

Engine Removal

GENERAL MOTORS ENGINE REMOVAL

BUICK

1964-69

To remove engine without transmission, proceed as follows: Remove hood, drain cooling system, remove battery and air cleaner. Remove radiator (plug transmission oil cooler lines). Disconnect all lines, wires, cables, and linkages from engine. Disconnect exhaust pipe from manifold, remove transmission from engine (support rear of engine), attach lifting device to engine and disconnect engine front mounts. Remove engine. *NOTE - Engine transmission can be removed as an assembly.*

1970-73

Scribe marks around hood hinges and brackets and remove hood. Remove air cleaner, drain cooling system and disconnect battery. With A/C, disconnect wiring, remove compressor from bracket and position out of the way. Remove fan blade, pulley and belts. Disconnect all water hoses from engine and remove fan shroud assembly. Disconnect battery ground cable from engine. Remove power steering pump from bracket and position to one side. Remove and plug fuel pump hoses and disconnect all vacuum and emission hoses at engine. Disconnect body ground strap at engine. Raise car, disconnect starter cables and cable shield. Disconnect crossover pipe from manifold and support exhaust system. Remove flywheel and converter crossover. Remove flywheel to converter bolts and scribe marks on flywheel and converter for reassembly alignment, (not necessary on Man. Trans.). Remove transmission attaching bolts, remove nuts from motor mounts and through bolts. Lower car and support transmission. With lifting tackle attached, raise engine slightly so that through bolts can be removed. Disengage engine from transmission and lift engine from chassis.

ENGINE MOUNTING ADJUSTMENT

1964-65 ENGINES

CAUTION - Position of support must NOT be changed by removal of shims to move support sideways. Whenever support is removed, the number and location of shims at each end of support must be noted, and shims must be reinstalled exactly where found.

1) Loosen exhaust pipes at manifolds. Loosen four engine mount to frame bolts.

2) Make sure that transmission support to frame shims are in original position and tighten all support to frame, support to mount, and mount to rear bearing retainer bolts.

3) Raise engine slightly to allow mounts to normalize. Lower engine and tighten engine mount to frame bolts.

1966-71 6 CYLINDER ENGINES

1) Raise car and support front of car. Remove nut, washer and engine mount through bolt. Raise engine at forward edge of oil pan (place a block of wood between jack and pan). Remove mount.

2) Install flywheel on crankshaft and position to align dowel hole of crankshaft flange and flywheel. Install bolts and torque to specifications.

NOTE - On auto. trans. equipped vehicles, flywheel must be installed with flange collar to transmission side.

3) Install mount to frame bracket and torque to specification. Lower engine until mounts rest on frame crossmember in normal manner. Install mount to bracket bolt and torque to specification. Remove frame support and lower car.

BUICK TIGHTENING SPECIFICATIONS 6 CYL. ENGINES

1964-67

Application	Ft. Lbs.
Upper Flywheel Housing-to-Block	30-35
Lower Flywheel Housing-to-Block	8-12
Man. Trans.-to-Flywheel Housing	
3-Speed Transmission	40-45
4-Speed Transmission	45-60
Auto. Trans.-to-Block	30-40
Motor Mount-to-Block	
1964	50-55
1965-67	50-75
Motor Mount-to-Frame	55-65

1968-73^⓪

Application	Ft. Lbs.
Flywheel Housing-to-Block	30
Lower Flywheel Housing	7
Motor Mount Bracket-to-Block	
1968	35
1969-71	33
Motor Mount-to-Bracket (1968-71)	45
Motor Mount-to-Engine (1973)	35

V8 ENGINES

1964-67

Application	Ft. Lbs.
Converter Housing-to-Block	45-55
Auto. Trans.-to-Block	30-40
Auto. Trans.-to-Converter Housing	35-40
Man. Trans.-to-Flywheel Housing	45-60
Flywheel Housing-to-Block	
3-Speed	30-35
4-Speed	45-50
Motor Mount-to-Block	
1964	50-55
1965-67 (Exc. 401" & 425")	50-75
1965-67 (401" & 425")	25-40
Motor Mount-to-Frame	55-60

1968-73

Application	Ft. Lbs.
Lower Flywheel Housing Plate (Auto. Trans.)	4
Lower Flywheel Housing Plate (Man. Trans.)	11
Flywheel Housing-to-Block	35
Motor Mount-to-Block	
1968	70
1969-73	63
Starter-to-Block	35

^⓪ - 6 Cyl. engine not used in 1972.

