

Engine Removal

FORD MOTOR CO. (Cont.)

8) Remove transmission oil cooler line routing clip. Remove exhaust inlet pipe at exhaust manifold. Remove transmission-to-engine lower attaching bolts. Remove engine mount-to-crossmember bolts. Lower vehicle. Support transmission with a suitable jack.

9) Remove upper transmission-to-engine attaching bolts. Raise engine slightly. Carefully pull engine away from transmission. Lift engine from engine compartment.

V8 MODELS

1) Mark hinges for reinstallation and remove hood. Drain crankcase and cooling system. Disconnect battery and alternator ground cables from engine. Remove air cleaner and intake duct assembly. Disconnect all coolant and vacuum hoses, fuel lines and transmission oil cooler lines.

NOTE — If engine is equipped with Thermactor system, remove or disconnect all components of system that will interfere with removal of engine.

2) Remove radiator, fan, spacer, pulley and fan shroud. Position alternator and power steering pump out of way. Isolate A/C compressor and remove from vehicle.

3) Disconnect all wiring and transmission and carburetor linkage. Remove flywheel or converter housing upper bolts, engine-to-body ground straps, and raise vehicle. Remove starter and disconnect exhaust pipes from manifolds.

4) On manual transmission vehicles, remove clutch equalizer bar and any other clutch linkage. Remove lower flywheel housing-to-engine bolts. On vehicles with automatic transmission, remove converter housing cover and disconnect flywheel from converter. Secure converter assembly in housing, and remove lower converter housing-to-engine bolts. Remove engine front support bolts on all models.

5) Lower vehicle and support transmission with floor jack. Attach suitable lifting sling to engine lifting brackets. Lift engine slightly and pull forward and away from transmission. Lift engine out of vehicle.

FORD MOTOR CO. TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)	Application	Ft. Lbs. (N·m)
4-Cyl. Engines		6-Cyl. Engines	
1.6L (98")		3.3L (200")	
Right Side		Motor Mount Bracket-to-Engine	40-55 (54-75)
Motor Mount-to-Engine	35-40 (47-54)	Motor Mount Bracket-to-Frame	70-90 (95-122)
Motor Mount Bracket-to-Insulator	65-70 (88-95)	Motor Mount-to-Engine Bracket	30-42 (41-57)
Insulator Through Bolt	65-70 (88-95)	Rear Mount-to-Transmission	50-70 (68-95)
Left Side Rear		Crossmember-to-Frame	35-50 (47-68)
Motor Mount Bracket-to-Transaxle	30-35 (40-47)	3.8L (232") V6	
Insulator-to-Bracket	75-80 (102-108)	Motor Mount-to-Engine	35-50 (47-68)
Insulator Through Bolt	65-70 (88-95)	Motor Mount-to-Frame	70-90 (95-122)
Left Side Front		Crossmember-to-Frame	35-50 (47-68)
Crossmember Bracket-to-Support	35-40 (47-54)	Rear Mount-to-Transmission	50-70 (68-95)
Front Support-to-Bracket	22-26 (30-35)	V8 Engines	
Roll Restrictor Bracket-to-Engine	22-26 (30-35)	Motor Mount-to-Engine	35-60 (47-81)
Motor Mount Bracket-to-Transaxle	30-35 (40-47)	Motor Mount Through Bolt	40-46 (54-62)
Insulator-to-Bracket	75-80 (102-108)	Motor Mount-to-Crossmember	70-90 (95-122)
Insulator Through Bolt	65-70 (88-95)	Rear Mount-to-Transmission	50-70 (68-95)
2.3L (140")		Crossmember-to-Frame	35-50 (47-68)
Motor Mount-to-Engine	40-55 (54-75)	① — Whenever self-locking fasteners are removed, they must be replaced with new self-locking fasteners.	
Motor Mount Bracket-to-Frame	70-90 (95-122)		
Rear Mount-to-Transmission	50-70 (68-95)		
Rear Mount-to-Crossmember	25-35 (34-47)		
Crossmember-to-Frame	50-70 (68-95)		

GENERAL MOTORS BUICK

4-CYLINDER MODELS

1.8L (112") & 2.0L (122") — 1) Disconnect battery cables at battery. Drain cooling system. Remove air cleaner. If equipped, remove power steering pump. Remove window washer bottle. If equipped with A/C, remove relay bracket at bulkhead connector. Remove bulkhead connector.

