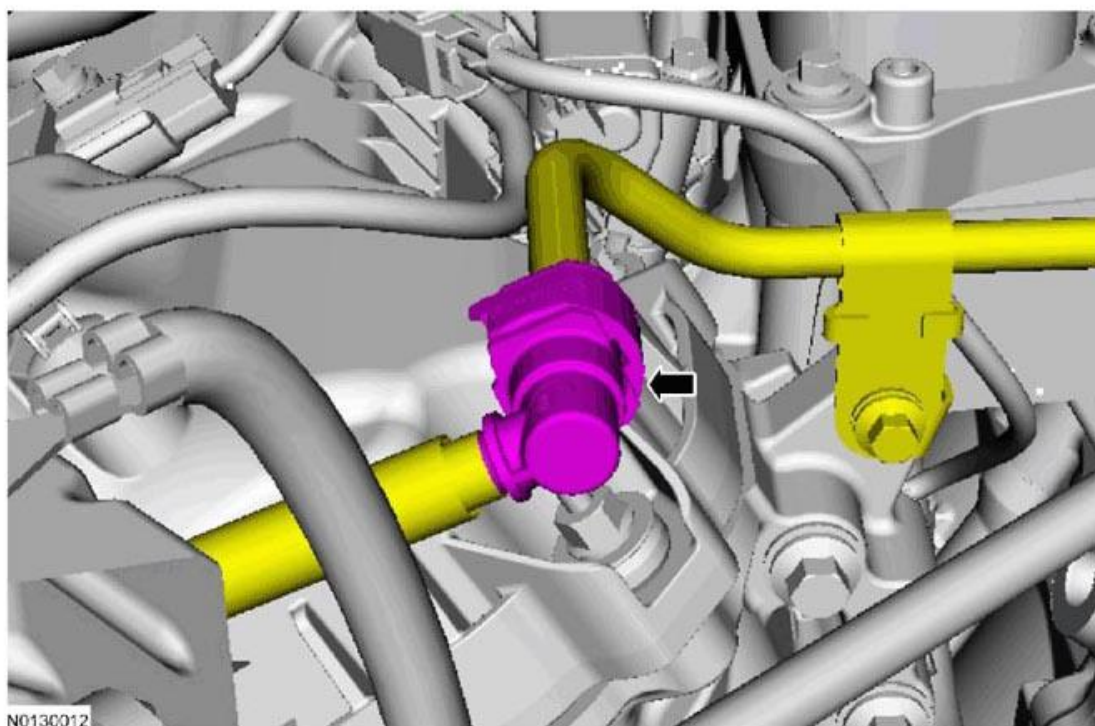


Fig. 90: Locating Exhaust And Intake VCT Unit Bolts
Courtesy of FORD MOTOR CO.

6. Using the flats on the exhaust and intake camshaft to prevent camshaft rotation, loosen the exhaust and intake VCT unit bolts.
7.
 1. Using a small pick, release and hold the ratchet mechanism.
 2. While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.
 3. Insert a holding pin into the hole to retain the tensioner.

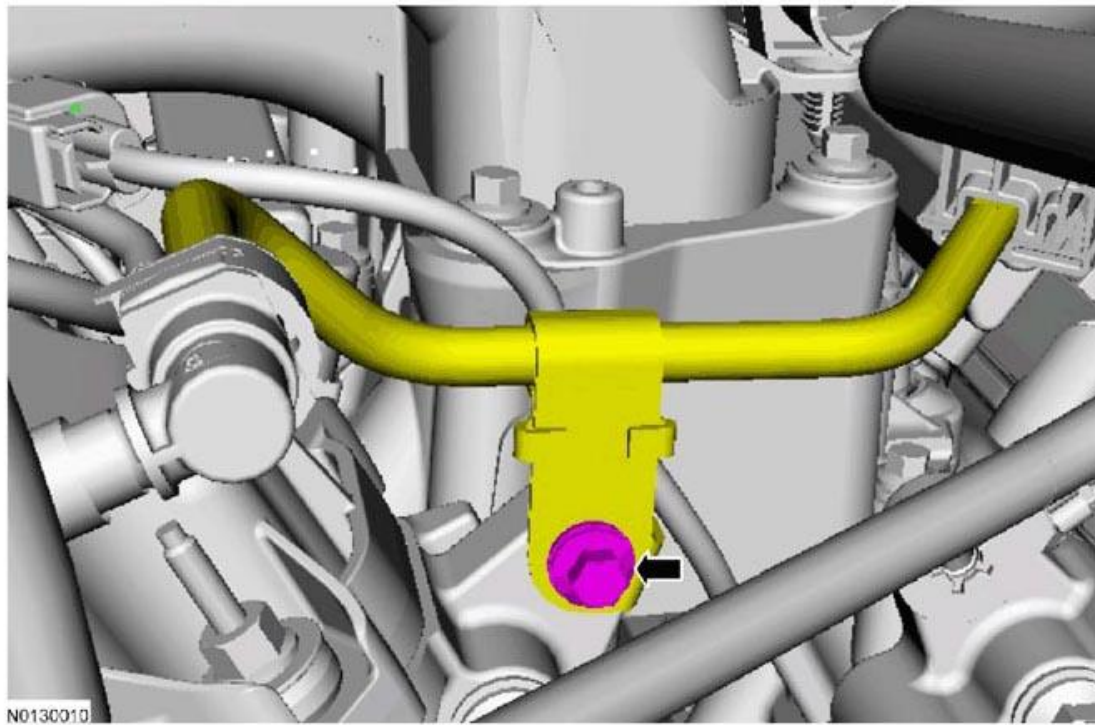
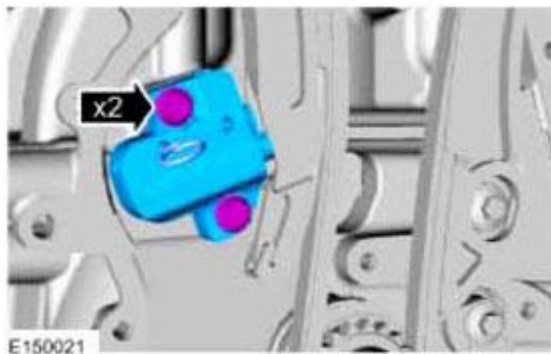
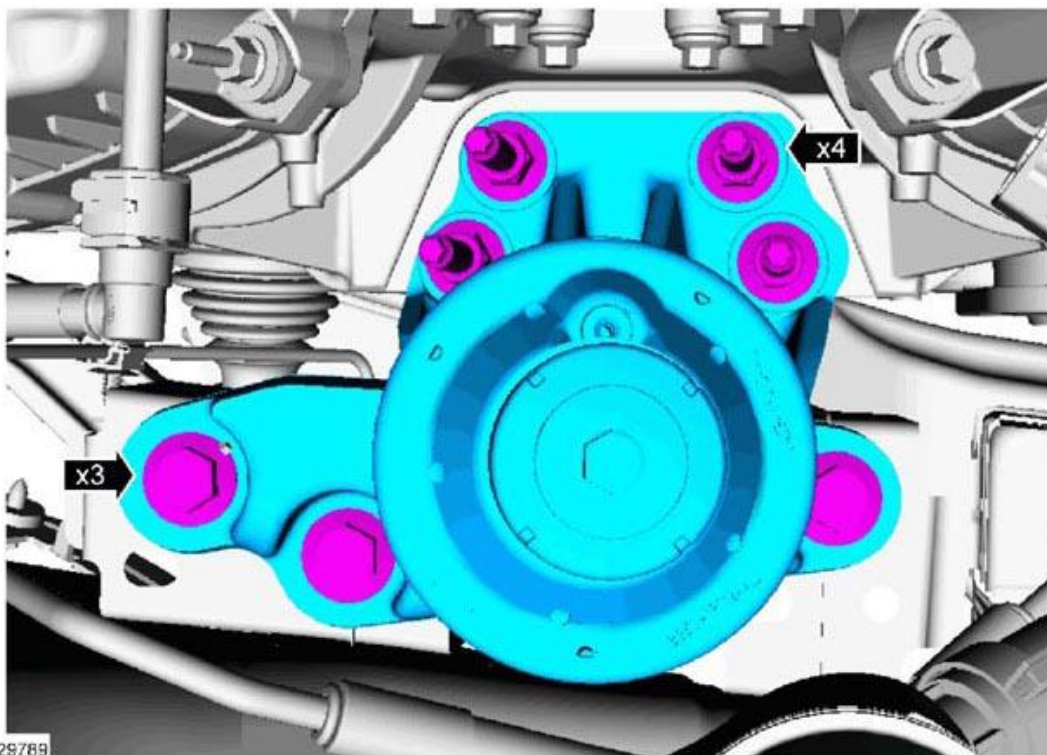


Fig. 91: Inserting Holding Pin Into Hole To Retain Tensioner
Courtesy of FORD MOTOR CO.



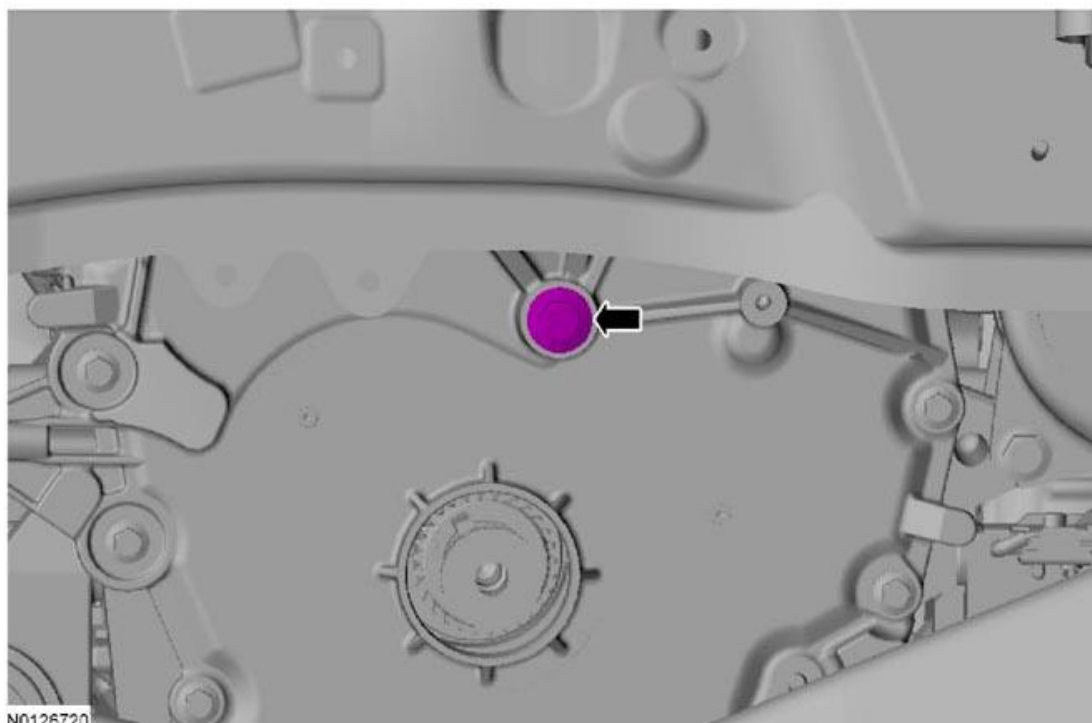
8.

Fig. 92: Locating Tensioner Bolts
Courtesy of FORD MOTOR CO.



9.

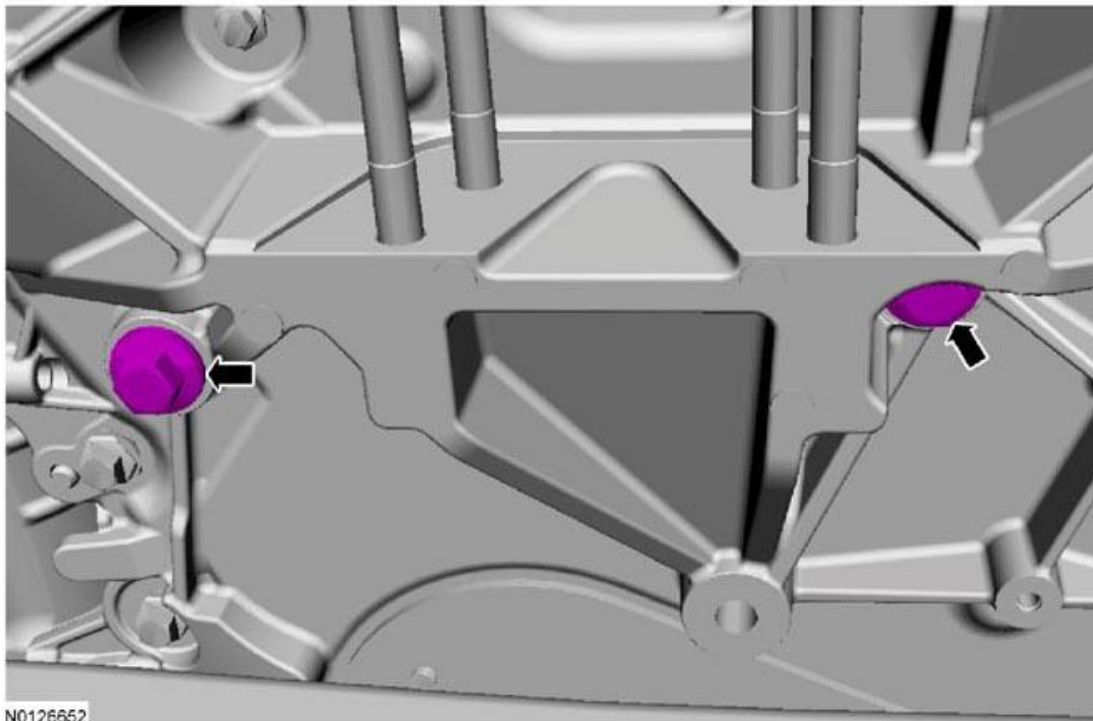
Fig. 93: Identifying Timing Chain Arm
Courtesy of FORD MOTOR CO.



10.

Fig. 94: Locating Timing Chain Arm Bolts

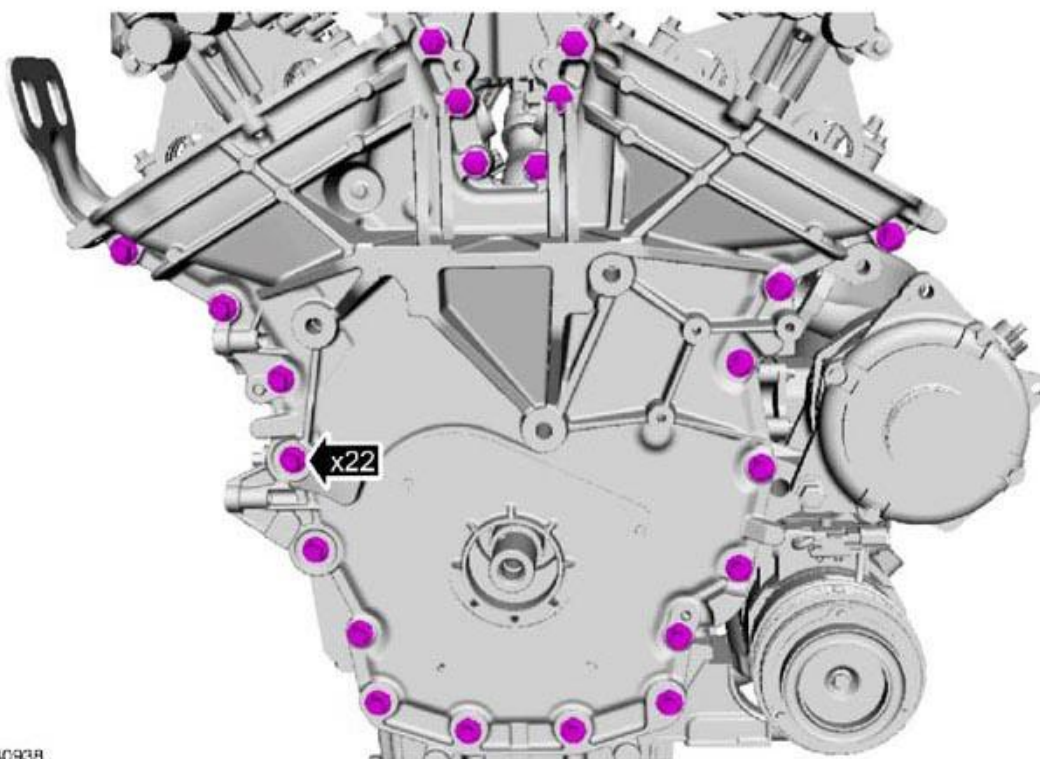
Courtesy of FORD MOTOR CO.



11.

Fig. 95: Identifying Timing Chain
Courtesy of FORD MOTOR CO.

Installation



1.

N0130938

Fig. 96: Identifying Timing Chain
Courtesy of FORD MOTOR CO.

2. *Torque* : 10 Nm

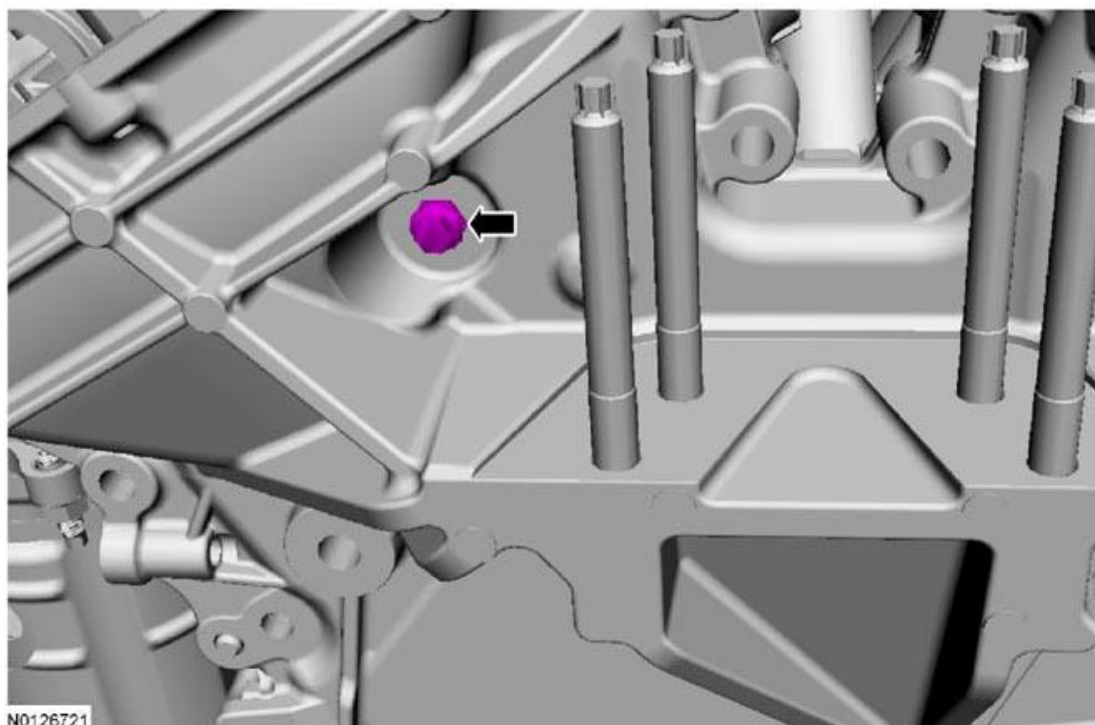
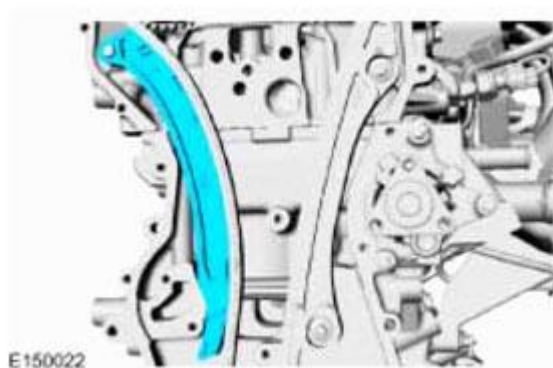


Fig. 97: Locating Timing Chain Arm Bolts
Courtesy of FORD MOTOR CO.



3.

Fig. 98: Identifying Timing Chain Arm
Courtesy of FORD MOTOR CO.

NOTE: If the timing chain tensioner plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

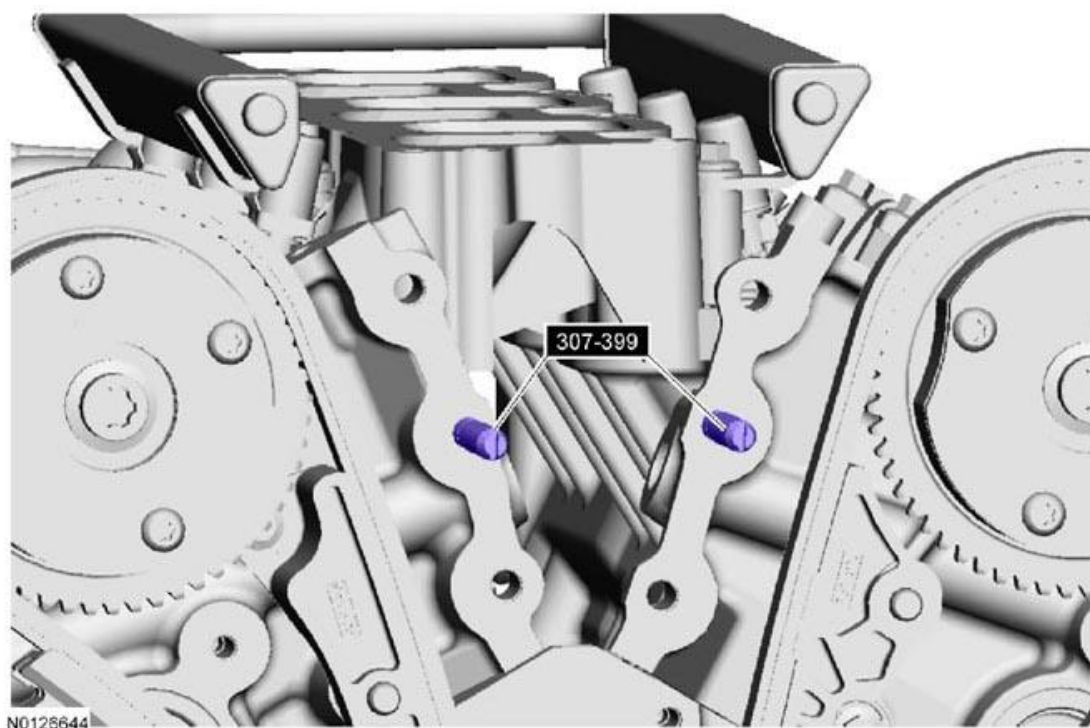


Fig. 99: Compressing Timing Chain Tensioner Plunger Using Edge Of Vise
Courtesy of FORD MOTOR CO.

4. Using the edge of a vise, compress the timing chain tensioner plunger.
5. Using a small pick, push back and hold the ratchet mechanism.



Fig. 100: Pushing Back And Hold Ratchet Mechanism Using Small Pick
Courtesy of FORD MOTOR CO.

6. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.

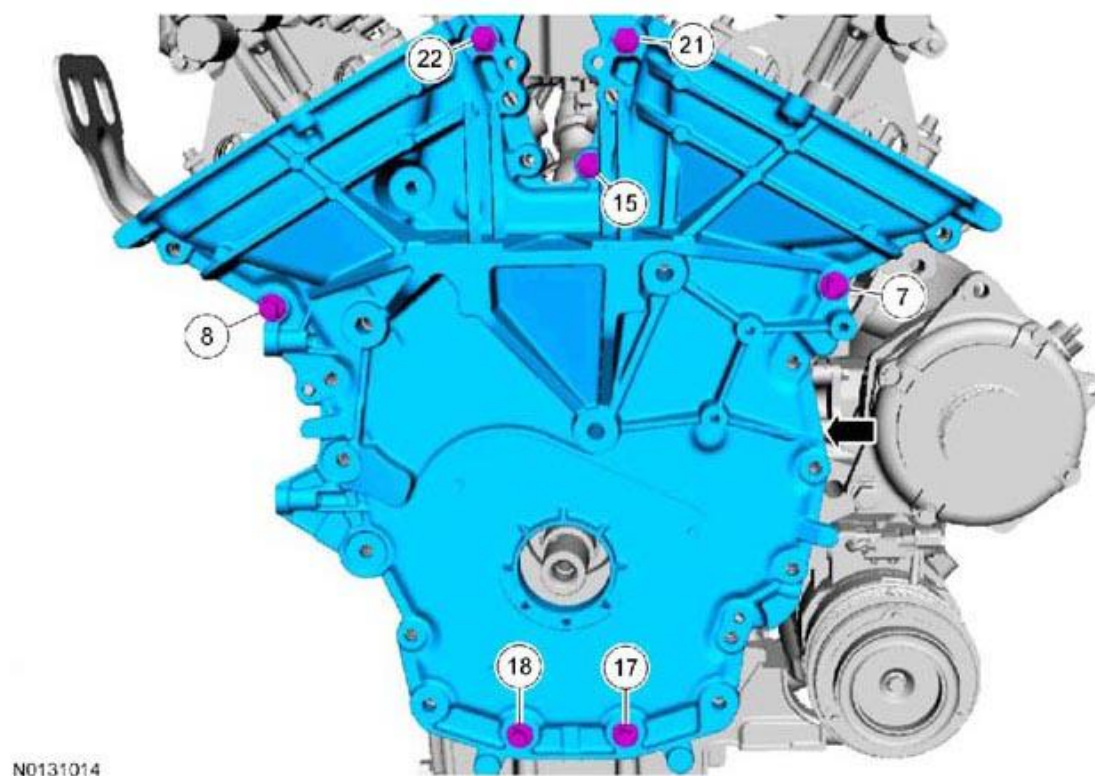


Fig. 101: Pushing Ratchet Arm Back Into Tensioner Housing Holding Ratchet Mechanism
Courtesy of FORD MOTOR CO.

7. Install a paper clip into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.

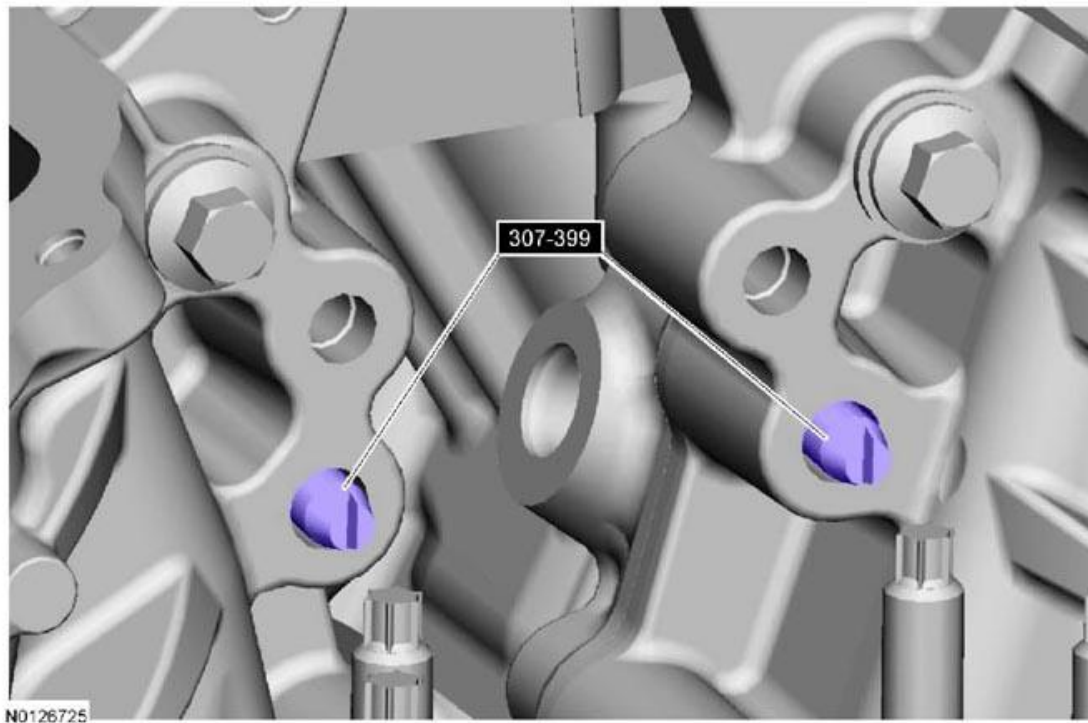


Fig. 102: Installing Paper Clip Into Hole In Tensioner Housing To Hold Ratchet Assembly And Plunger In During Installation
Courtesy of FORD MOTOR CO.

8. *Torque* : 10 Nm

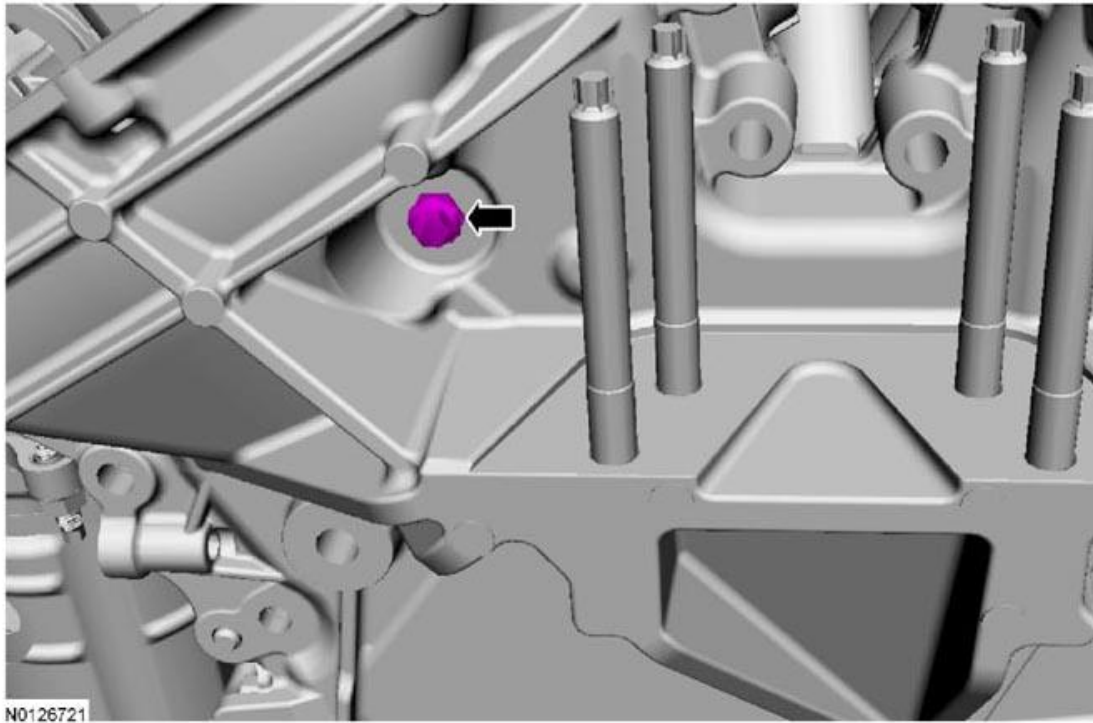


Fig. 103: Locating Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

NOTE: Using the flats on the camshafts to prevent camshaft rotation.

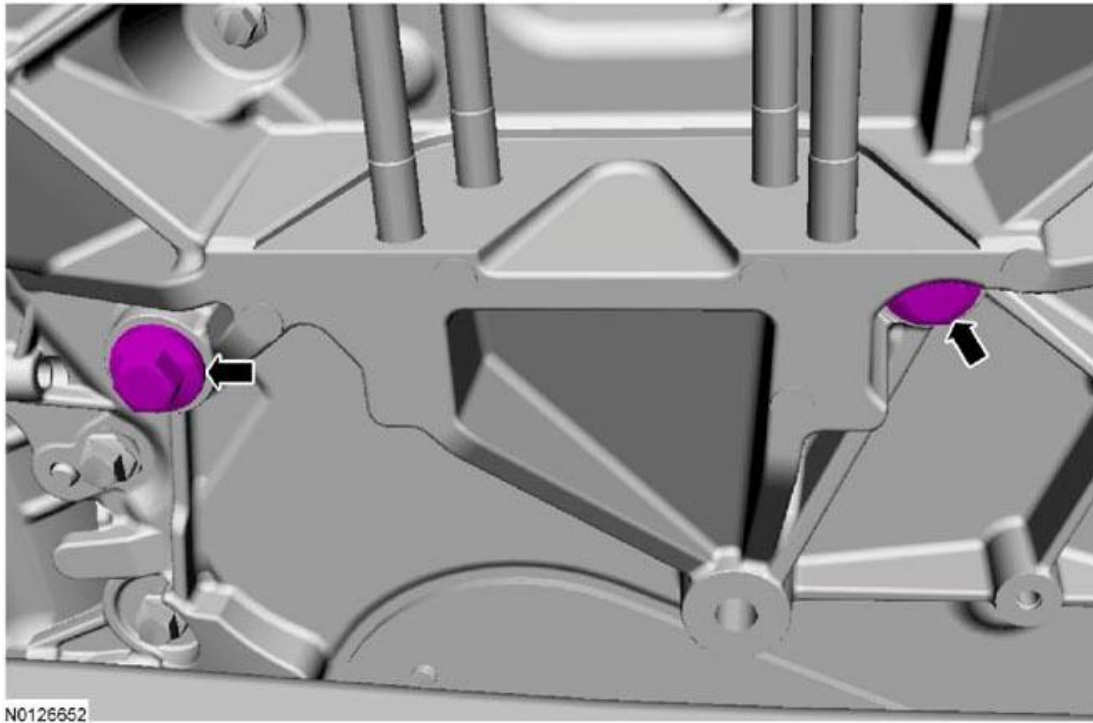


Fig. 104: Locating Exhaust And Intake VCT Unit Bolts
Courtesy of FORD MOTOR CO.

9. *Torque :*

Stage 1: 50 Nm

Stage 2: Tighten an additional 90°

10. *Remove the Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)*

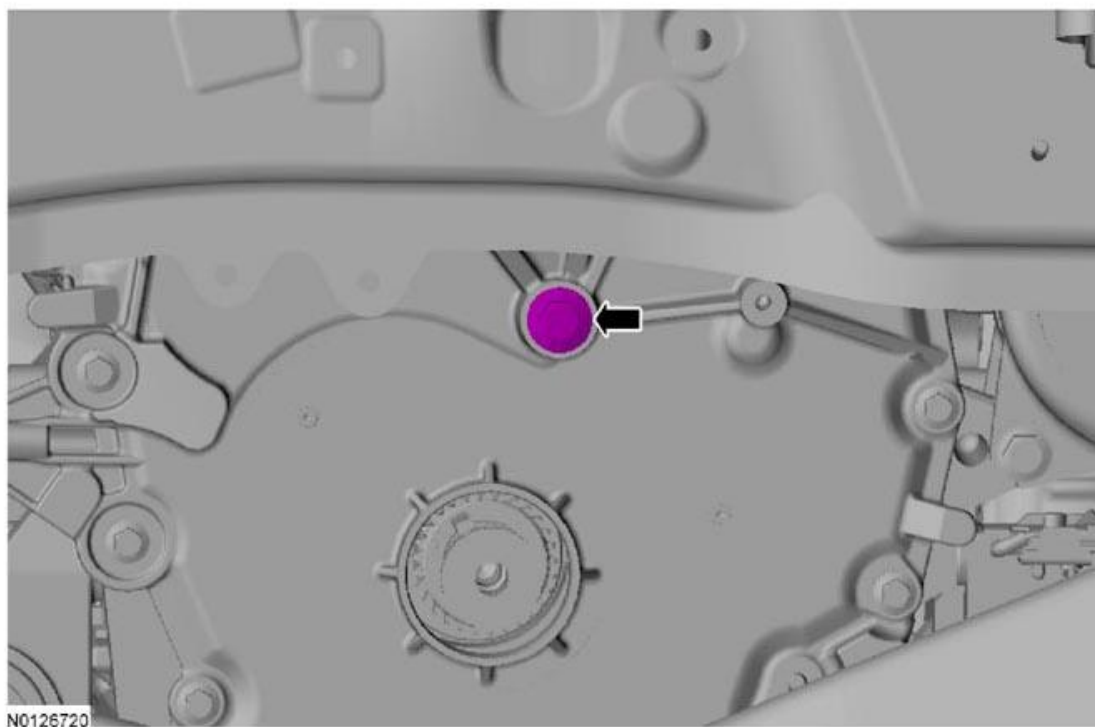


Fig. 105: Identifying 303-1565 Alignment Tool
Courtesy of FORD MOTOR CO.

11. *Torque :*

Stage 1: 8 Nm

Stage 2: Tighten an additional 60°

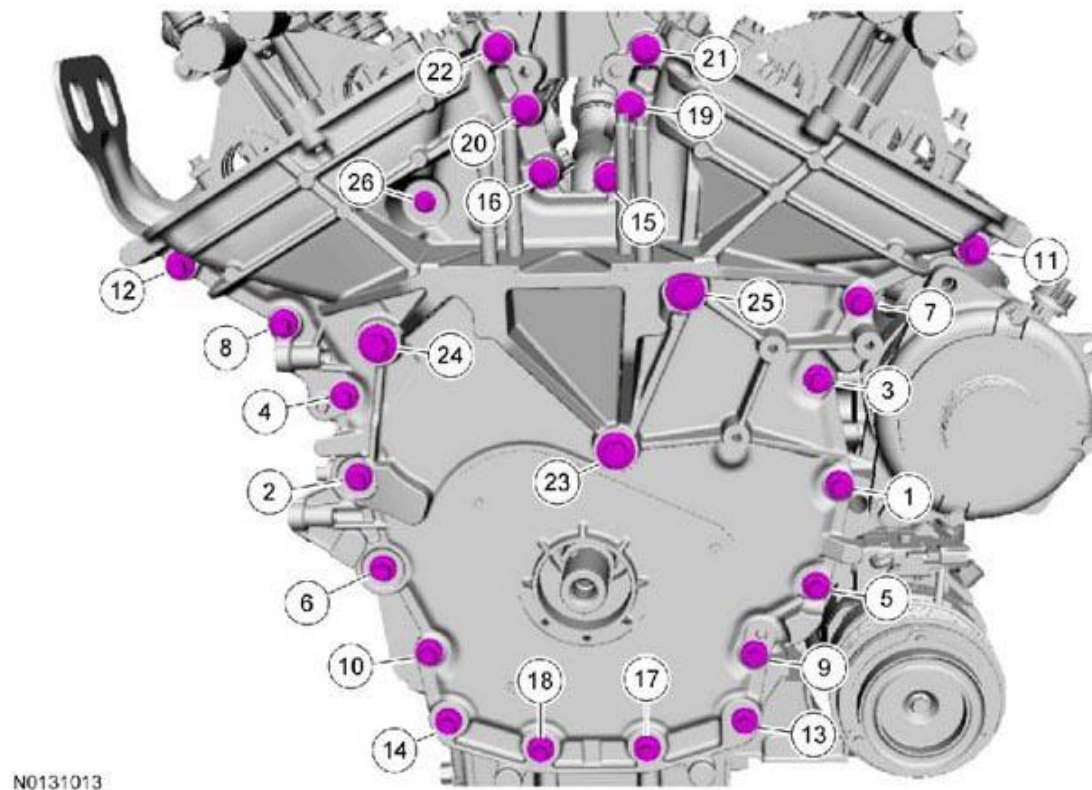


Fig. 106: Locating Fuel Injection Pump Cover Stud Bolts
Courtesy of FORD MOTOR CO.

12. Torque : 20 Nm

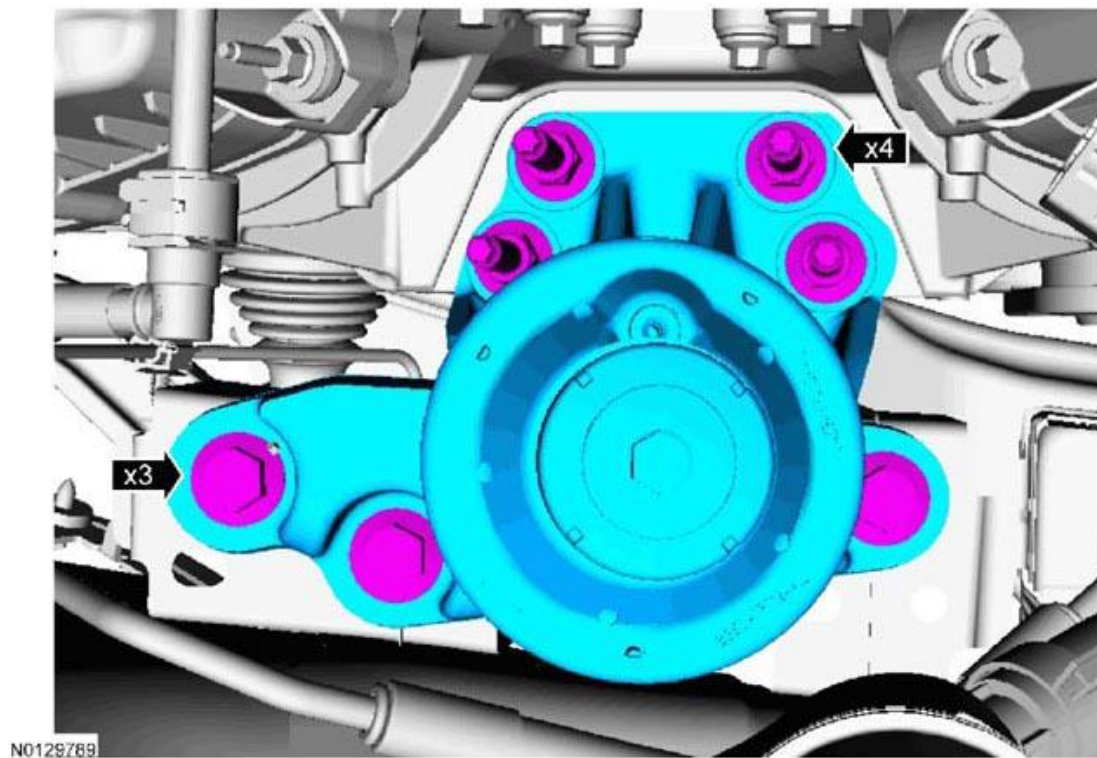


Fig. 107: Locating Fuel Injection Pump Bracket Nuts
Courtesy of FORD MOTOR CO.

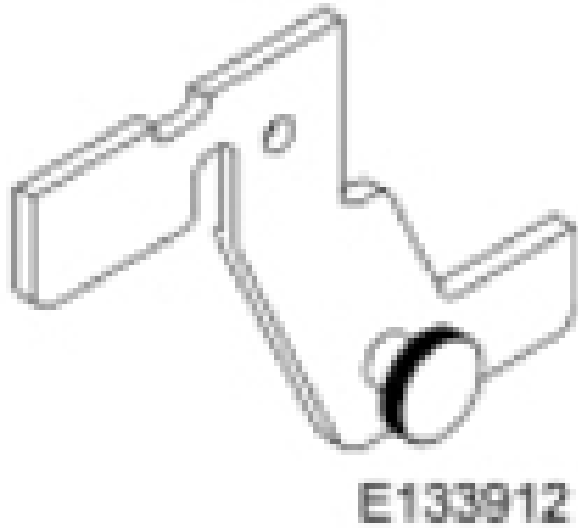
13. Install the following items:

1. Refer to: **Engine Front Cover** .
2. Refer to: **FUEL INJECTION PUMP** .

CAMSHAFT

SPECIAL TOOL(S) / GENERAL EQUIPMENT

303-1565
Alignment Tool, Camshaft

**MATERIALS SPECIFICATIONS**

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A
flange sealant	WSS-M2G348-A11

Removal

- NOTE:** During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.
- NOTE:** Do not rotate the camshafts unless instructed to in this procedure. Rotating the camshafts or crankshaft with timing components loosened or removed can cause serious damage to the valves and pistons.
- NOTE:** Failure to position the No. 1 piston at TDC can result in damage to the engine. Turn the engine in the normal direction of rotation only.
- NOTE:** The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.
- NOTE:** The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the

counterclockwise direction. The crankshaft must remain at the TDC position during the camshaft removal and installation

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Refer to: **Variable Valve Timing (VVT) Unit** .
3. Refer to: **Valve Clearance Check** .

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

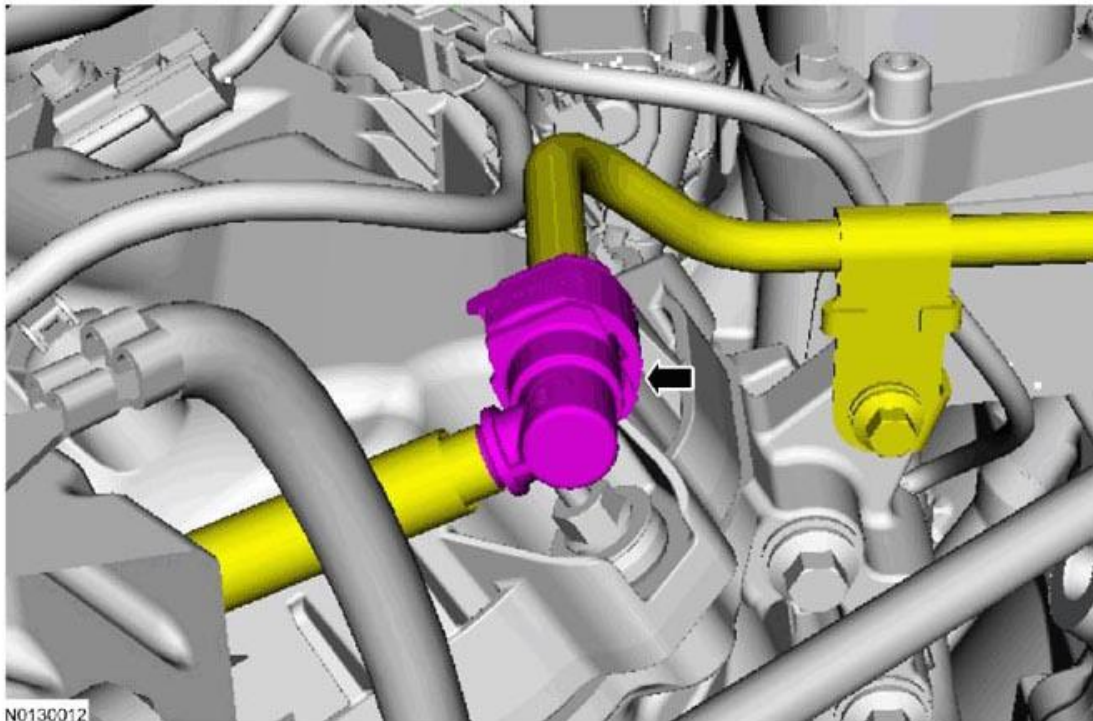
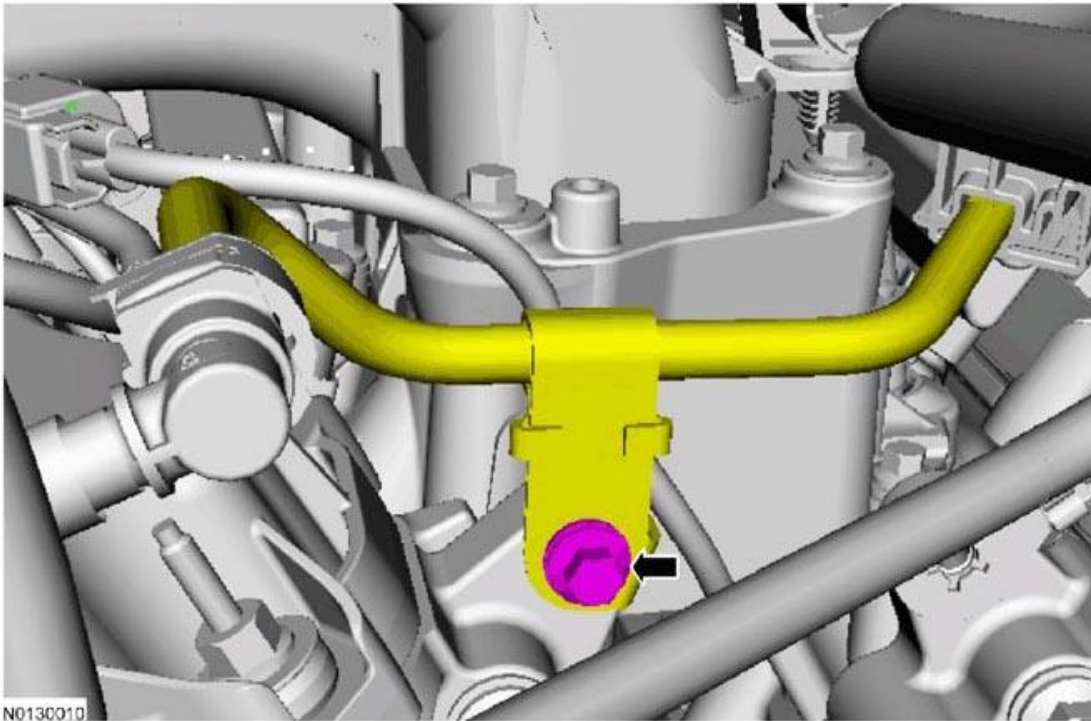


Fig. 108: Locating Camshaft Alignment Tool In Camshaft
Courtesy of FORD MOTOR CO.

4. *Remove the Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)*



5.

Fig. 109: Locating VCT Oil Control Solenoids Bolts

Courtesy of FORD MOTOR CO.

NOTE: Do not mark the camshaft lobe surface. If any material is applied to the camshaft lobe surface, the lobe must be cleaned with Motorcraft Metal Surface Prep.

NOTE: Exhaust Camshaft

6. Depending on the camshaft being serviced, mark the camshaft lobe orientation onto the camshaft bearing cap.

NOTE: Failure to follow the camshaft bearing cap loosening procedure can result in damage to the camshafts.

NOTE: Mark the location and orientation of each camshaft bearing cap.

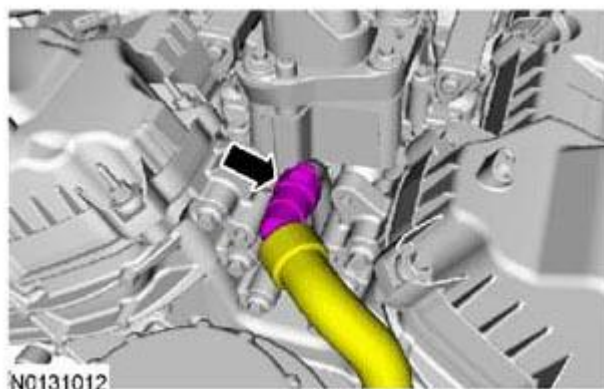


Fig. 110: Identifying Exhaust Camshaft Bearing Cap Bolts Removing Sequence
Courtesy of FORD MOTOR CO.

NOTE: Intake Camshaft

7. If servicing the exhaust camshaft, remove the camshaft bearing cap bolts in the sequence shown in illustration and remove the exhaust camshaft.

NOTE: Failure to follow the camshaft bearing cap loosening procedure can result in damage to the camshafts.

NOTE: Mark the location and orientation of each camshaft bearing cap.

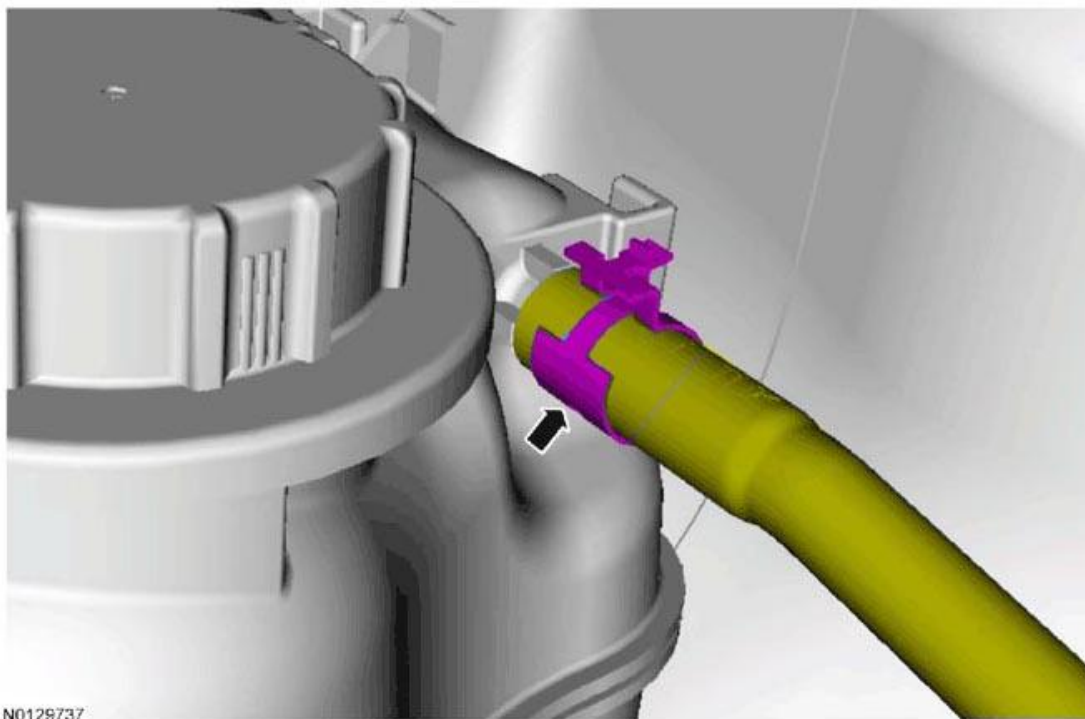


Fig. 111: Identifying Intake Camshaft Bearing Cap Bolts Removing Sequence
Courtesy of FORD MOTOR CO.

8. If servicing the intake camshaft, remove the camshaft bearing cap bolts in the sequence shown in illustration and remove the intake camshaft.
9. Inspect the camshaft.

Installation

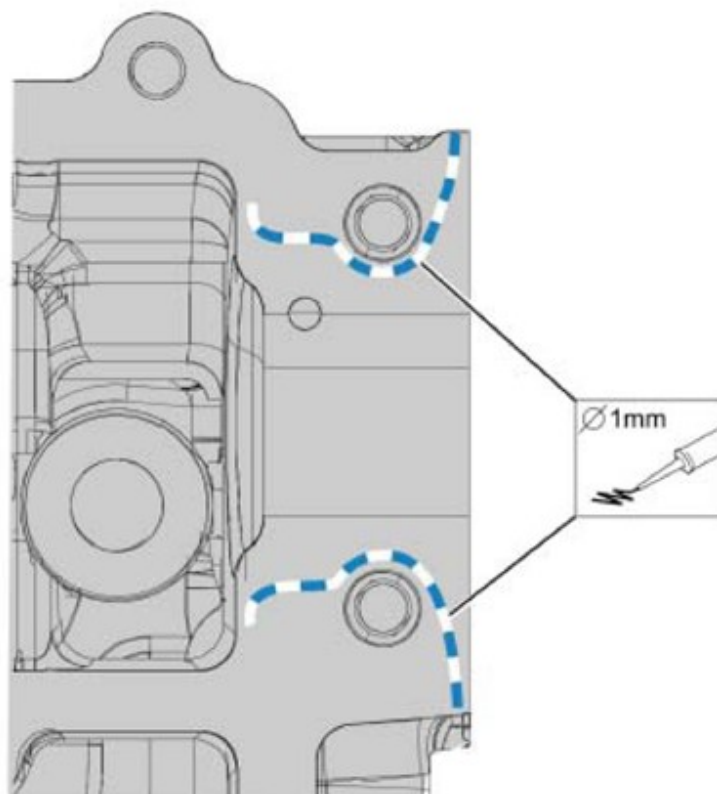
NOTE: Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Tool can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position can cause severe damage to the valves and pistons.

1. Lubricate the cylinder head and camshaft journals with clean engine oil and position the camshafts onto the cylinder head in their original location and orientation.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

NOTE: The exhaust camshaft rear bearing cap must be secured within 10 minutes of Gasket Maker application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

NOTE: Do not allow Gasket Maker to enter the camshaft bearing journal. If Gasket Maker is applied to the camshaft bearing journal, the journal and sealing area must be cleaned with Motorcraft Metal Surface Prep.



E149710

Fig. 112: Applying Bead Of Specified Diameter From Specified Tube
Courtesy of FORD MOTOR CO.

NOTE: Exhaust Camshaft

2. Apply a bead of the specified diameter from the specified tube.

Material : flange sealant (WSS-M2G348-A11)

NOTE: Failure to follow the camshaft bearing cap tightening procedure can result in damage to the camshafts.

NOTE: Lubricate the bearing cap journals with clean engine oil prior to installation.

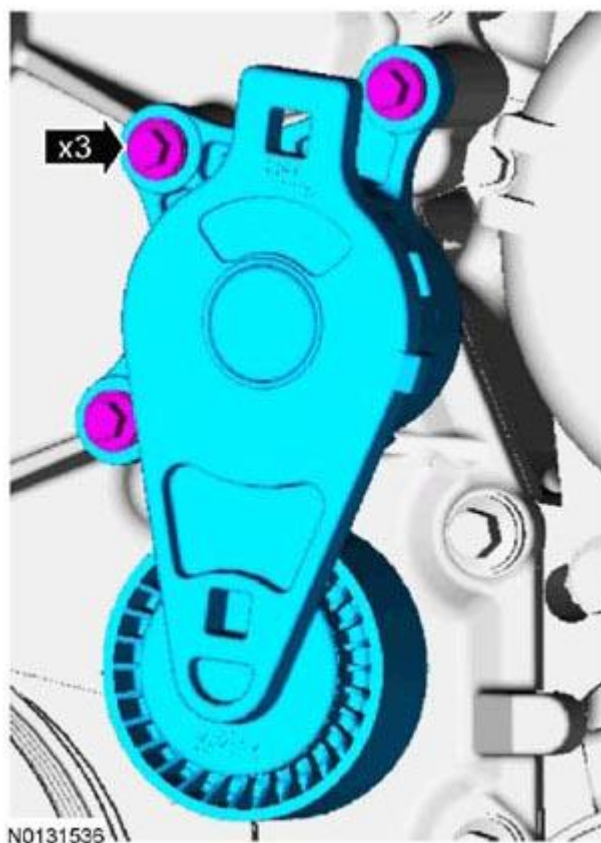


Fig. 113: Identifying Exhaust Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Intake Camshaft

3. If servicing the exhaust camshaft, install the camshaft bearing caps in their original location and orientation and tighten the camshaft bearing cap bolts in pairs in the sequence shown in illustration in 2 stages:

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 7 Nm

Stage 2: 16 Nm

NOTE: Failure to follow the camshaft bearing cap tightening procedure can result in damage to the camshafts.

NOTE: Lubricate the bearing cap journals with clean engine oil prior to

installation.

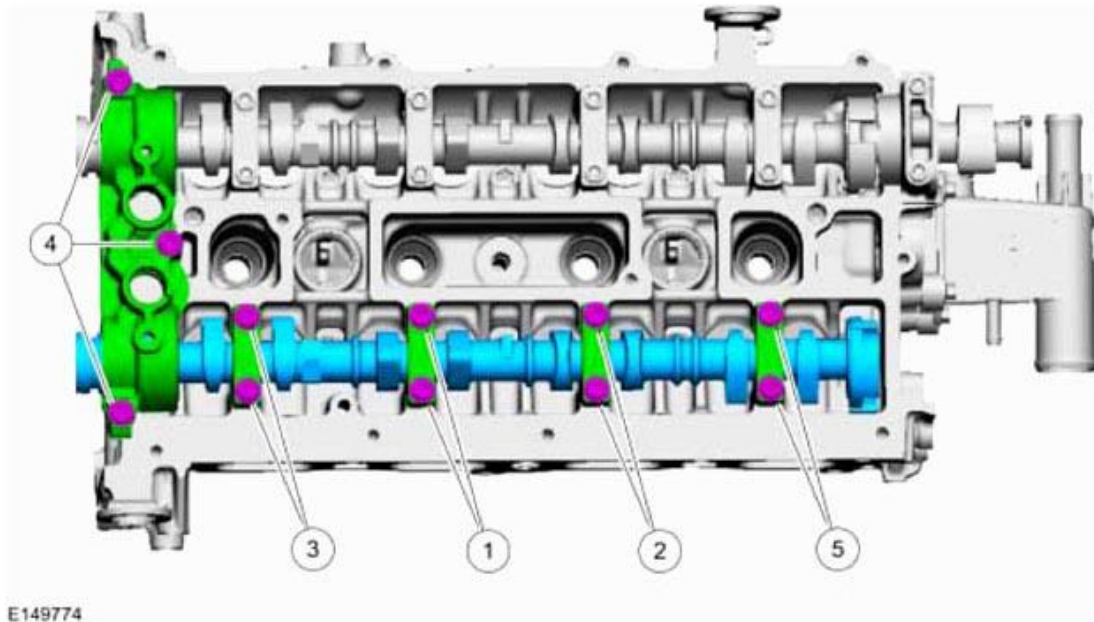


Fig. 114: Identifying Intake Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. If servicing the intake camshaft, install the camshaft bearing caps in their original location and orientation and tighten the camshaft bearing cap bolts in pairs in the sequence shown in illustration in 2 stages:

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 7 Nm

Stage 2: 16 Nm

5. If exhaust or intake camshafts were replaced, check the valve clearance.

Refer to: **Valve Clearance Check** .

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

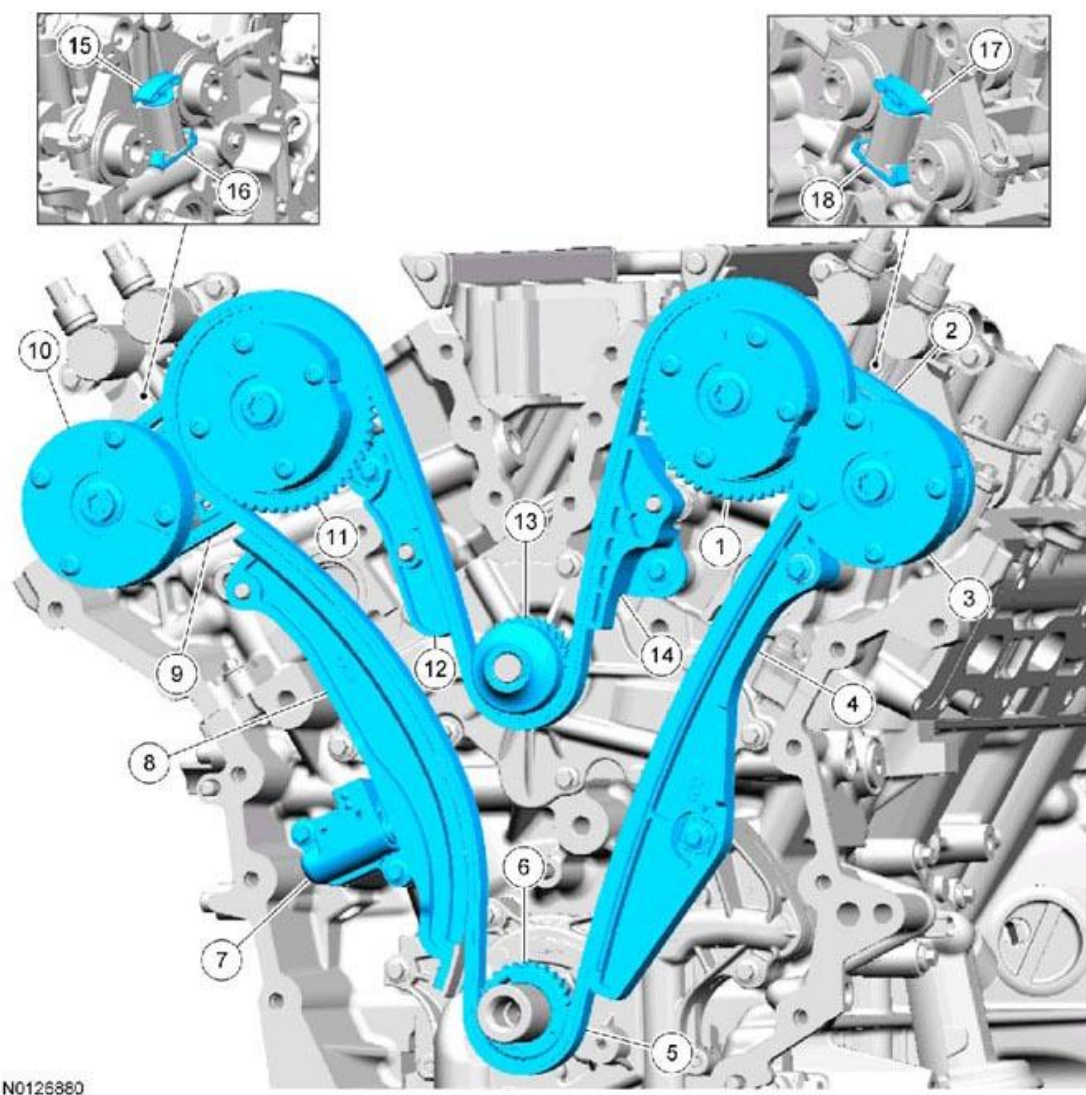


Fig. 115: Installing Camshaft Alignment Tool Into Rear Of Both Of Camshaft Slots
Courtesy of FORD MOTOR CO.

6. Install the Camshaft Alignment Tool into the rear of both of the camshaft slots as shown in illustration and tighten the retainer.

Install the Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)

NOTE: Lubricate the VCT oil control solenoids with clean engine oil.

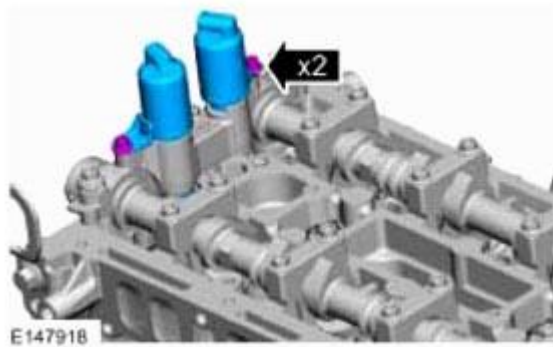


Fig. 116: Locating VCT Oil Control Solenoids Bolts
Courtesy of FORD MOTOR CO.

7. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque : 10 Nm

8. Refer to: Variable Valve Timing (VVT) Unit .

VALVE TAPPETS

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

Removal

1. Refer to: Camshaft .

NOTE: If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

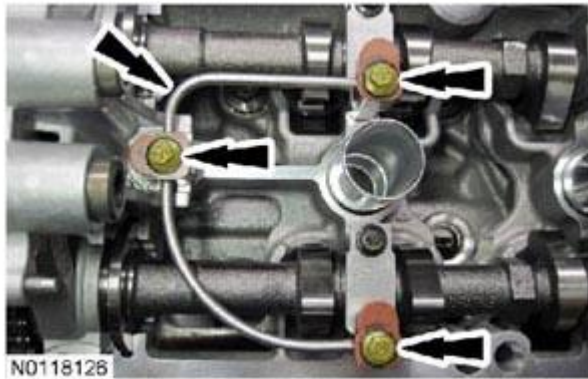


Fig. 117: Lubricating Valve Tappets
Courtesy of FORD MOTOR CO.

2. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

NOTE: The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of.



Fig. 118: Inspecting Valve Tappet
Courtesy of FORD MOTOR CO.

3. Install new components as necessary.

Installation

1. To install, reverse the removal procedure.

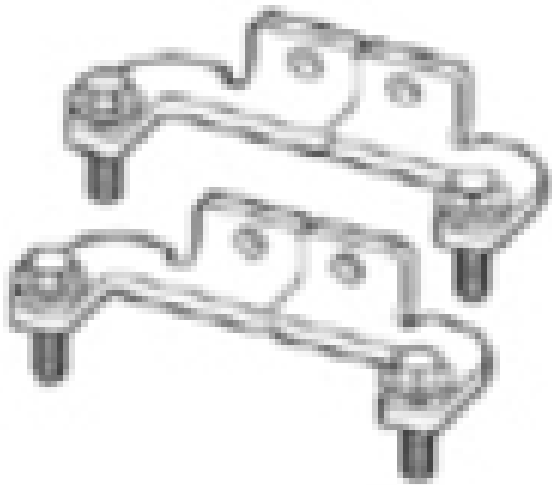
VALVE SPRINGS

SPECIAL TOOL(S) / GENERAL EQUIPMENT

--	--

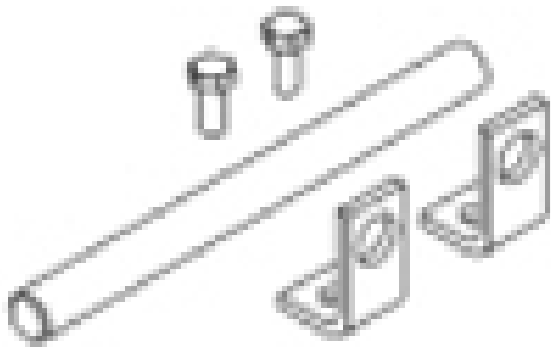
2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



303-1249

Valve Spring Compressor
TKIT-2006UF-FLM



E134677

303-300

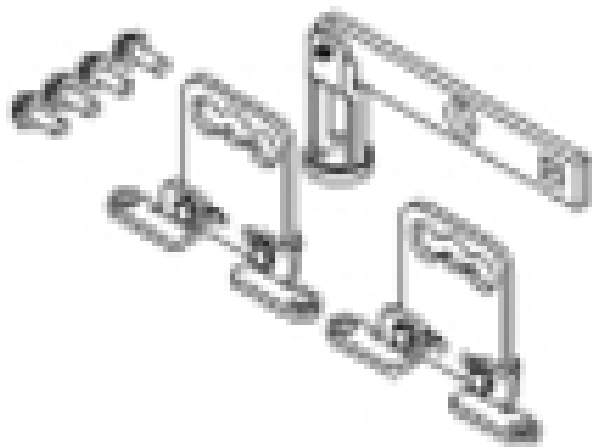
Set, Valve Spring Compressor
TKIT-2009TC-F

303-350

Compressor, Valve Spring
TKIT-1989-F
TKIT-1989-FLM
TKIT-1989-FM
TKIT-1990-LMH

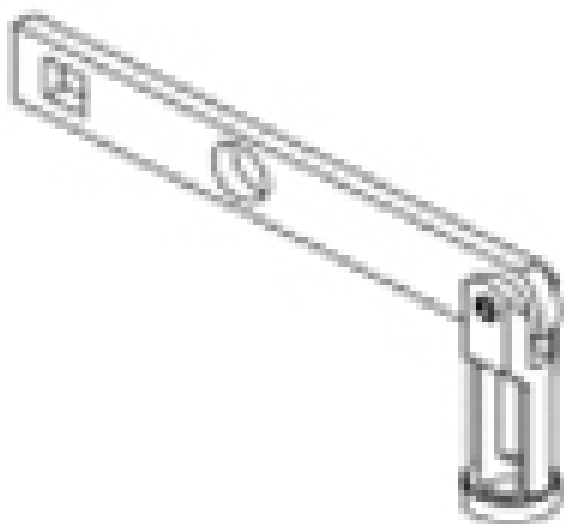
2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



E134678

TKIT-2009TC-F



E134679

303-472

Adapter, Valve Spring Compressor

TKIT-1994-FH/FMH/FLMH

TKIT-1994-LMH/MH2

MATERIALS SPECIFICATIONS

Name	Specification
Multi-Purpose Grease Motorcraft® XL-5 (aerosol) and/or CRC® SL3151	ESB-M1C93-B

Removal

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Remove the following items:
 1. Refer to: **Valve Tappets** .
 2. Refer to: **SPARK PLUGS** .

NOTE: Use compressed air at 7 to 10 bars (100-150 psi). Do not disconnect the compressed air from the cylinder until the valve spring, valve spring retainer and valve collet is installed. Any loss of air pressure will allow the valve to fall into the cylinder.

3. Connect a compressed air supply to the cylinder that is being serviced.

NOTE: Place all parts in order to one side.

NOTE: Remove the valve collet, using some multi-purpose grease and a small screwdriver.

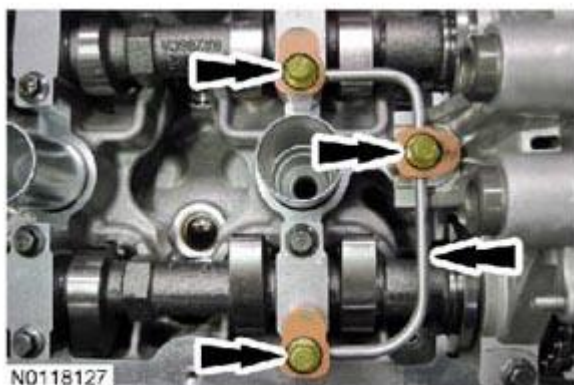


Fig. 119: Compressing Valve Spring Using 303-300 (Set), 303-350 (Compressor), 303-472 (Adapter), 303-1249 (Valve Spring Compressor)
Courtesy of FORD MOTOR CO.

4. Apply compressed air to the cylinder and remove the valve spring.

Special Tool(s) : 303-300 (Set, Valve Spring Compressor) , 303-350 (Compressor, Valve Spring) , 303-472 (Adapter, Valve Spring Compressor) , 303-1249 (Valve Spring Compressor)

Material : Multi-Purpose Grease / Motorcraft® XL-5 (aerosol) and/or CRC® SL3151 (ESB-M1C93-B)

5. Repeat the appropriate removal steps for all of the other cylinders
6. Install new parts, as necessary.



Fig. 120: Inspecting Valve Spring
Courtesy of FORD MOTOR CO.

Installation

NOTE: Install the valve collet, using some multi-purpose grease and a small screwdriver.

NOTE: Check the seating of the valve collet.

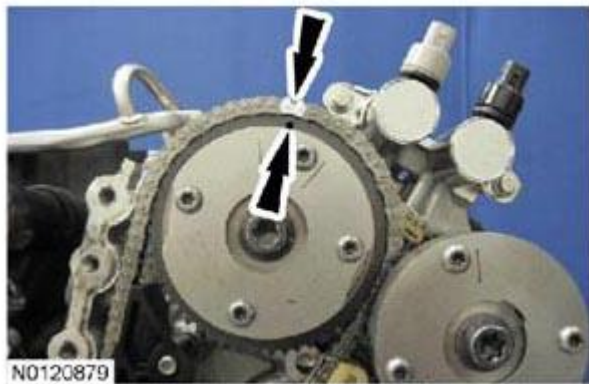


Fig. 121: Compressing Valve Spring Using 303-300 (Set), 303-350 (Compressor), 303-472 (Adapter), 303-1249 (Valve Spring Compressor)
Courtesy of FORD MOTOR CO.

1. *Special Tool(s)* : 303-300 (Set, Valve Spring Compressor) , 303-350 (Compressor, Valve Spring) , 303-472 (Adapter, Valve Spring Compressor) , 303-1249 (Valve Spring Compressor)

Material : Multi-Purpose Grease / Motorcraft® XL-5 (aerosol) and/or CRC® SL3151 (ESB-M1C93-B)

2. Disconnect the compressed air supply.
3. Install the following items:
 1. Refer to: **Valve Tappets** .
 2. Refer to: **SPARK PLUGS** .

CYLINDER HEAD

Hose Clamp Remover/Installer

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30	-
Motorcraft® Metal Surface Prep ZC-31-A	-

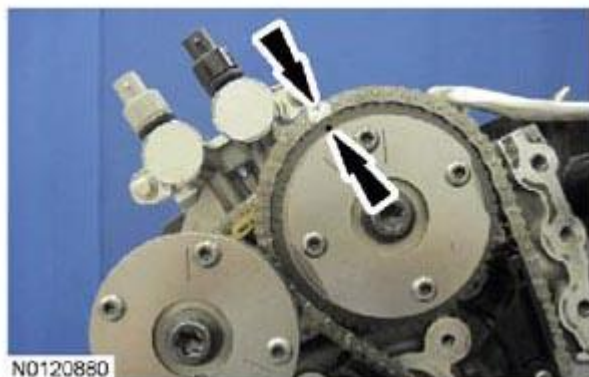
Removal

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Refer to: **COOLING SYSTEM DRAINING AND VACUUM FILLING** .

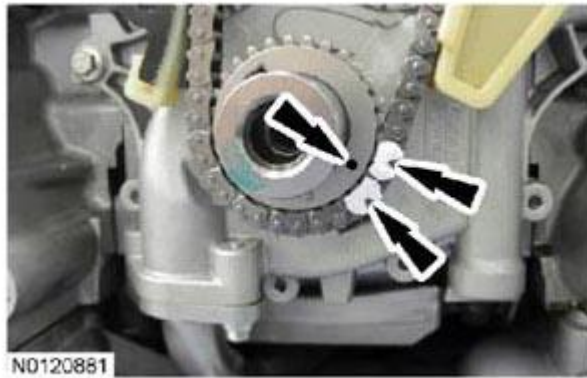
Refer to: **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

3. Remove the following items:
 1. Refer to: **FUEL INJECTOR** .
 2. Refer to: **HEATED OXYGEN SENSOR (HO2S)** .



4.

Fig. 122: Locating Heated Oxygen Sensor Connector And Retainer
Courtesy of FORD MOTOR CO.



5.

Fig. 123: Identifying Oil Filter
Courtesy of FORD MOTOR CO.



6.

Fig. 124: Locating Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.



7.

Fig. 125: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

8. **NOTE:** Discard the gasket.

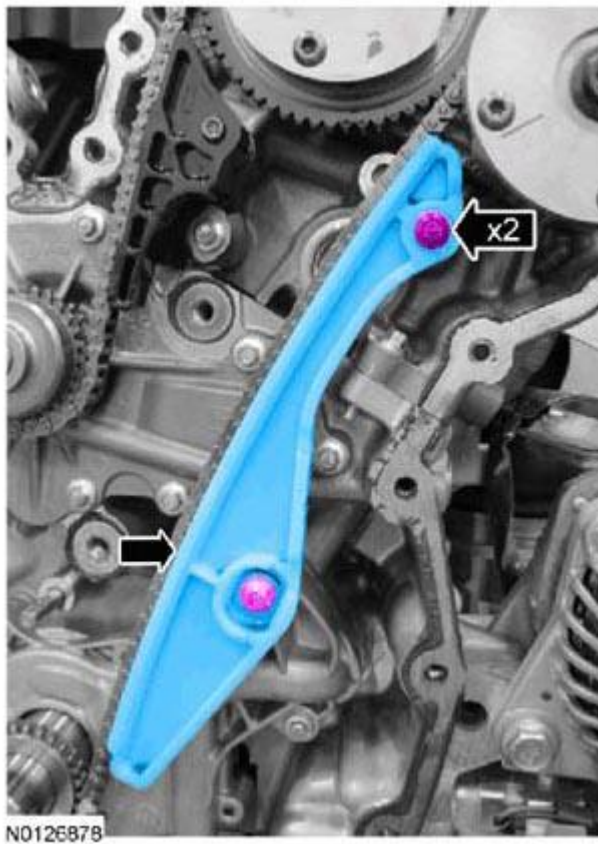


Fig. 126: Locating Catalytic Converter Joint Nuts
Courtesy of FORD MOTOR CO.



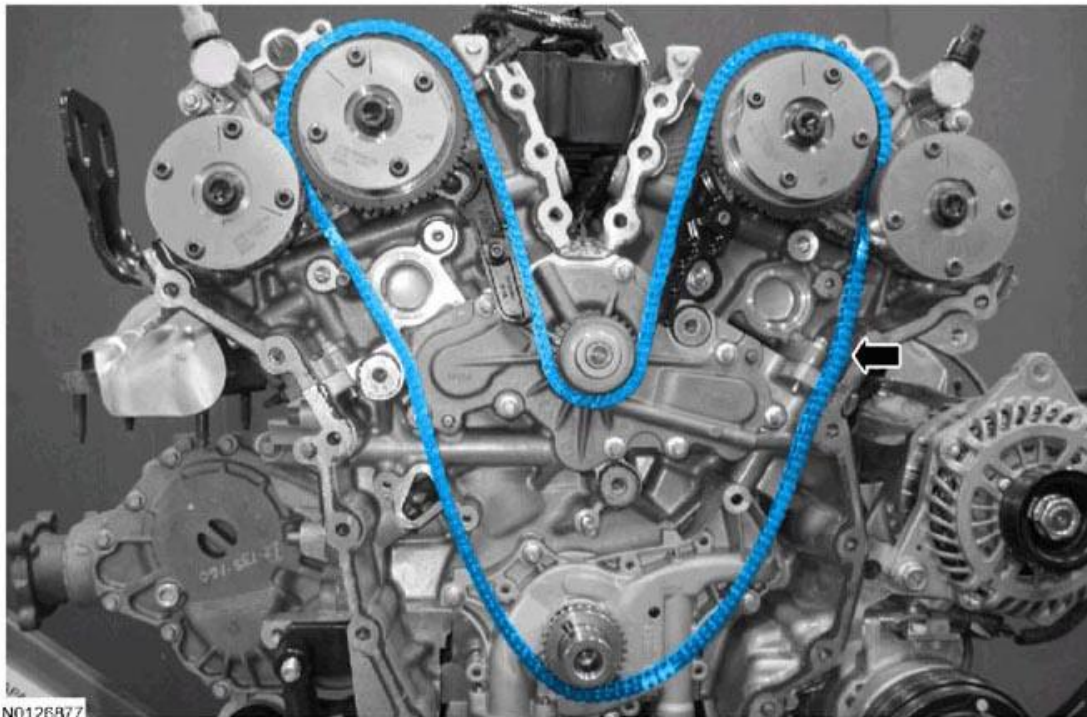
9.

Fig. 127: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

10. **NOTE:** Discard the nuts and catalytic converter gasket.



Fig. 128: Identifying Nuts And Catalytic Converter
Courtesy of FORD MOTOR CO.



11.

Fig. 129: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

12. Refer to: Camshaft .



13.

Fig. 130: Locating Engine Ground Bolt
Courtesy of FORD MOTOR CO.



14.

Fig. 131: Locating Pipe Retainer
Courtesy of FORD MOTOR CO.

15. *General Equipment* : Hose Clamp Remover/Installer



Fig. 132: Locating Hose Clamps
Courtesy of FORD MOTOR CO.

NOTE: If the valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

16.

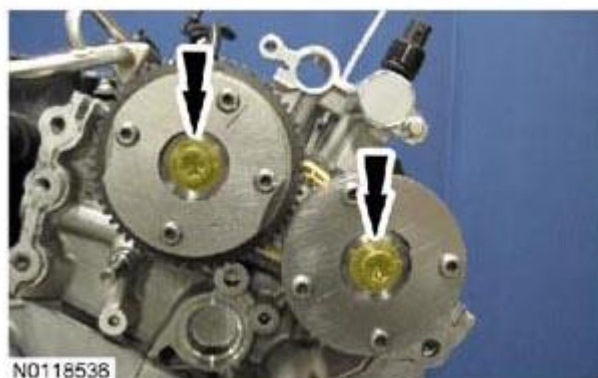
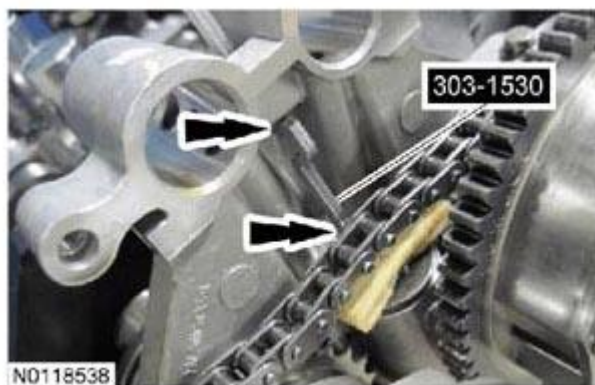


Fig. 133: Identifying Valve Tappets
Courtesy of FORD MOTOR CO.



17.

Fig. 134: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.



18.

Fig. 135: Identifying Cylinder Head Gasket
Courtesy of FORD MOTOR CO.

Installation

NOTE: Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

1.

NOTE: Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

1. Remove any large deposits of silicone or gasket material with a plastic scraper.
2. Apply Motorcraft Silicone Gasket Remover following package directions, and allow to set for several minutes.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

3. Remove the Motorcraft Silicone Gasket Remover with a plastic scraper. A second application of Motorcraft Silicone Gasket Remover may be required if residual traces of silicone or gasket material remain.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

4. Apply Motorcraft Metal Surface Prep following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

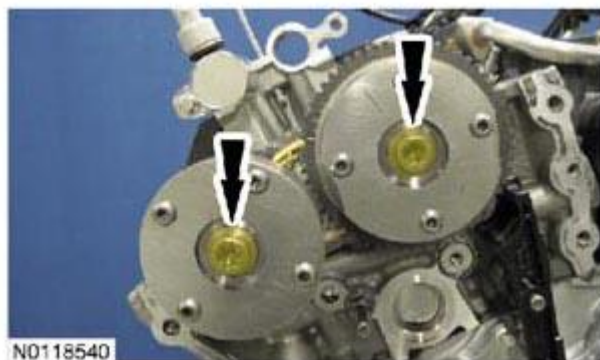
Material : Motorcraft® Metal Surface Prep / ZC-31-A

2. Clean and inspect the catalytic converter flange.

Refer to: EXHAUST MANIFOLD CLEANING AND INSPECTION .

3. Refer to: Refer to: CYLINDER HEAD DISTORTION .

Refer to: CYLINDER BLOCK DISTORTION .



4. **Fig. 136: Identifying Cylinder Head Gasket**
Courtesy of FORD MOTOR CO.

NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.



Fig. 137: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

5. *Torque :*

Stage 1: 7 Nm

Stage 2: 15 Nm

Stage 3: 45 Nm

Stage 4: 90°

Stage 5: Tighten an additional 90°

NOTE: Install the 16 valve tappets in their original positions.



Fig. 138: Lubricating Valve Tappets
Courtesy of FORD MOTOR CO.

6. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)
7. *General Equipment* : Hose Clamp Remover/Installer



Fig. 139: Locating Hose Clamps
Courtesy of FORD MOTOR CO.



8.

Fig. 140: Locating Pipe Retainer
Courtesy of FORD MOTOR CO.

9. Torque : 10 Nm



Fig. 141: Locating Engine Ground Bolt
Courtesy of FORD MOTOR CO.

10. Refer to: **Camshaft** .

11. Torque : 17 Nm



Fig. 142: Locating Catalytic Converter Manifold Studs

Courtesy of FORD MOTOR CO.

NOTE: Failure to tighten the catalytic converter manifold nuts to specification a second time may cause the converter to develop an exhaust leak.

NOTE: Always install new fasteners and gaskets as indicated. Clean flange faces prior to new gasket installation to make sure of proper sealing.

**Fig. 143: Identifying Catalytic Converter Manifold Nuts Tightening Sequence**

Courtesy of FORD MOTOR CO.

12. *Torque :*

Stage 1: 55 Nm

Stage 2: Re-tighten to 55 Nm

13. *Torque :* 25 Nm

**Fig. 144: Locating Catalytic Converter Lower Bracket Bolts**

Courtesy of FORD MOTOR CO.

14.

- *Torque* : Tighten the first nut to 48 Nm
- *Torque* : Tighten the second nut to 48 Nm
- *Torque* : Re-tighten the first nut to 48 Nm



Fig. 145: Locating Catalytic Converter Joint Nuts
Courtesy of FORD MOTOR CO.

15. *Torque* : 25 Nm

Fig. 146: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

16. *Torque : 10 Nm*



Fig. 147: Locating Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.



- 17.

Fig. 148: Locating Heated Oxygen Sensor Connector And Retainer
Courtesy of FORD MOTOR CO.

18. Drain and install the drain plug.

Torque : 27 Nm

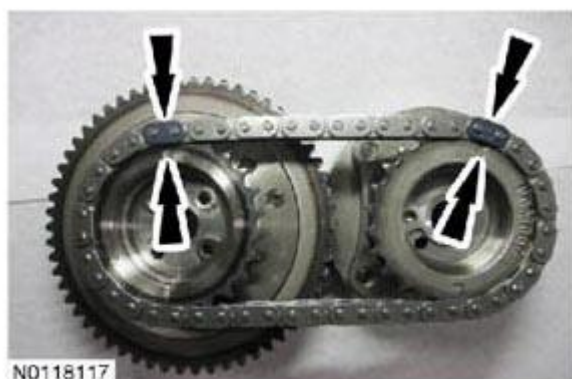


Fig. 149: Locating Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the engine oil filter gasket with clean engine oil prior to installing the oil filter.



Fig. 150: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

19. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 8 Nm

Stage 2: 180°

20. Remove the following items:

1. Refer to: **HEATED OXYGEN SENSOR (HO2S)** .
2. Refer to: **FUEL INJECTOR** .

21. Refer to: **COOLING SYSTEM DRAINING AND VACUUM FILLING** .

Refer to: **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

22. Fill the engine with clean engine oil.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

EXHAUST MANIFOLD

Removal

1. The exhaust manifold is an integral part of the catalytic converter and serviced as an assembly.

Refer to: **CATALYTIC CONVERTER** .

Installation

1. The exhaust manifold is an integral part of the catalytic converter and serviced as an assembly.

Refer to: **CATALYTIC CONVERTER** .

OIL PAN

MATERIALS SPECIFICATIONS

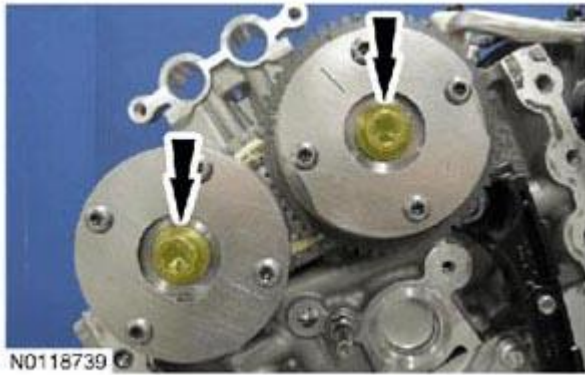
Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30	-
Motorcraft® Metal Surface Prep ZC-31-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

All vehicles

NOTE: Automatic transmission shown in illustration, manual transmission similar.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .



2.

Fig. 151: Identifying Oil Dipstick
Courtesy of FORD MOTOR CO.

NOTE: This step does not apply if the engine front cover is removed.

3. Refer to: **AIR CLEANER** .

Refer to: **AIR CLEANER OUTLET PIPE** .

Vehicles with automatic transmission

4. **NOTE:** This step does not apply if the engine front cover is removed.



Fig. 152: Locating Automatic Transmission Linkage Coupling
Courtesy of FORD MOTOR CO.

5. **NOTE:** This step does not apply if the engine front cover is removed.



Fig. 153: Locating Bracket Bolts
Courtesy of FORD MOTOR CO.

All vehicles

NOTE: To prevent damage to the transmission, do not loosen the transmission-to-engine bolts more than (0.197 in) 5 mm.

NOTE: This step does not apply if the engine front cover is removed.



Fig. 154: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

6. Loosen.

Distance : 0, 197 in (5 mm)

7. **NOTE:** This step does not apply if the engine front cover is removed.



Fig. 155: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

NOTE: This step does not apply if the engine front cover is removed.

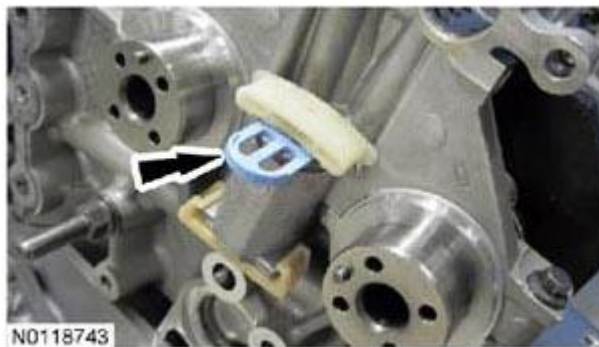


Fig. 156: Locating Transmission-To-Engine Bolt
Courtesy of FORD MOTOR CO.

8. Loosen.

Distance : 0, 197 in (5 mm)

9. Refer to: **AIR CONDITIONING (A/C) COMPRESSOR BELT** .



10.

Fig. 157: Locating A/C Compressor Connector

Courtesy of FORD MOTOR CO.



11.

Fig. 158: Locating A/C Compressor Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

NOTE: Support the A/C compressor. Do not allow the A/C compressor to hang by the A/C lines or damage to the A/C compressor and tubes may occur.

12.

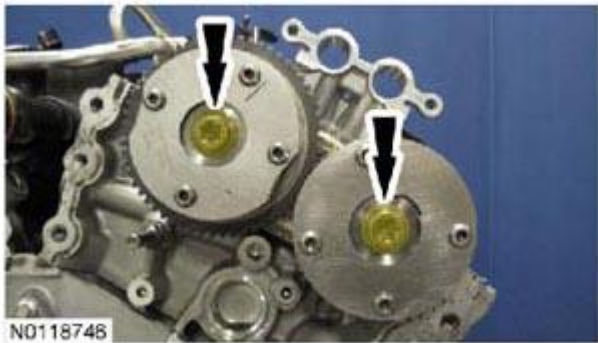


Fig. 159: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

13. Drain and install the drain plug.

Torque : 27 Nm

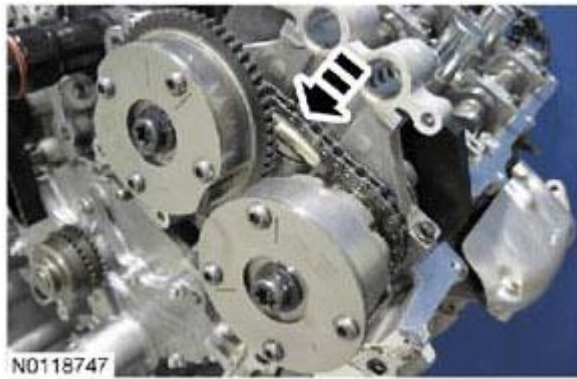
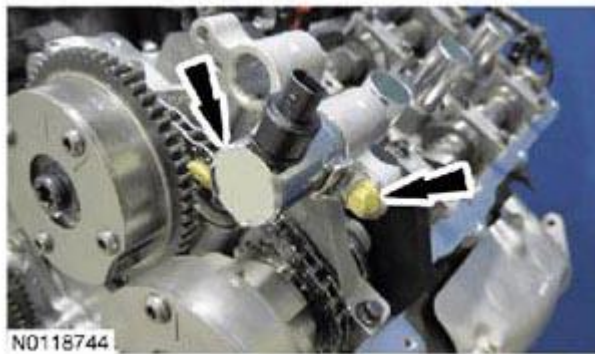


Fig. 160: Locating Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.



14.

Fig. 161: Identifying Oil Filter
Courtesy of FORD MOTOR CO.

15. Remove.

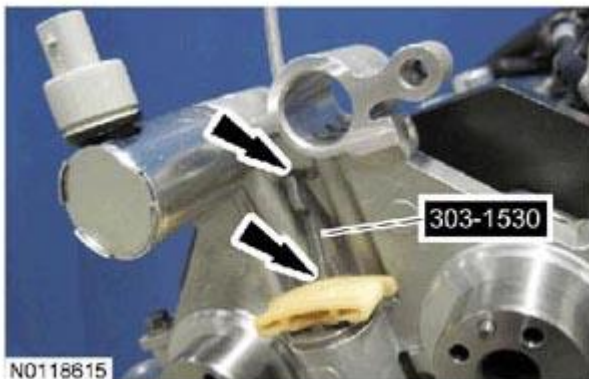


Fig. 162: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

16. Remove.

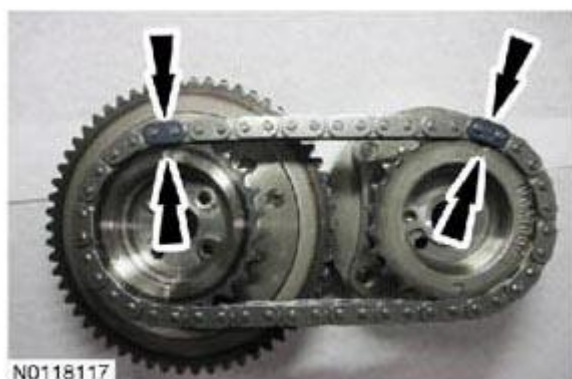


Fig. 163: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

17. **NOTE:** This step does not apply if the engine front cover is removed.



Fig. 164: Locating Transmission Clamp Bolts
Courtesy of FORD MOTOR CO.

NOTE: This step does not apply if the engine front cover is removed.

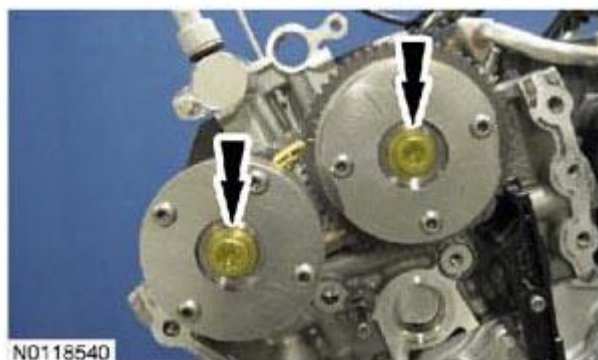


Fig. 165: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

18. Loosen.

Distance : 0, 197 in (5 mm)

NOTE: This step does not apply if the engine front cover is removed.

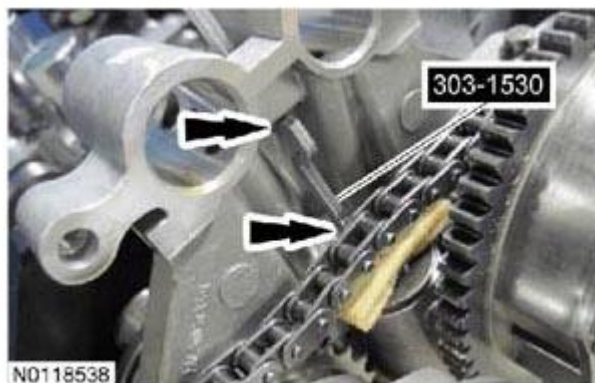


Fig. 166: Separating Transaxle From Engine
Courtesy of FORD MOTOR CO.

19. Separate the engine and transaxle.

Distance : 0, 197 in (5 mm)

NOTE: This step does not apply if the engine front cover is removed.



Fig. 167: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

20. Remove.



21.

Fig. 168: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

Installation

All vehicles

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

1. Clean and inspect all mating surfaces.

Material : Motorcraft® Metal Surface Prep / ZC-31-A

Material : Motorcraft® Silicone Gasket Remover / ZC-30

NOTE: Do not apply sealant to oil pan-to-engine front cover mating surface if the engine front cover is removed.

NOTE: If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

NOTE: Apply sealant to the oil pan-to-engine block and to the oil pan-to-engine front cover mating surfaces.



Fig. 169: Applying Sealant To Oil Pan-To-Engine Block
Courtesy of FORD MOTOR CO.

2. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)
3. Finger-tight.