GENERAL MOTORS ENGINE REMOVAL (Cont.)

1966-69 V8 ENGINES

1) Raise car and provide frame support at front of car. Support weight of engine at forward edge of oil pan (place a block of wood between jack and pan). Remove mount to engine block bolts and raise engine slightly and remove mount to mount bracket bolt and nut. Remove mount.

2) Install mount to engine block bolts and torque to specifications. Lower engine so mounts rest on frame cross-member in normal manner. Install mount to bracket bolt and torque to specifications. Remove frame support and lower car.

CADILLAC

1964

To remove engine without transmission, proceed as follows: 1) Remove radiator (unnecessary to disturb air conditioning condenser). Disconnect air conditioning compressor and move to one side (unnecessary to disconnect lines or purge system). Remove fan blade assembly, pulley, and all belts. Disconnect power steering pump and move aside (do not disconnect hoses).

2) Remove starter, and support transmission at front end.

3) Raise engine with 3-point suspension as follows: Use adapter plates or eye bolts at the 2 center cylinder head bolts in lower row on each head. Attach chain or hoist to water outlet pipe. **NOTE - Chain at water outlet pipe must be as tight as possible to prevent engine from tilting forward.**

4) Remove engine by lifting upward and pushing forward to disengage all dowels and studs. Use extreme care to prevent damage to flex plate.

1965

Engine and transmission must be removed as an assembly.

1) Remove hoses and lines from radiator (do not remove radiator). Move power steering pump to one side, and remove fan blades, spacer, pulley, and generator drive belt.

2) Disconnect air conditioning compressor from mounting brackets and position out of way (do not disconnect lines). Disconnect idler arm support at frame and move arm out of way.

3) Disconnect engine ground strap at frame. Disconnect all lines, wires, and linkages from engine and transmission, then remove the engine front support mount studs.

4) Place a jack under transmission and support weight of engine and transmission, then remove engine rear support crossmember. Remove engine from car. **NOTE - Tilt engine down at rear to a 45° angle for clearance.**

1966-67 (EXC. ELDORADO)

NOTE - Transmission and engine must be removed as an assembly.

1) Raise car, disconnect battery, remove air cleaner, and drain cooling system. Unbolt air conditioner compressor and move to side without disconnecting hoses. Disconnect cooler lines and hoses and remove radiator.

2) Remove fan assembly and pulley. Unbolt power steering and move to side without disconnecting hoses. Remove exhaust crossover pipe. Disconnect idler arm support from frame and move idler arm to one side.

3) Disconnect all lines, wiring, and linkage to engine and transmission. Remove two front engine support mount to frame stud nuts. Disconnect propeller shaft and remove hood. Support rear of transmission to take load from engine rear support crossmember. Disconnect and remove engine rear support crossmember.

4) On cars with A.I.R., make scribe marks on crankshaft pulley, spacer, and harmonic balancer, then remove six screws and remove crankshaft pulley. Remove four screws in air pump pulley and remove pulley.

5) Remove engine compartment struts. Support engine with cable under intake manifold and remove support from under transmission. Tilt rear of engine down and lift engine and transmission from car.

1967 ELDORADO

NOTE - Engine and transmission can NOT be removed as an assembly.

1) Remove hood and pivot cowl rods, then remove all pumps and compressors (do not disconnect hoses). Disconnect all lines, hoses, linkages, and wiring. Remove fan shrouds and pulley, starter motor, transmission-to-adapter screws, right drive shaft, and final drive brace, then remove right exhaust pipe clamp, front cover-to-transmission screws, and converter-to-flex plate screws (remove cork from harmonic balancer, insert a screw and rotate screw to gain access to flex plate-to-converter screws). **DO NOT pry on flex plate ring gear.**

2) Loosen, but do not remove two transmission mounting nuts, then remove two nuts securing engine mounting studs to front frame crossmember. **CAUTION - There is only one bolt left securing final drive housing to engine support bracket, and two screws securing transmission adapter to engine. Do not proceed further until engine has been connected to chain hoist.**

3) Remove lower transmission-to-adapter-to-engine screws and place jack under final drive housing. Remove bolt securing final drive housing to engine support bracket, then pull engine slightly forward and remove engine. **INSTALLATION NOTE - Converter must be aligned with flex plate to prevent draw-up when attaching bolts are installed.**

1968-70 ALL MODELS

1) Disconnect negative battery cable, and remove hood. Remove carburetor air cleaner, and automatic lever control hoses (if equipped).