2) If equipped, remove cruise control servo bracket. Disconnect all vacuum hoses and wiring from engine. Remove bolts attaching vacuum booster-to-master cylinder. Lay vacuum

booster aside. Remove heater hose at hot water pipe. Remove fan assembly. Remove horn. Remove carburetor linkage.

3) Raise vehicle on hoist. Remove heater hose and fuel line at intake manifold. If equipped, remove A/C compressor brace. Remove exhaust shield. Remove starter. Remove exhaust pipe at exhaust manifold. Remove front tires.

4) Remove stabilizer at lower control arms. Remove ball joints from steering knuckle. Remove drive axles at transaxle.

GENERAL MOTORS (Cont.)

BUICK (Cont.)

Remove transaxle strut. If equipped with A/C, remove inner fender shield, drive belt and compressor.

5) Remove front motor mount nuts. If equipped with manual transaxle, remove clutch cable at transaxle. If equipped with automatic transaxle, remove detent cable at transaxle. On all models, install engine lifting device. Remove transaxle mount and bracket. Remove engine.

2.5L (151") Auto. Trans. - 1) Disconnect battery cables at battery. Drain cooling system. Remove air cleaner and heat tube. Disconnect engine wiring harness connector. Disconnect all vacuum lines. Remove throttle and transmission linkage at carburetor.

2) Remove upper radiator hose. If equipped, remove A/C compressor from mounting brackets and position aside, leaving refrigerant lines connected. Remove front engine strut assembly. Disconnect heater hoses at engine.

3) Remove transaxle-to-engine bolts, leaving upper 2 bolts installed. Remove front mount-to-cradle nuts. Remove forward exhaust pipe. Remove converter housing inspection cover and remove starter motor. Remove converter-to-flex plate bolts.

4) If equipped, remove power steering pump and bracket and position aside. Remove lower radiator hose. Remove 2 rear transaxle support bracket bolts. Remove fuel line at fuel pump. Position suitable jack and a block of wood under transaxle and raise engine and transaxle until front engine mount studs clear cradle.

5) Install engine lifting device and raise engine slightly. Remove 2 remaining transaxle-to-engine bolts. Slide engine forward and remove from vehicle.

2.5L (151") Man. Trans. - 1) Disconnect battery cables at battery. Raise vehicle on hoist. Remove front engine mount-to-cradle nuts. Remove forward exhaust pipe. Remove starter motor, with wiring attached, and position aside.

2) Remove flywheel housing inspection cover. Lower vehicle. Remove air cleaner. Remove all bell housing-to-engine bolts. Remove forward torque reaction rod from engine and radiator core support. If equipped, remove A/C compressor and position aside, leaving refrigerant lines connected.

3) Remove vacuum hoses at canister. If equipped, remove power steering hose. Remove all vacuum hoses and electrical connectors at solenoid. Remove heater blower motor. Disconnect accelerator cable at carburetor. Drain cooling system.

4) Disconnect heater hose at engine. Disconnect upper and lower radiator hoses. Disconnect engine wiring harness at bulkhead connector. Install engine lifting device. Lift engine slightly. Remove heater hose and fuel line at intake manifold. Remove engine from vehicle.

V6 MODELS

2.8L (173") Auto. Trans. & 3.0L (181") - 1) Disconnect battery cables at battery. Remove air cleaner. Drain cooling system. Disconnect all vacuum lines to all components not mounted on engine. Disconnect detent cable at carburetor.

2) Disconnect accelerator linkage at carburetor. Disconnect engine wiring harness connector. Disconnect ground strap

from engine at engine forward strut. Disconnect radiator hoses from radiator. Remove heater hoses from engine.

3) If equipped, remove power steering pump and bracket from engine. Raise vehicle on hoist. Remove exhaust pipe. Disconnect fuel line at rubber hose connection at right side of engine. Remove right front engine mount-to-cradle nuts.

4) Disconnect battery cables at starter and transaxle housing. Remove converter housing inspection cover. Remove converter-to-flex plate bolts. Remove transaxle case-to-engine block support bracket bolts. Lower vehicle. Position support stand under transaxle rear extension.

5) Remove engine strut bracket from radiator support and swing rearward. Remove transaxle housing-to-engine bolts, noting location of ground stud bolt. If equipped, remove A/C compressor from mounting bracket and position aside, leaving refrigerant lines connected. Install engine lifting device. Remove engine from engine compartment.

2.8L (173") Man. Trans. - 1) Disconnect battery cables at battery. Remove air cleaner. Drain cooling system. Disconnect vacuum hoses to all components not mounted on engine. Disconnect accelerator linkage from carburetor. Disconnect engine harness connector.