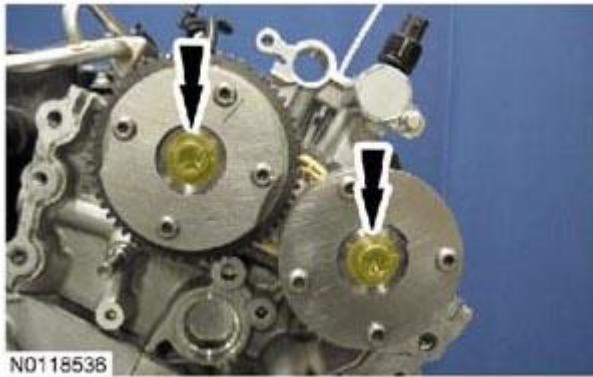


Fig. 170: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

NOTE: The engine front cover-to-oil pan fasteners must be tightened first to align the front surface of the oil pan flush with the front surface of the engine block.

NOTE: This step does not apply if the engine front cover is removed.



Fig. 171: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

4. Torque : 10 Nm
5. Torque : 20 Nm



Fig. 172: Locating Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: This step does not apply if the engine front cover is removed.

NOTE: Alternate tightening the LH bellhousing-to-engine and RH engine-to-bellhousing lower bolts to draw the transaxle and engine together.



Fig. 173: Locating LH Bellhousing-To-Engine Bolt
Courtesy of FORD MOTOR CO.

6. Torque : 48 Nm
7. Torque : 48 Nm

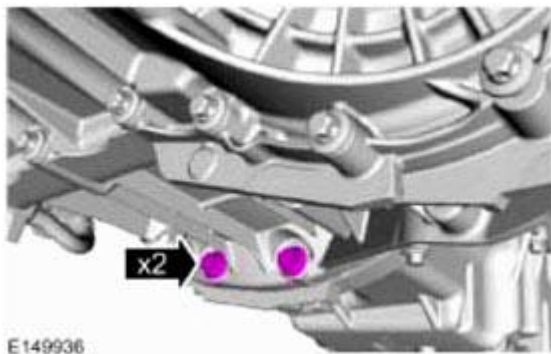


Fig. 174: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

8. Torque : 48 Nm



Fig. 175: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

NOTE: This step does not apply if the engine front cover is removed.

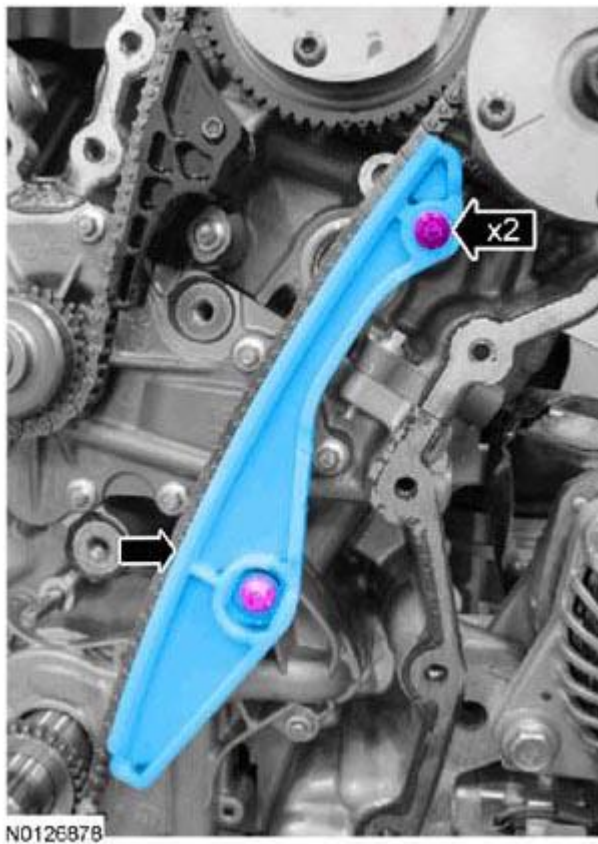


Fig. 176: Locating Transmission Clamp Bolts
Courtesy of FORD MOTOR CO.

9. *Torque* : 86 Nm

NOTE: This step does not apply if the engine front cover is removed.



Fig. 177: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

10. Torque : 48 Nm
11. Torque : 25 Nm

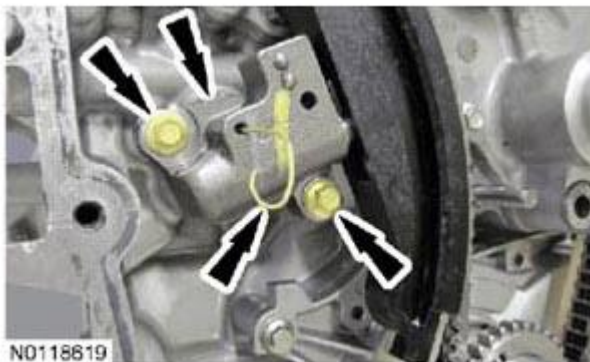


Fig. 178: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

12. Torque : 18 Nm



Fig. 179: Locating A/C Compressor Tube Bracket Bolt
Courtesy of FORD MOTOR CO.



13.

Fig. 180: Locating A/C Compressor Connector
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the engine oil filter gasket with clean engine oil prior to installing the oil filter.



Fig. 181: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

14. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 8 Nm

Stage 2: 180°

NOTE: This step does not apply if the engine front cover is removed.



Fig. 182: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

15. *Torque* : 20 Nm
16. Refer to: AIR CONDITIONING (A/C) COMPRESSOR BELT .

NOTE: This step does not apply if the engine front cover is removed.

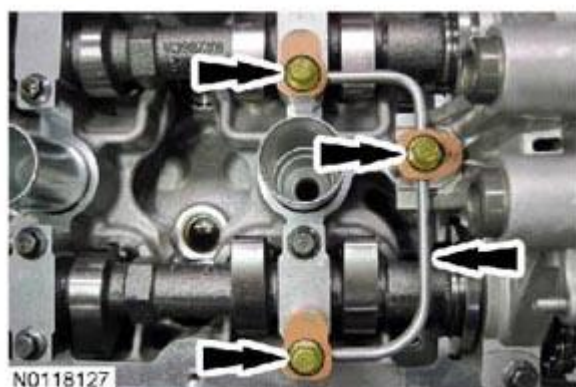


Fig. 183: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

17. *Torque* : 48 Nm

Vehicles with automatic transmission

NOTE: This step does not apply if the engine front cover is removed.

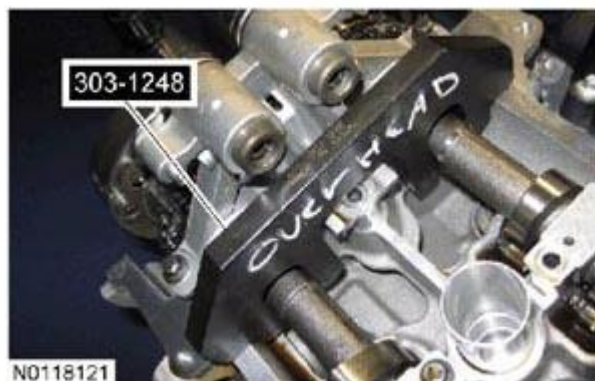


Fig. 184: Locating Bracket Bolts
Courtesy of FORD MOTOR CO.

18. *Torque* : 10 Nm

19. **NOTE:** This step does not apply if the engine front cover is removed.



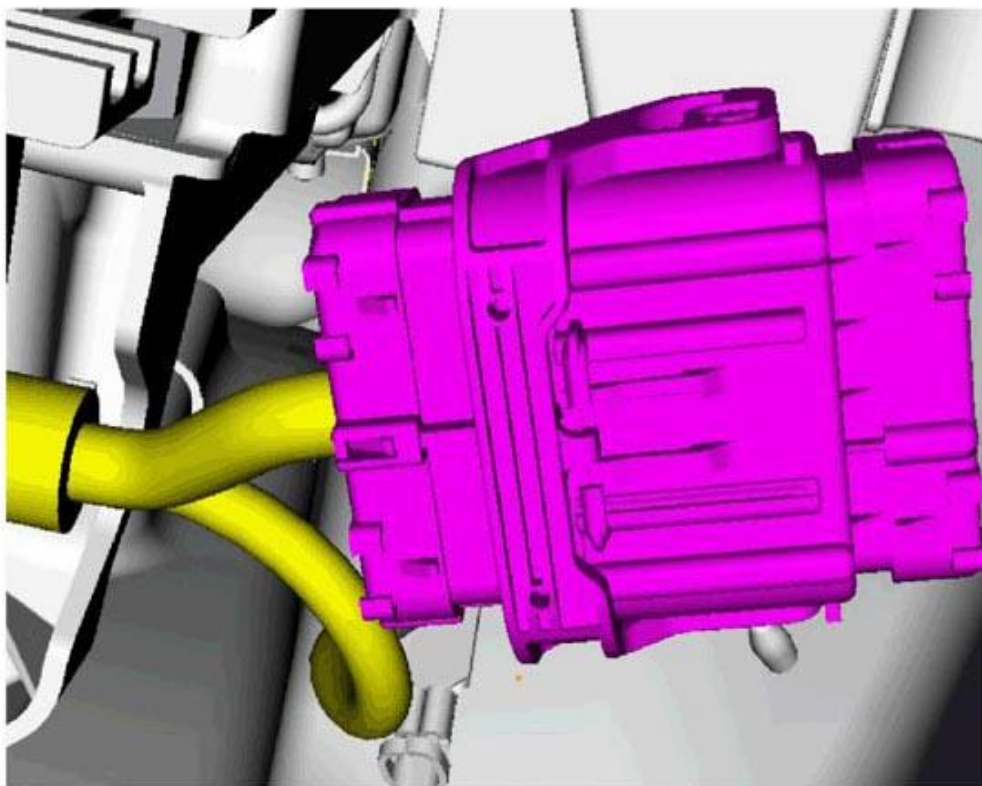
Fig. 185: Locating Automatic Transmission Linkage Coupling
Courtesy of FORD MOTOR CO.

All vehicles

NOTE: This step does not apply if the engine front cover is removed.

20. Refer to: **AIR CLEANER** .

Refer to: **AIR CLEANER OUTLET PIPE** .



21.

Fig. 186: Identifying Oil Dipstick

Courtesy of FORD MOTOR CO.

22. Fill the engine with clean engine oil.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

OIL PUMP

Round-Ended Steel Rule

MATERIALS SPECIFICATIONS

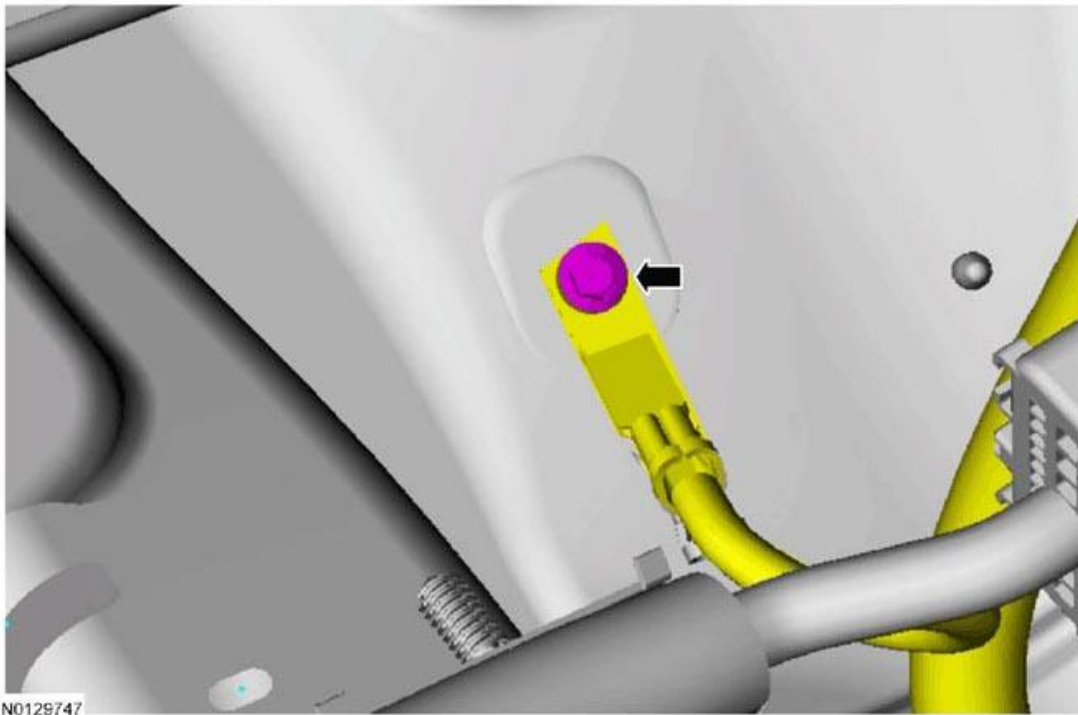
Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30	-
Motorcraft® Metal Surface Prep ZC-31-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

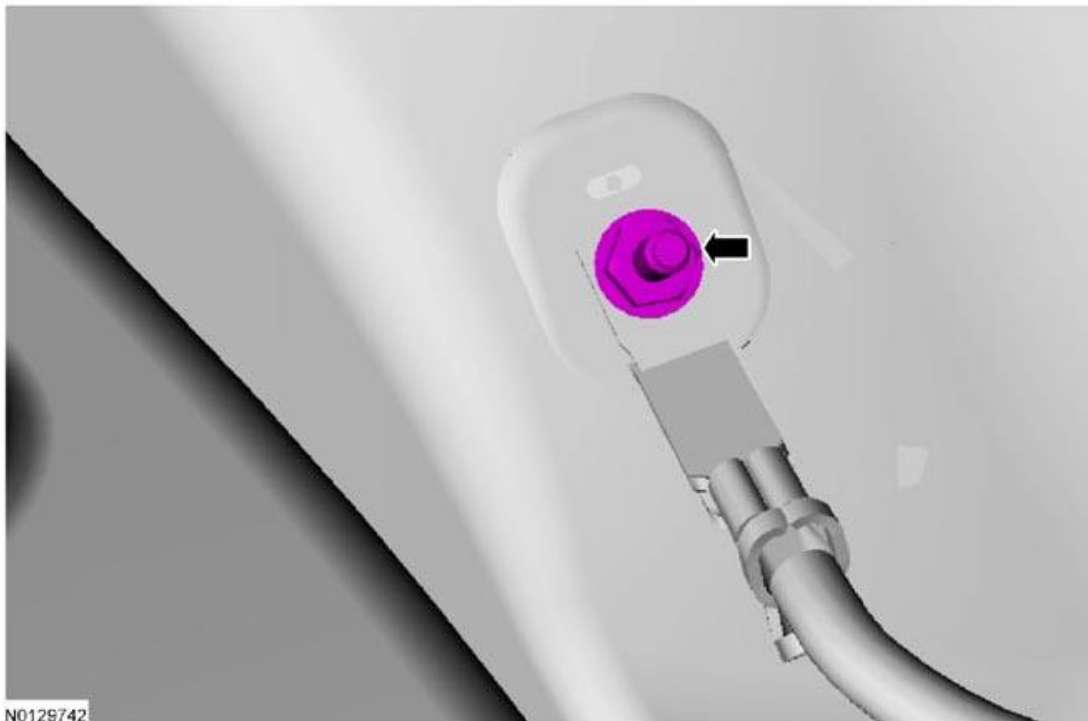
NOTE: Automatic transmission shown in illustration, manual transmission similar.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Refer to: **Engine Front Cover** .



3.

Fig. 187: Locating A/C Compressor Connector
Courtesy of FORD MOTOR CO.

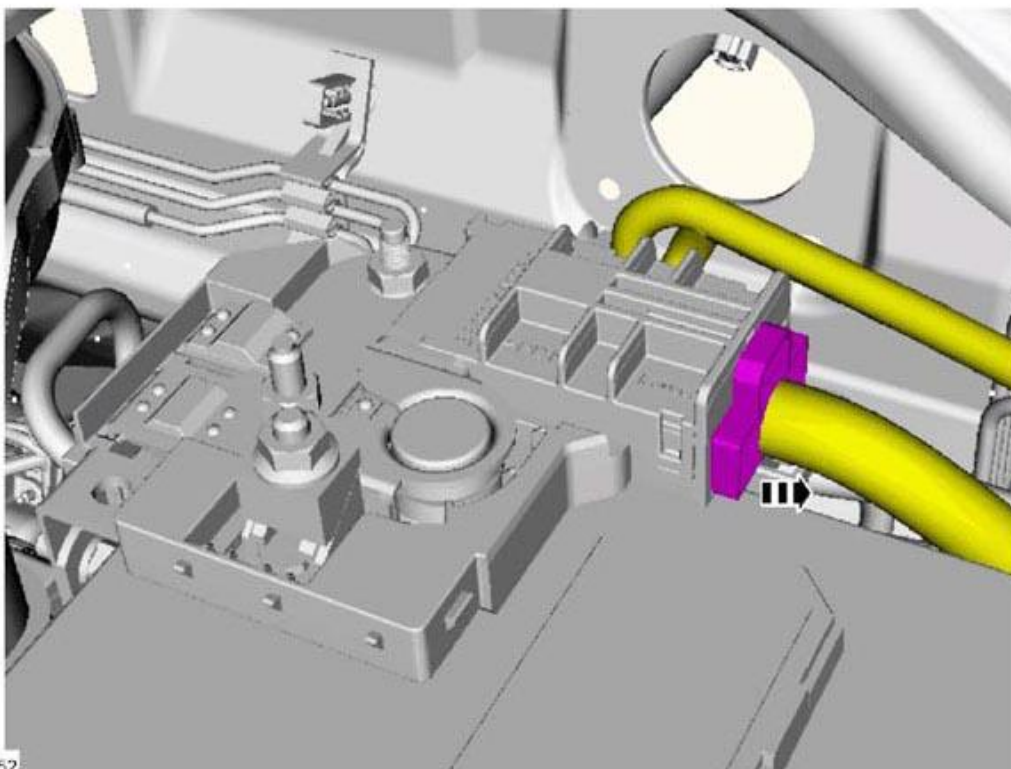


4.

Fig. 188: Locating A/C Compressor Tube Bracket Bolt

Courtesy of FORD MOTOR CO.

5. **NOTE:** Support the A/C compressor. Do not allow the A/C compressor to hang by the A/C lines or damage to the A/C compressor and tubes may occur.



N0129752

Fig. 189: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

6. Drain and install the drain plug.

Torque : 27 Nm

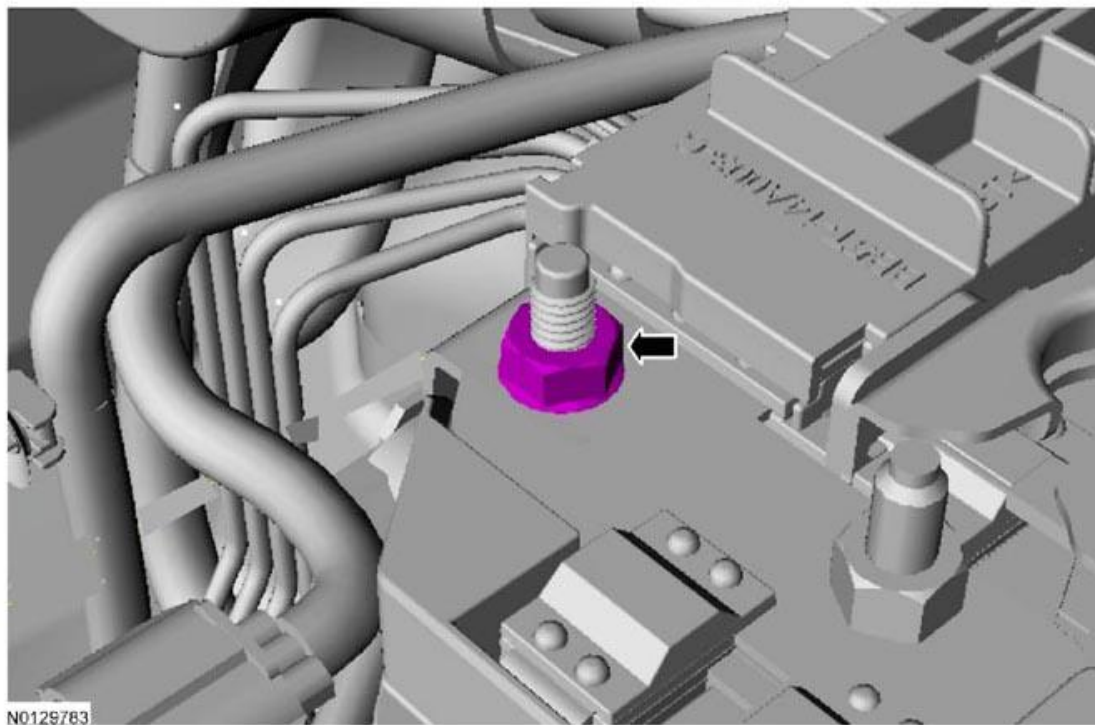
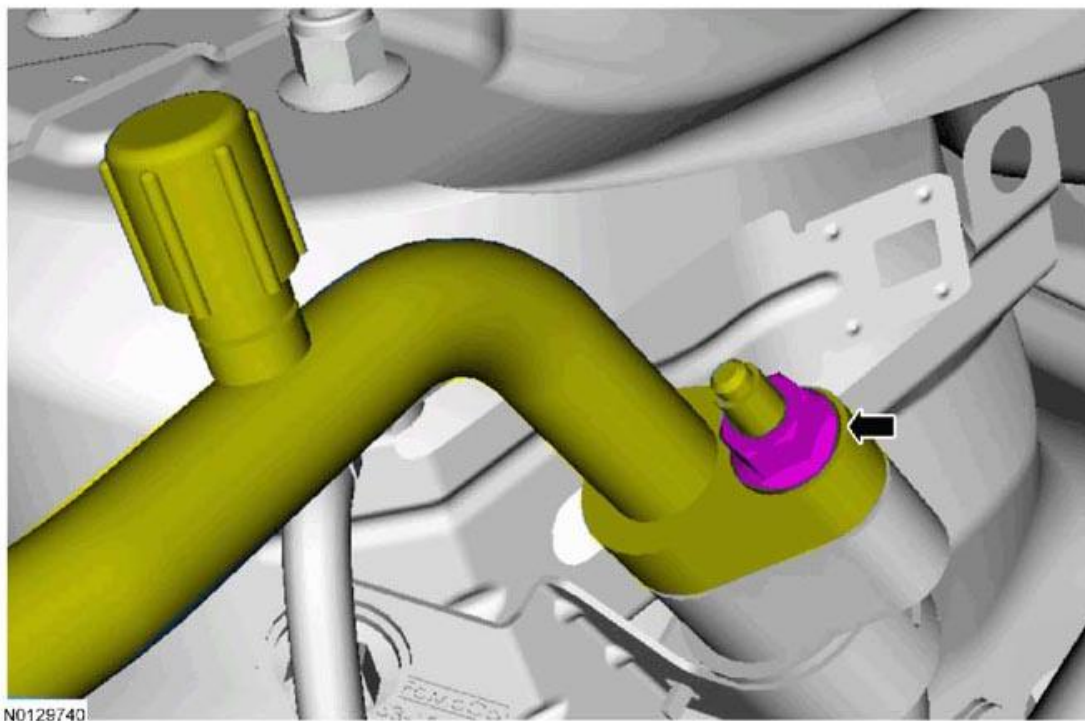
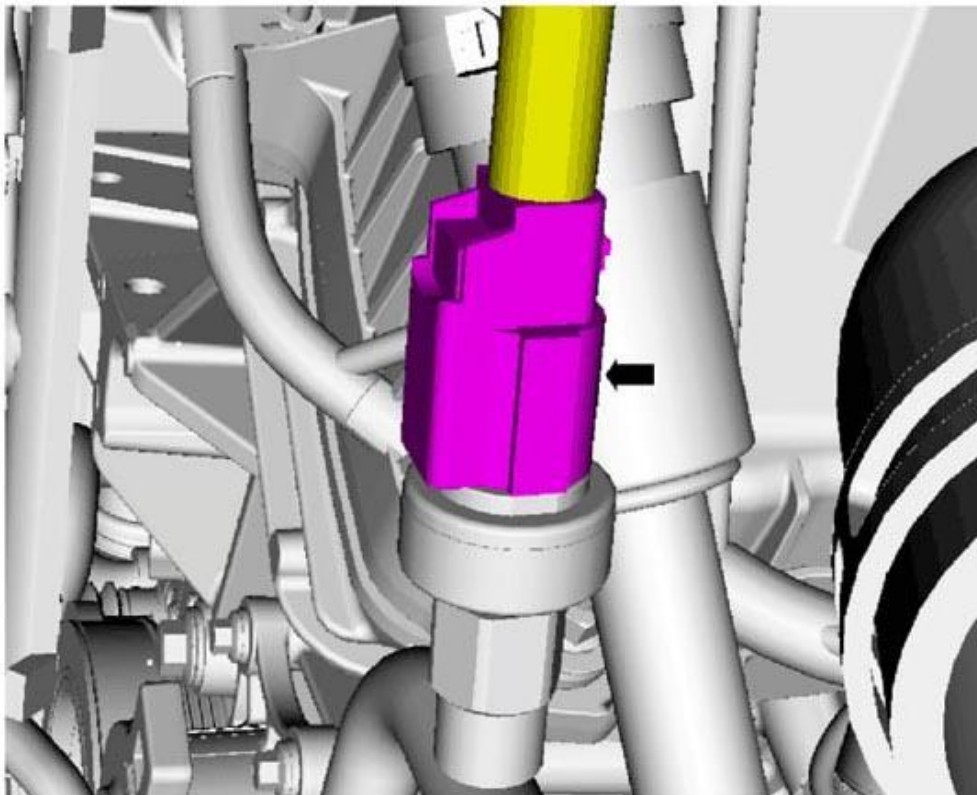


Fig. 190: Locating Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.



7.

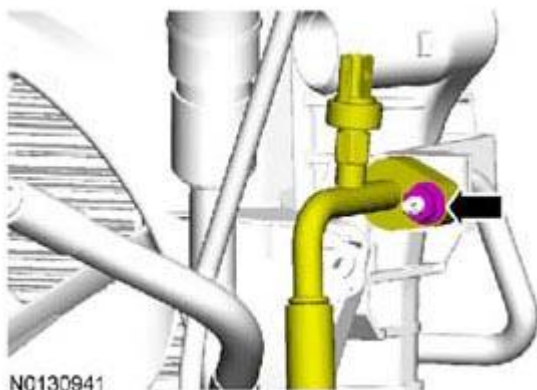
Fig. 191: Identifying Oil Filter
Courtesy of FORD MOTOR CO.



8.

N0129741

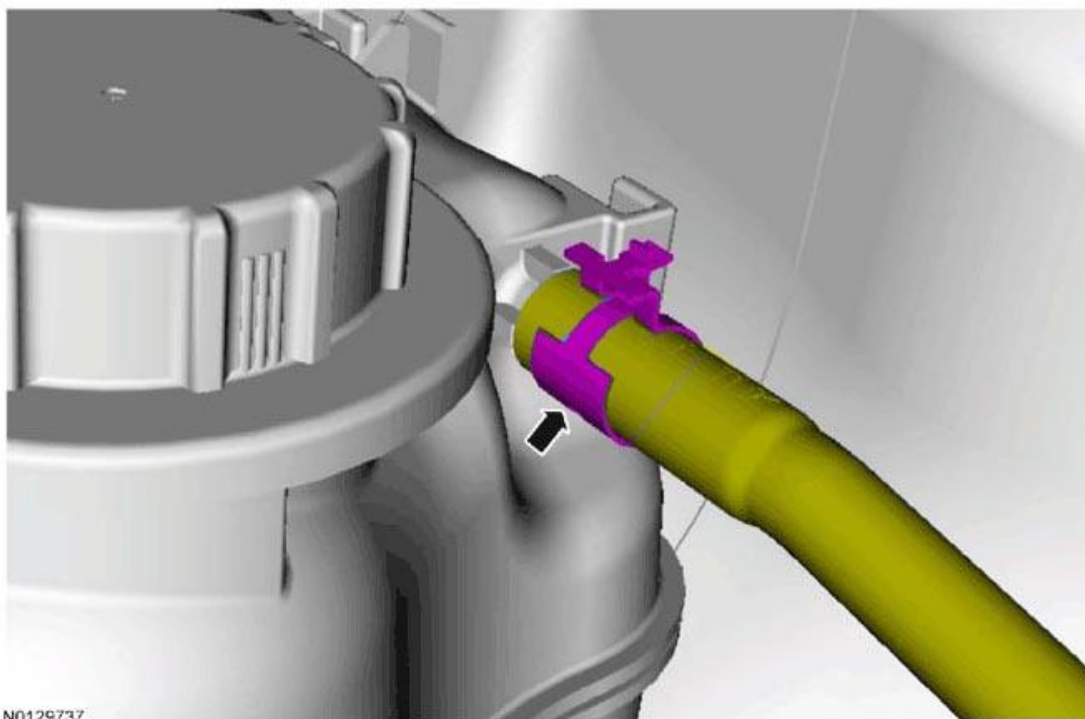
Fig. 192: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.



9.

N0130941

Fig. 193: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.



10. N0129737

Fig. 194: Locating Oil Pan Bolts

Courtesy of FORD MOTOR CO.

11. **NOTE:** Discard the gasket.

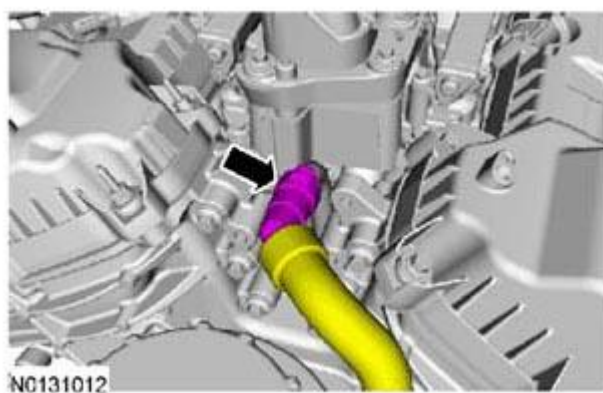


Fig. 195: Locating Bolts Of Oil Pump Screen And Pickup Tube

Courtesy of FORD MOTOR CO.

12.

1. Push the tensioner spring down and release the spring from under the shoulder bolt.
2. Remove the 2 shoulder bolts and the tensioner and chain.

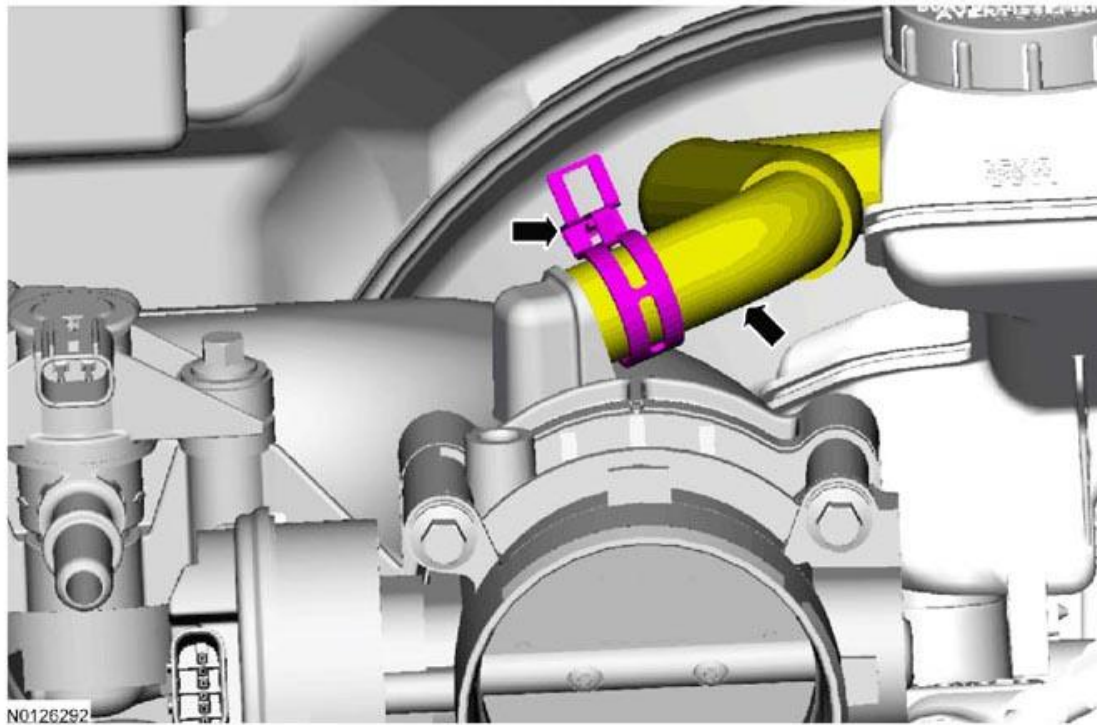
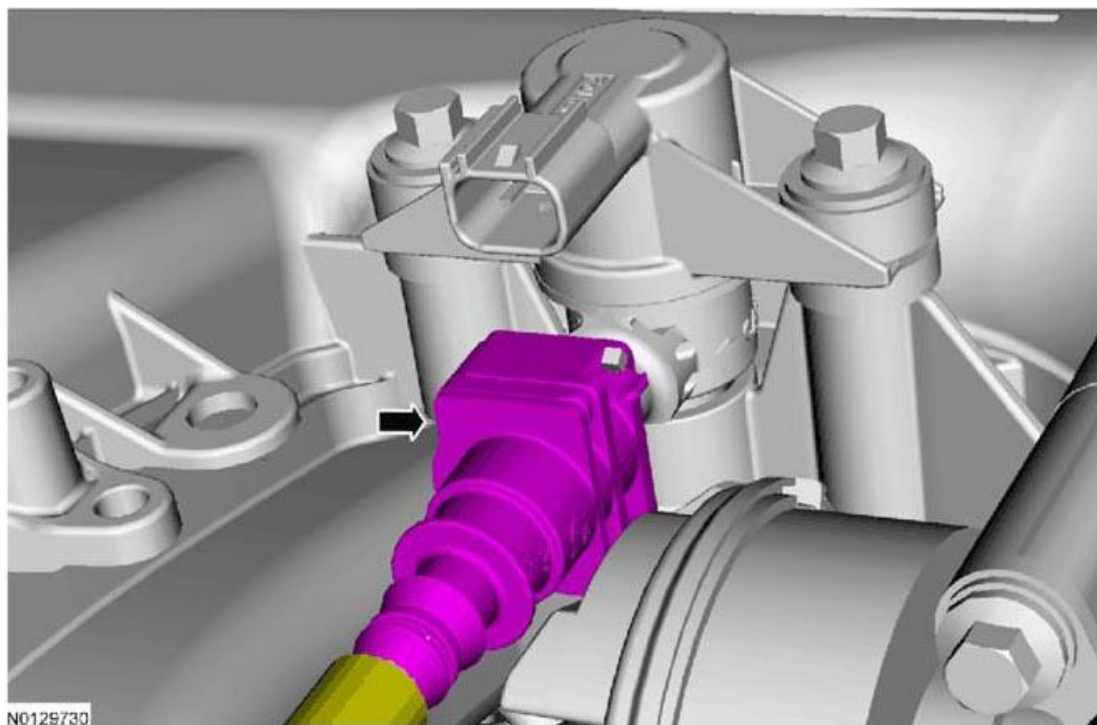
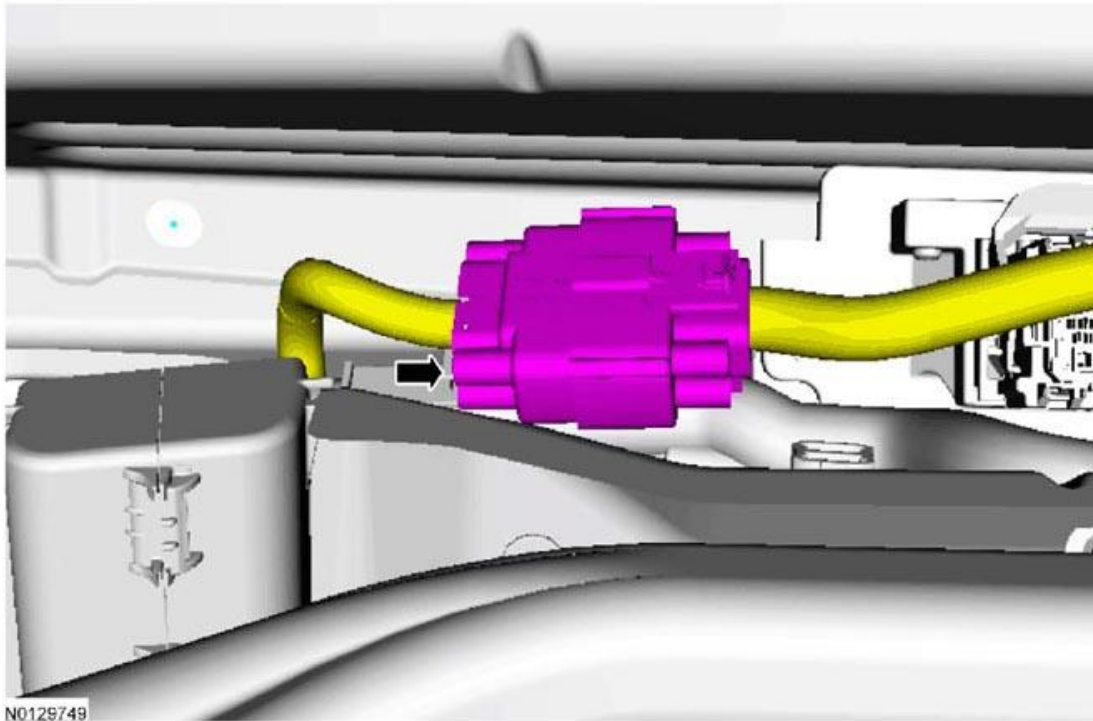


Fig. 196: Locating Shoulder Bolts, Tensioner And Chain
Courtesy of FORD MOTOR CO.



13.

Fig. 197: Locating Oil Pump Sprocket Bolt
Courtesy of FORD MOTOR CO.



14.

Fig. 198: Locating Oil Pump Bolts
Courtesy of FORD MOTOR CO.

Installation

1. Clean the oil pump and cylinder block mating surfaces.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

2. *Torque* :

Stage 1: 10 Nm

Stage 2: 20 Nm

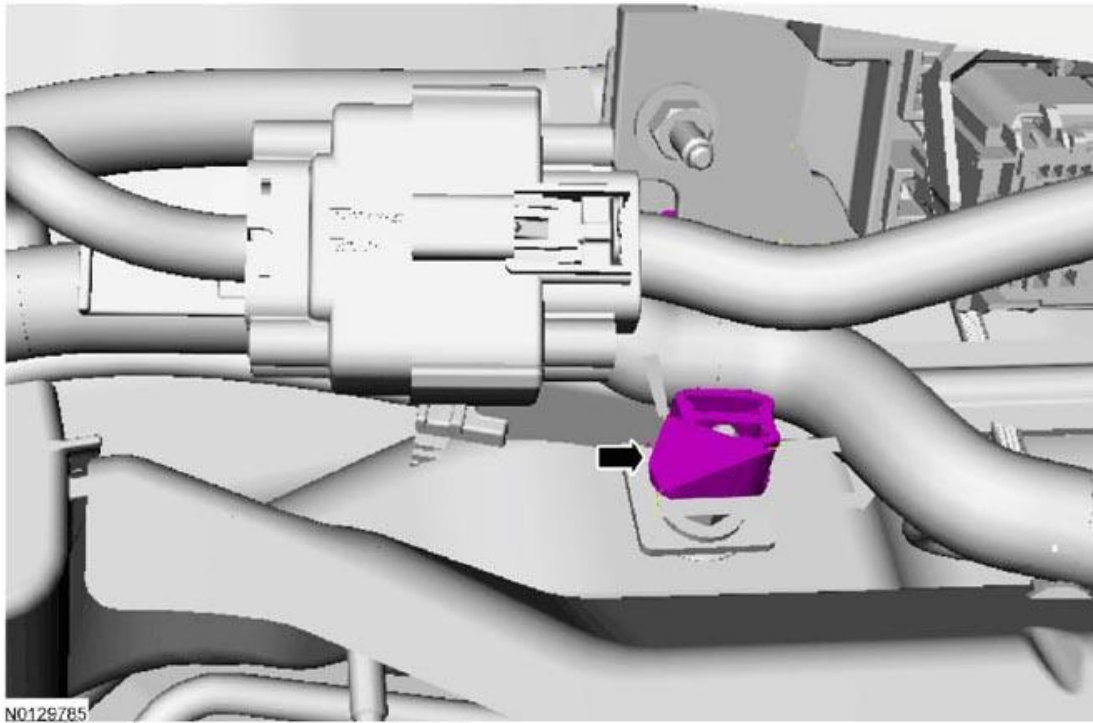


Fig. 199: Identifying Oil Pump Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. *Torque : 25 Nm*

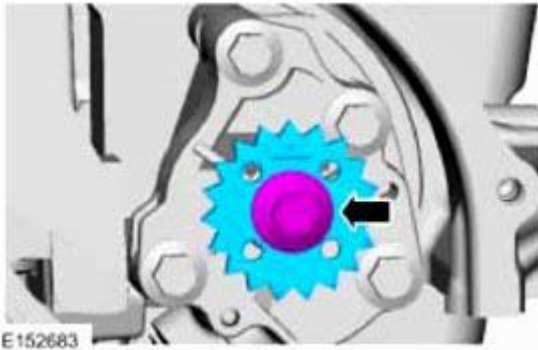


Fig. 200: Locating Oil Pump Sprocket Bolt
Courtesy of FORD MOTOR CO.

4.

1. Install the tensioner and the 2 shoulder bolts.

Torque : 10 Nm

2. Push the tensioner spring down and position the spring under the shoulder bolt.

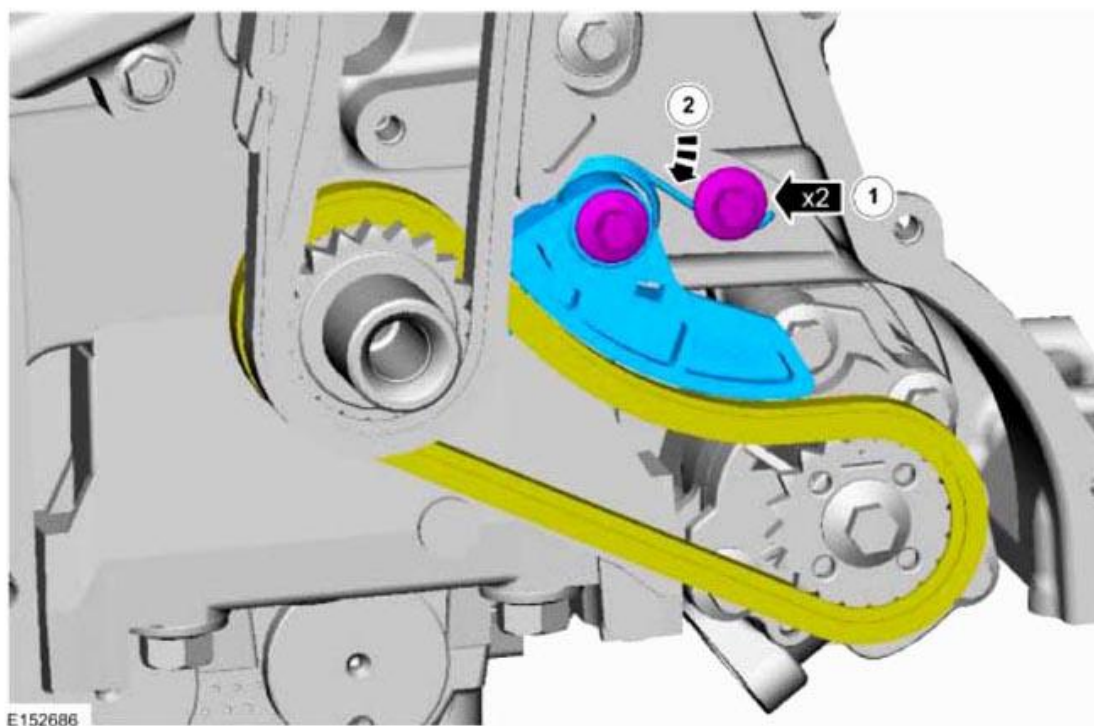


Fig. 201: Pushing Tensioner Spring Down And Position Spring Under Shoulder Bolt
Courtesy of FORD MOTOR CO.

NOTE: Install a new gasket.

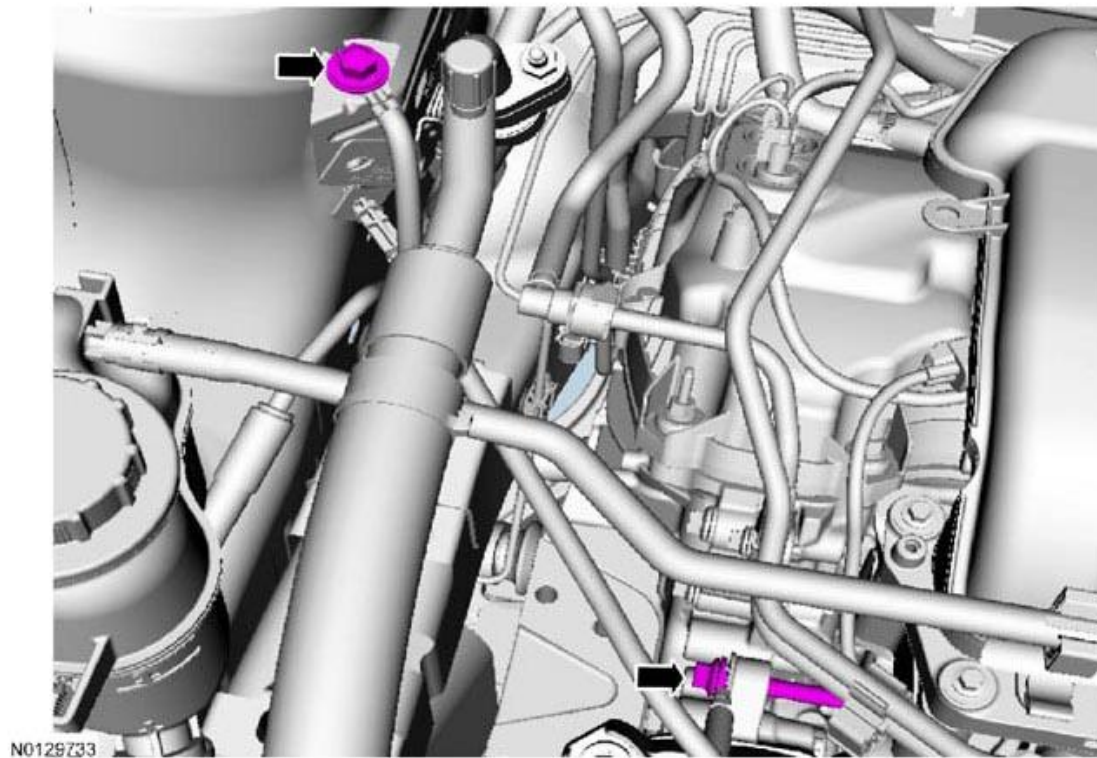


Fig. 202: Locating Bolts Of Oil Pump Screen And Pickup Tube
Courtesy of FORD MOTOR CO.

5. *Torque* : 10 Nm

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces to sealant.

6. Clean and inspect all mating surfaces.

Material : Motorcraft® Metal Surface Prep / ZC-31-A

Material : Motorcraft® Silicone Gasket Remover / ZC-30

NOTE: If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

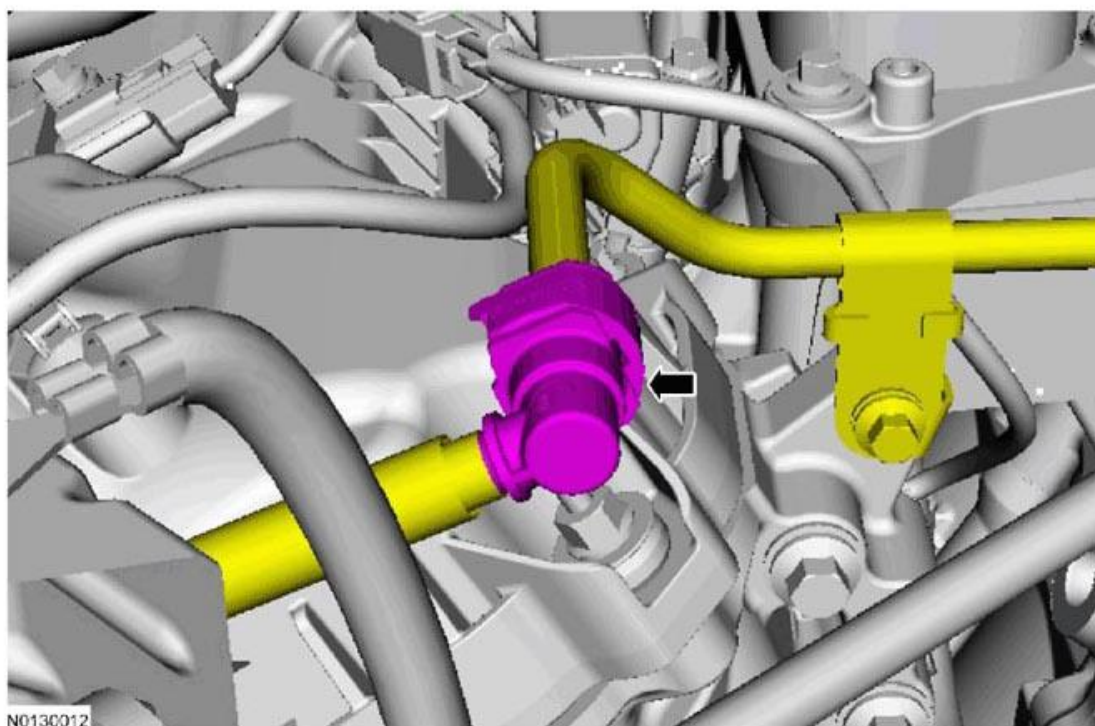


Fig. 203: Applying Sealant On Oil Pan
Courtesy of FORD MOTOR CO.

7. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

NOTE: Do not tighten the oil pan bolts at this time.

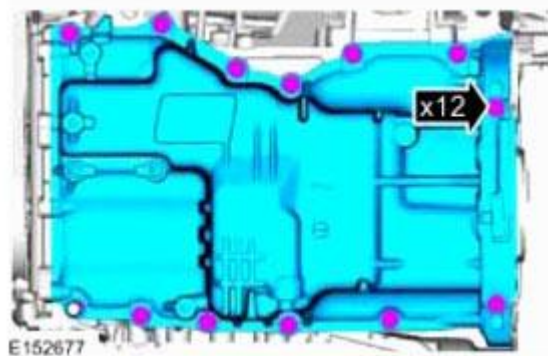


Fig. 204: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

8. Finger tight.
9. Align the front surface of the oil pan flush with the front surface of the engine block.

General Equipment : Round-Ended Steel Rule

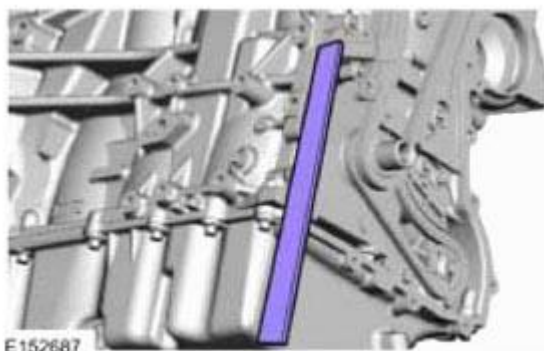


Fig. 205: Aligning Front Surface Of Oil Pan Flush With Front Surface Of Engine Block
 Courtesy of FORD MOTOR CO.

10. *Torque* : 20 Nm

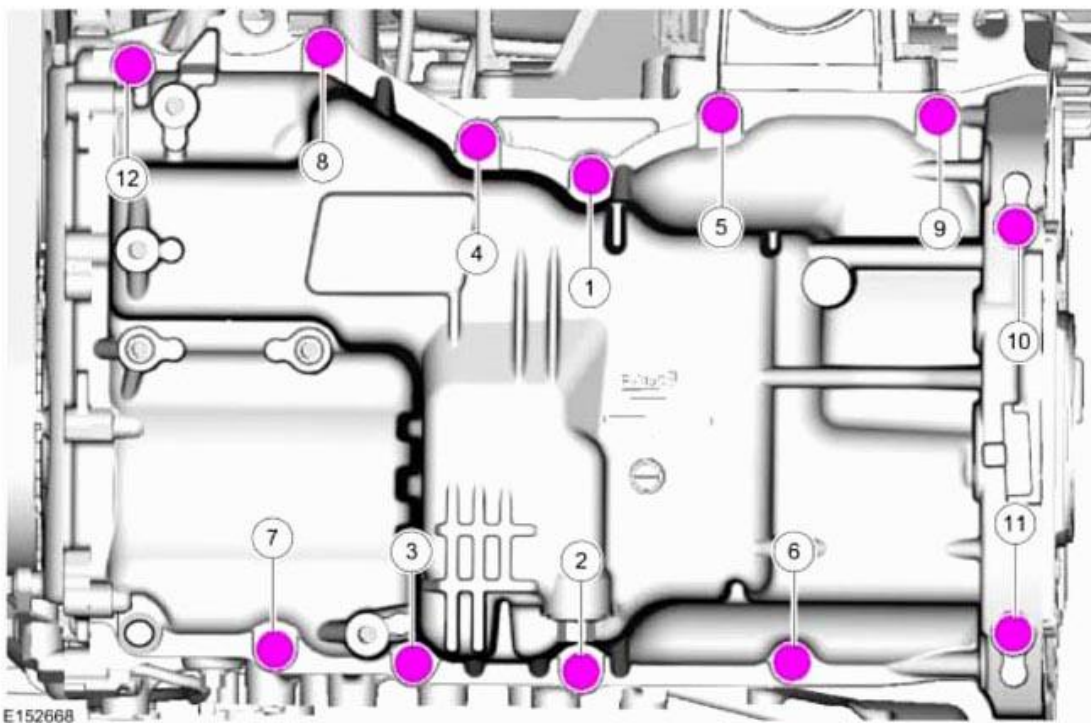


Fig. 206: Locating Oil Pan Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

11. *Torque* : 48 Nm

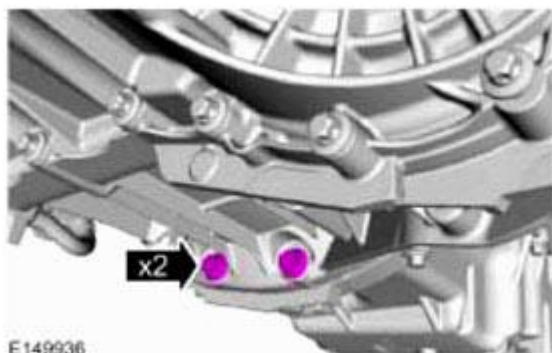


Fig. 207: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

12. *Torque* : 48 Nm

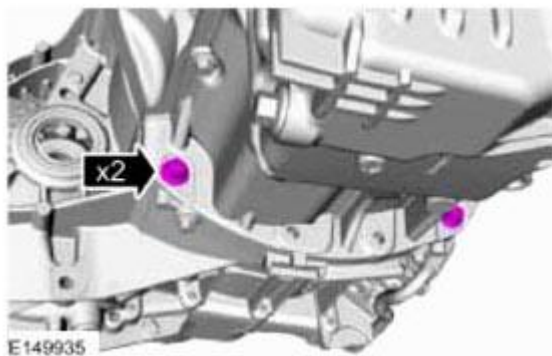


Fig. 208: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the engine oil filter gasket with clean engine oil prior to installing the oil filter.



Fig. 209: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

13. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 8 Nm

Stage 2: 180°

14. *Torque* : 25 Nm

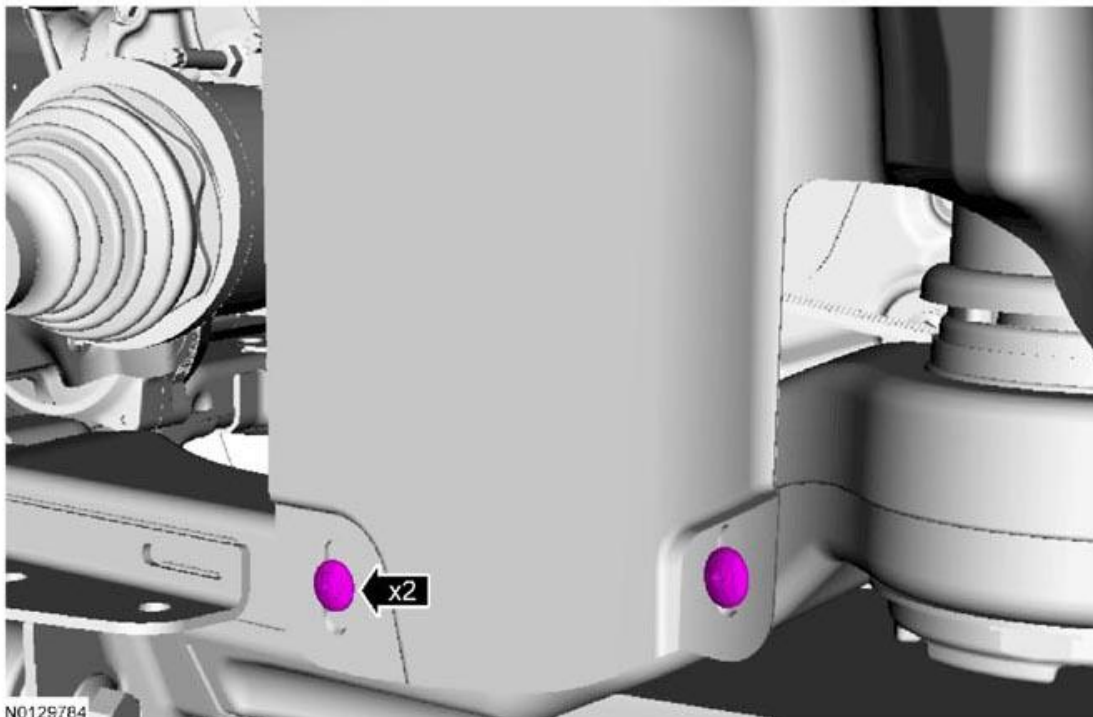
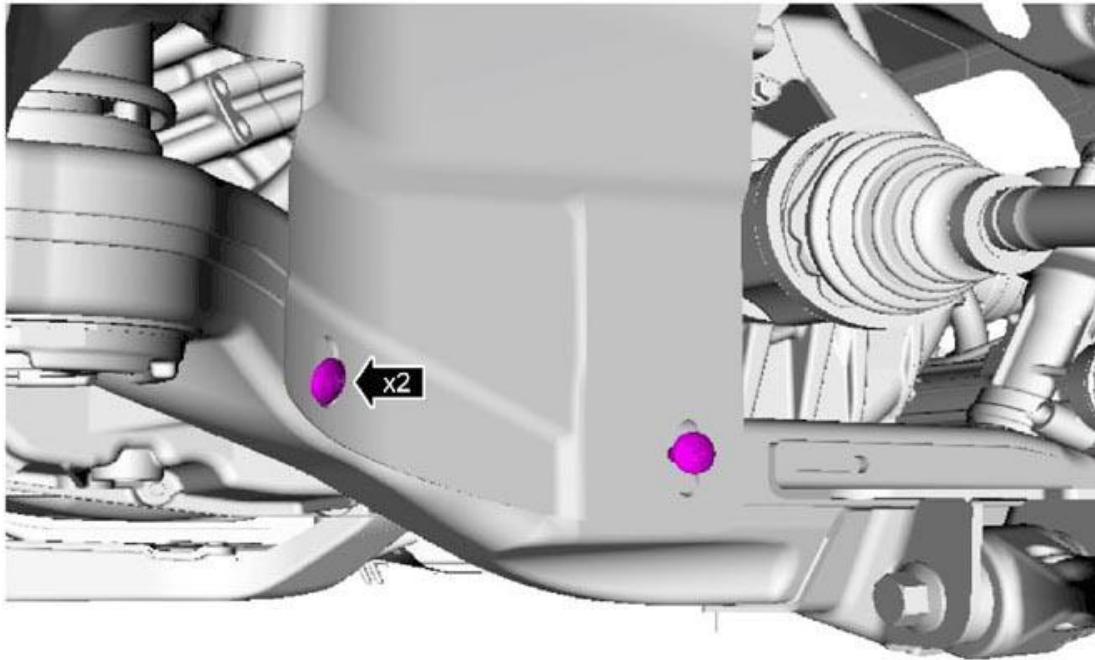


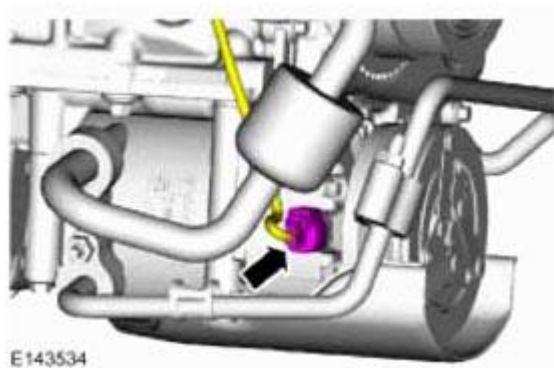
Fig. 210: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

15. *Torque* : 18 Nm



N0129751

Fig. 211: Locating A/C Compressor Tube Bracket Bolt
Courtesy of FORD MOTOR CO.



E143534

16.

Fig. 212: Locating A/C Compressor Connector
Courtesy of FORD MOTOR CO.

17. Refer to: **Engine Front Cover** .

18. Fill the engine with clean engine oil.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

OIL PUMP SCREEN AND PICKUP TUBE

Removal

NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Oil Pan .

NOTE: A new gasket must be installed.

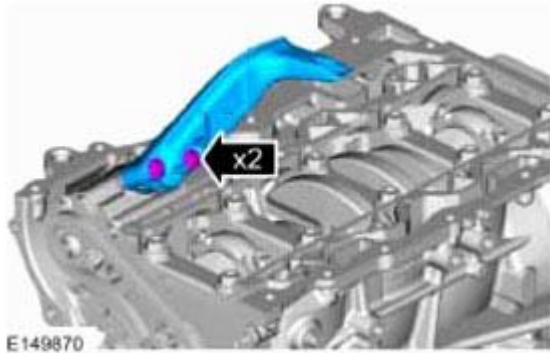


Fig. 213: Locating Bolts Of Oil Pump Screen And Pickup Tube
Courtesy of FORD MOTOR CO.

2. *Torque* : 10 Nm

Installation

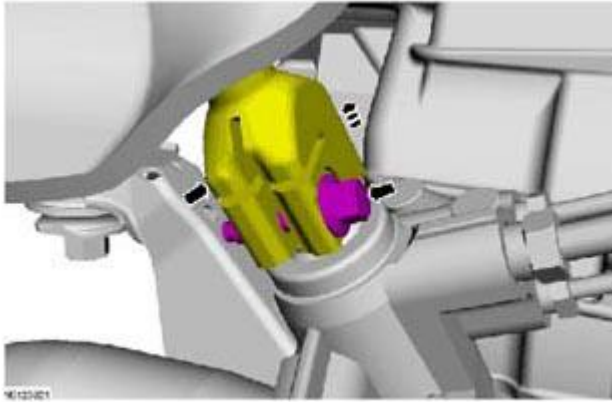
1. To install, reverse the removal procedure.

OIL FILTER ADAPTER**MATERIALS SPECIFICATIONS**

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

Removal

1. Refer to: JACKING AND LIFTING - OVERVIEW .



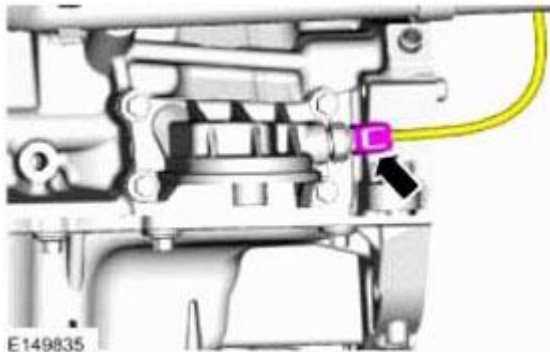
2.

Fig. 214: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.



3.

Fig. 215: Identifying Oil Filter
Courtesy of FORD MOTOR CO.



4.

Fig. 216: Locating Oil Filter EOP Switch Connector
Courtesy of FORD MOTOR CO.

5. **NOTE:** Discard the gasket.

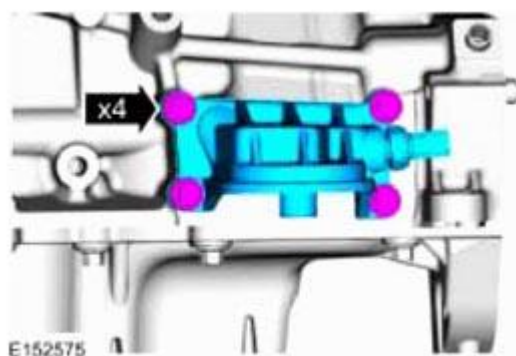


Fig. 217: Locating Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

Installation

1. Clean and inspect the mating surfaces.

NOTE: Install a new gasket.

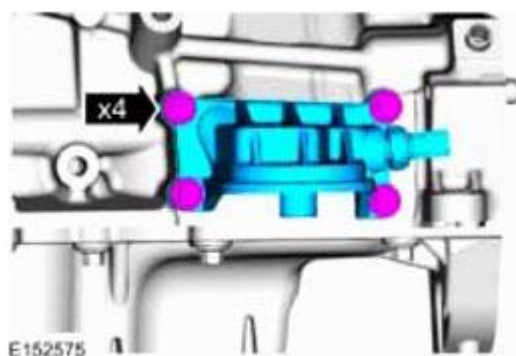


Fig. 218: Locating Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

2. Torque : 25 Nm



- 3.

Fig. 219: Locating Oil Filter EOP Switch Connector

Courtesy of FORD MOTOR CO.

NOTE: Lubricate the oil filter gasket with clean engine oil.



Fig. 220: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

4. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 8 Nm

Stage 2: 180°



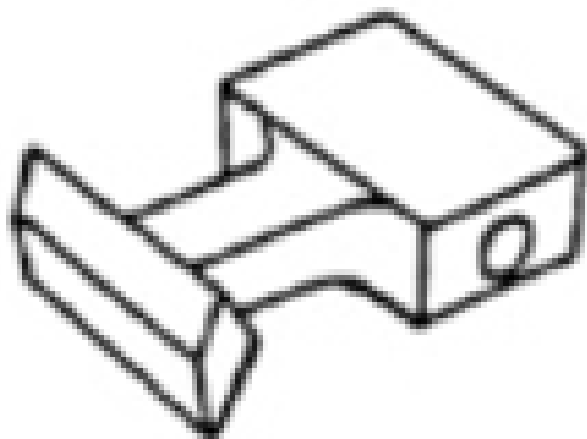
- 5.

Fig. 221: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.

FLYWHEEL

SPECIAL TOOL(S) / GENERAL EQUIPMENT

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303-103
Holding Tool, Flywheel
TKIT-2009TC-F

Removal

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Refer to: **CLUTCH DISC AND PRESSURE PLATE - VEHICLES WITH: 5-SPEED MANUAL TRANSMISSION - MTX75** .
3. *Special Tool(s)* : **303-103 (Holding Tool, Flywheel)**

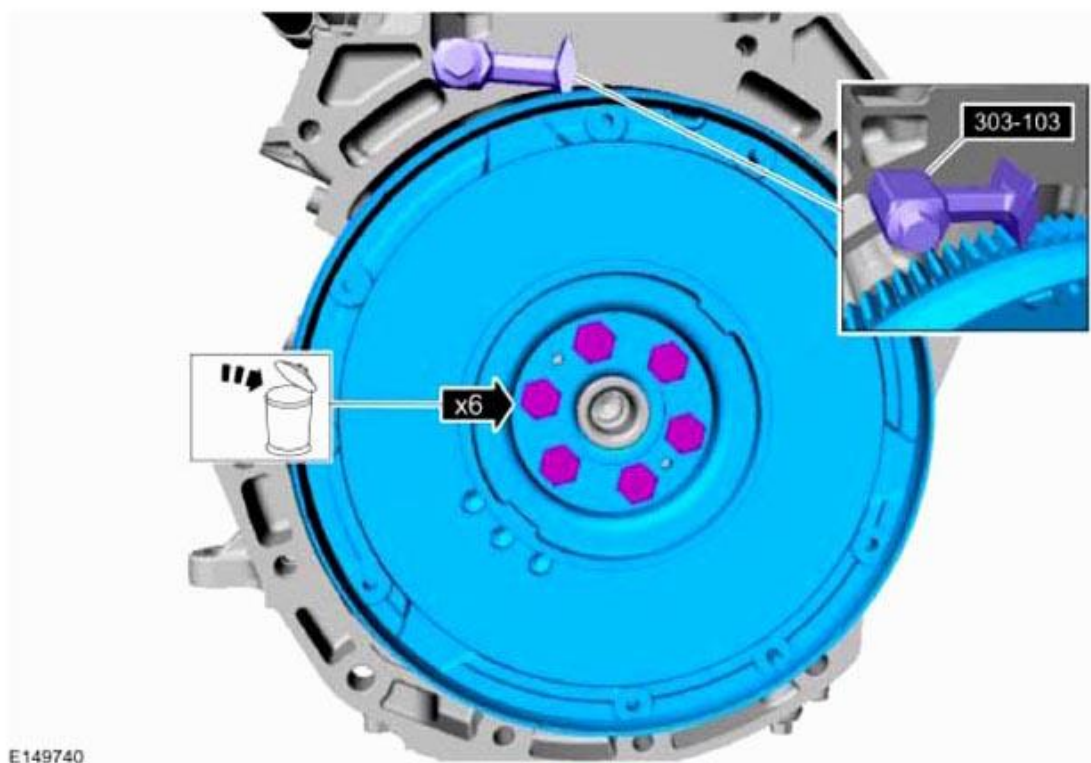


Fig. 222: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts

Courtesy of FORD MOTOR CO.

Installation

NOTE: Special bolts are used for installation. Do not use standard bolts.

1. *Special Tool(s)* : 303-103 (Holding Tool, Flywheel)

2.

- Torque : 50 Nm
- Torque : 80 Nm
- Torque : 112 Nm

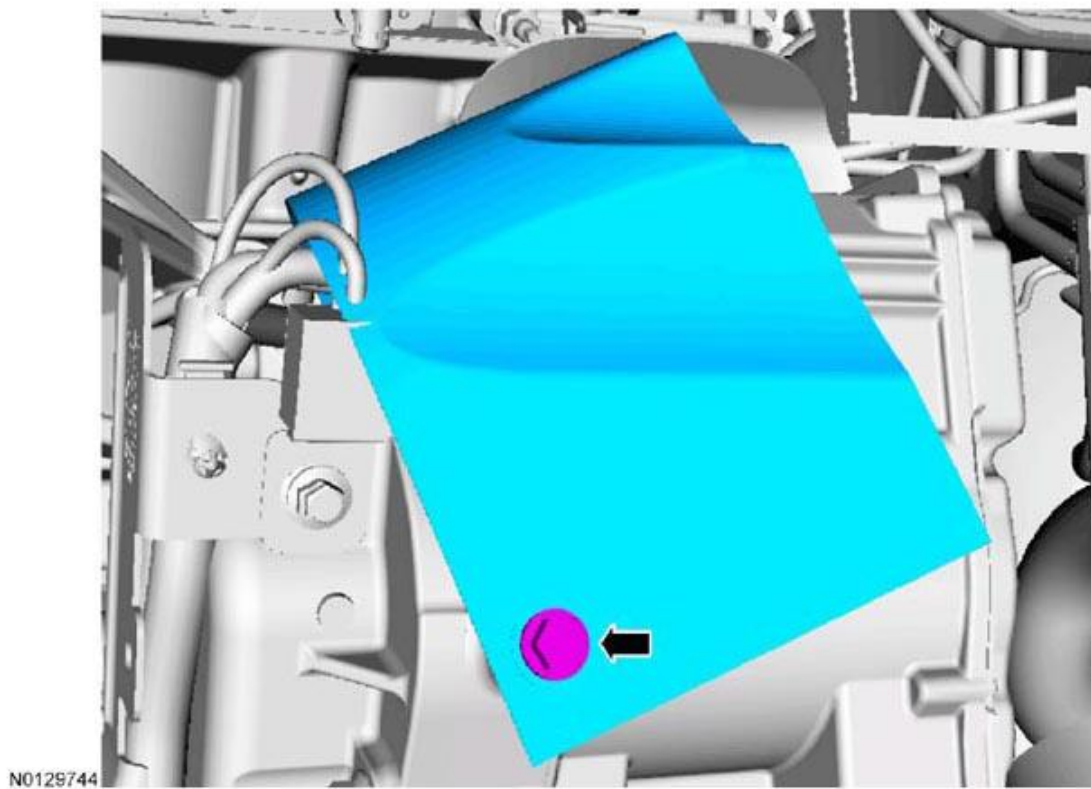


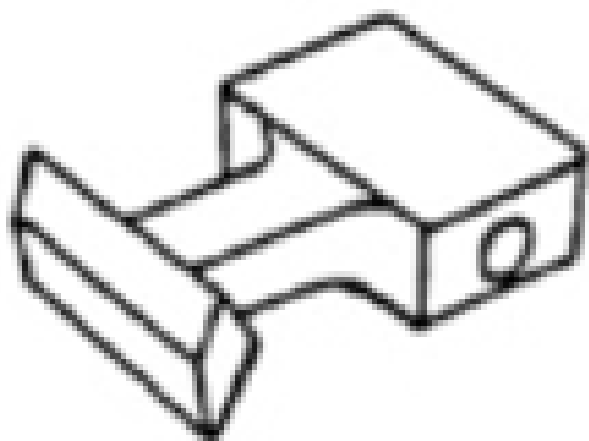
Fig. 223: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Refer to: **CLUTCH DISC AND PRESSURE PLATE - VEHICLES WITH: 5-SPEED MANUAL TRANSMISSION - MTX75** .

FLEXPLATE

SPECIAL TOOL(S) / GENERAL EQUIPMENT

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303-103
Holding Tool, Flywheel
TKIT-2009TC-F

Removal

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .
2. Refer to: **Transmission - 2.0L Duratec-HE (TRANSMISSION - 2.0L DURATEC-HE)** .
3. *Special Tool(s)* : **303-103 (Holding Tool, Flywheel)**

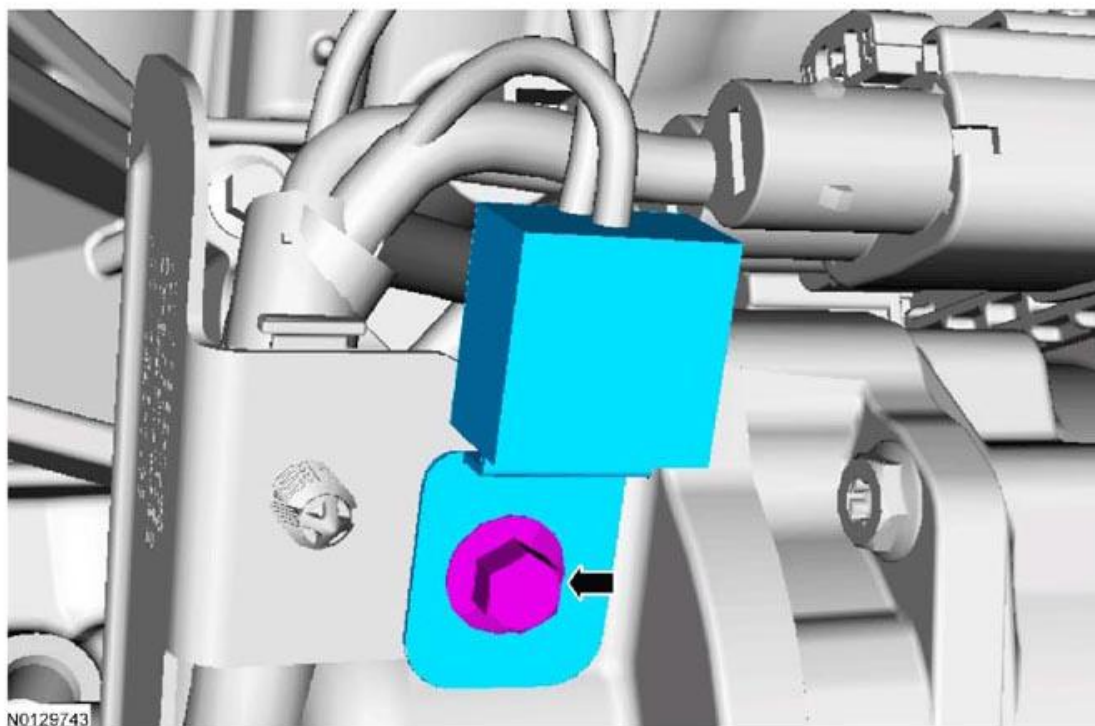


Fig. 224: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

Installation

NOTE: Special bolts are used for installation. Do not use standard bolts.

1. *Special Tool(s)* : 303-103 (Holding Tool, Flywheel)
2.
 - Torque : 50 Nm
 - Torque : 80 Nm
 - Torque : 112 Nm

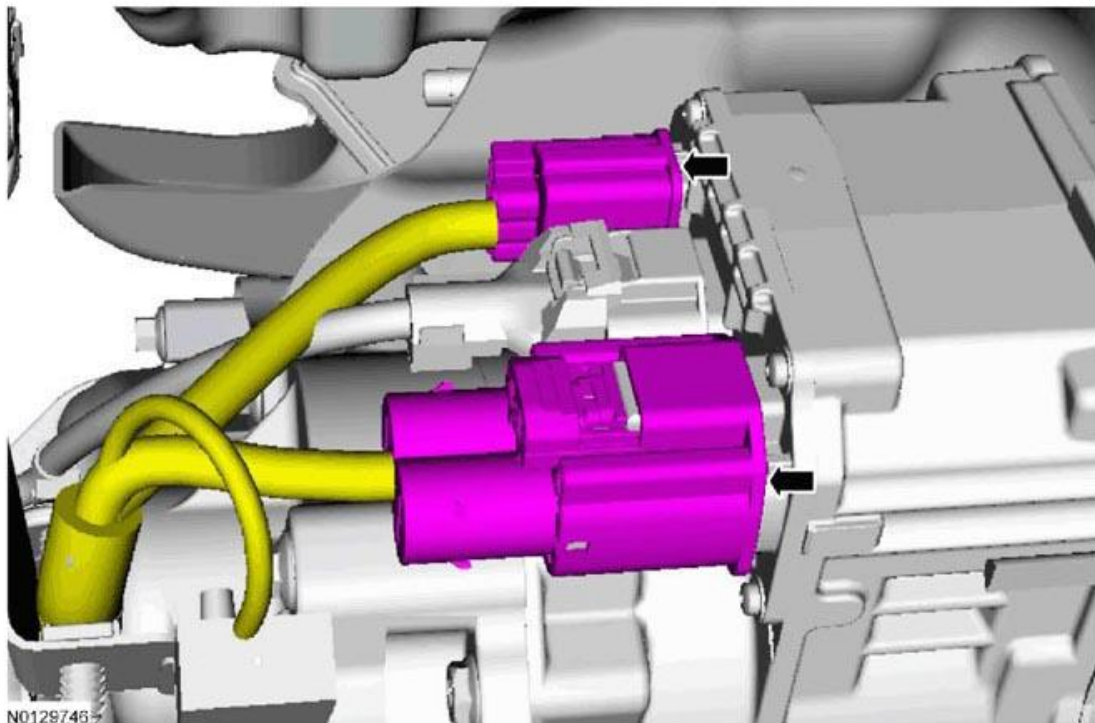


Fig. 225: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

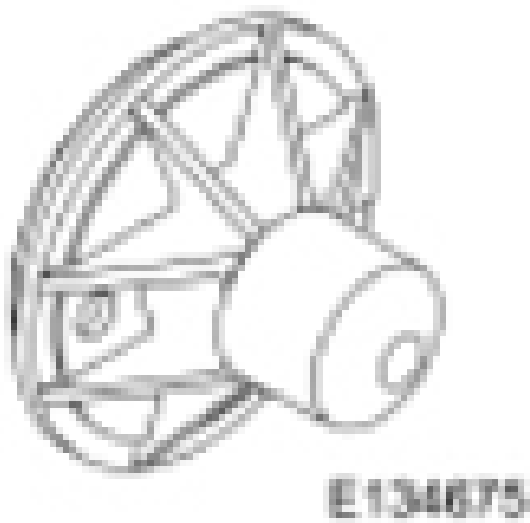
3. Refer to: TRANSMISSION - 2.0L DURATEC-HE .

CRANKSHAFT REAR SEAL**SPECIAL TOOL(S) / GENERAL EQUIPMENT**

--	--

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



303-328

Replacer, Rear Seal

TKIT-1988-F

TKIT-1988-FLM

TKIT-1988-LM

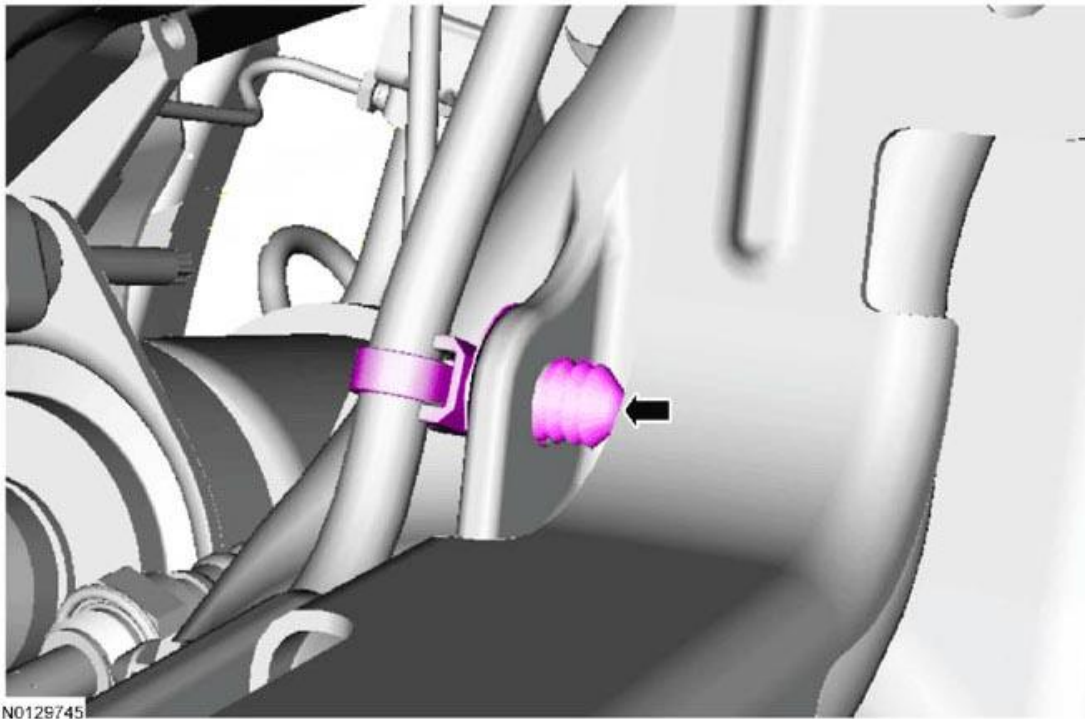
TKIT-2009TC-F

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

1. Refer to: **JACKING AND LIFTING - OVERVIEW**.



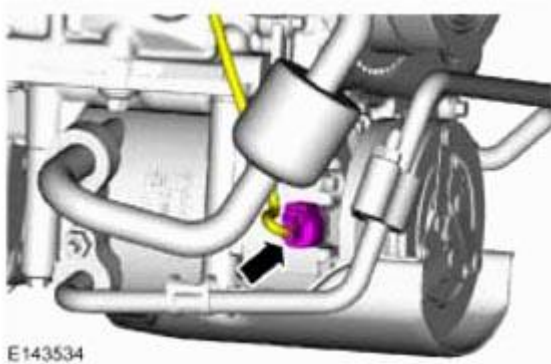
2.

Fig. 226: Identifying Oil Dipstick
Courtesy of FORD MOTOR CO.

3. Refer to: **Flexplate** .

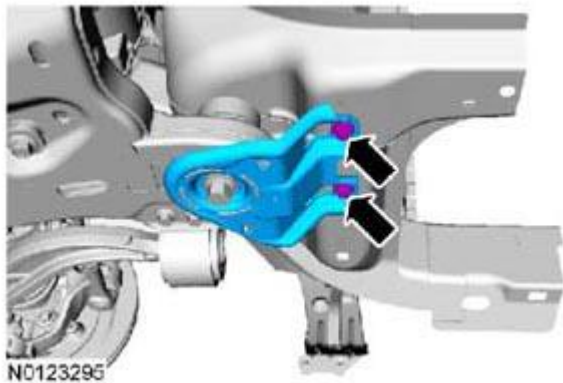
Refer to: **Flywheel** .

4. Refer to: **AIR CONDITIONING (A/C) COMPRESSOR BELT** .



5.

Fig. 227: Locating A/C Compressor Connector
Courtesy of FORD MOTOR CO.



6.

Fig. 228: Locating A/C Compressor Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

NOTE: Support the A/C compressor. Do not allow the A/C compressor to hang by the A/C lines or damage to the A/C compressor and tubes may occur.

7.

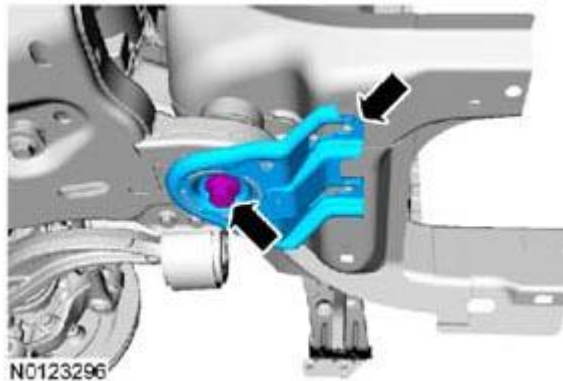


Fig. 229: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

8. Drain and install the drain plug.

Torque : 27 Nm

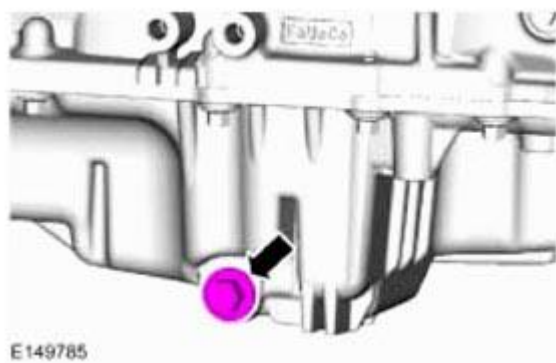
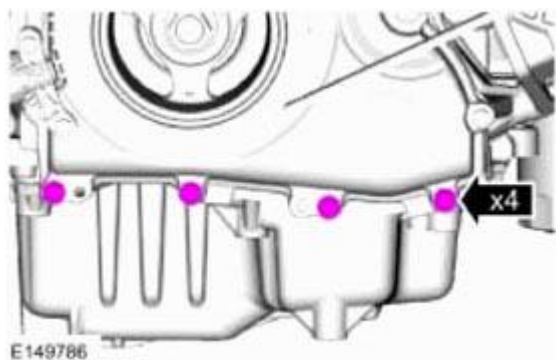
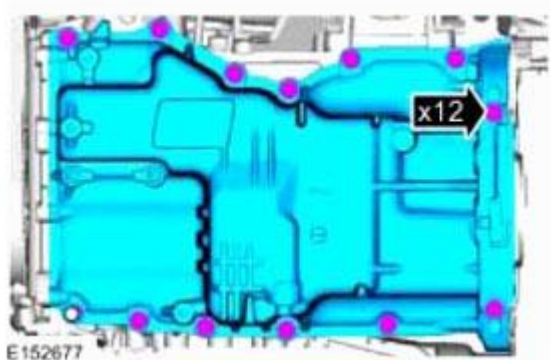


Fig. 230: Locating Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.



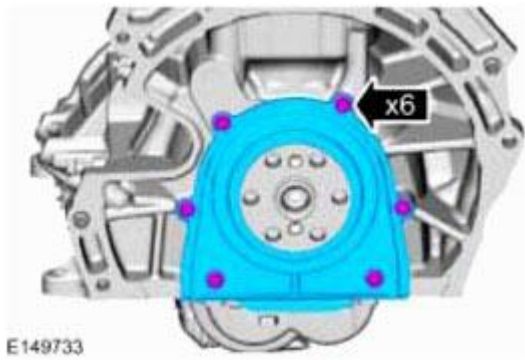
9.

Fig. 231: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.



10.

Fig. 232: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.



11.

Fig. 233: Identifying Crankshaft Rear Oil Seal Retainer Plate Bolts
Courtesy of FORD MOTOR CO.

Installation

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

1. Clean and inspect all the oil pan and cylinder block mating surfaces.
2. Using the special tool, position the crankshaft rear oil seal with retainer plate onto the crankshaft.

Special Tool(s) : 303-328 (Replacer, Rear Seal)

Torque : 10 Nm

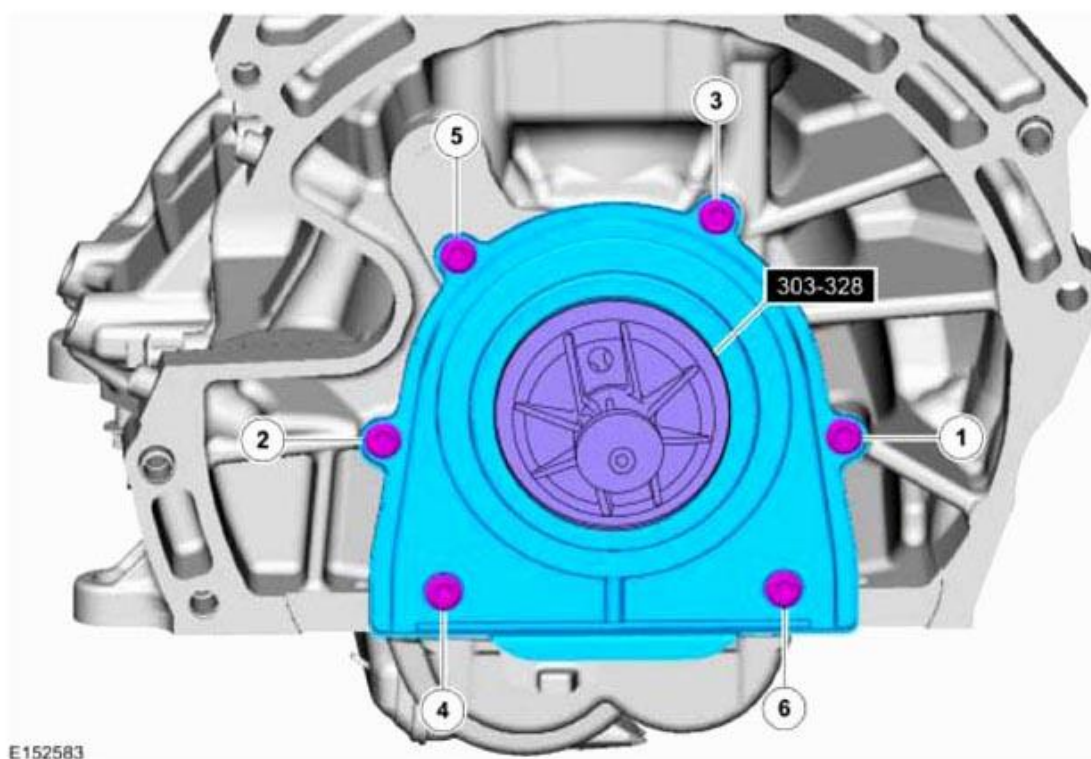


Fig. 234: Identifying Crankshaft Rear Oil Seal Retainer Plate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

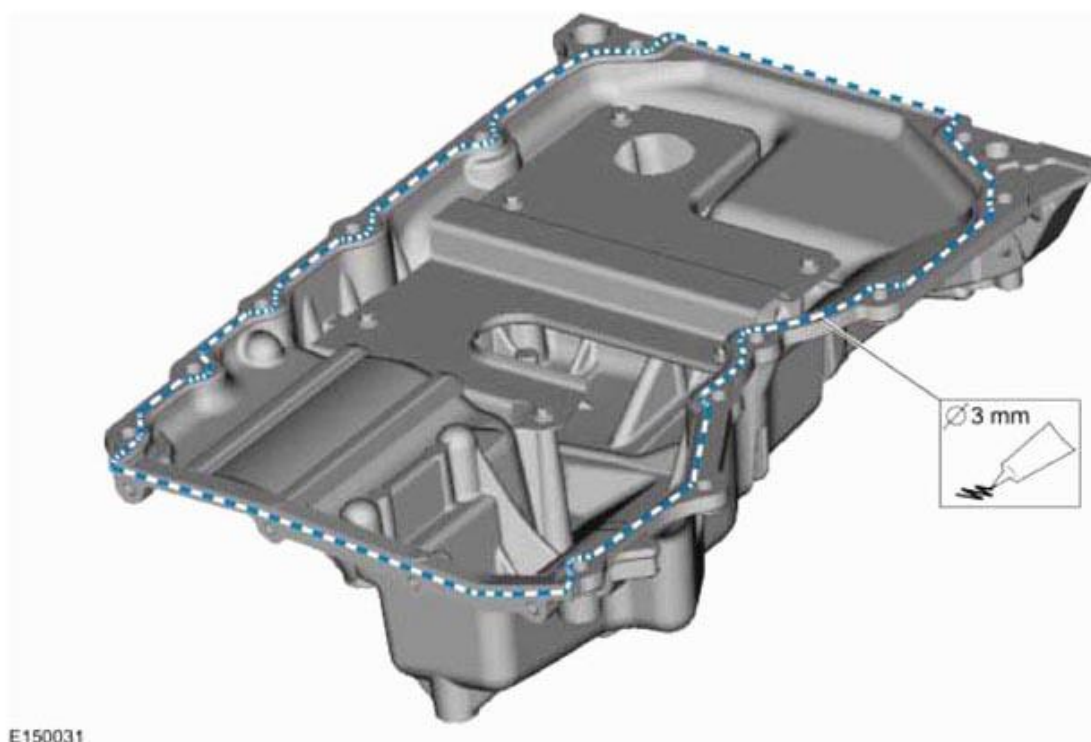


Fig. 235: Applying Sealant To Oil Pan-To-Engine Block
Courtesy of FORD MOTOR CO.

3. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)
4. Finger-tight.

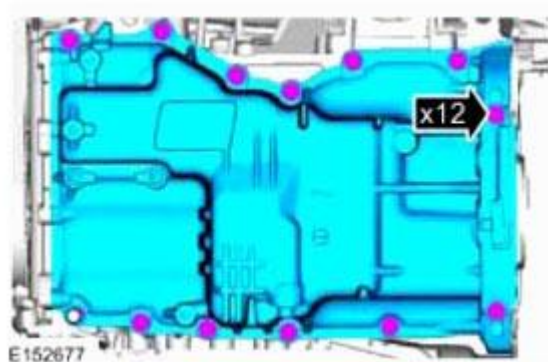


Fig. 236: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

NOTE: The engine front cover-to-oil pan fasteners must be tightened first to align the front surface of the oil pan flush with the front surface of the engine block.

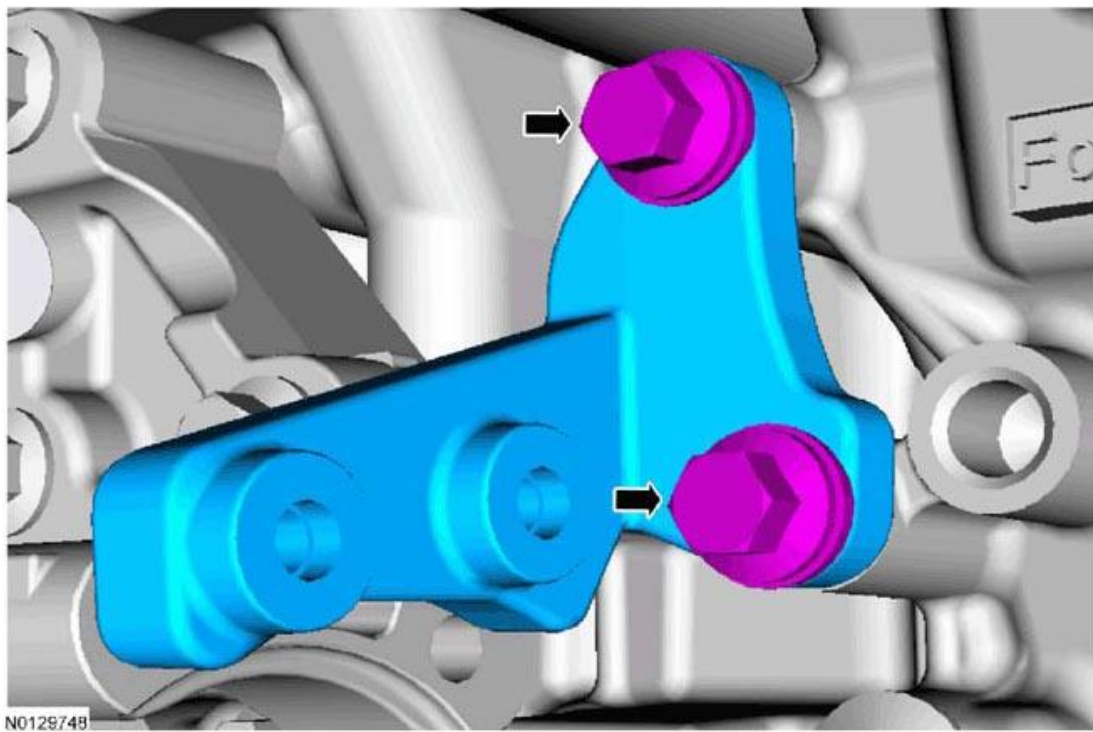


Fig. 237: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

5. *Torque* : 10 Nm
6. *Torque* : 20 Nm

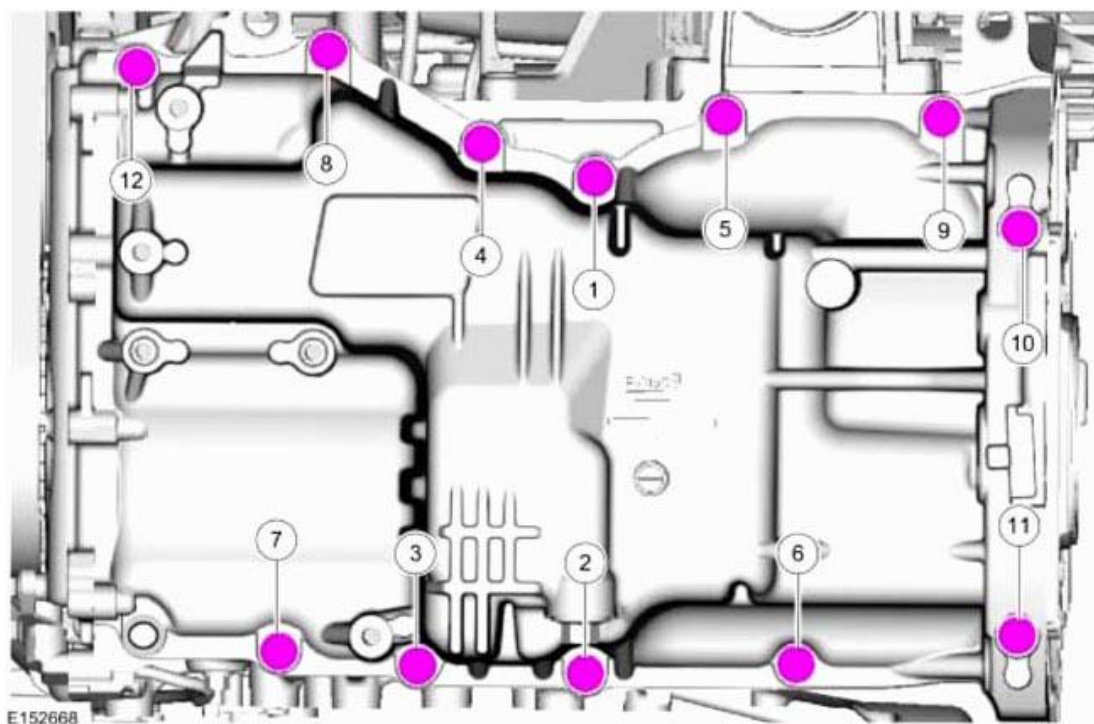


Fig. 238: Locating Oil Pan Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

7. Torque : 25 Nm

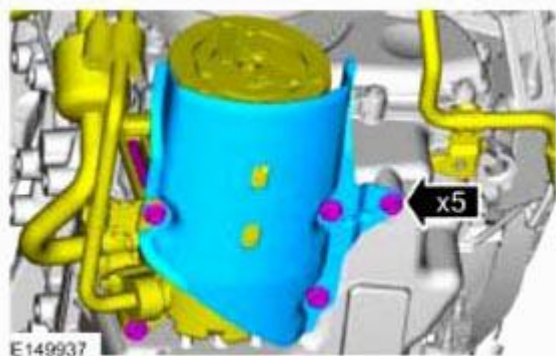


Fig. 239: Locating A/C Compressor Cover Bolts
 Courtesy of FORD MOTOR CO.