2) Disconnect carburetor linkage at accelerator pedal lever, and Cruise Control linkage (if equipped). Remove screws securing radiator shroud and remove shroud.

3) Remove clamp holding upper radiator hose to cradle. Disconnect positive wire from ignition coil, and single connection under ignition coil. Disconnect wires from downshift switch.

On air conditioned cars, disconnect compressor lead at double connector and remove black wire from connector.

4) Remove clamps securing wiring harness to left rocker arm cover, place harness out of the way. Remove fan, dis-

GENERAL MOTORS ENGINE REMOVAL (Cont.)

tributor cap, and spark plug wires. On 1969 Eldorado, remove studs from water pump shaft hub (for clearance).

5) Disconnect power brake and vacuum modulator lines from fitting on rear of intake manifold. Remove vacuum line from fitting on right rear of intake manifold. Remove Cruise Control Power Head (if equipped).

6) Remove fuel line (between filter and carburetor). Disconnect right ignition wires (at plugs) and place out of the way. Disconnect A.I.R. hose (at check valve).

On air conditioned cars, partially remove compressor (position out of the way) and remove idle speed-up hose (white striped), from idle speed-up device.

7) Partially remove power steering pump and remove power steering cooler, position both out of the way. Drain radiator and remove overflow hose. On 1969 models, remove green hose from thermo vacuum switch at cowl connection.

8) On 1969 Eldorado, remove one screw holding transmission filler tube to cylinder block. Disconnect upper radiator hose at radiator fitting and thermostat housing. Loosen A.I.R. pump and remove belt. Remove water pump pulley and generator. Remove wiring harness from right rocker arm cover, position out of the way.

9) Remove two upper transmission to engine screws. Disconnect heater hose from water control valve. Remove two screws securing right air deflector to lower radiator cradle and disconnect fuel line from fuel pump and vapor return line from fuel filter. Plug lines.

On air conditioned cars, remove power servo from heater air selector, except 1969 Eldorado. On 1969 air conditioned cars (except Eldorado), remove blower relay from heater air selector.

10) Disconnect ground straps from cowl at rear of heads and disconnect wiring connector from temperature sending unit. Remove tie struts.

11) Position a lifting bracket to rear intake manifold attaching screws on left rear of engine (Cruise Control Equipped only). Bracket is in place on all others.

12) Raise car and place on jack stands. Remove two nuts securing each front engine mount to frame, and remove oil filter. On Eldorado, remove right output shaft.

13) Remove three screws securing starter motor to engine, allow starter to hang by cables. Remove four screws securing converter cover to transmission bellhousing and remove inspection pan.

14) Disconnect exhaust pipes from manifolds. Support exhaust system with jack stand. Connect a chain to lifting brackets and attach hook of a hoisting device to chain.

15) Support transmission at oil pan with a floor jack and remove four lower transmission to engine screws. Remove three screws securing converter to flex plate.

16) Remove lower radiator hose. Pry engine forward while raising it as far as possible. Lower transmission and again raise engine, remove flex plate from engine and lift engine free of car.

CADILLAC TIGHTENING SPECIFICATIONS

1964

Bolt or Nut	Torque Ft. Lbs.
Front Support Mount to Crankcase	30
Front Support Mount to Frame	90
Side Support Cushion Mount to No. 3 Crossmember	25
No. 3 Crossmember to Frame	30
Rear Support Mount to Extension Housing	55
Rear Support Mount to Rear Engine Support	55
Rear Engine Support to Frame	30

1965-68 (EXC. ELDORADO)

Bolt or Nut	Torque Ft. Lbs.
Front Support Mount to Cylinder Block	30
Rear Engine Support Crossmember to Frame	20
Rear Support Mount to Crossmember	50
Rear Support Mount to Transmission	55
Front Support Mount to Frame	60

1969-73 ELDORADO

Bolt or Nut	Torque Ft. Lbs.
Front Support Mount to Cylinder Block	21
Rear Engine Support Crossmember to Frame	20
Rear Support Mount to Crossmember	45
Rear Support Mount to Transmission	50
Front Support Mount to Frame	52

1967-68 ELDORADO

Bolt or Nut	Torque Ft. Lbs.
Front Mount Support Bracket to Crankcase	30
Front Support Cushion to Frame Stud	30
Front Support Cushion to Engine Mount Bracket	32
Rear Support Bracket to Transmission	50
Rear Support Assembly to Bracket	50
Rear Support Assembly to Frame	50