2) Disconnect radiator hoses from radiator. Disconnect heater hoses from engine. If equipped, remove power steering pump and bracket assembly from engine. Disconnect clutch cable from transaxle. Disconnect shift linkage from shift levers. Remove cables from transaxle bosses.

3) Disconnect speedometer cable from transaxle. Install engine support fixture. Raise engine until weight is relieved from mount assemblies. Remove exhaust crossover pipe. Remove all but 1 transaxle-to-engine bolt.

4) Remove side and crossmember assembly. Disconnect exhaust pipe. Remove all powertrain mount-to-cradle attachments. Remove both drive axles from transaxle assembly. Lower left side of engine using engine support fixture.

5) Place a suitable jack under transaxle. Remove the final transaxle-to-engine bolt. Separate transaxle from engine. Install engine lifting fixture. If equipped, remove A/C compressor from engine, leaving refrigerant hoses connected. Disconnect forward strut bracket from radiator support and swing aside. Remove engine from engine compartment.

3.8L (231") & 4.1L (252") Exc. Riviera - 1) Mark hinges for reinstallation and remove hood. Disconnect battery and drain cooling system. Remove air cleaner. If equipped, remove A/C compressor from mounting bracket and position aside, leaving refrigerant lines connected. Remove fan, pulleys and belts.

2) Disconnect radiator and heater hoses at engine. Remove fan shroud assembly. If equipped, remove power steering pump and position aside, leaving hoses connected. Disconnect and plug fuel pump hoses at pump. Disconnect battery ground cable from engine.

3) Disconnect all electrical wiring at engine. Disconnect all vacuum lines to non-engine mounted components. Disconnect accelerator cable and TV cable at carburetor. Disconnect

GENERAL MOTORS (Cont.)

BUICK (Cont.)

engine-to-body ground strap at engine. Remove alternator. Raise vehicle on hoist and disconnect cable shield from engine.

4) Disconnect exhaust pipes at manifolds. On automatic transmission, remove converter housing inspection cover. Remove converter-to-flex plate bolts. Remove engine-to-transmission attaching bolts.

5) On manual transmission, transmission is removed with engine. Remove drive shaft, shift linkage, clutch equalizer shaft and transmission mount. On all models, remove motor mount through bolts and cruise control bracket (if equipped). Lower vehicle.

6) On automatic transmission, support transmission. On all models, install lifting device to engine. Raise engine and transmission alternately until engine clears motor mounts and can be disengaged from automatic transmission, then remove engine from vehicle.

3.8L (231") & 4.1L (252") Riviera – 1) Mark hinges for reinstallation and remove hood. Disconnect battery and drain cooling system. Remove air cleaner. Disconnect heater hoses at engine. Remove fan, pulleys and belts. Disconnect radiator hoses from engine.

2) Remove fan shroud. Disconnect transmission oil cooler lines at radiator and remove radiator. Discharge A/C system and remove A/C compressor. Disconnect all electrical wiring and vacuum lines at engine. Disconnect and plug fuel pump hoses at pump.

3) Disconnect accelerator cable at carburetor. Remove power steering pump from mounting bracket and position aside, leaving hoses connected. Remove alternator and disconnect engine-to-body ground strap(s) at engine. If equipped, disconnect turbo outlet exhaust pipe from turbocharger assembly.

4) Raise vehicle on hoist and remove starter motor. Drain crankcase. Remove converter housing inspection cover and remove converter-to-flex plate bolts. Remove lower engine-to-transmission attaching bolts. Remove right output shaft support bolts. Remove front motor mount bolts.

5) Lower vehicle and install final drive support chain (BT-6322 or equivalent). Remove remaining engine-to-transmission attaching bolts. Remove final drive-to-engine bracket bolts and remove bracket. Install engine lifting device and remove engine from vehicle.

4.3L (262") Diesel Front Wheel Drive – 1) Drain cooling system. Remove all fan belts. Remove air cleaner. Cover air intake hole in intake manifold. Disconnect negative battery cables at batteries. Disconnect engine ground strap (from right cylinder head to cowl).

2) Raise vehicle on hoist. Remove flywheel cover. Remove flywheel-to-torque converter bolts. Disconnect exhaust pipe from rear exhaust manifold. Remove engine-to-transaxle brace. Remove engine mount-to-cradle retaining nuts.