8. Torque : 18 Nm

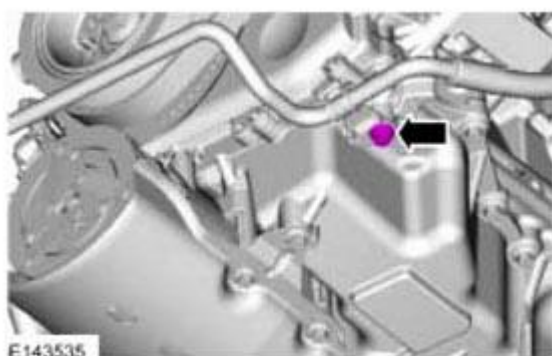
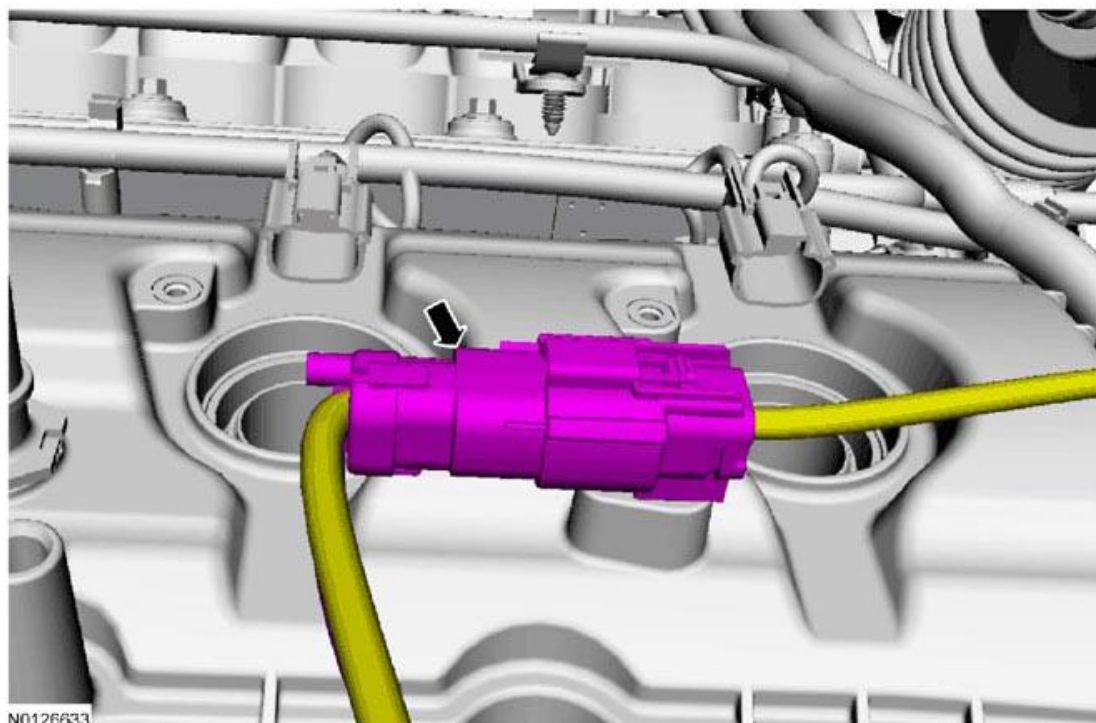


Fig. 240: Locating A/C Compressor Tube Bracket Bolt
Courtesy of FORD MOTOR CO.



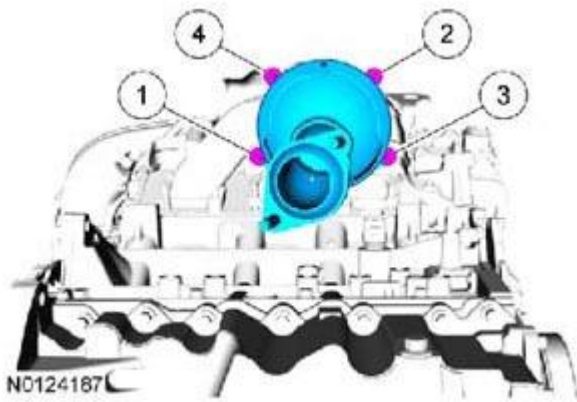
9.

Fig. 241: Locating A/C Compressor Connector
Courtesy of FORD MOTOR CO.

10. Refer to: **AIR CONDITIONING (A/C) COMPRESSOR BELT** .

11. Refer to: **Flexplate** .

Refer to: **Flywheel** .



12.

Fig. 242: Identifying Oil Dipstick
Courtesy of FORD MOTOR CO.

13. Fill the engine with clean engine oil.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

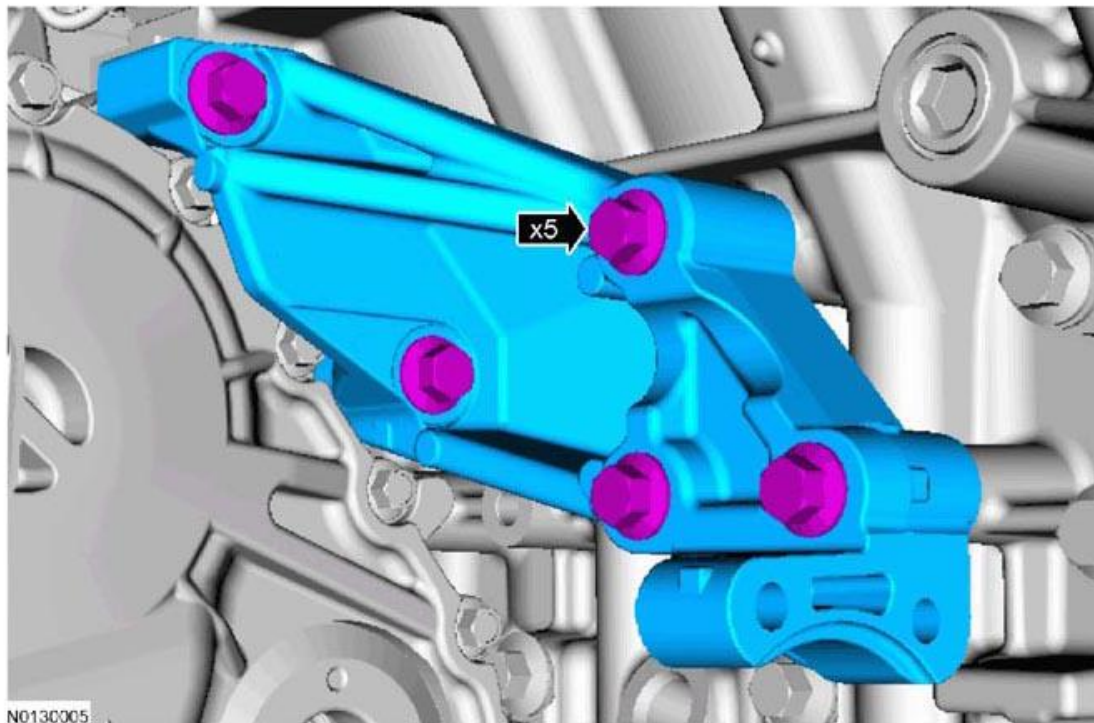
ENGINE MOUNT

Trolley Jack

Wooden Block

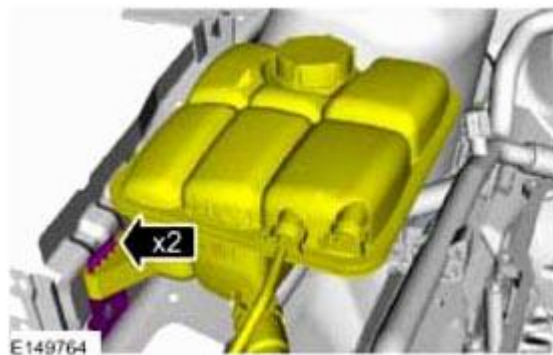
Removal

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .



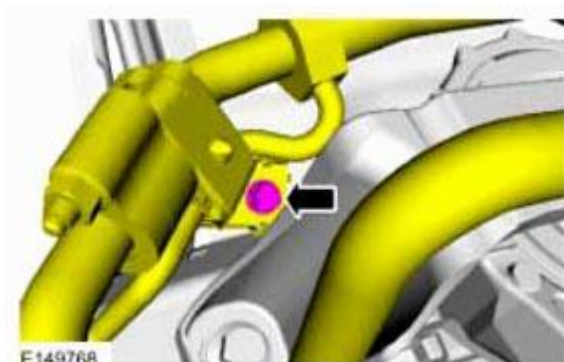
2.

Fig. 243: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.



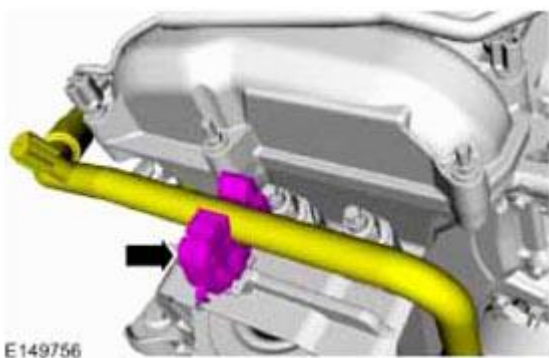
3.

Fig. 244: Locating Reservoir Tank
Courtesy of FORD MOTOR CO.



4.

Fig. 245: Locating AC Pipe Support Bracket Bolt
Courtesy of FORD MOTOR CO.



5.

Fig. 246: Locating AC Pipe Bracket
Courtesy of FORD MOTOR CO.

NOTE: Do not support the engine on the Air Conditioning (A/C) compressor.

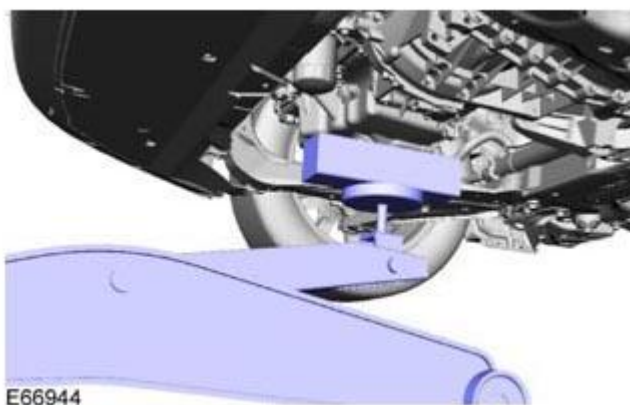
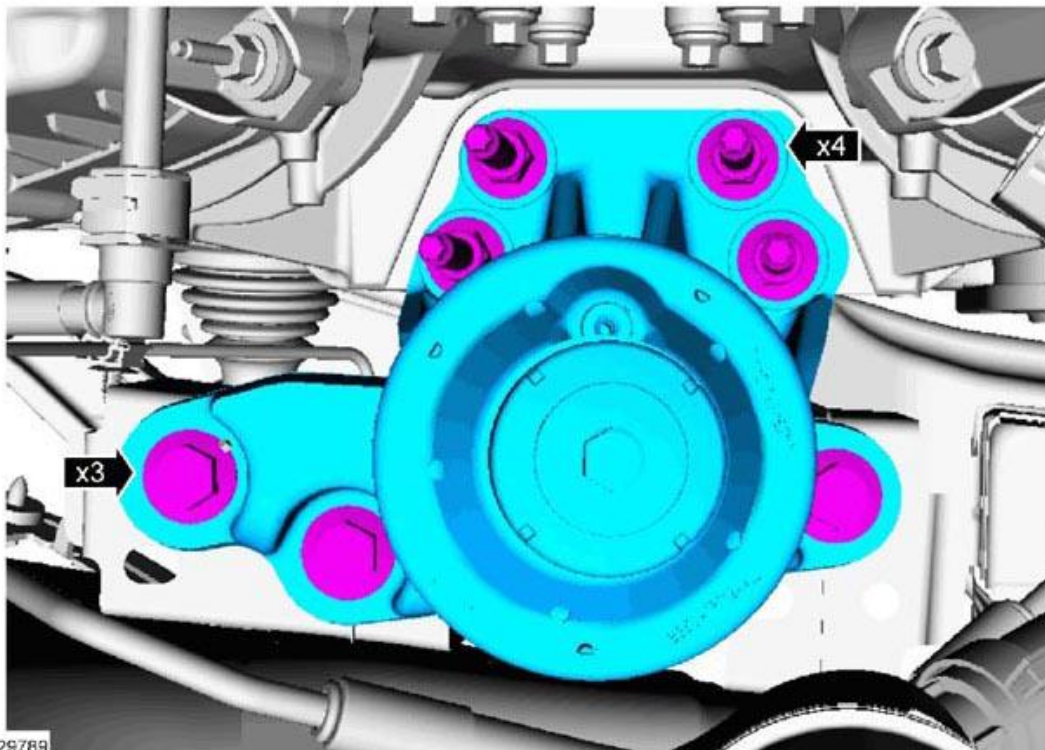


Fig. 247: Supporting Engine Using Oil Pan
Courtesy of FORD MOTOR CO.

6. Support the engine using the oil pan.

General Equipment : Trolley Jack

General Equipment : Wooden Block



7.

Fig. 248: Locating Engine Mount Nuts And Bolts
Courtesy of FORD MOTOR CO.

Installation

1.

- *Torque* : Tighten the 2 nuts to 80 Nm
- *Torque* : Tighten the 2 bolts to 90 Nm

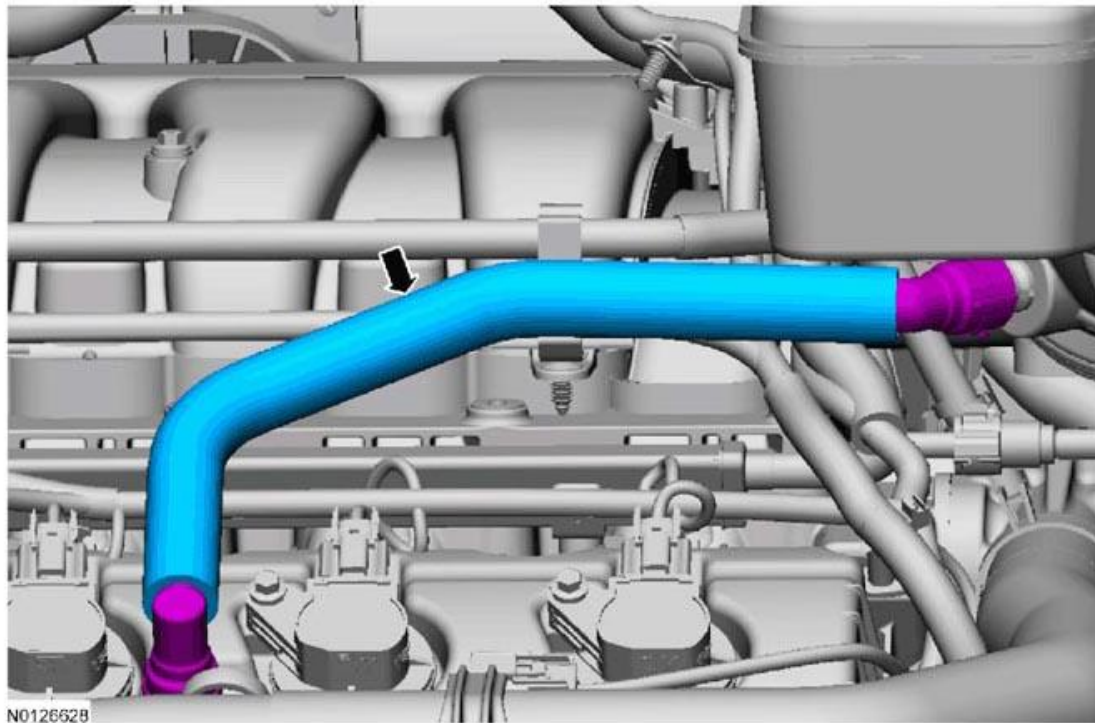


Fig. 249: Locating Engine Mount Nuts And Bolts
Courtesy of FORD MOTOR CO.



2.

Fig. 250: Locating AC Pipe Bracket
Courtesy of FORD MOTOR CO.

3. *Torque* : 11 Nm

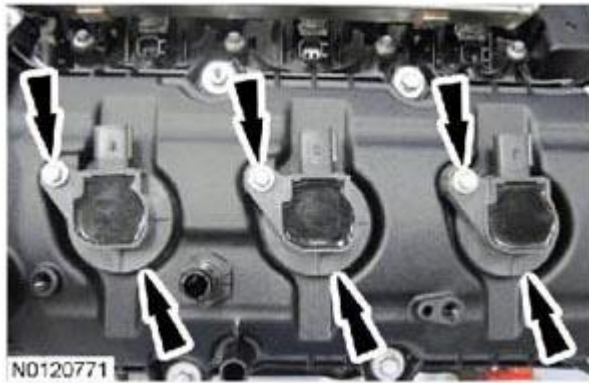
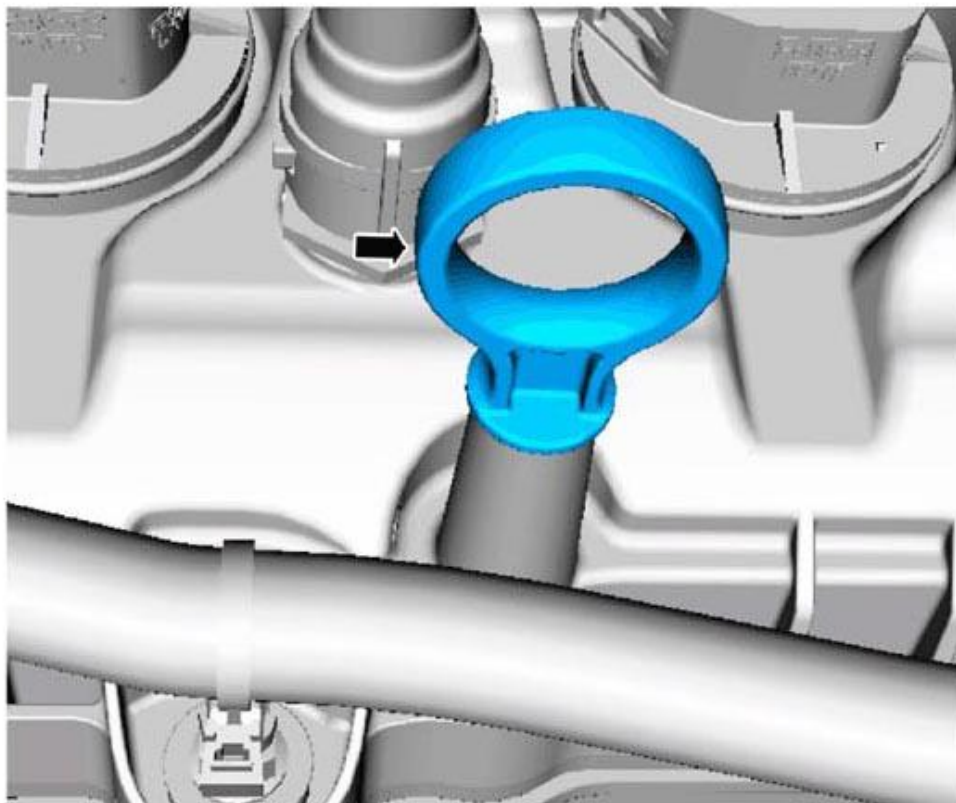
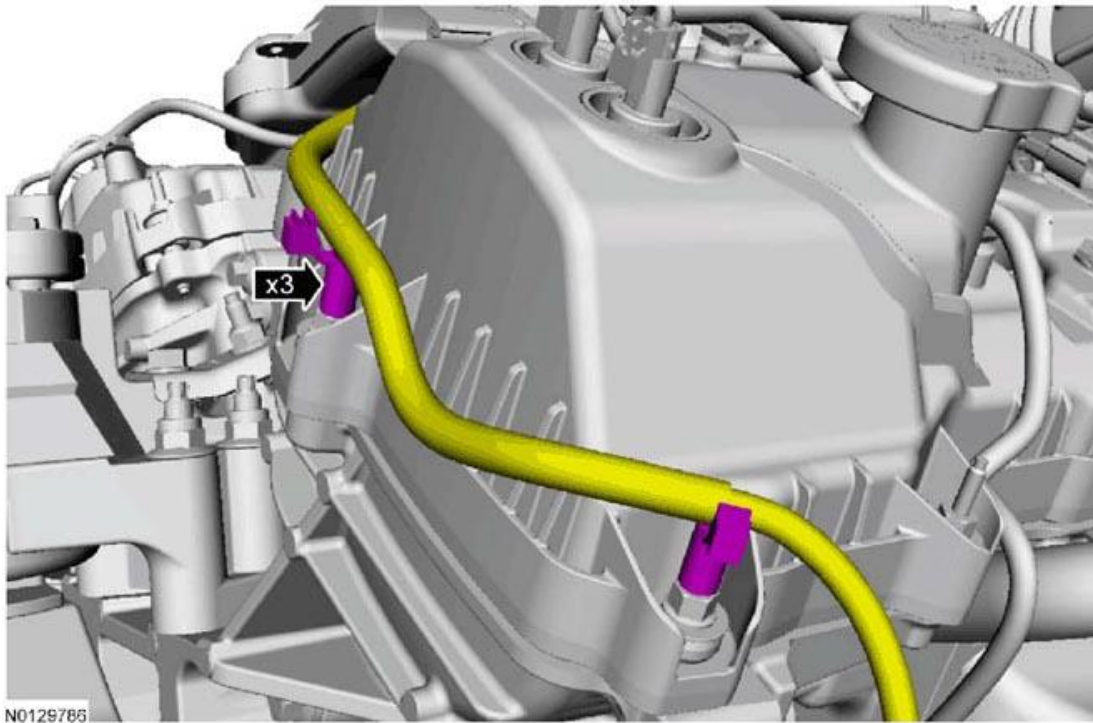


Fig. 251: Locating AC Pipe Support Bracket Bolt
Courtesy of FORD MOTOR CO.



4.

Fig. 252: Locating Reservoir Tank
Courtesy of FORD MOTOR CO.



5.

Fig. 253: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.

VARIABLE VALVE TIMING (VVT) UNIT

Removal

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. Refer to: **Timing Drive Components** .

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

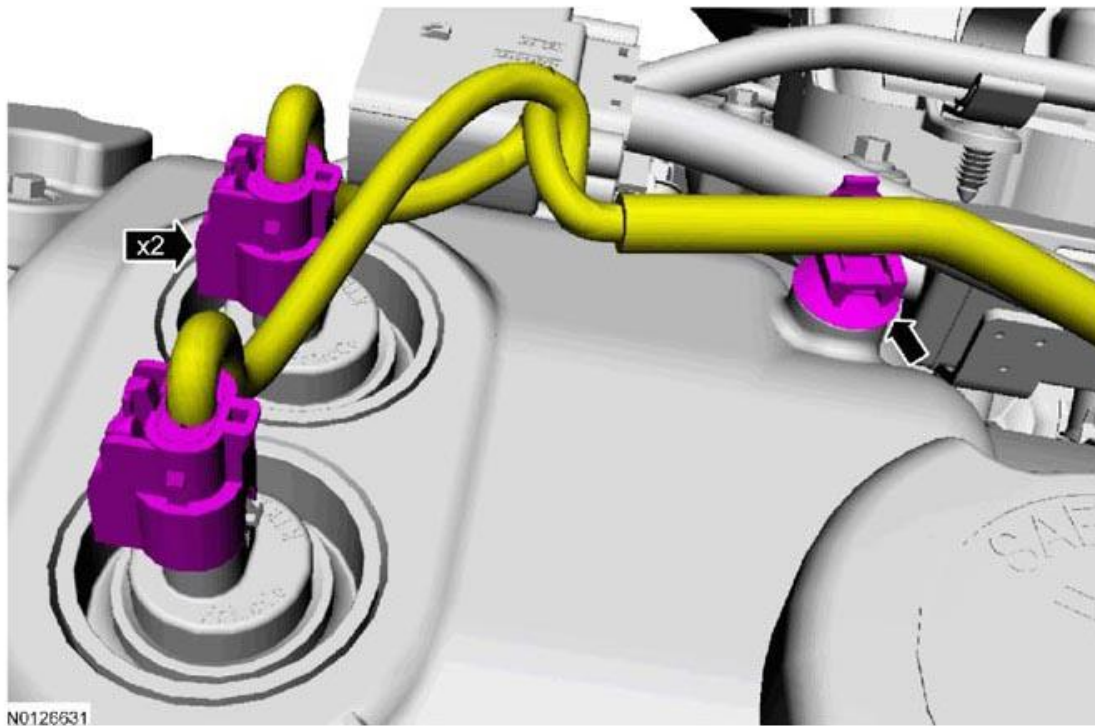


Fig. 254: Locating Exhaust And Intake VCT Unit Bolts
Courtesy of FORD MOTOR CO.

2. Using the flats on the exhaust and intake camshaft to prevent camshaft rotation, loosen the exhaust and intake VCT unit bolts.

Installation

NOTE: The VCT unit bolts are final torqued in the timing drive installation procedure.

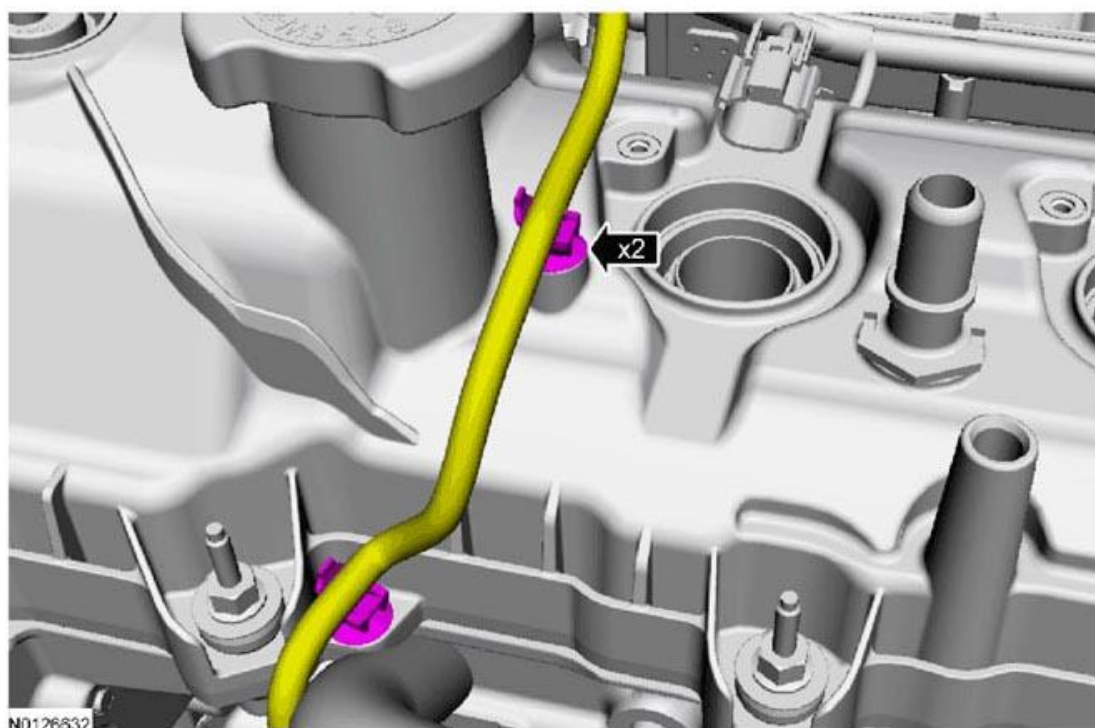


Fig. 255: Locating Exhaust And Intake VCT Unit Bolts
 Courtesy of FORD MOTOR CO.

1. Position the exhaust and intake VCT unit and install the bolts finger tight.
2. Refer to: **Timing Drive Components** .

VALVE STEM SEALS

SPECIAL TOOL(S) / GENERAL EQUIPMENT

	303-468 Remover, Valve Stem Oil Seal TKIT-1994-FH/FMH/FLMH TKIT-1994-LMH/MH2
	303-470 Installer, Valve Stem Oil Seal

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



TKIT-2009TC-F



307-005
Slide Hammer

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

Removal

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1. Remove the valve spring from the valve being serviced.

Refer to: **Valve Springs** .

2.

- Position the Valve Stem Oil Seal Remover and the Slide Hammer over the seal.

Special Tool(s) : **303-468 (Remover, Valve Stem Oil Seal)** , **307-005 (Slide Hammer)**

- Pull up on the Slide Hammer and remove the seal.

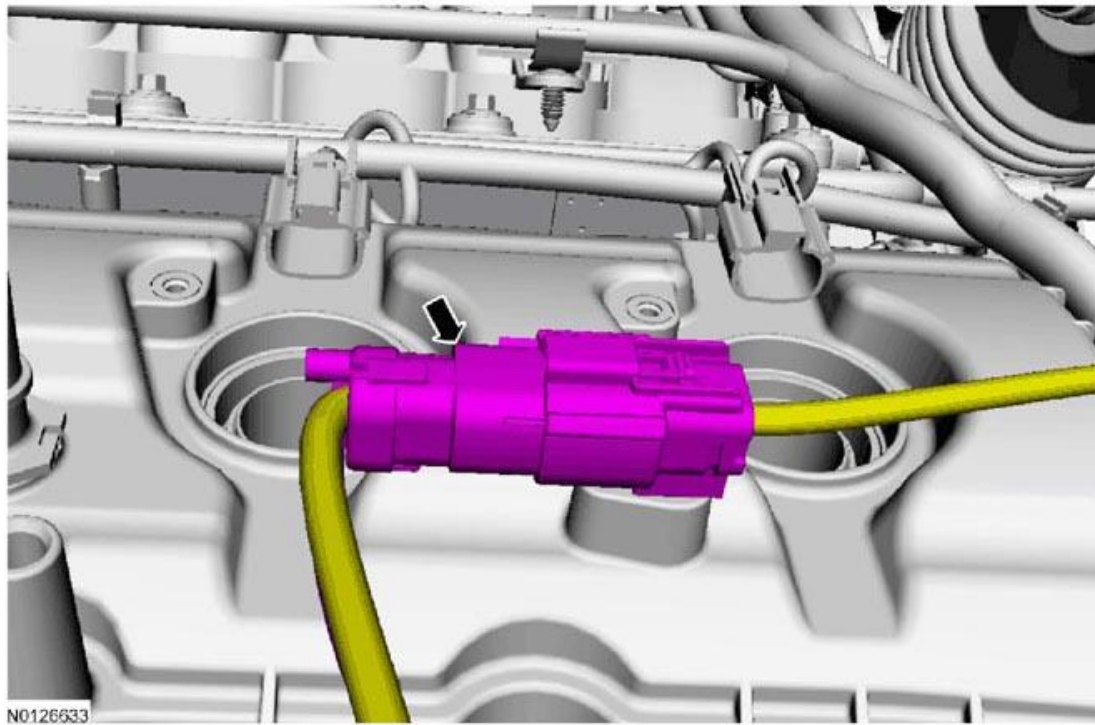


Fig. 256: Positioning Valve Stem Oil Seal Remover And Slide Hammer Over Seal
Courtesy of FORD MOTOR CO.

Installation

NOTE: Lubricate the valve seal with clean engine oil prior to installing.

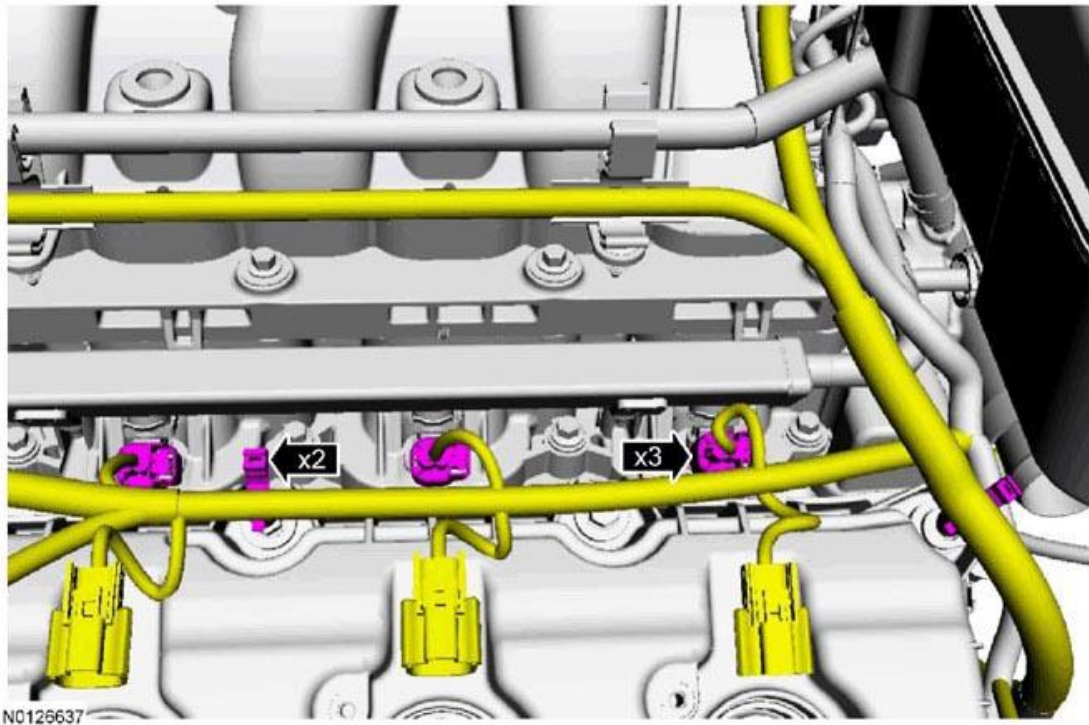


Fig. 257: Identifying Valve Seal And 303-470 Installer
Courtesy of FORD MOTOR CO.

1. *Special Tool(s)* : 303-470 (Installer, Valve Stem Oil Seal)

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

2. Install the valve spring onto the valve being serviced.

Refer to: **Valve Springs** .

3. Repeat the appropriate removal and installation steps for all of the other cylinders.

OIL PRESSURE SWITCH

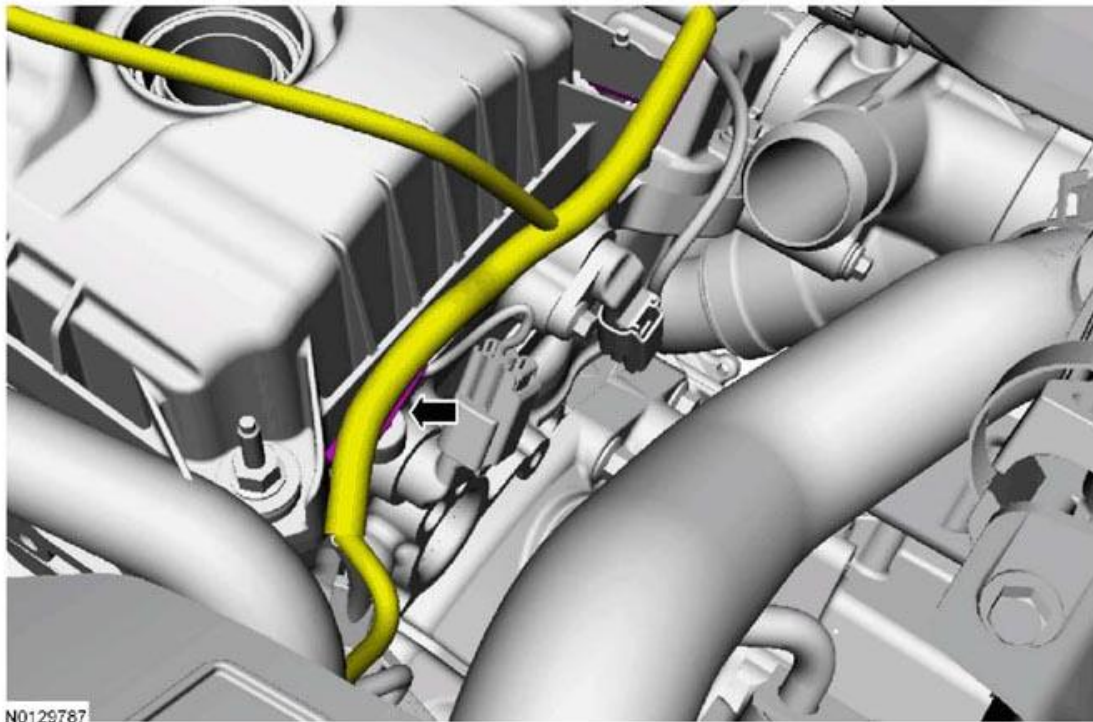
MATERIALS SPECIFICATIONS

Name	Specification
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

Removal

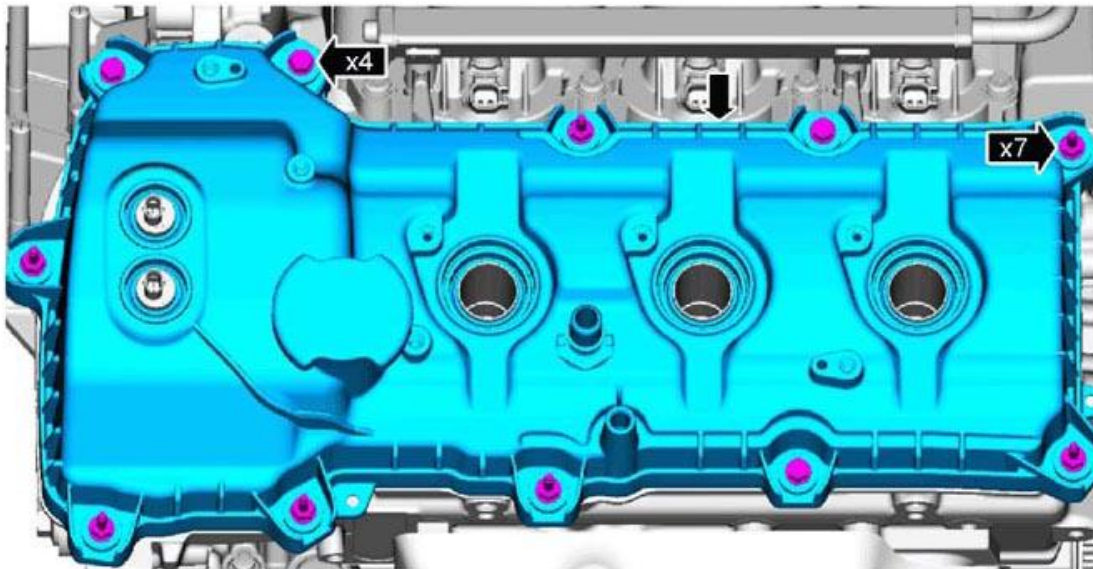
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: **JACKING AND LIFTING - OVERVIEW** .



- 2.

Fig. 258: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.



3. N0126731

Fig. 259: Locating Oil Pressure Switch Connector
Courtesy of FORD MOTOR CO.

NOTE: Apply thread sealant to the oil pressure switch threads.



Fig. 260: Locating Oil Pressure Switch
Courtesy of FORD MOTOR CO.

4. *Material* : Thread Sealant with PTFE / TA-24 (WSK-M2G350-A2)

Torque : 12 Nm

Installation

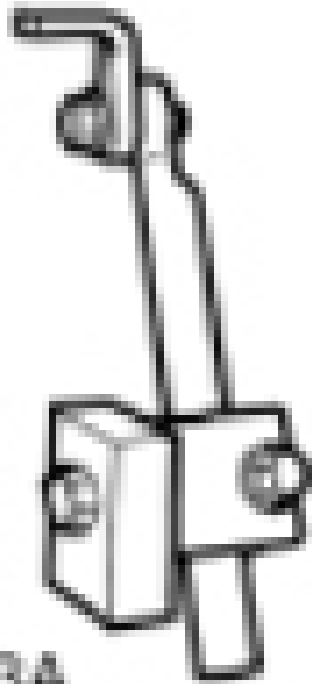
1. To install, reverse the removal procedure.

REMOVAL

ENGINE

SPECIAL TOOL(S) / GENERAL EQUIPMENT

--	--



ST2743A

014-00001
ADJUSTABLE GRIP 1735A



ST1293-A

300-OTC1585AE
Powertrain Lift

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



ST1341-A

300-OTC1819E

2, 200# Floor Crane, Fold Away



303-D089

Spreader Bar

Hose Clamp Remover/Installer

Wooden Block

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in SERVICE INFORMATION General Information. Failure to follow this instruction may result in serious personal injury.

1. Refer to: HEALTH AND SAFETY PRECAUTIONS .
2. Refer to: JACKING AND LIFTING - OVERVIEW .
3. Refer to: AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING .

4. Refer to: **FUEL SYSTEM PRESSURE RELEASE** .



5. **Fig. 261: Locating Engine Lower Cover Bolts**
Courtesy of FORD MOTOR CO.

6. Refer to: **COOLING SYSTEM DRAINING AND VACUUM FILLING** .

Refer to: **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .

7. Remove the following items:

1. Refer to: **DEGAS BOTTLE** .
2. Refer to: **BATTERY TRAY** .
3. Refer to: **AIR CLEANER** .

Refer to: **AIR CLEANER OUTLET PIPE** .

8. If equipped with automatic transmission.

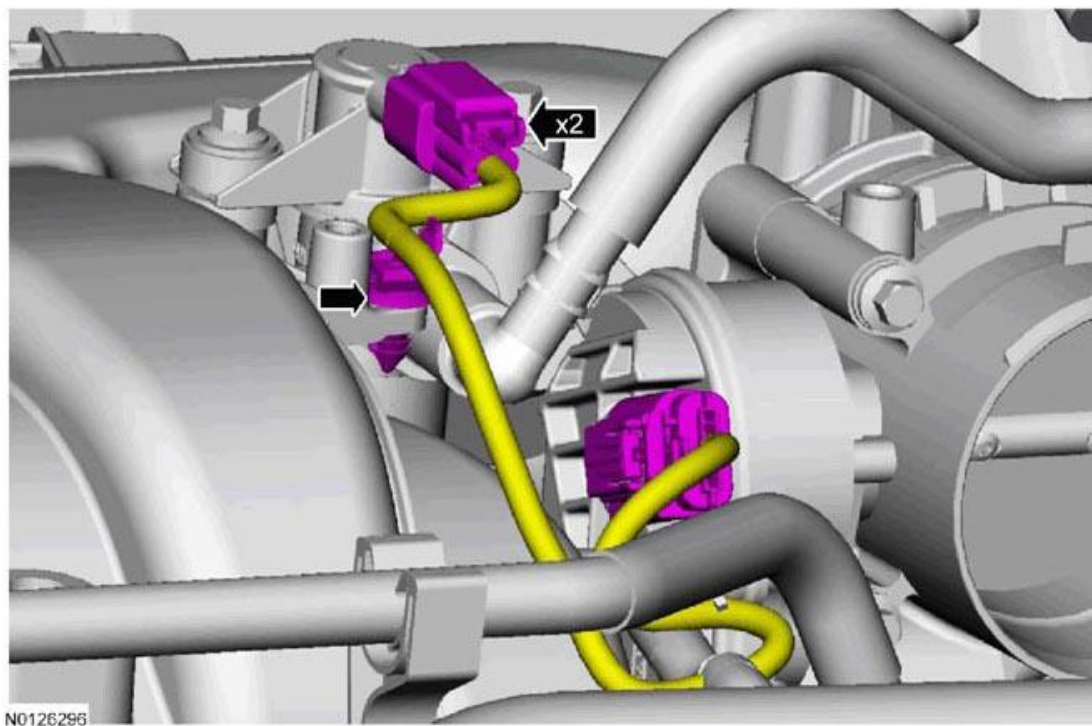
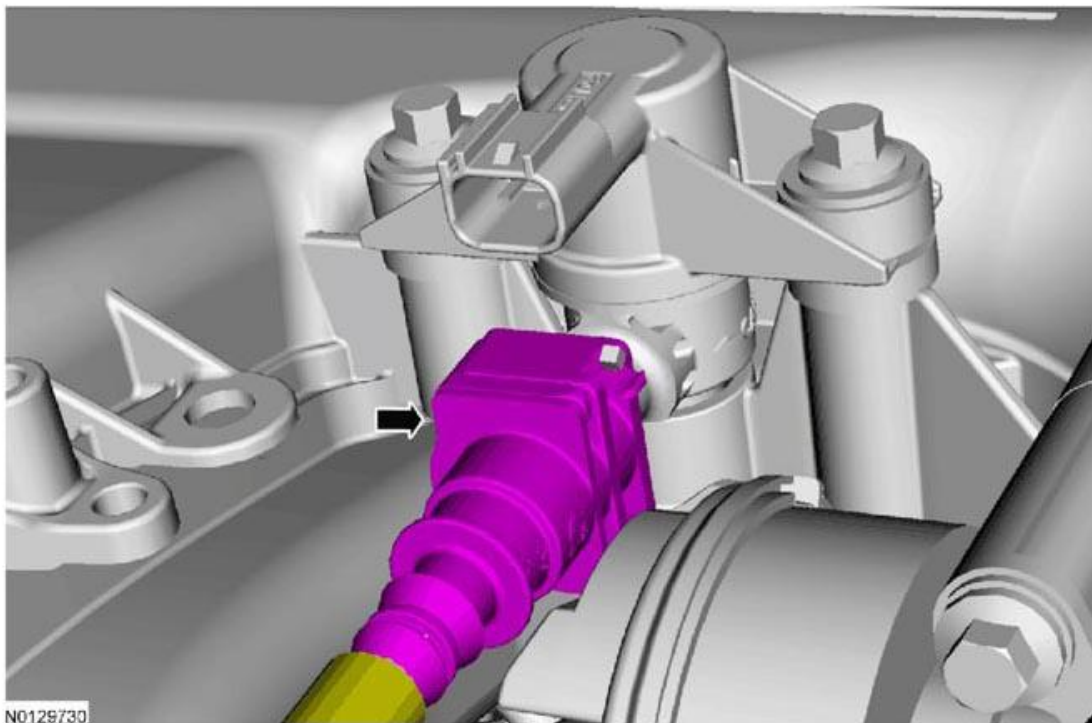
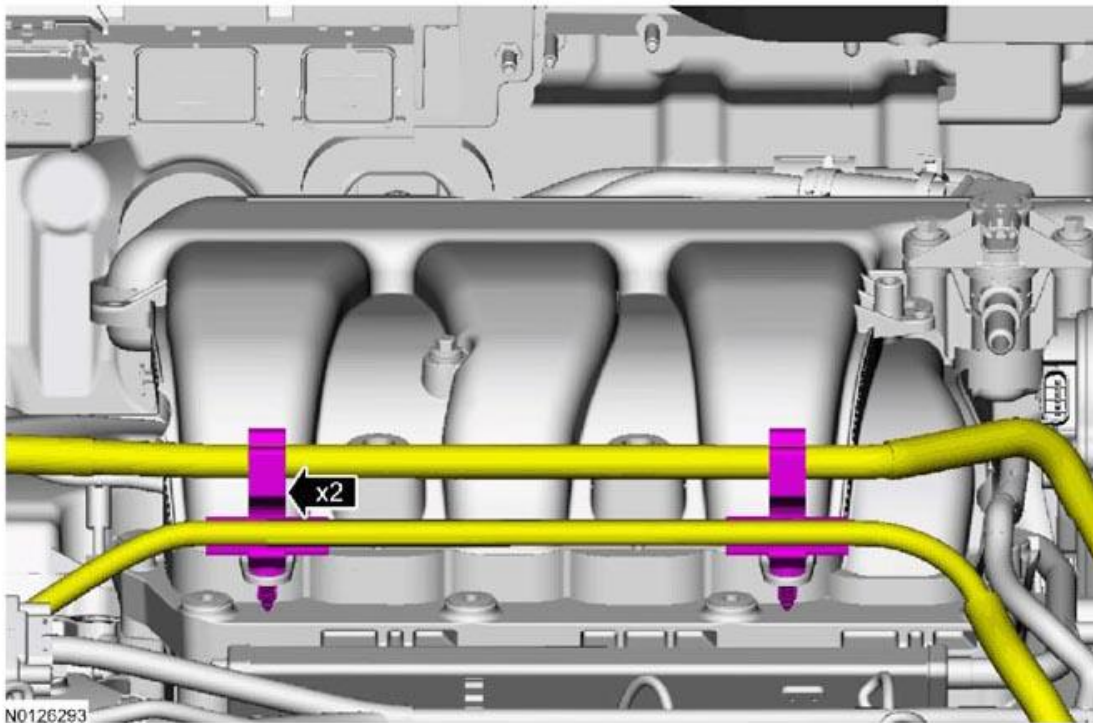


Fig. 262: Locating Harness Retainer
Courtesy of FORD MOTOR CO.



9.

Fig. 263: Locating Engine Ground Point
Courtesy of FORD MOTOR CO.



10.

Fig. 264: Locating Harness Retainer
Courtesy of FORD MOTOR CO.

11. Refer to: **POWERTRAIN CONTROL MODULE (PCM)** .

12. **NOTE:** The electrical connector is located behind the PCM case.

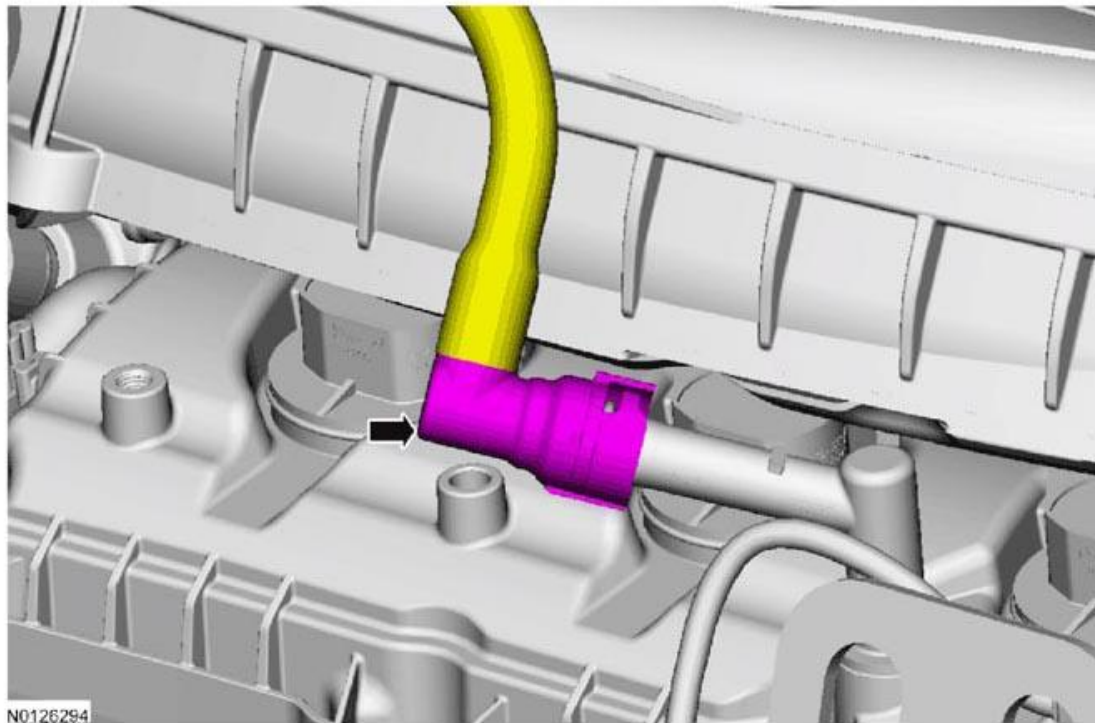
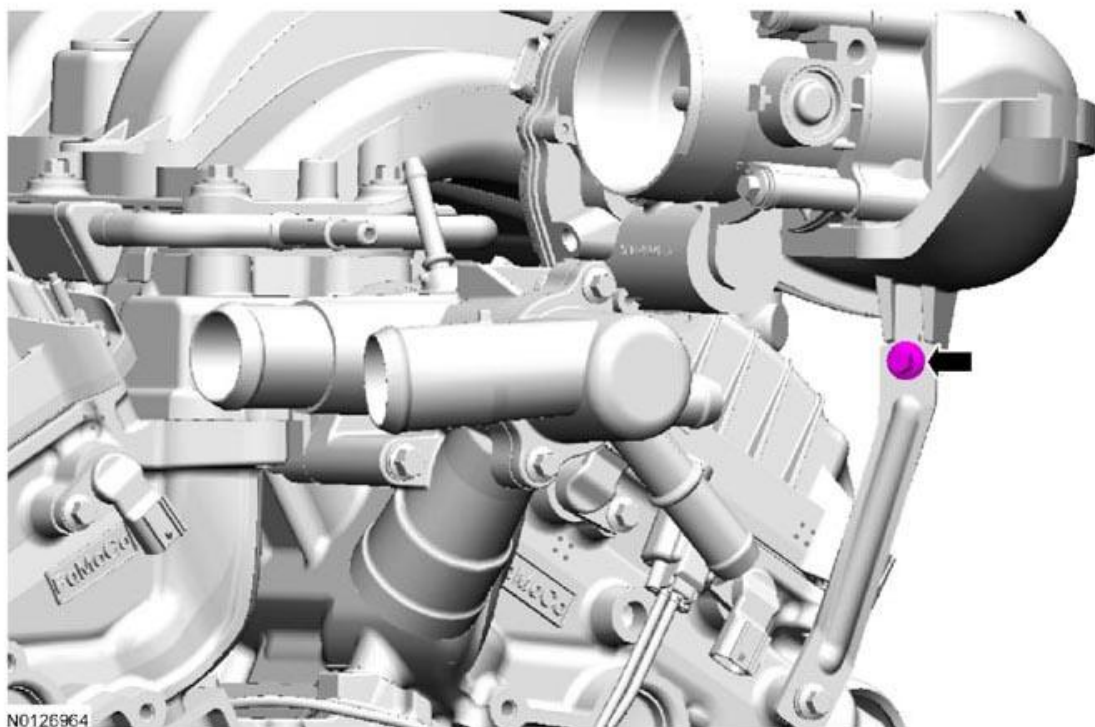
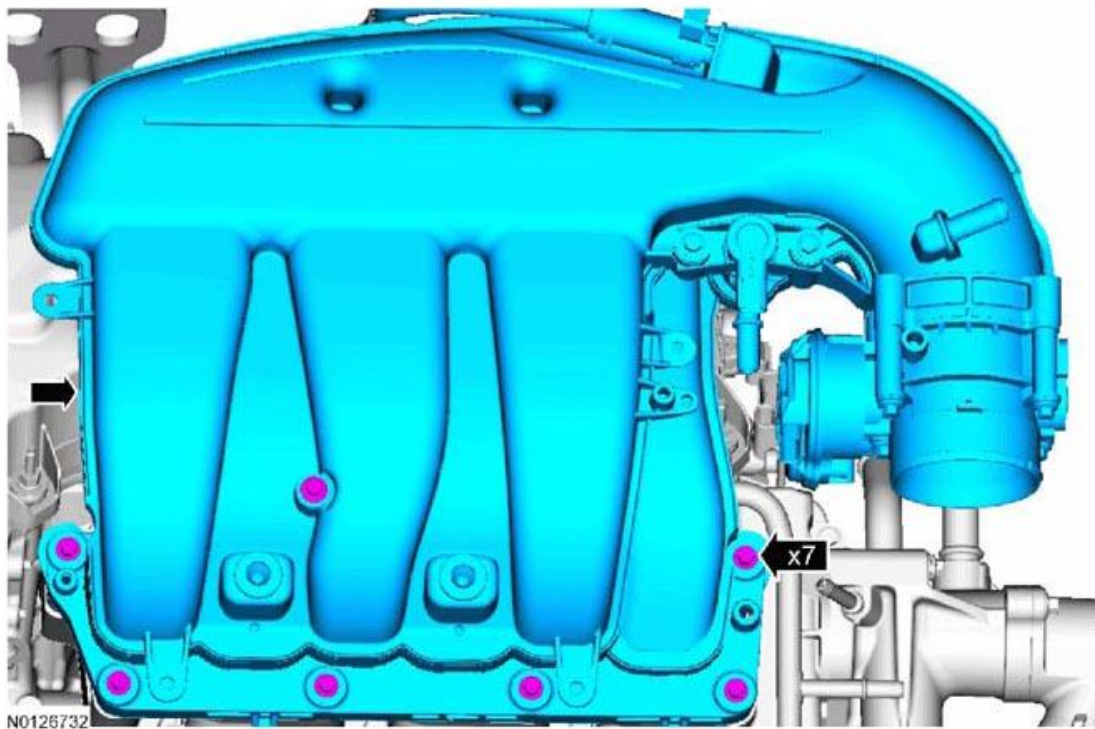


Fig. 265: Locating Electrical Connector Behind PCM Case
Courtesy of FORD MOTOR CO.



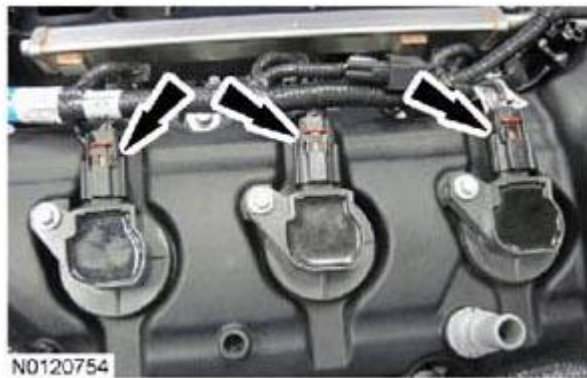
13.

Fig. 266: Locating Harness Retainer And Ground Bolts
Courtesy of FORD MOTOR CO.



14.

Fig. 267: Locating Harness Retainer
Courtesy of FORD MOTOR CO.



15.

Fig. 268: Identifying Harness Retainer
Courtesy of FORD MOTOR CO.

16. *General Equipment* : Hose Clamp Remover/Installer

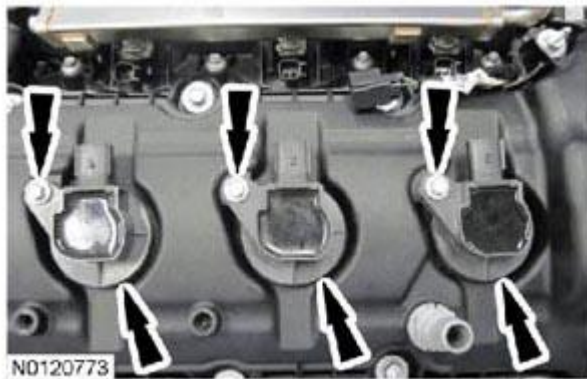
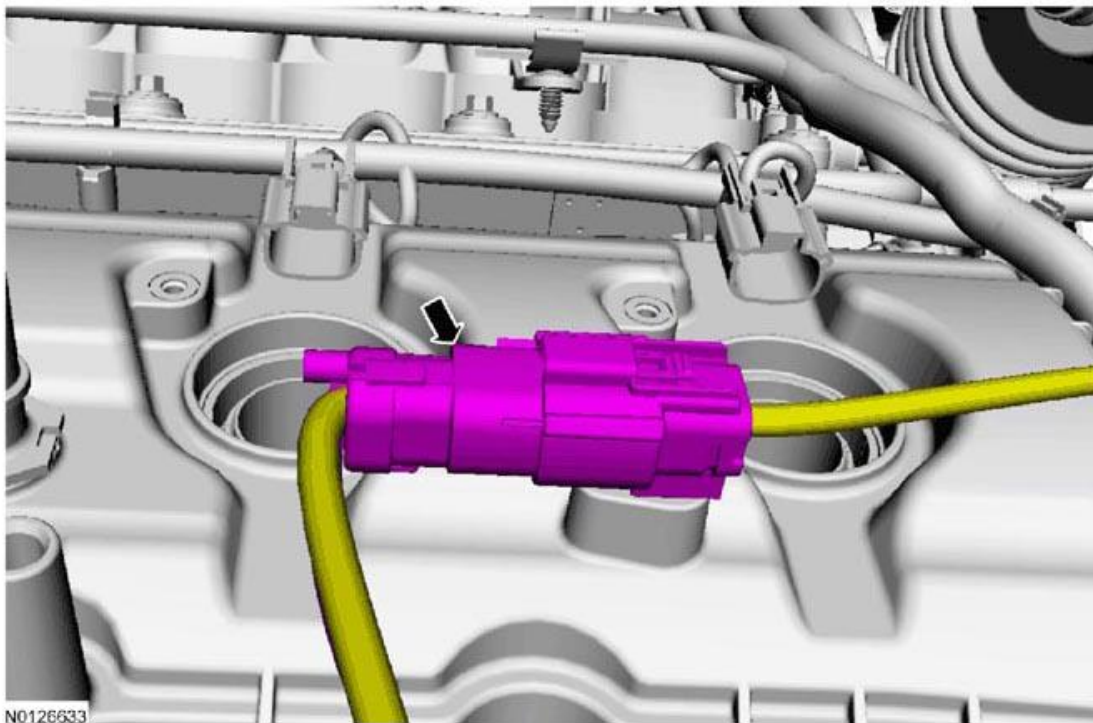


Fig. 269: Locating Hose Clamps
Courtesy of FORD MOTOR CO.



17.

Fig. 270: Locating Hose Connection And Retainer
Courtesy of FORD MOTOR CO.

18. If equipped.

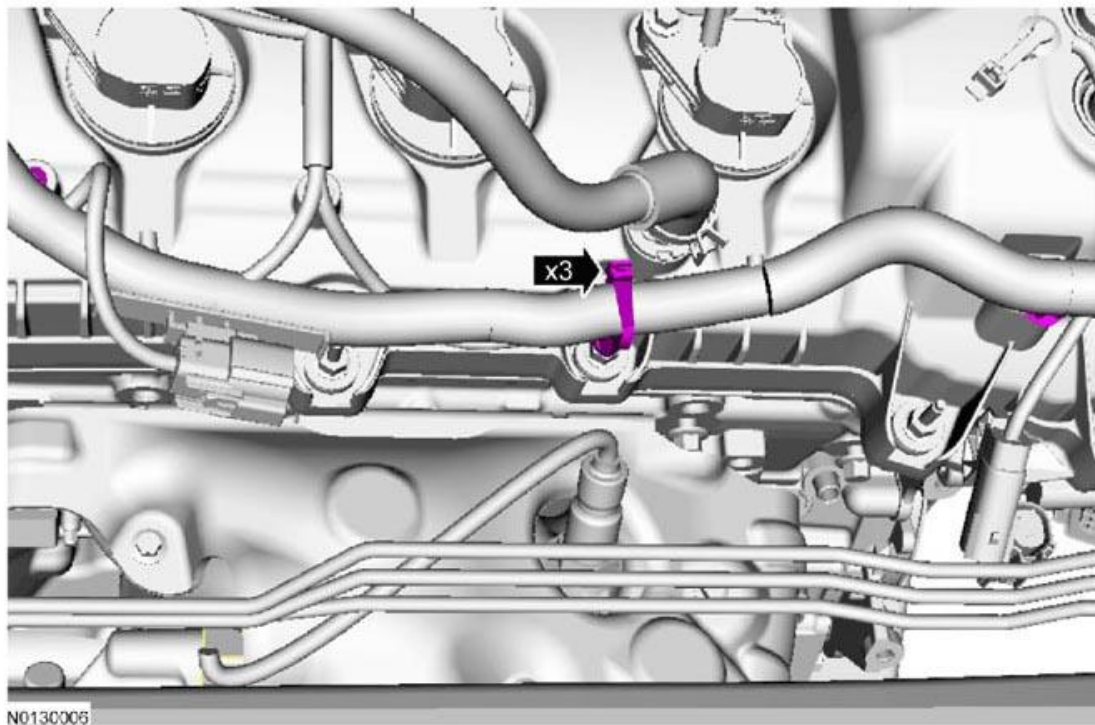
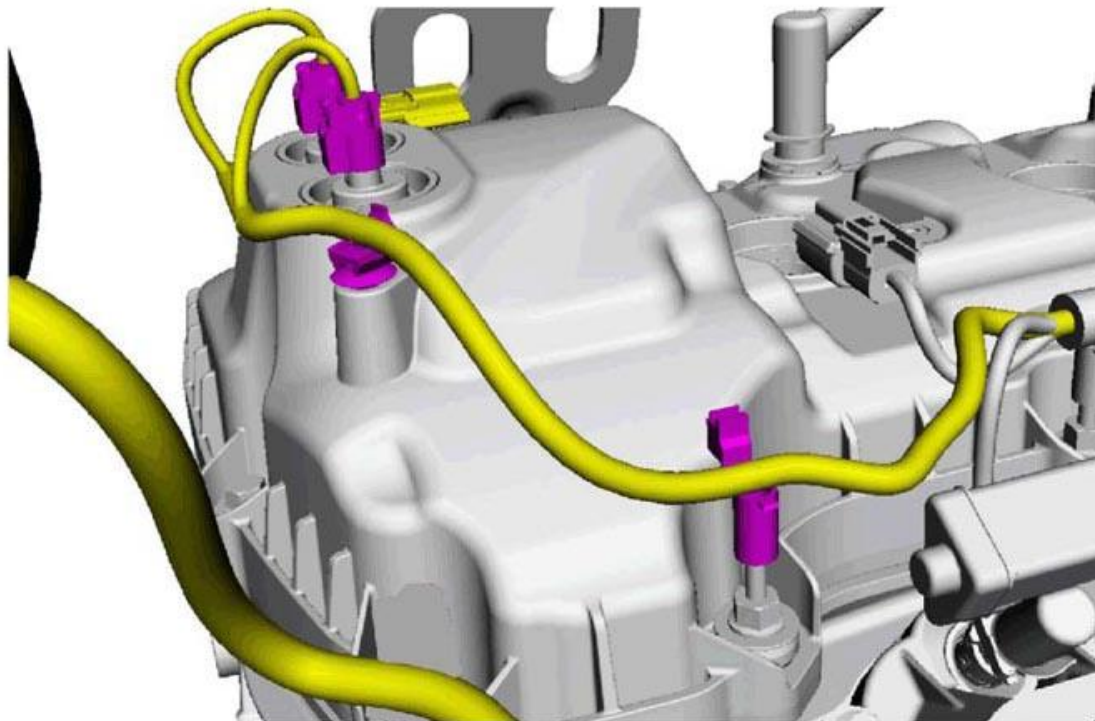


Fig. 271: Locating Pipe Connection Plug
Courtesy of FORD MOTOR CO.

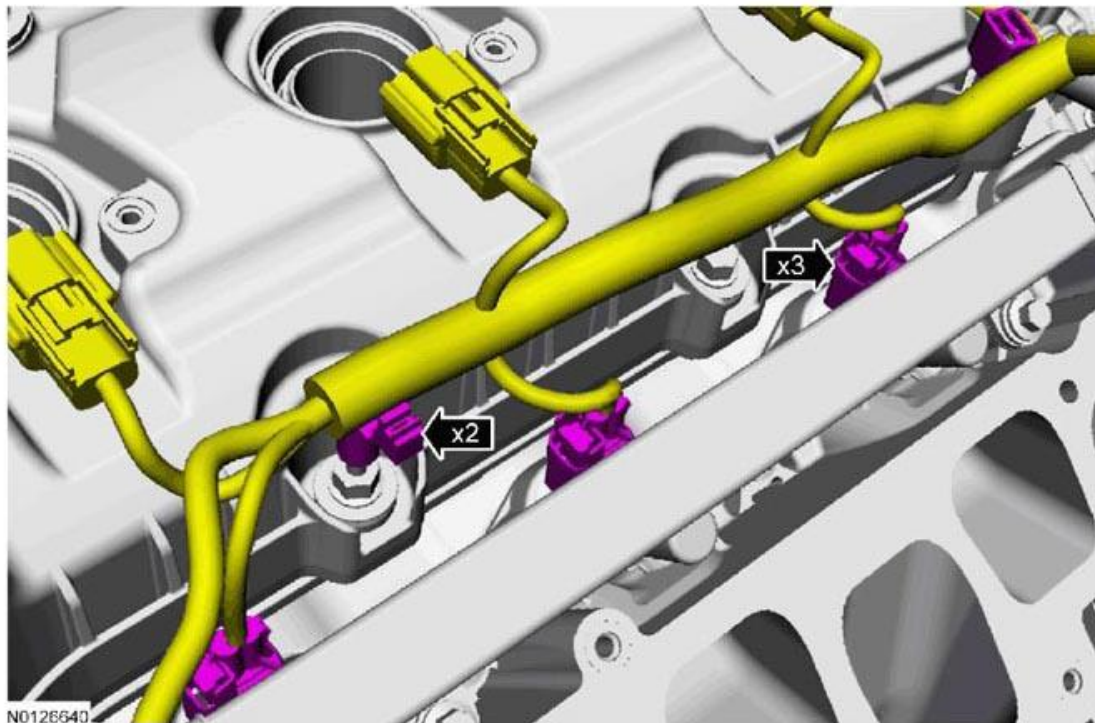
19. Refer to: **HEATED OXYGEN SENSOR (HO2S)** .



- 20.

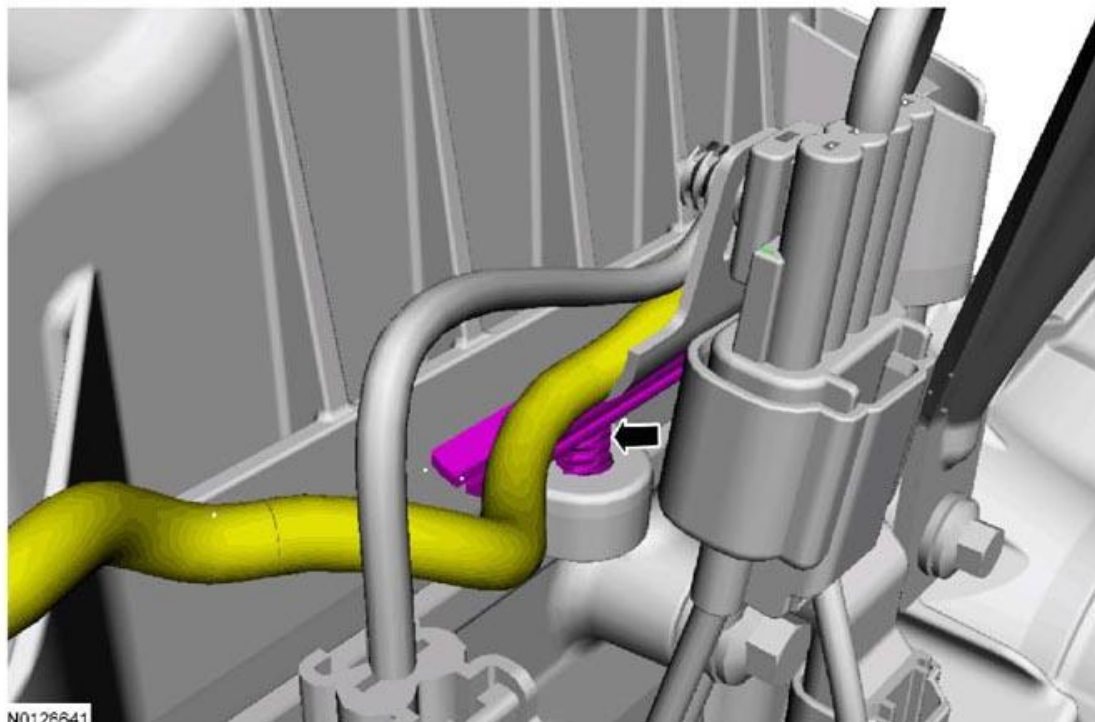
Fig. 272: Locating Heated Oxygen Sensor Connector And Retainer

Courtesy of FORD MOTOR CO.



21.

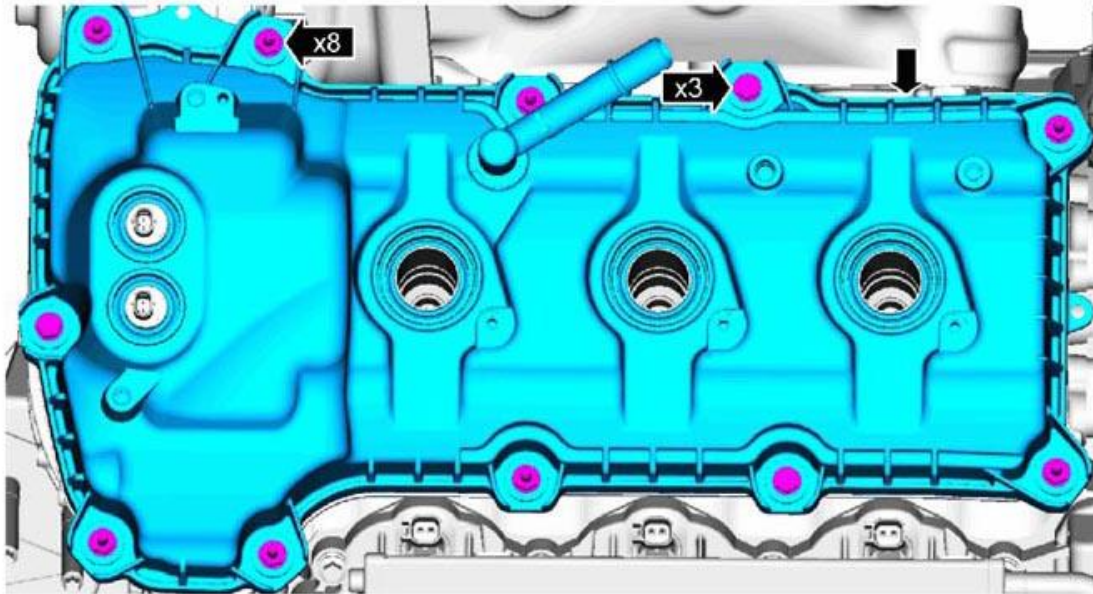
Fig. 273: Locating Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.



22.

Fig. 274: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

23. **NOTE:** Discard the gasket.



N0126733

Fig. 275: Locating Catalytic Converter Joint Nuts
Courtesy of FORD MOTOR CO.



24.

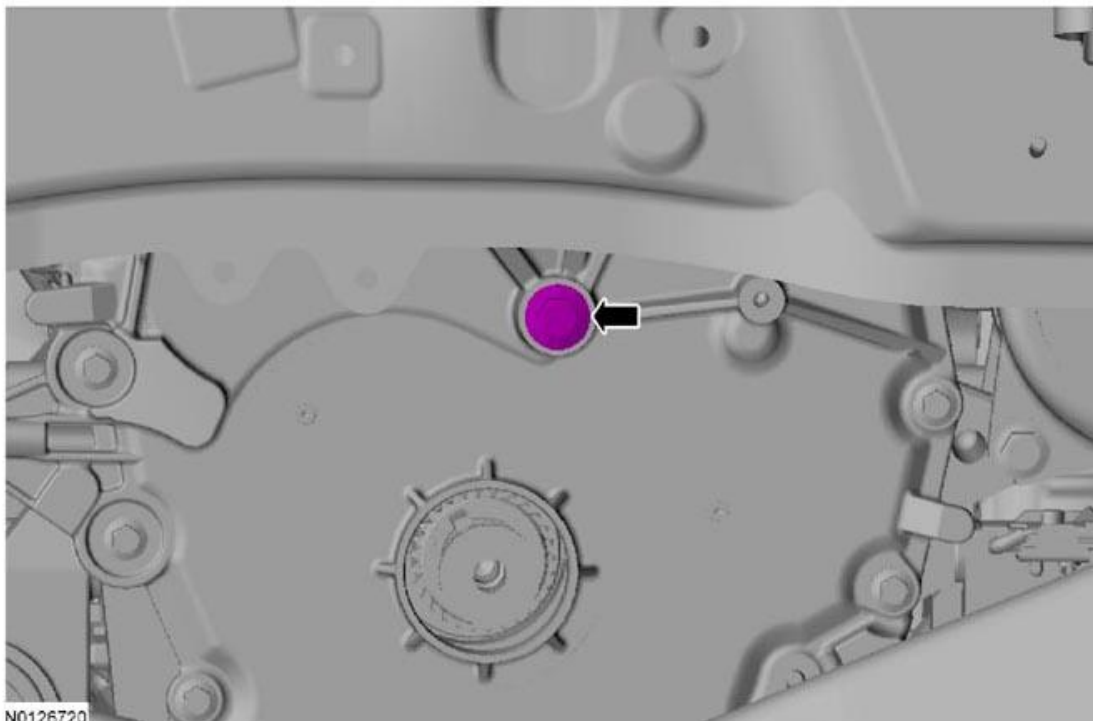
Fig. 276: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

25.

NOTE: Discard the catalytic converter nuts and gasket.



Fig. 277: Identifying Nuts And Catalytic Converter
Courtesy of FORD MOTOR CO.



26.

Fig. 278: Locating Exhaust Manifold Studs

Courtesy of FORD MOTOR CO.

27. Refer to: **QUICK RELEASE COUPLING** .

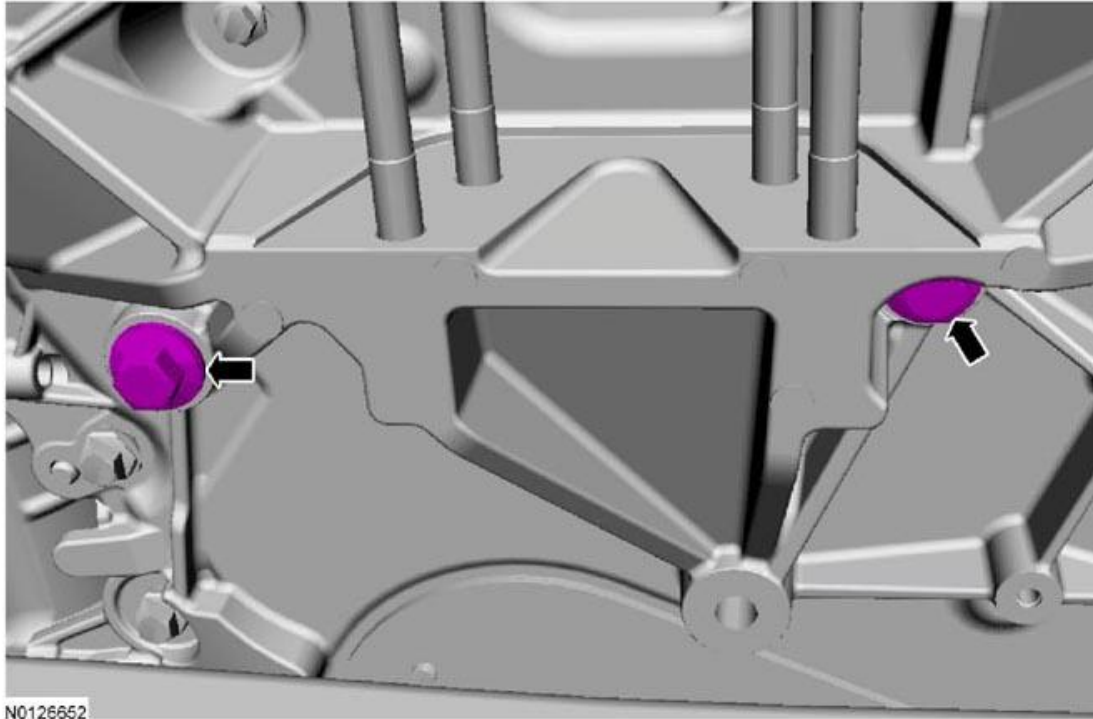


Fig. 279: Locating Quick Release Coupling
Courtesy of FORD MOTOR CO.

28. Refer to: **QUICK RELEASE COUPLING** .

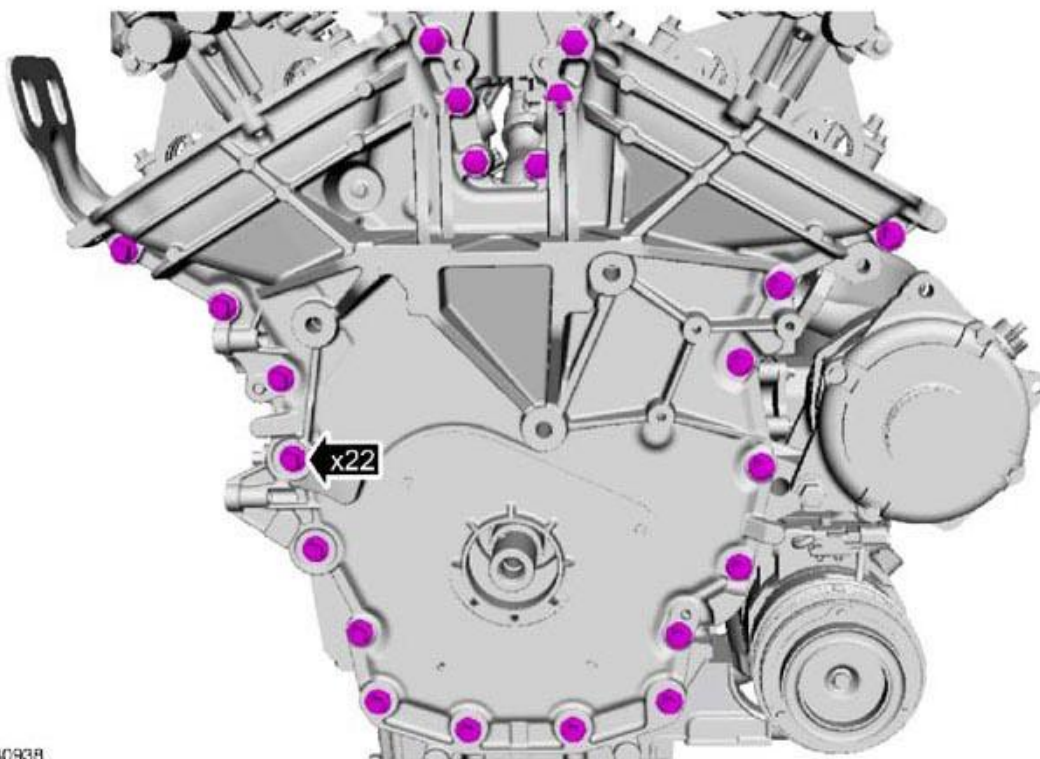
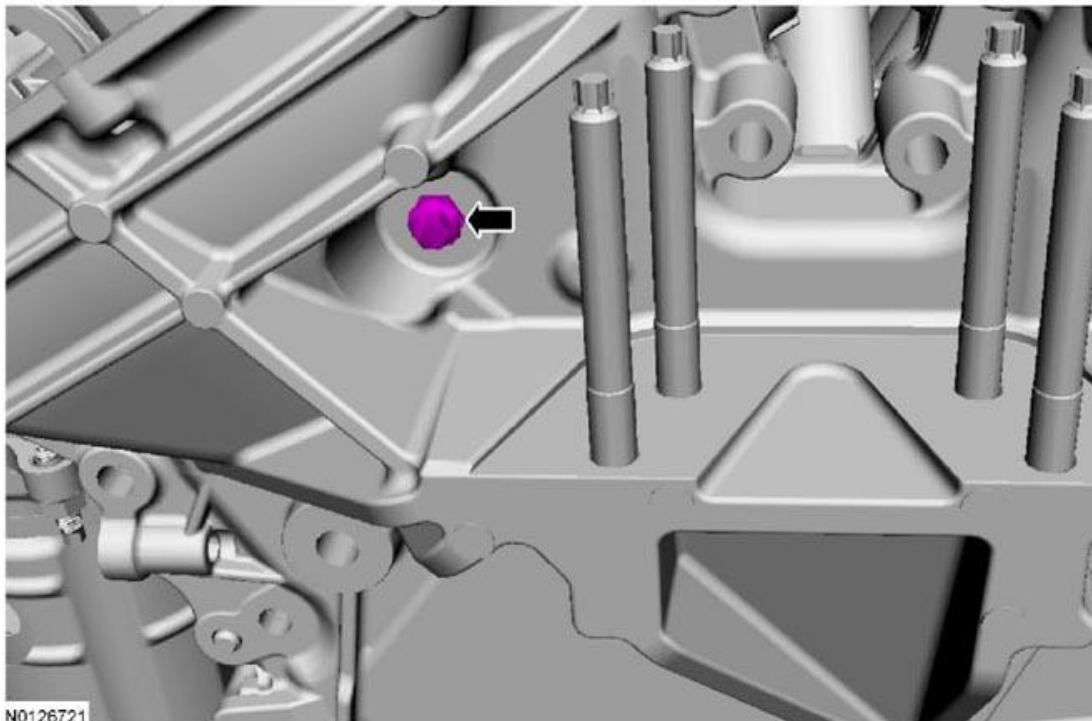


Fig. 280: Locating Quick Release Coupling
Courtesy of FORD MOTOR CO.



29.

Fig. 281: Locating Tube Connection

Courtesy of FORD MOTOR CO.

30. If equipped with an automatic transmission.

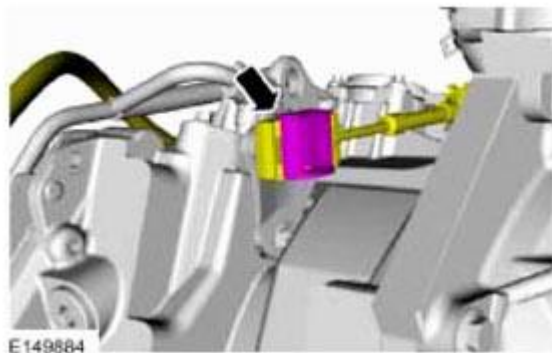


Fig. 282: Locating Automatic Transmission Linkage Coupling
Courtesy of FORD MOTOR CO.

31. If equipped with an automatic transmission.

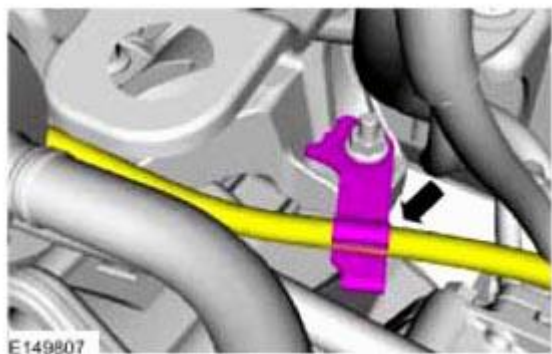


Fig. 283: Locating Hose Bracket
Courtesy of FORD MOTOR CO.

32. If equipped with an automatic transmission.



Fig. 284: Locating Hose Bracket
Courtesy of FORD MOTOR CO.

33. If equipped with an automatic transmission.

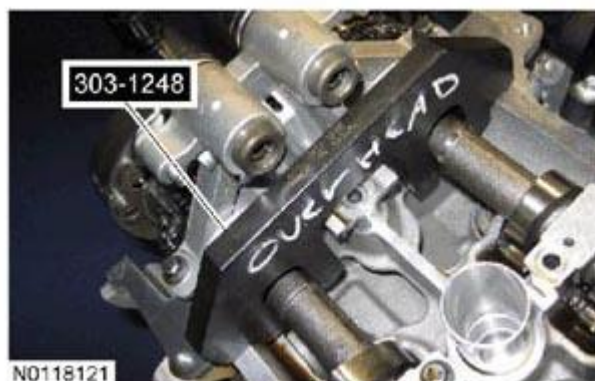


Fig. 285: Locating Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: Do not spill brake fluid on painted or plastic surfaces or damage to the surface may occur. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.

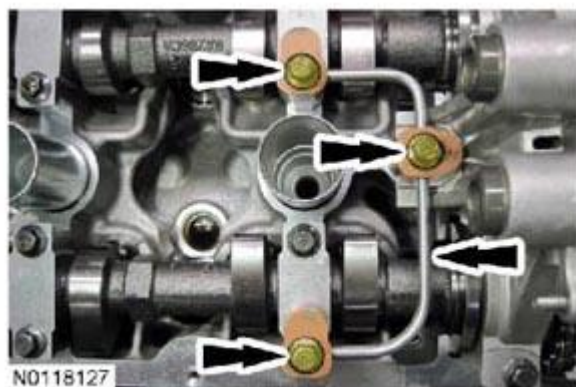


Fig. 286: Locating Hose Connection
Courtesy of FORD MOTOR CO.

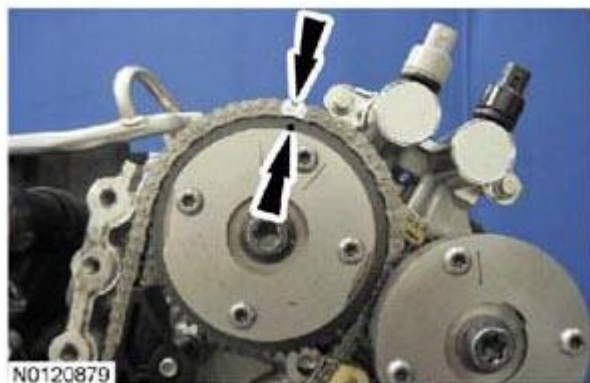
34. If equipped with a manual transmission.
35. If equipped with a manual transmission.



Fig. 287: Locating Automatic Transmission Linkage Coupling And Bracket Nuts
Courtesy of FORD MOTOR CO.

36. Refer to: **FRONT HALFSHAFT RH** .

Refer to: **FRONT HALFSHAFT LH** .



37.

Fig. 288: Locating Hose Bracket Bolt
Courtesy of FORD MOTOR CO.

38. **NOTE:** Discard the O-ring seals.

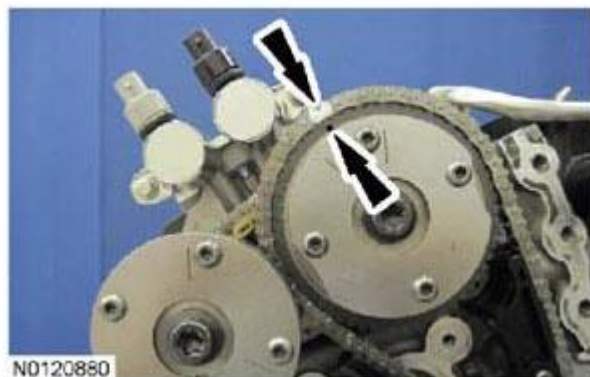


Fig. 289: Locating Hose Bracket Bolt And Nuts
Courtesy of FORD MOTOR CO.

39. *General Equipment* : Hose Clamp Remover/Installer

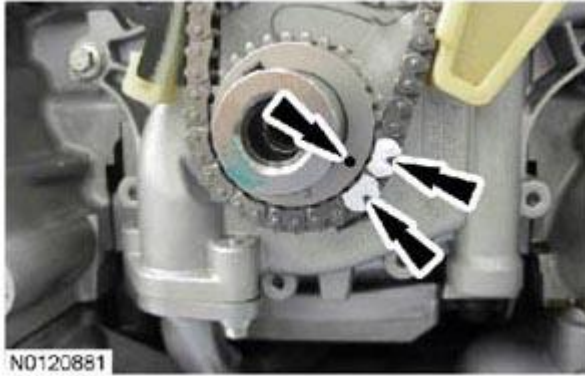


Fig. 290: Locating Hose Clamp
Courtesy of FORD MOTOR CO.

40. Drain and install the drain plug.

Torque : 27 Nm



Fig. 291: Locating Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.



41.

Fig. 292: Identifying Oil Filter
Courtesy of FORD MOTOR CO.

42. Refer to: COOLING FAN MOTOR AND SHROUD .

NOTE: Automatic transmission shown in illustration, manual transmission similar.

43.

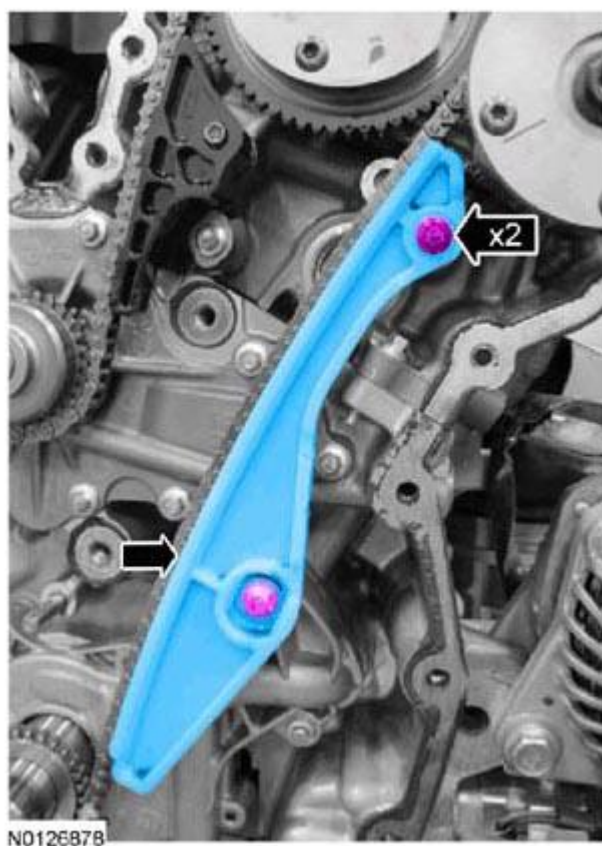


Fig. 293: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

44.



Fig. 294: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.



45.

Fig. 295: Locating Transmission Clamp Bolts
Courtesy of FORD MOTOR CO.

NOTE: Position a block of wood under the transmission.

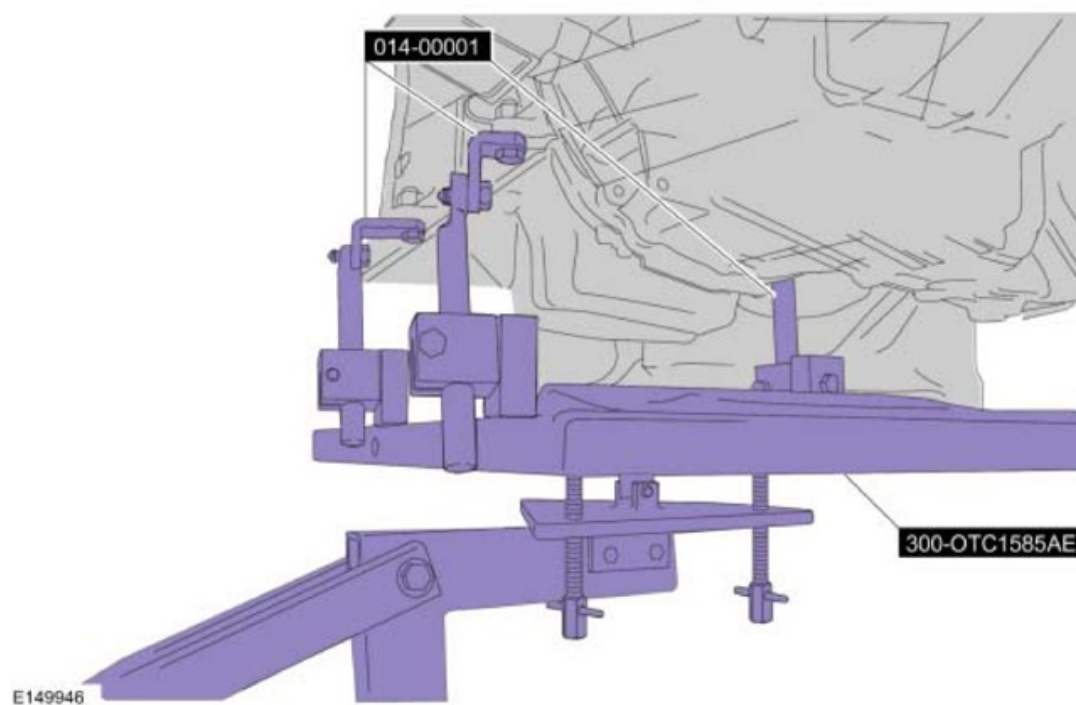


Fig. 296: Supporting Transmission With Powertrain Lift
Courtesy of FORD MOTOR CO.

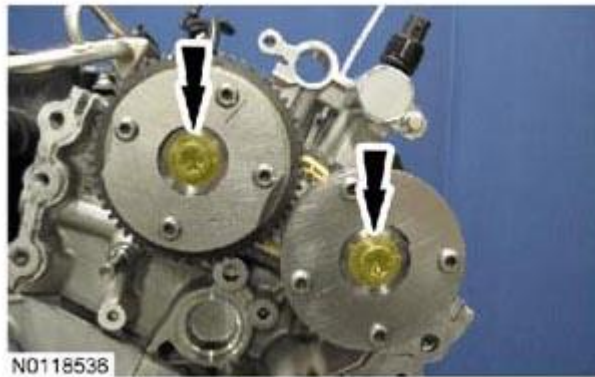
46. *Special Tool(s)* : 300-OTC1585AE (Powertrain Lift) , 014-00001 (ADJUSTABLE GRIP 1735A)

General Equipment : Wooden Block



47.

Fig. 297: Locating AC Pipe Bracket
Courtesy of FORD MOTOR CO.



48.

Fig. 298: Locating Engine Mount Nuts And Bolts
Courtesy of FORD MOTOR CO.



49.

Fig. 299: Locating Engine Mounting Bracket Bolt
Courtesy of FORD MOTOR CO.

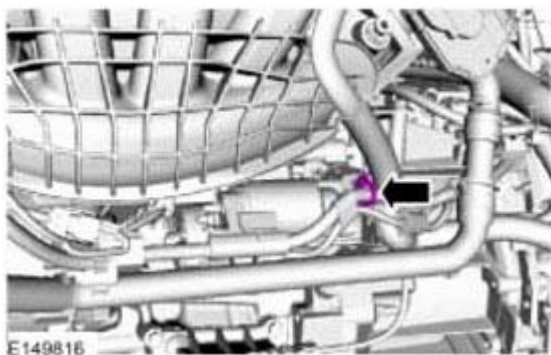
50. Lower the powertrain from the vehicle.
51. Clean and inspect the catalytic converter flange.

Refer to: EXHAUST MANIFOLD CLEANING AND INSPECTION .