1969-73 (EXC. ELDORADO)

Bolt or Nut	Torque Ft. Lbs.
Front Mount Support Bracket to Crankcase	21
Front Support Cushion to Frame Stud	35
Front Support Cushion to Engine Mount Bracket	57
Rear Support Bracket to Transmission	50
Rear Support Assembly to Bracket	46
Rear Support Assembly to Frame (Bolt)	52
Rear Support Assembly to Frame (Nut)	52

1971-72 (EXC. ELDORADO)

1) Disconnect negative battery cable and remove hood. Remove carburetor air cleaner, heat shroud and radiator.

2) Remove upper radiator hose bracket at cradle and remove radiator cover if so equipped. Remove fan and upper radiator hose from thermostat housing.

3) Disconnect throttle and cruise control linkage at carburetor and position out of way.

4) Remove air conditioning compressor and power steering pump, without disconnecting hoses of either, and place to side out of way. Disconnect wires on left side of engine and position wiring harness out of way.

GENERAL MOTORS ENGINE REMOVAL (Cont.)

- 5) Remove vacuum hoses from carburetor and from tee at rear of intake manifold and remove purge hose at canister. Disconnect wires from right side of engine and position out of way.
- 6) Remove hot water hose from right cylinder head. Loosen generator and remove belt. Loosen A.I.R. pump and remove belt.
- 7) Loosen tie struts and position out of way. Remove two upper transmission to engine screws and raise car on hoist.
- 8) Remove starter motor and disconnect exhaust pipes from manifold.
- 9) Remove two nuts securing front engine mounts to frame crossmember.
- 10) Disconnect and plug fuel line and vapor return line (A/C cars only) at fuel pump. Remove lower radiator hose at water pump.
- 11) Remove flywheel inspection cover and screws securing flywheel to converter. Remove screws securing transmission to engine and lower car.
- 12) Move right hand lifting bracket to a position where it straddles the intake passage for #1 cylinder and support transmission with floor jack.
- 13) Raise engine slowly and pull forward to disengage transmission. Remove engine from car.

1971-73 ELDORADO

- 1) Remove hood and drain radiator.
- 2) Remove carburetor air cleaner, hot air duct and vacuum hoses.
- 3) Remove upper radiator hose at thermostat housing, bracket at cradle, radiator cover and fan blade assembly.
- 4) Disconnect battery negative cable, generator wires, right hand spark plug wires, heater turn-on switch and position harness out of way. Position spark plug wires away from top of compressor.
- 5) Disconnect water control valve hose at block and starter motor wiring harness at multiple connector. Remove power steering pump (do not disconnect hoses) and position out of way. Remove all drive belts.
- 6) Remove A/C compressor mounts and move compressor to top of battery.
- 7) Disconnect throttle and Cruise Control linkage at carburetor and bracket and disconnect wires on left hand side of engine and position out of way.
- 8) Disconnect vacuum lines at S.C.S. solenoid and rear of carburetor.
- 9) Remove left hand exhaust manifold flange nuts and transmission cooler line bracket screw and filler pipe nut from exhaust manifold.
- 10) Move right hand lifting bracket to a position where it straddles the intake passage from #1 cylinder and raise car on hoist.

- 11) Remove bolt securing final drive to motor mount, disconnect fuel pump lines and plug, remove front engine mount nuts and lower radiator hose.
- 12) Remove right hand exhaust manifold flange nuts and remove starter motor (do not disconnect wiring from terminals).
- 13) Remove flywheel inspection cover and flywheel-to-converter screws.
- 14) Remove two lower transmission to block screws and right hand output shaft screws.
- 15) Remove two output shaft bracket to block screws and one screw securing bracket to final drive.
- 16) Loosen right hand shock absorber lower mounting nut and move outward on stud.
- 17) Move drive axle as far back as possible and remove output shaft. Lower car.
- 18) Place support under transmission and remove bolts securing transmission to block.
- 19) Install lifting chain and remove engine.