3) Disconnect all wiring from engine. Disconnect lower oil cooler line. Remove power steering pump and bracket assembly and position out of way, leaving hoses connected. Remove heater water return pipe. If equipped, remove A/C compressor and position aside with hoses connected.

4) Disconnect all fuel and vacuum lines from engine. Plug all fuel lines. Disconnect throttle and T.V. cables at injection pump and cable bracket. Position cables aside. Remove upper oil cooler line and plug openings. Remove exhaust crossover pipe heat shield.

5) Disconnect transaxle filler tube and position aside. Remove exhaust crossover pipe. Remove engine mounting strut and strut brackets. Install suitable engine lifting device. Support transaxle rear extension with suitable jack. Remove transaxle-to-engine bolts. Remove engine from engine compartment.

4.3L (262") Diesel Rear Wheel Drive – 1) Drain cooling system. Remove air cleaner. Cover air intake hole in intake manifold. Mark hood and hinges for reassembly reference. Remove hood. Disconnect negative battery cable at batteries. Disconnect engine ground strap (from right cylinder head to cowl).

2) Remove radiator hoses. Remove engine oil and transmission oil cooler lines. Disconnect all vacuum hoses to engine. Remove power steering hoses. If equipped, remove A/C compressor from engine, with hoses and brackets attached, and position aside. Disconnect all fuel lines from fuel pump and injection pump.

3) Disconnect all wiring attached to engine, except at starter. Disconnect throttle cable from injection pump. Disconnect detent cable from injection pump and engine brackets. Remove upper radiator support. Remove radiator.

4) Raise vehicle on hoist. Disconnect exhaust pipes at manifolds. Remove torque converter cover. Remove torque converter-to-flywheel bolts. Remove starter. Remove motor mount through bolts. Remove 3 transmission-to-engine bolts on right side.

5) Lower vehicle. Install suitable engine lifting device to engine. Place a board on top of a jack and slightly raise transmission. Remove 3 transmission-to-engine bolts on left side. Remove engine from engine compartment.

V8 MODELS

5.0L (307") Exc. Riviera – 1) Drain cooling system. Remove air cleaner and hot air pipe. Mark hood and hinges for reassembly reference. Remove hood. Disconnect negative battery cable at battery. Remove engine ground strap (from right cylinder head to cowl).

2) Remove radiator hoses. Remove automatic transmission cooler lines from radiator. Remove all heater hoses. Remove all vacuum hoses connected to engine. Disconnect power steering hose bracket from engine. If equipped, remove A/C compressor, with hoses and brackets attached, and position aside.

3) Disconnect fuel line at carburetor. Disconnect all wiring from engine. Disconnect throttle cable from carburetor. Remove upper radiator support. Remove radiator. Raise vehicle on hoist. Disconnect exhaust pipes at manifolds.

4) Remove torque converter cover. Remove bolts attaching converter-to-flywheel. Remove engine mount bolts or nuts. Remove 3 transmission-to-engine bolts on right side. Remove starter, with wires attached, and secure to frame.

GENERAL MOTORS (Cont.) BUICK (Cont.)

5) Lower vehicle. Secure lift chain to engine. Place a board on top of a jack and raise transmission slightly. Remove 3 transmission-to-engine bolts on left side. Remove engine from engine compartment.

5.0L (307") Riviera - 1) Mark hood and hinges for reassembly reference. Remove hood. Disconnect battery cables at battery. Remove air cleaner. Drain cooling system. Remove heater hoses. Remove fan. Remove upper radiator hose. Remove upper radiator support. Remove fan shroud. Remove lower radiator hose from water pump. Disconnect transmission cooler lines from radiator. Remove radiator.

2) Remove A/C compressor. Disconnect all electrical wiring and vacuum hoses from engine. Disconnect accelerator rod and throttle valve cable. Disconnect all fuel lines from engine. Remove power steering pump. Remove transmission cooler line bracket. Disconnect left exhaust pipe from manifold.

3) Raise vehicle on hoist. Remove starter assembly. Drain crankcase. Remove flywheel shield. Remove flywheel-to-converter bolts. Disconnect right exhaust pipe from manifold. Remove splash shield. Remove right transmission-to-engine bolts.

4) Remove right output shaft support bolts. Remove front motor mount bolts. Install final drive support chain. Remove remaining transmission-to-engine bolts. Remove final drive-to-engine bracket. Install lifting chains to engine. Remove engine from compartment.