52. If equipped with automatic transmission.



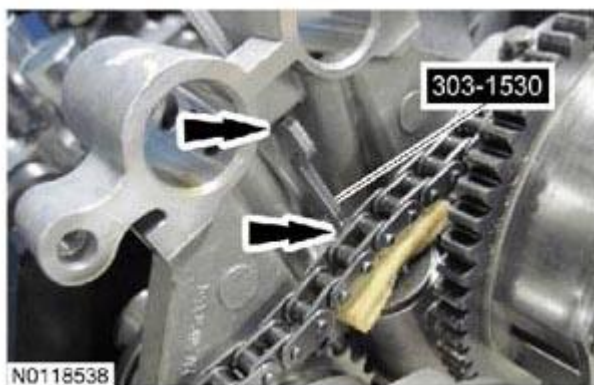
Fig. 300: Locating Harness Connector
Courtesy of FORD MOTOR CO.



- 53.

Fig. 301: Locating Hose Retainer
Courtesy of FORD MOTOR CO.

54. Refer to: STARTER MOTOR .



- 55.

Fig. 302: Locating Starter Insulator

Courtesy of FORD MOTOR CO.

NOTE: Rotate the engine in a clockwise direction only or engine damage may occur.

NOTE: To prevent the flexplate-to-clutch nuts from falling into the clutch housing and causing damage, use a magnetic socket to install the 6 flexplate-to-clutch nuts.

NOTE: Index mark one stud and the clutch for assembly reference.

NOTE: Discard the 6 clutch-to-flexplate nuts.

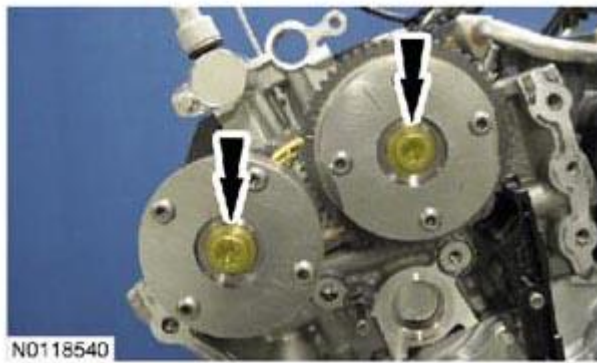


Fig. 303: Locating Clutch-To-Flexplate Nut
Courtesy of FORD MOTOR CO.

- 56. If equipped with automatic transmission.
- 57. *Special Tool(s)* : 300-OTC1819E (2, 200# Floor Crane, Fold Away) , 303-D089 (Spreader Bar)



E149949

Fig. 304: Lifting Engine With Crane (300-OTC1819E And 303-D089)

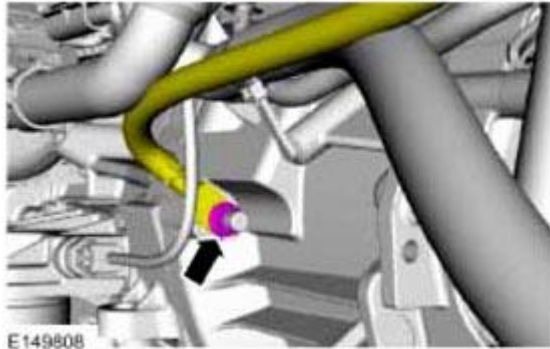
Courtesy of FORD MOTOR CO.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

58.

**Fig. 305: Locating Transmission-To-Engine Bolts**

Courtesy of FORD MOTOR CO.



59.

Fig. 306: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

60.

- If equipped with a automatic transmission, remove the 4 bellhousing-to-engine fasteners.
- If equipped with a manual transmission, remove the 5 bellhousing-to-engine fasteners.

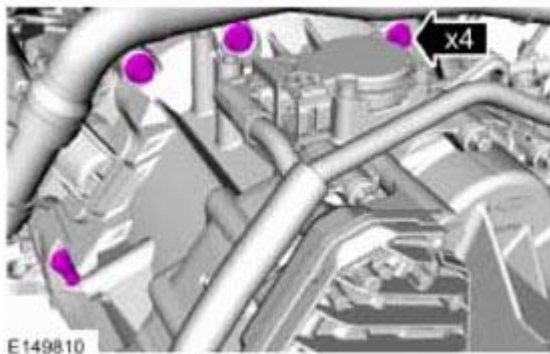


Fig. 307: Identifying Bellhousing-To-Engine Fasteners
Courtesy of FORD MOTOR CO.

61. Separate the transaxle from the engine.

DISASSEMBLY

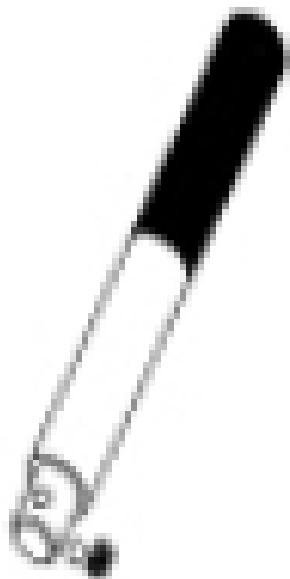
ENGINE

SPECIAL TOOL(S) / GENERAL EQUIPMENT

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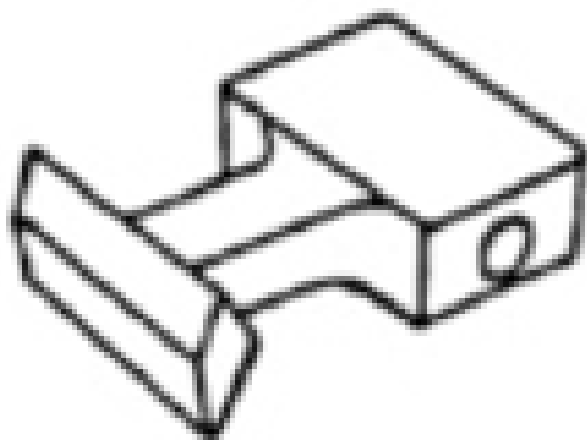
2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



E133913

205-153
Handle

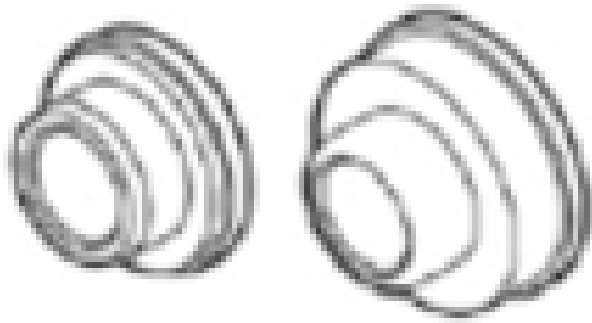


303-103
Holding Tool, Flywheel
TKIT-2009TC-F

303-1247/1
Remover, VCT Spark Plug Tube Seal

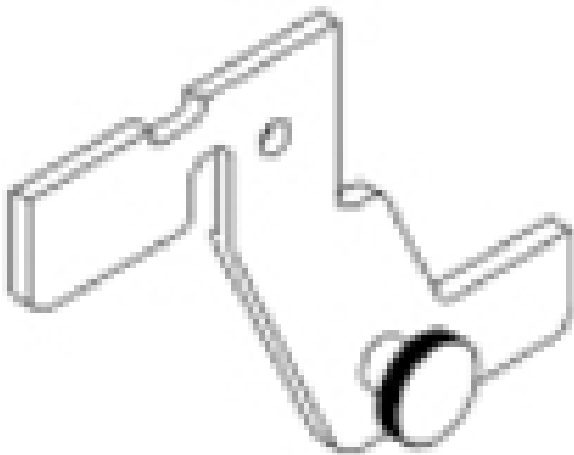
2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



303-1419

Remover, 3.5L / 3.7L Stretchy Belt
TKIT-2008SB-FLM



E133912

303-1565

Alignment Tool, Camshaft

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



E134603

303-409

Remover, Crankshaft Seal
TKIT-1992-FH/FMH/FLMH
TKIT-1993-LMH/MH



E139375

303-462

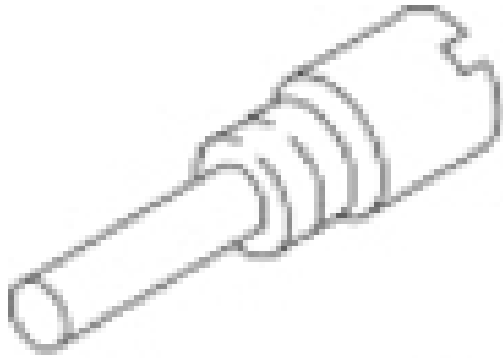
Installer, Connecting Rod

303-507

Timing Peg, Crankshaft TDC

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



PZ21210

TKIT-2001N-FLM



303-D055

303-D055
Strap Wrench



307-005
Slide Hammer

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



ST3096-A

310-205
Fuel Injector Brush



ST3095-A

310-206
Remover, Fuel Injector
TKIT-2009A-FLM

Hose Clamp Remover/Installer

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30	-

Motorcraft® Metal Surface Prep
ZC-31-A

-

- NOTE:** Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.
- NOTE:** During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.
- NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.
- NOTE:** Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.
- NOTE:** Early build engines have a 6-rib crankshaft pulley, late build engines have a 4-rib crankshaft pulley.
- NOTE:** Refer to exploded views in Description and Operation.

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

NOTE: Loosen the 6 clutch pressure plate-to-flywheel bolts evenly, by 2 turns at a time.

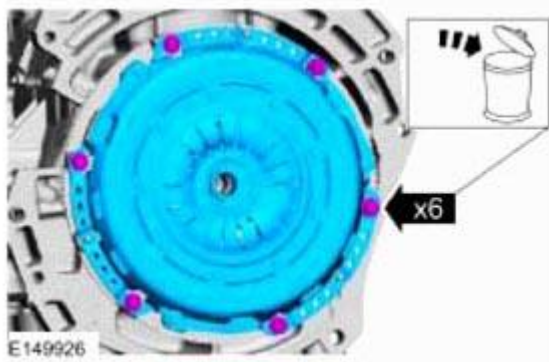


Fig. 308: Locating Clutch Pressure Plate-To-Flywheel Bolts
Courtesy of FORD MOTOR CO.

1. If equipped with a manual transmission.
2. If equipped with a manual transmission.

Special Tool(s) : 303-103 (Holding Tool, Flywheel)

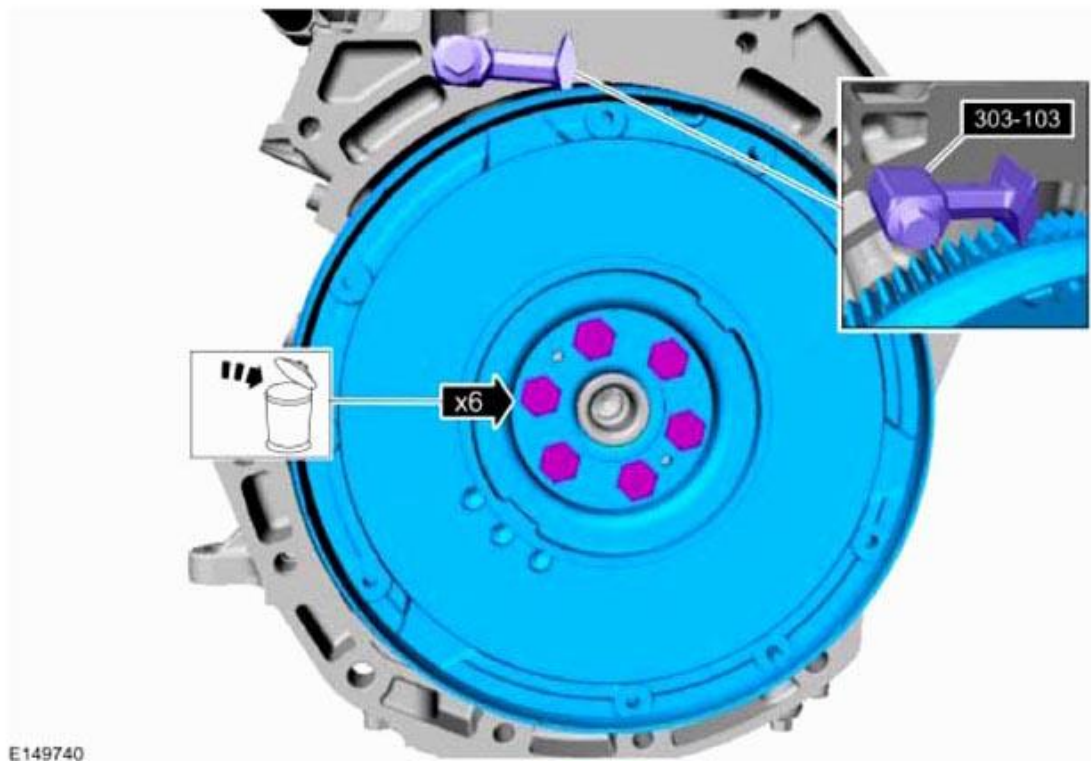


Fig. 309: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts
Courtesy of FORD MOTOR CO.

3. If equipped with a automatic transmission.

Special Tool(s) : 303-103 (Holding Tool, Flywheel)

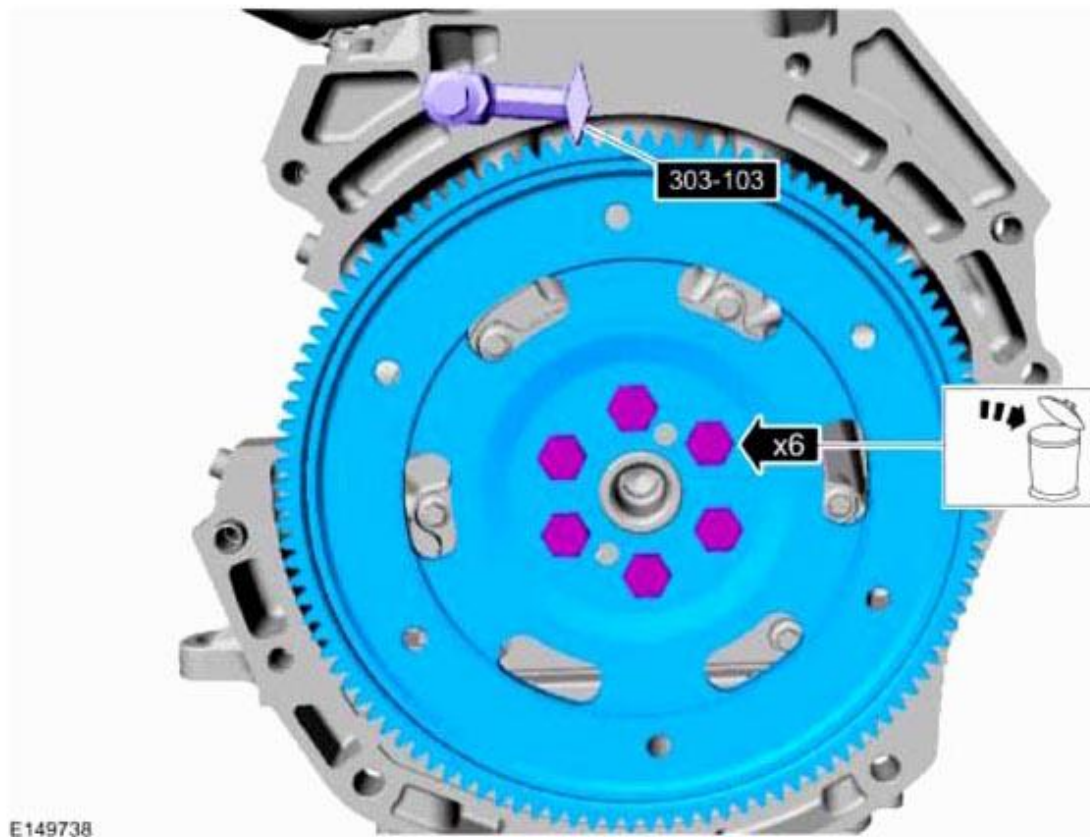


Fig. 310: Locating Flywheel Bolts And 303-103 (Flywheel Holding Tool)
Courtesy of FORD MOTOR CO.

4. Mount the engine on a engine stand.
5. Refer to: **QUICK RELEASE COUPLING** .

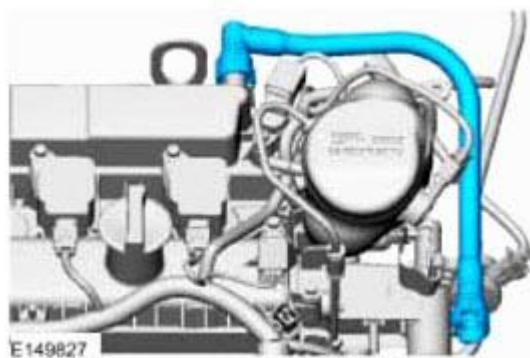
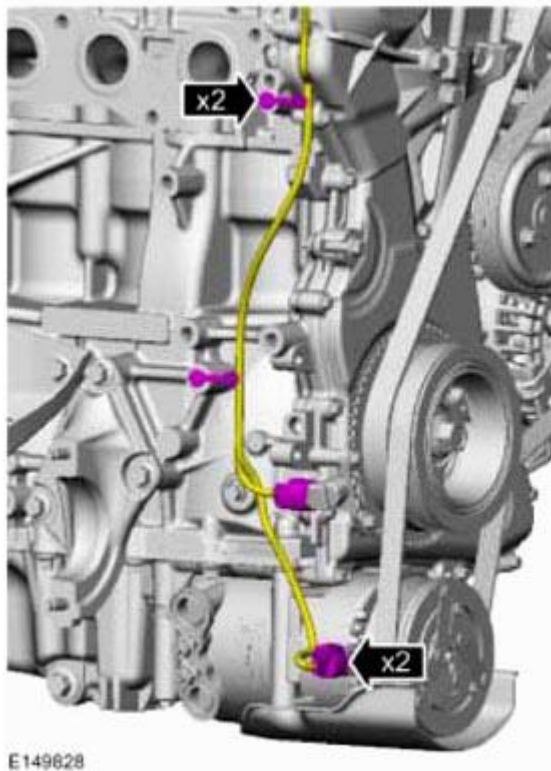
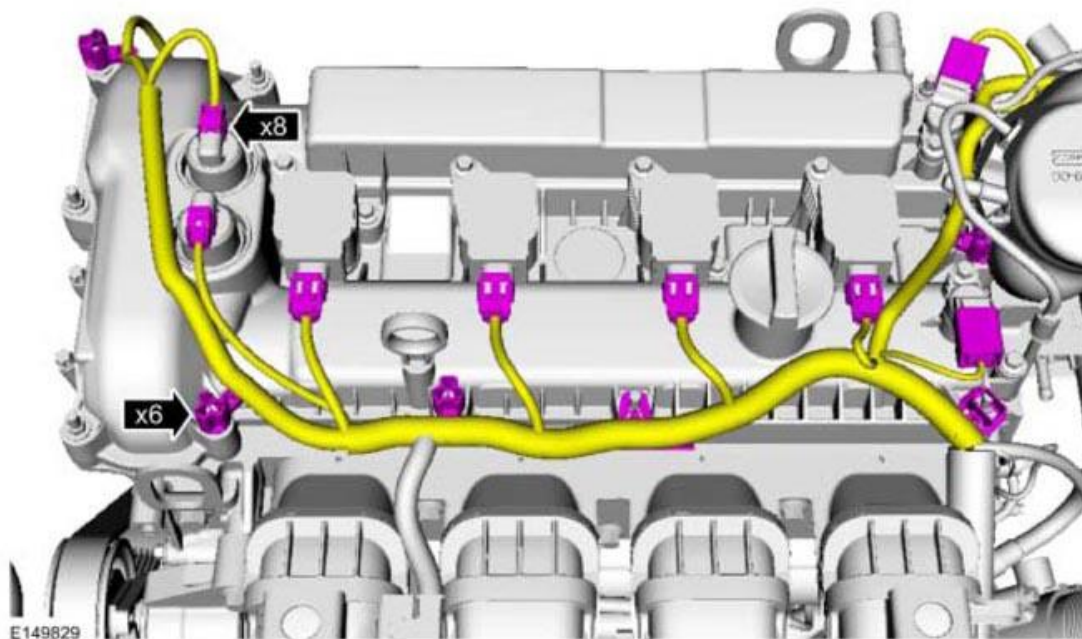


Fig. 311: Identifying Hose Quick Release Coupling
Courtesy of FORD MOTOR CO.



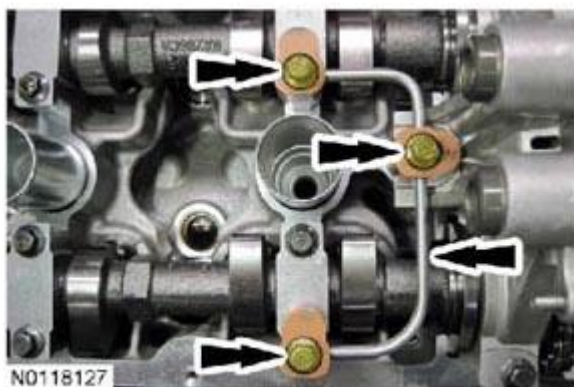
6.

Fig. 312: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



7.

Fig. 313: Locating Fuel Injector Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



8.

Fig. 314: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



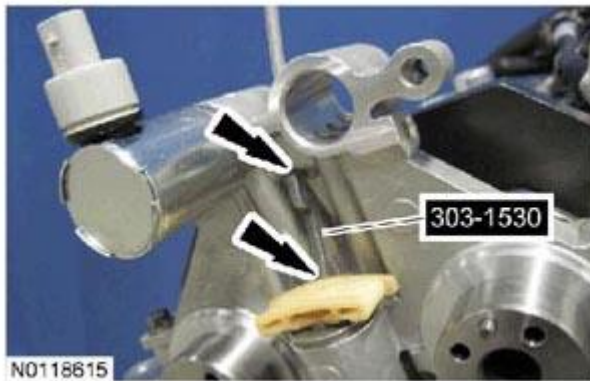
9.

Fig. 315: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



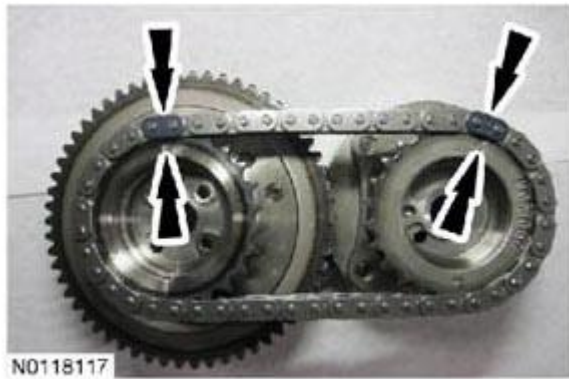
10.

Fig. 316: Locating Engine Ground Bolt
Courtesy of FORD MOTOR CO.



11.

Fig. 317: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



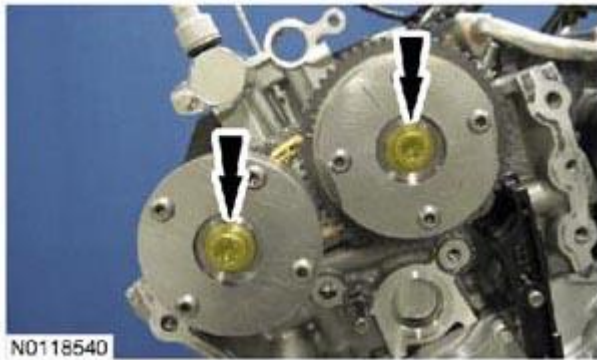
12.

Fig. 318: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



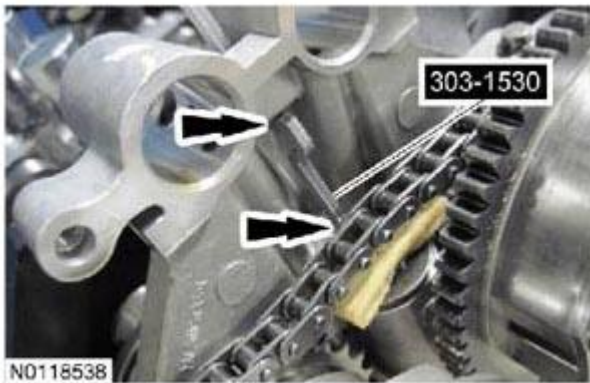
13.

Fig. 319: Locating Hose Coupling
Courtesy of FORD MOTOR CO.



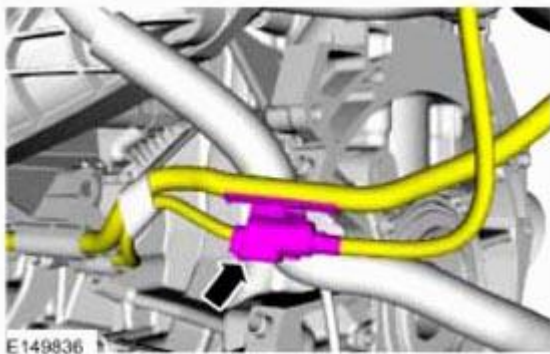
14.

Fig. 320: Locating Harness Connector
Courtesy of FORD MOTOR CO.



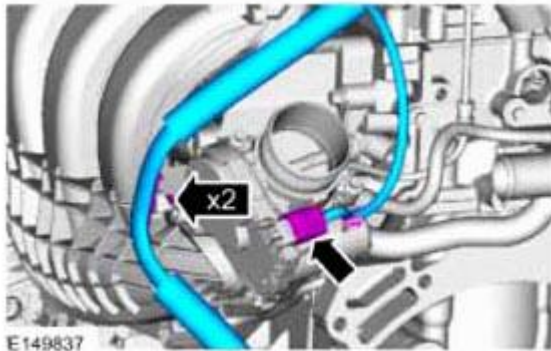
15.

Fig. 321: Locating Oil Filter EOP Switch Connector
Courtesy of FORD MOTOR CO.



16.

Fig. 322: Locating Hose Connection And Retainer
Courtesy of FORD MOTOR CO.



17.

Fig. 323: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.

18. Position the special tool between the crankshaft pulley and A/C compressor belt as shown in illustration and rotate the crankshaft clockwise.

Special Tool(s) : 303-1419 (Remover, 3.5L / 3.7L Stretchy Belt)



Fig. 324: Positioning Special Tool Between Crankshaft Pulley And A/C Compressor Belt
Courtesy of FORD MOTOR CO.

19. Rotate the crankshaft until the special tool is at approximately the 5 o'clock position as shown in illustration.

Special Tool(s) : 303-1419 (Remover, 3.5L / 3.7L Stretchy Belt)

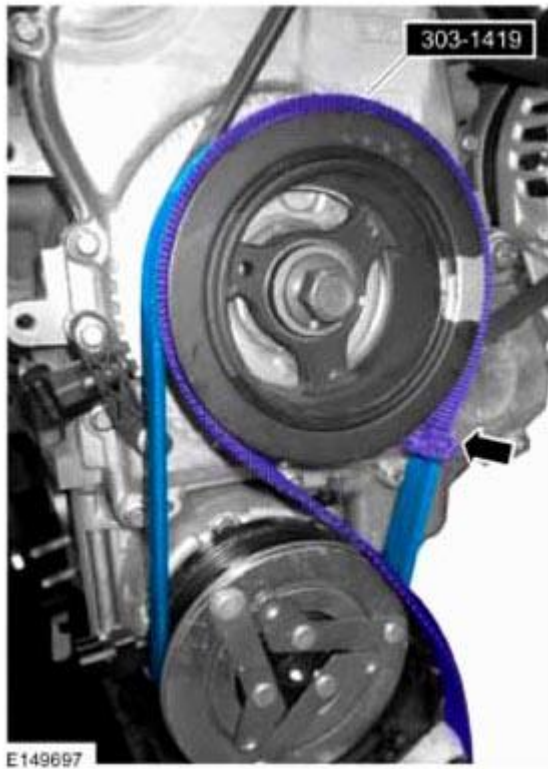


Fig. 325: Rotating Crankshaft Until Special Tool Is At Approximately 5 O'Clock Position
Courtesy of FORD MOTOR CO.

20. Fold the special tool around the inside of the A/C compressor belt as shown in illustration.

Special Tool(s) : 303-1419 (Remover, 3.5L / 3.7L Stretchy Belt)

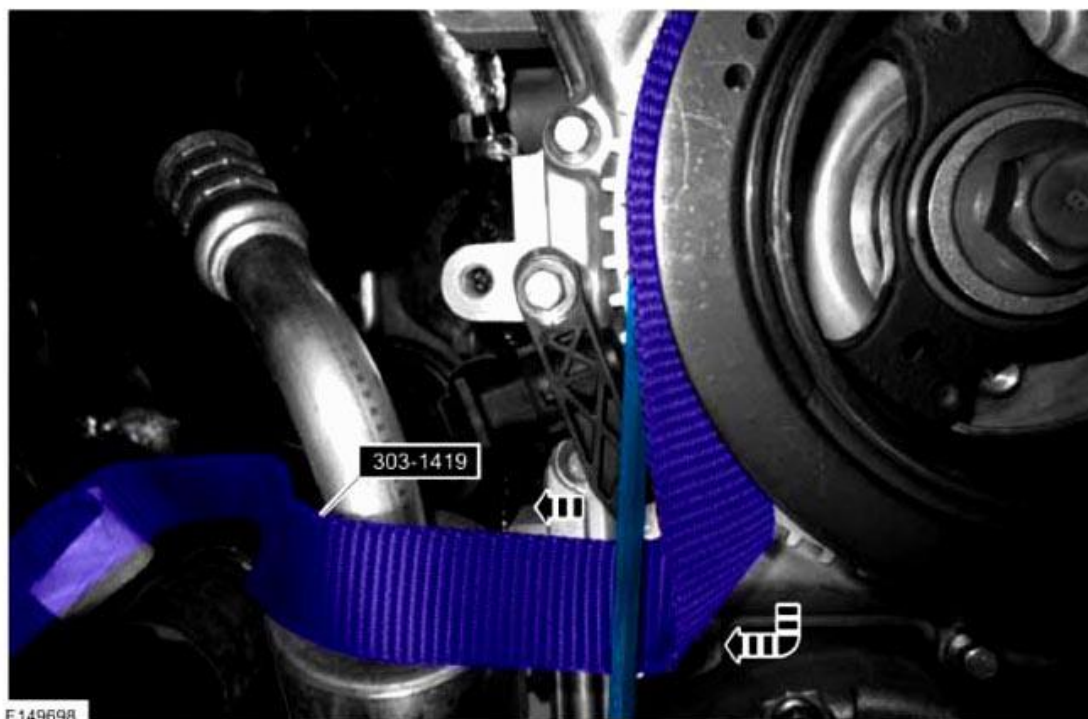


Fig. 326: Folding Special Tool Around Inside Of A/C Compressor Belt
Courtesy of FORD MOTOR CO.

21. In one quick motion, firmly pull the special tool and remove the A/C compressor belt.

Special Tool(s) : 303-1419 (Remover, 3.5L / 3.7L Stretchy Belt)



Fig. 327: Removing A/C Compressor Belt By Pulling Special Tool
Courtesy of FORD MOTOR CO.

22. Loosen.

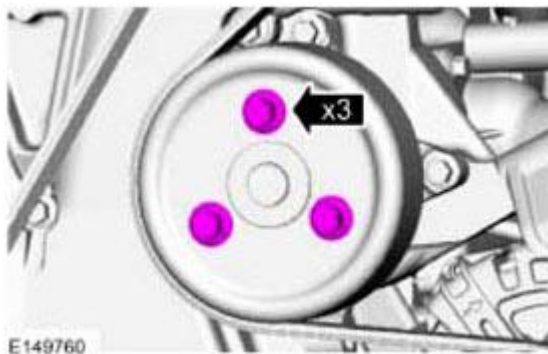


Fig. 328: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.



23.

Fig. 329: Identifying Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.



24.

Fig. 330: Locating Pulley Bracket Bolts
Courtesy of FORD MOTOR CO.



25.

Fig. 331: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.

26. **NOTE:** Discard the O-ring seal.

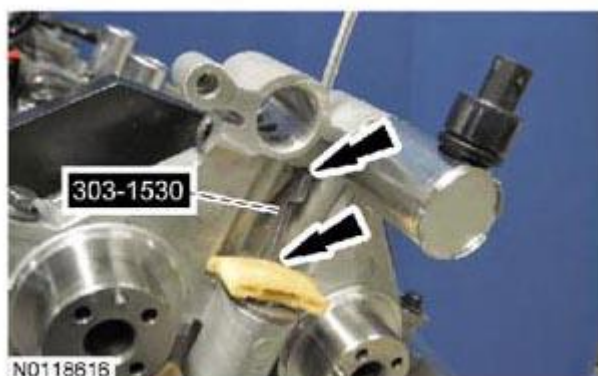


Fig. 332: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.



27.

Fig. 333: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

28. *General Equipment* : Hose Clamp Remover/Installer



Fig. 334: Locating Hose Clamp
Courtesy of FORD MOTOR CO.

29. **NOTE:** Remove the generator stud after generator is removed.

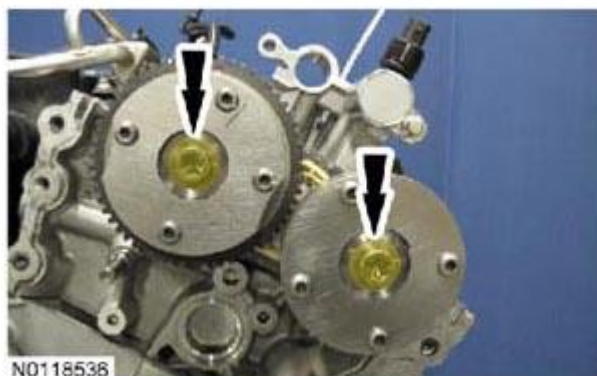


Fig. 335: Locating Generator Stud
Courtesy of FORD MOTOR CO.

30. **NOTE:** Discard the thermostat housing gasket.



Fig. 336: Locating Thermostat Housing Bolts
Courtesy of FORD MOTOR CO.

31. Refer to: **QUICK RELEASE COUPLING** .

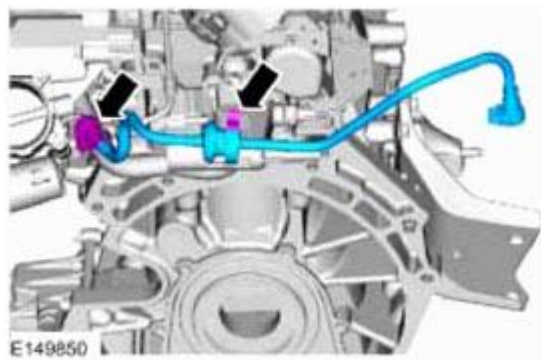


Fig. 337: Locating Hose Quick Release Coupling And Retainer
Courtesy of FORD MOTOR CO.

~

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

32.

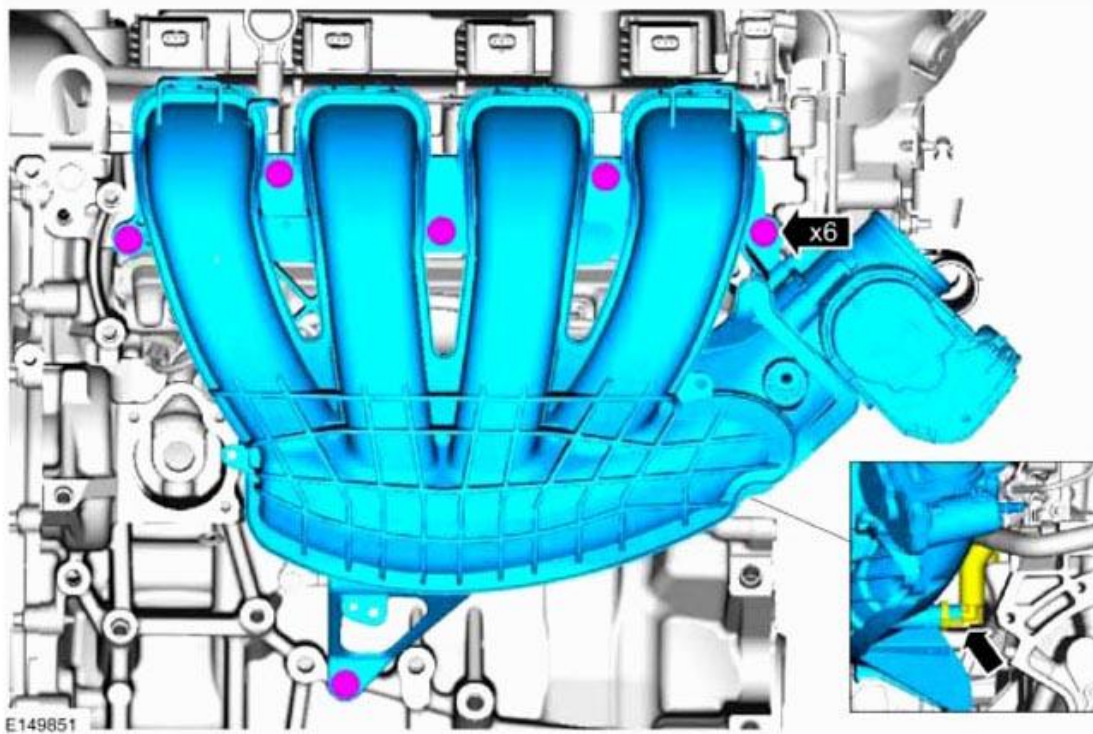


Fig. 338: Locating Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

33. *General Equipment* : Hose Clamp Remover/Installer

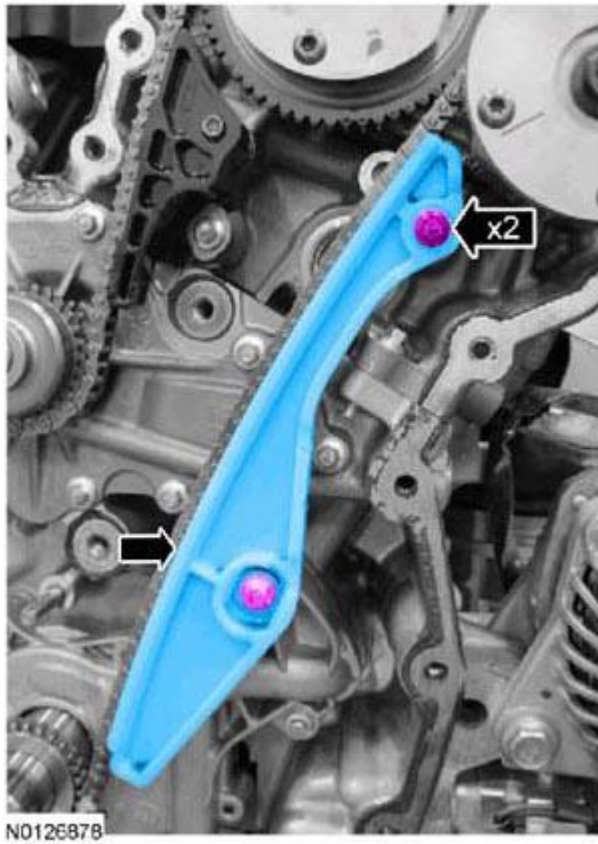


Fig. 339: Locating Hose Clamps
Courtesy of FORD MOTOR CO.



34.

Fig. 340: Locating Fuel Injector Harness Connectors
Courtesy of FORD MOTOR CO.

NOTE: Use care when removing the fuel injection pump noise insulator. Spreading the openings will aid in removing the fuel injection pump noise insulator and reduce the risk of damage.

35.



Fig. 341: Identifying Fuel Injection Pump Noise Insulator
Courtesy of FORD MOTOR CO.

NOTE: To release the fuel pressure in the high pressure fuel tube, wrap the fuel injection pump flare nut with a shop towel to absorb any residual fuel pressure during the loosening of fuel injection pump flare nut.

36.

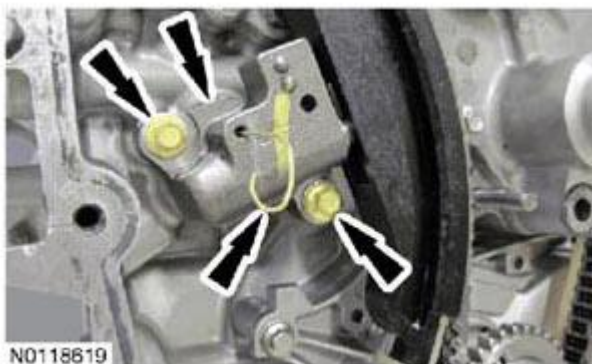


Fig. 342: Locating Fuel Injection Pump Flare Nut
Courtesy of FORD MOTOR CO.

NOTE: Pull out the fuel rails in the direction of the fuel injector axis or damage

37.

37. may occur to the fuel injectors.

NOTE: Use compressed air and remove any dirt or foreign material from the cylinder head, block and general surrounding area of the fuel rail and injectors.

NOTE: When removing the fuel rails, the fuel injectors may remain in the fuel rails but normally remain in the cylinder heads and require the use of a Fuel Injector Remover tool to extract.

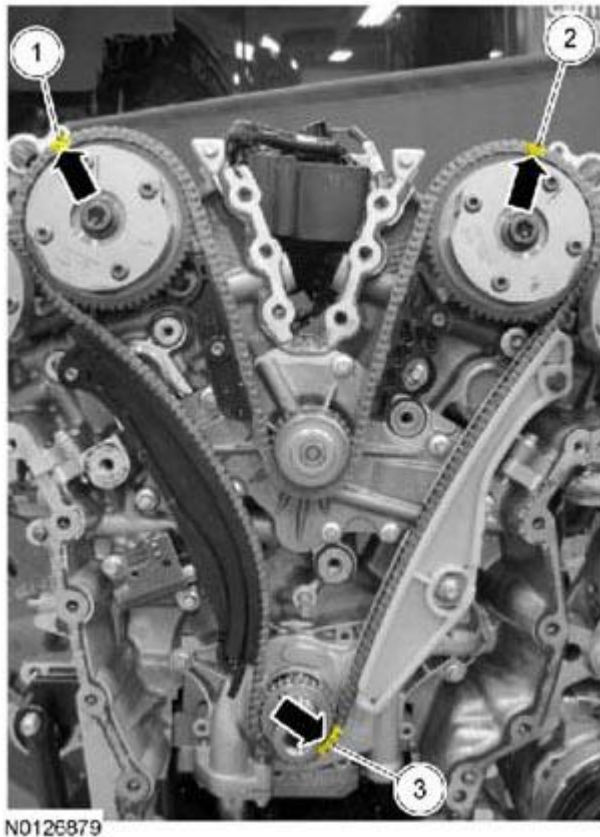


Fig. 343: Locating Fuel Rails Bolts
Courtesy of FORD MOTOR CO.

38. Remove any of the fuel injectors that remained in the head.

Special Tool(s) : 307-005 (Slide Hammer) , 310-206 (Remover, Fuel Injector)



Fig. 344: Removing Fuel Injectors
Courtesy of FORD MOTOR CO.



39.

Fig. 345: Identifying Injector Clip
Courtesy of FORD MOTOR CO.

40. Discard the specified component. Follow local disposal regulations.

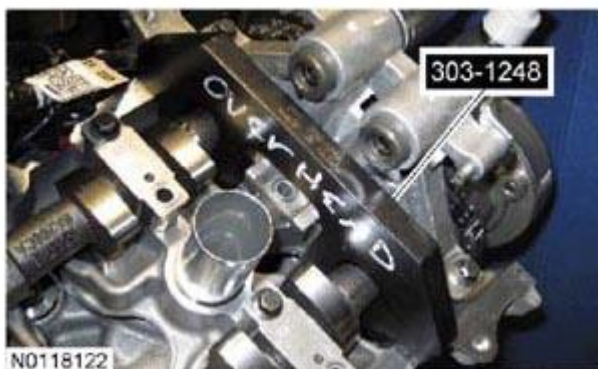


Fig. 346: Identifying Injector O-Ring Seal
Courtesy of FORD MOTOR CO.

NOTE: Make sure to thoroughly clean any residual fuel or foreign material from the cylinder head, block and the general surrounding area of the fuel rails

and injectors.

NOTE: Do not use compressed air to clean the tip of the fuel injector.

NOTE: Do not use a brush to clean the tip of the fuel injector.

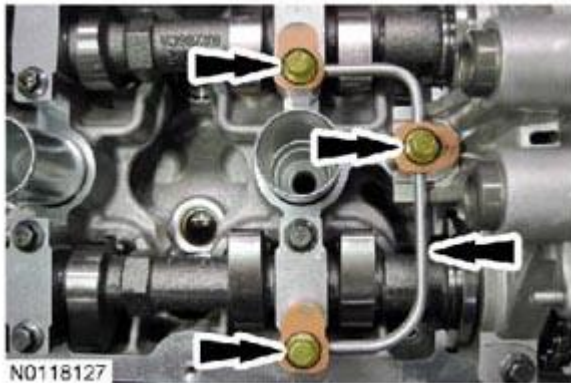


Fig. 347: Cleaning Fuel Injector Bores In Cylinder Head
Courtesy of FORD MOTOR CO.

41. Clean the 4 fuel injector bores in the cylinder head.

Special Tool(s) : 310-205 (Fuel Injector Brush)

42. **NOTE:** Remove and discard the gasket.



Fig. 348: Locating PCV Oil Separator Assembly Bolts
Courtesy of FORD MOTOR CO.

43. **NOTE:** Remove and discard the gasket.

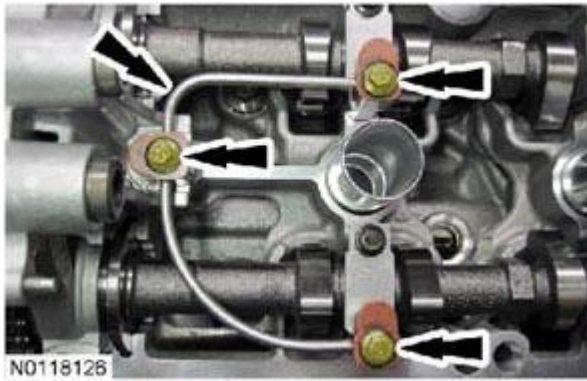


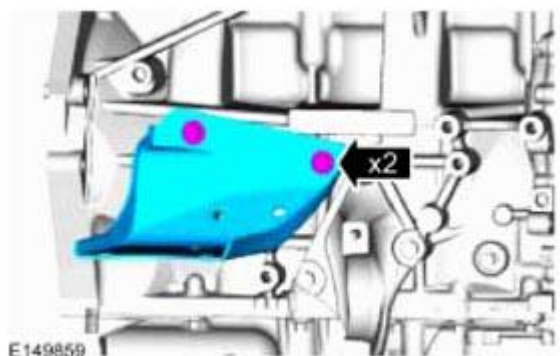
Fig. 349: Locating Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

44. **NOTE:** The RH KS must be installed in the 6 o'clock position and the LH KS must be installed in the 4 o'clock position. Failure to follow these instructions may result in damage to the engine.

NOTE: Mark the location of the RH and LH KS.

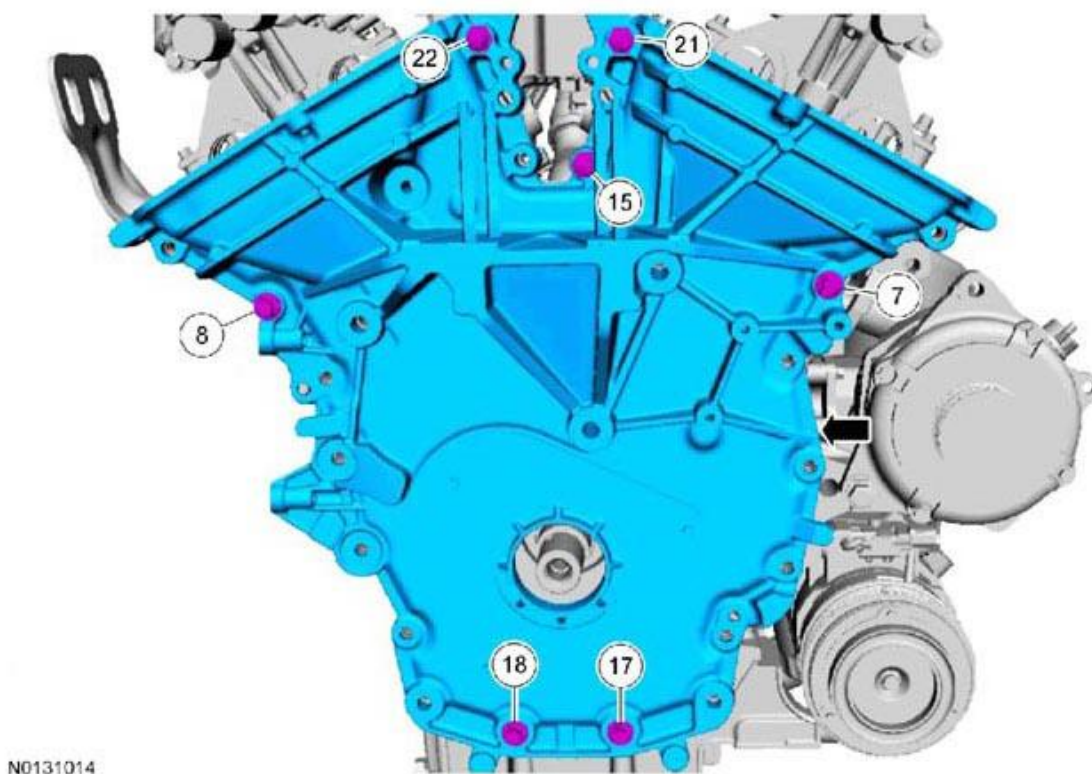


Fig. 350: Identifying RH And LH KS Location
Courtesy of FORD MOTOR CO.



45.

Fig. 351: Identifying RH And LH KS Bolts
Courtesy of FORD MOTOR CO.



46.

Fig. 352: Identifying RH And LH KS Bolts
Courtesy of FORD MOTOR CO.

NOTE: Alternately loosen the 2 fuel injection pump bolts one complete revolution at a time, remove the 2 bolts and fuel injection pump.

47.

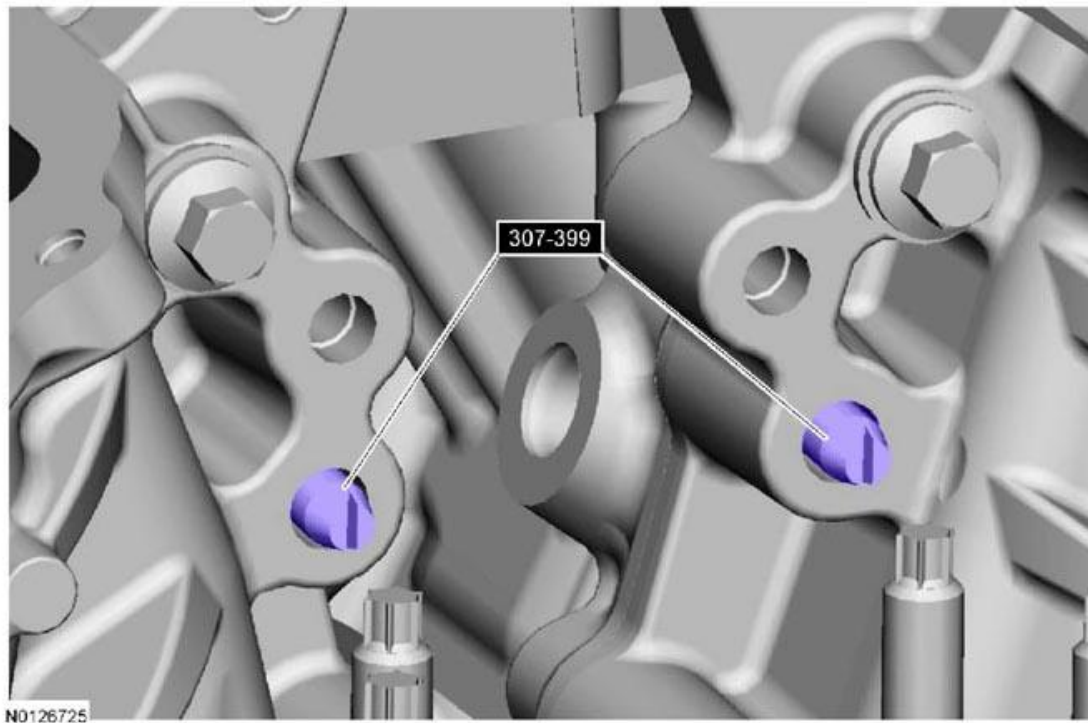
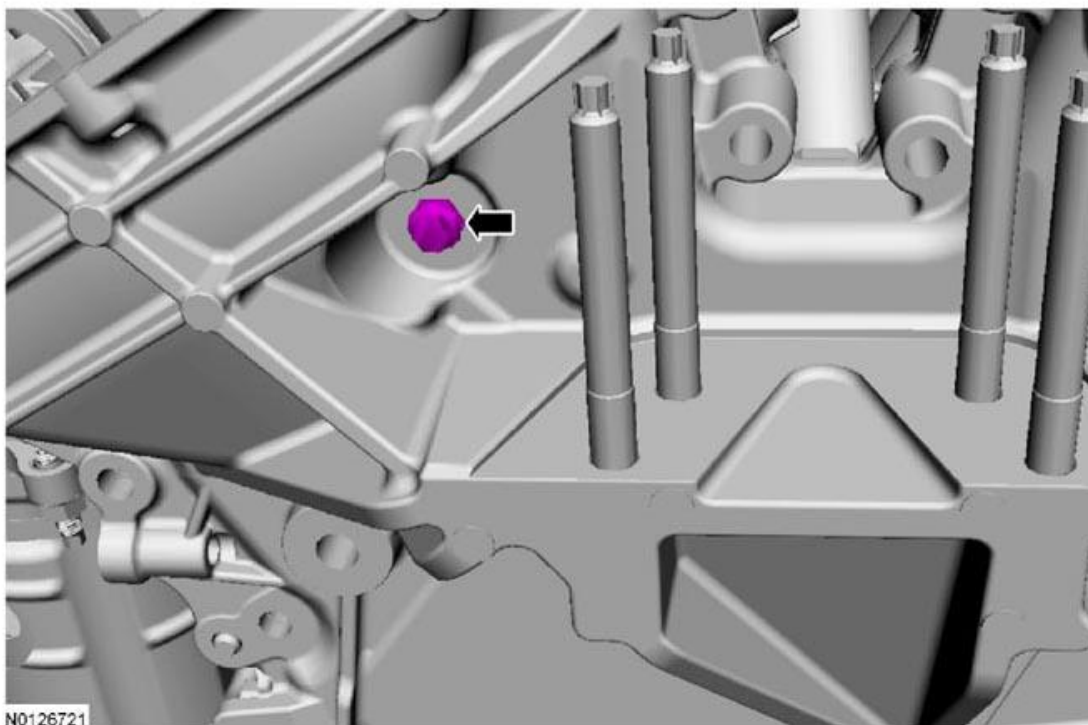
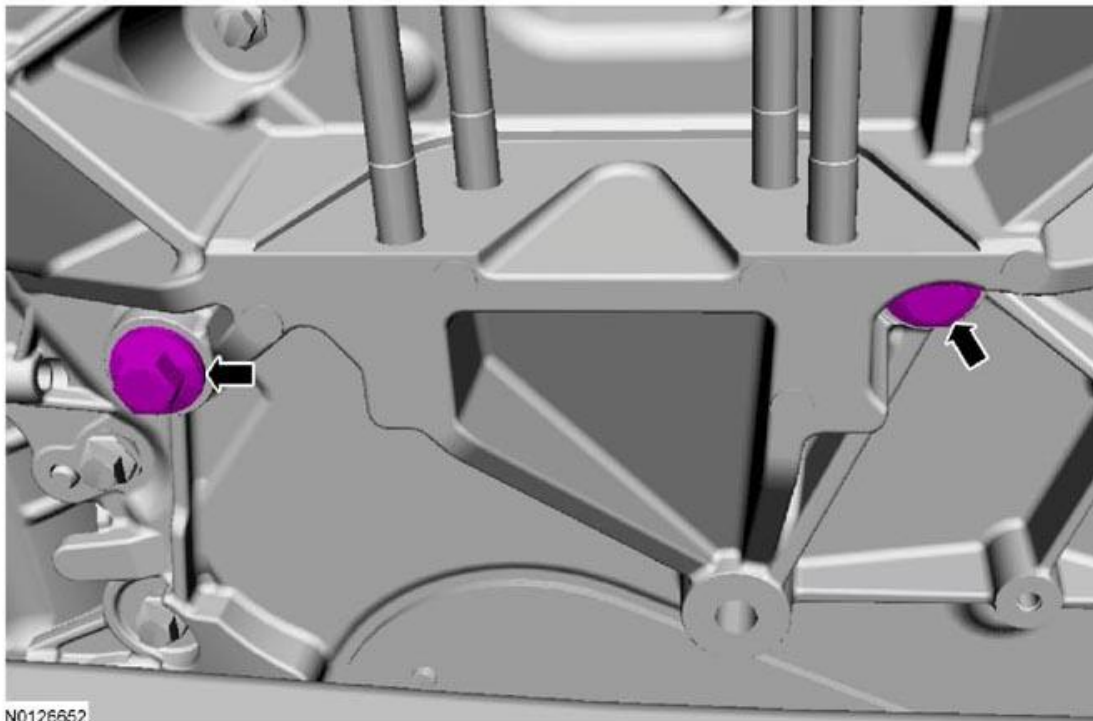


Fig. 353: Locating Fuel Injection Pump Bolts
Courtesy of FORD MOTOR CO.



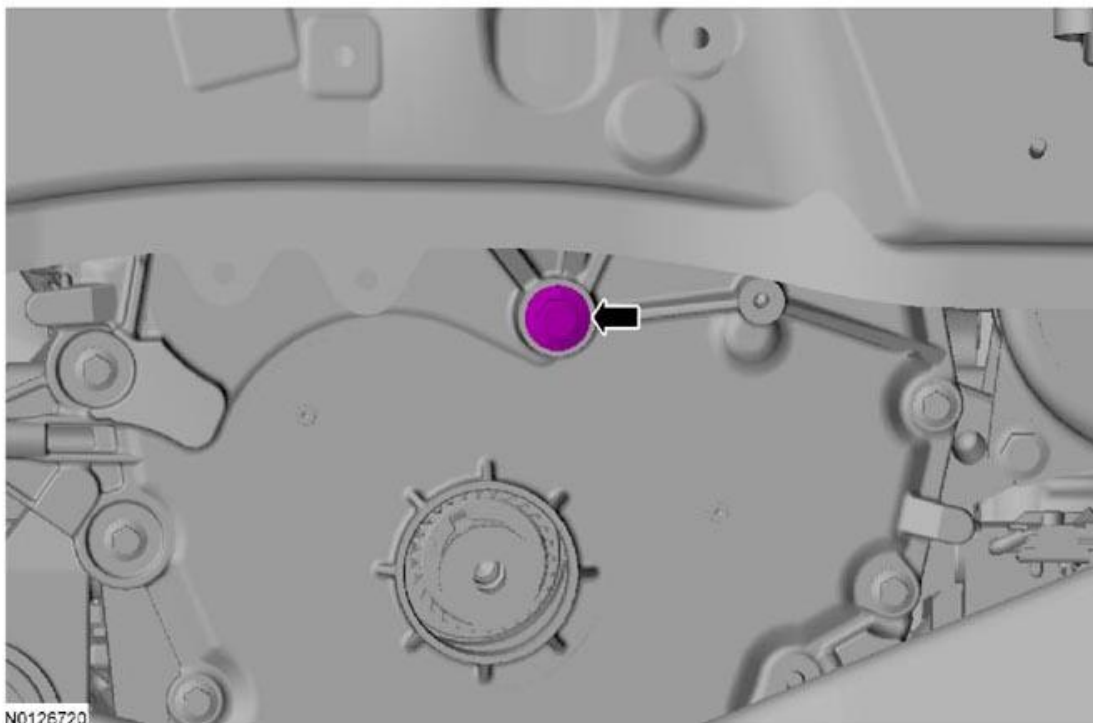
48.

Fig. 354: Identifying Fuel Injection Pump O-Ring Seal
Courtesy of FORD MOTOR CO.



49.

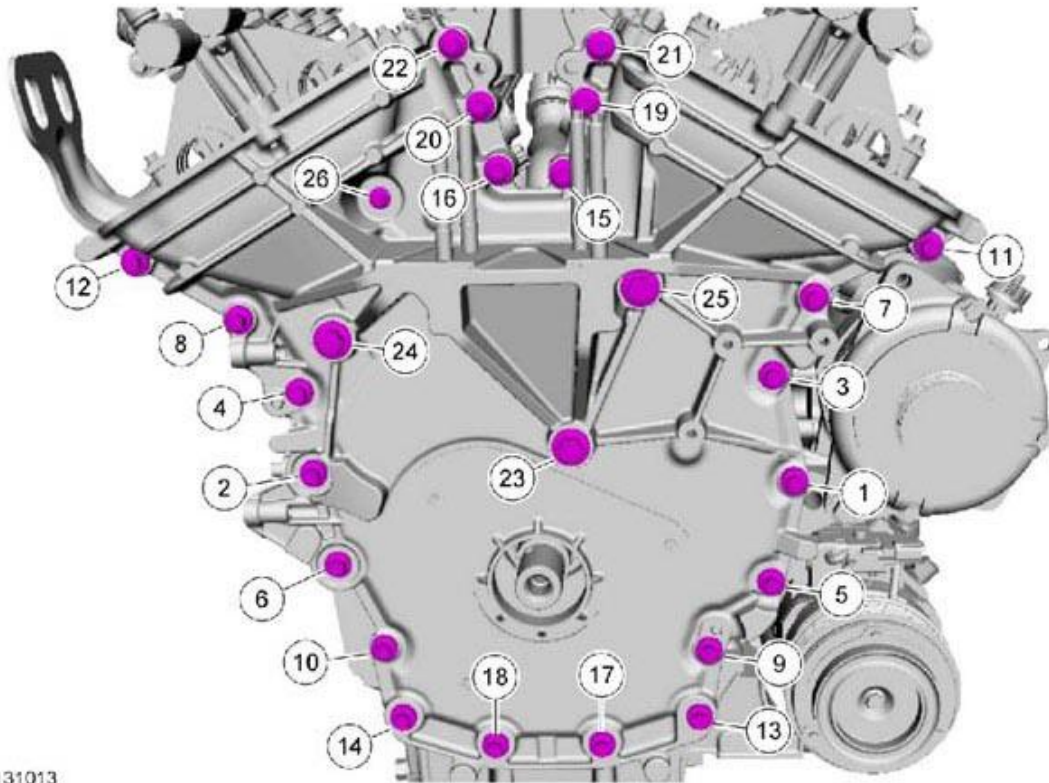
Fig. 355: Removing Fuel Injection Pump Roller Tappet
Courtesy of FORD MOTOR CO.



50.

Fig. 356: Inspecting Fuel Injection Pump Roller Tappet

Courtesy of FORD MOTOR CO.



51.

Fig. 357: Locating Fuel Injection Pump Bracket Nuts
Courtesy of FORD MOTOR CO.

52. **NOTE:** Inspect and replace the gasket, if necessary.



Fig. 358: Locating Fuel Injection Pump Cover Stud Bolts
Courtesy of FORD MOTOR CO.

53. **NOTE:** Inspect and replace the gasket, if necessary.



Fig. 359: Locating Coolant Outlet Connector Assembly Bolts
Courtesy of FORD MOTOR CO.

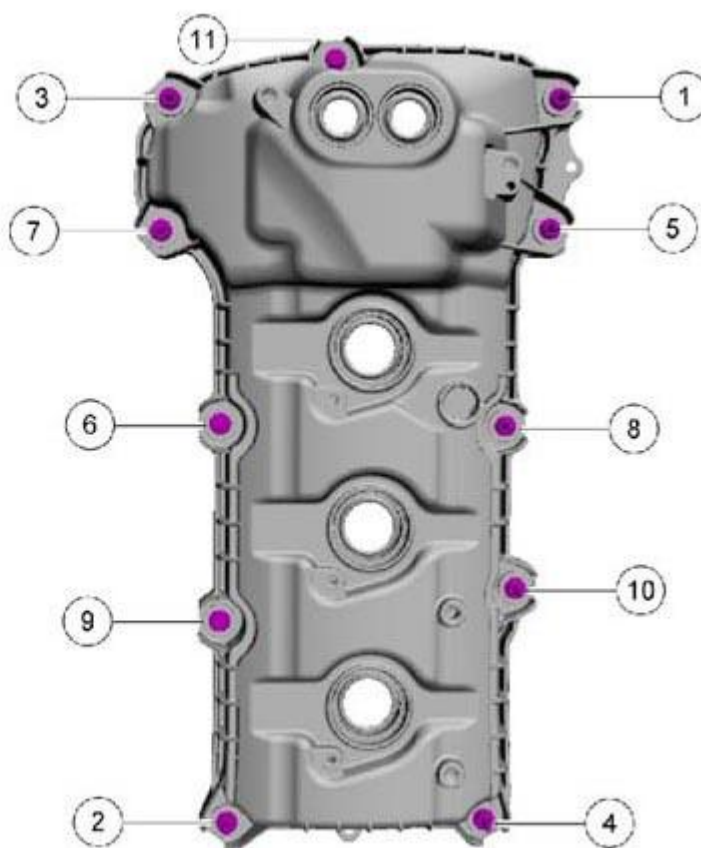


54.

Fig. 360: Locating Oil Dipstick
Courtesy of FORD MOTOR CO.

55.

NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.



N0130007

Fig. 361: Locating Ignition Coil-On-Plugs Bolts
Courtesy of FORD MOTOR CO.

56. If equipped.

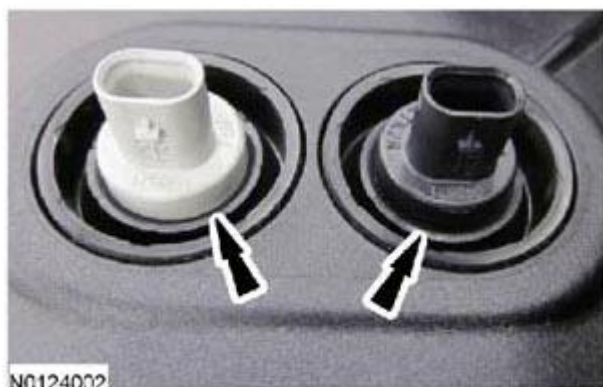


Fig. 362: Locating Stud Bolts
Courtesy of FORD MOTOR CO.

57. **NOTE:** Discard the valve cover gasket.

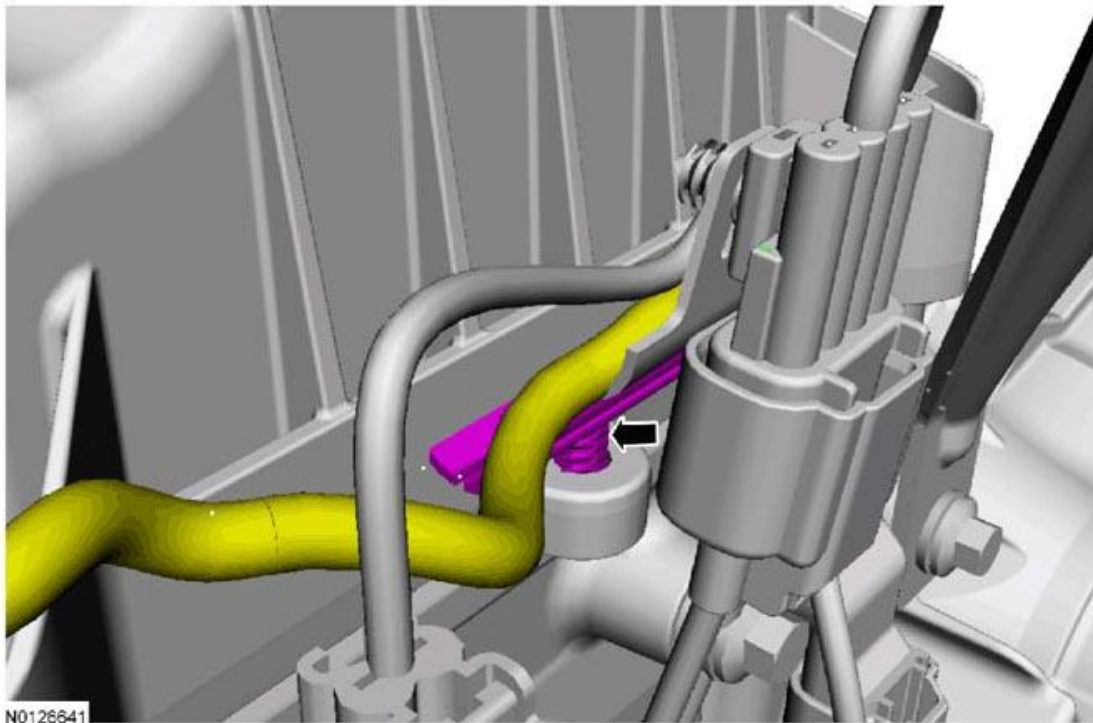


Fig. 363: Locating Valve Cover Bolts
Courtesy of FORD MOTOR CO.

NOTE: The Variable Camshaft Timing (VCT) solenoid seals should only be replaced if they are damaged.

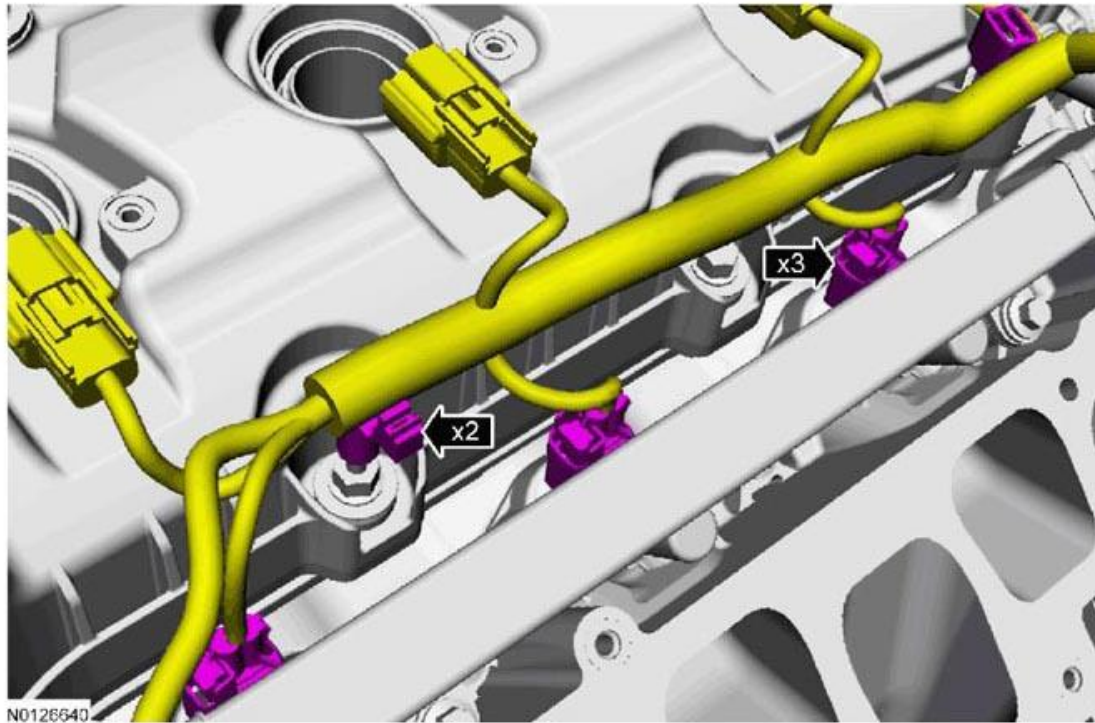


Fig. 364: Removing Variable Camshaft Timing Solenoid Seals
Courtesy of FORD MOTOR CO.

58. *Special Tool(s)* : 205-153 (Handle) , 303-1247/1 (Remover, VCT Spark Plug Tube Seal)
59. Turn the crankshaft until piston no. 1 is 45 degrees before TDC by using the guide holes on the engine front cover and the crankshaft pulley.

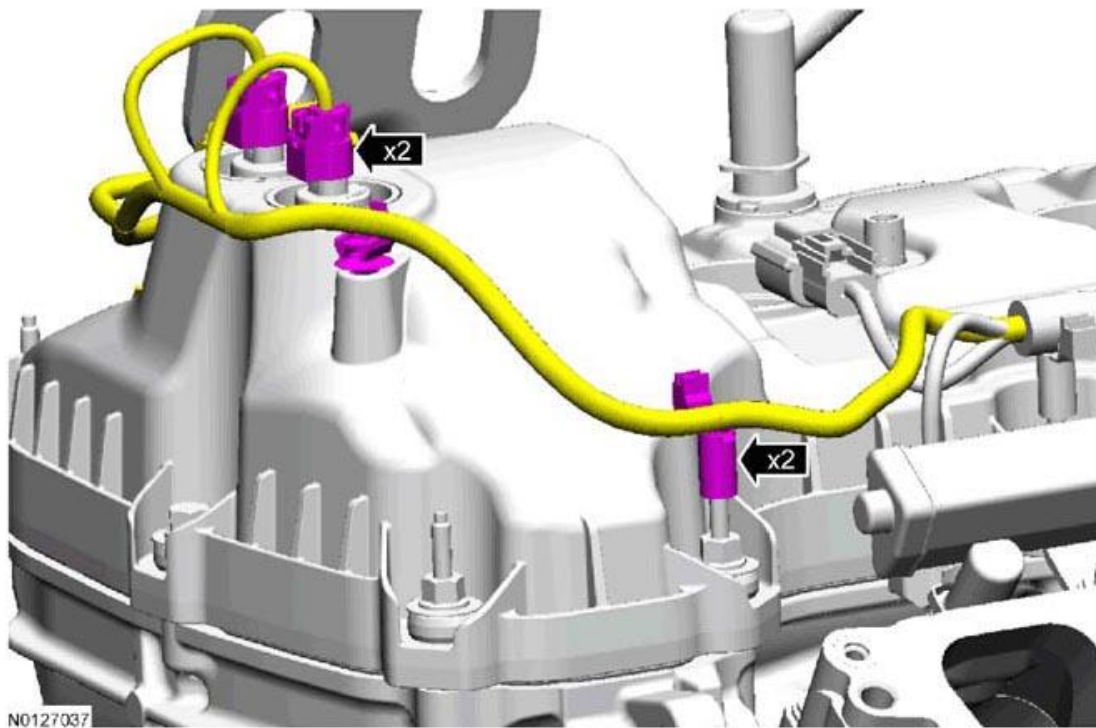
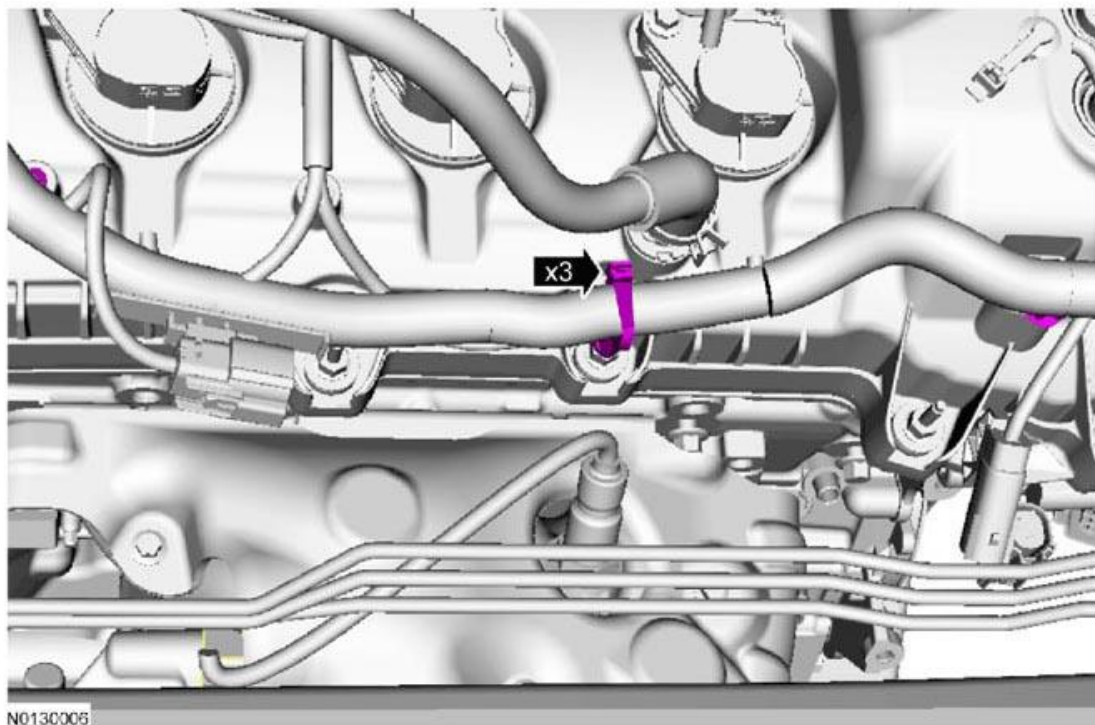
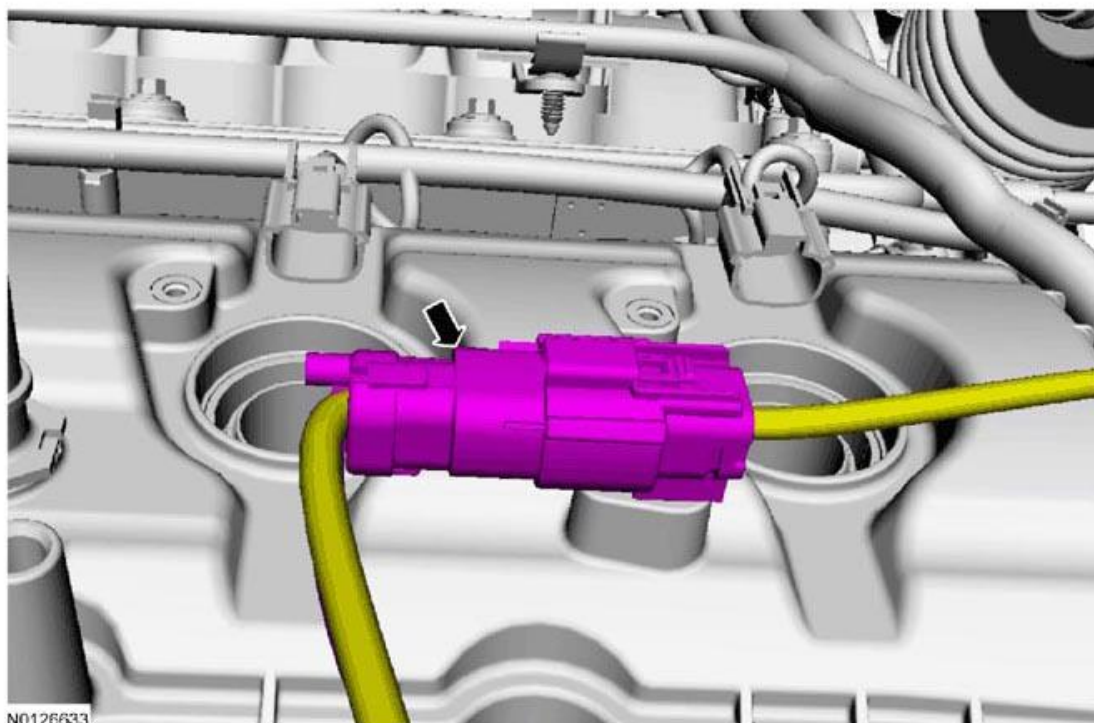


Fig. 365: Turning Crankshaft Until Piston No. 1 Is 45 Degrees
Courtesy of FORD MOTOR CO.



60.

Fig. 366: Locating CKP Sensor Bolts
Courtesy of FORD MOTOR CO.



61.

Fig. 367: Locating Plug

Courtesy of FORD MOTOR CO.

NOTE: Failure to position the No. 1 piston at TDC can result in damage to the engine. Turn the engine in the normal direction of rotation only.

NOTE: The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.

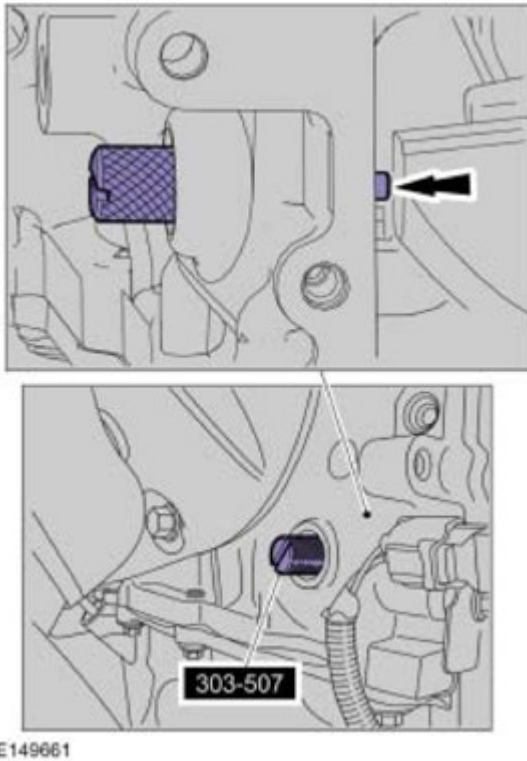


Fig. 368: Identifying 303-507 Timing Peg
Courtesy of FORD MOTOR CO.

62. Install the special tool and using the crankshaft pulley bolt, turn the crankshaft clockwise slowly until contact is made with the special tool.

Special Tool(s) : 303-507 (Timing Peg, Crankshaft TDC) , 303-507 (Timing Peg, Crankshaft TDC)

NOTE: The special tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

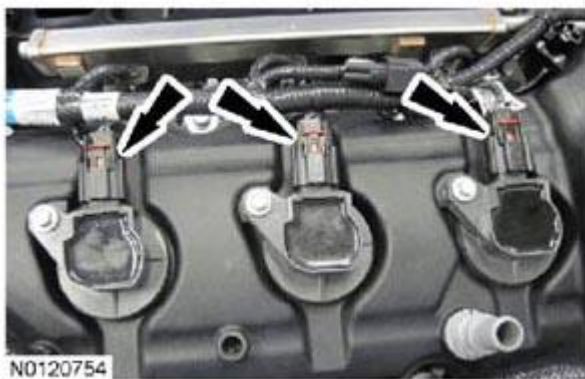
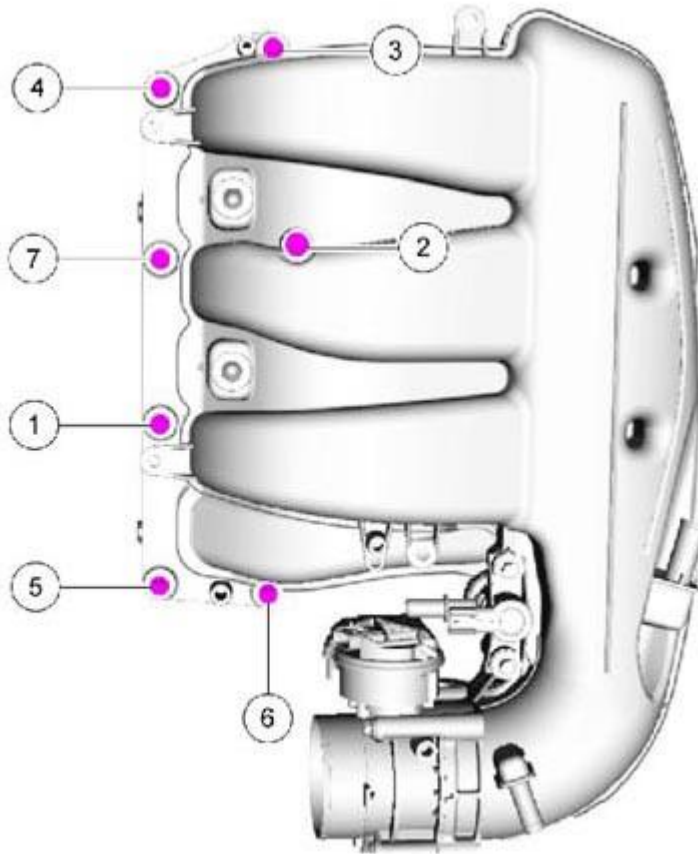


Fig. 369: Identifying 303-1565 Alignment Tool
Courtesy of FORD MOTOR CO.

63. *Install the Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)*

NOTE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer must be replaced, remove and discard the diamond washer. If the diamond washer is not installed, engine damage may occur.

NOTE: The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool, and the crankshaft pulley bolt should be removed using an air impact wrench (1/2-in drive minimum).



N0129729

Fig. 370: Holding Crankshaft Pulley Using 303-D055 Strap Wrench
Courtesy of FORD MOTOR CO.

64. *Special Tool(s) : 303-D055 (Strap Wrench)*

65. **NOTE:** Remove the diamond washer and discard.

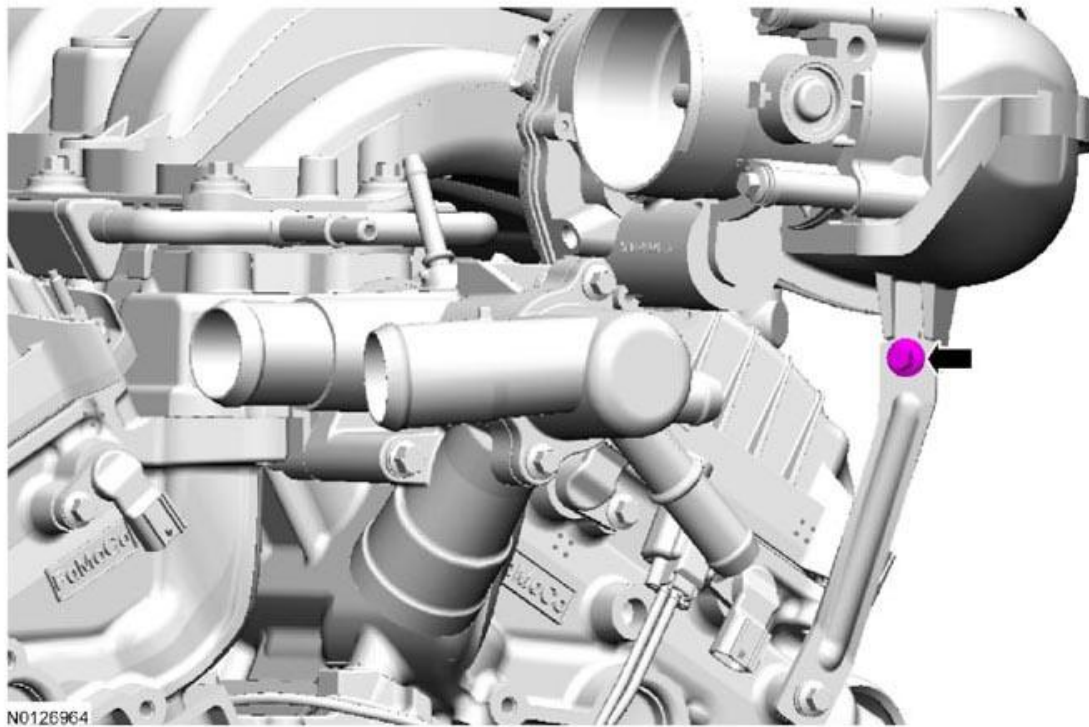


Fig. 371: Locating Diamond Washer
Courtesy of FORD MOTOR CO.

NOTE: Use care not to damage the engine front cover or the crankshaft when removing the seal.

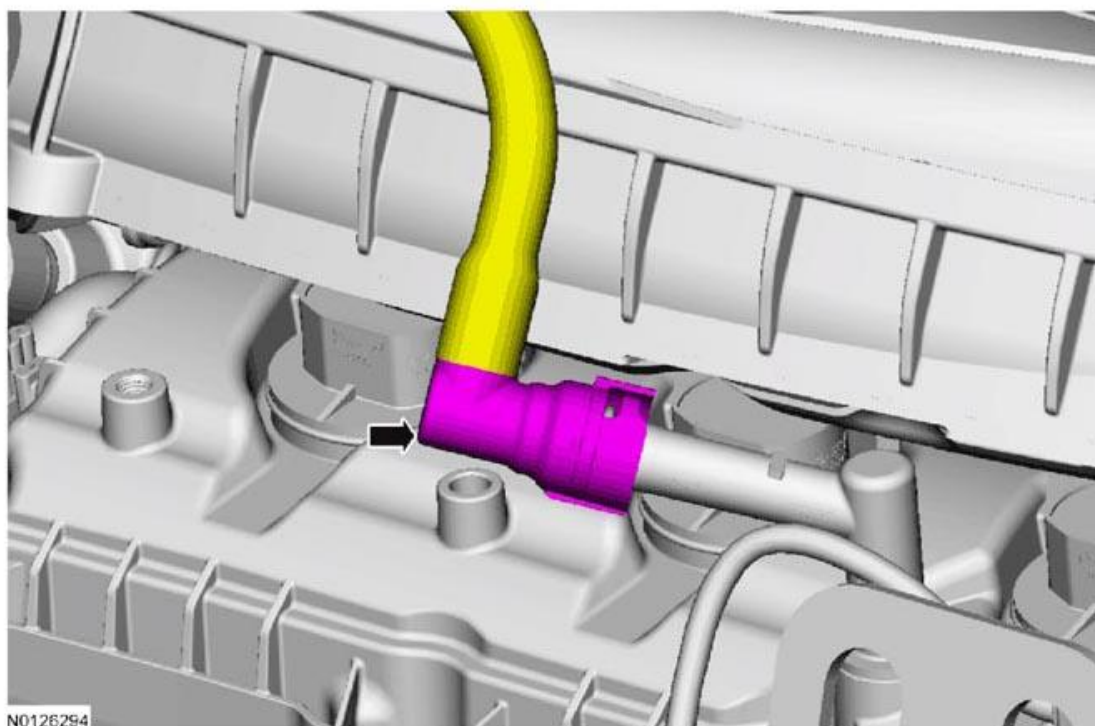
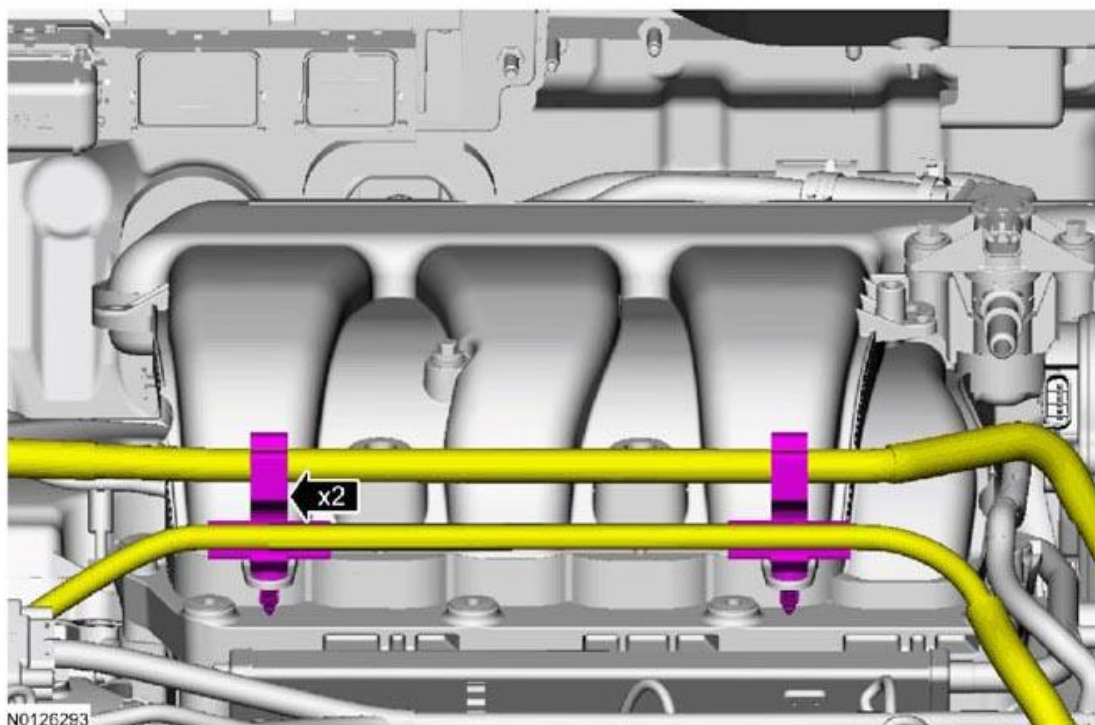


Fig. 372: Removing Crankshaft Seal From Engine Front Cover Using 303-409 Remover
Courtesy of FORD MOTOR CO.

66. *Special Tool(s) : 303-409 (Remover, Crankshaft Seal)*



67.

Fig. 373: Locating Engine Front Cover Bolts

Courtesy of FORD MOTOR CO.

NOTE: Do not rely on the special tool to prevent camshaft rotation. Damage to the tool or the camshaft can occur.

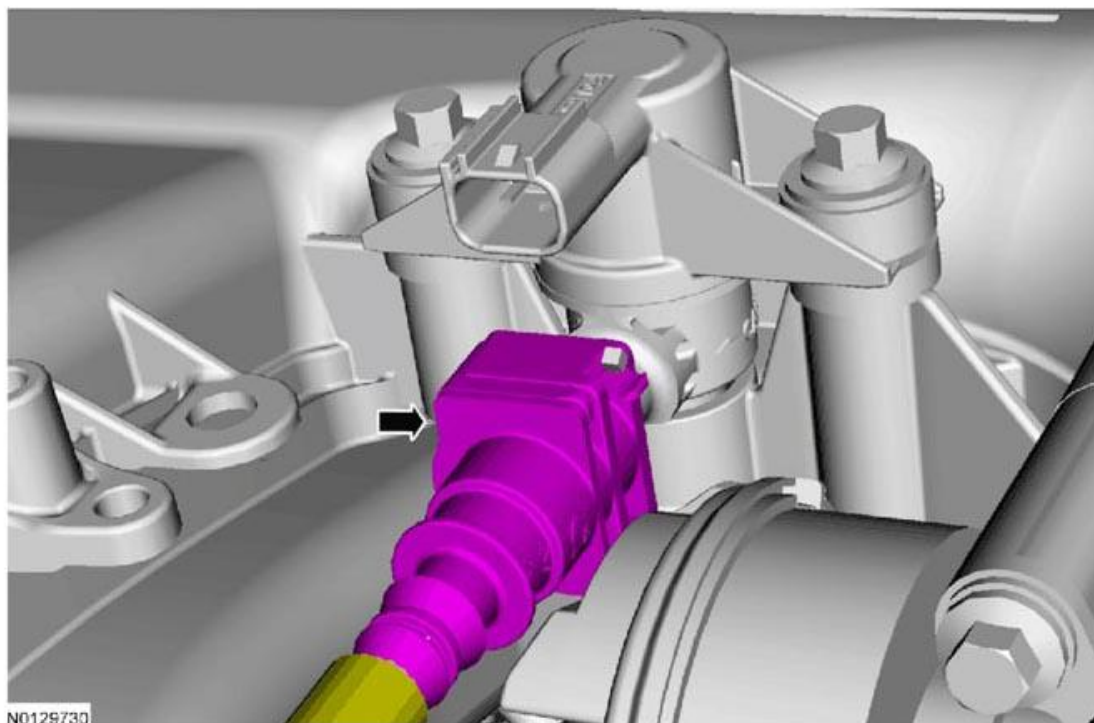


Fig. 374: Locating Exhaust Camshaft Phaser And Sprocket Bolt
Courtesy of FORD MOTOR CO.

68. Using a wrench on the flats of the exhaust camshaft to prevent camshaft rotation, loosen the exhaust camshaft phaser and sprocket bolt.

NOTE: The special tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

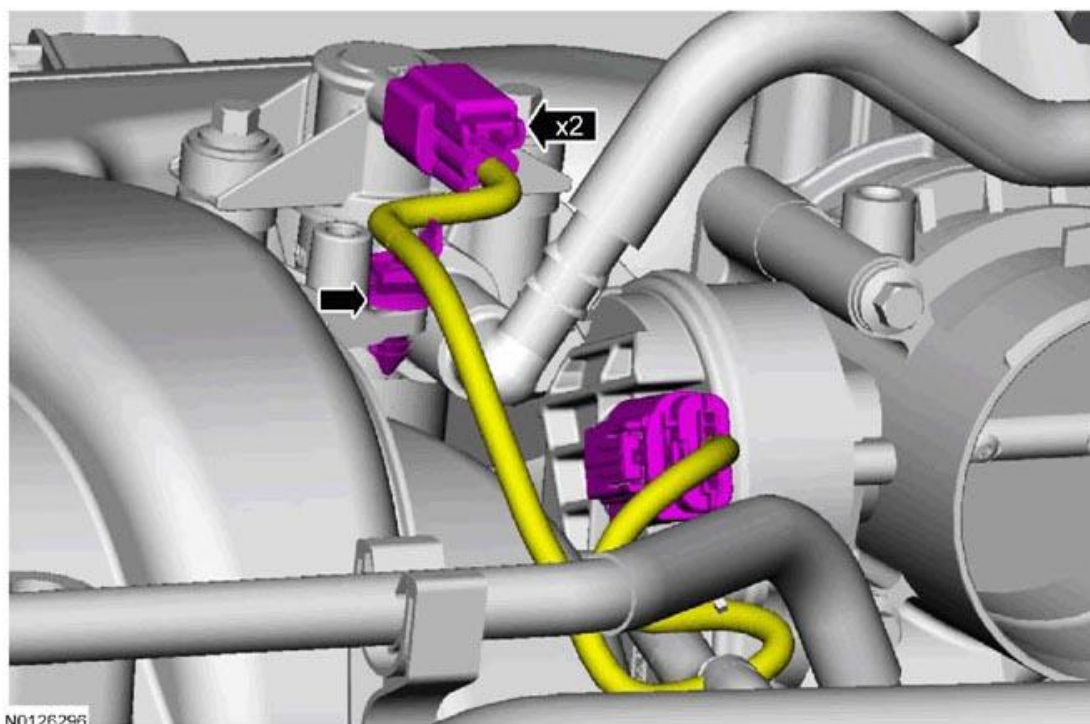


Fig. 375: Locating Intake Camshaft Phaser And Sprocket Bolt
Courtesy of FORD MOTOR CO.

69. Using a wrench on the flats of the intake camshaft to prevent camshaft rotation, loosen the intake camshaft phaser and sprocket bolt.
70.
 1. Using a small pick, release and hold the ratchet mechanism.
 2. While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.
 3. Insert a holding pin into the hole to retain the tensioner.



Fig. 376: Inserting Holding Pin Into Hole To Retain Tensioner
Courtesy of FORD MOTOR CO.