VEGA 4 CYL. ENGINE

1971-73

- 1) Disconnect both battery cables, all water and vacuum emission control hoses and disconnect all wires from sending units, switches and solenoids.
- 2) Remove radiator panel or shroud. If equipped with A/C, move compressor forward and rest on frame forward brace without disconnecting lines. Position power steering pump out of way without disconnecting hoses.
- 3) Disconnect exhaust pipe at manifold. Remove flywheel dust cover or converter under pan. With Auto. Trans., remove converter retaining bolts and nuts and install converter safety strap.
- 4) Remove converter housing or flywheel housing bolts. Loosen engine front mounts at frame attachment. Lower car to floor and install floor jack at suitable support under transmission.
- 5) Using suitable lifting tackle, slightly raise engine to take weight off engine mounts and remove engine front mount retaining bolts. Pull engine forward to clear transmission and slowly lift engine from car.

VEGA	
TIGHTENING SPECIFICATIONS	
Application	Ft. Lbs.
Engine Front Mount Stud to Block	20
Crossmember-to-Frame Bolts	28
Crossmember-to-Mount Bolts	26
Transmission Mount-to-Rear Extension	30

Engine Removal

GENERAL MOTORS ENGINE REMOVAL (Cont.)

CHEVELLE 6 CYL. ENGINES

1965-73

Engine and transmission must be removed as a unit as follows:

- 1) Remove hood, radiator, shroud, fan and pulley. Remove air cleaner and disconnect battery cables. Disconnect all wires, hoses and linkages. Remove power steering pump and air conditioning compressor (if equipped), but do not disconnect hoses.
- 2) Disconnect exhaust pipe at manifold flange, and disconnect speedometer cable at transmission. Drain transmission and remove propeller shaft.
- 3) On cars with Synchro-mesh transmissions, disconnect clutch linkage at cross shaft then remove cross shaft engine bracket.
- 4) Attach lifting device, remove front mount through bolts, raise engine slightly (take weight off front mounts), then remove rear mount bolts. Raise engine to take weight off rear mount, then remove crossmember. *It is necessary to remove transmission mount before crossmember can be removed.*
- 5) Remove engine and transmission.

V8 ENGINES

1965-70

- 1) Drain systems, remove air cleaner and disconnect cables at battery. Remove hood.
- 2) Remove radiator, fan blades, shroud and pulley. Disconnect cooler lines at transmission on cars equipped with automatic transmissions. Disconnect all wires.
- 3) Disconnect accelerator linkage at accelerator pedal, exhaust pipe flange, gas tank line, and fuel pump vacuum line to power brake unit and power steering pump lines (plug open ends).
- 4) Raise and support vehicle. Drain transmission and remove propeller shaft.
- 5) Disconnect shift linkage and speedometer cable at transmission. On cars with synchro-mesh transmission, disconnect clutch linkage at cross-shaft and remove clutch cross-shaft engine bracket.
- 6) Remove rocker arm covers, attach lifting device, and remove front mount through bolts. Raise engine slightly (take weight off front mounts), then remove rear mount bolts. Raise engine to take weight off rear mount, then remove crossmember. *NOTE - It is necessary to remove transmission mount before crossmember can be removed.*
- 7) Remove engine and transmission as a unit.

1971-73

Engine and transmission must be removed as a unit.

- 1) Remove hood and disconnect battery cables, all wires, water hoses, vacuum hoses and exhaust pipes. Remove radiator, shroud, fan and pulley. Remove air cleaner and disconnect accelerator linkage.

- 2) Remove fuel line at fuel pump. Disconnect A/C and power steering components and position to one side with hoses attached. Remove propeller shaft.

- 3) With Synchro-mesh Trans. disconnect clutch linkage at cross-shaft, then remove cross-shaft at frame bracket. Connect lifting tackle to take weight off front mounts and remove front mount through bolts.

- 4) Remove rear mount to crossmember bolts. Raise engine to take weight off rear mount, then remove crossmember.

- 5) Lift engine slightly, move forward and remove from car.

CHEVROLET & CAMARO 6 CYL. ENGINES

1965-73

See Chevelle 6 Cyl. Engine Removal.

V8 ENGINES

1965-67

Engine and transmission must be removed as a unit as follows:

- 1) Drain systems, remove air cleaner and disconnect cables at battery. Remove hood.
- 2) Remove radiator, fan blades and pulley. Disconnect cooler lines at transmission on cars equipped with automatic transmissions. Disconnect all wires.
- 3) Disconnect accelerator linkage at accelerator pedal, exhaust pipe flange, gas tank line, vacuum line to power brake unit and power steering pump lines (plug open ends).
- 4) Raise and support vehicle. Drain transmission and remove propeller shaft.
- 5) Disconnect shift linkage and speedometer cable at transmission. On cars with synchro-mesh transmission, disconnect clutch linkage at cross-shaft and remove clutch cross-shaft engine bracket.
- 6) Remove rocker arm covers, attach lifting device, and remove front mount through bolts. Raise engine slightly (take weight off front mounts), then remove rear mount bolts. Raise engine to take weight off rear mount, then remove crossmember. *NOTE - It is necessary to remove transmission mount before crossmember can be removed.*
- 7) Remove engine and transmission as a unit.