5.7L (350") Diesel Exc. Riviera - 1) Drain cooling system. Remove air cleaner. Cover air intake hole in intake manifold. Mark hood and hinges for reassembly reference. Remove hood. Disconnect negative battery cables at batteries. Disconnect engine ground strap from right head to cowl.

2) Remove radiator hose. Remove engine oil and transmission oil cooler lines. Remove heater hoses. Disconnect power steering hoses from steering gear. Remove A/C compressor from engine, with hoses and brackets attached, and position aside.

3) Disconnect fuel line from fuel pump. Disconnect all wiring to engine. Remove hairpin clip at bellcrank. Remove throttle and T.V. cables from intake manifold and position aside. Remove upper radiator support. Remove radiator.

4) Raise vehicle on hoist. Disconnect exhaust pipes at manifolds. Remove torque converter cover. Remove bolts attaching converter-to-flywheel. Remove motor mount bolts or nuts. Remove 3 bolts attaching transmission-to-engine on right side.

5) Disconnect wires from starter and remove starter. Lower vehicle. Secure chain lift to engine. Place a board on top of a jack and raise transmission slightly. Remove 3 bolts attaching transmission-to-engine on left side. Remove engine from engine compartment.

5.7L (350") Diesel Riviera - 1) Disconnect negative battery cable at battery. Drain cooling system. Remove upper radiator support. Remove air cleaner. Cover air intake hole in intake manifold. Mark hood and hinges for reassembly reference. Remove hood.

2) Disconnect engine ground strap. Remove fan and fan shroud together. Disconnect upper and lower radiator hoses at

engine. Disconnect transmission and engine oil cooler lines at radiator. Disconnect heater hoses from water pump and water control valve.

3) Disconnect all wiring to engine. Remove alternator with upper brace. Remove power steering pump bracket from engine. Position power steering pump aside. Remove A/C compressor from engine, with hoses and brackets attached, and position aside.

4) Disconnect all fuel lines to engine. Disconnect accelerator rod detent cable. Disconnect all vacuum hoses from engine. Remove cooler line bracket. Disconnect left exhaust pipe from manifold. Remove upper mount heat shield.

BUICK TIGHTENING SPECIFICATIONS	
Application	Ft. Lbs. (N·m)
4-Cyl. Engines	
1.8L (112") & 2.0L (122")	
Front Motor Mount-to-Engine	25-35 (34-47)
Lower Motor Mount-to-Engine	15-20 (20-27)
Motor Mount-to-Frame	35-45 (47-61)
Starter-to-Engine	26-37 (35-50)
Transaxle-to-Engine	48-63 (65-85)
Flywheel-to-Torque Converter	35 (47)
2.5L (151")	
Motor Mount-to-Frame	41 (56)
Motor Mount-to-Engine	47 (64)
Starter-to-Engine	26-37 (35-50)
Transmission-to-Engine	48-63 (65-85)
Flywheel-to-Torque Converter	31 (42)
6-Cyl. Engines	
2.8L (173")	
Engine Mounting Bracket-to-Engine	70-92 (95-125)
Engine Mounting Torque Strut Bracket ..	30-40 (41-54)
Flywheel-to-Torque Converter	25-35 (34-47)
Starter-to-Engine	26-37 (35-50)
Transmission-to-Engine	48-63 (65-85)
3.0L (181")	
Transmission-to-Engine	55 (75)
Starter-to-Engine	35 (47)
Transaxle Brace-to-Transaxle	26-37 (35-50)
Transaxle Brace-to-Engine Mtg. Bracket	59-81 (80-110)
3.8L (231") & 4.1L (252")	
Motor Mount-to-Engine	59 (80)
Motor Mount-to-Crossmember	33 (45)
Motor Mount Through Bolt	47 (64)
Starter-to-Engine	35 (47)
Transmission-to-Engine	35 (47)
4.3L (262") Diesel	
Motor Mount-to-Engine	37 (50)
Motor Mount-to-Frame	38 (52)
Motor Mount Through Bolt	55 (75)
Flywheel-to-Torque Converter	35 (47)
Transmission-to-Engine	35 (47)
V8 Engines	
5.0L (307") & 5.7L (350") Diesel	
Front Wheel Drive	
Motor Mount Bracket-to-Engine	66 (89)
Motor Mount-to-Bracket	52 (71)
Transmission-to-Engine	35 (47)
Rear Wheel Drive	
Motor Mount-to-Engine	70 (95)
Motor Mount Through Bolt	48 (65)
Transmission-to-Engine	35 (47)