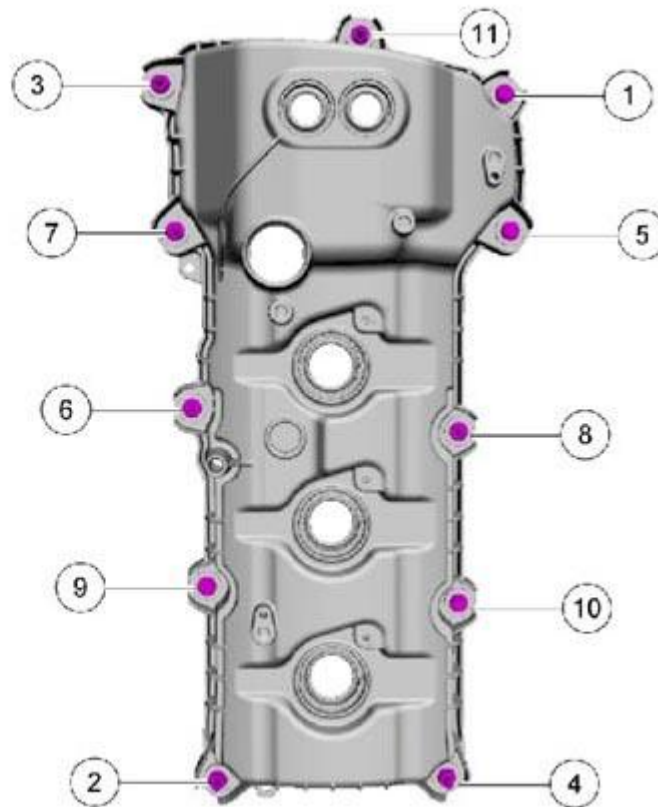
71.

Fig. 377: Locating Tensioner Bolts
Courtesy of FORD MOTOR CO.



72.

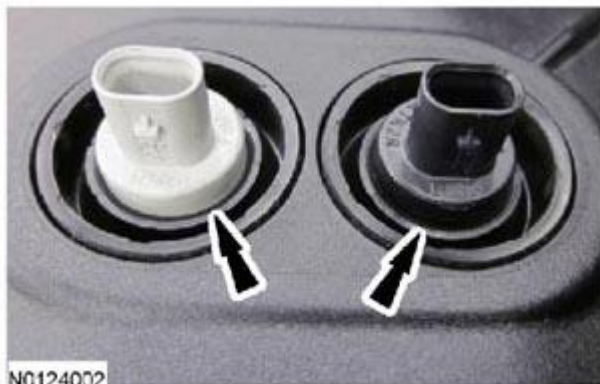
Fig. 378: Identifying Timing Chain Arm
Courtesy of FORD MOTOR CO.



N0129791

73.

Fig. 379: Locating Timing Chain Arm Bolts
Courtesy of FORD MOTOR CO.



N0124002

74.

Fig. 380: Identifying Timing Chain
Courtesy of FORD MOTOR CO.

75. **NOTE:** The phaser and sprocket bolts must be discarded and new installed.

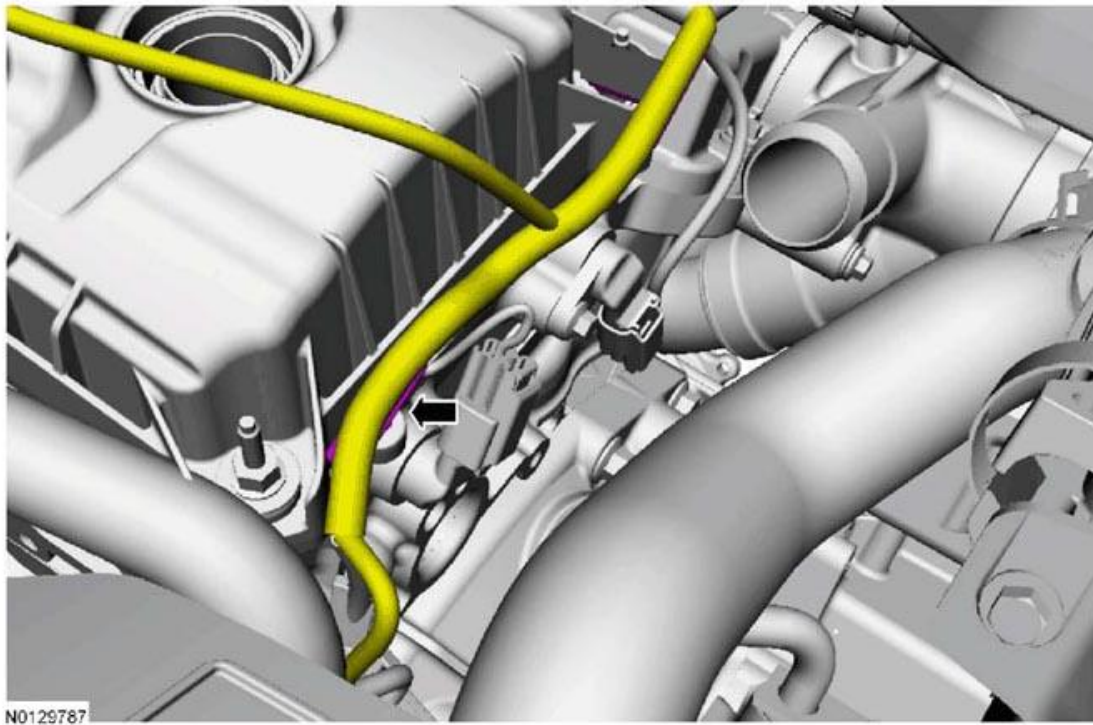


Fig. 381: Locating Exhaust And Intake VCT Unit Bolts
Courtesy of FORD MOTOR CO.

NOTE: The special tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

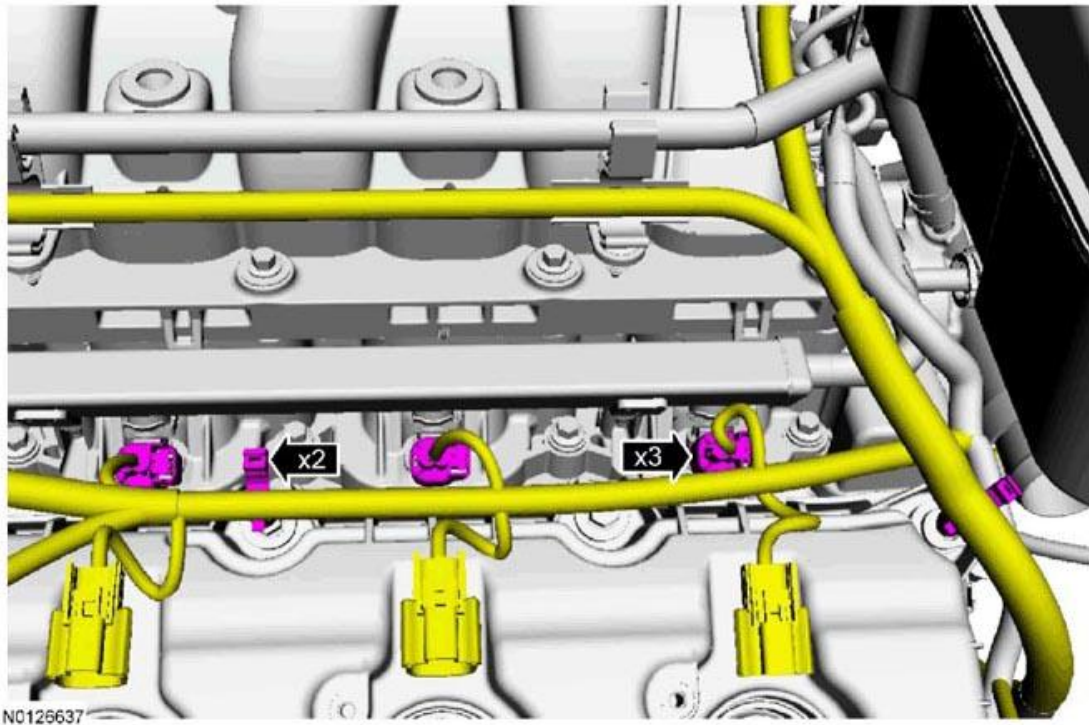
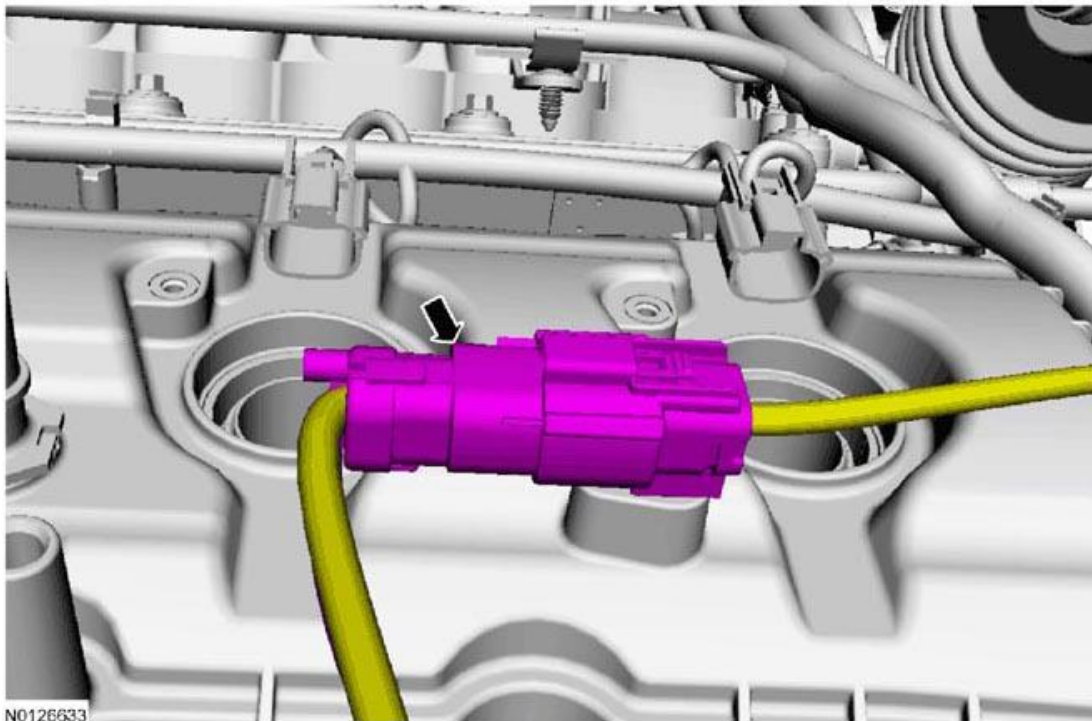


Fig. 382: Identifying 303-1565 Alignment Tool
Courtesy of FORD MOTOR CO.

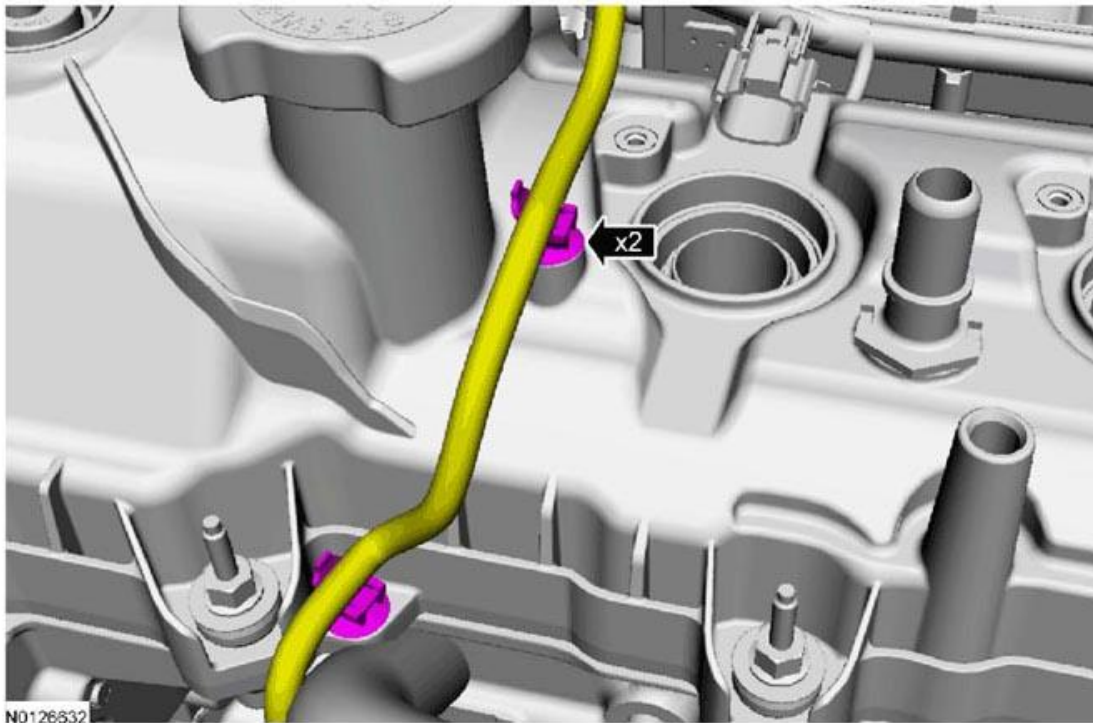
76. *Remove the Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)*



77.

Fig. 383: Locating VCT Oil Control Solenoids Bolts

Courtesy of FORD MOTOR CO.



78.

Fig. 384: Locating Camshaft Front Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

79.

NOTE: Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

NOTE: Note the position of the camshaft lobes on the No. 1 cylinder for installation reference.

NOTE: Mark the location and orientation of each camshaft bearing cap.

1. Loosen the camshaft bearing caps in sequence 2 turns at a time until all tension is released from the camshaft bearing caps.
2. Remove the camshaft bearing caps.
3. Remove the camshafts.

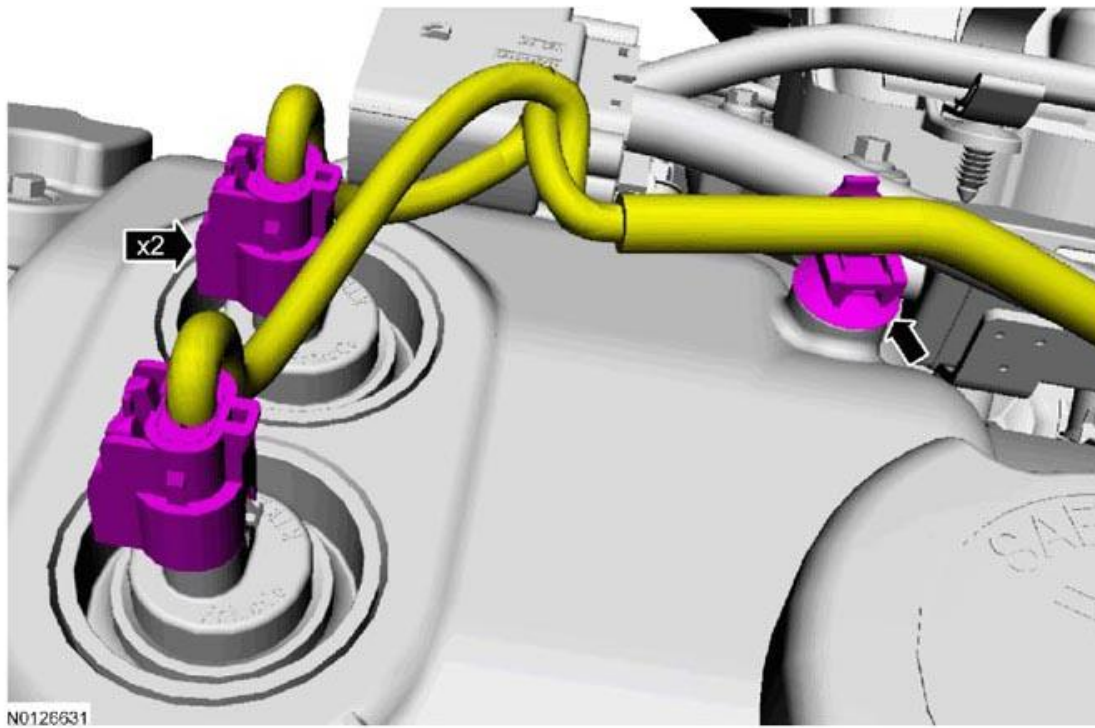


Fig. 385: Identifying Camshaft Bearing Cap Bolts Loosening Sequence
Courtesy of FORD MOTOR CO.

NOTE: If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

80.

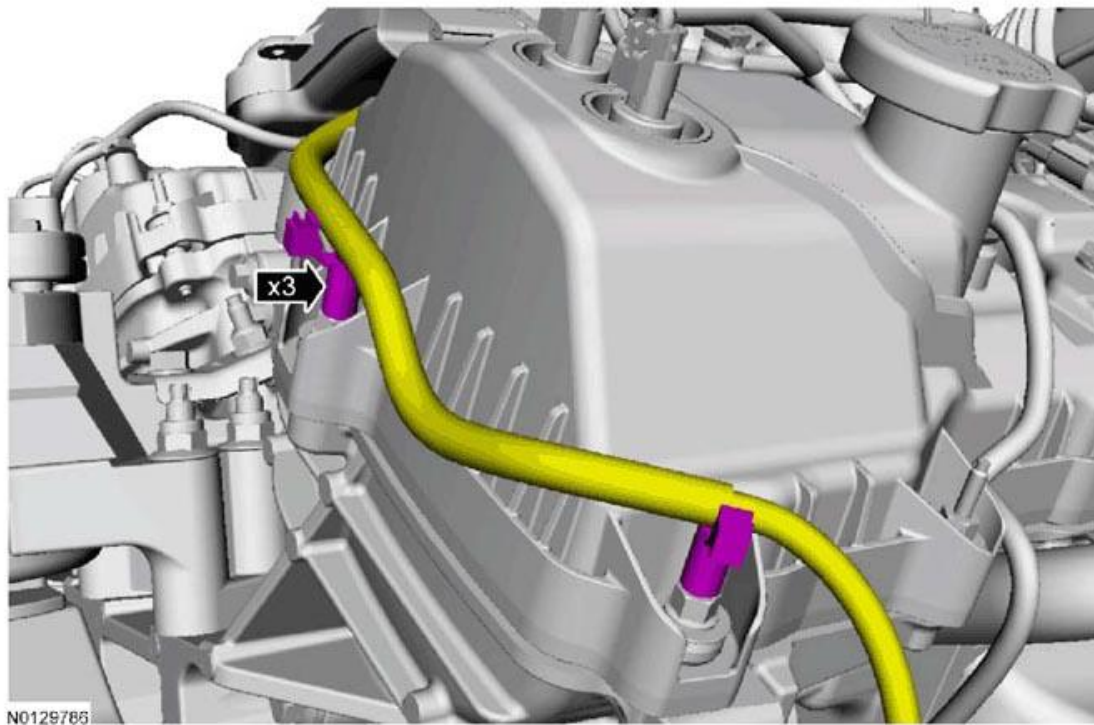


Fig. 386: Identifying Valve Tappets
Courtesy of FORD MOTOR CO.

NOTE: The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

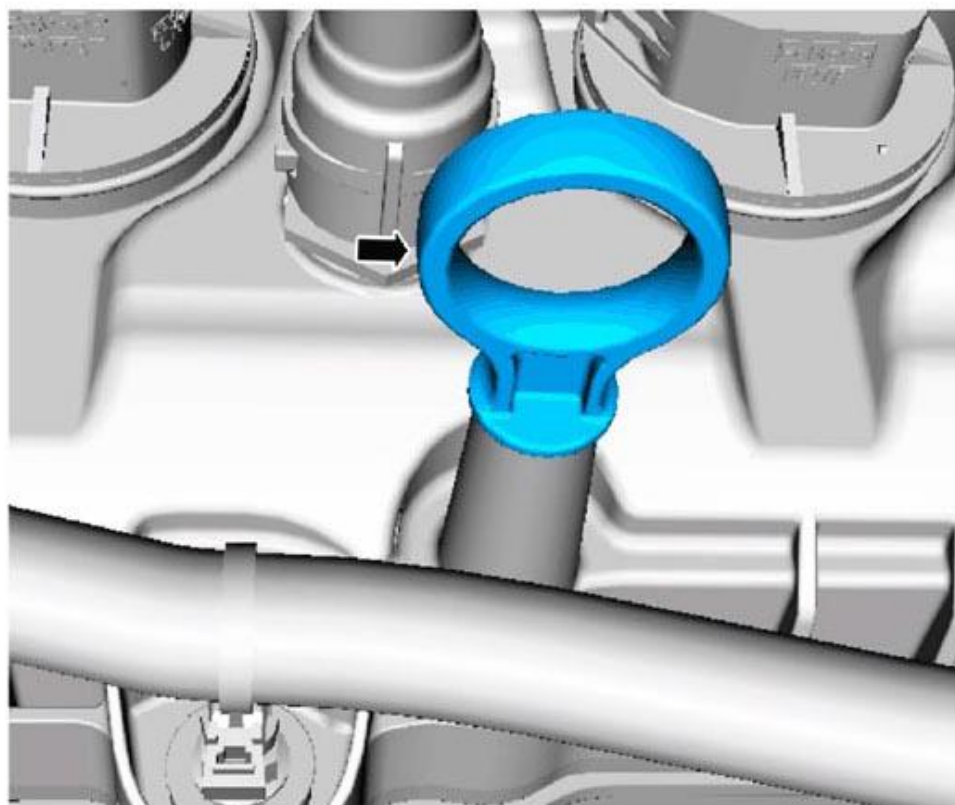


Fig. 387: Inspecting Valve Tappet
Courtesy of FORD MOTOR CO.

81. Install new components as necessary.

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

- 82.

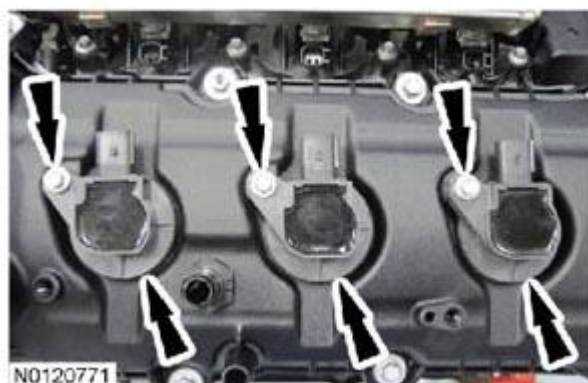
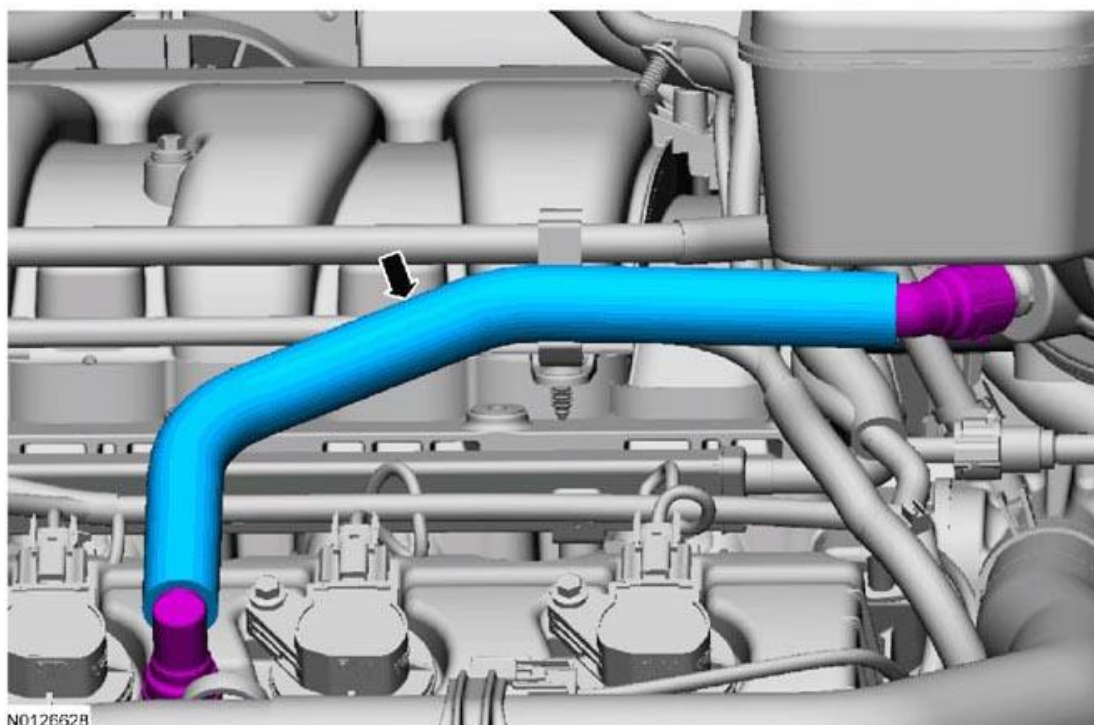


Fig. 388: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.



83.

Fig. 389: Identifying Cylinder Head Gasket
Courtesy of FORD MOTOR CO.



84.

Fig. 390: Locating Cylinder Head Alignment Dowels
Courtesy of FORD MOTOR CO.

85. **NOTE:** Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

NOTE: Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

NOTE: **If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.**

1. Remove any large deposits of silicone or gasket material with a plastic scraper.
2. Apply Motorcraft Silicone Gasket Remover following package directions, and allow to set for several minutes.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

3. Remove the Motorcraft Silicone Gasket Remover with a plastic scraper. A second application of Motorcraft Silicone Gasket Remover may be required if residual traces of silicone or gasket material remain.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

4. Apply Motorcraft Metal Surface Prep following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

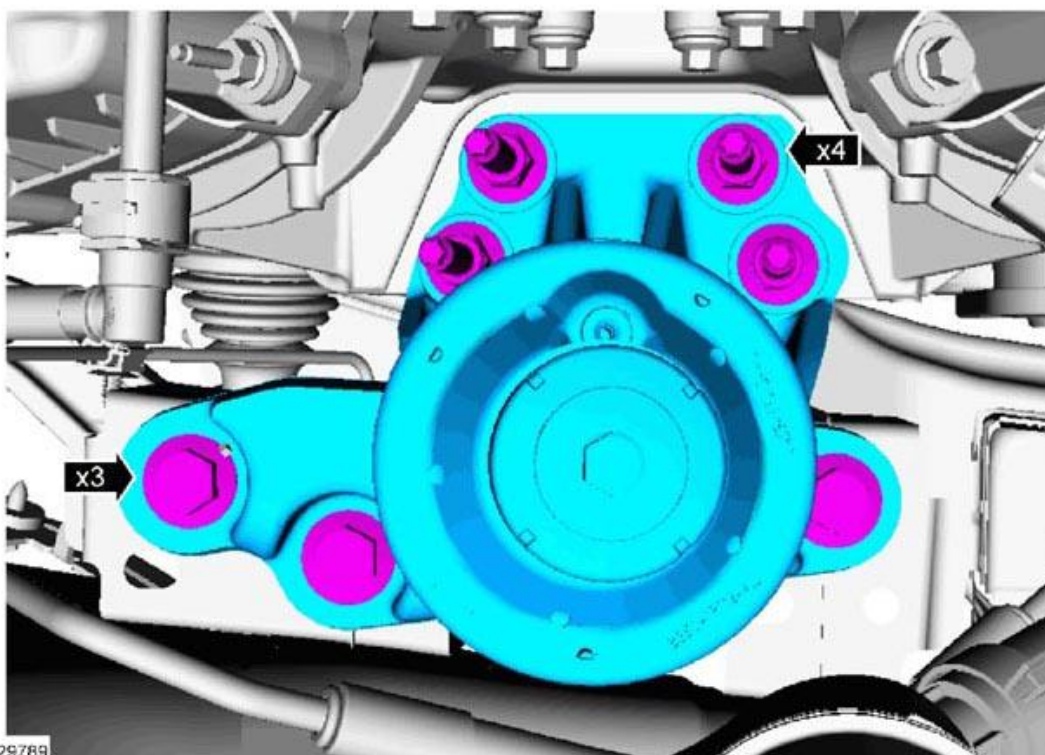
Material : Motorcraft® Metal Surface Prep / ZC-31-A

NOTE: **Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.**

86. Support the cylinder head on a bench with the head gasket side up.

Refer to: **CYLINDER HEAD DISTORTION** .

Refer to: **CYLINDER BLOCK DISTORTION** .



87.

Fig. 391: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

88.

NOTE: Discard the gasket.

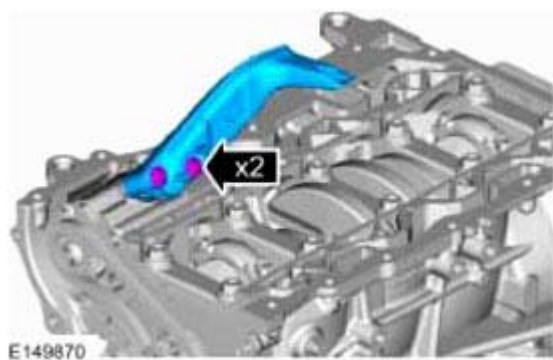
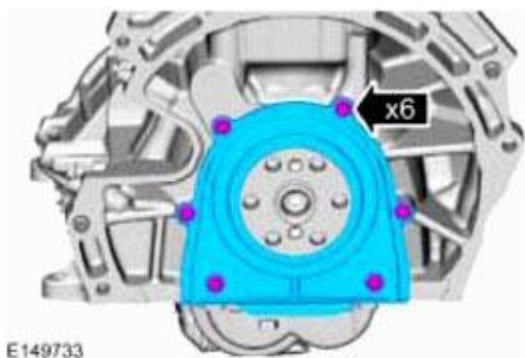


Fig. 392: Locating Bolts Of Oil Pump Screen And Pickup Tube
Courtesy of FORD MOTOR CO.



89.

Fig. 393: Identifying Crankshaft Rear Oil Seal Retainer Plate Bolts
Courtesy of FORD MOTOR CO.

90.

1. Push the tensioner spring down and release the spring from under the shoulder bolt.
2. Remove the 2 shoulder bolts and the tensioner and chain.

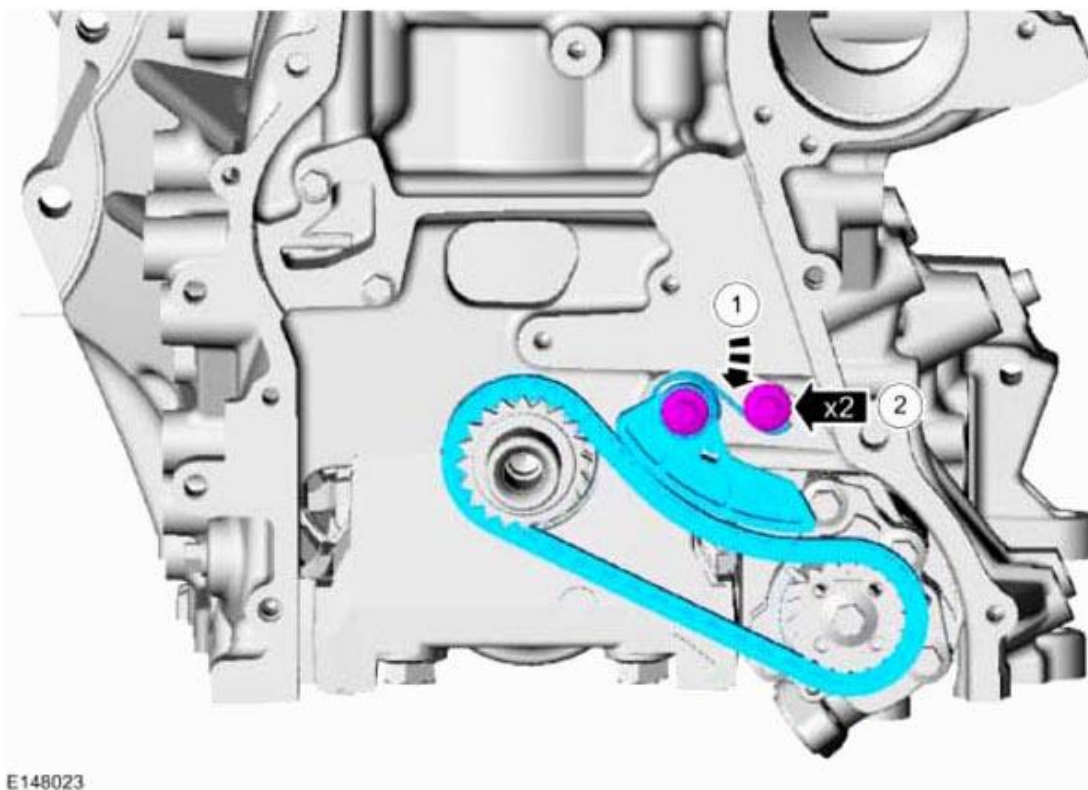
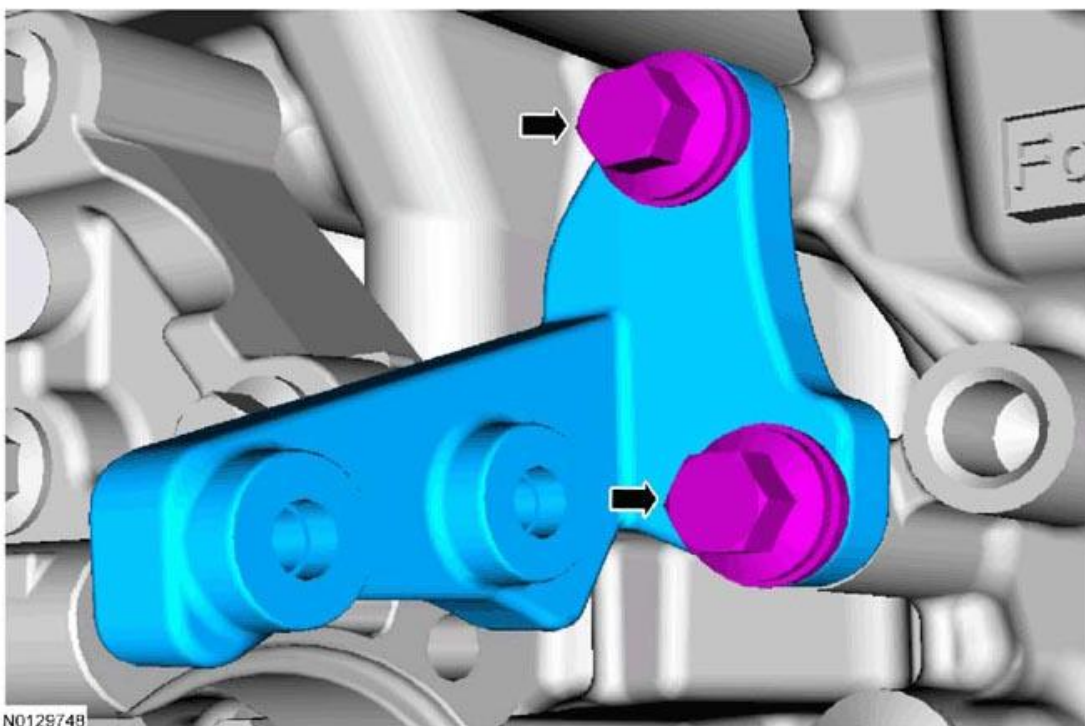


Fig. 394: Locating Shoulder Bolts And Tensioner
Courtesy of FORD MOTOR CO.



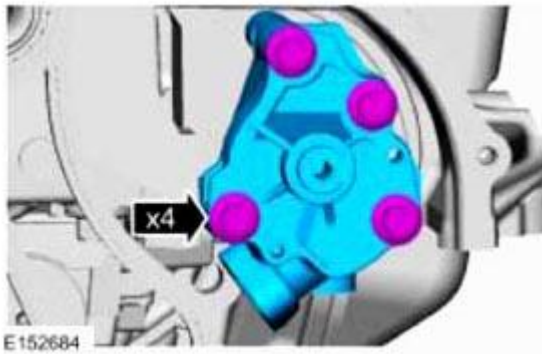
91.

Fig. 395: Locating Crankshaft Sprocket
Courtesy of FORD MOTOR CO.



92.

Fig. 396: Locating Oil Pump Sprocket Bolt
Courtesy of FORD MOTOR CO.



93.

Fig. 397: Locating Oil Pump Bolts
Courtesy of FORD MOTOR CO.

94. *Remove the Special Tool(s) : 303-507 (Timing Peg, Crankshaft TDC)*

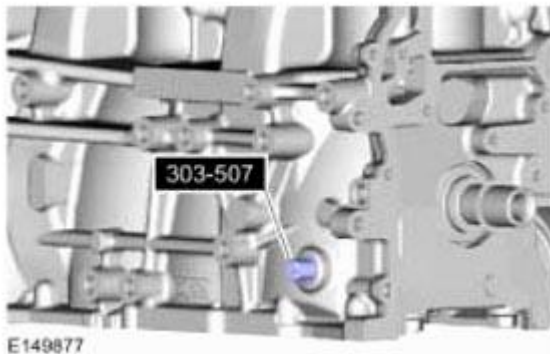


Fig. 398: Locating Crankshaft TDC Timing Peg
Courtesy of FORD MOTOR CO.

95. Before removing the pistons, inspect the top of the cylinder bores. If necessary, remove the ridge or carbon deposits from each cylinder using an abrasive pad or equivalent, following manufacturer's instructions.

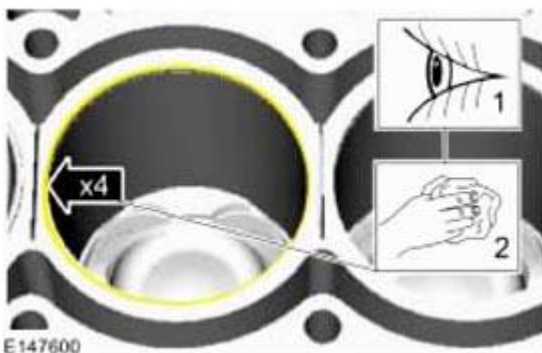


Fig. 399: Removing Ridge Or Carbon Deposits From Each Cylinder Using An Abrasive Pad
Courtesy of FORD MOTOR CO.

96. **NOTE:** Clearly mark the connecting rods, connecting rod caps and connecting rod bearings in numerical order for correct orientation for reassembly.

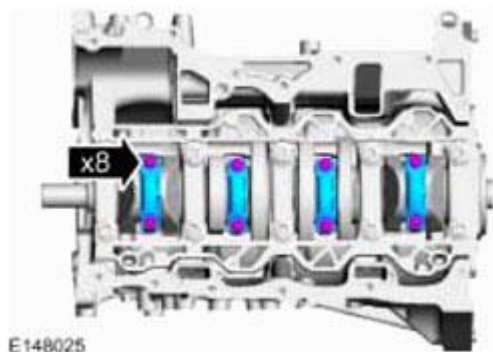


Fig. 400: Locating Connecting Rod Caps Bolts
Courtesy of FORD MOTOR CO.

- NOTE:** Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

- NOTE:** Repeat until all the piston/rod assemblies are removed from the engine block.

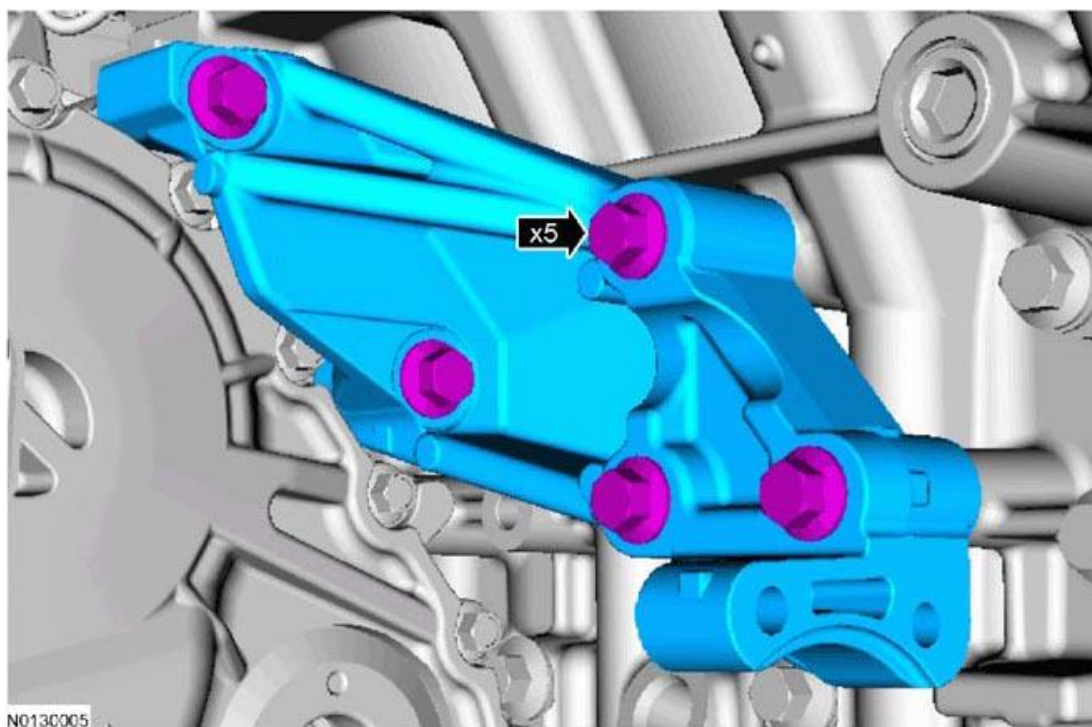
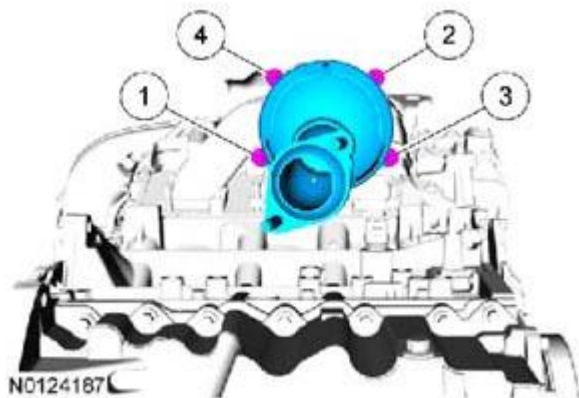


Fig. 401: Identifying Special Tool 303-462 (Installer, Connecting Rod)
Courtesy of FORD MOTOR CO.

97. Remove the piston/rod assembly from the engine block.

Special Tool(s) : 303-462 (Installer, Connecting Rod)

98. Refer to: PISTON INSPECTION .



99.

Fig. 402: Identifying Main Bearing Beam Bolts Removing Sequence
Courtesy of FORD MOTOR CO.

NOTE: If the main bearings are being reused, mark them in order for correct orientation and reassembly.

100.

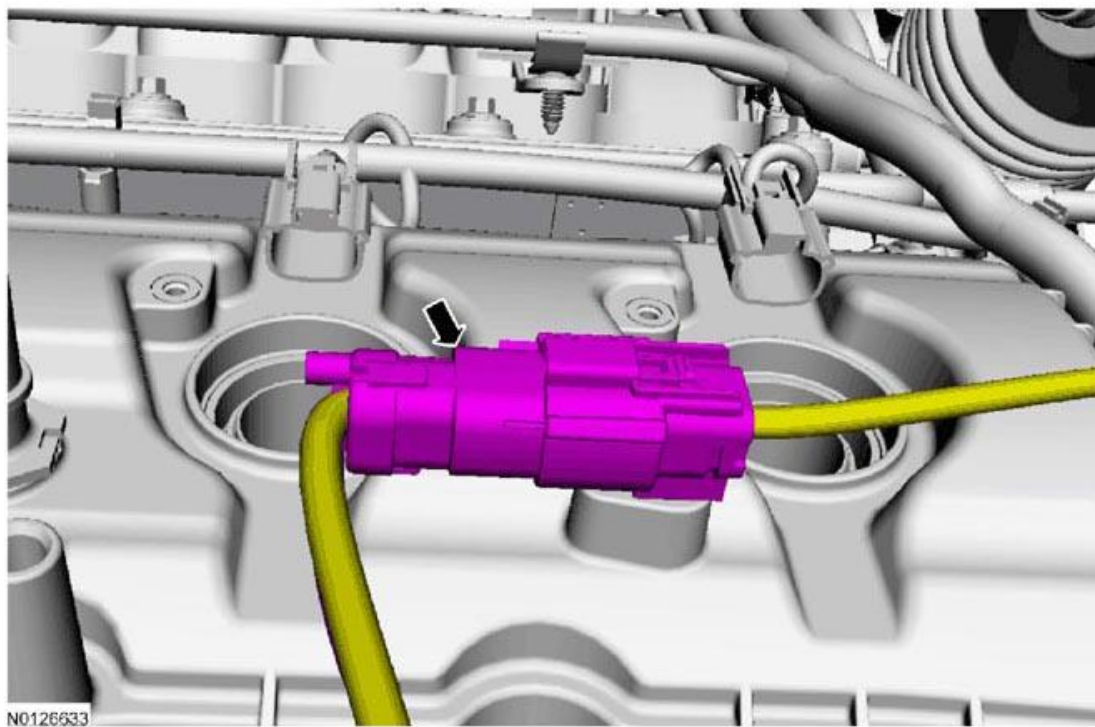
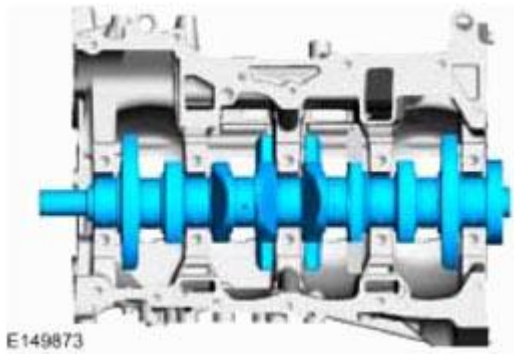


Fig. 403: Identifying Main Bearings Correct Orientation
Courtesy of FORD MOTOR CO.



101.

Fig. 404: Identifying Crankshaft In Engine Block
Courtesy of FORD MOTOR CO.

NOTE: If the main bearings are being reused, mark them in order for correct orientation and reassembly.

102.

NOTE: The center bulkhead has the thrust bearing.

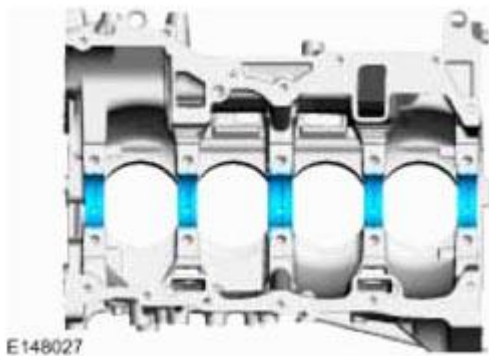


Fig. 405: Identifying Main Bearings Correct Orientation
Courtesy of FORD MOTOR CO.

NOTE: If the engine piston oil coolers are being reused, mark them in order for correct location during reassembly.

103.

NOTE: The front bulkhead does not have an engine piston oil cooler.

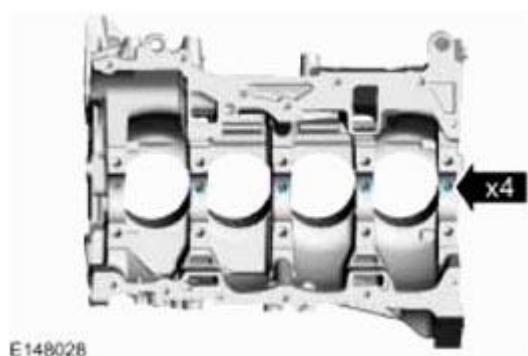
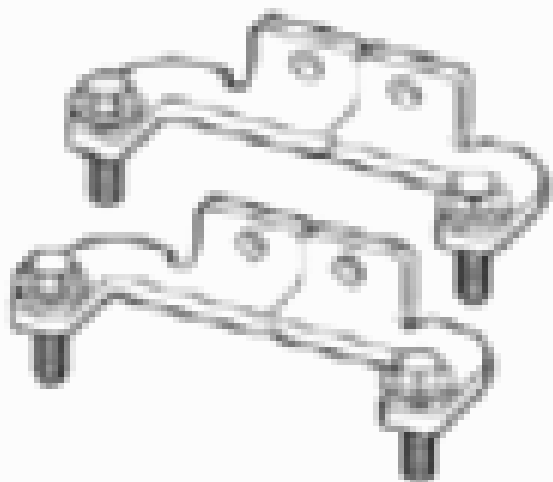


Fig. 406: Locating Engine Piston Oil Coolers
Courtesy of FORD MOTOR CO.

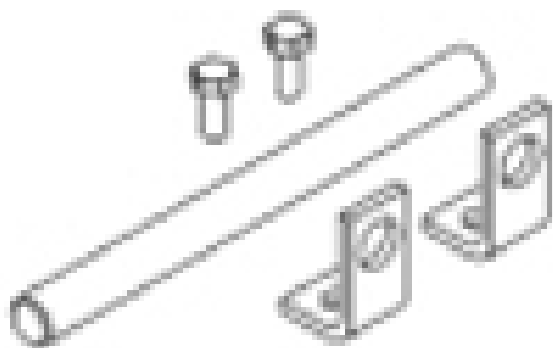
CYLINDER HEAD

SPECIAL TOOL(S) / GENERAL EQUIPMENT

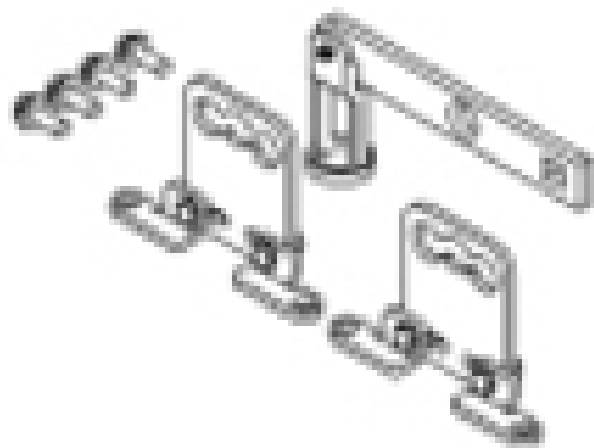


303-1249
Valve Spring Compressor
TKIT-2006UF-FLM

303-300
Set, Valve Spring Compressor
TKIT-2009TC-F



E134677



E134678

303-350

Compressor, Valve Spring

TKIT-1989-F

TKIT-1989-FLM

TKIT-1989-FM

TKIT-1990-LMH

TKIT-2009TC-F

303-468

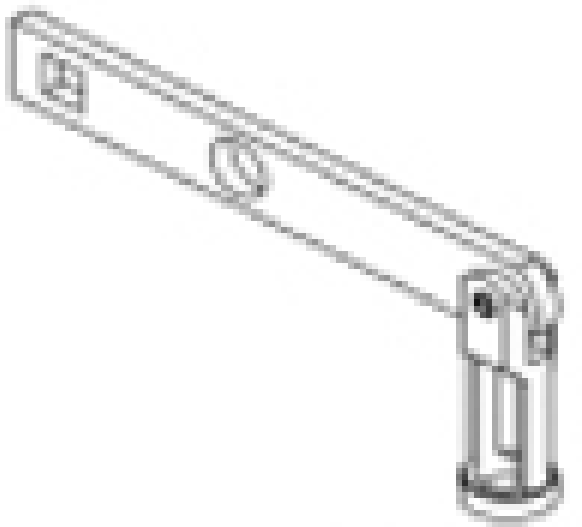
Remover, Valve Stem Oil Seal

TKIT-1994-FH/FMH/FLMH

TKIT-1994-LMH/MH2

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus

**303-470**Installer, Valve Stem Oil Seal
TKIT-2009TC-F**E134679****303-472**Adapter, Valve Spring Compressor
TKIT-1994-FH/FMH/FLMH
TKIT-1994-LMH/MH2**307-005**

2013 Ford Focus SE

2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



Slide Hammer

MATERIALS SPECIFICATIONS

Name	Specification
Multi-Purpose Grease Motorcraft® XL-5 (aerosol) and/or CRC® SL3151	ESB-M1C93-B
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

DISASSEMBLY

NOTE: Front side shown in illustration, rear similar.

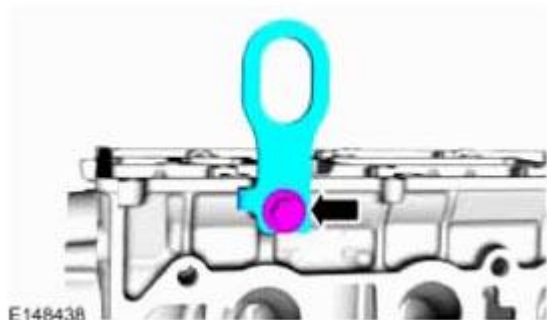


Fig. 407: Locating Engine Lift Eye Bolt
Courtesy of FORD MOTOR CO.

1. Remove the 2 bolts and the LH and RH engine lift eyes.
2. Inspect and replace the gasket, if necessary.

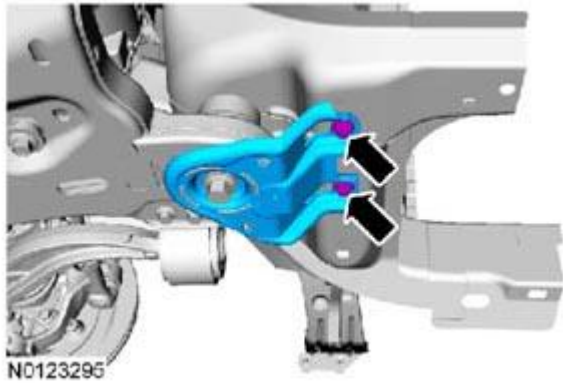


Fig. 408: Locating Coolant Outlet Connector Assembly Bolts
Courtesy of FORD MOTOR CO.

- NOTE:** Only use hand tools when removing the spark plugs, or damage can occur to the cylinder head or spark plug.
- NOTE:** Use compressed air to remove any foreign material in the spark plug well before removing the spark plugs.

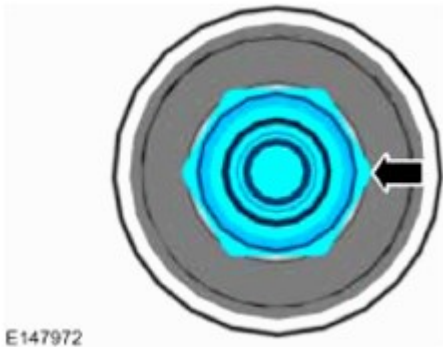


Fig. 409: Identifying Spark Plug
Courtesy of FORD MOTOR CO.

3. Remove the 4 spark plugs.

- NOTE:** Place all parts in order to one side.
- NOTE:** Remove the valve collet, using some multi-purpose grease and a small screwdriver.

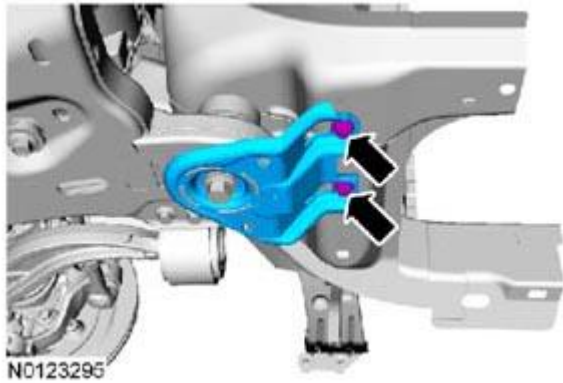


Fig. 410: Removing Valve Collet Using Some Multi-Purpose Grease
Courtesy of FORD MOTOR CO.

4. Apply compressed air to the cylinder and remove the valve spring.

Special Tool(s) : 303-300 (Set, Valve Spring Compressor) , 303-350 (Compressor, Valve Spring) , 303-472 (Adapter, Valve Spring Compressor) , 303-1249 (Valve Spring Compressor)

Material : Multi-Purpose Grease / Motorcraft® XL-5 (aerosol) and/or CRC® SL3151 (ESB-M1C93-B)

5. Repeat the appropriate removal steps for all of the other cylinders.
6. Install new parts, as necessary.

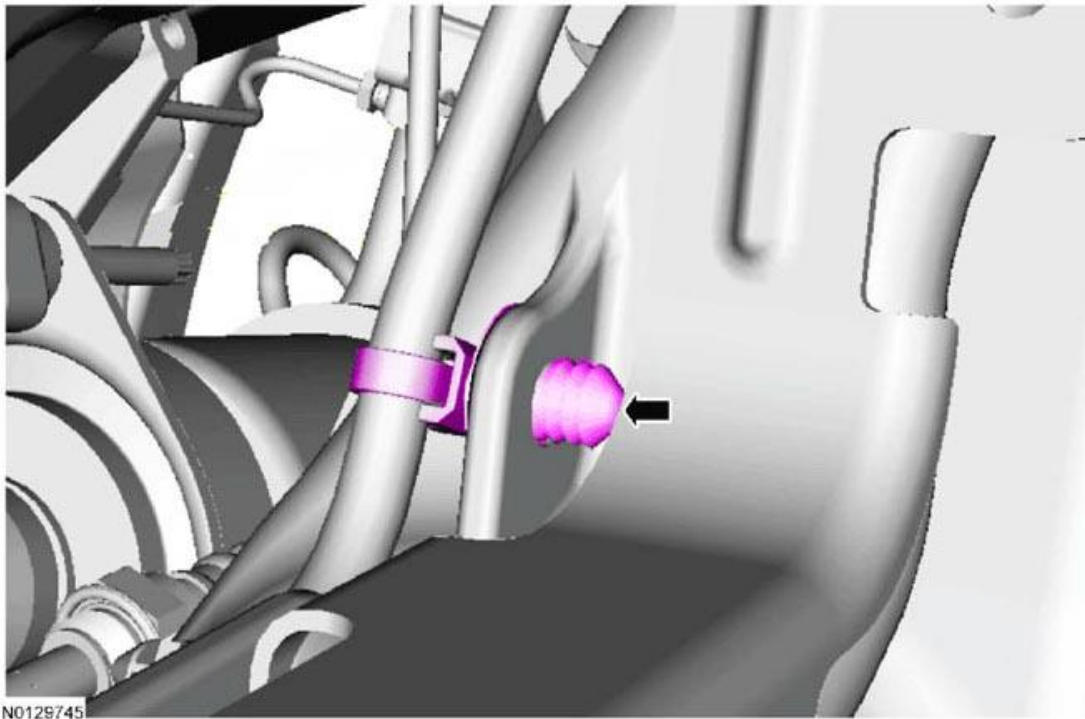


Fig. 411: Inspecting Valve Spring

Courtesy of FORD MOTOR CO.

7.

- Position the Valve Stem Oil Seal Remover and the Slide Hammer over the seal.

Special Tool(s) : 303-468 (Remover, Valve Stem Oil Seal) , 307-005 (Slide Hammer)

- Pull up on the Slide Hammer and remove the seal.

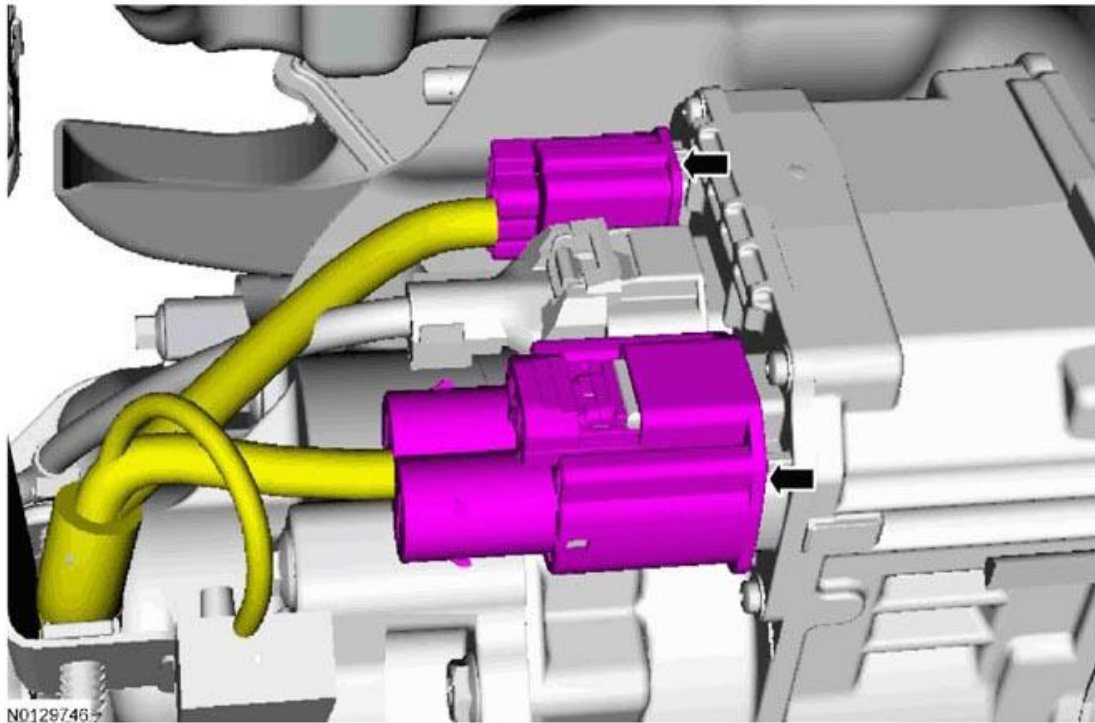


Fig. 412: Positioning Valve Stem Oil Seal Remover And Slide Hammer Over Seal
Courtesy of FORD MOTOR CO.

NOTE: Mark each valve location if the original valves are to be used.

8. Remove the valves.

9. **NOTE:** Install new parts, as necessary.

1. The end of the stem for grooves or scoring.
2. The valve face and the edge for pits, grooves or scores.
3. The valve head for signs of burning, erosion, warpage and cracking.
4. The valve margin for wear.

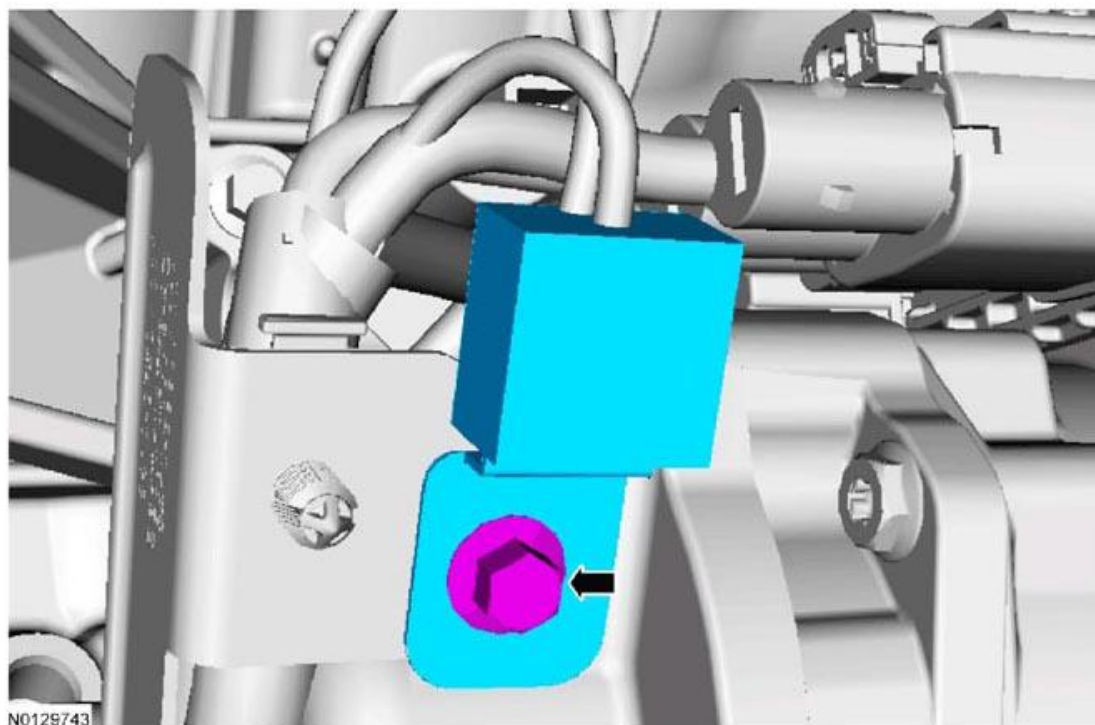


Fig. 413: Inspecting Valves
Courtesy of FORD MOTOR CO.

ASSEMBLY

NOTE: If installing the original valves, make sure the valves are installed in the same position from which they were removed.

1. Coat the valve stems with clean engine oil and install the valves.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

2. *Special Tool(s) :* 303-470 (Installer, Valve Stem Oil Seal)

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

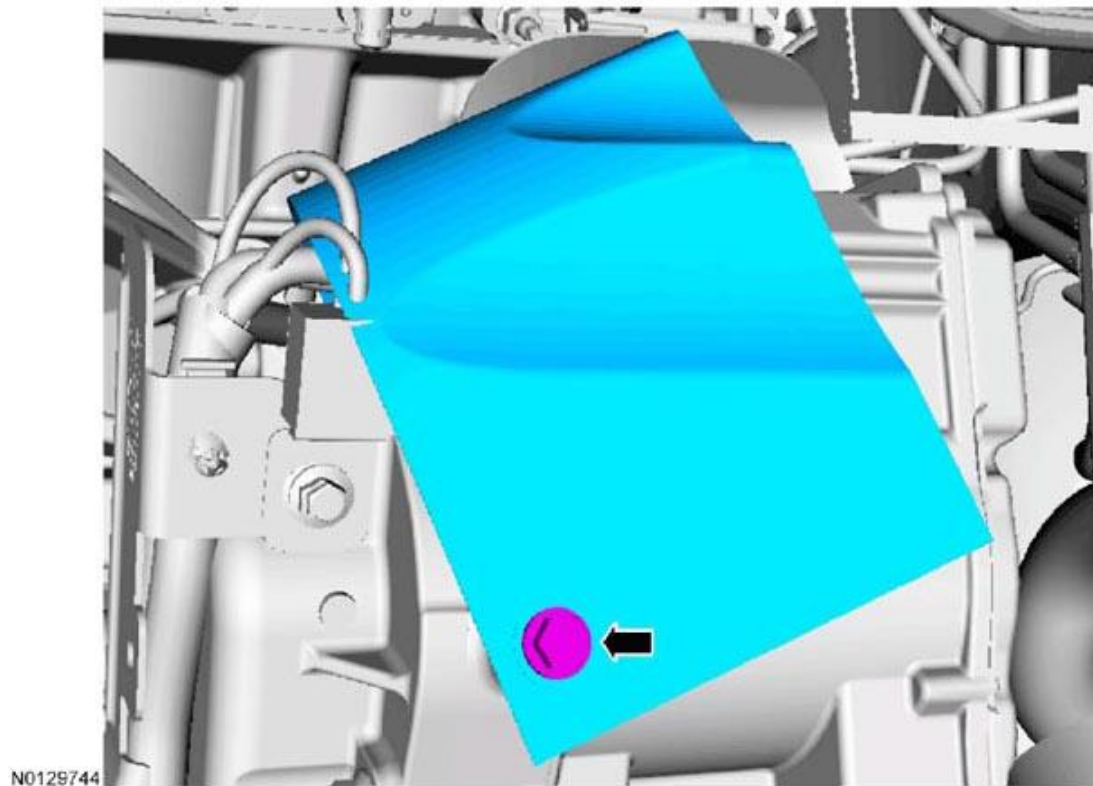


Fig. 414: Installing Valve Stem Oil Seal Using Special Tool 303-470
Courtesy of FORD MOTOR CO.

NOTE: Install the valve collet, using some multi-purpose grease and a small screwdriver.

NOTE: Check the seating of the valve collet.

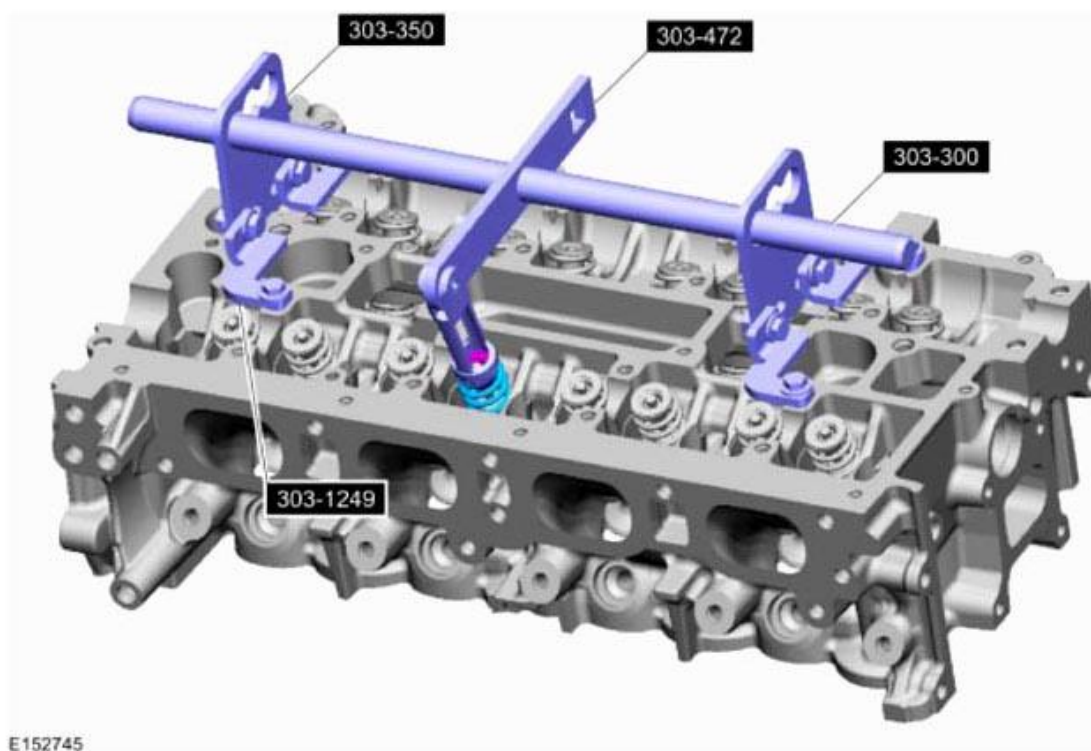


Fig. 415: Installing Valve Collet Using Some Multi-Purpose Grease
Courtesy of FORD MOTOR CO.

3. *Special Tool(s)* : 303-300 (Set, Valve Spring Compressor) , 303-350 (Compressor, Valve Spring) , 303-472 (Adapter, Valve Spring Compressor) , 303-1249 (Valve Spring Compressor)

Material : Multi-Purpose Grease / Motorcraft® XL-5 (aerosol) and/or CRC® SL3151 (ESB-M1C93-B)

NOTE: Only use hand tools when installing the spark plugs, or damage can occur to the cylinder head or spark plug.

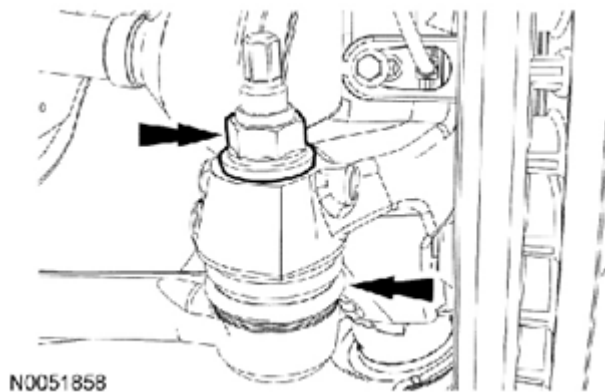


Fig. 416: Identifying Spark Plug
Courtesy of FORD MOTOR CO.

4. Install the 4 spark plugs.

Torque : 15 Nm

NOTE: Install the gasket.

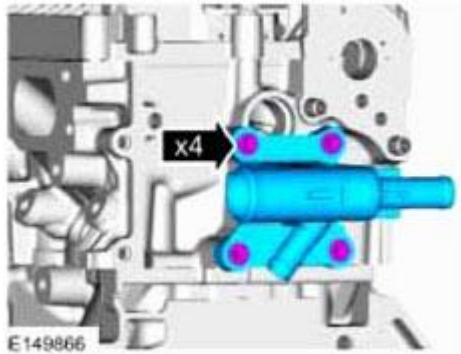


Fig. 417: Locating Coolant Outlet Connector Assembly Bolts
Courtesy of FORD MOTOR CO.

5. *Torque* : 10 Nm

NOTE: Front side shown in illustration, rear similar.

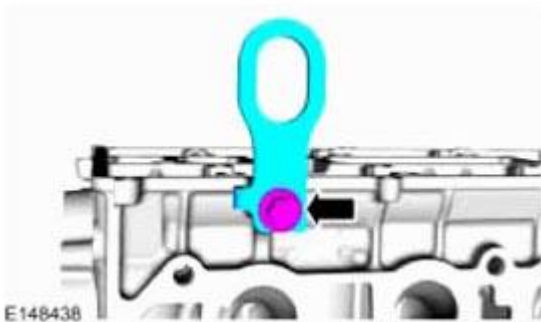


Fig. 418: Locating Engine Lift Eye Bolt
Courtesy of FORD MOTOR CO.

6. Install the LH and RH engine lift eyes and the 2 bolts.

Torque : 53 Nm

PISTON

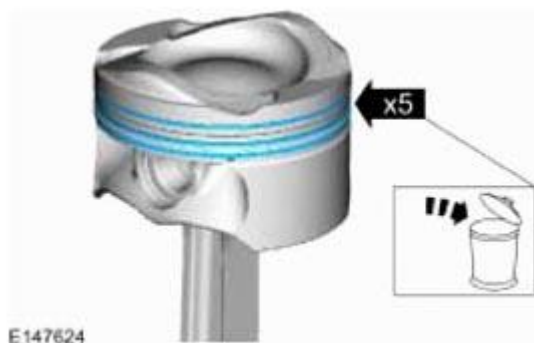
MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil	

XO-5W20-QSP

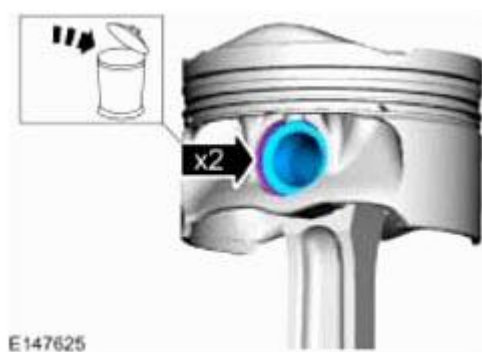
WSS-M2C945-A

DISASSEMBLY



1.

Fig. 419: Locating Piston Rings
Courtesy of FORD MOTOR CO.



2.

Fig. 420: Locating Piston Pin And Retainers
Courtesy of FORD MOTOR CO.



3.

Fig. 421: Separating Piston From Connecting Rod
Courtesy of FORD MOTOR CO.

4. Refer to: **PISTON INSPECTION** .

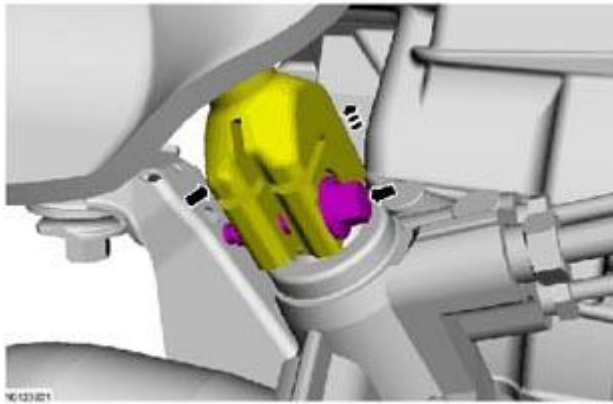


Fig. 422: Inspecting Piston And Connecting Rod
Courtesy of FORD MOTOR CO.

ASSEMBLY

1. Indicates front of engine.

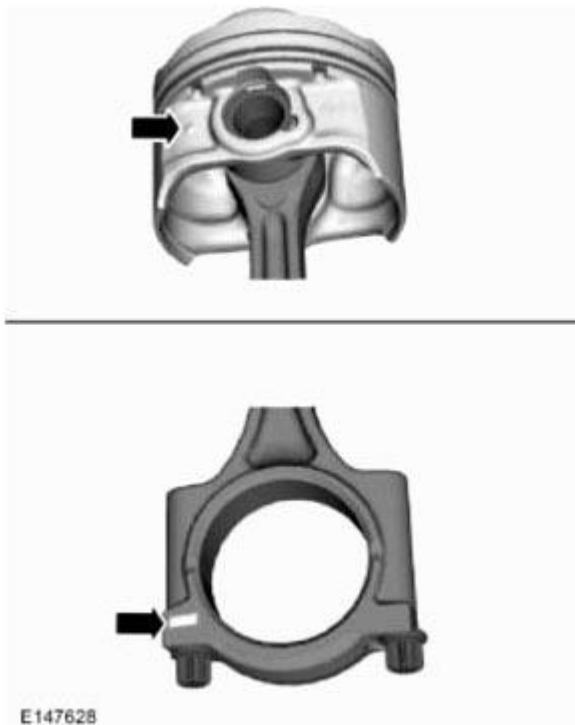


Fig. 423: Locating Piston And Connecting Rod Orientation Mark
Courtesy of FORD MOTOR CO.



2.

Fig. 424: Positioning Piston On Connecting Rod
Courtesy of FORD MOTOR CO.

3. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

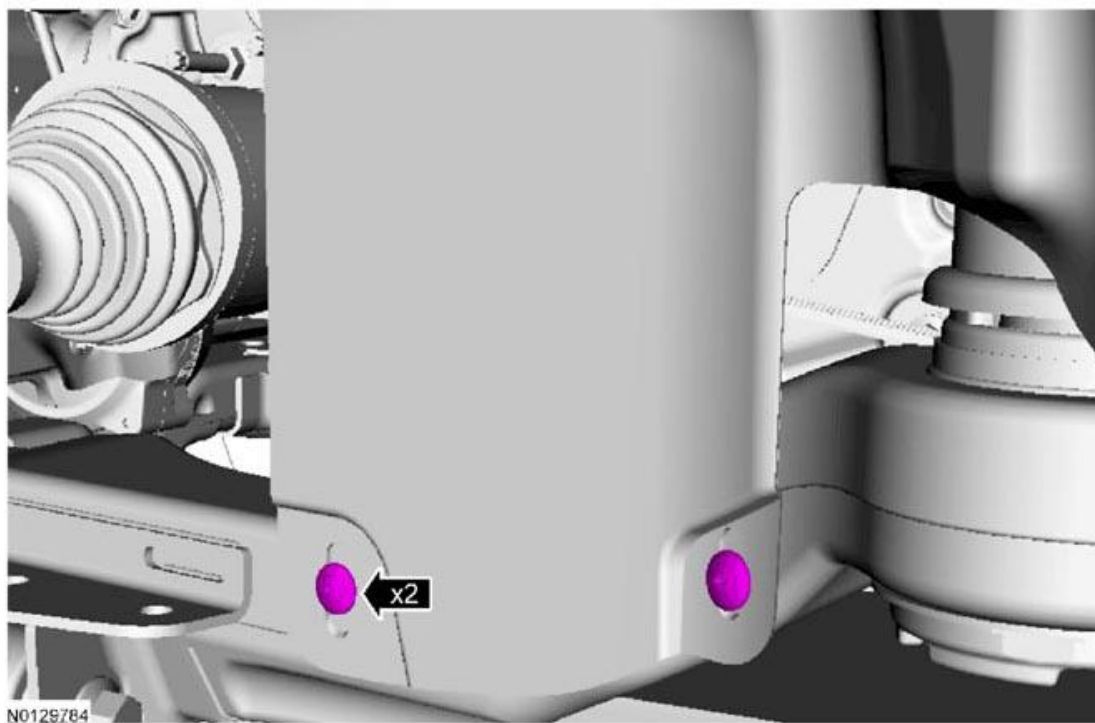


Fig. 425: Lubricating Piston Pin And Pin Bore With Clean Engine Oil
Courtesy of FORD MOTOR CO.



4.

Fig. 426: Locating Piston Pin Retainers In Piston
Courtesy of FORD MOTOR CO.

5. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

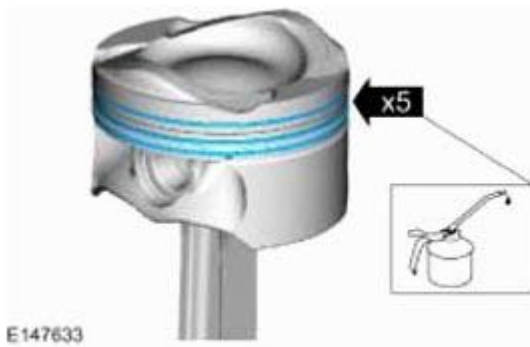


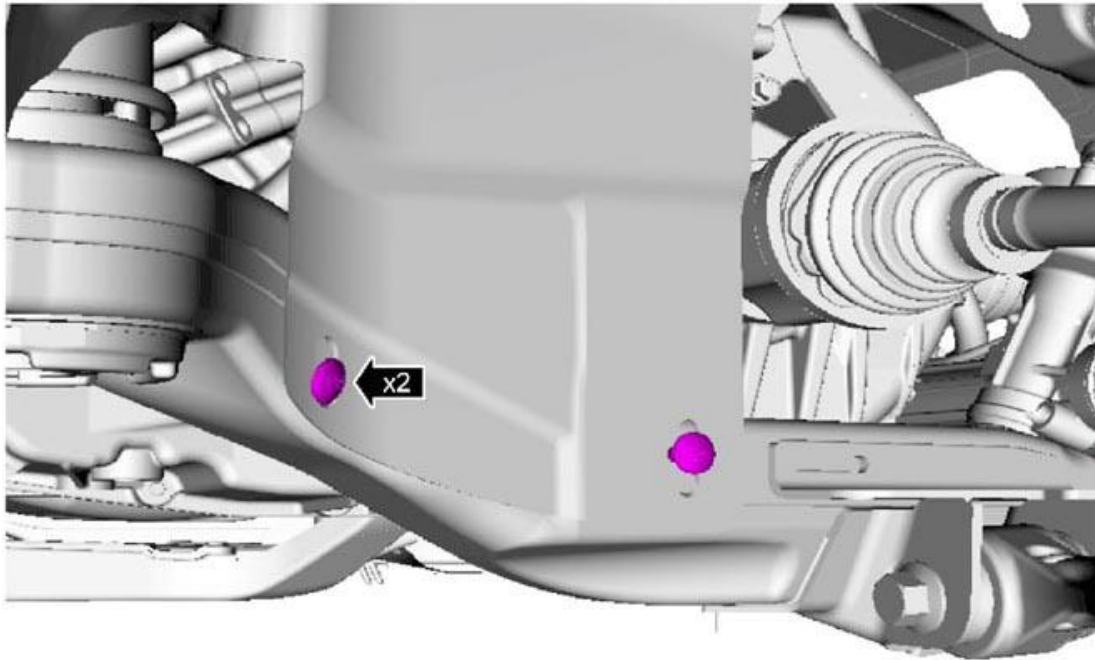
Fig. 427: Lubricating Piston And Piston Rings With Clean Engine Oil
Courtesy of FORD MOTOR CO.

6. **NOTE:** The upper and lower compression rings are to be fitted with the identification marks on the upper side.

NOTE: Arrows faces the front of the engine.

NOTE: Align the piston rings on the piston.

1. Upper compression ring gap location.
2. Lower compression ring gap location.
3. Upper oil control segment ring gap location.
4. Expander ring gap location.
5. Lower oil control segment ring gap location.



N0129751

Fig. 428: Identifying Piston Rings Positions On Piston
Courtesy of FORD MOTOR CO.

ASSEMBLY

ENGINE

SPECIAL TOOL(S) / GENERAL EQUIPMENT

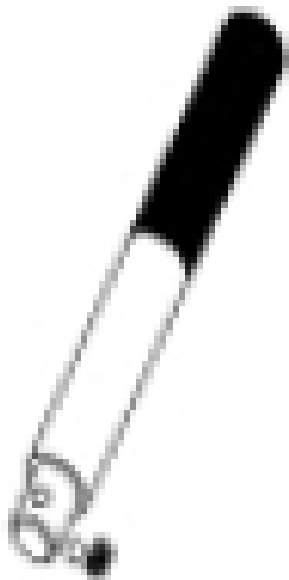
100-002
Holding Fixture with Dial Indicator Gauge

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E139373



E133913

205-153
Handle

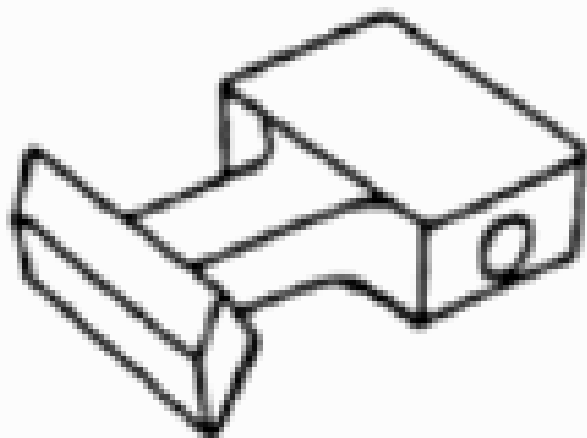
303-096
Installer, Camshaft Front Oil Seal

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TKIT-2009TC-F



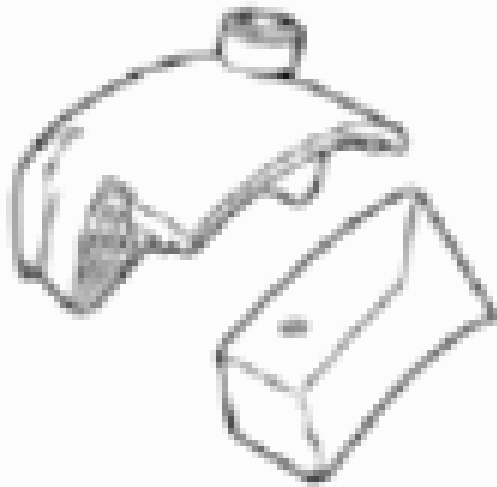
303-103
Holding Tool, Flywheel
TKIT-2009TC-F



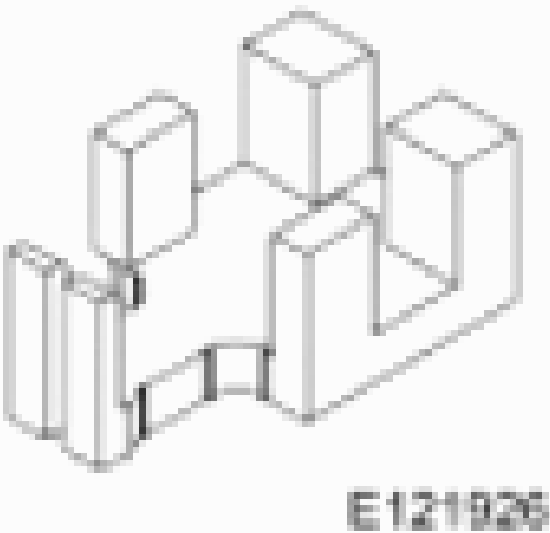
303-1247/2
Installer, VCT Spark Plug Tube Seal

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303-1252/2
Tool, Stretchy Belt Installer

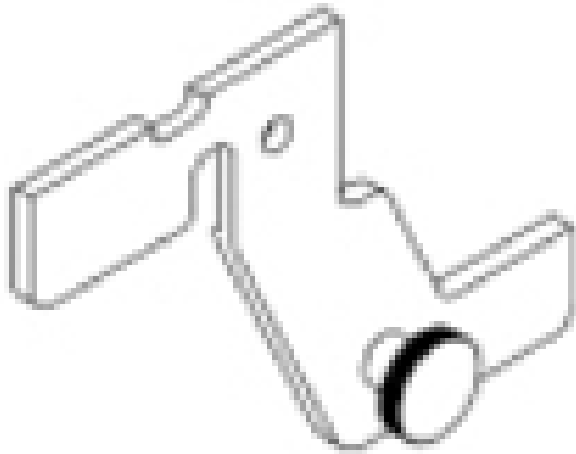


303-1521
Alignment Tool, Crankshaft Position Sensor

303-1565
Alignment Tool, Camshaft

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E133912



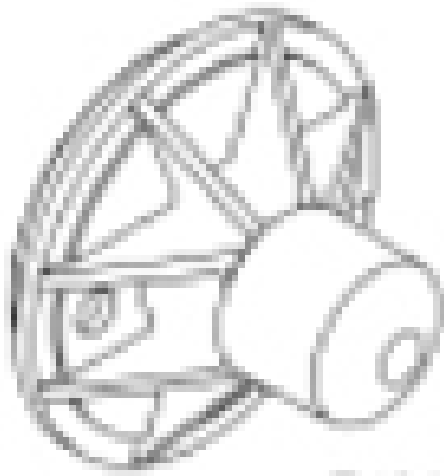
ST3266-A

303-1567
Sizer, Teflon Seal

303-328

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E134675

Replacer, Rear Seal
TKIT-1988-F
TKIT-1988-FLM
TKIT-1988-LM
TKIT-2009TC-F

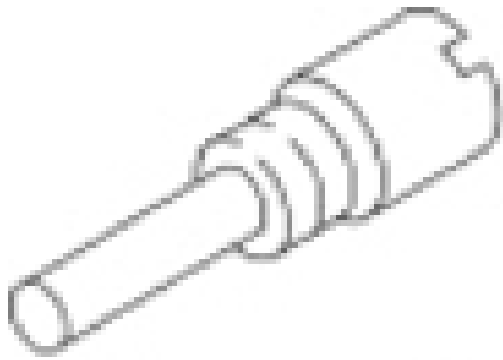


E139375

303-462
Installer, Connecting Rod

2013 Ford Focus SE

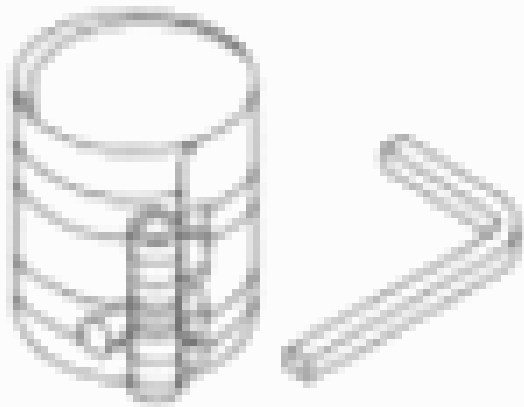
2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



PZ21210

303-507

Timing Peg, Crankshaft TDC
TKIT-2001N-FLM



E139376

303-D032

Compressor, Piston Ring

303-D055

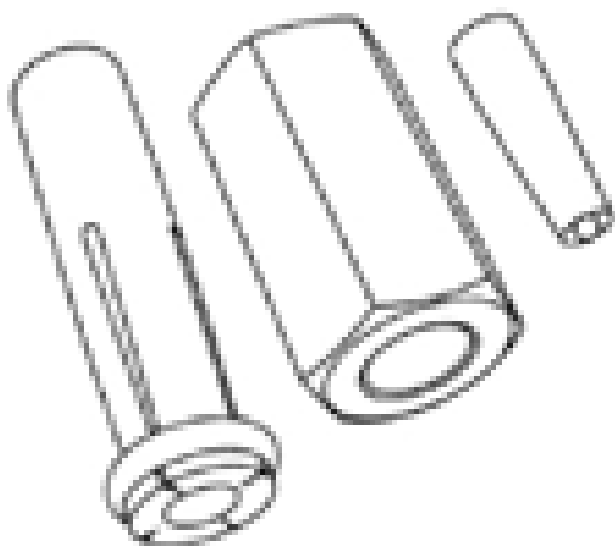
Strap Wrench

2013 Ford Focus SE

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303-D055



ST3097-A

310-207

Installer, Fuel Injector Seal Assembly
TKIT-2009A-FLM

Hose Clamp Remover/Installer

Round-Ended Steel Rule

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

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Motorcraft® Silicone Gasket Remover ZC-30	-
Motorcraft® Metal Surface Prep ZC-31-A	-
flange sealant	WSS-M2G348-A11
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: Assembly of the engine requires various inspections/measurements of the engine components (engine block, crankshaft, connecting rods, pistons and piston rings). These inspections/measurements will aid in determining if the engine components will require replacement.

NOTE: Refer to exploded views in Description and Operation.

NOTE: If the oil squirters are being reused, they must be installed in the same location as marked during disassembly.

NOTE: The front bulkhead does not have an engine piston oil cooler.



Fig. 429: Locating Engine Piston Oil Coolers
Courtesy of FORD MOTOR CO.

1. *Torque* : 4 Nm
2. Measure each of the crankshaft main bearing journal diameters in at least 2 directions and record the smallest diameter for each journal.

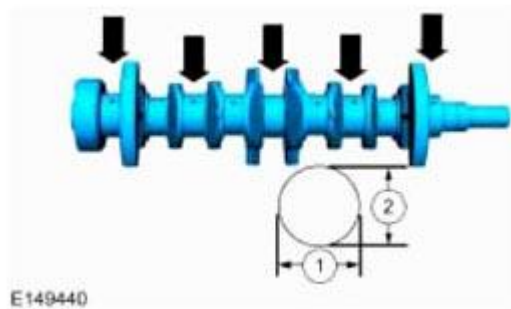


Fig. 430: Identifying Crankshaft Main Bearing Journal Diameters Measuring Directions
Courtesy of FORD MOTOR CO.

3. Position the main bearing beam in the engine block with the main bearing beam mounted flush with the rear face of the engine block and install the original main bearing beam bolts finger tight.

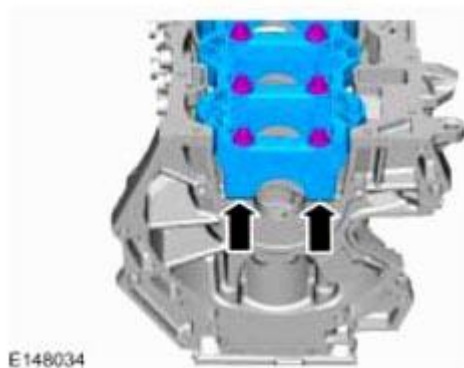


Fig. 431: Locating Main Bearing Beam And Bolts
Courtesy of FORD MOTOR CO.

4. *Torque :*

Stage 1: 5 Nm

Stage 2: 25 Nm

Stage 3: Tighten an additional 90°

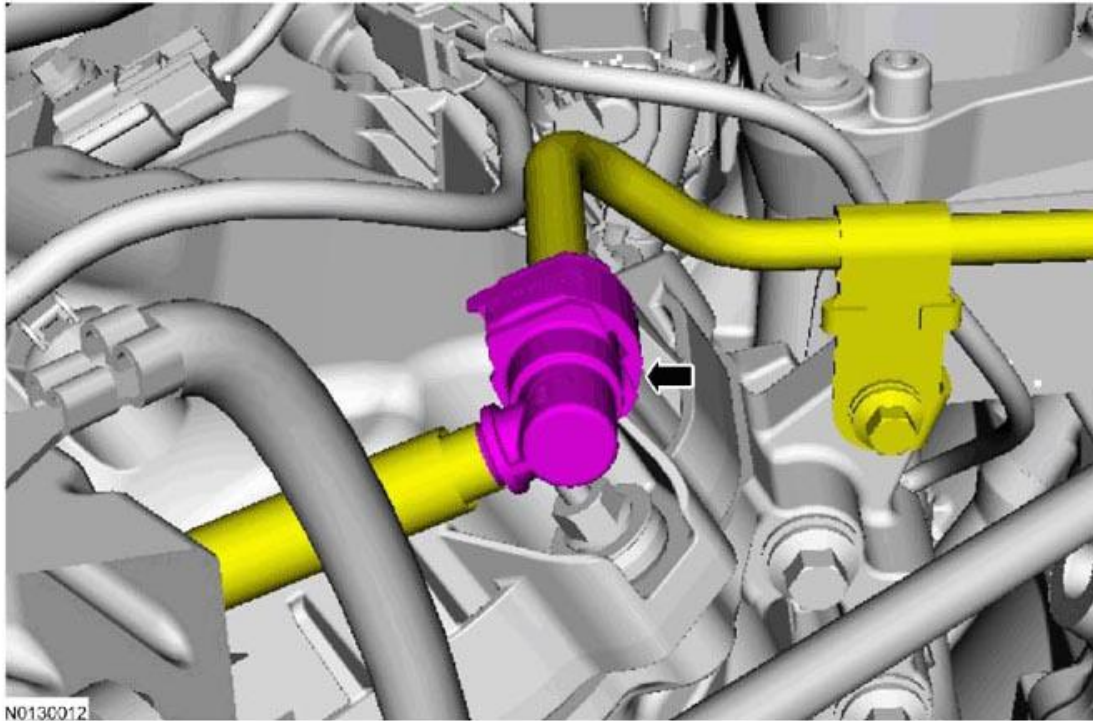


Fig. 432: Identifying Main Bearing Beam Bolts Tightening Sequences
Courtesy of FORD MOTOR CO.

5. Measure each crankshaft block main bearing bore diameter.

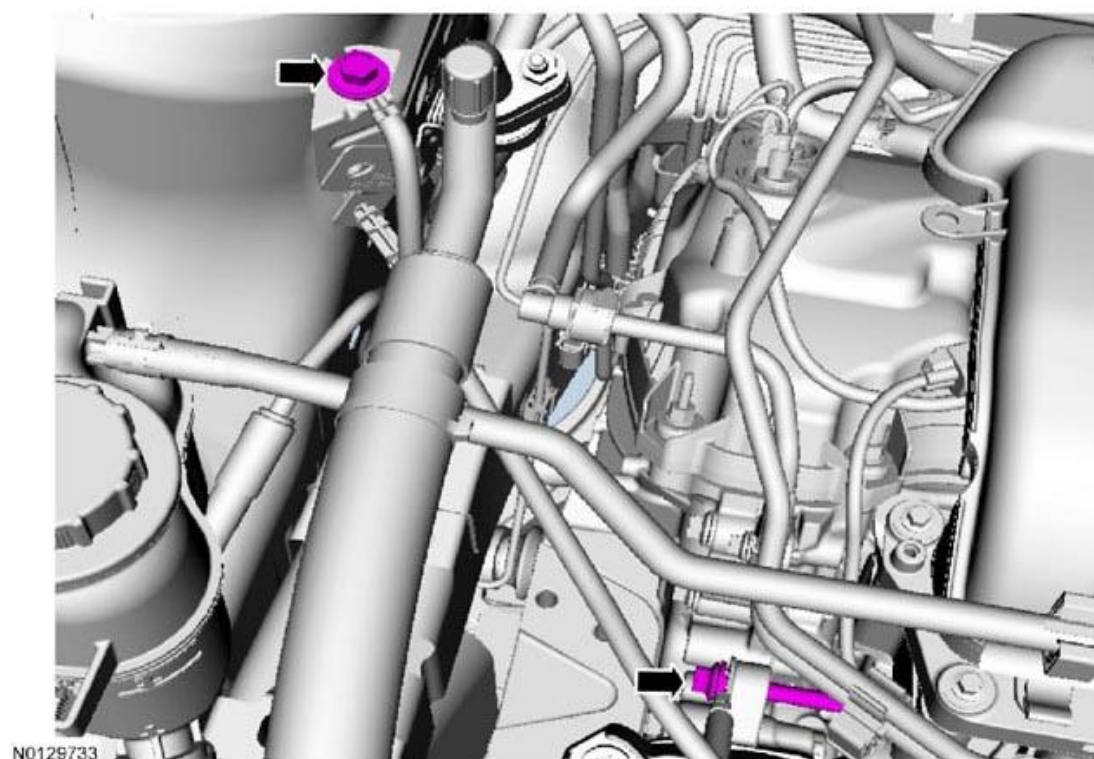


Fig. 433: Measuring Crankshaft Block Main Bearing Bore Diameter
 Courtesy of FORD MOTOR CO.