1968-73

See 1971-73 Chevelle V8 Engine Removal.

CHEVY II & NOVA 4 & 6 CYL. ENGINES

1965-73

See Chevelle 6 Cyl. Engine Removal.

V8 ENGINES

1964-73

See 1971-73 Chevelle V8 Engine Removal.

GENERAL MOTORS ENGINE REMOVAL (Cont.)

CORVAIR

POWER TRAIN REMOVAL. *NOTE* - Complete assembly (engine, transmission, and rear axle) must be removed from car as a unit. To separate transaxle from engine, see "Separation From Transaxle" below.

► **TURBOCHARGED ENGINE REMOVAL NOTE:** Engine removal procedure is same as for standard passenger cars after supercharger and carburetor assembly removed. Disconnect manifold pressure tube at manifold and thread through front shield as engine is raised or lowered.

1964

On Spyder (Supercharged), first remove supercharger and carburetor assembly, and disconnect manifold pressure tube at manifold and thread through front shield as engine is raised or lowered. Proceed as follows:

- 1) Remove spare tire (coupe & sedan), engine access cover (station wagon). Remove carburetor air cleaners. Disconnect air heater return air hose. Remove engine-to-body front seal retainer. Disconnect left carburetor return spring and throttle rod at cross shaft. Disconnect main choke cable at firewall.
- 2) Make the following electrical disconnections: Battery positive terminal cable, generator ground strap and leads to voltage regulator, ignition leads from starter motor harness connector, right and left engine-to-body ground straps, coil and oil and temperature switch wires.
- 3) Raise car on hoist and remove battery cable and ignition leads from starter solenoid. Remove engine rear grille and skid plate, rear and side seal engine retainers. Disconnect parking brake spring from crossmember. Pull choke cable forward to clear front engine mount. Disconnect accelerator control rods at idler lever and push lever-to-carburetor rod into engine compartment. Disconnect fuel line and speedometer cable. Disconnect air heater flexible hoses from engine. Disconnect gasoline heater fuel line.
- 4) Remove axle shafts (see Rear Axle Section), and pull universal joints from differential carrier.
- 5) On Synchro-mesh cars, disconnect shift tube coupling at transmission shifter shaft, then loosen coupling clamp nut and push shift tube coupling into tube until clear of engine front mount. Disconnect clutch return spring and clutch pull rod. Remove clutch cross shaft from front mount. Unfasten clutch cable sheath clamp from engine front mount and drop clutch cable and cross shaft clear of power train. Remove back-up light switch from 4-speed transmission housing (switch is below normal oil level).
- 6) On Powerglide cars, disconnect transmission shift cable from transmission case. Rotate transmission throttle valve lever fully counterclockwise and remove cable from transmission case. Remove transmission filler tube (use a container to catch oil).
- 7) Position a hydraulic transmission jack stand under engine assembly, using Tool J-7894 (adapter), and lock tool in place with attached locking knob and additional bolt and nut. Remove cotter pins and castellated nuts from front engine mount (at transmission) and from rear engine mount. *NOTE* - If front mounting bracket and shims are removed from transmission, the same amount of shims removed must be replaced. Rear "toe-in" will be affected if shims are changed. Lower power train gradually and watch for possible interference at rear mount and left rear lower control arm. Remove exhaust pipe and muffler assembly.

1965-69

- 1) Remove spare tire, disconnect heater hose at upper shroud, and seal from engine shields. Remove axle dipstick. Disconnect all battery cables, starter wiring, temperature and oil pressure wires, and ignition coil positive wire. Disconnect radio ground straps.
- 2) Raise car, remove grille and rear center shield, then disconnect fuel line (plug line), right and left heater hoses, and accelerator control rod at transmission idler lever.
- 3) Scribe a mark on rear wheel camber adjusting cams, loosen nut (do not turn bolt), then disconnect both strut rod brackets from differential carrier. Let rods swing down. Disconnect universal joints at differential carrier.
- 4) Disconnect automatic transmission shift cable by removing bolt at transmission case and rotating throttle lever fully clockwise and pulling cable from case.
- 5) Disconnect synchro-mesh shift tube coupling at shifter shaft, clutch return spring, and clutch rod from cross shaft. Disconnect back-up light switch from transmission.
- 6) Remove the 3/8" bolt from bottom of engine skid plate and support engine with a lift and Adapter J-7894. Disconnect engine rear mount, then disconnect front mount bracket from transmission. *CAUTION* - On Synchro-mesh cars, do not lose spacer on right bolt between transmission case and engine front mount. Lower power train slowly, making sure there is no interference, then remove exhaust pipe and muffler and separate engine from transaxle.