6. Using the chart, select the crankshaft main bearings.

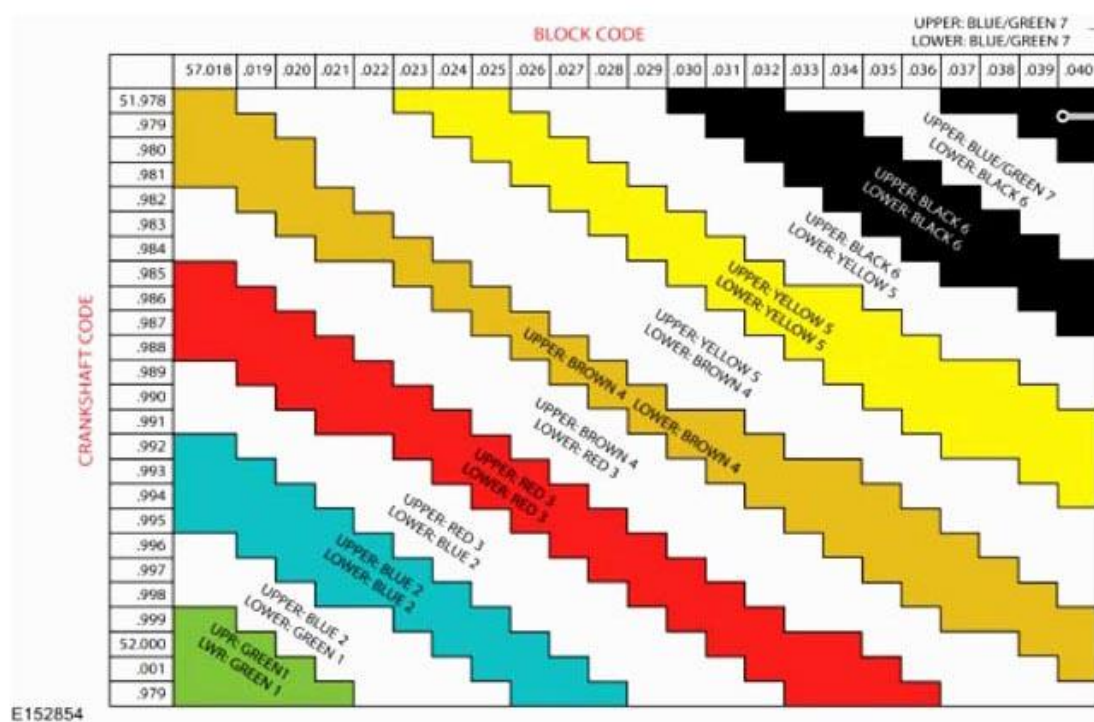


Fig. 434: Crankshaft Main Bearings Chart
Courtesy of FORD MOTOR CO.

7. Using the original connecting rod cap bolts, install the connecting caps and bolts and tighten the bolts in 2 stages:

Torque :

Stage 1: 29 Nm

Stage 2: Tighten an additional 90°

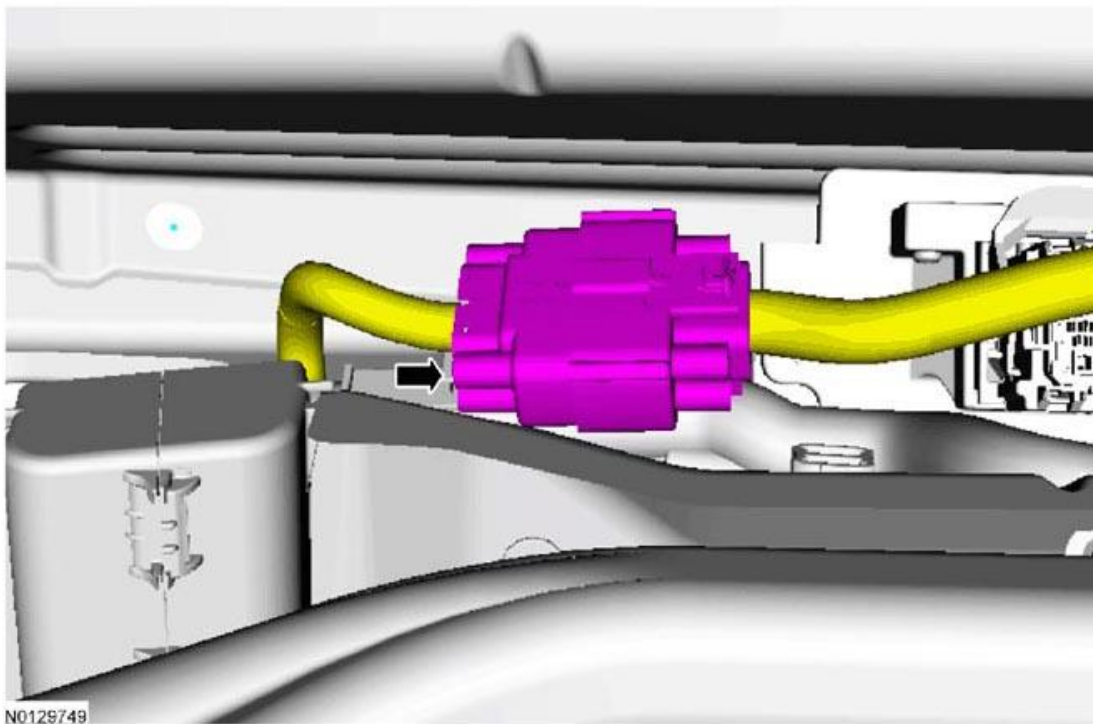


Fig. 435: Locating Connecting Rod Cap Bolts
Courtesy of FORD MOTOR CO.

- 8.
- Measure the connecting rod large end bore in 2 directions. Record the smallest measurement for each connecting rod.
 - Remove the bolts and the connecting rod cap.
 - Discard the connecting rod cap bolts.

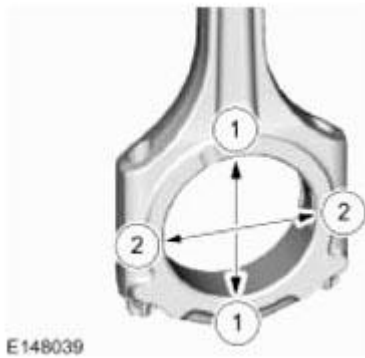


Fig. 436: Identifying Connecting Rod Large End Bore Measuring Directions
Courtesy of FORD MOTOR CO.

9. Measure each of the crankshaft connecting rod bearing journal diameters in at least 2 directions. Record the smallest measurement for each connecting rod journal.

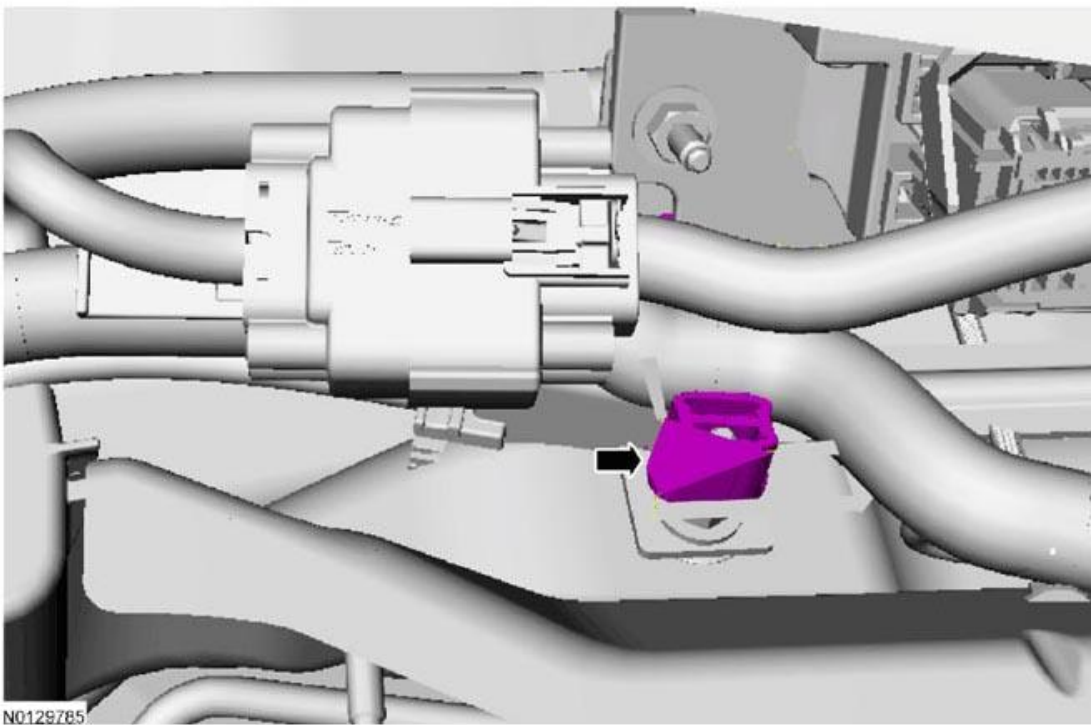


Fig. 437: Identifying Crankshaft Connecting Rod Bearing Journal Diameters Measuring Directions
Courtesy of FORD MOTOR CO.

10. Using the chart, select the correct connecting rod bearings for each crankshaft connecting rod journal.

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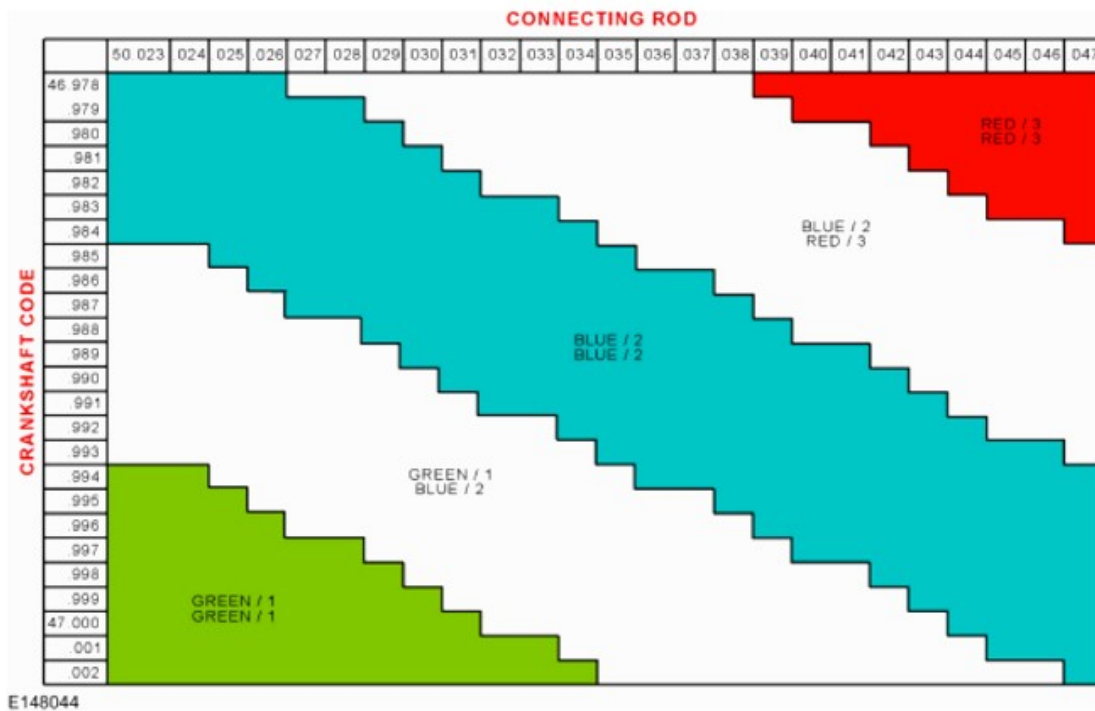


Fig. 438: Connecting Rod Bearings Chart
Courtesy of FORD MOTOR CO.

NOTE: Discard the main bearing beam bolts.

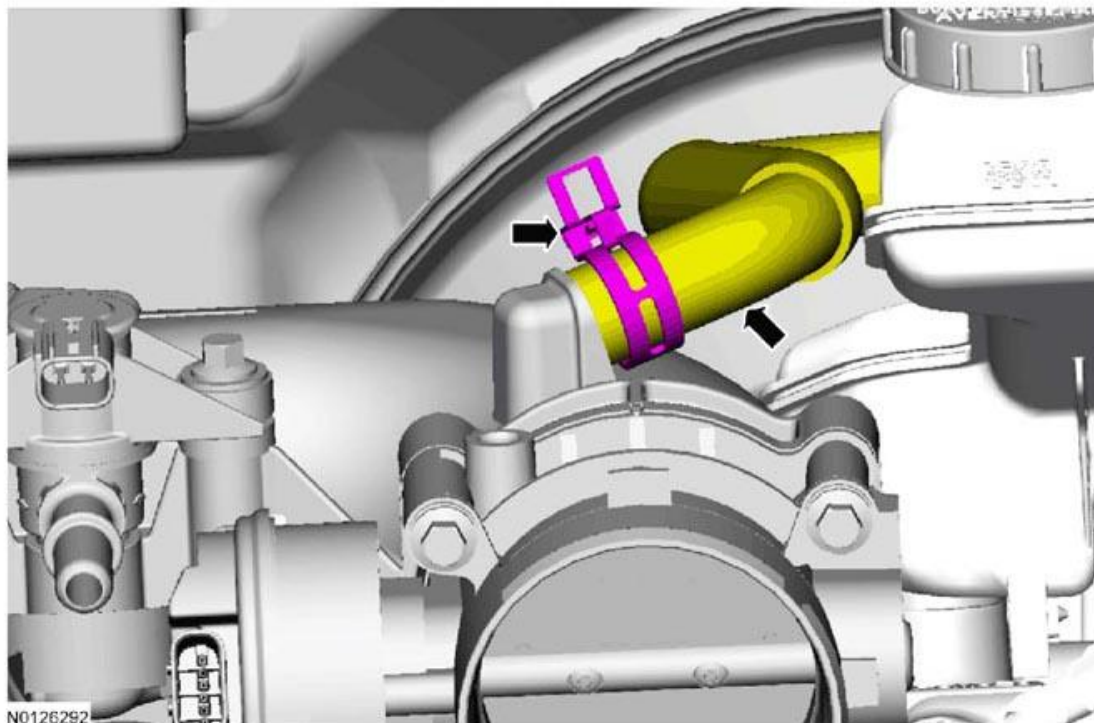


Fig. 439: Identifying Main Bearing Beam Bolts Removing Sequence
Courtesy of FORD MOTOR CO.

11. Remove the 10 bolts in the sequence shown in illustration and the main bearing beam.

NOTE: Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

NOTE: If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

NOTE: The center bulkhead is the thrust bearing.

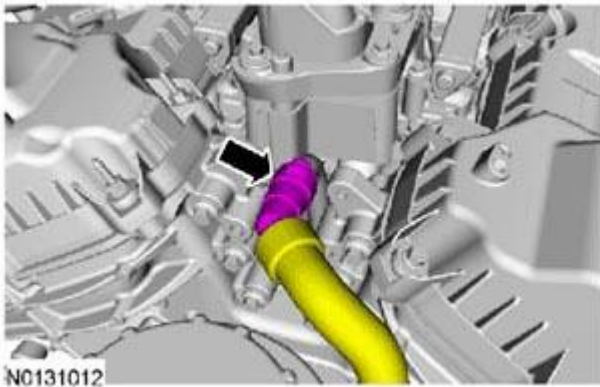


Fig. 440: Lubricating Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

12. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

NOTE: If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

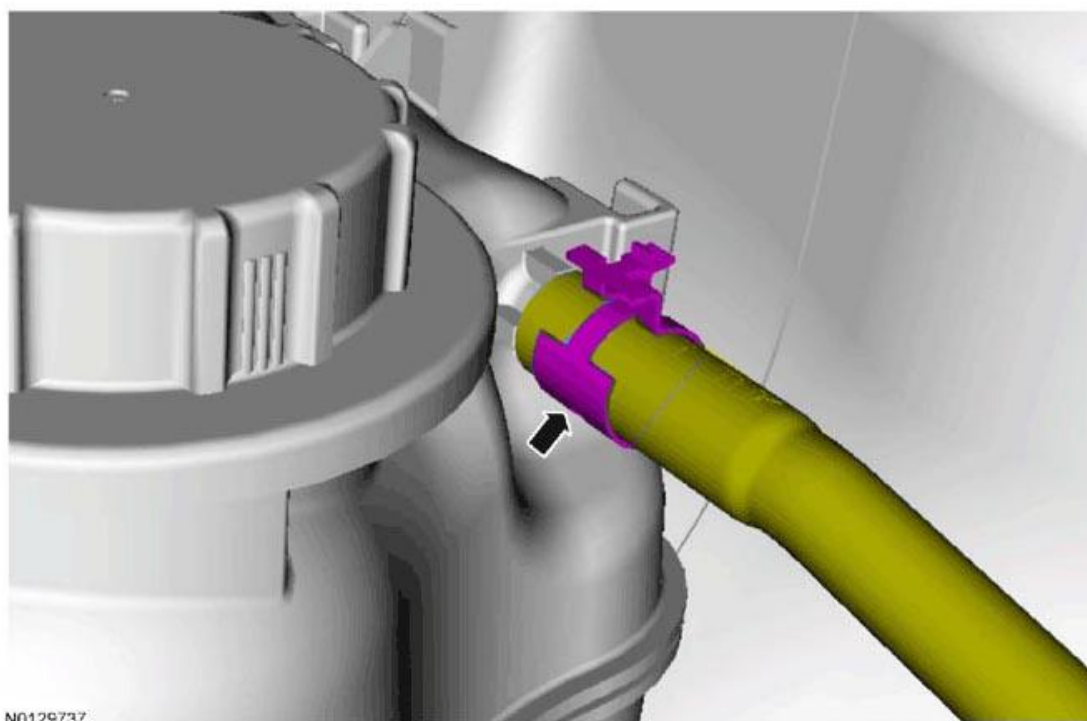


Fig. 441: Lubricating Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

13. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)
14. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

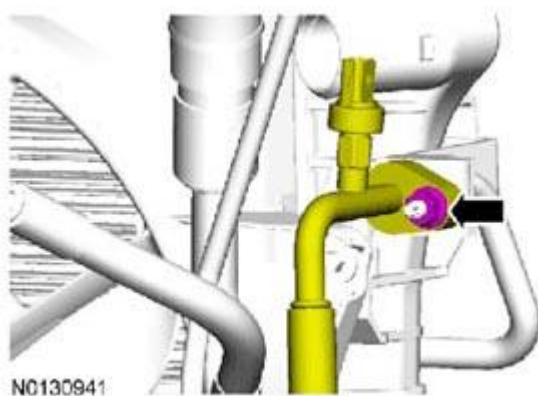


Fig. 442: Lubricating Crankshaft
Courtesy of FORD MOTOR CO.

15. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

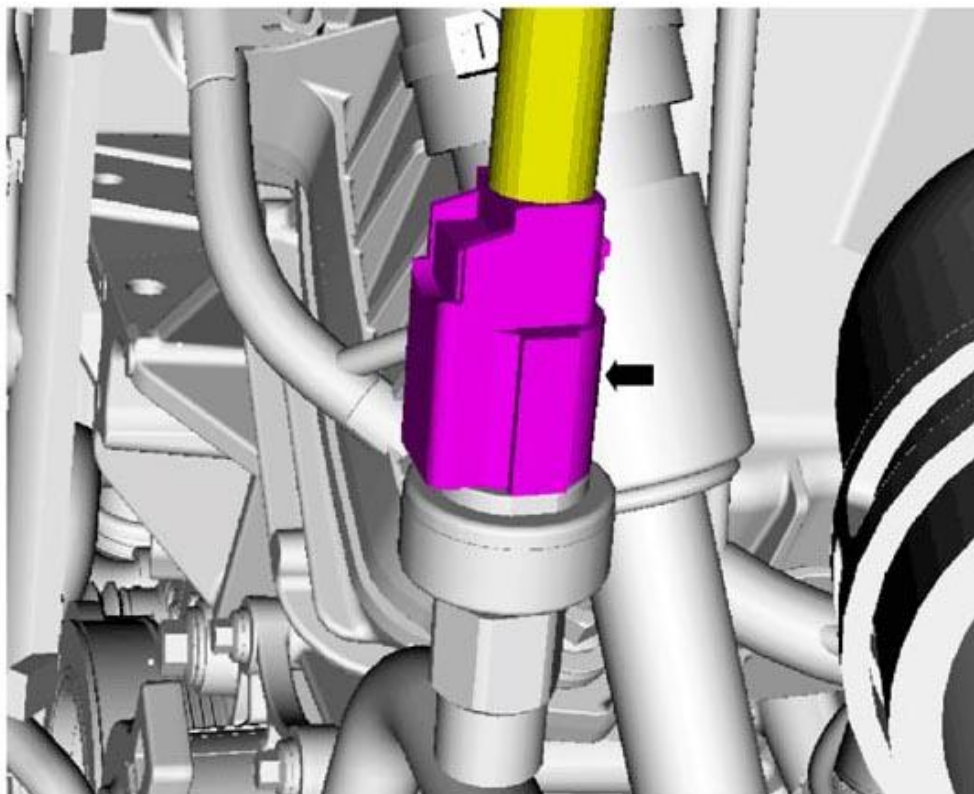


Fig. 443: Lubricating Main Bearing Beam
Courtesy of FORD MOTOR CO.

16. Position the main bearing beam in the engine block with the main bearing beam mounted flush with the rear face of the engine block.

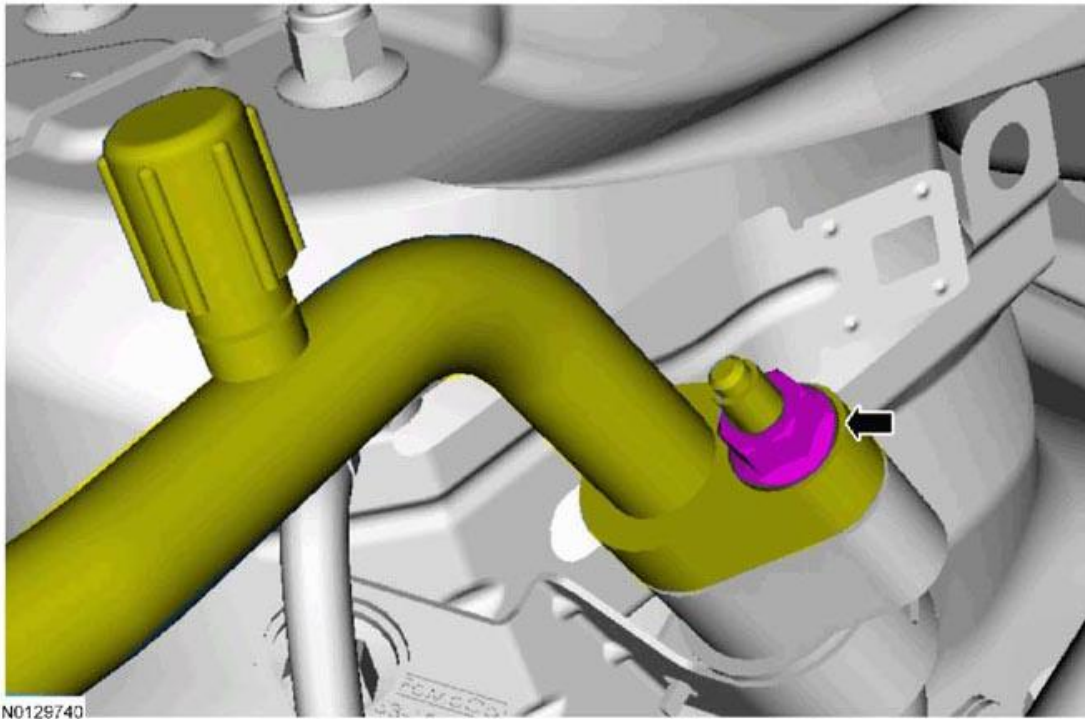


Fig. 444: Positioning Main Bearing Beam In Engine Block

Courtesy of FORD MOTOR CO.

- NOTE:** Lubricate the main bearing beam bolt threads and under the bolt heads with clean engine oil.
- NOTE:** Position the crankshaft to the rear of the cylinder block, then position the crankshaft to the front of the cylinder block before tightening the main bearing beam bolts.

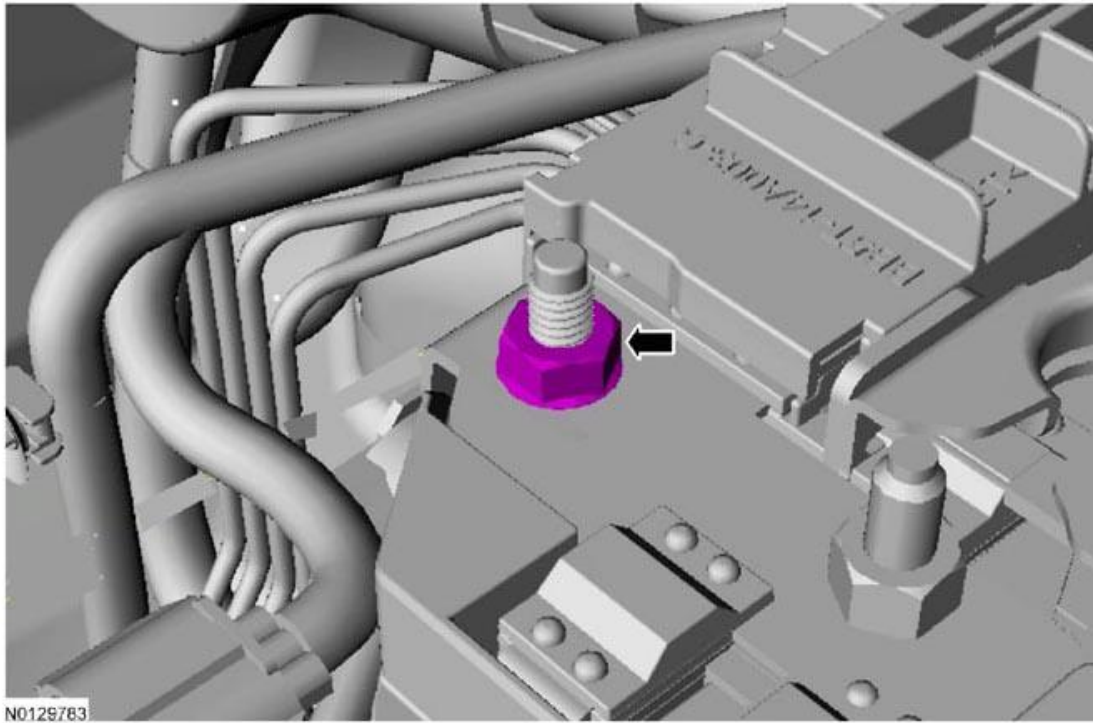


Fig. 445: Identifying Main Bearing Beam Bolts Tighten Sequence
 Courtesy of FORD MOTOR CO.

17. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 5 Nm

Stage 2: 25 Nm

Stage 3: Tighten an additional 90°

- 18.
- Measure crankshaft end play.
- Special Tool(s)* : **100-002 (Holding Fixture with Dial Indicator Gauge)**
- Position the crankshaft to the rear of the cylinder block.
 - Zero the Dial Indicator Gauge with Holding Fixture.
 - Move the crankshaft to the front of the cylinder block.
 - Note and record the crankshaft end play.
 - Acceptable crankshaft end play is 0.2-0.43 mm (0.008-0.017 in). If the crankshaft end play exceeds the specified range, install new parts as necessary.

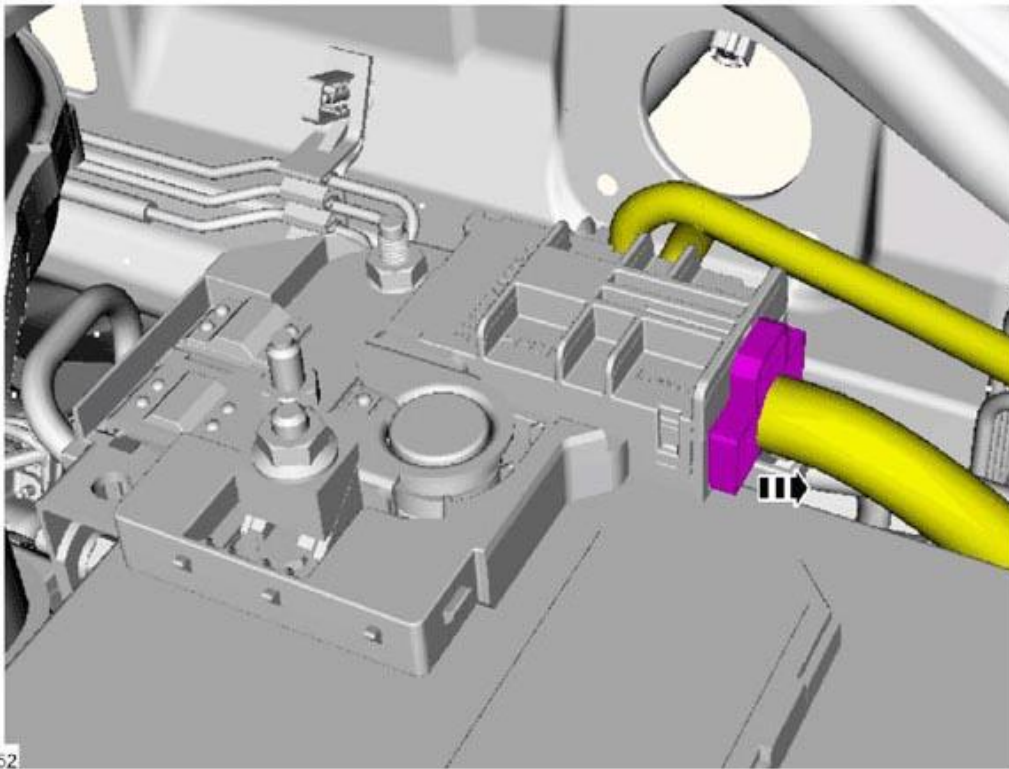


Fig. 446: Measuring Crankshaft End Play
Courtesy of FORD MOTOR CO.

19. Piston to be assembled with the arrow pointing to the front of the engine.

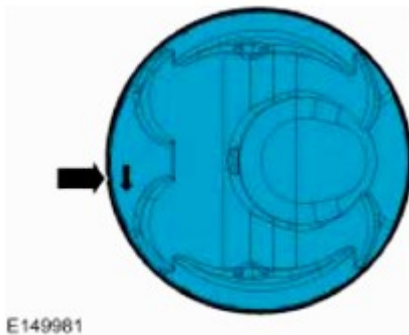


Fig. 447: Identifying Piston Arrow Pointing To Front Of Engine
Courtesy of FORD MOTOR CO.

20. Connecting rod to be assembled with the front marks pointing to the front of the engine.

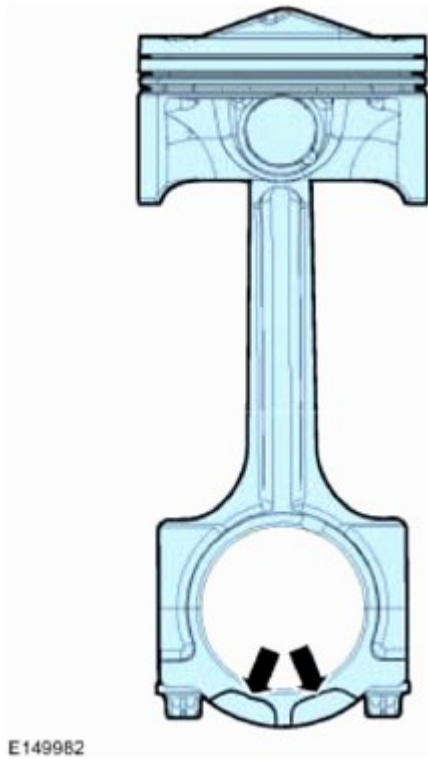


Fig. 448: Identifying Connecting Rod Assembled With Front Marks Pointing To Front Of Engine
Courtesy of FORD MOTOR CO.

- NOTE:** Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.
- NOTE:** Lubricate the pistons, piston rings, connecting rod bearings and the entire cylinder bores with clean engine oil
- NOTE:** Make sure the piston arrow on top is facing toward the front of the engine.
- NOTE:** When installing the pistons and connecting rod assemblies, the oil ring gaps must be positioned 60 degrees apart from each other and a minimum of 90 degrees from the expander gap. The position of the upper and lower compression ring gaps are not controlled for installation.

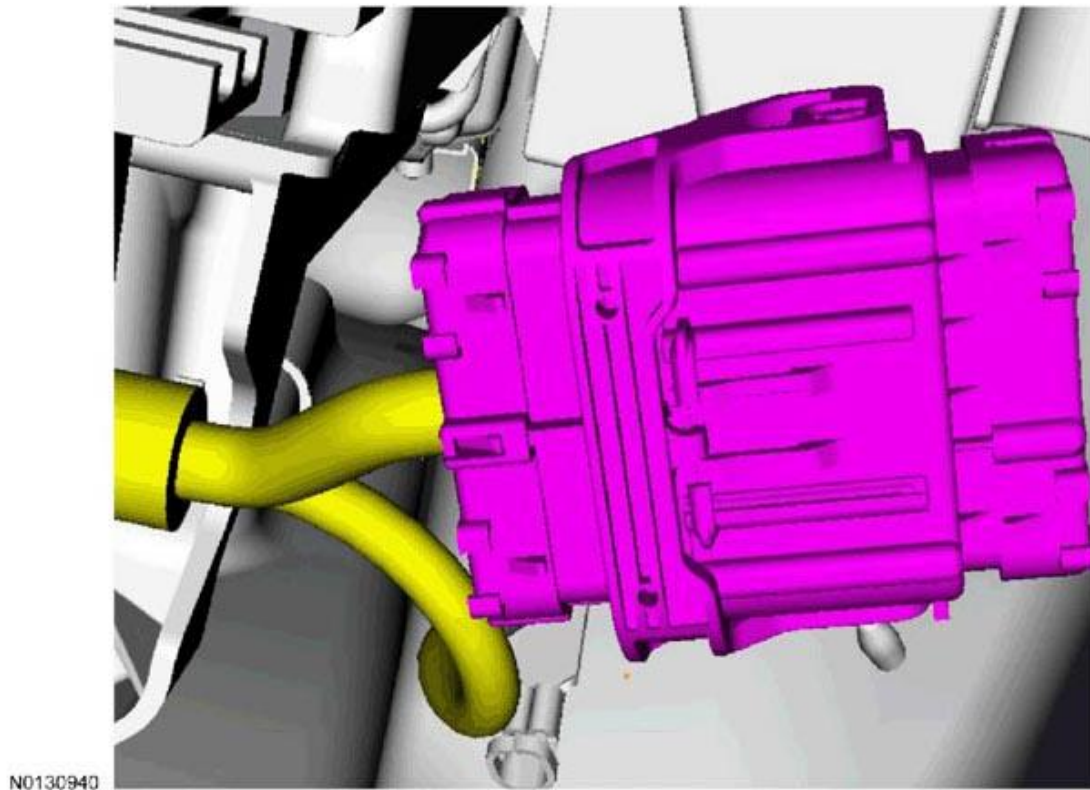


Fig. 449: Installing Piston And Connecting Rod Assemblies
Courtesy of FORD MOTOR CO.

21. Install the piston and connecting rod assemblies.

Special Tool(s) : 303-D032 (Compressor, Piston Ring) , 303-462 (Installer, Connecting Rod)

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

- NOTE:** The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.
- NOTE:** Install connecting rod caps and bolts on the connecting rods for cylinders 1 and 4 first and tighten. Then rotate crankshaft 180 degrees and install connecting rod caps and bolts on connecting rods for cylinders 2 and 3 and tighten.
- NOTE:** After installation of each connecting rod cap, rotate the crankshaft to verify smooth operation.

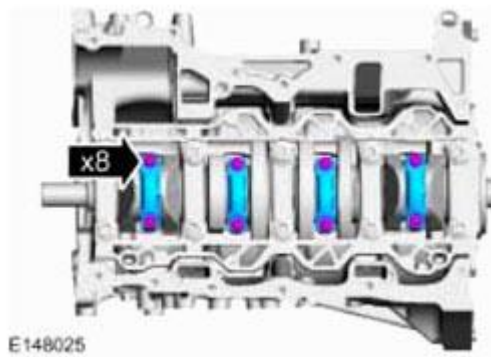


Fig. 450: Locating Connecting Rod Caps Bolts
Courtesy of FORD MOTOR CO.

22. Install the connecting rod caps and the new bolts and tighten the bolts in 2 stages:

Torque :

Stage 1: 29 Nm

Stage 2: Tighten an additional 90°

23. Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the special tool. The engine is now at TDC.

Special Tool(s) : 303-507 (Timing Peg, Crankshaft TDC)

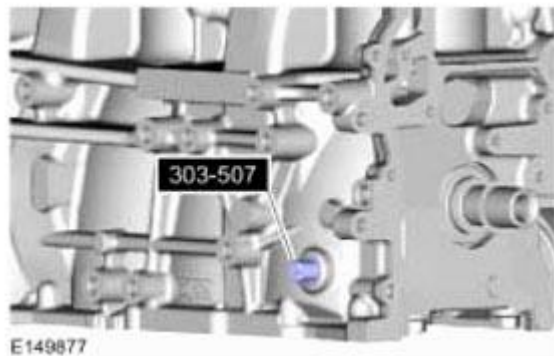


Fig. 451: Locating Crankshaft TDC Timing Peg
Courtesy of FORD MOTOR CO.

NOTE: Clean the oil pump and cylinder block mating surfaces with Motorcraft Metal Surface Prep.

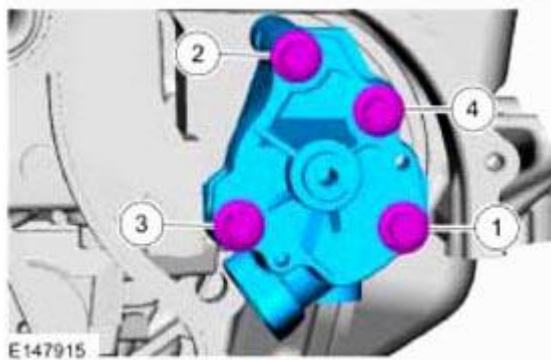


Fig. 452: Identifying Oil Pump Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

24. *Material* : Motorcraft® Metal Surface Prep / ZC-31-A

Torque :

Stage 1: 10 Nm

Stage 2: 20 Nm

25. *Torque* : 25 Nm

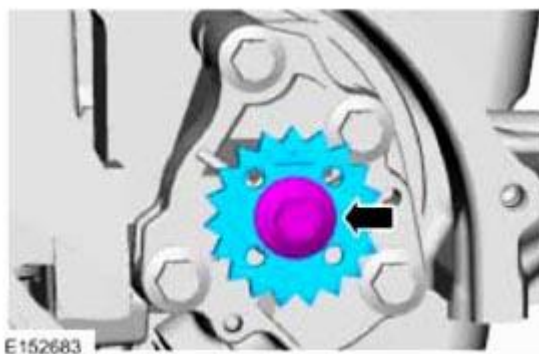


Fig. 453: Locating Oil Pump Sprocket Bolt
Courtesy of FORD MOTOR CO.

26. Install the diamond washer and the crankshaft sprocket.



Fig. 454: Locating Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

27.

1. Install the chain on the oil pump sprocket and install the tensioner and the 2 shoulder bolts.

Torque : 10 Nm

2. Push the tensioner spring down and position the spring under the shoulder bolt.

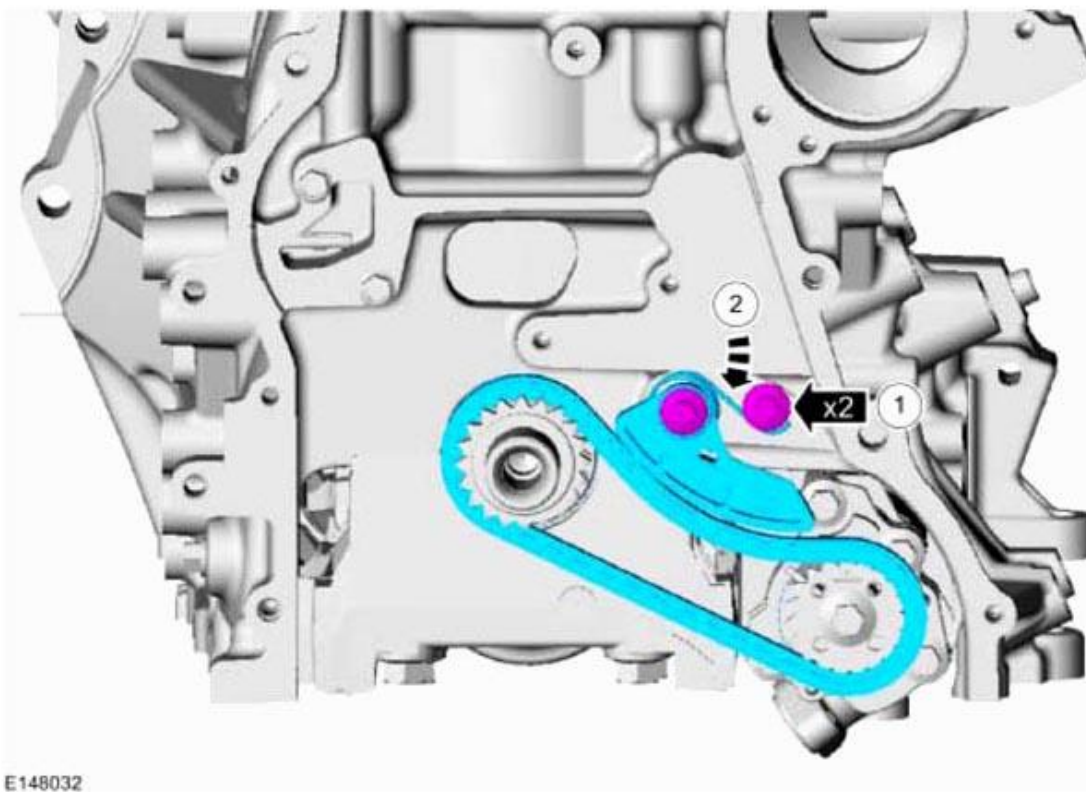


Fig. 455: Positioning Spring Under Shoulder Bolt
Courtesy of FORD MOTOR CO.

28. Position the crankshaft rear oil seal with retainer plate onto the crankshaft.

Special Tool(s) : 303-328 (Replacer, Rear Seal)

Torque : 10 Nm

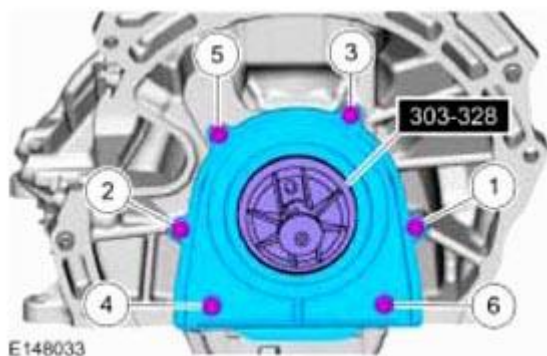


Fig. 456: Identifying Crankshaft Rear Oil Seal Retainer Plate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Install a new gasket.

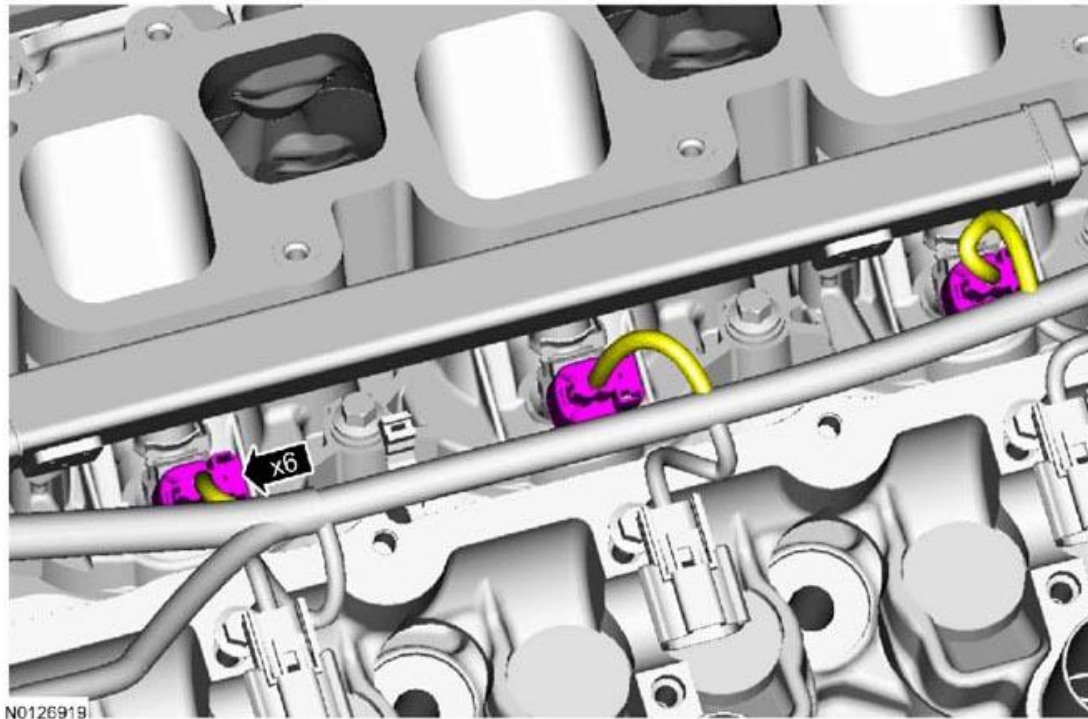


Fig. 457: Locating Bolts Of Oil Pump Screen And Pickup Tube
Courtesy of FORD MOTOR CO.

29. *Torque : 10 Nm*

NOTE: If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned with metal surface prep. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.



Fig. 458: Applying Sealant On Oil Pan
Courtesy of FORD MOTOR CO.

30. *Material* : Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)
31. Finger-tight.



Fig. 459: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

32. Align the front surface of the oil pan flush with the front surface of the engine block.

General Equipment : Round-Ended Steel Rule

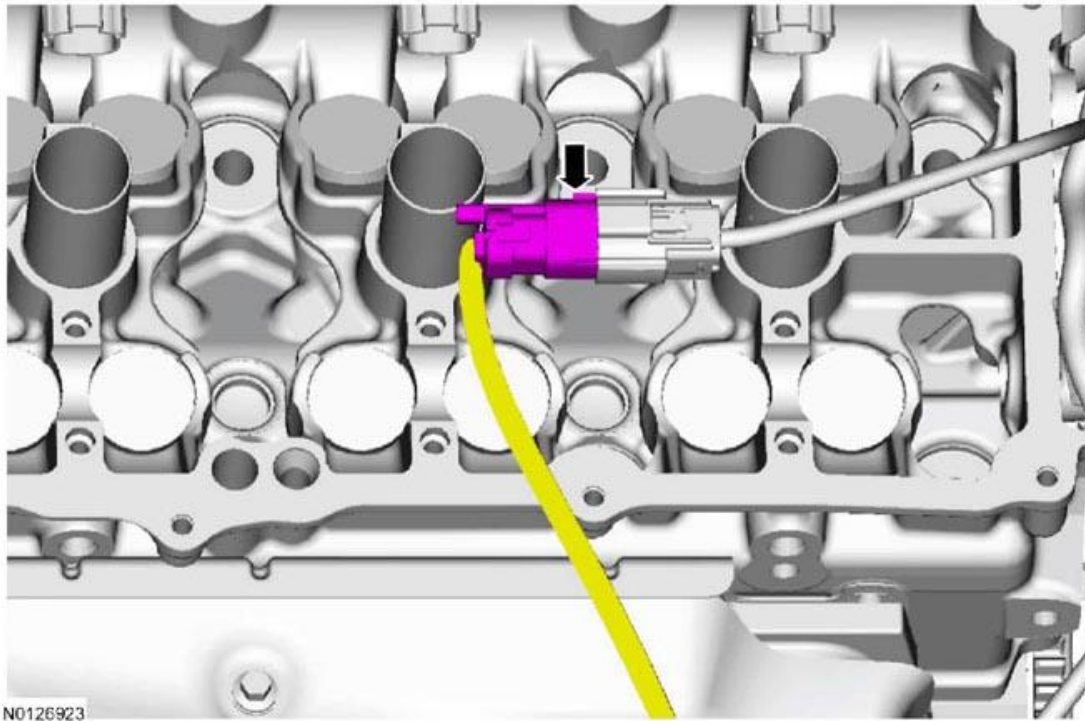


Fig. 460: Aligning Front Surface Of Oil Pan Flush With Front Surface Of Engine Block
Courtesy of FORD MOTOR CO.

33. *Torque : 20 Nm*

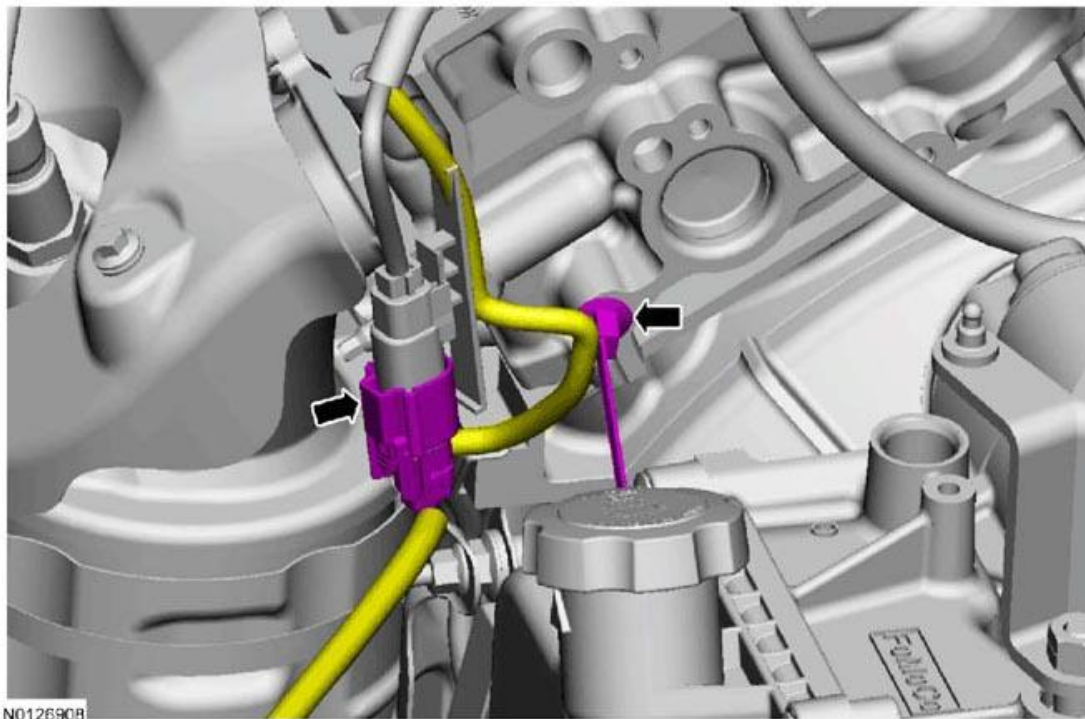
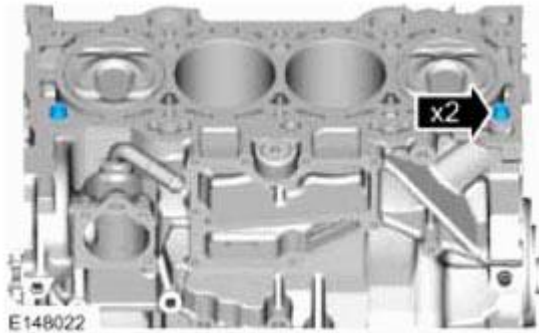
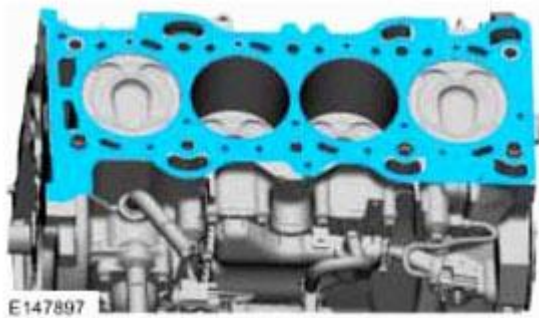


Fig. 461: Locating Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.



34.

Fig. 462: Locating Cylinder Head Alignment Dowels
Courtesy of FORD MOTOR CO.



35.

Fig. 463: Installing Cylinder Head Gasket
Courtesy of FORD MOTOR CO.

NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

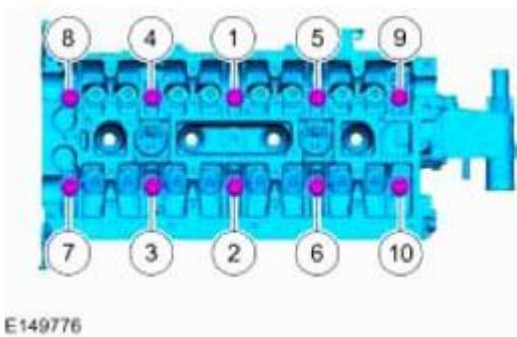


Fig. 464: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

36. Torque :

Stage 1: 7 Nm

Stage 2: 15 Nm

Stage 3: 45 Nm

Stage 4: 90°

Stage 5: Tighten an additional 90°

NOTE: Install the 16 valve tappets in their original positions.

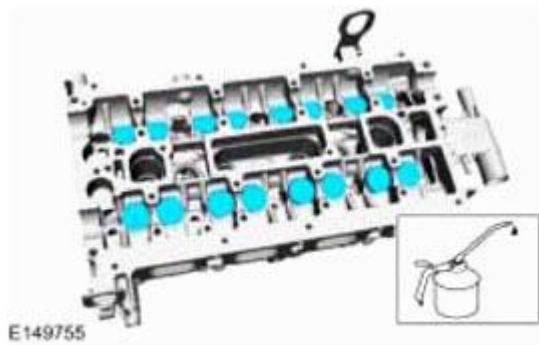


Fig. 465: Lubricating Valve Tappets
Courtesy of FORD MOTOR CO.

37. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

NOTE: The exhaust camshaft rear bearing cap must be secured within 10 minutes of Gasket Maker application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

NOTE: Do not allow Gasket Maker to enter the camshaft bearing journal. If Gasket Maker is applied to the camshaft bearing journal, the journal and sealing area must be cleaned with Motorcraft Metal Surface Prep.

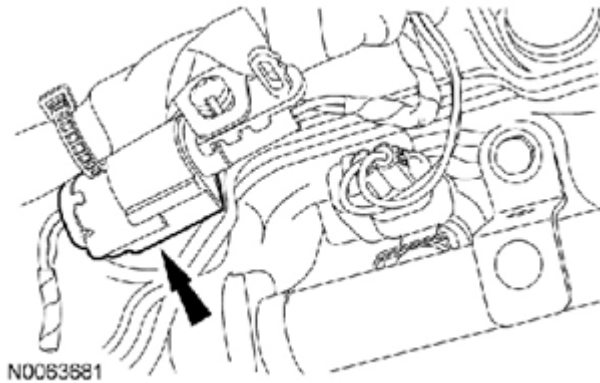


Fig. 466: Applying Bead Of Specified Diameter From Specified Tube
Courtesy of FORD MOTOR CO.

38. *Material* : flange sealant (WSS-M2G348-A11)

- NOTE:** Install the camshafts with the alignment slots in the camshafts lined up so the special tool can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position can cause severe damage to the valves and pistons.
- NOTE:** Failure to follow the camshaft bearing cap tightening procedure can result in damage to the camshafts.
- NOTE:** Lubricate the cylinder head and camshaft journals with clean engine oil and position the camshafts onto the cylinder head in their original location and orientation.
- NOTE:** Lubricate the bearing cap journals with clean engine oil prior to installation.

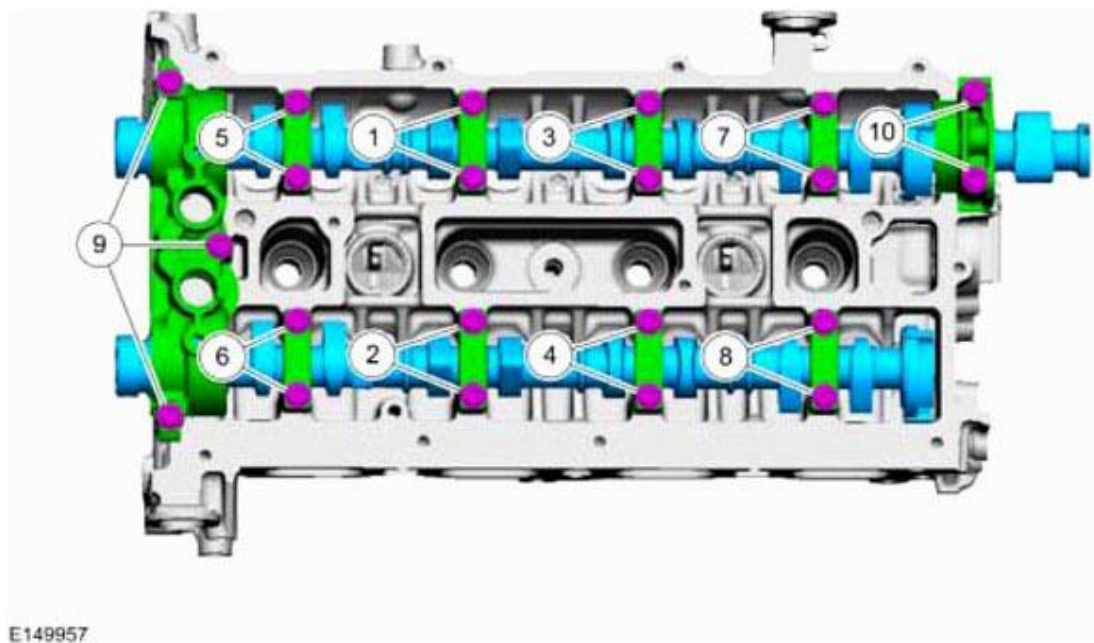


Fig. 467: Identifying Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

39. Install the camshaft bearing caps in their original location and orientation and tighten the camshaft bearing cap bolts in pairs in the sequence shown in illustration in 2 stages:

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 7 Nm

Stage 2: 16 Nm

40. If camshafts were replaced, check that the camshaft end play is within specification.
41. If camshafts were replaced, check the valve clearance.

Refer to: **Valve Clearance Check** .

NOTE: The special tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

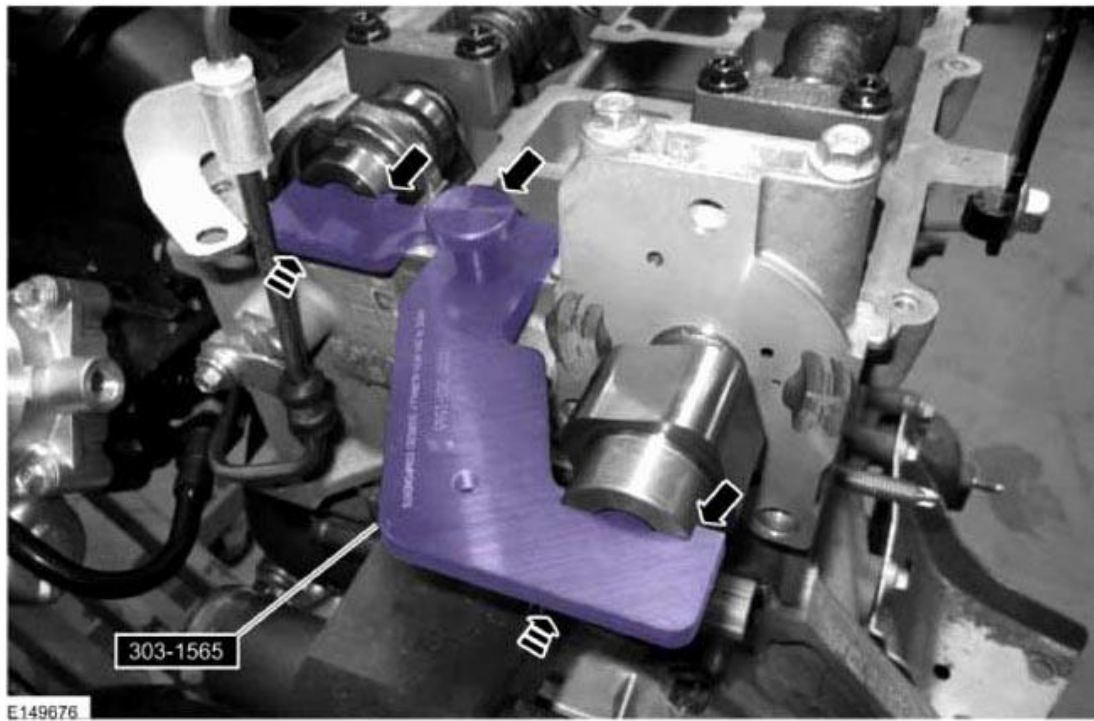


Fig. 468: Installing Camshaft Alignment Tool Into Rear Of Both Of Camshaft Slots
Courtesy of FORD MOTOR CO.

42. *Install the Special Tool(s) : 303-1565 (Alignment Tool, Camshaft)*

NOTE: Lubricate the VCT oil control solenoids with clean engine oil.

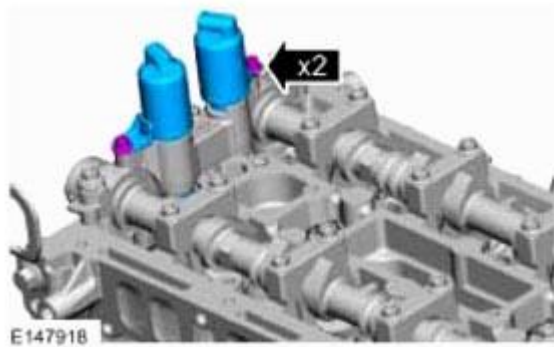


Fig. 469: Locating VCT Oil Control Solenoids Bolts
Courtesy of FORD MOTOR CO.

43. *Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)*

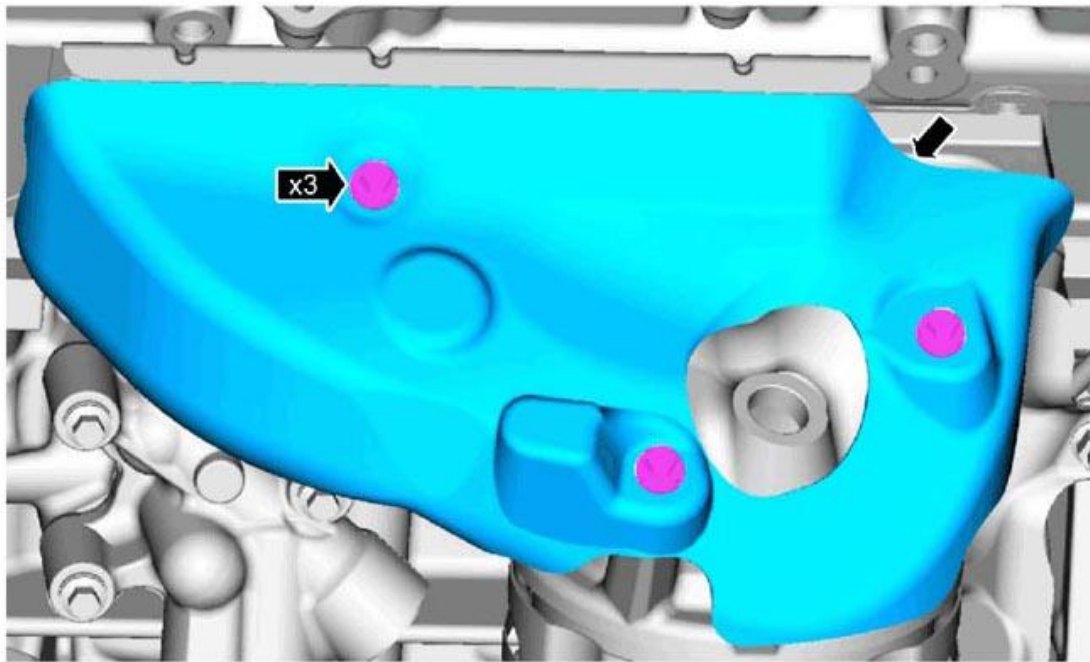
Torque : 10 Nm

NOTE: The VCT unit bolts are final torqued in the timing drive installation.



Fig. 470: Locating Exhaust And Intake VCT Unit Bolts
Courtesy of FORD MOTOR CO.

44. Finger tight.



45. N0126940

Fig. 471: Identifying Timing Chain
Courtesy of FORD MOTOR CO.

46. Torque : 10 Nm

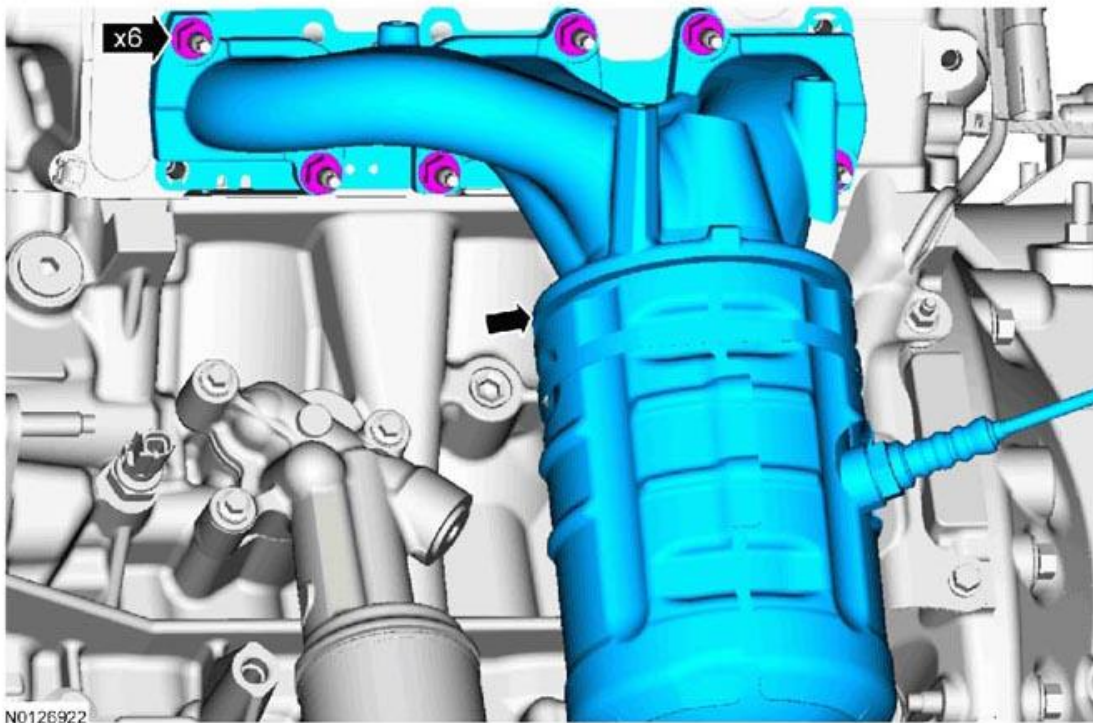
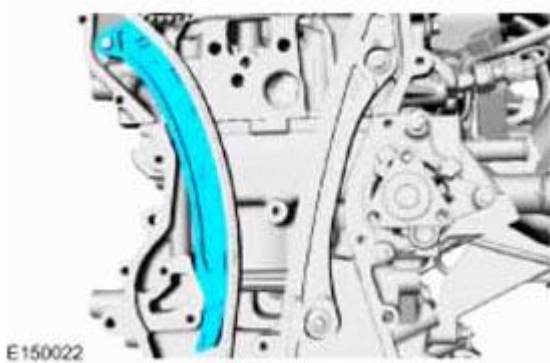


Fig. 472: Locating Timing Chain Arm Bolts

Courtesy of FORD MOTOR CO.



47.

Fig. 473: Identifying Timing Chain Arm
Courtesy of FORD MOTOR CO.

NOTE: If the timing chain tensioner plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

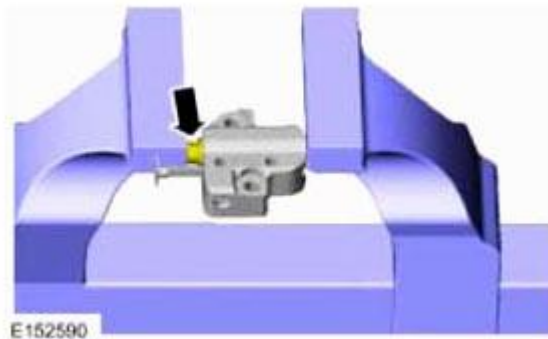


Fig. 474: Compressing Timing Chain Tensioner Plunger Using Edge Of Vise
Courtesy of FORD MOTOR CO.

- 48. Using the edge of a vise, compress the timing chain tensioner plunger.
- 49. Using a small pick, push back and hold the ratchet mechanism.



Fig. 475: Pushing Back And Hold Ratchet Mechanism Using Small Pick
Courtesy of FORD MOTOR CO.

50. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.

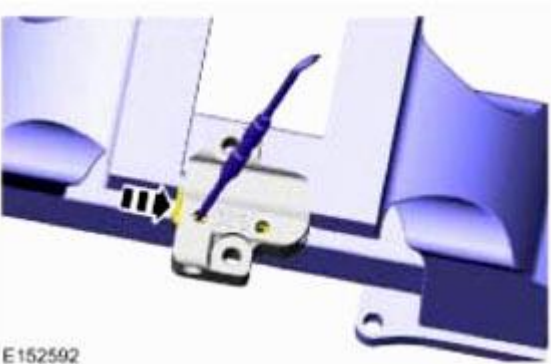


Fig. 476: Pushing Ratchet Arm Back Into Tensioner Housing Holding Ratchet Mechanism
Courtesy of FORD MOTOR CO.

51. Install a holding pin into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.

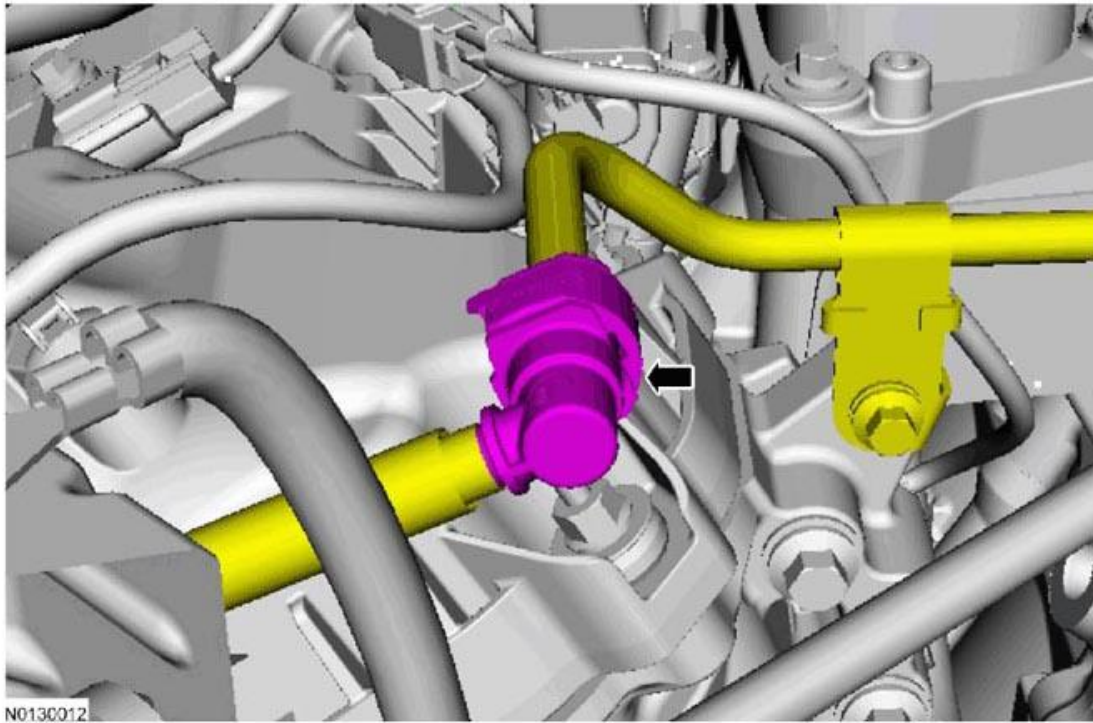


Fig. 477: Installing Paper Clip Into Hole In Tensioner Housing To Hold Ratchet Assembly And Plunger In During Installation
Courtesy of FORD MOTOR CO.

52. Install the timing chain tensioner and the 2 bolts, then remove the holding pin to release the piston.

Torque : 10 Nm

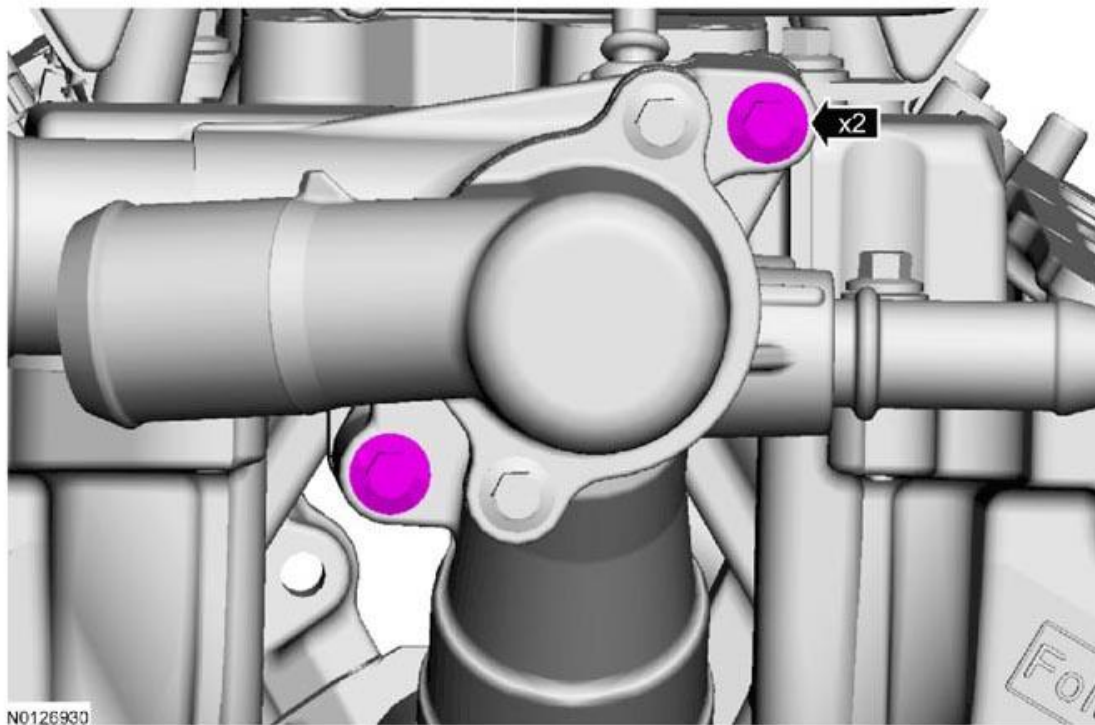
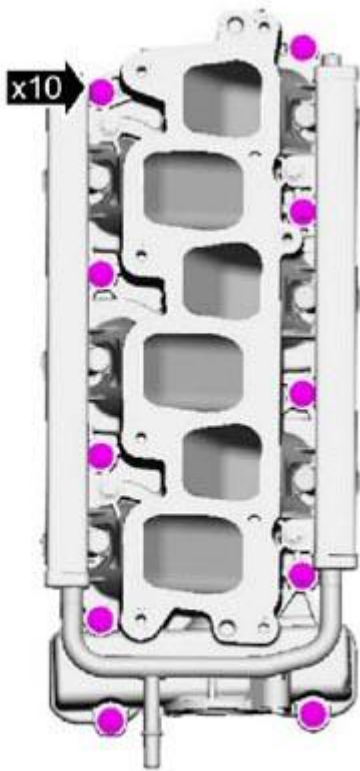


Fig. 478: Locating Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

NOTE: Using the flats on the camshafts to prevent camshaft rotation.



N0126947

Fig. 479: Locating Exhaust And Intake VCT Unit Bolts
Courtesy of FORD MOTOR CO.

53. *Torque :*

Stage 1: 50 Nm

Stage 2: Tighten an additional 90°

NOTE: Do not use metal scrapers, wire brushes, power abrasive disks or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

54. Clean and inspect the mounting surfaces of the engine and the front cover.

Material : Motorcraft® Silicone Gasket Remover / ZC-30

NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

55.

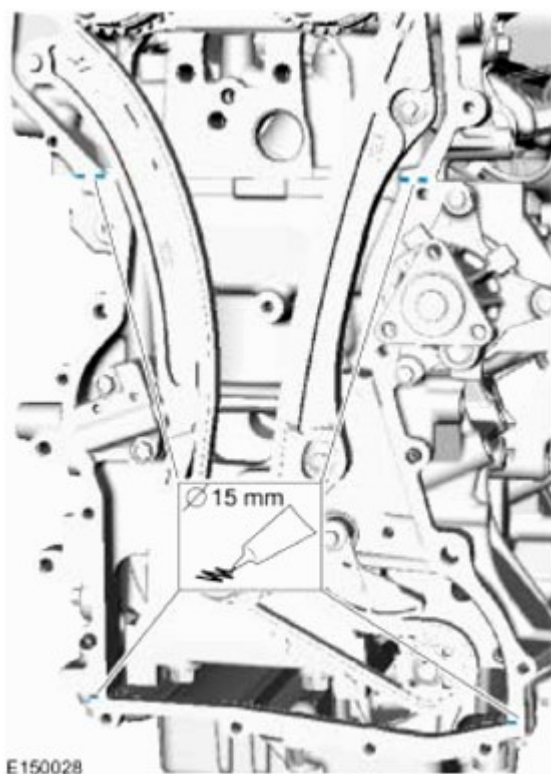


Fig. 480: Applying Silicone Gasket And Sealant On Engine Front Cover
Courtesy of FORD MOTOR CO.

NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

56.

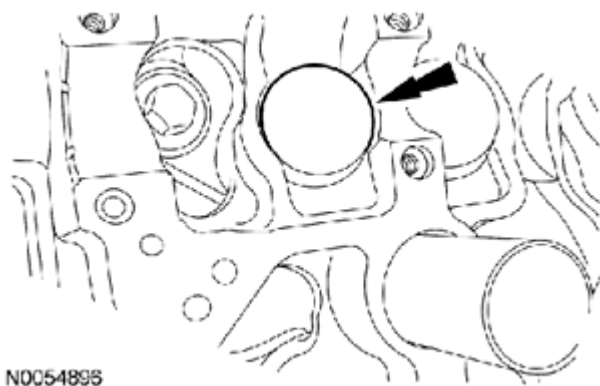


Fig. 481: Identifying Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

57. Install engine front cover.

Torque :

Stage 1: Tighten bolts 1 through 17 to 10 Nm

Stage 2: Tighten bolts 19 through 21 to 48 Nm

Stage 3: Tighten bolt 22 to 25 Nm

Stage 4: Tighten bolt 18 to 48 Nm

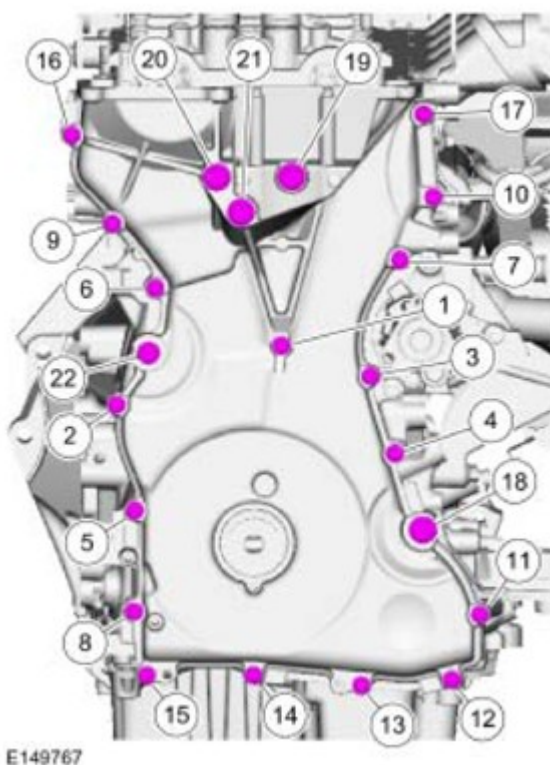
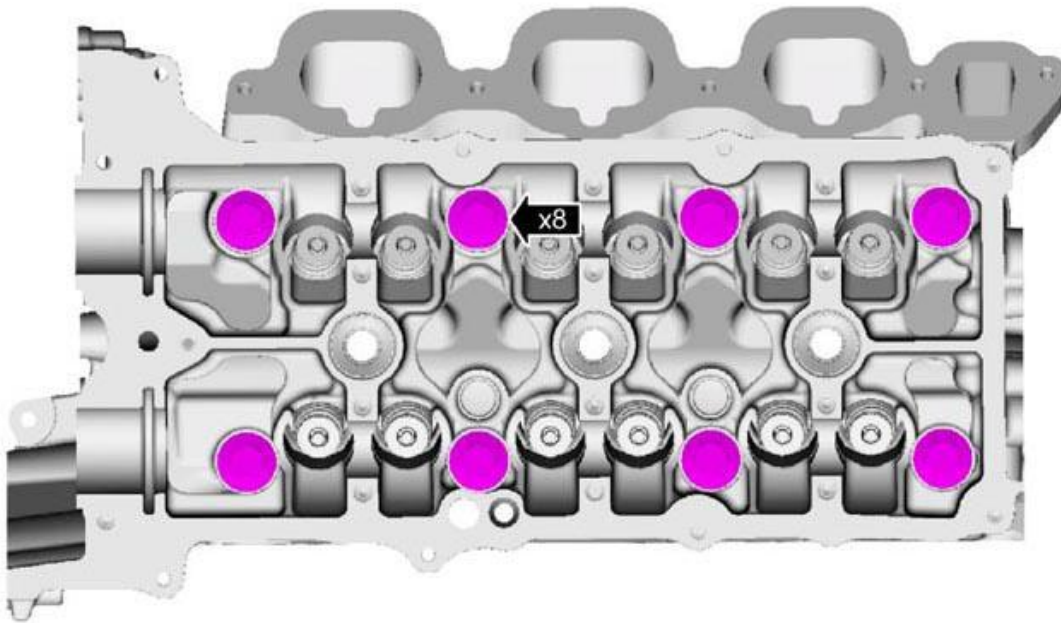


Fig. 482: Identifying Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Remove the through-bolt from the special tool.



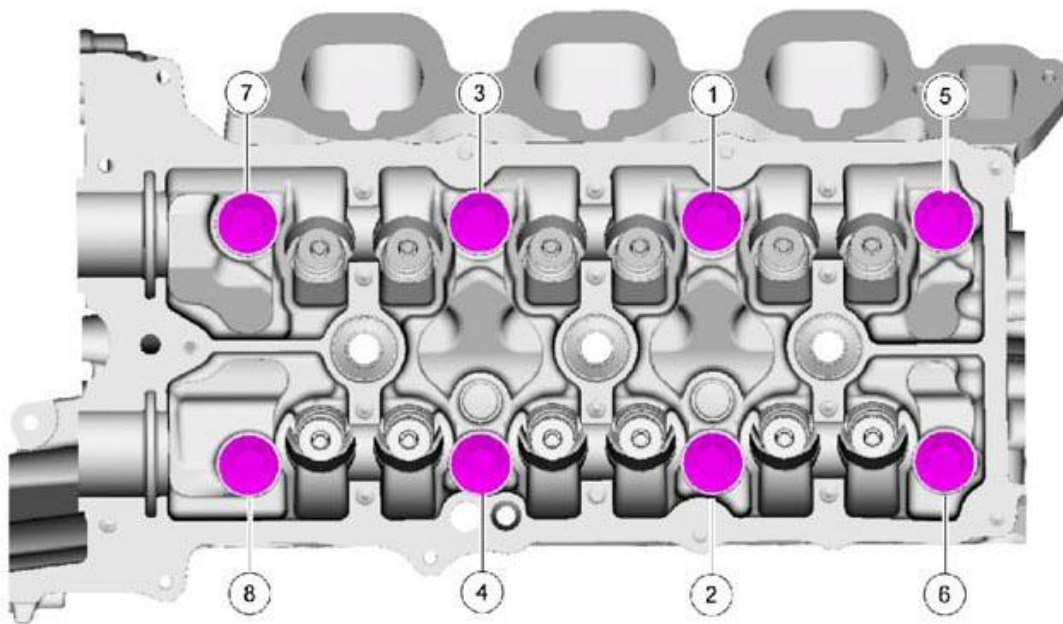
N0127034

Fig. 483: Installing Camshaft Front Oil Seal Using 303-096 Installer
Courtesy of FORD MOTOR CO.

58. *Special Tool(s)* : **303-096 (Installer, Camshaft Front Oil Seal)**

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

59. **NOTE:** **Install a new diamond washer.**

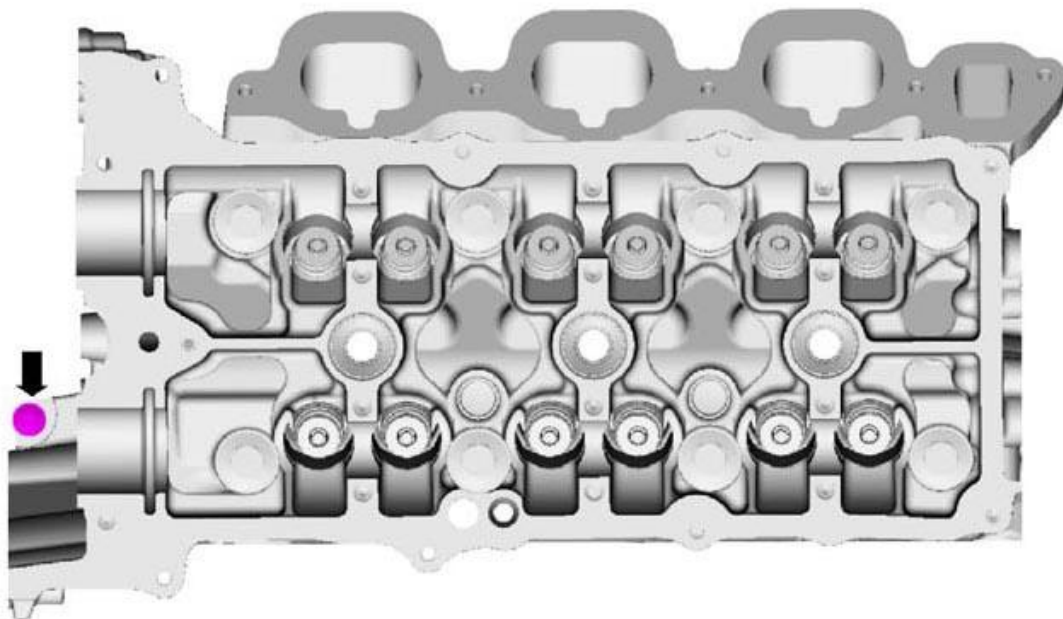


N0127035

Fig. 484: Locating Diamond Washer
Courtesy of FORD MOTOR CO.

NOTE: Do not install the crankshaft pulley bolt at this time.

NOTE: Apply clean engine oil on the seal area before installing.



N0127033

Fig. 485: Positioning Crankshaft Pulley Onto Crankshaft With Crankshaft Pulley TDC Guide Hole At 6 O'Clock Position

Courtesy of FORD MOTOR CO.

60. Position the crankshaft pulley onto the crankshaft with the crankshaft pulley TDC guide hole at the 6 o'clock position.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

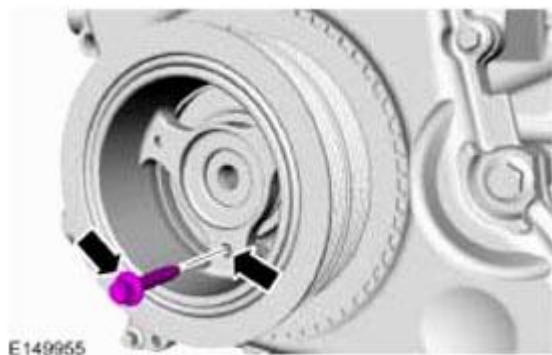


Fig. 486: Installing Standard Bolt Through Crankshaft Pulley TDC Guide Hole And Into Engine Front Cover TDC Guide Hole

Courtesy of FORD MOTOR CO.

61. Install a standard bolt through the crankshaft pulley TDC guide hole and into the engine front cover.

NOTE: The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the special tool and a new bolt should be installed using hand tools only.

NOTE: Do not reuse the crankshaft pulley bolt. Install a new crankshaft pulley bolt



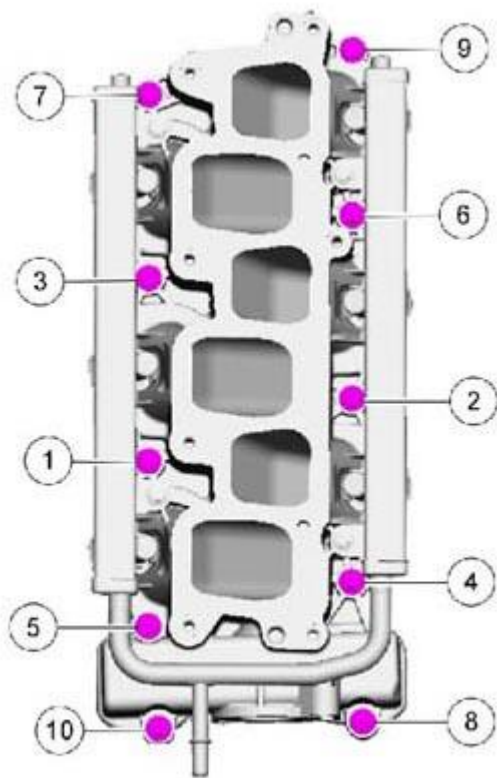
Fig. 487: Holding Crankshaft Pulley Using 303-D055 Strap Wrench
Courtesy of FORD MOTOR CO.

62. *Special Tool(s)* : 303-D055 (Strap Wrench)

Torque :

Stage 1: 100 Nm

Stage 2: Tighten an additional 90°



N0126297

63. **Fig. 488: Removing Standard Bolt From Crankshaft Pulley TDC Guide Hole And On Engine Front Cover TDC Guide Hole**
 Courtesy of FORD MOTOR CO.

64. Finger tight.

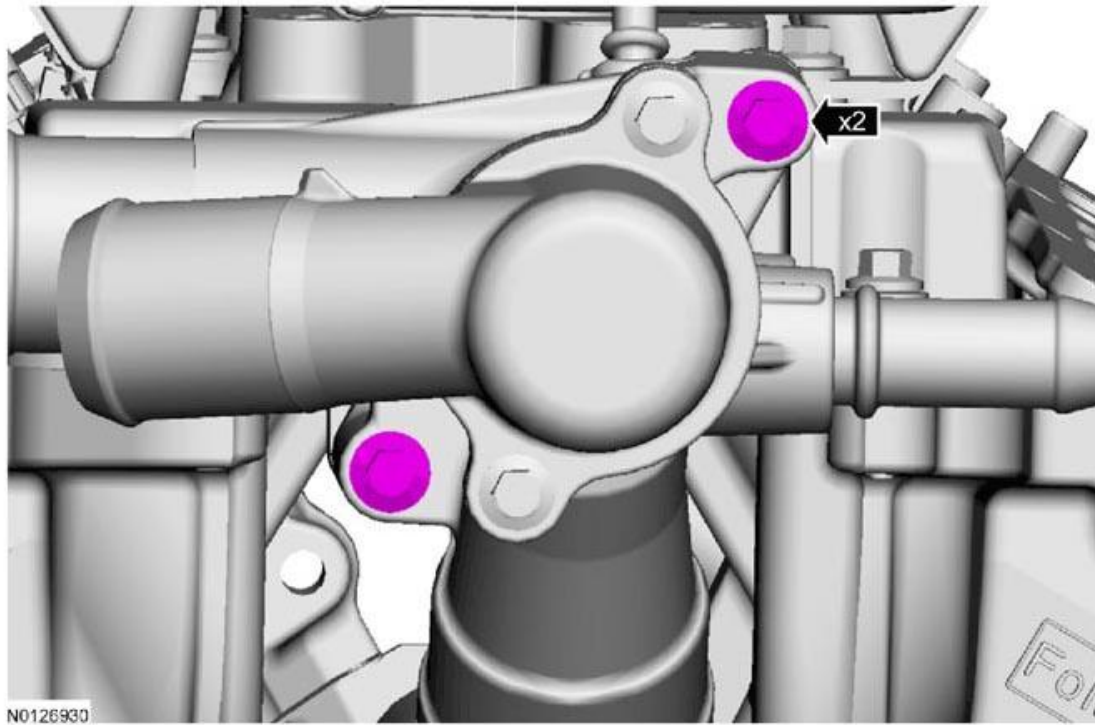


Fig. 489: Locating CKP Sensor Bolts
Courtesy of FORD MOTOR CO.

65. Install the special tool to set the CKP sensor position and tighten the 2 bolts.

Special Tool(s) : 303-1521 (Alignment Tool, Crankshaft Position Sensor)

Torque : 7 Nm

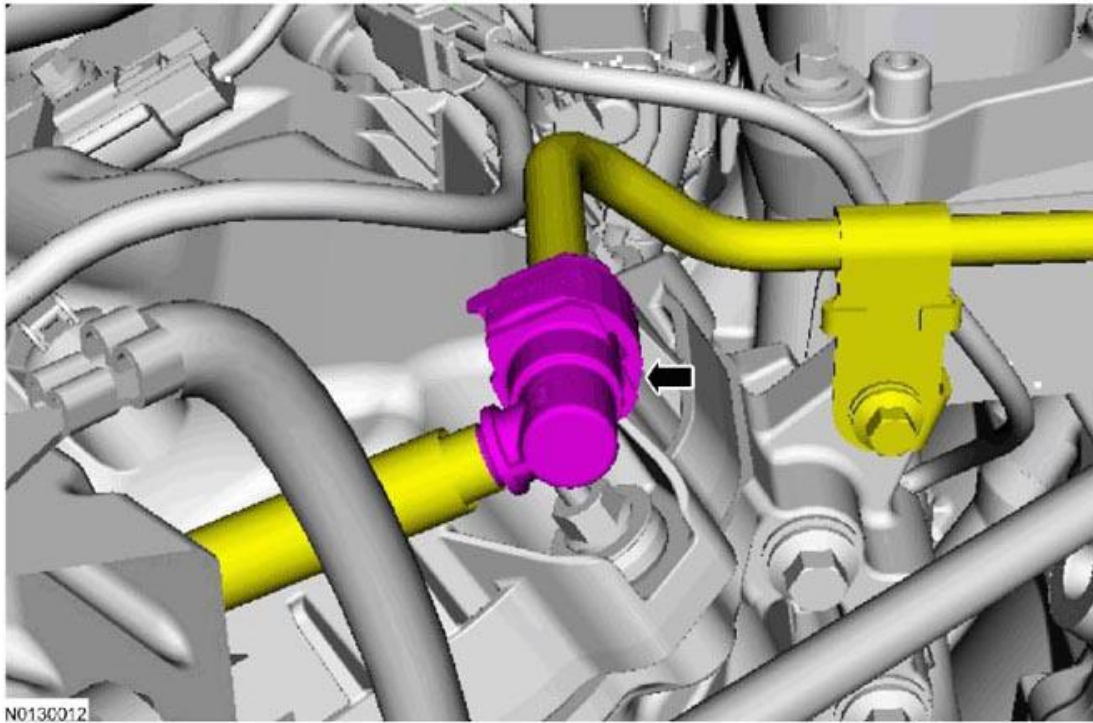


Fig. 490: Locating CKP Sensor Bolts And 303-1521 Alignment Tool
Courtesy of FORD MOTOR CO.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

66. Clean and inspect the sealing surfaces of the valve cover.

NOTE: Installation of new seals is only required if damaged seals were removed during disassembly of the engine.

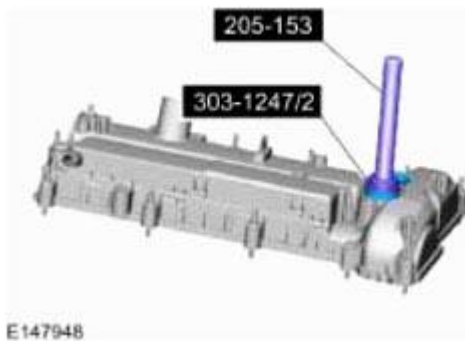


Fig. 491: Installing VCT Spark Plug Tube Seal Using Special Tools 205-153 And 303-1247/2
Courtesy of FORD MOTOR CO.

67. *Special Tool(s)* : 205-153 (Handle) , 303-1247/2 (Installer, VCT Spark Plug Tube Seal)

NOTE: The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned with Motorcraft Metal Surface Prep.

68.

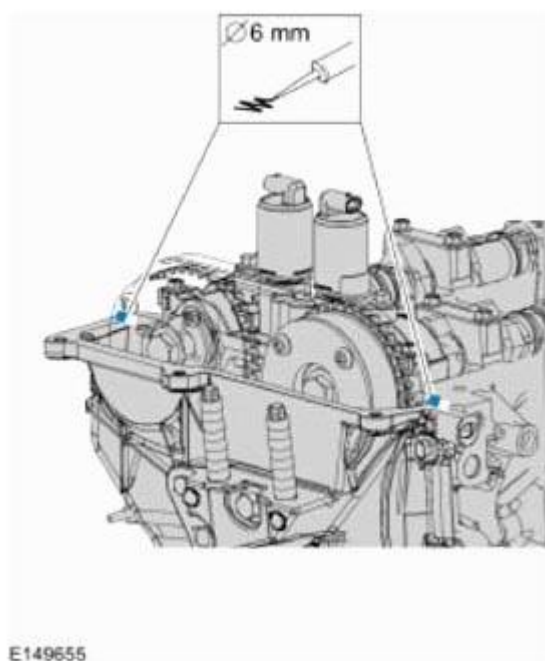


Fig. 492: Applying Silicone Gasket On Valve Cover
Courtesy of FORD MOTOR CO.

NOTE: Install a new valve cover gasket.

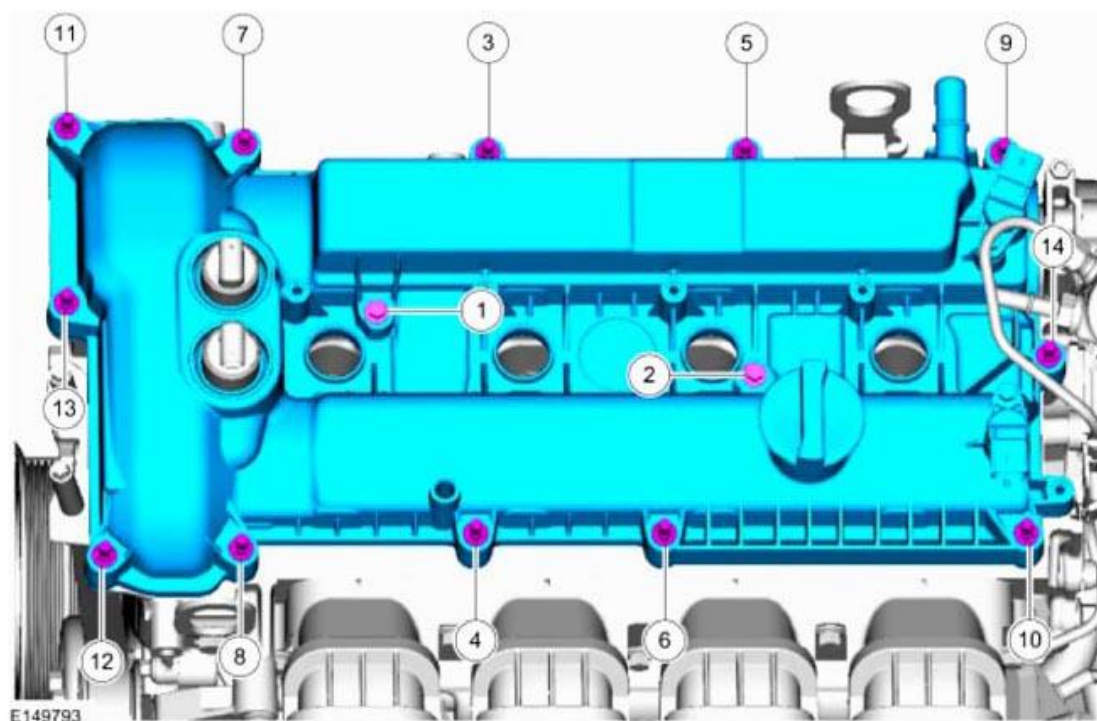


Fig. 493: Identifying Valve Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

69. Torque : 10 Nm

70. If equipped.

Torque : 3 Nm

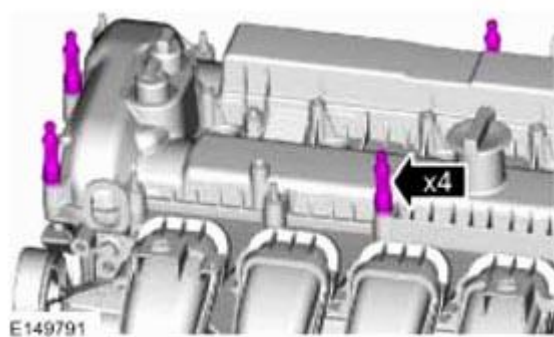


Fig. 494: Locating Stud Bolts
Courtesy of FORD MOTOR CO.

NOTE: Inspect the ignition coil boot for rips, nicks or tears. Remove and discard the damaged ignition coil boots.

71.

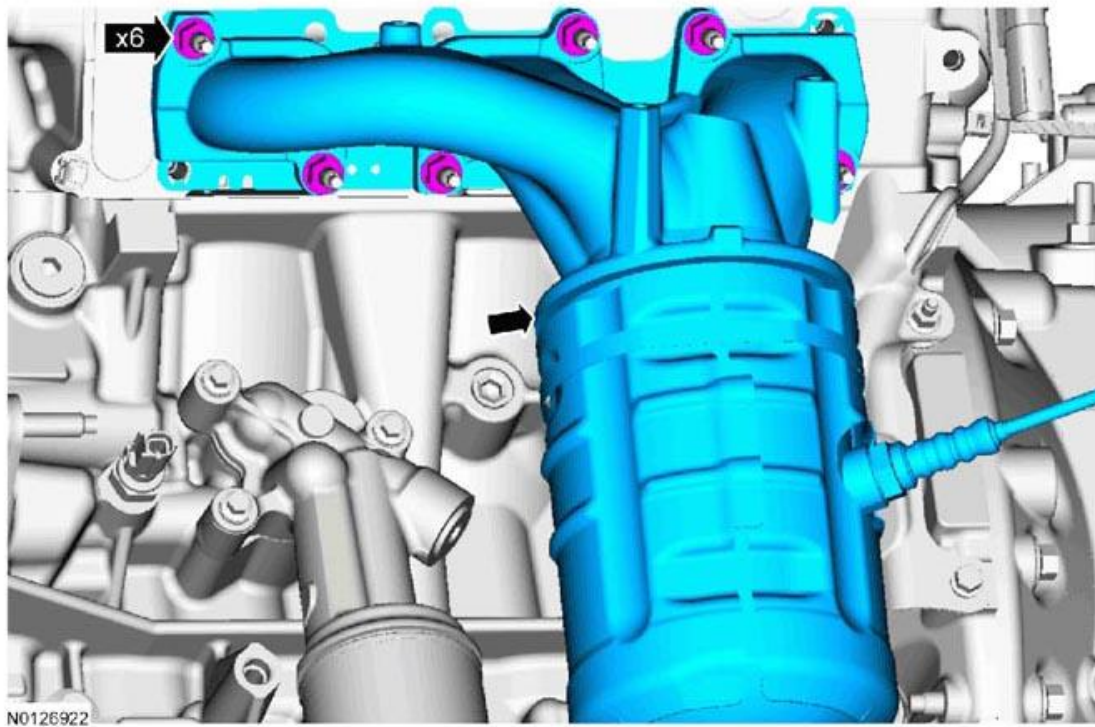
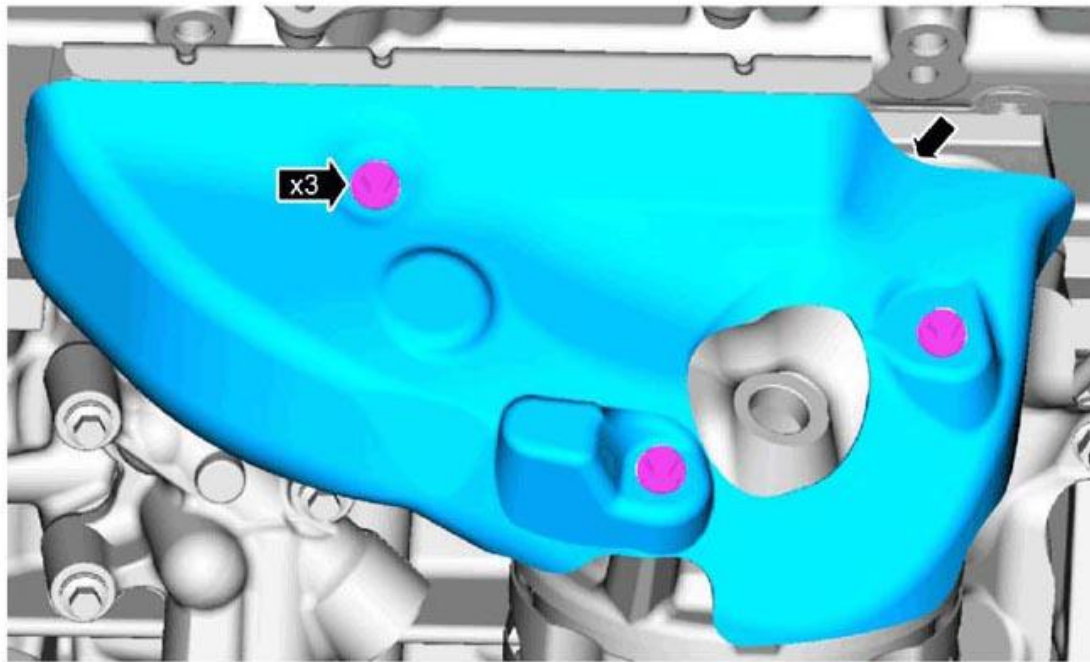


Fig. 495: Inspecting Ignition Coil Boot For Rips, Nicks Or Tears
Courtesy of FORD MOTOR CO.

NOTE: Apply a small amount of silicone brake caliper grease and dielectric compound to the inside of the ignition coil-on-plug boots before installation.



N0126940

Fig. 496: Locating Ignition Coil-On-Plugs Bolts
Courtesy of FORD MOTOR CO.

72. *Material* : Silicone Brake Caliper Grease and Dielectric Compound / XG-3-A (ESE-M1C171-A)

Torque : 10 Nm



73.

Fig. 497: Locating Oil Dipstick
Courtesy of FORD MOTOR CO.

74. Torque : 10 Nm

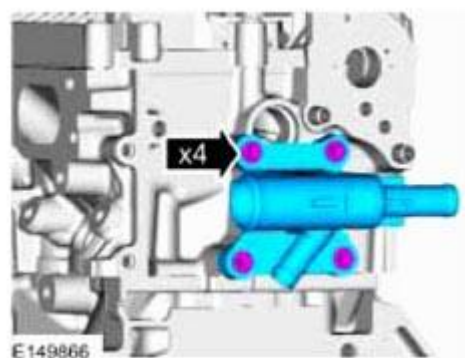


Fig. 498: Locating Coolant Outlet Connector Assembly Bolts
Courtesy of FORD MOTOR CO.

75. Torque :

Stage 1: 8 Nm

Stage 2: Tighten an additional 60°

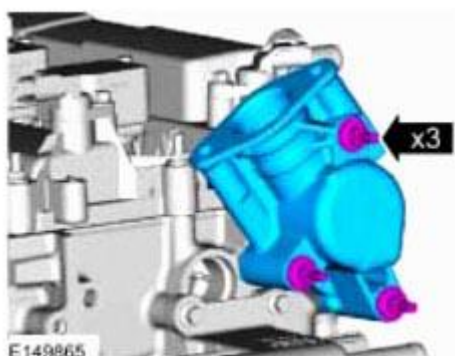


Fig. 499: Locating Fuel Injection Pump Cover Stud Bolts
Courtesy of FORD MOTOR CO.

76. Torque : 20 Nm

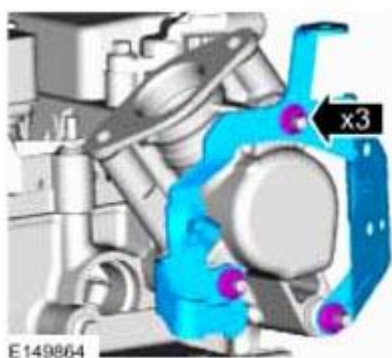


Fig. 500: Locating Fuel Injection Pump Bracket Nuts
Courtesy of FORD MOTOR CO.

NOTE: The cam lobe for the fuel injection pump must be at BDC for the fuel injection pump installation.

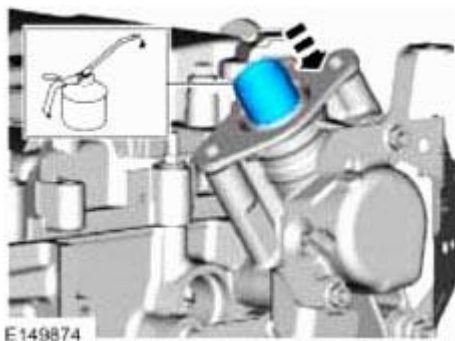


Fig. 501: Lubricating Fuel Injection Pump Roller Tappet
Courtesy of FORD MOTOR CO.

77. Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-

M2C945-A)

78. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

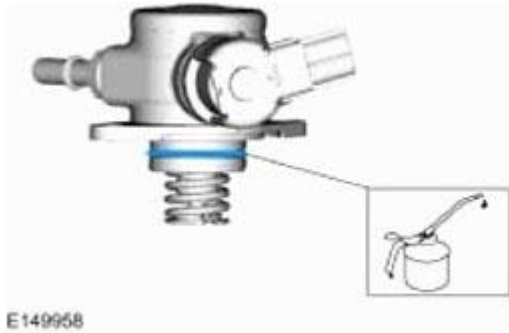


Fig. 502: Lubricating Fuel Injection Pump Seal
Courtesy of FORD MOTOR CO.

NOTE: Only rotate the crankshaft clockwise or damage to the engine may occur.

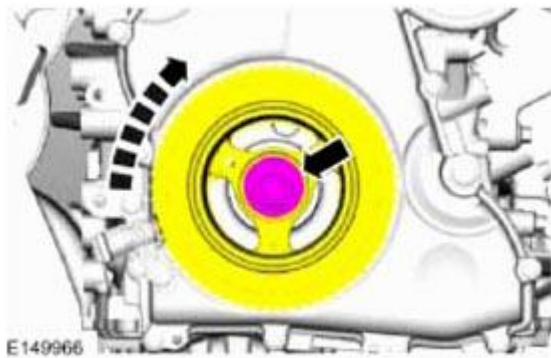


Fig. 503: Turning Crankshaft Clockwise Until Fuel Injection Pump Cam Lobe Is At BDC
Courtesy of FORD MOTOR CO.

79. Turn the crankshaft clockwise until the fuel injection pump cam lobe is at BDC.
80. Install the fuel injection pump and loosely install 2 new fuel injection pump bolts, alternately tighten each bolt one complete revolution until seated.

Torque :

Stage 1: 20 Nm

Stage 2: Tighten an additional 45°

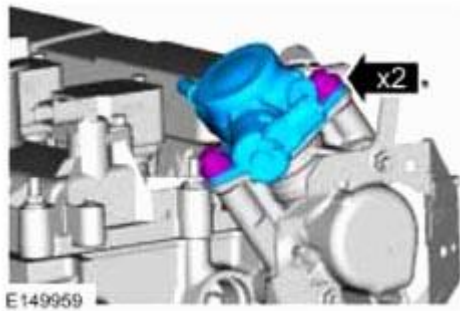


Fig. 504: Locating Fuel Injection Pump Bolts
Courtesy of FORD MOTOR CO.

81. *Torque* : 48 Nm

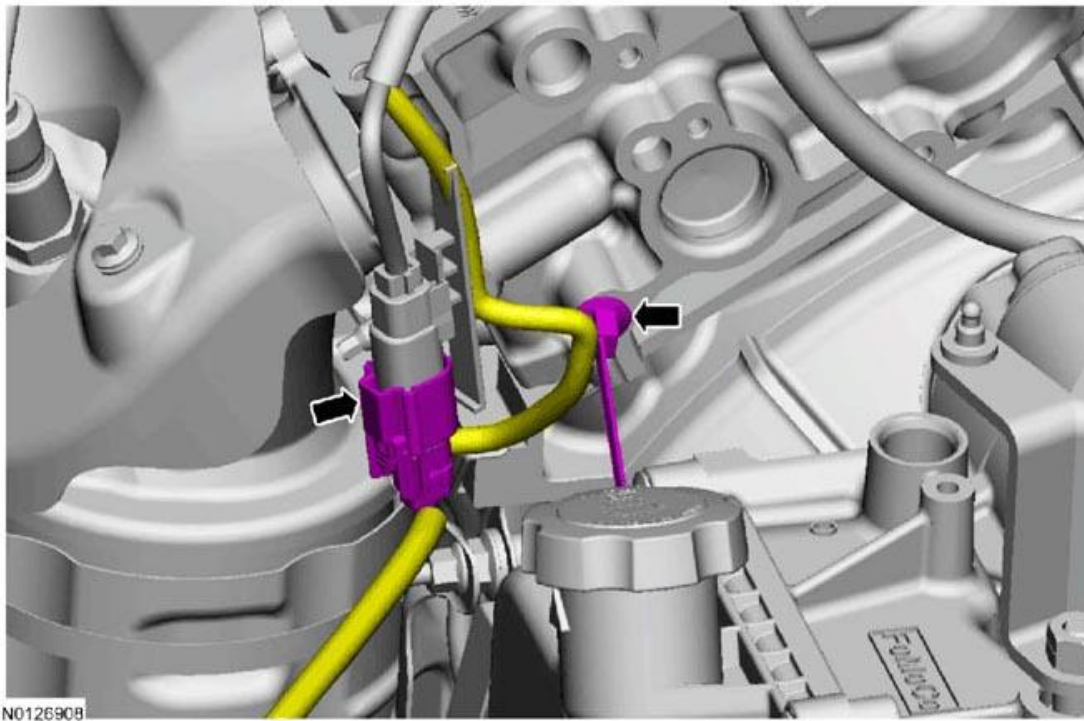


Fig. 505: Identifying RH And LH KS Bolts
Courtesy of FORD MOTOR CO.

82. *Torque* : 25 Nm

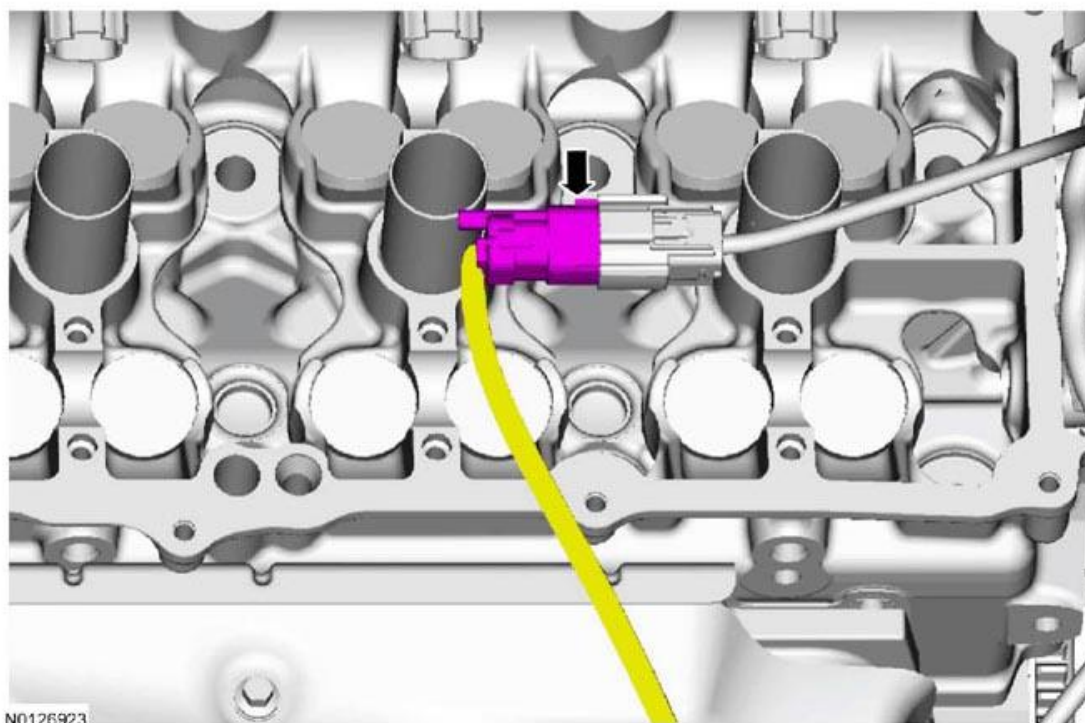


Fig. 506: Identifying RH And LH KS Bolts
Courtesy of FORD MOTOR CO.

NOTE: The RH KS must be installed in the 6 o'clock position and the LH KS must be installed in the 4 o'clock position. Failure to follow these instructions may result in damage to the engine.



Fig. 507: Identifying RH And LH KS Location
Courtesy of FORD MOTOR CO.

83. Torque : 20 Nm

NOTE: Install a new gasket.



Fig. 508: Locating Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

84. Torque : 25 Nm

NOTE: Install a new gasket.

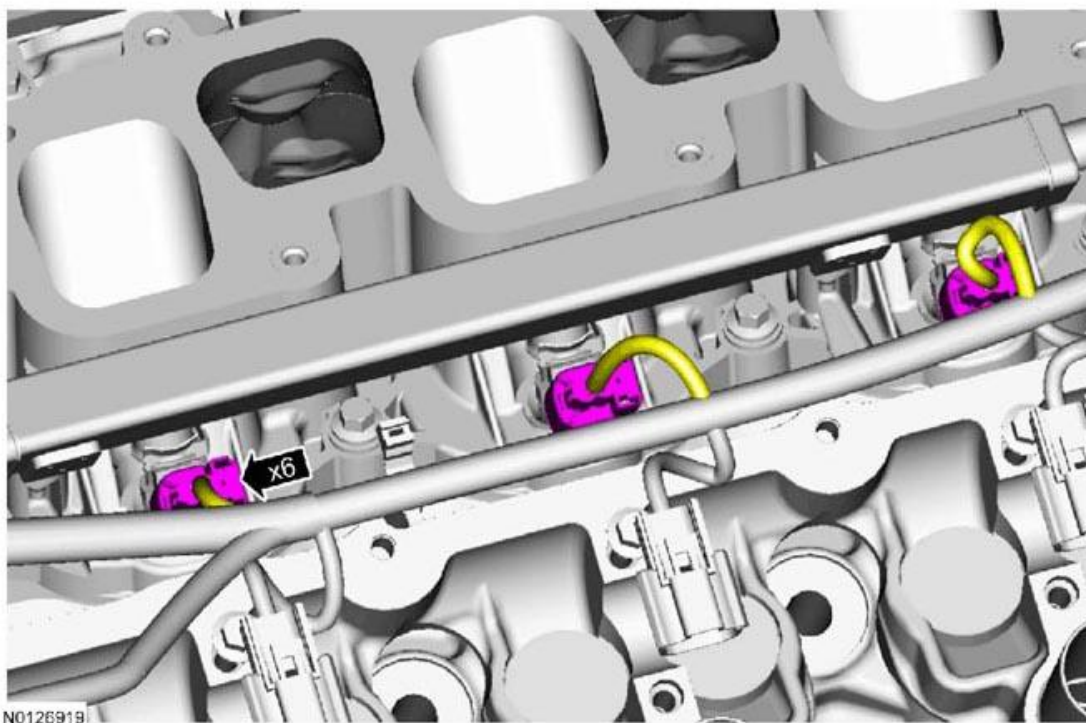


Fig. 509: Locating PCV Oil Separator Assembly Bolts
Courtesy of FORD MOTOR CO.

85. Torque : 10 Nm

NOTE: Do not attempt to cut the lower Teflon® seal without first pulling it away from the fuel injector or damage to the injector may occur.

NOTE: Be very careful when removing the lower Teflon® seals, not to scratch, nick or gouge the fuel injectors.

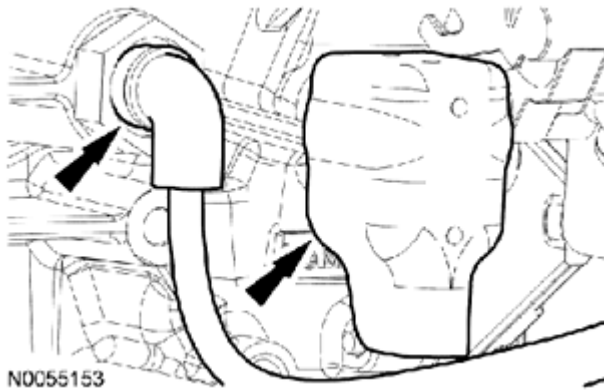


Fig. 510: Pulling Lower Teflon® Seal Away From Injector With Narrow Tip Pliers
Courtesy of FORD MOTOR CO.

86. Pull the lower Teflon® seal away from the injector with narrow tip pliers.
87. Carefully cut and discard the lower fuel injector Teflon® seals.

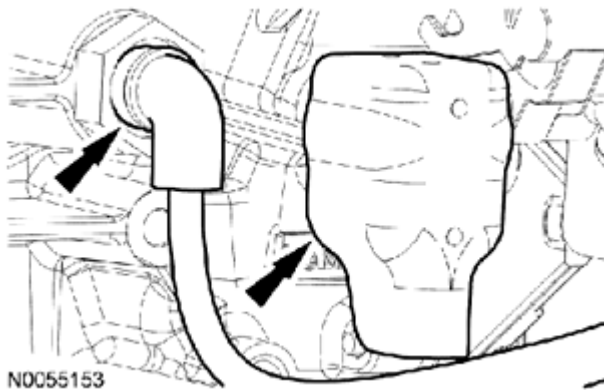


Fig. 511: Cutting Lower Fuel Injector Teflon® Seals
Courtesy of FORD MOTOR CO.

88. Place the special tool, knurled side out, over the fuel injector tip until the fuel injector seal recess is exposed.

Special Tool(s) : 303-1567 (Sizer, Teflon Seal)

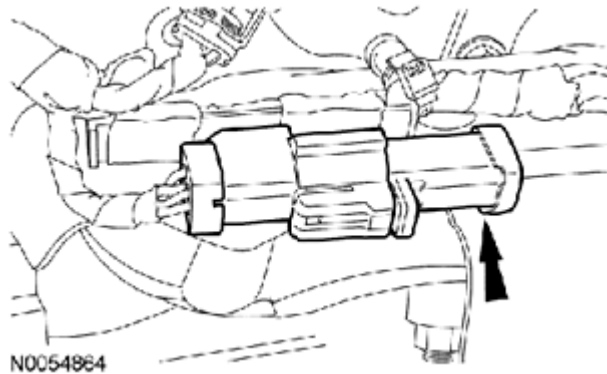


Fig. 512: Placing Special Tool, Knurled Side Out, Over Fuel Injector Tip
Courtesy of FORD MOTOR CO.

NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

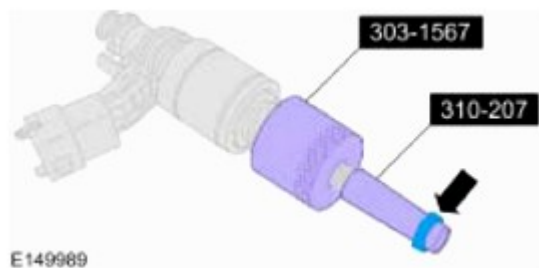


Fig. 513: Installing Lower Teflon® Seals On Narrow End Of Arbor
Courtesy of FORD MOTOR CO.

89. Install the new lower Teflon® seals on the narrow end of the Arbor (part of the special tool), then install the Arbor on the fuel injector tips.

Special Tool(s) : 310-207 (Installer, Fuel Injector Seal Assembly) , 303-1567 (Sizer, Teflon Seal)

NOTE: Once the Teflon® seal is installed on the Arbor, it should immediately be installed onto the fuel injector to avoid excessive expansion of the seal.

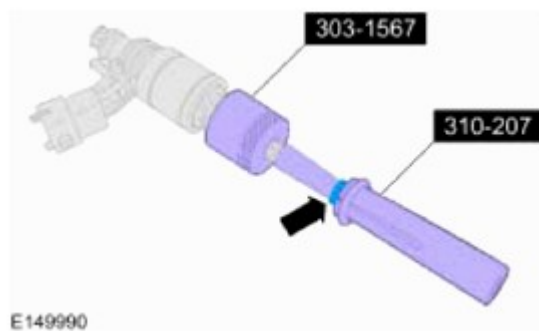


Fig. 514: Sliding Teflon® Seals Off Of Arbor And Into Groove On Fuel Injectors Using Pusher

Tool**Courtesy of FORD MOTOR CO.**

90. Using the Pusher Tool (part of the special tool), slide the Teflon® seals off of the Arbor and into the groove on the fuel injectors.

Special Tool(s) : 310-207 (Installer, Fuel Injector Seal Assembly) , 303-1567 (Sizer, Teflon Seal)

NOTE: Make sure the Teflon® seal is fully seated in the groove on the fuel injector before sizing the seal.

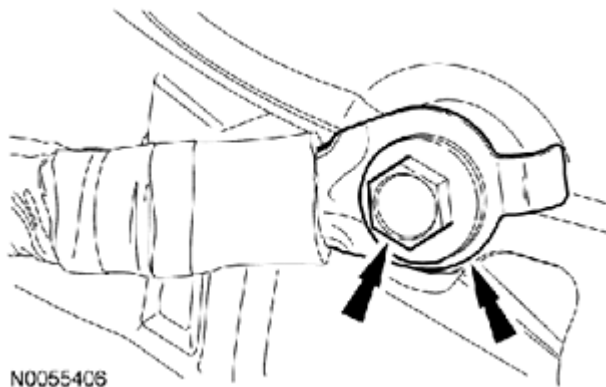


Fig. 515: Sliding Special Tool Off End Of Fuel Injector To Size Seal
Courtesy of FORD MOTOR CO.

91. Slide the special tool off the end of the fuel injector to size the seal.

Special Tool(s) : 303-1567 (Sizer, Teflon Seal)

NOTE: Use fuel injector O-ring seals that are made of special fuel-resistant material. The use of ordinary O-ring seals may cause the fuel system to leak. Do not reuse the O-ring seals.

NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

NOTE: Lubricate the upper fuel injector O-ring seals with clean engine oil.

NOTE: Install the fuel injectors into the cylinder head within 15 minutes due to Teflon® seal expansion.

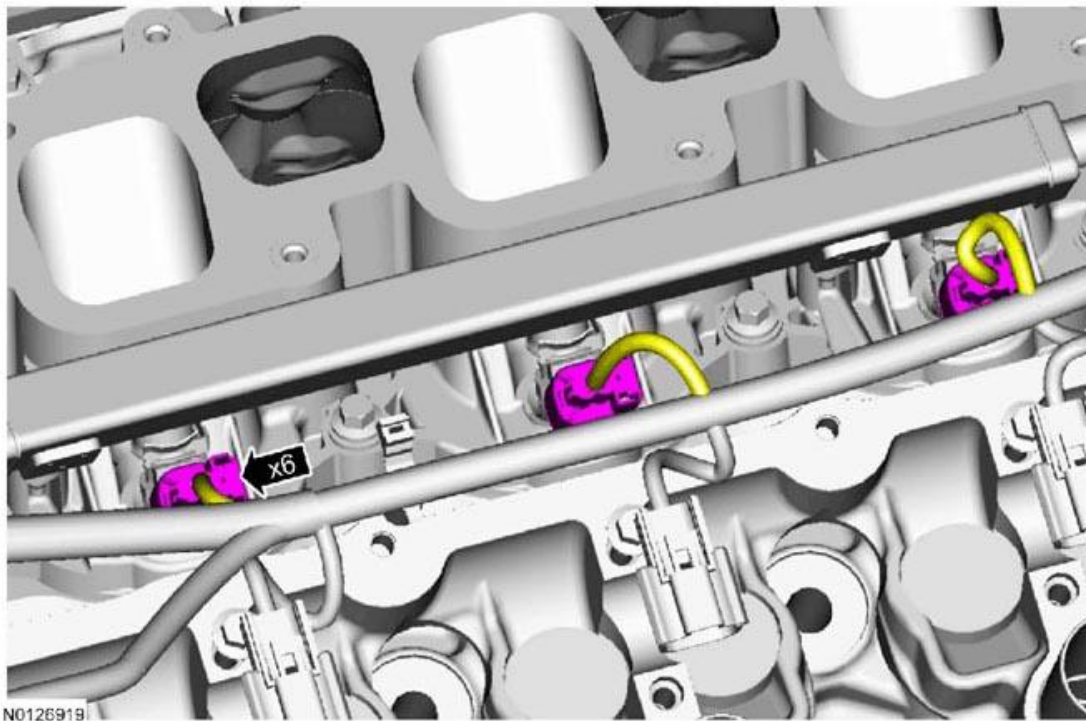
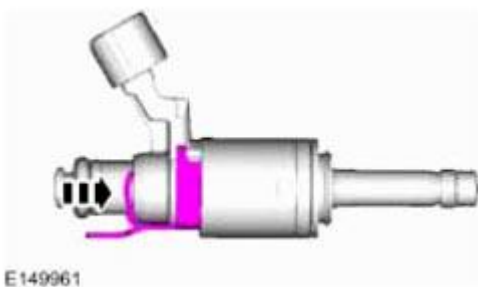


Fig. 516: Lubricating Upper Fuel Injector O-Ring Seal Support Rings And Upper Fuel Injector O-Ring Seals
Courtesy of FORD MOTOR CO.

92. Install the new upper fuel injector O-ring seal support rings and the new upper fuel injector O-ring seals.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)



- 93.

Fig. 517: Installing Fuel Injector Clip
Courtesy of FORD MOTOR CO.

94. **NOTE:** The anti-rotation finger of the fuel injector clip must slip into the groove of the fuel rail cup.

NOTE: The fuel rail pressure sensor must be replaced if it is removed from the

fuel rail.

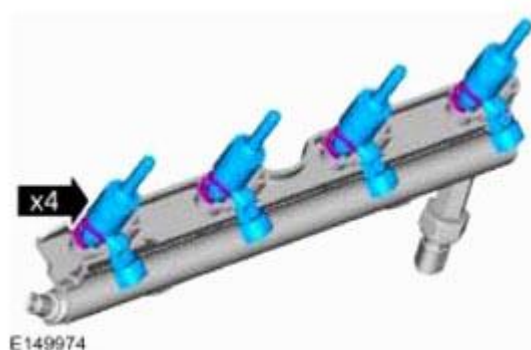


Fig. 518: Locating Fuel Injector Clip
Courtesy of FORD MOTOR CO.

NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

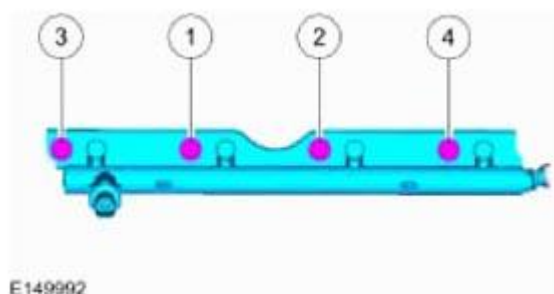


Fig. 519: Identifying Fuel Rail Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

95. Install the fuel rail by pushing down on the fuel rail face above the injectors and install the 4 bolts.

Torque : 25 Nm

- 96.
1. Hand tighten the high pressure fuel tube-to-fuel rail flare nut.
 2. Hand tighten the high pressure fuel tube-to-fuel injection pump flare nut.

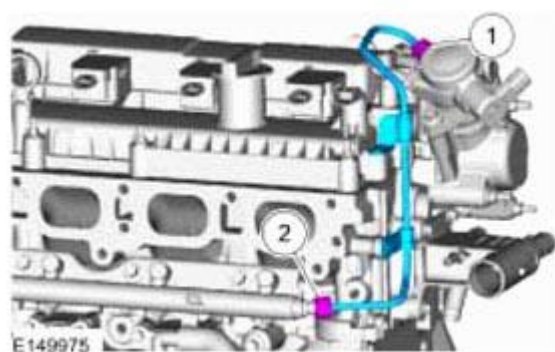


Fig. 520: Identifying High Pressure Fuel Tube-To-Fuel Rail Flare Nut And High Pressure Fuel Tube-To-Fuel Injection Pump Flare Nut
Courtesy of FORD MOTOR CO.

97. Finger tight.

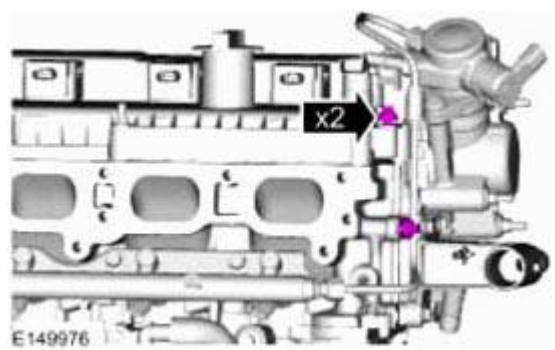


Fig. 521: Locating High Pressure Fuel Tube Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: Calculate the correct torque wrench setting for the following torque.
REFER to Torque Wrench Adapter Formulas in illustration.

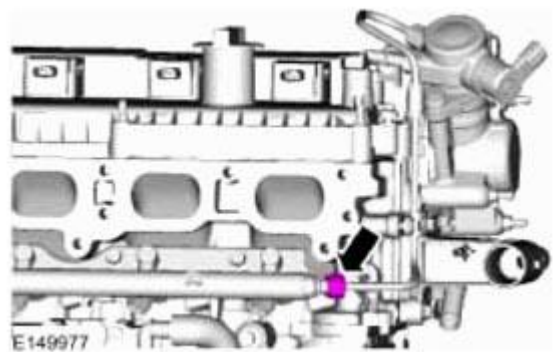
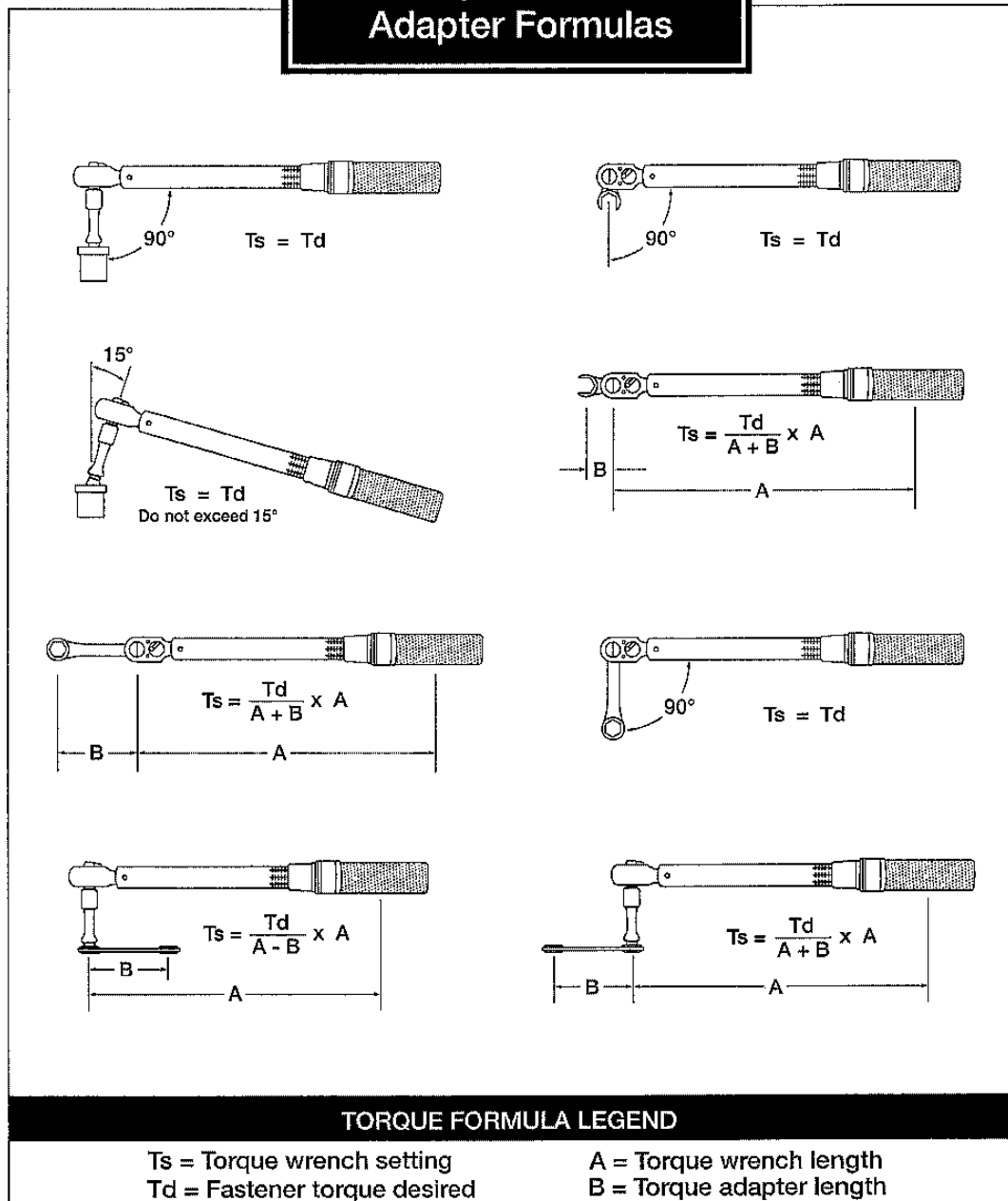


Fig. 522: Locating High Pressure Fuel Tube-To-Fuel Injection Pump Flare Nut
Courtesy of FORD MOTOR CO.

Torque Wrench Adapter Formulas



G00468730

Fig. 523: Torque Wrench Adapter Formulas
 Courtesy of FORD MOTOR CO.

98. Torque :

Stage 1: 15 Nm

Stage 2: 45°

NOTE: Calculate the correct torque wrench setting for the following torque.
REFER to Torque Wrench Adapter Formulas in illustration.

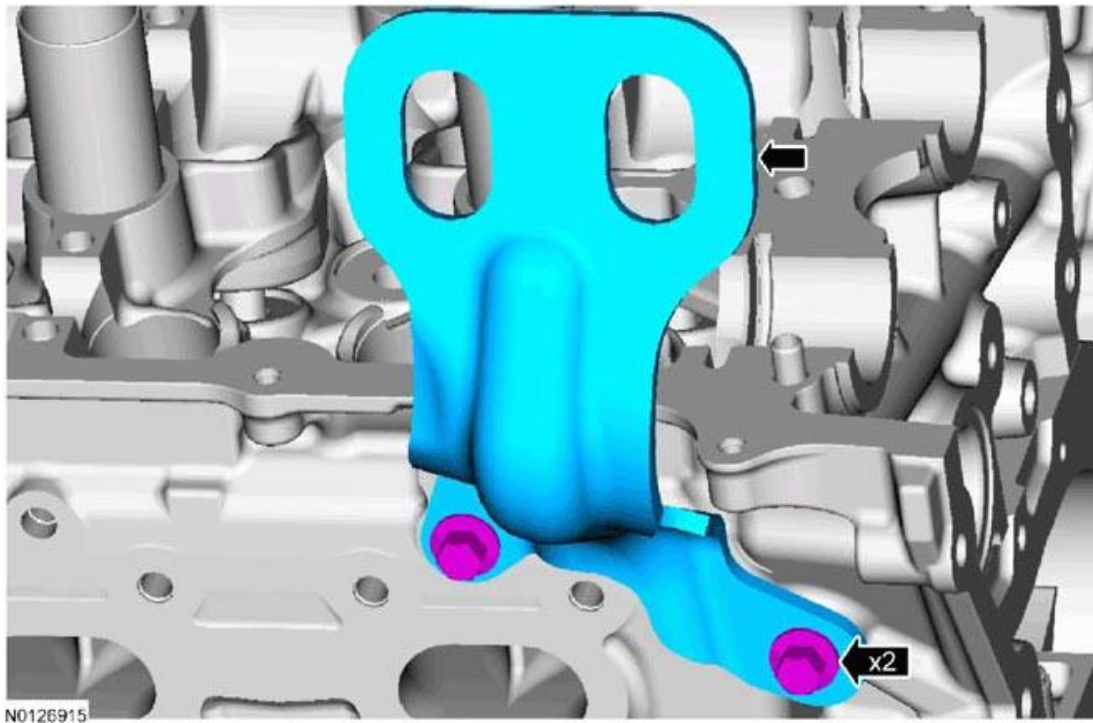
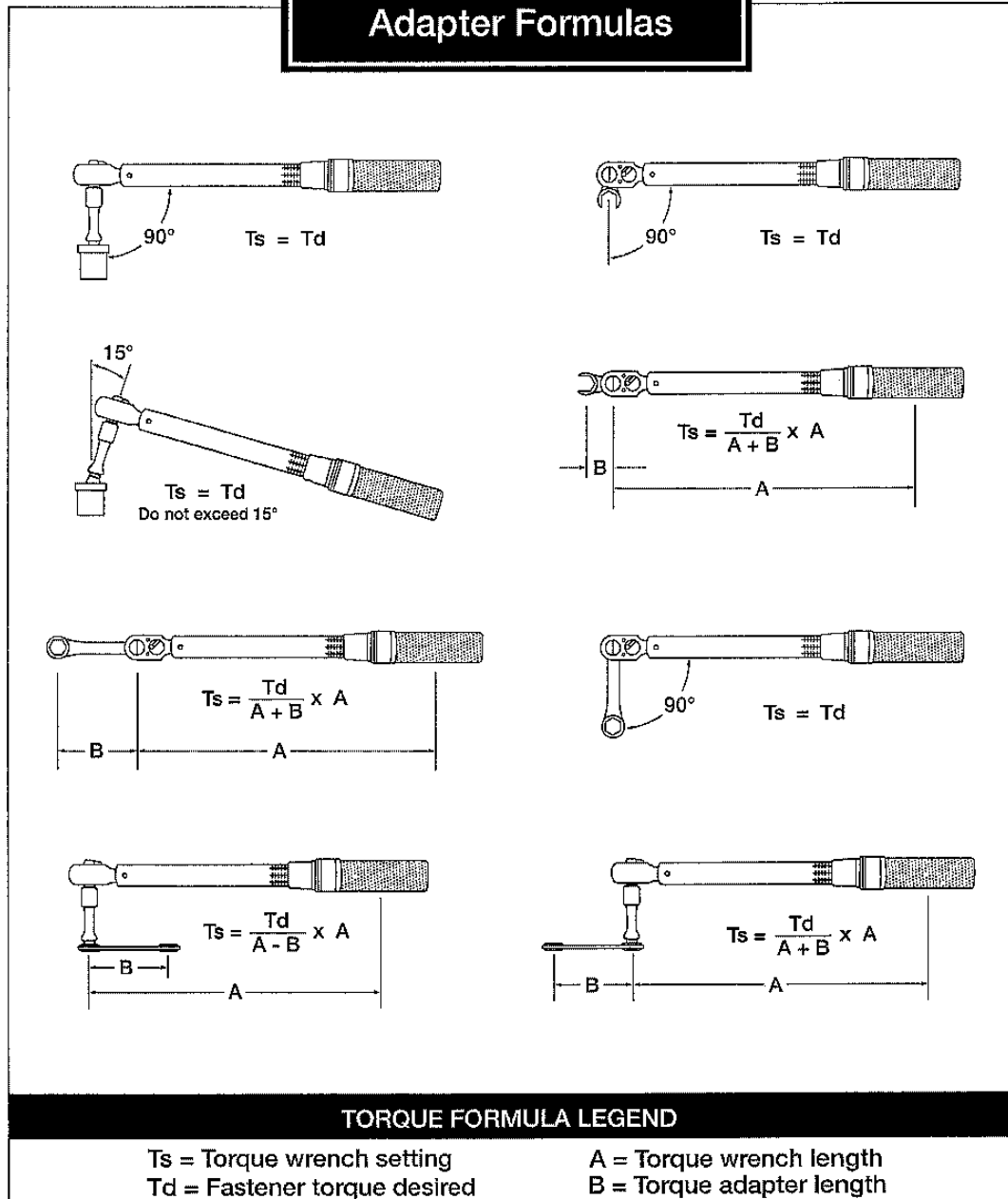


Fig. 524: Locating High Pressure Fuel Tube-To-Fuel Rail Flare Nut
Courtesy of FORD MOTOR CO.

Torque Wrench Adapter Formulas



G00468730

Fig. 525: Torque Wrench Adapter Formulas
 Courtesy of FORD MOTOR CO.

99. Tighten the high pressure fuel tube-to-fuel injection pump flare nut in the following 2 stages:

Torque :

Stage 1: 15 Nm

Stage 2: 45°

100. *Torque* : 10 Nm

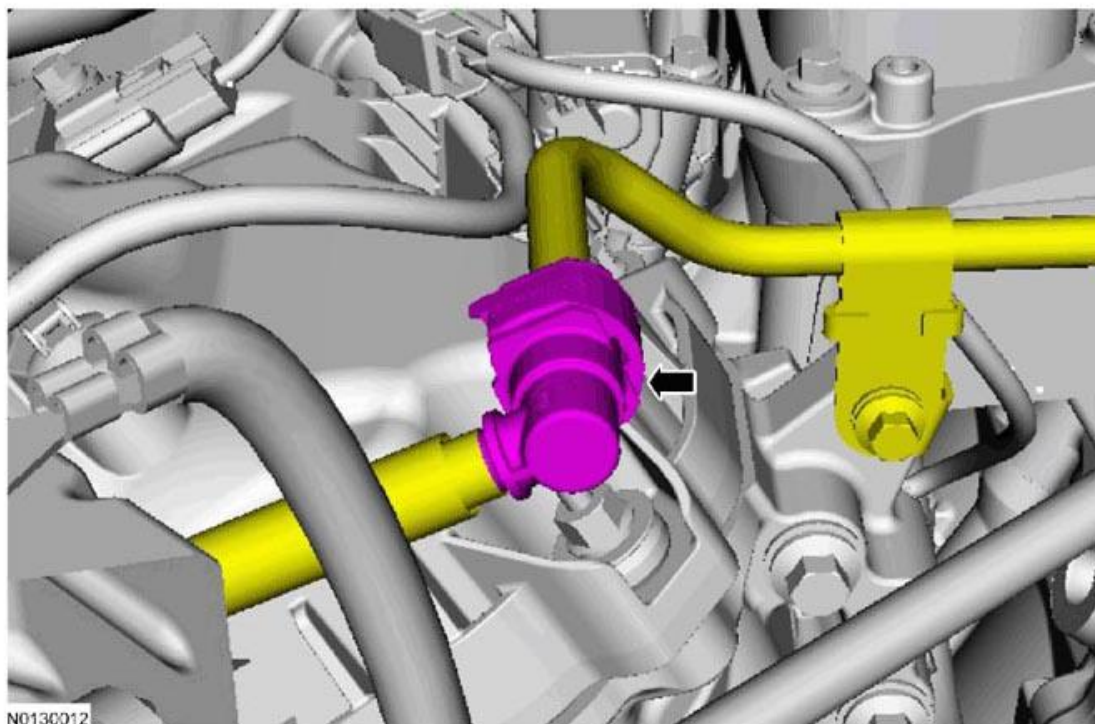


Fig. 526: Locating High Pressure Fuel Tube Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: Use care when installing the fuel injection pump noise insulator. Spreading the openings will aid in installing the fuel injection pump noise insulator and reduce the risk of damage.

101.

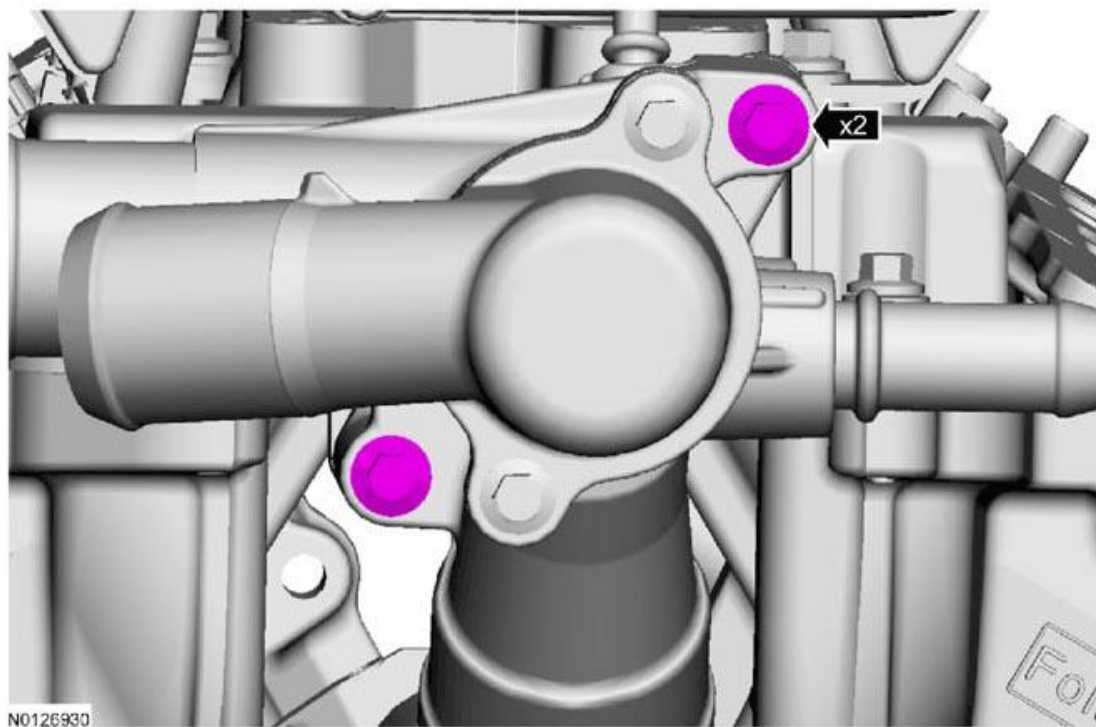
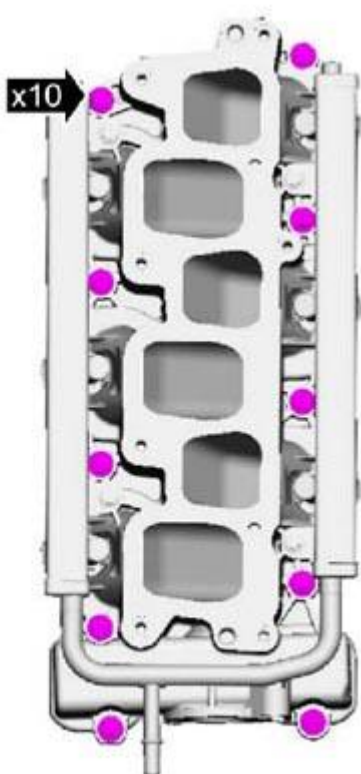


Fig. 527: Identifying Fuel Injection Pump Noise Insulator
Courtesy of FORD MOTOR CO.



N0126947

102.

Fig. 528: Locating Fuel Injector Harness Connectors
Courtesy of FORD MOTOR CO.

103. *General Equipment* : Hose Clamp Remover/Installer

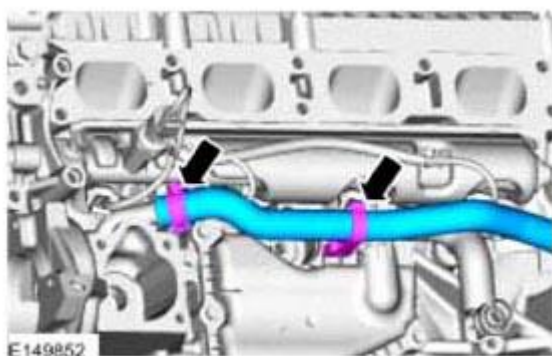


Fig. 529: Locating Hose Clamps
Courtesy of FORD MOTOR CO.

104. **NOTE:** **Inspect and install new intake manifold gaskets if necessary.**

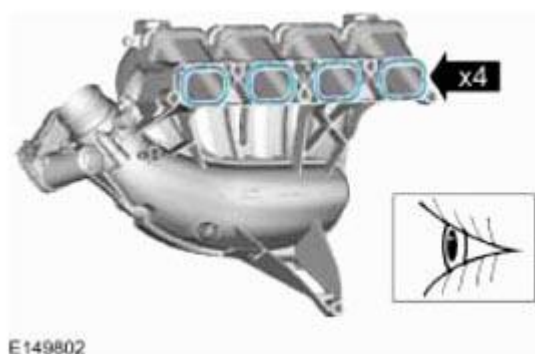


Fig. 530: Inspecting Intake Manifold Gaskets
Courtesy of FORD MOTOR CO.

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

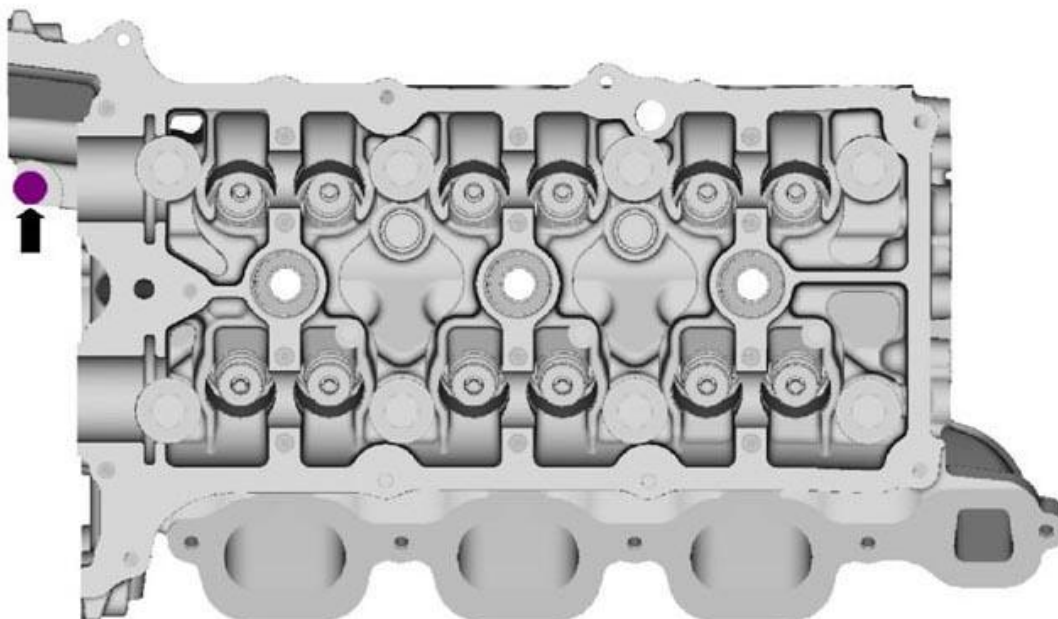
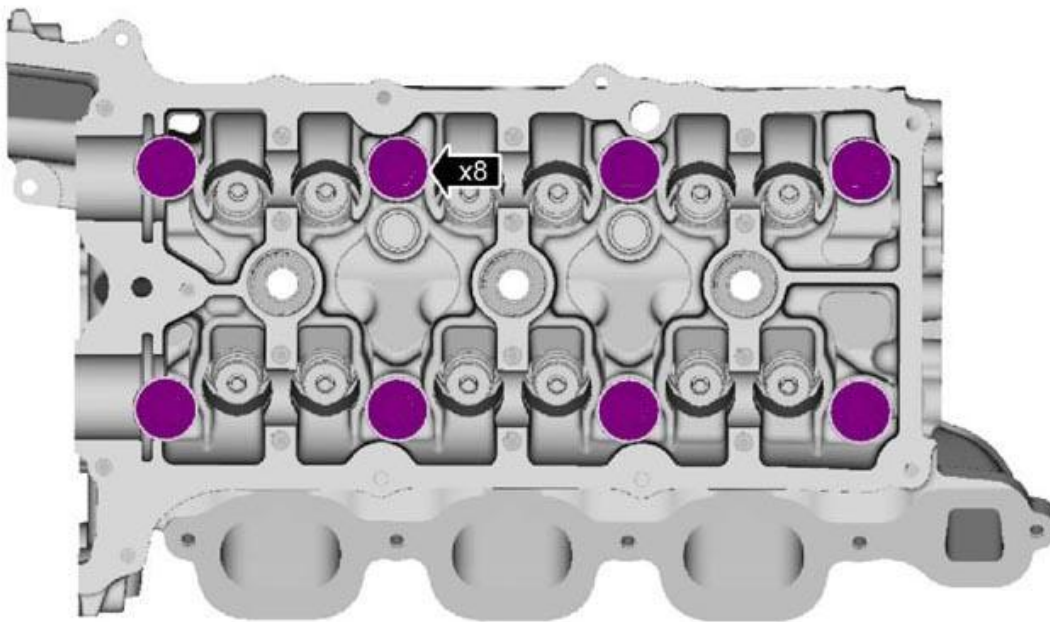


Fig. 531: Locating Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

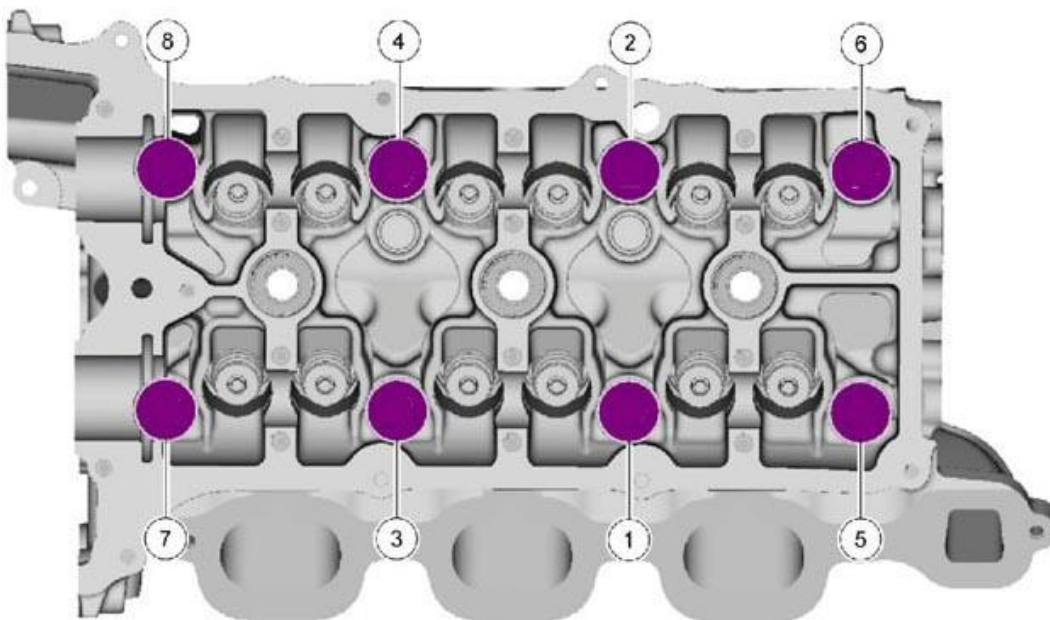
105. Finger tight.
106. Torque : 20 Nm



N0127031

Fig. 532: Locating Intake Manifold Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

107. Refer to: **QUICK RELEASE COUPLING** .

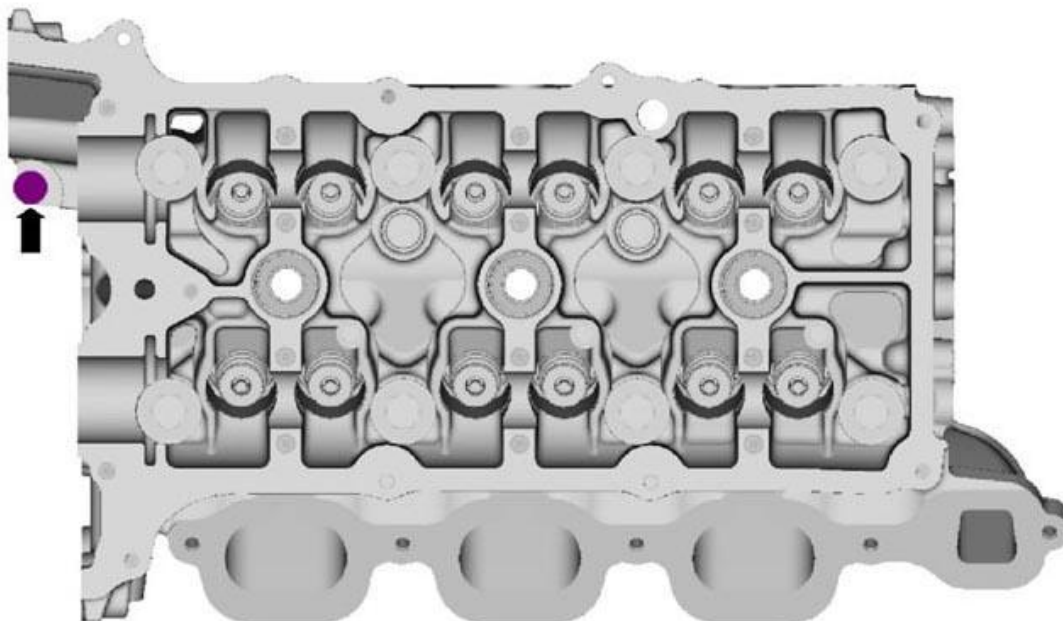


N0127032

Fig. 533: Locating Hose Quick Release Coupling And Retainer

Courtesy of FORD MOTOR CO.

NOTE: Install a new gasket.



N0127030

Fig. 534: Locating Thermostat Housing Bolts
Courtesy of FORD MOTOR CO.

108. *Torque* : 10 Nm

109. **NOTE:** Install the generator stud before the generator is installed.

- *Torque* : Tighten the generator stud to 8 Nm
- *Torque* : Tighten the nut and 2 bolts to 25 Nm

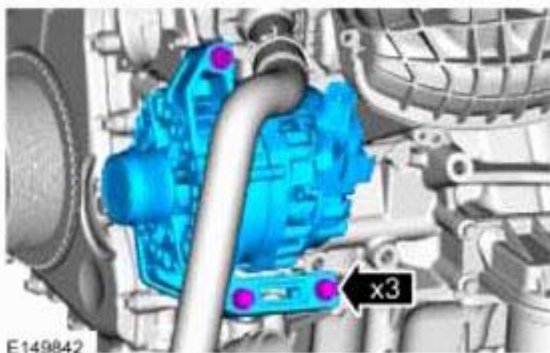


Fig. 535: Locating Generator Stud

Courtesy of FORD MOTOR CO.

110. *General Equipment* : Hose Clamp Remover/Installer

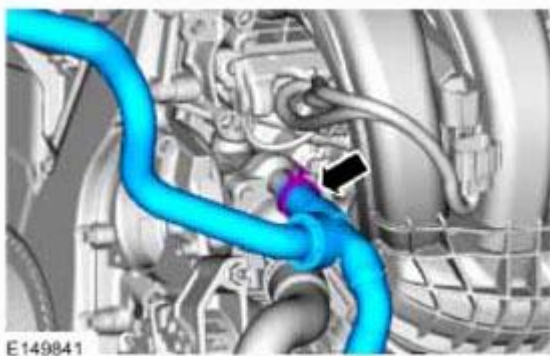
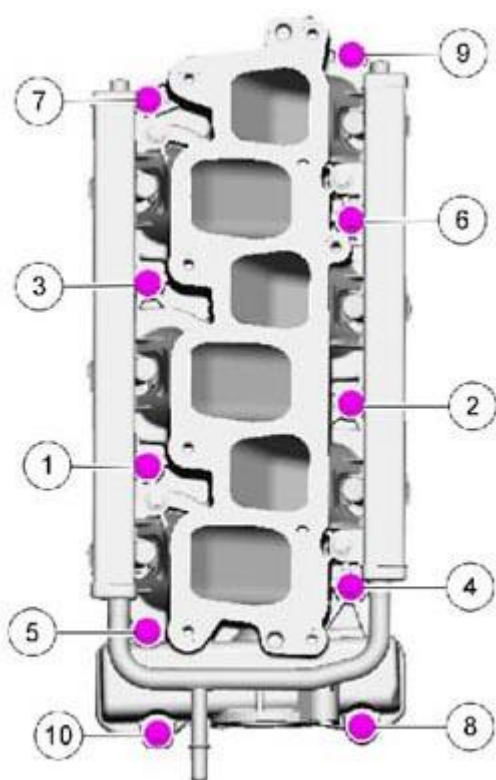


Fig. 536: Locating Hose Clamp
Courtesy of FORD MOTOR CO.

111. *Torque* : 25 Nm



N0126297

Fig. 537: Locating A/C Compressor Cover Bolts
Courtesy of FORD MOTOR CO.

NOTE: Install a new O-ring seal.

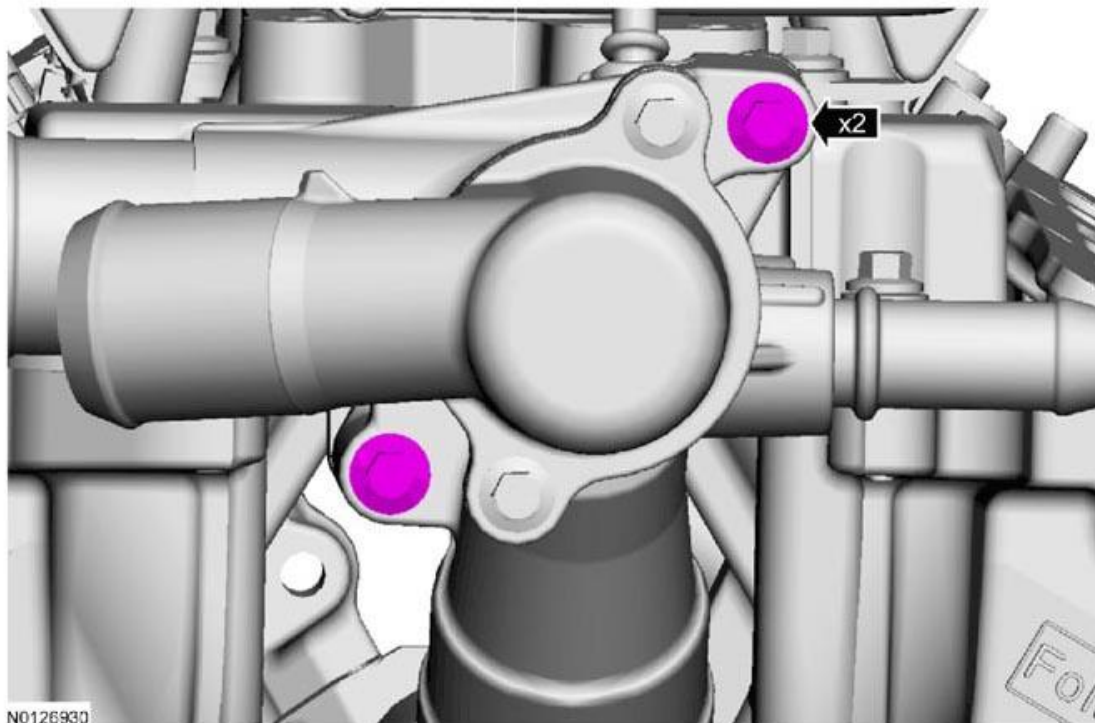


Fig. 538: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

- 112. *Torque* : 10 Nm
- 113. Finger tight.

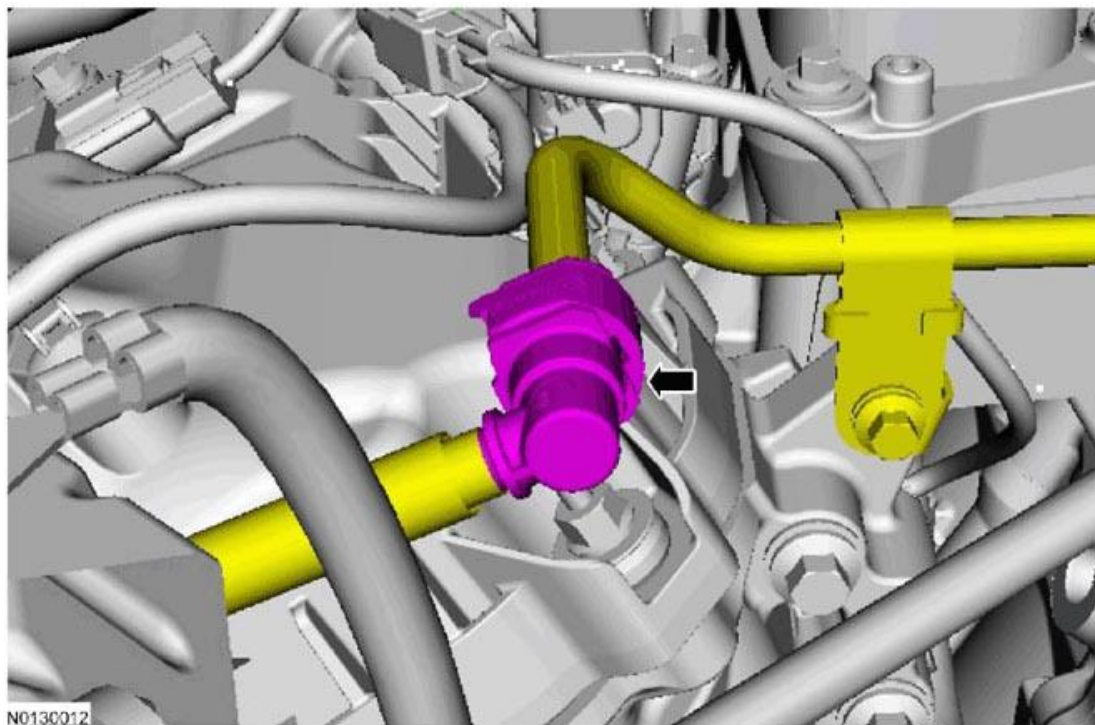


Fig. 539: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.

114. *Torque : 25 Nm*

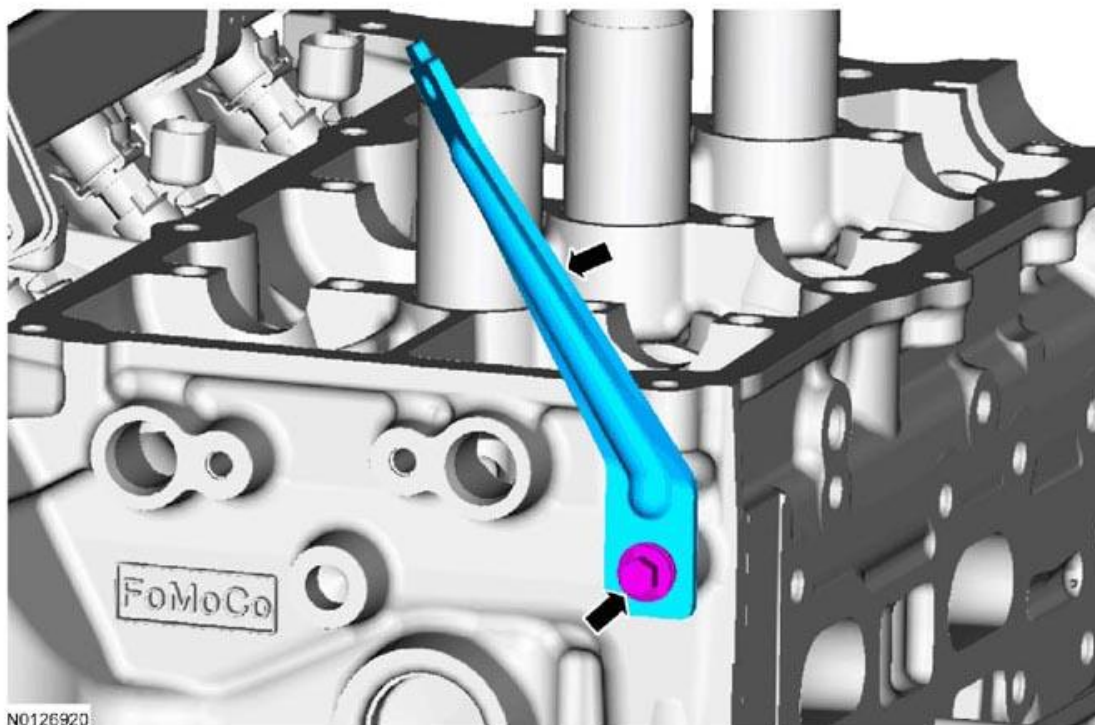
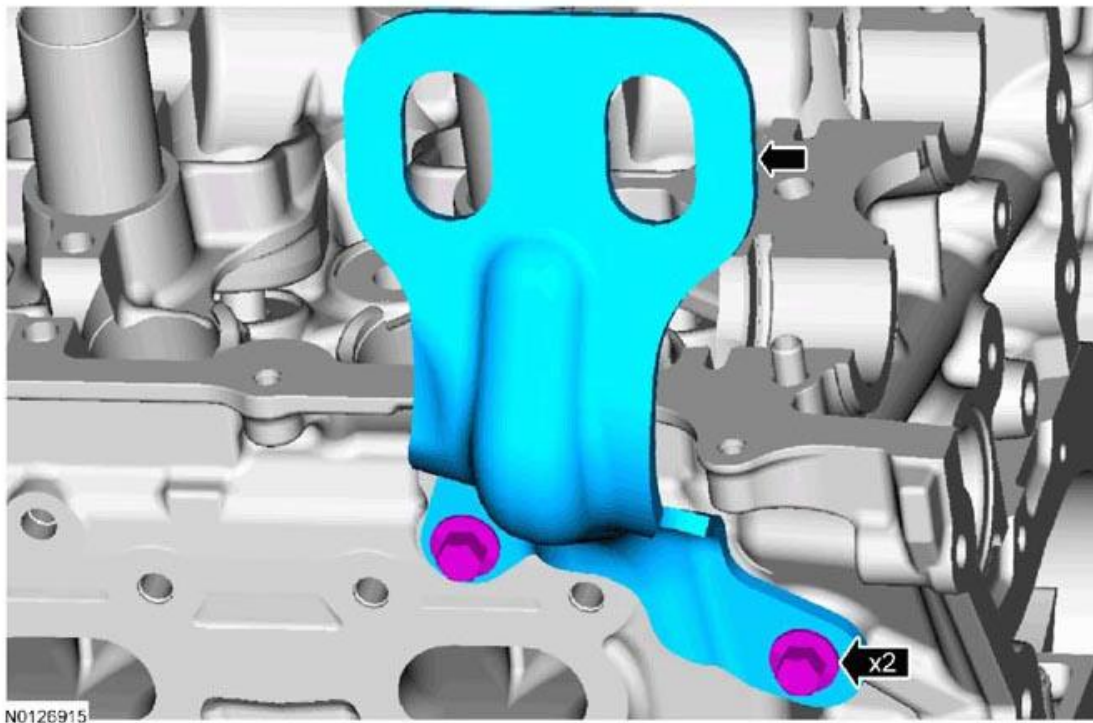


Fig. 540: Locating Pulley Bracket Bolts

Courtesy of FORD MOTOR CO.

NOTE: Under no circumstances should the A/C compressor belt, accessory drive belt, tensioner or pulleys be lubricated as potential damage to the belt material and tensioner damping mechanism will occur. Do not apply any fluids or belt dressing to the A/C compressor belt, accessory drive belt or pulleys.

115.

**Fig. 541: Identifying Accessory Drive Belt Tensioner**

Courtesy of FORD MOTOR CO.

116. Tighten.

Torque : 20 Nm



Fig. 542: Locating AC Clutch Pulley Bolts
Courtesy of FORD MOTOR CO.

NOTE: After installation, make sure the A/C compressor belt is correctly seated on the crankshaft and the A/C compressor pulleys.

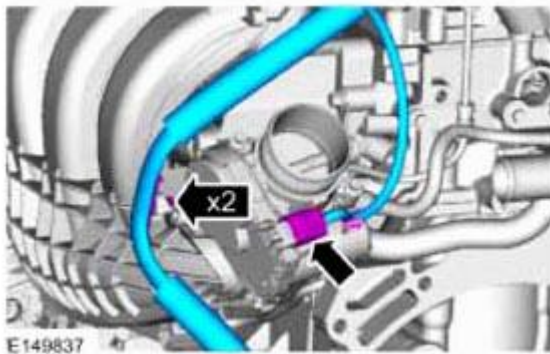


Fig. 543: Positioning A/C Compressor Belt Onto A/C Compressor Pulley And Around Special Tool On Crankshaft Pulley

Courtesy of FORD MOTOR CO.

117. Position the A/C compressor belt onto the A/C compressor pulley and around the special tool on the crankshaft pulley. Make sure that the belt is engaged with the crankshaft pulley and rotate the crankshaft clockwise to install the A/C compressor belt.

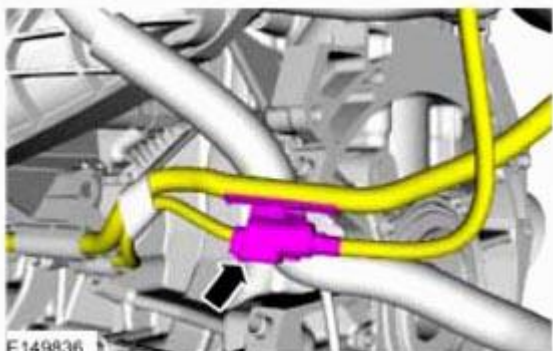
Special Tool(s) : 303-1252/2 (Tool, Stretchy Belt Installer)



- 118.

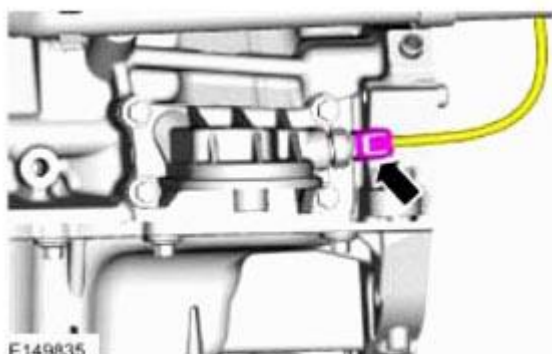
Fig. 544: Locating Harness Connector And Retainer

Courtesy of FORD MOTOR CO.



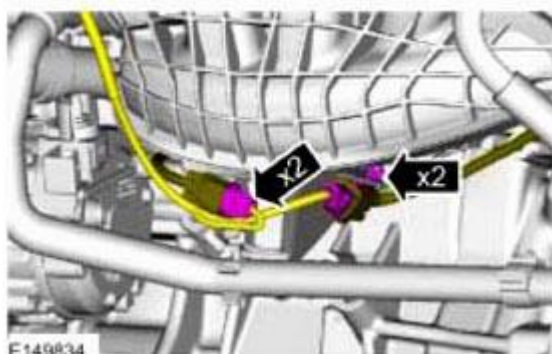
119.

Fig. 545: Locating Hose Connection And Retainer
Courtesy of FORD MOTOR CO.



120.

Fig. 546: Locating Oil Filter EOP Switch Connector
Courtesy of FORD MOTOR CO.



121.

Fig. 547: Locating Harness Connector
Courtesy of FORD MOTOR CO.

122. Torque : 17 Nm

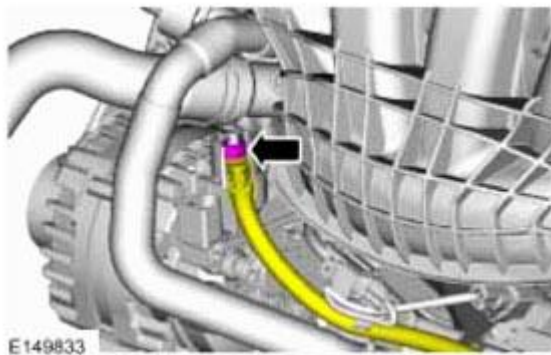
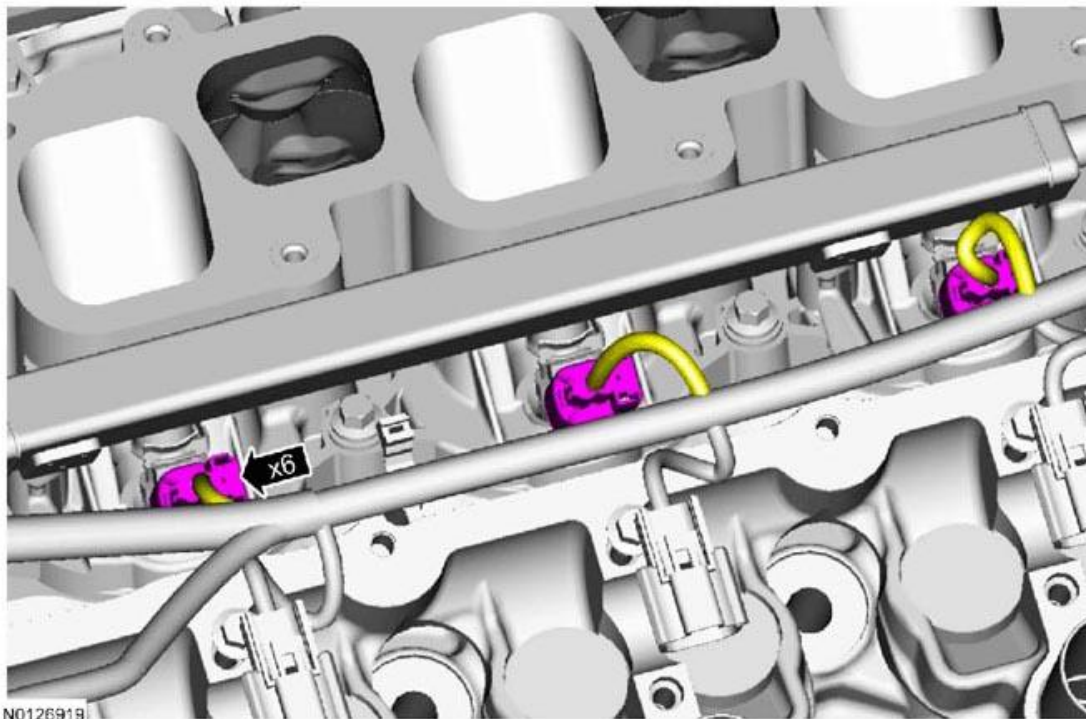
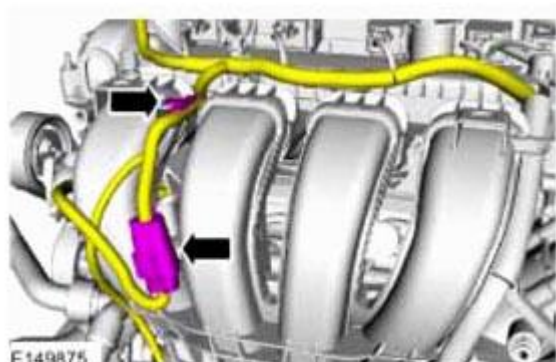


Fig. 548: Locating Hose Coupling
Courtesy of FORD MOTOR CO.



123.

Fig. 549: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



124.

Fig. 550: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.

125. Torque : 10 Nm

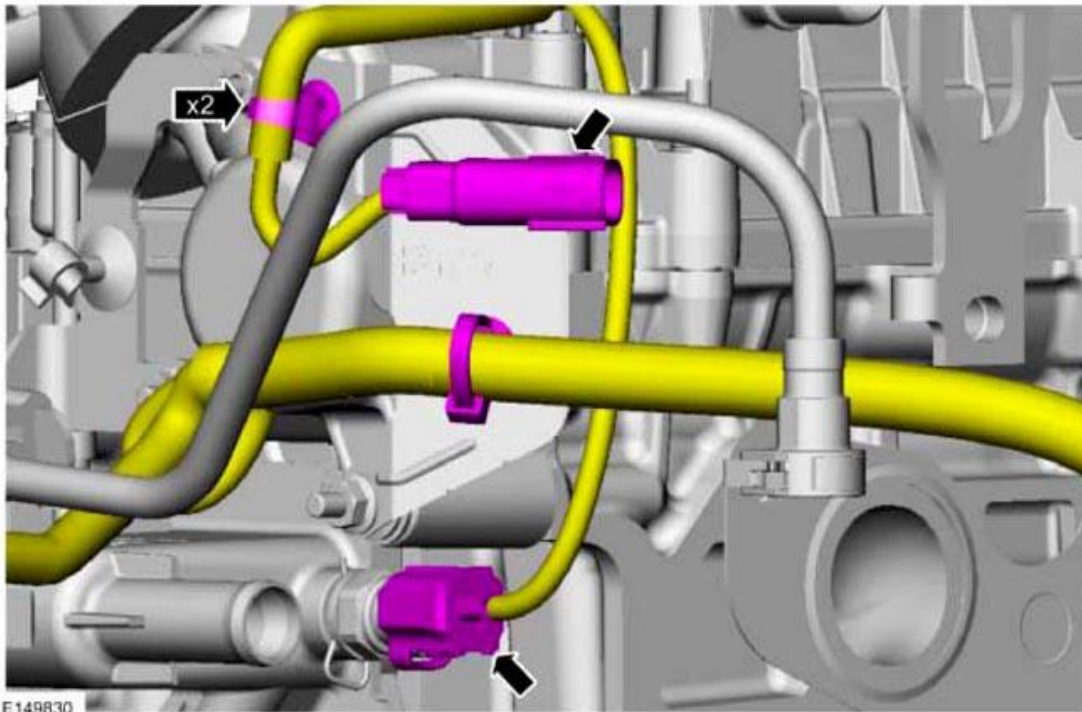


Fig. 551: Locating Engine Ground Bolt
Courtesy of FORD MOTOR CO.



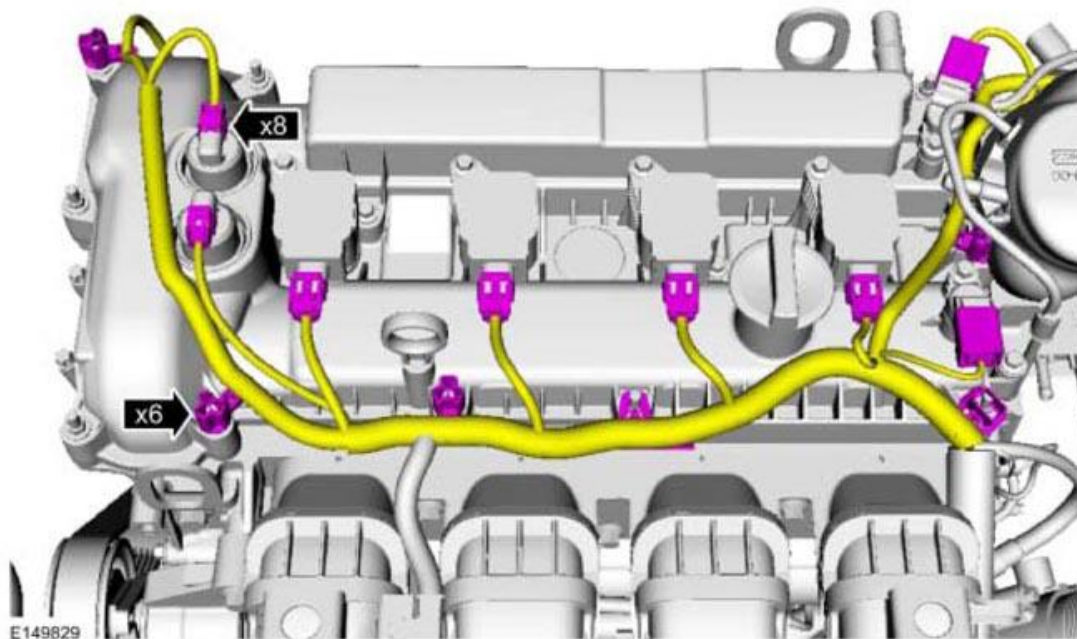
126.

Fig. 552: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



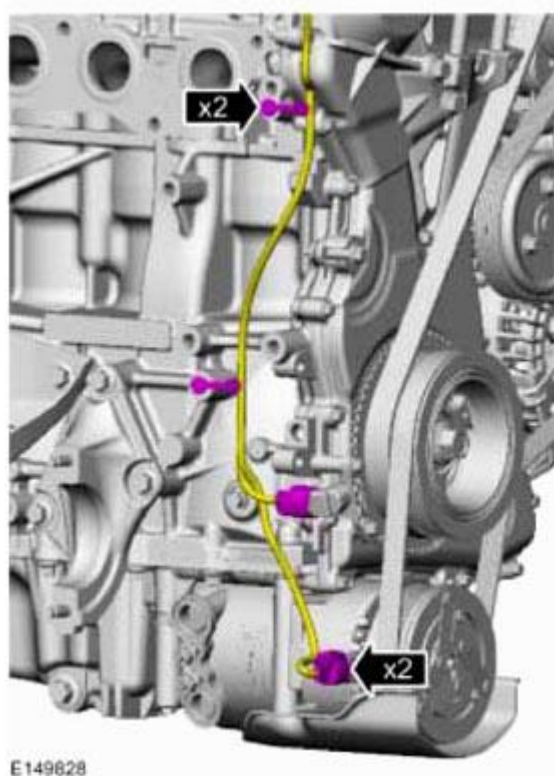
127.

Fig. 553: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



128.

Fig. 554: Locating Fuel Injector Harness Connector And Retainer
Courtesy of FORD MOTOR CO.



129.

Fig. 555: Locating Harness Connector And Retainer
Courtesy of FORD MOTOR CO.

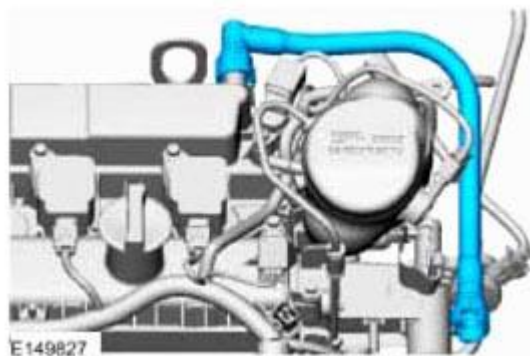
130. Refer to: **QUICK RELEASE COUPLING** .

Fig. 556: Identifying Hose Quick Release Coupling
Courtesy of FORD MOTOR CO.

131. Remove the engine from the engine stand.

NOTE: Special bolts are used for installation. Do not use standard bolts.



Fig. 557: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

132. If equipped with a automatic transmission.

Special Tool(s) : 303-103 (Holding Tool, Flywheel)

Torque :

Stage 1: 50 Nm

Stage 2: 80 Nm

Stage 3: 112 Nm

NOTE: Special bolts are used for installation. Do not use standard bolts.

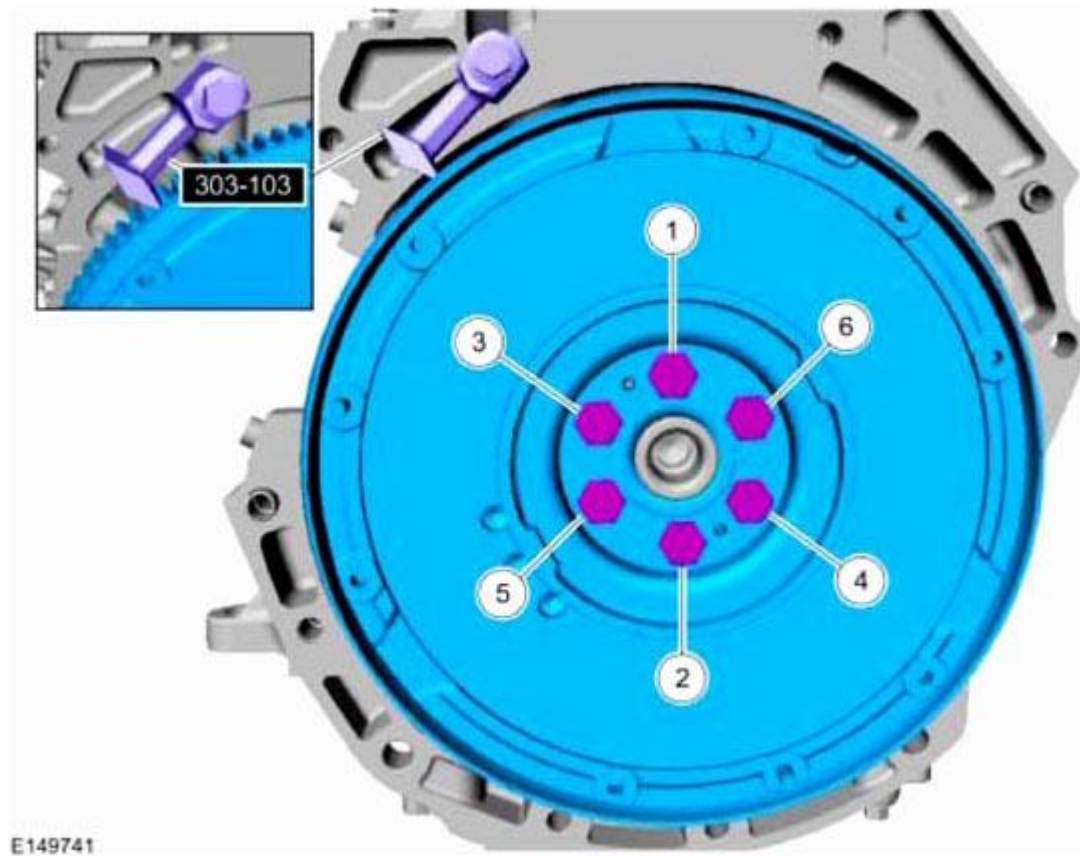


Fig. 558: Identifying 303-103 Flywheel Holding Tool And Flywheel Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

133. If equipped with a manual transmission.

Special Tool(s) : **303-103 (Holding Tool, Flywheel)**

Torque :

Stage 1: 50 Nm

Stage 2: 80 Nm

Stage 3: 112 Nm

NOTE: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to

other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

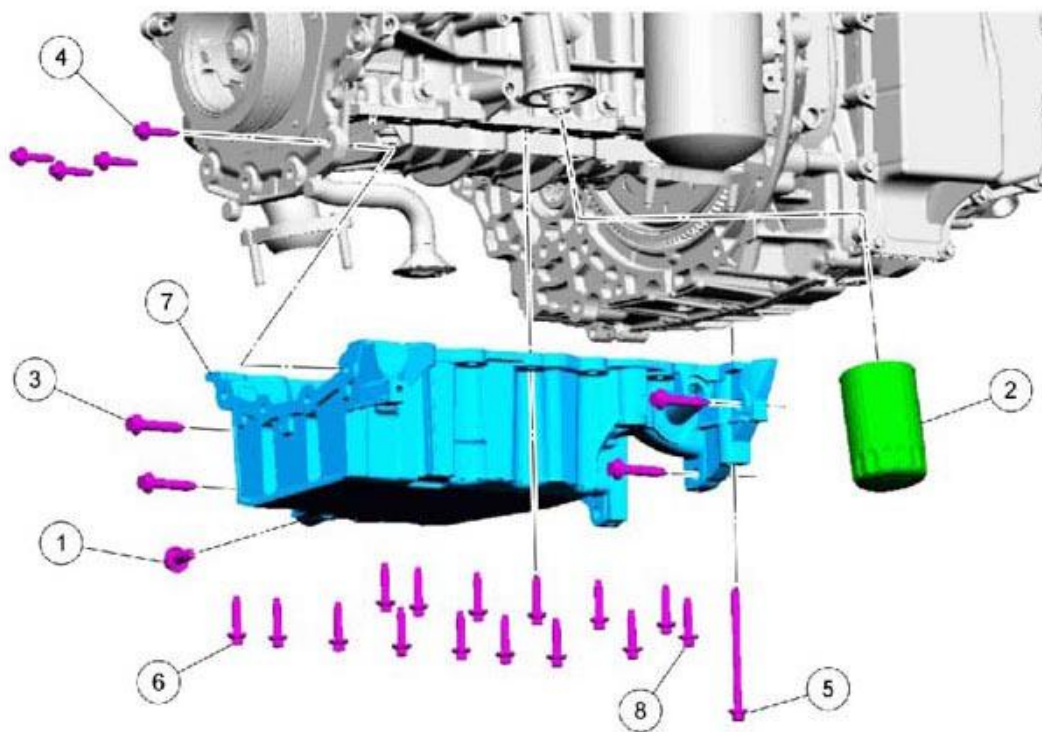
NOTE: Clean the clutch pressure plate and flywheel with a commercial alcohol-based solvent so surfaces are free from oil film. Do not use cleaners with a petroleum base. Do not immerse the clutch pressure plate in solvent.



Fig. 559: Positioning Clutch Disc On Clutch Pressure Plate
Courtesy of FORD MOTOR CO.

134. Position the clutch disc on the clutch pressure plate. Using a clutch aligner, centralize the clutch disc to the clutch pressure plate.

NOTE: Install new bolts.



N0126742

Fig. 560: Identifying Clutch Pressure Plate Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

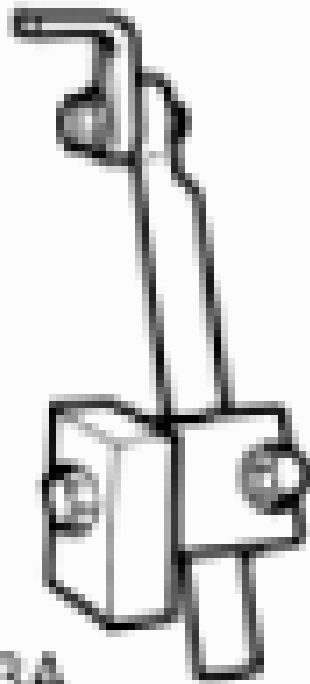
135. Using a clutch aligner, position the clutch disc and clutch pressure plate on the flywheel.