SEPARATION FROM TRANSAXLE

MAN. TRANS.

Support transaxle with blocks. Remove starter, clutch rod dust seal bolts, then remove pin attaching clutch rod to clutch fork. Remove differential carrier-to-flywheel housing attaching bolts, and pull engine away from transaxle.

POWERGLIDE

Drain transmission, disconnect vacuum modulator hose, and remove starter. Rotate converter to 12 o'clock position, then remove converter bolts through access hole and disconnect converter from engine flex plate. Lower power train with lift and support transaxle on blocks. Remove differential-to-flywheel housing bolts and separate transaxle from engine.

1964-69

CAUTION - Shims between transmission and mounting bracket determine rear wheel toe-in, and must be replaced in original positions.

CORVETTE

1965-70

Engine and transmission must be removed as a unit as follows:

- 1) Drain all systems, and disconnect all wires, hoses, and linkages. Remove radiator, fan blades and pulley. On 327" engines when draining cylinder block it will be necessary to remove the starting motor heat shielding and ignition lower shielding for clearance.

Engine Removal

GENERAL MOTORS ENGINE REMOVAL (Cont.)

2) On 327" engines, remove heater hoses at exhaust manifold routing clamp. Disconnect accelerator linkage at accelerator pedal, and ground straps at accelerator linkage and engine left front mount.

3) On cars with automatic transmissions, disconnect cooler lines at transmission. On 327" engines, remove crankcase vent tube, then disconnect oil pressure gauge line.

4) Remove exhaust pipe clamps at exhaust pipe support yoke (except on cars with side-mounted exhaust system). Attach lifting device to cylinder heads, raise and support transmission, and remove rear mount and exhaust pipe yoke.

5) On cars with synchro-mesh transmissions, remove gear-shift lever and bracket assembly from adapter plate on side of transmission.

6) Remove propeller shaft bolts at transmission, wire yoke onto transmission and tape universal joint bearings to trunnion.

7) Remove front mount through bolts and remove engine and transmission as a unit.

1971

See 1971-73 Chevelle V8 Engine Removal.

1972 ALL TRANSMISSION

1973 AUTO. TRANS.

1) Remove hood, air cleaner, fan and pulley, and disconnect battery. Disconnect all wires, hoses and linkages. Remove power steering pump and A/C compressor, position out of way but do not disconnect hoses or lines.

2) Disconnect exhaust pipes at manifold flanges. Attach a suitable lifting device to engine, raise slightly and disconnect front motor mounts.

3) Remove bolts securing flywheel housing to engine. On vehicles equipped with automatic transmission, remove bolts securing converter to flywheel.

4) Remove engine from vehicle. *NOTE* - Converter must be supported as engine is removed.

1973 MAN. TRANS.

See 1971-73 Chevelle Engine Removal.

OLDSMOBILE V8 ENGINES

1964-65 ALL MODELS

Drain radiator, disconnect all lines, wires, cables, and linkages from engine, and remove fan blade, pulley, coil, and upper radiator support. Disconnect exhaust pipes at manifold, and remove converter cover. Install converter Holding Tool BT-21645. Install engine lifting device, remove mount bolts, lift engine, and secure transmission chain support to frame. Remove converter-to-flywheel bolts, transmission-to-engine bolts, and remove engine. *CAUTION* - DO NOT damage modulator line.

1966-67 (EXC. TORONADO)

1) Remove hood, disconnect battery, disconnect all hoses, wires, and linkage from engine. Remove fan and pulley, coil, and upper radiator support.

2) Raise car, drain radiator, disconnect exhaust pipes at manifold. Remove torque converter cover and install suitable converter holding tool.

3) Remove engine mount through bolts, raise engine and install suitable transmission support between transmission and frame.

4) Remove three converter-to-flywheel bolts, six transmission-to-engine bolts, and lift engine from car. *CAUTION*- Do not damage vacuum modulator line.