Torque : 29 Nm

ENGINE

SPECIAL TOOL(S) / GENERAL EQUIPMENT

014-00001
 ADJUSTABLE GRIP 1735A



ST2743A



ST1293-A

300-OTC1585AE
Powertrain Lift

2013 Ford Focus SE

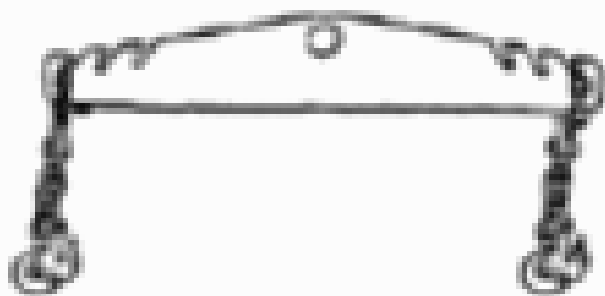
2012-13 ENGINE Engine - 2.0L Duratec-HE - Focus



ST1341-A

300-OTC1819E

2, 200# Floor Crane, Fold Away



303-D089

Spreader Bar

Hose Clamp Remover/Installer

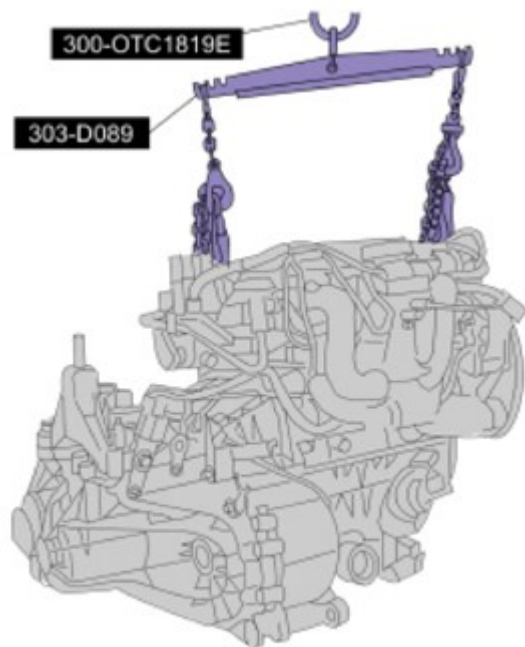
Wooden Block

MATERIALS SPECIFICATIONS

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP	WSS-M2C945-A

1. Lift the engine and position the engine and transaxle together.

Special Tool(s) : **300-OTC1819E (2, 200# Floor Crane, Fold Away) , 303-D089 (Spreader Bar)**



E149949

Fig. 561: Lifting Engine With Crane (300-OTC1819E And 303-D089)
Courtesy of FORD MOTOR CO.

2. **NOTE:** Use caution not to damage the transmission wiring harness or sensors.

NOTE: If using the existing automatic transmission clutch assembly, align the index marks on the flexplate and the clutch stud made during removal.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

- If equipped with automatic transmission, install the 4 bellhousing-to-engine fasteners.

Torque : 45 Nm

- If equipped with manual transmission, install the 5 bellhousing-to-engine fasteners.

Torque : 45 Nm

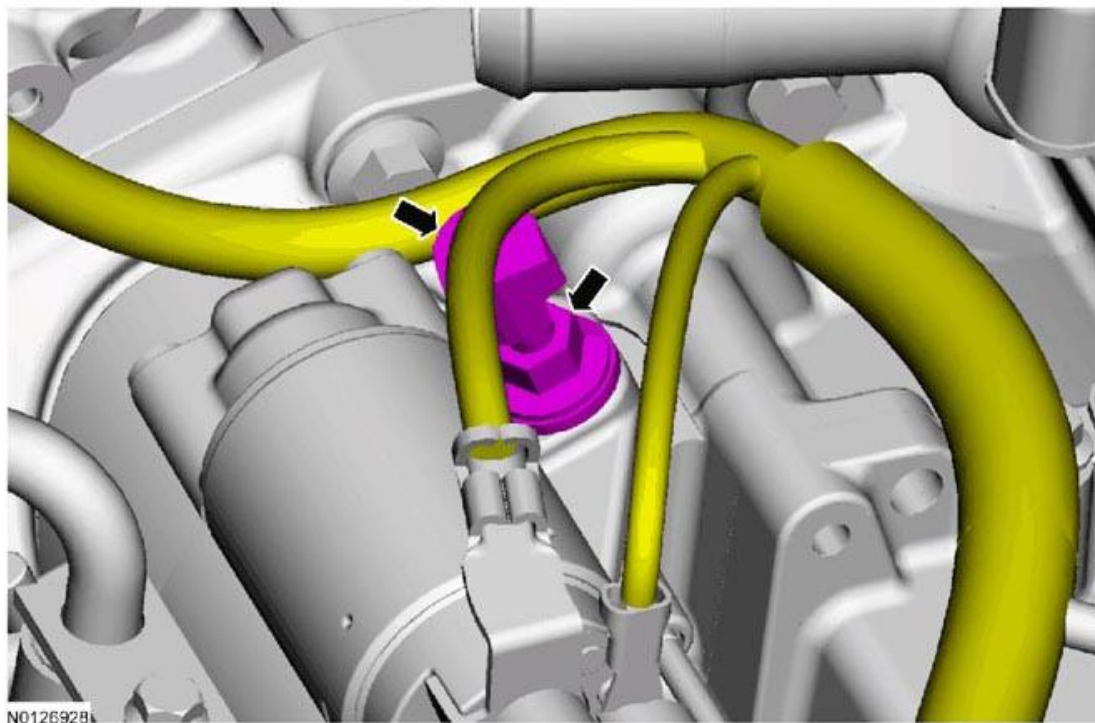


Fig. 562: Identifying Bellhousing-To-Engine Fasteners
Courtesy of FORD MOTOR CO.

3. Torque : 20 Nm

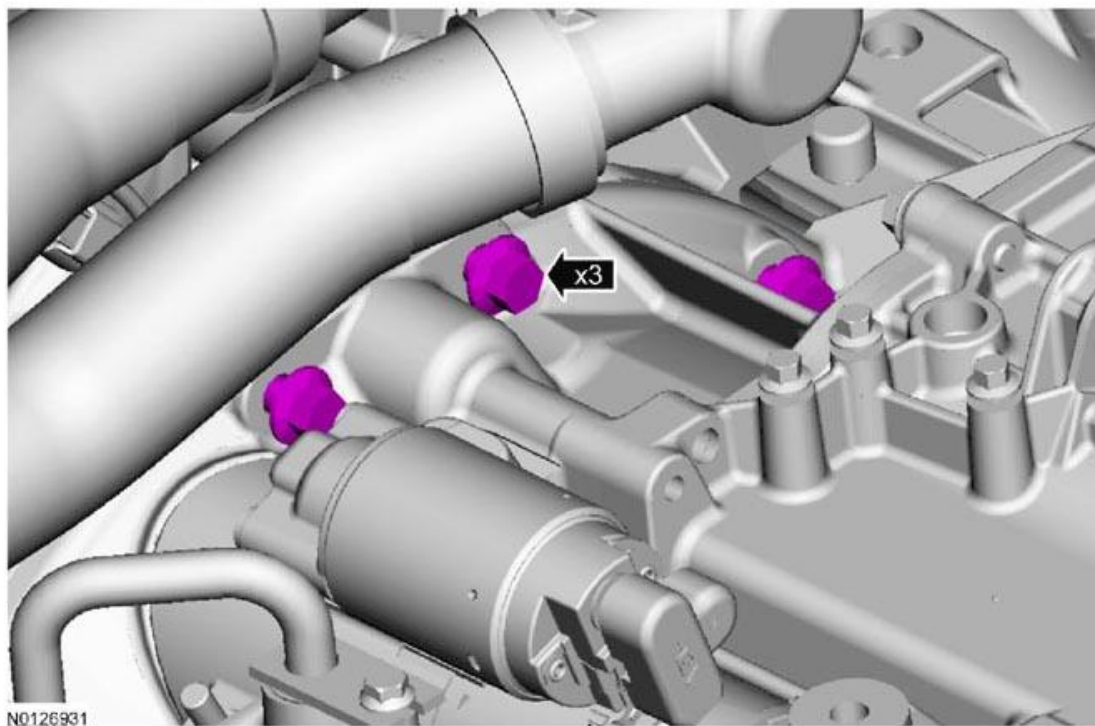


Fig. 563: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

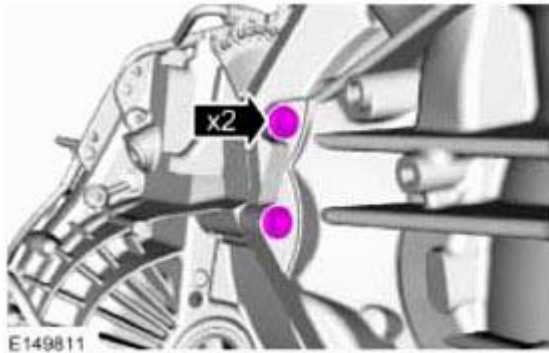


Fig. 564: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

4. Torque : 45 Nm
5. Raise the engine and transaxle assembly onto the lift table.

Special Tool(s) : 300-OTC1819E (2, 200# Floor Crane, Fold Away) , 303-D089 (Spreader Bar)

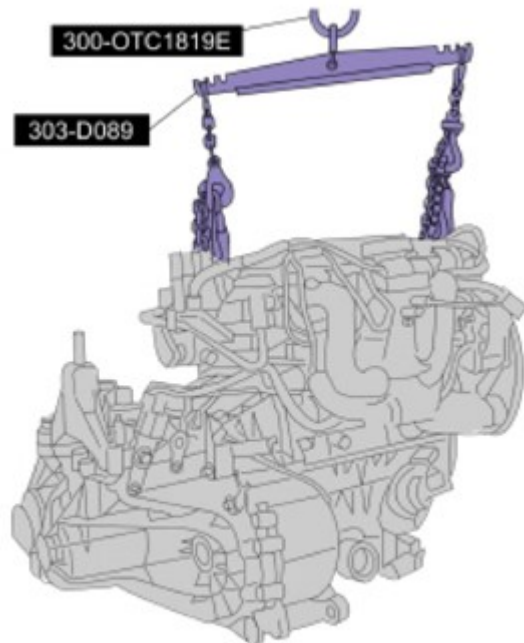


Fig. 565: Lifting Engine With Crane (300-OTC1819E And 303-D089)
Courtesy of FORD MOTOR CO.

NOTE: Position a block of wood under the transmission.

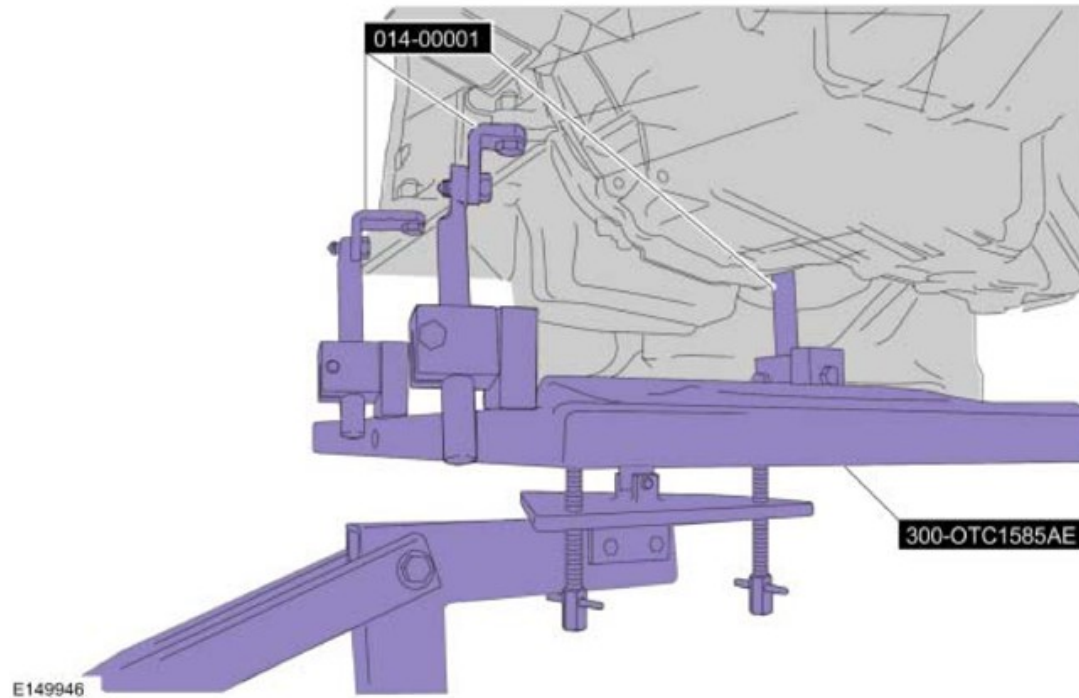


Fig. 566: Supporting Transmission With Powertrain Lift
Courtesy of FORD MOTOR CO.

6. Attach the powertrain to the powertrain lift.

Special Tool(s) : 014-00001 (ADJUSTABLE GRIP 1735A) , 300-OTC1585AE (Powertrain Lift)

General Equipment : Wooden Block

NOTE: Rotate the engine in a clockwise direction only or engine damage may occur.

NOTE: Tighten the flexplate-to-clutch nuts in a star pattern or transmission damage can occur.

NOTE: To prevent the flexplate-to-clutch nuts from falling into the clutch housing and causing damage, use a magnetic socket to install the 6 flexplate-to-clutch nuts.

NOTE: Align the index mark on the clutch stud made during removal.

NOTE: **Install 6 new flexplate-to-clutch nuts.**

7. If equipped with an automatic transmission.
8. *Torque :*

Stage 1: Tighten nuts 1, 5 and 3 to 12 Nm

Stage 2: Tighten all nuts to 25 Nm

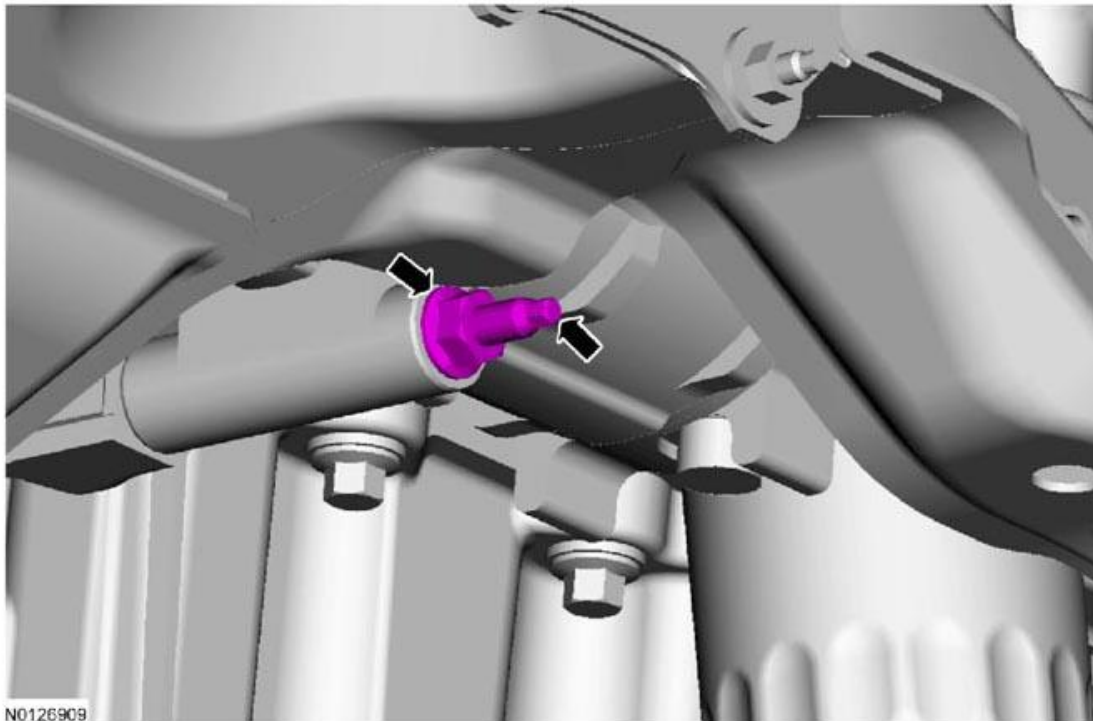
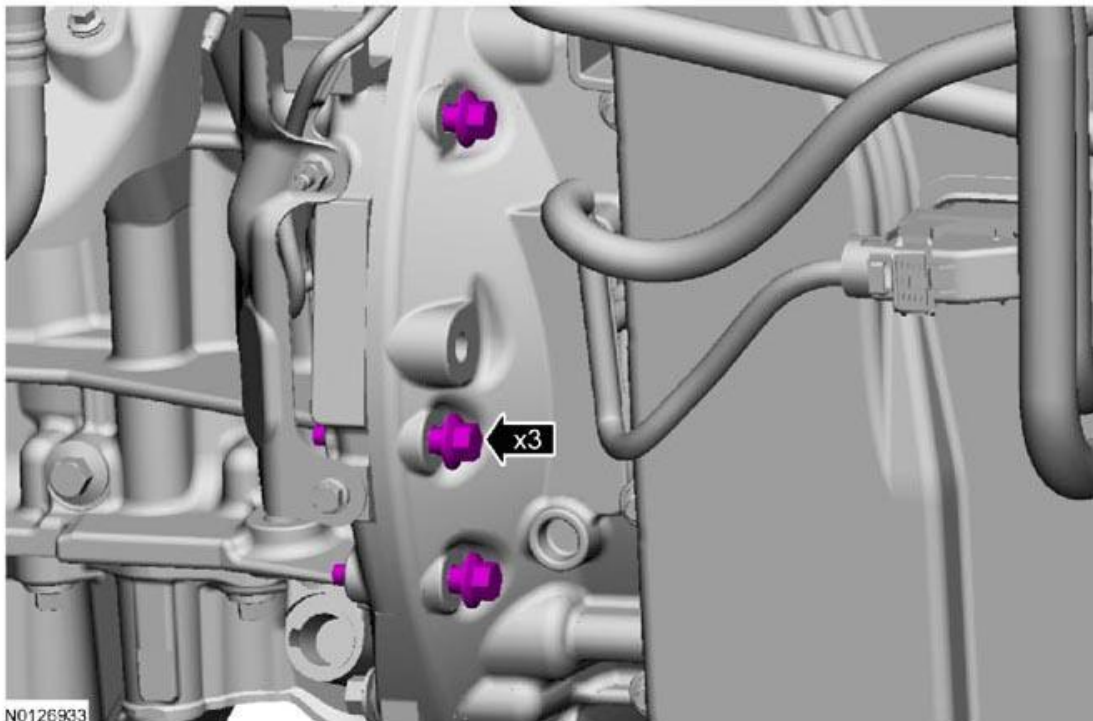


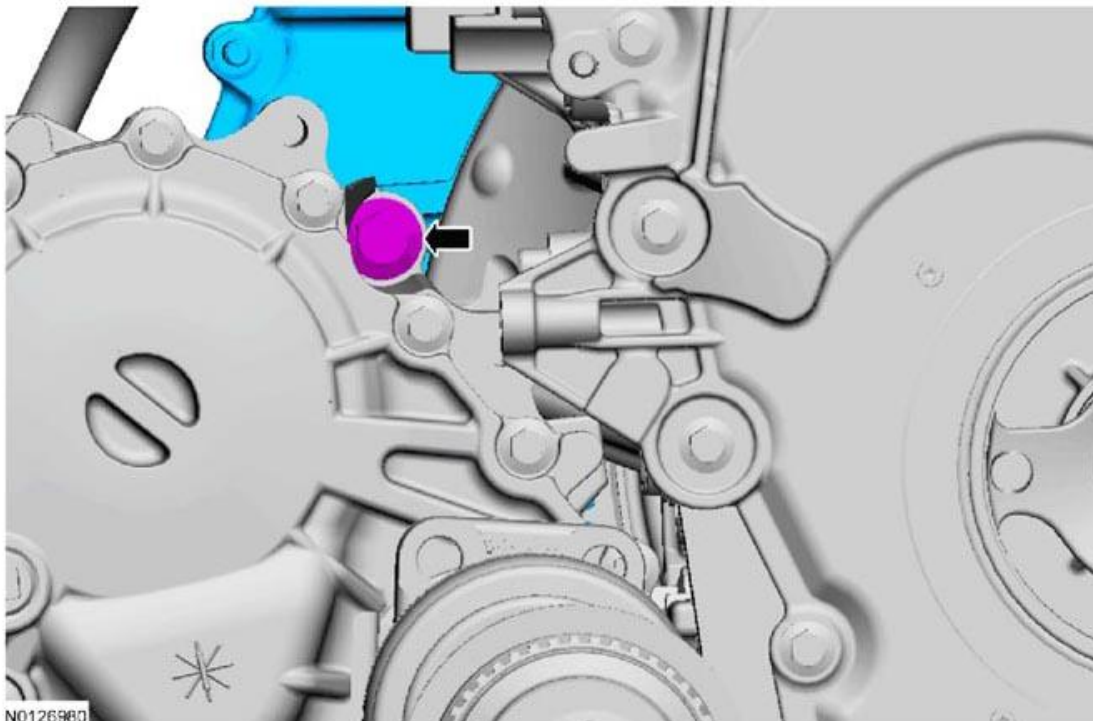
Fig. 567: Identifying Flexplate-To-Clutch Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.



9.

Fig. 568: Locating Starter Insulator
Courtesy of FORD MOTOR CO.

10. Refer to: **STARTER MOTOR** .



11.

Fig. 569: Locating Hose Retainer
Courtesy of FORD MOTOR CO.

12. If equipped with automatic transmission.

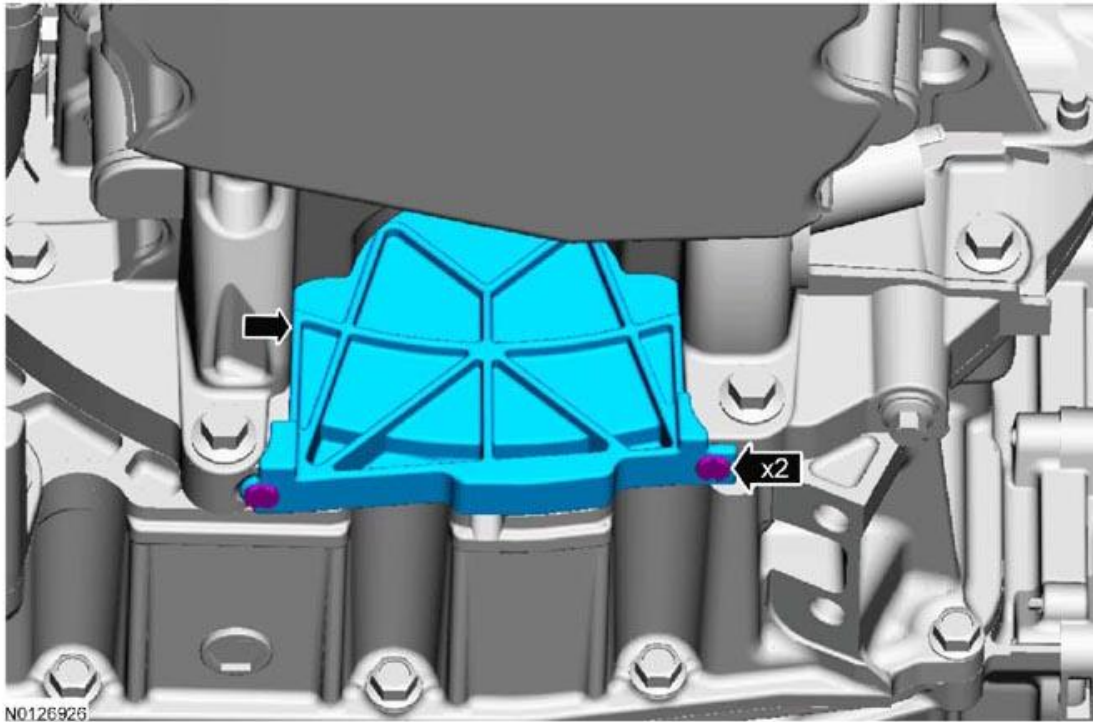


Fig. 570: Locating Harness Connector
Courtesy of FORD MOTOR CO.

13. Position the powertrain into the vehicle.
14. *Torque* : 150 Nm

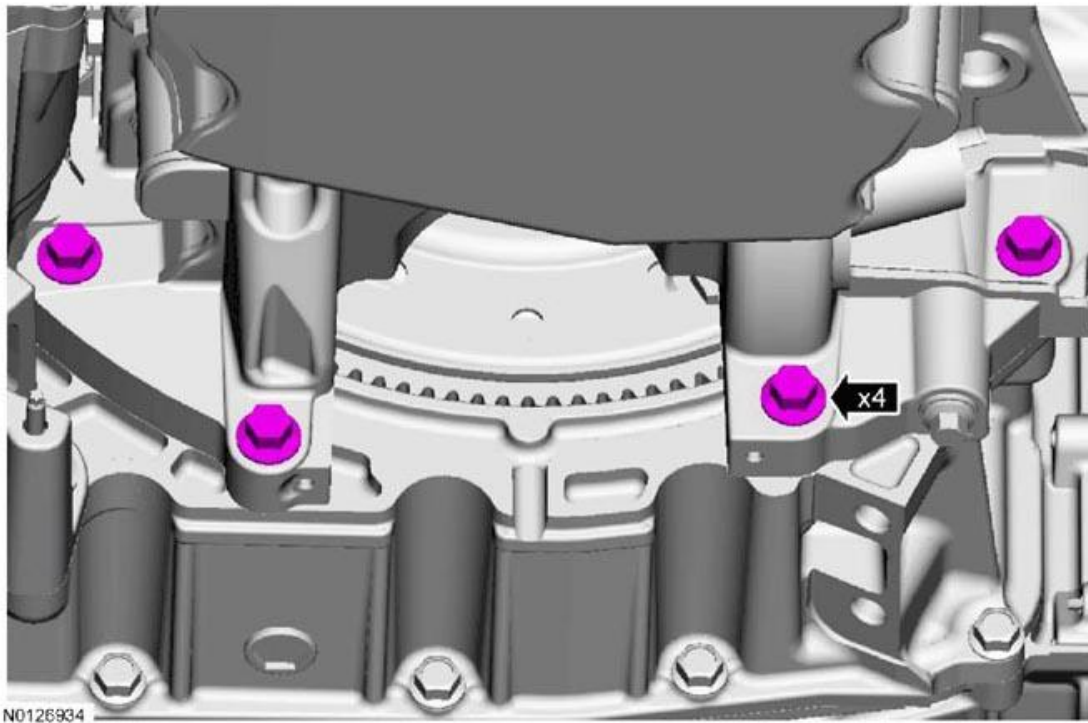


Fig. 571: Locating Engine Mounting Bracket Bolt
Courtesy of FORD MOTOR CO.

15. *Torque :*

Stage 1: Tighten the 2 nuts to 80 Nm

Stage 2: Tighten the 2 bolts to 90 Nm

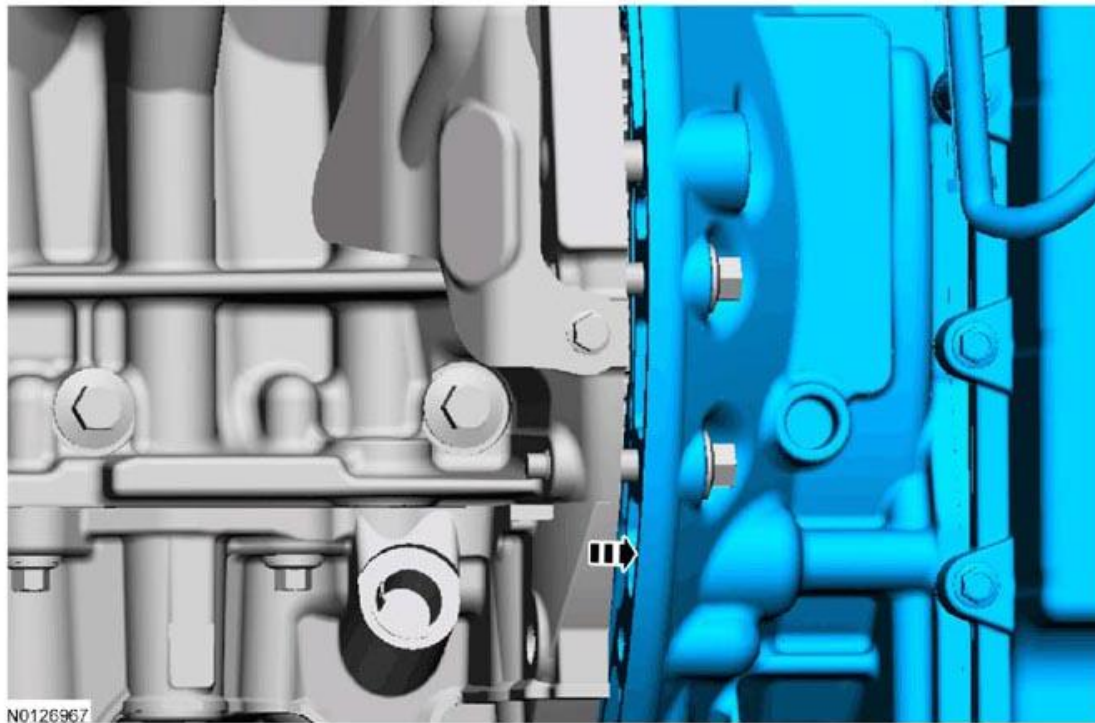
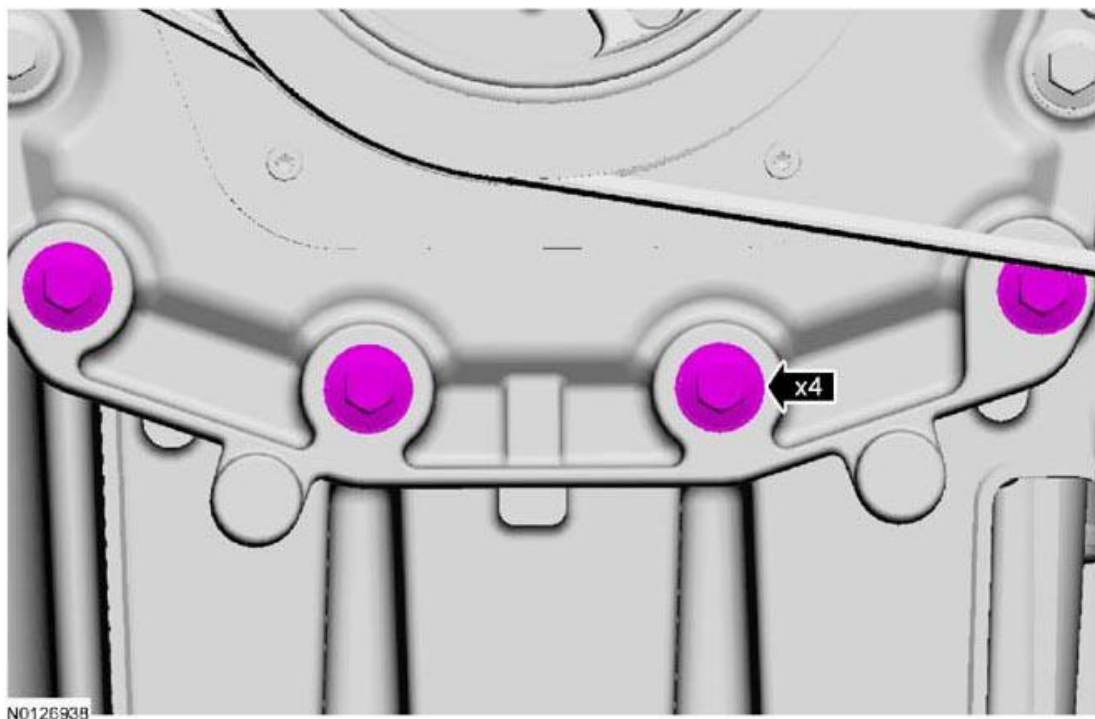


Fig. 572: Locating Engine Mount Nuts And Bolts
Courtesy of FORD MOTOR CO.



16.

Fig. 573: Locating AC Pipe Bracket
Courtesy of FORD MOTOR CO.

17. *Torque* : 86 Nm

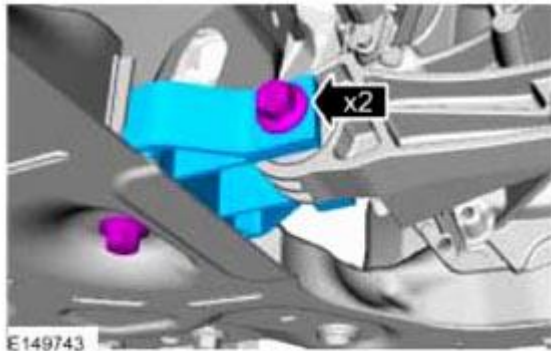
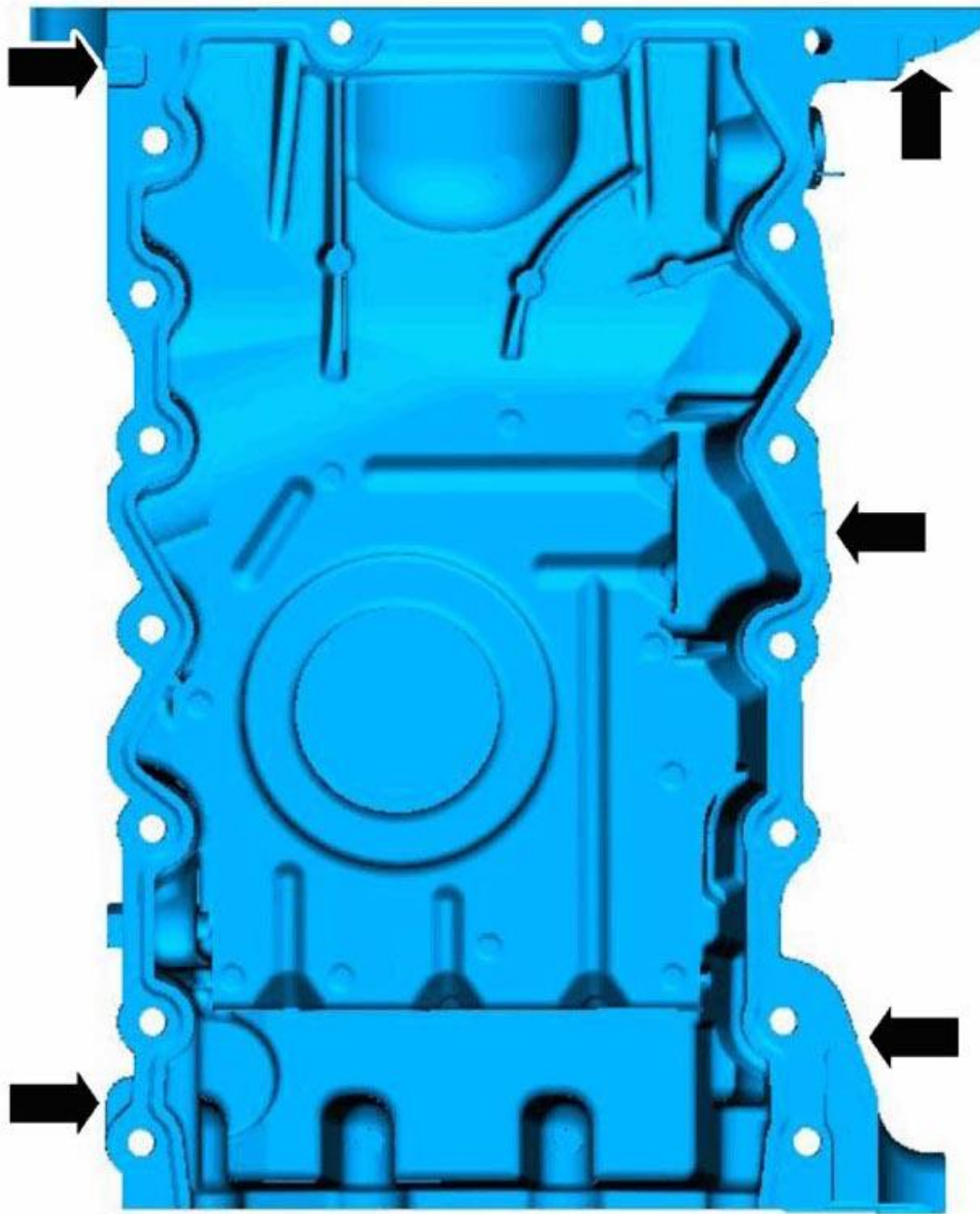


Fig. 574: Locating Transmission Clamp Bolts
Courtesy of FORD MOTOR CO.

NOTE: Automatic transmission shown in illustration, manual transmission similar.



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Fig. 575: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

18. *Torque* : 48 Nm

NOTE: Automatic transmission shown in illustration, manual transmission similar.



N0126743

Fig. 576: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

19. *Torque* : 48 Nm
20. Refer to: **COOLING FAN MOTOR AND SHROUD** .

NOTE: Lubricate the engine oil filter gasket with clean engine oil prior to installing the oil filter.

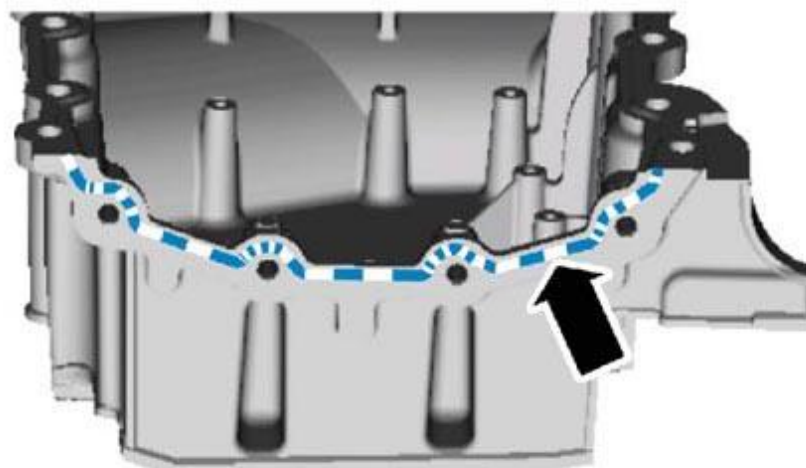
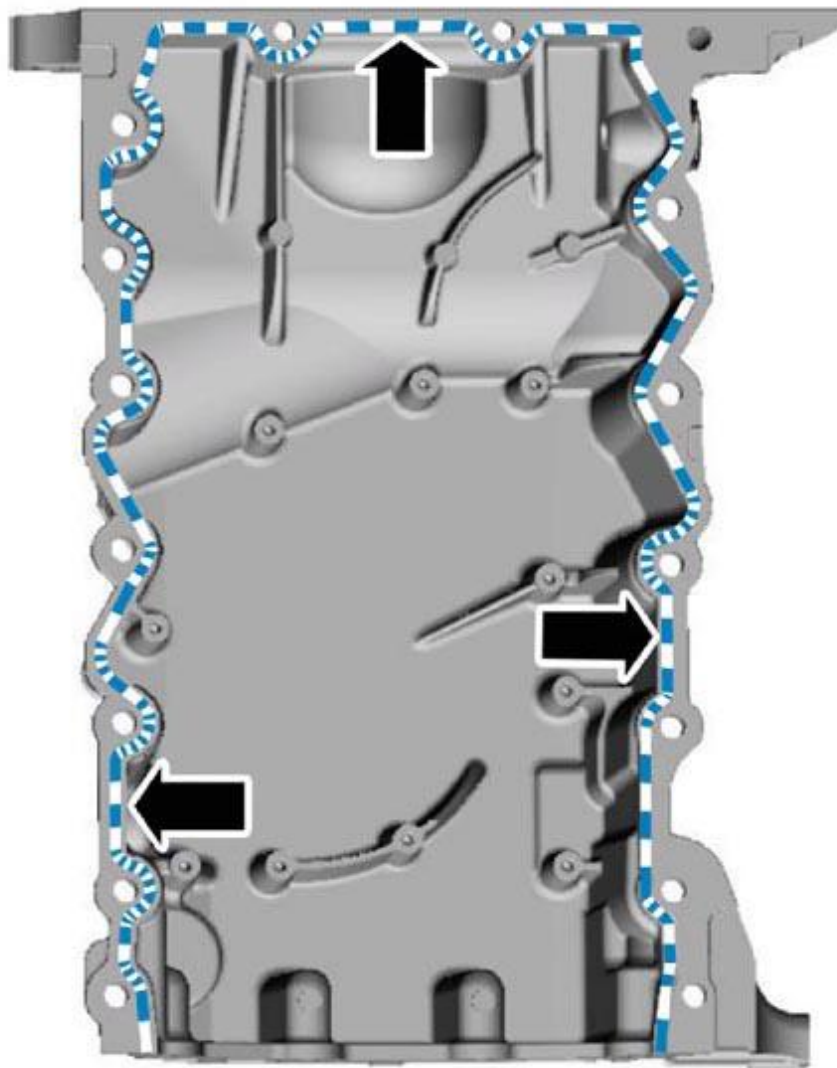


Fig. 577: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

21. *Material* : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)

Torque :

Stage 1: 8 Nm

Stage 2: 180°

22. *General Equipment* : Hose Clamp Remover/Installer

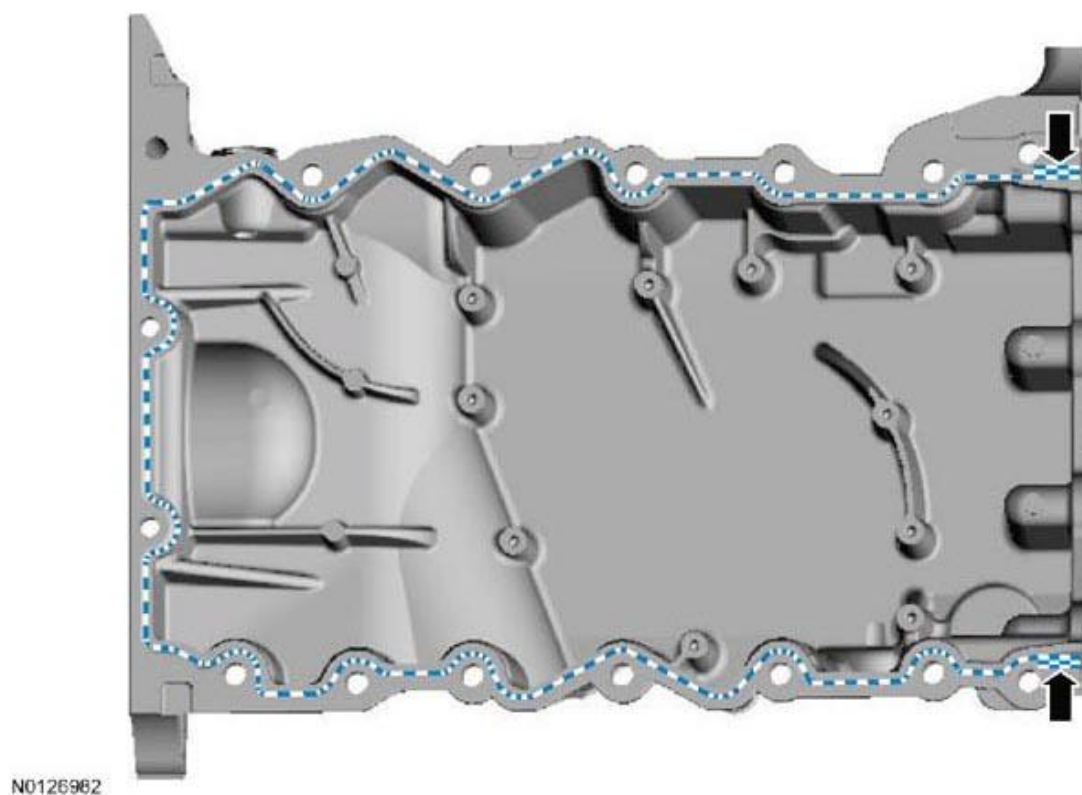


Fig. 578: Locating Hose Clamp
Courtesy of FORD MOTOR CO.

23. **NOTE:** **Install 2 new O-ring seals.**

- *Torque* : Tighten the nuts to 20 Nm
- *Torque* : Tighten the bolt to 25 Nm

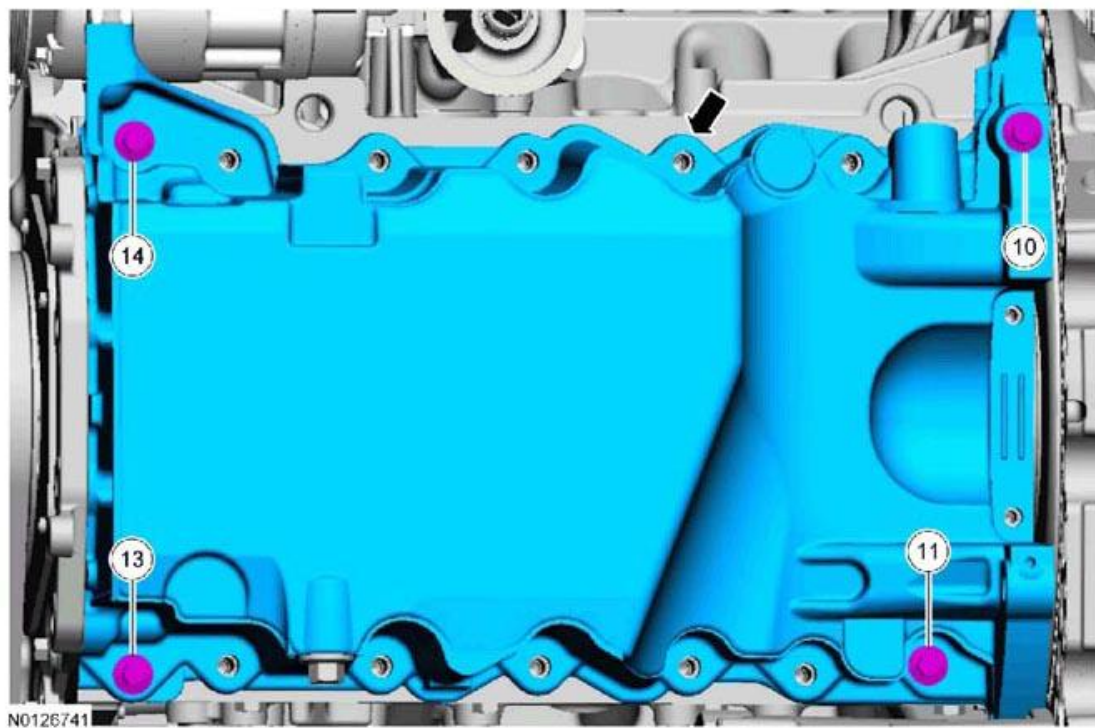


Fig. 579: Locating Hose Bracket Bolt And Nuts
Courtesy of FORD MOTOR CO.

24. *Torque* : 18 Nm

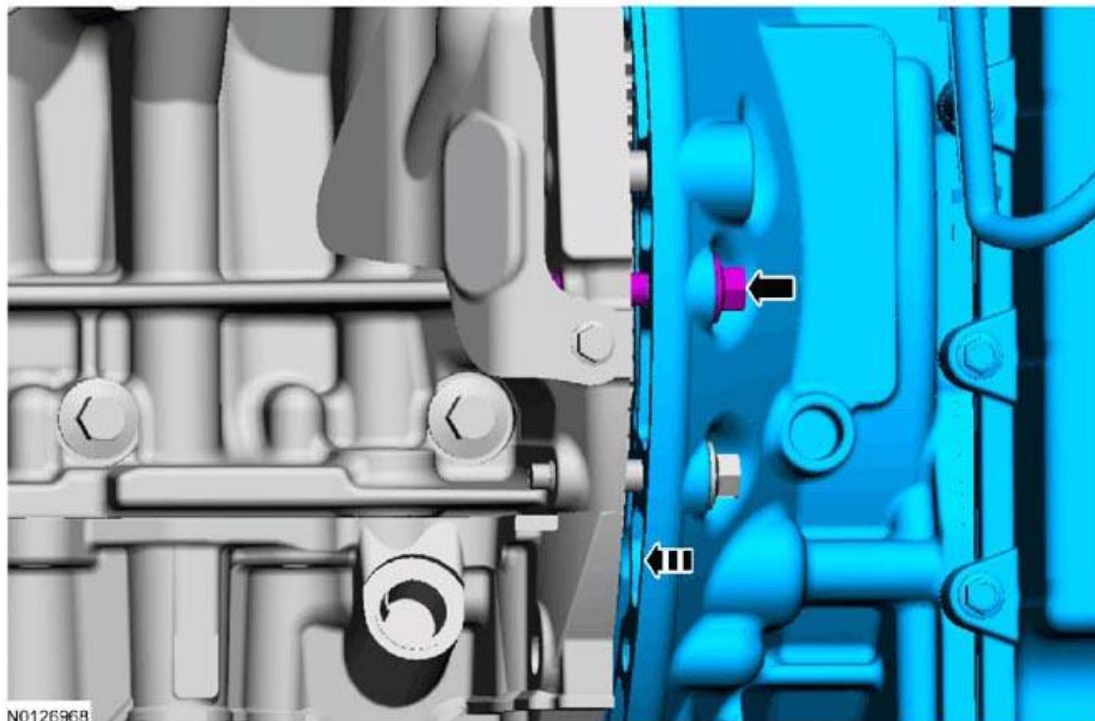


Fig. 580: Locating Hose Bracket Bolt
Courtesy of FORD MOTOR CO.

25. Refer to: **FRONT HALFSHAFT RH** .

Refer to: **FRONT HALFSHAFT LH** .

26. If equipped with a manual transmission.

Torque : 48 Nm

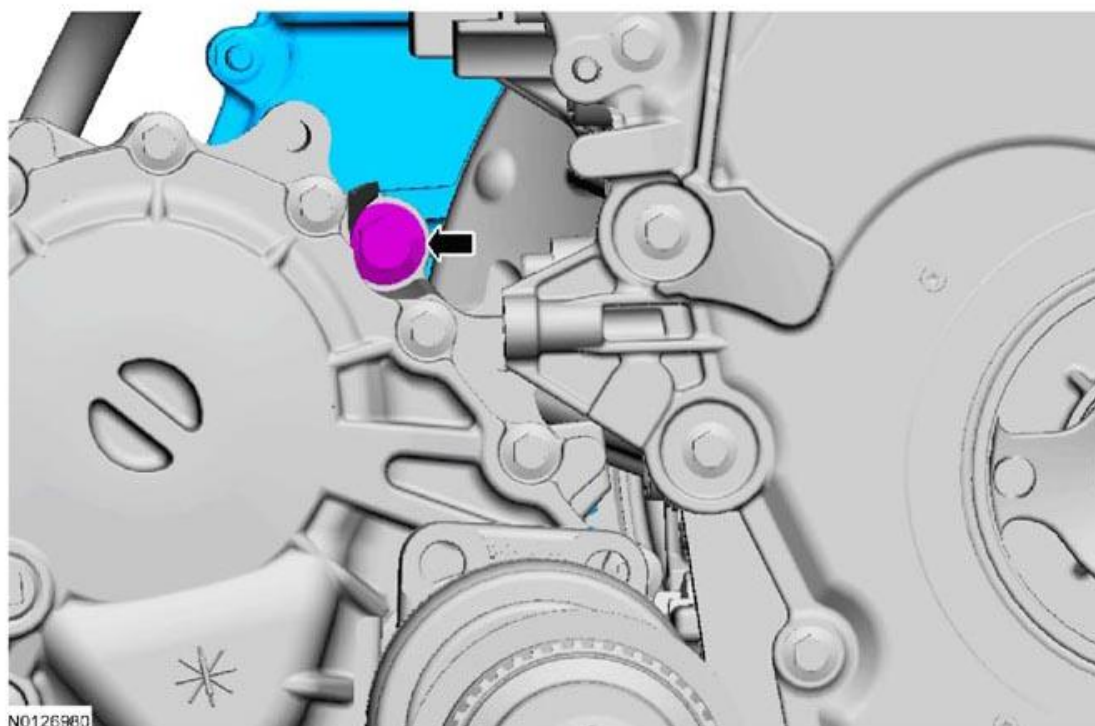


Fig. 581: Locating Automatic Transmission Linkage Coupling And Bracket Nuts
Courtesy of FORD MOTOR CO.

NOTE: Do not spill brake fluid on painted or plastic surfaces or damage to the surface may occur. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.

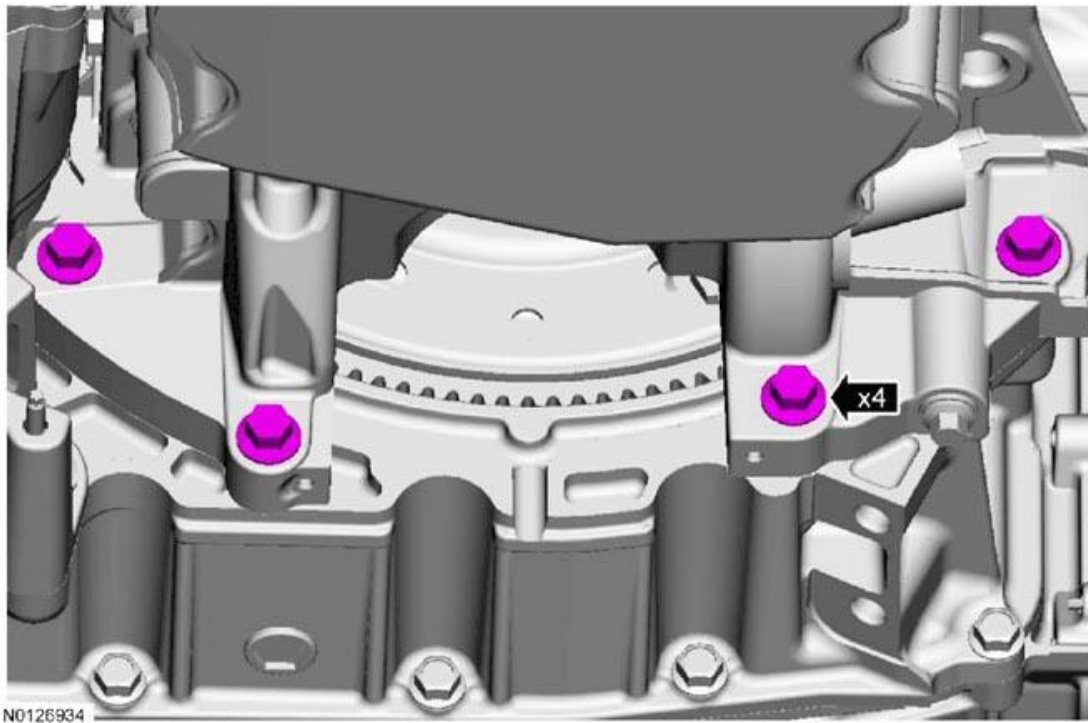


Fig. 582: Locating Hose Connection
Courtesy of FORD MOTOR CO.

- 27. If equipped with a manual transmission.
- 28. If equipped with an automatic transmission.

Torque : 10 Nm

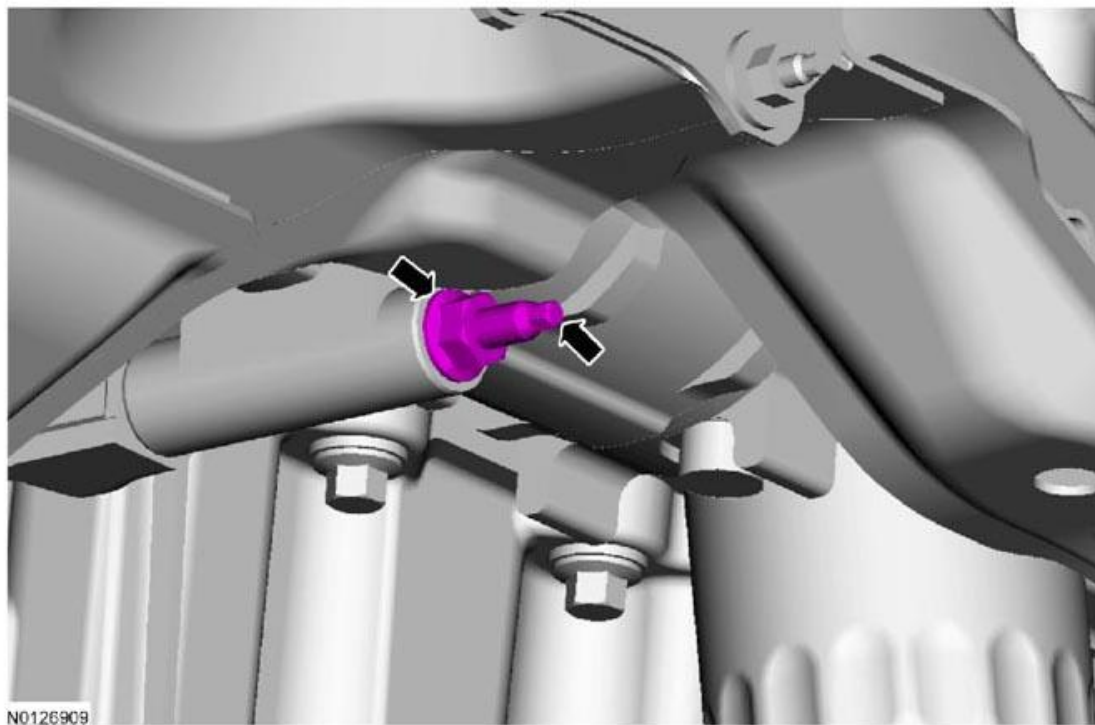


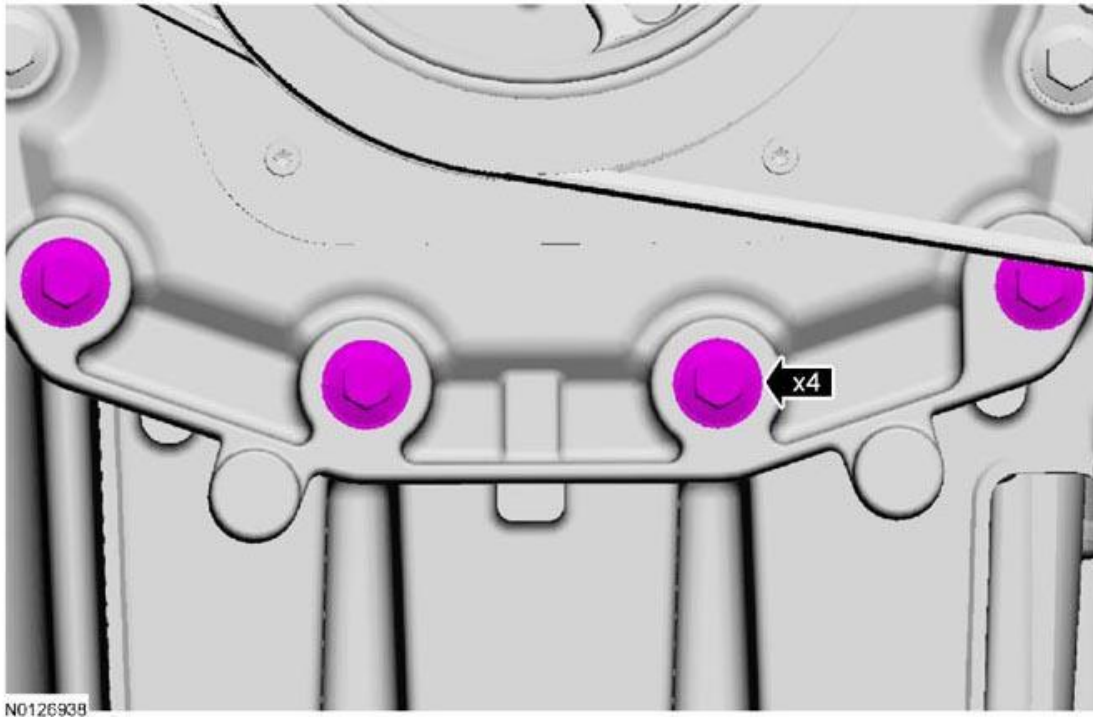
Fig. 583: Locating Bracket Bolts
Courtesy of FORD MOTOR CO.

29. If equipped with an automatic transmission.



Fig. 584: Locating Hose Bracket**Courtesy of FORD MOTOR CO.**

30. If equipped with an automatic transmission.

**Fig. 585: Locating Hose Bracket****Courtesy of FORD MOTOR CO.**

31. If equipped with an automatic transmission.

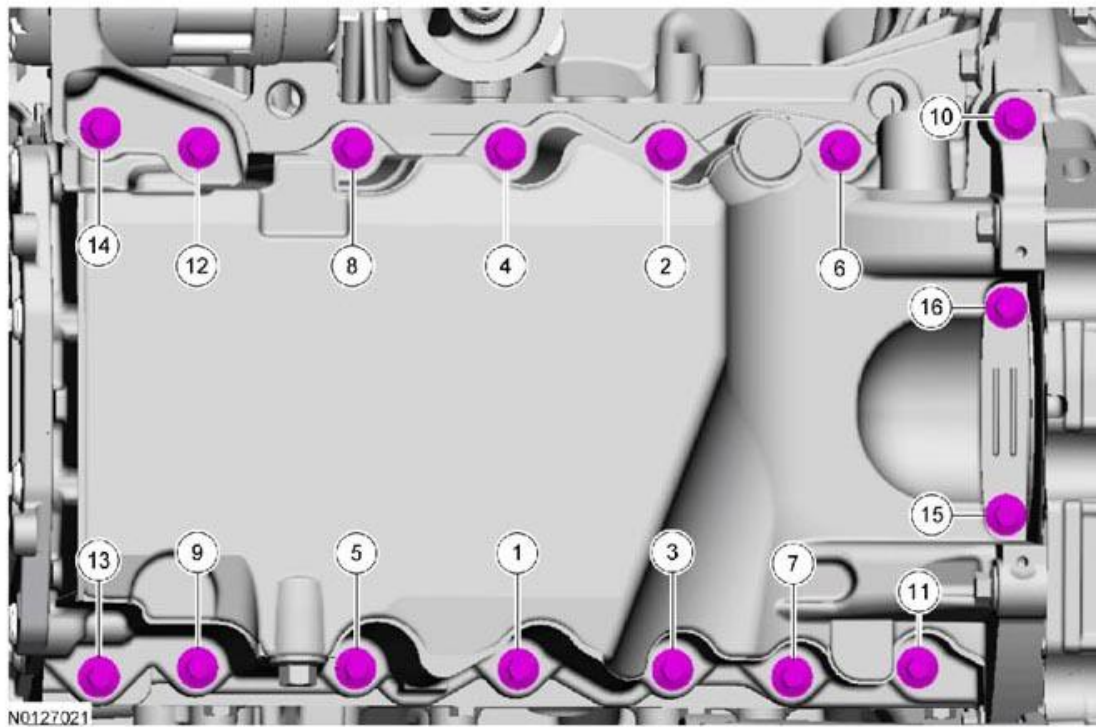
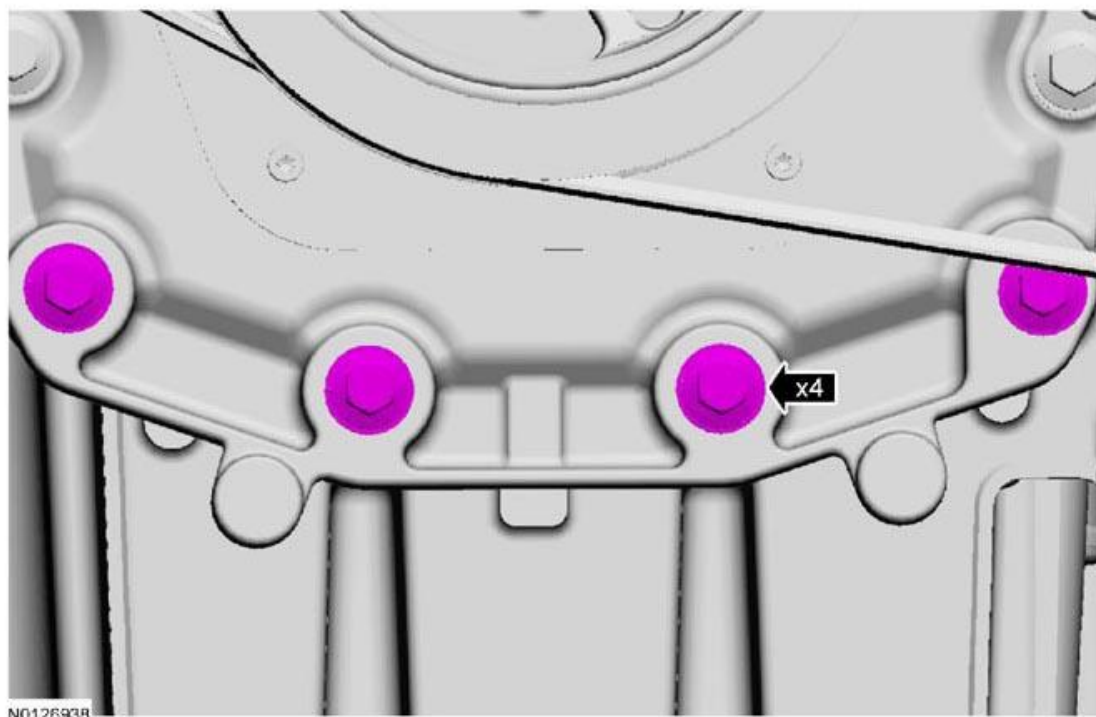


Fig. 586: Locating Automatic Transmission Linkage Coupling
Courtesy of FORD MOTOR CO.



32.

Fig. 587: Locating Tube Connection
Courtesy of FORD MOTOR CO.

33. Refer to: **QUICK RELEASE COUPLING** .

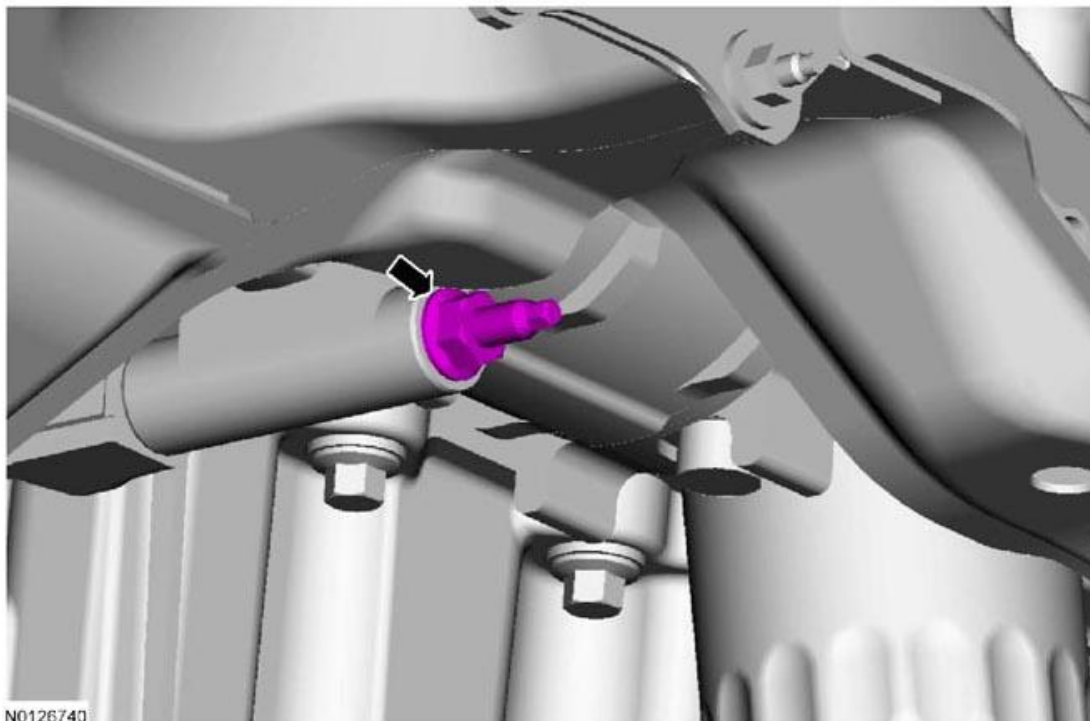


Fig. 588: Locating Quick Release Coupling
Courtesy of FORD MOTOR CO.

34. Refer to: **QUICK RELEASE COUPLING** .

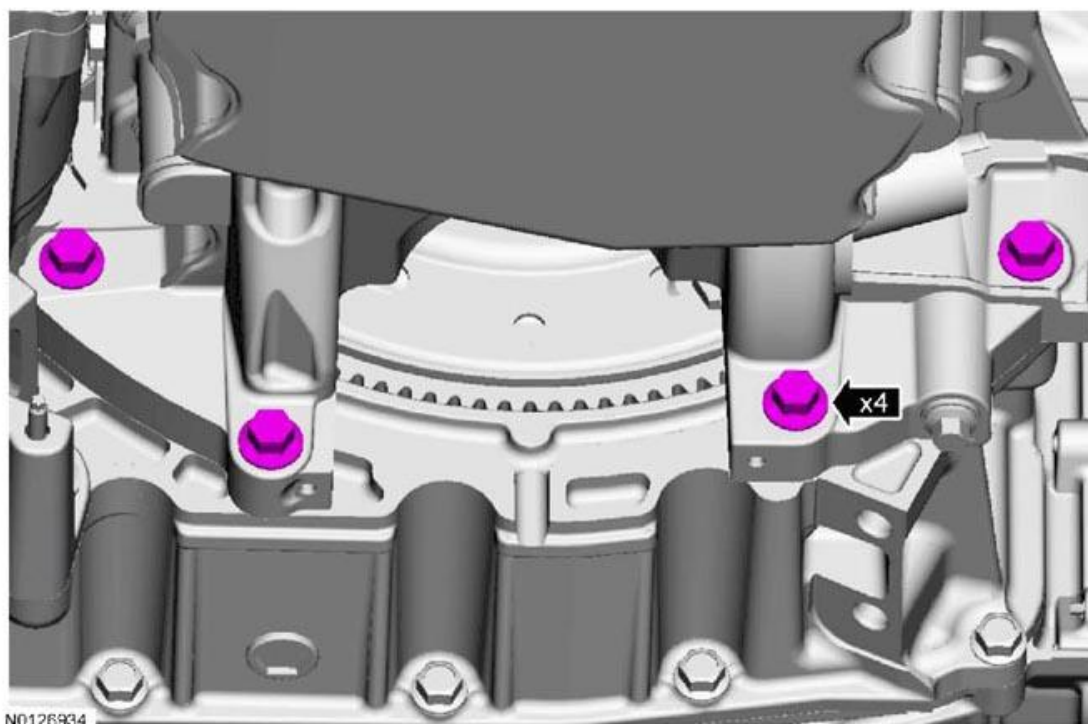


Fig. 589: Locating Quick Release Coupling
Courtesy of FORD MOTOR CO.

NOTE: Install 5 new catalytic converter-to-cylinder head studs.

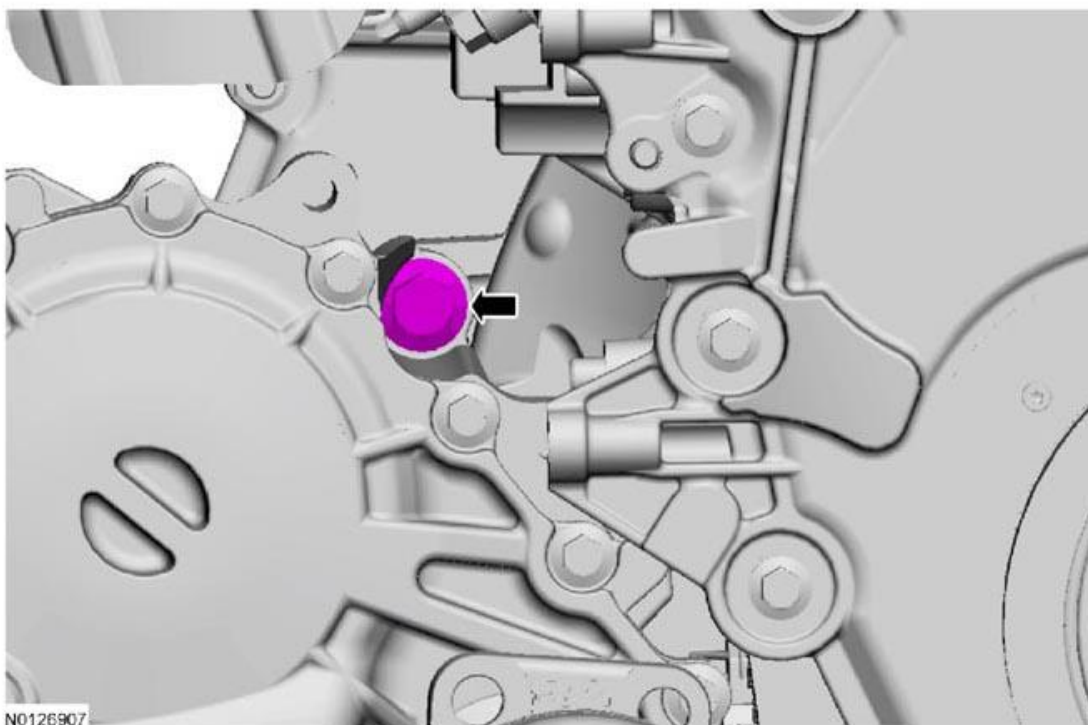


Fig. 590: Locating Catalytic Converter Manifold Studs
Courtesy of FORD MOTOR CO.

35. *Torque* : 17 Nm

NOTE: Failure to tighten the catalytic converter manifold nuts to specification a second time may cause the converter to develop an exhaust leak.

NOTE: Always install new fasteners and gaskets as indicated. Clean flange faces prior to new gasket installation to make sure of proper sealing.

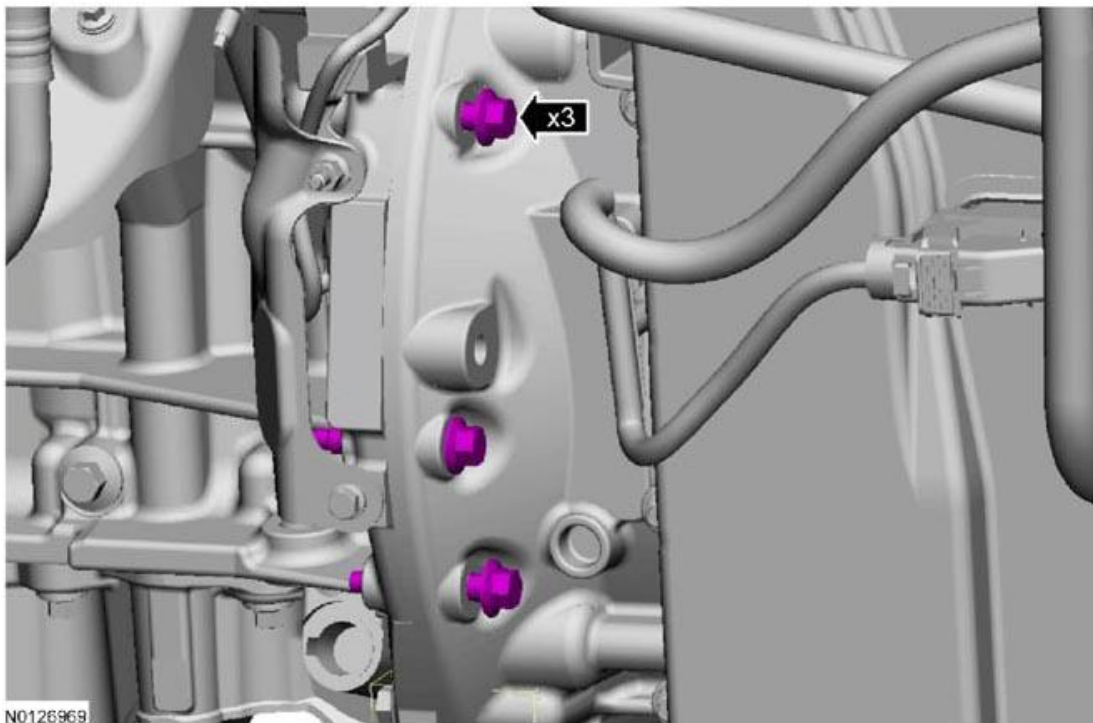


Fig. 591: Identifying Catalytic Converter Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

36. Using a new gasket, position the catalytic converter and install the 5 new catalytic converter manifold-to-cylinder head nuts and tighten in 2 stages in the sequence shown in illustration.

Torque :

Stage 1: 55 Nm

Stage 2: Re-tighten to 55 Nm

37. *Torque* : 25 Nm

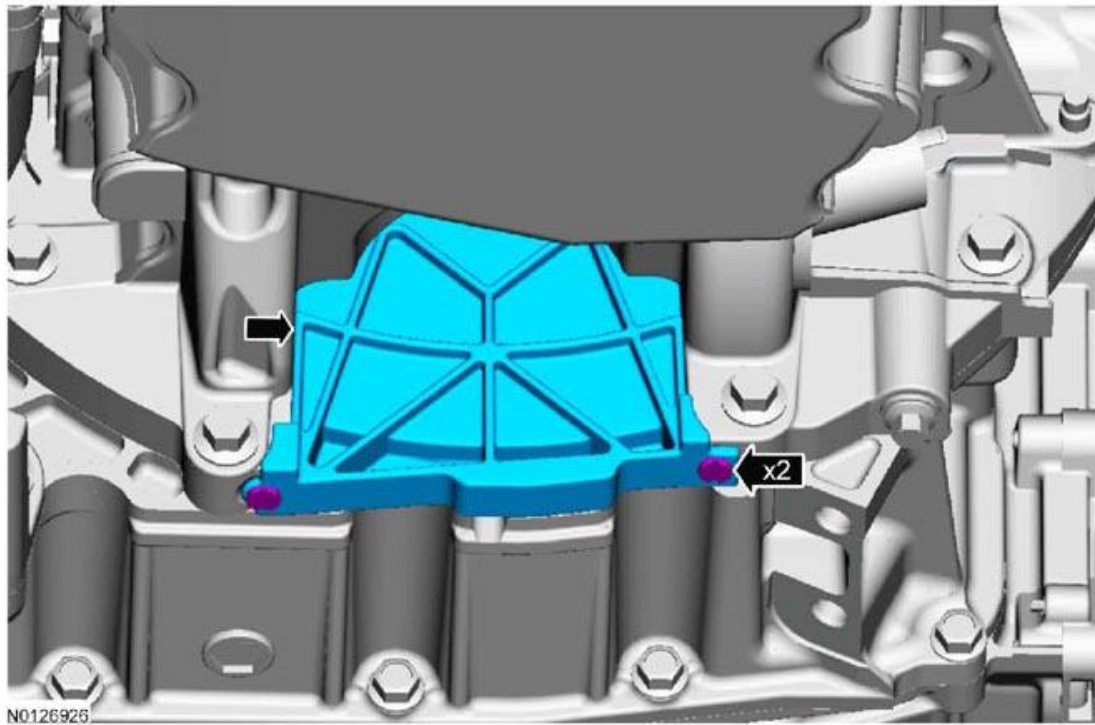


Fig. 592: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

38.

- *Torque* : Tighten the first nut to 48 Nm
- *Torque* : Tighten the second nut to 48 Nm
- *Torque* : Re-tighten the first nut to 48 Nm

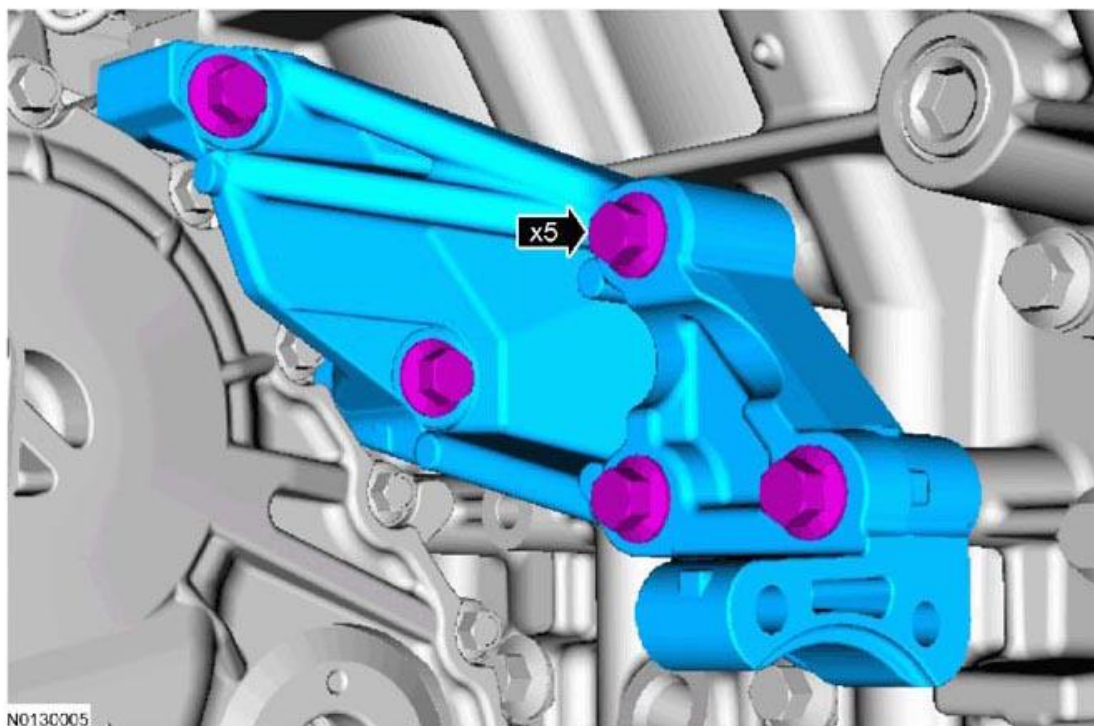


Fig. 593: Locating Catalytic Converter Joint Nuts
Courtesy of FORD MOTOR CO.

39. *Torque* : 25 Nm

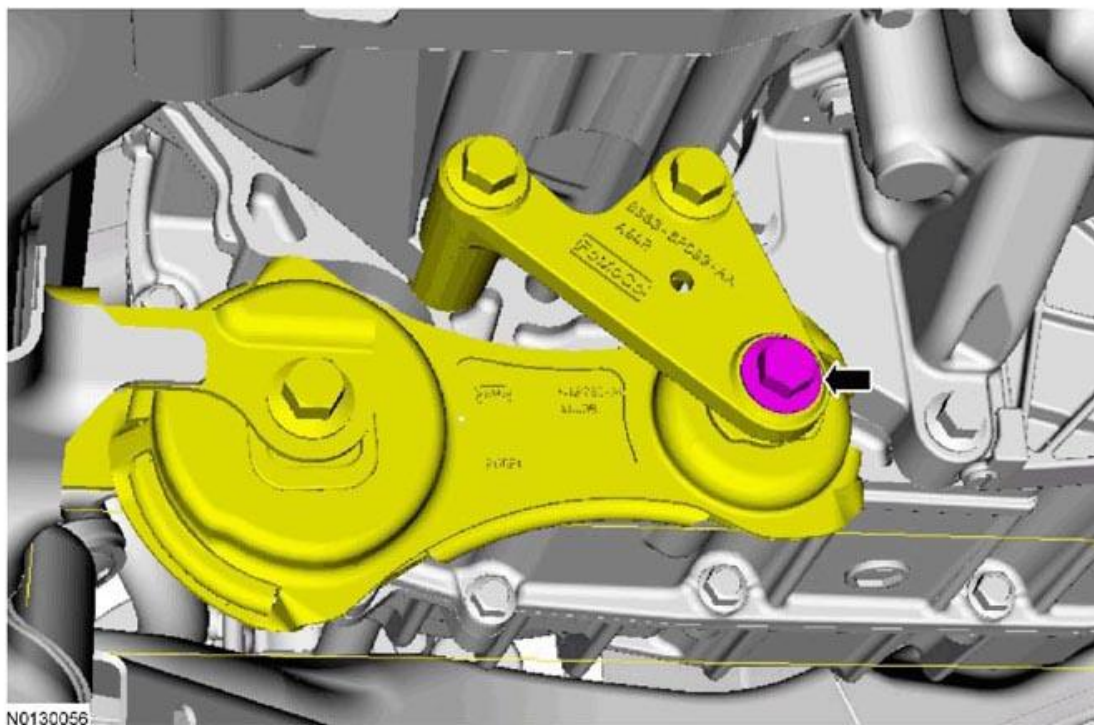


Fig. 594: Locating Catalytic Converter Lower Bracket Bolts
Courtesy of FORD MOTOR CO.

40. Torque : 10 Nm

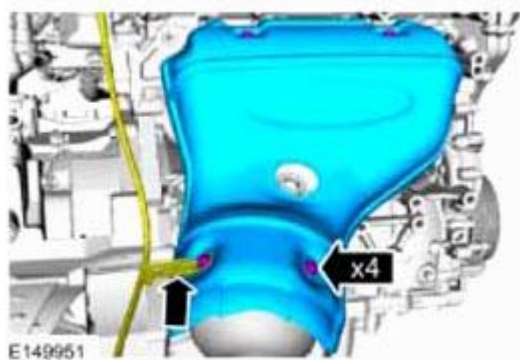
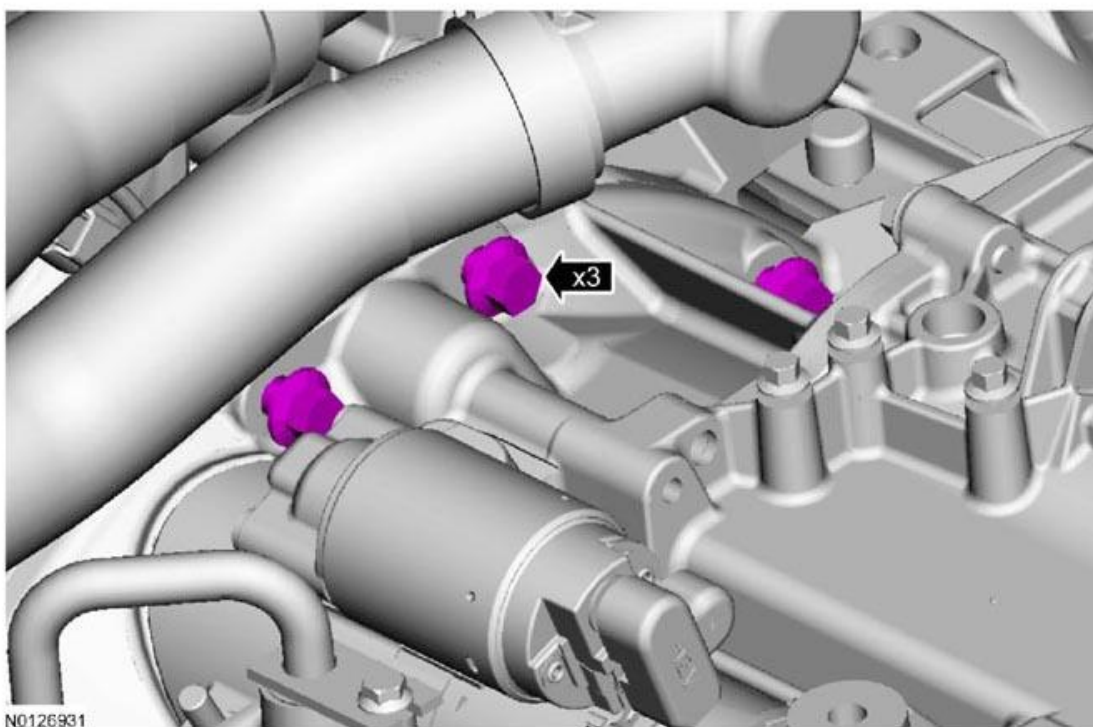


Fig. 595: Locating Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.



41.

Fig. 596: Locating Heated Oxygen Sensor Connector And Retainer
Courtesy of FORD MOTOR CO.

42. Refer to: **HEATED OXYGEN SENSOR (HO2S)** .

43. If equipped.

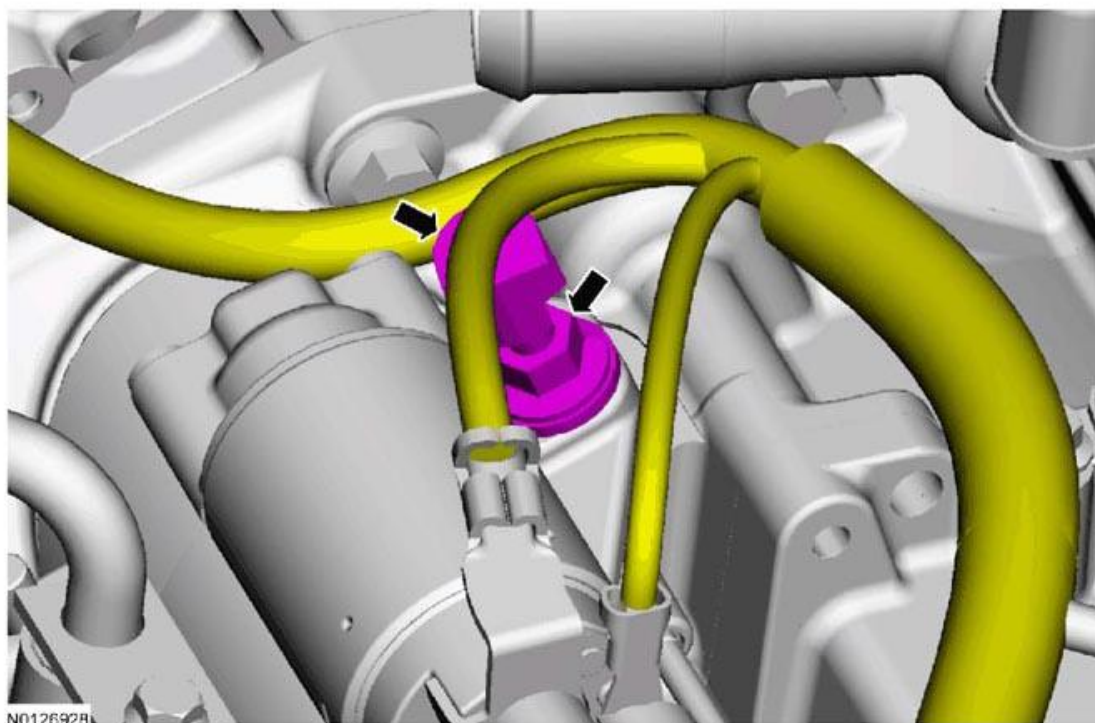
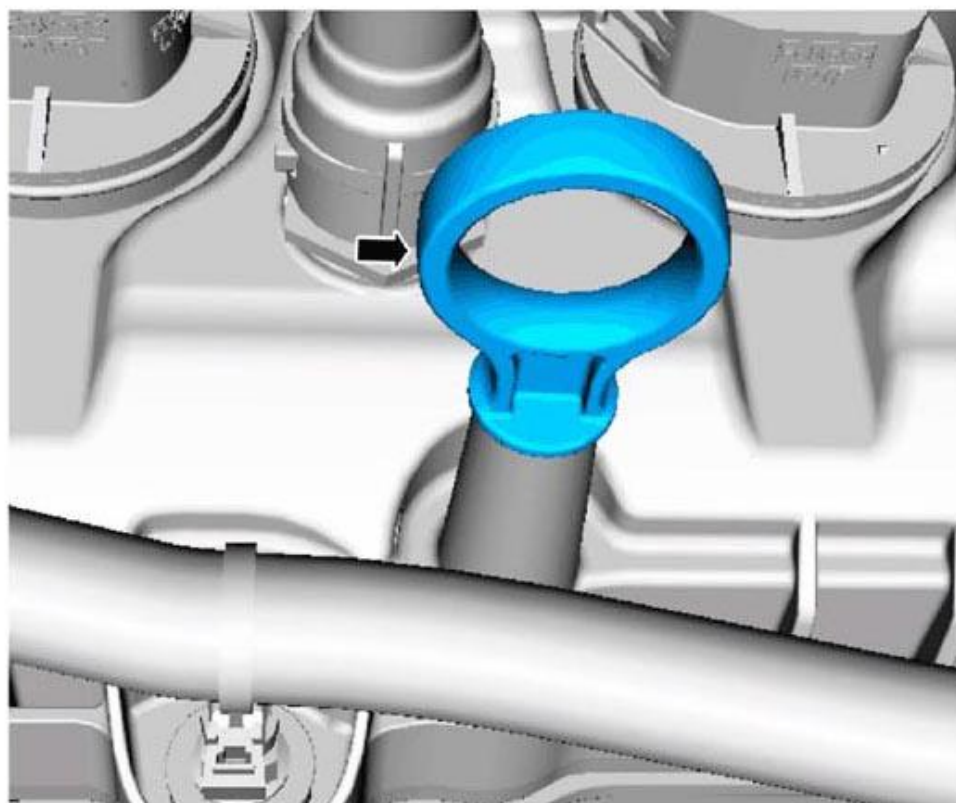


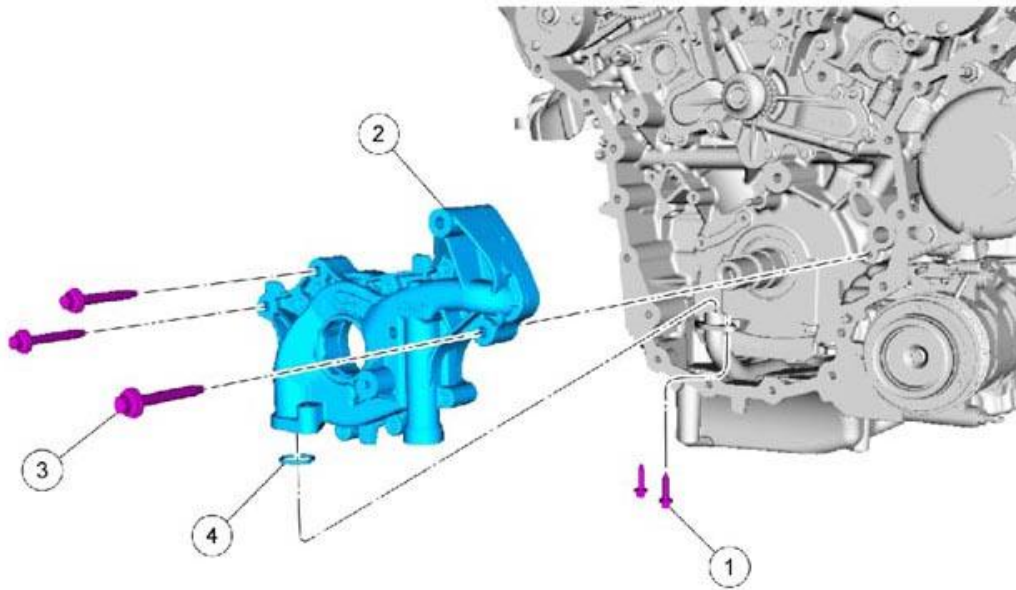
Fig. 597: Locating Pipe Connection Plug
Courtesy of FORD MOTOR CO.



44.

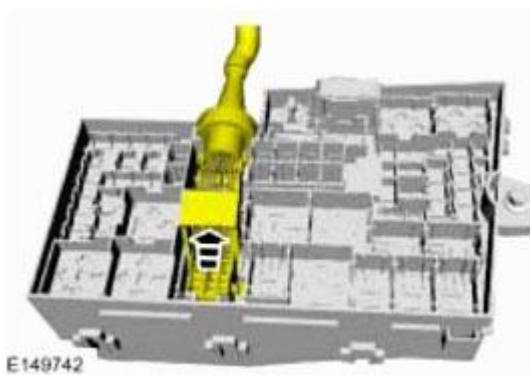
Fig. 598: Locating Hose Connection And Retainer
Courtesy of FORD MOTOR CO.

45. *General Equipment* : Hose Clamp Remover/Installer



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Fig. 599: Locating Hose Clamps
Courtesy of FORD MOTOR CO.



E149742

46.

Fig. 600: Identifying Harness Retainer
Courtesy of FORD MOTOR CO.



47.

Fig. 601: Locating Harness Retainer
Courtesy of FORD MOTOR CO.

48. *Torque* : 20 Nm

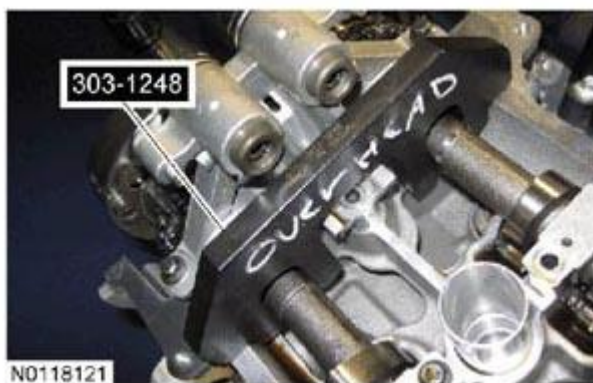


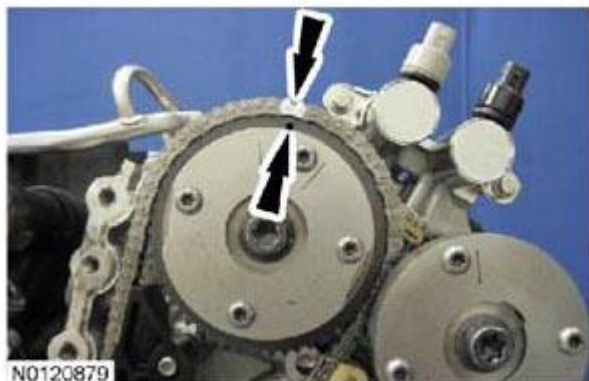
Fig. 602: Locating Harness Retainer And Ground Bolts
Courtesy of FORD MOTOR CO.

49. **NOTE:** The electrical connector is located behind the PCM case.



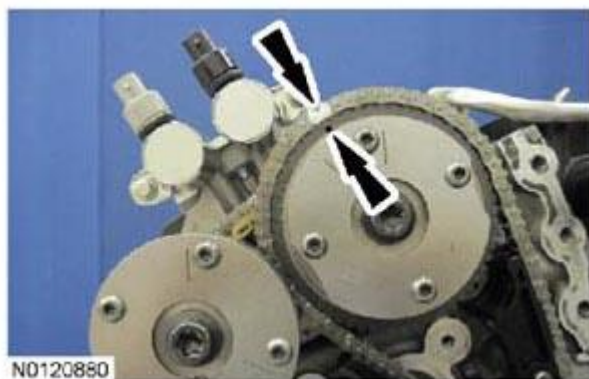
Fig. 603: Locating Electrical Connector Behind PCM Case
Courtesy of FORD MOTOR CO.

50. Refer to: **POWERTRAIN CONTROL MODULE (PCM)** .



- 51.

Fig. 604: Locating Harness Retainer
Courtesy of FORD MOTOR CO.



- 52.

Fig. 605: Locating Engine Ground Point
Courtesy of FORD MOTOR CO.

53. If equipped with automatic transmission.



Fig. 606: Locating Harness Retainer
Courtesy of FORD MOTOR CO.

54. Install the following items:

1. Refer to: **AIR CLEANER** .

Refer to: **AIR CLEANER OUTLET PIPE** .

2. Refer to: **BATTERY TRAY** .

3. Refer to: **DEGAS BOTTLE** .

55. If equipped with manual transmission, fill and bleed the clutch system.

Refer to: **CLUTCH SYSTEM BLEEDING** .

56. Refer to: **COOLING SYSTEM DRAINING AND VACUUM FILLING** .

Refer to: **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .



57.

Fig. 607: Locating Engine Lower Cover Bolts
Courtesy of FORD MOTOR CO.

58. Refer to: **AIR CONDITIONING (A/C) SYSTEM RECOVERY, EVACUATION AND CHARGING** .

59. Fill the engine with clean engine oil.

Material : Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil / XO-5W20-QSP (WSS-M2C945-A)