1968-73 (EXC. TORONADO)

1) Drain cooling system, remove air cleaner and hot air pipe. Remove hood (mark hood for reassembly). Disconnect negative battery cable and engine ground strap.

2) Disconnect all hoses, auto. trans. cooler lines, power steering pump (hoses attached), power steering hose bracket from engine, air conditioning compressor (with brackets and hoses attached), fuel hose from fuel line, and wires and accelerator linkage.

3) Remove upper radiator support and radiator, remove air conditioning condenser attaching bolts (if equipped), and lay condenser aside with lines attached.

4) Raise car and disconnect exhaust pipes at manifold. Remove torque converter cover and three bolts holding converter to flywheel. Remove engine mount bolts or nuts.

5) Remove three bolts, transmission to engine on right side. Remove starter (with lines attached) and tie to frame. Lower car and secure a suitable chain lift to engine.

6) Place board on top of jack and raise transmission slightly. Remove three remaining transmission to engine bolts and remove engine. *NOTE* - Install converter holding tool if car is to be moved with engine out.

1966-70 TORONADO

1) Remove hood, disconnect battery, disconnect all hoses, wires, and linkage from engine. Drain radiator, remove coil, throttle control switch bracket, radiator support, and radiator.

2) Raise car, disconnect exhaust pipes at manifold. Remove starter. Remove torque converter cover, and three converter-to-flywheel bolts.

CHEVROLET TIGHTENING SPECIFICATIONS ALL MODELS EXC. CORVAIR

Application	Ft. Lbs.
Transmission-to-Engine	35
Crossmember Mounting Bolts	25
Rear Mount-to-Transmission	40
Rear Mount-to-Crossmember	40

CORVAIR

Application	Ft. Lbs.
Clutch Housing-to-Engine	20-30
Front Mount Nuts	60-80
Front Mount-to-Crossmember	20-30
Rear Mount Nuts	50-60
Rear Mount-to-Frame	14-22
Bracket-to-Transmission	20-30

GENERAL MOTORS ENGINE REMOVAL (Cont.)

3) Attach chain or other suitable support between final drive and frame so that final drive will not fall when it is unbolted from engine.

4) Disconnect cooler lines from transmission and move slightly to side away from engine. Remove two attaching bolts from right output shaft support bracket and one through bolt attaching final drive to left side of engine block.

5) Remove engine mount-to-crossmember nuts. Support engine, remove six transmission-to-engine bolts and remove engine. *NOTE - Install converter holding tool if car is to be moved with engine out.*

1971-73 TORONADO

1) Disconnect battery, drain cooling system, unhook venturi shroud (if equipped) and move shroud toward radiator. Remove air cleaner and hot air pipe, mark hood hinges and remove hood.

2) Remove all hoses, lines, cables, linkages and electrical connections, except power steering and air conditioning. Remove radiator from vehicle, and detach power steering pump and air conditioning (with brackets and lines attached) from engine and set aside.

3) Raise vehicle, remove starter, disconnect exhaust pipes from manifolds and loosen upper left bolt securing flywheel cover. Remove remaining three flywheel cover bolts and pivot cover out of upper left bolt slot.

4) Mark flywheel and remove three converter to flywheel bolts. Remove two bolts securing right output shaft support bracket (mark washer position for reassembly) and remove engine front mount nuts.

5) On left side, remove through bolt securing final drive to engine and remove lower right transmission to engine attaching bolts.

6) Attach a suitable support (BT-6322) to final drive unit, lower vehicle, attach suitable engine lifting chain (BT-6606), remove remaining five transmission to engine bolts and lift engine from vehicle.

OLDSMOBILE 6 CYL. ENGINES

1964-65 V6

1) Disconnect front exhaust pipe from rear pipe, speedometer cable, front of propeller shaft, and shift linkage from transmission. Disconnect clutch and equalizer, battery cable, ground cable, and engine ground strap. Disconnect oil pressure switch, ignition and switch wire, temperature gauge and fuel line. Disconnect radiator hoses and heater hoses.

2) Remove air conditioning pressure hoses from compressor and fan shroud. Disconnect stabilizer brackets from frame rail, front brake hoses, steering shaft from gear (raise shaft into column), remove air cleaner and carburetor cover. Remove turbo-charger outlet pipe.

3) Place a block of wood between front cross bar and front of engine oil pan. Remove rear transmission mount cross support, and support rear of transmission with stand.

4) With front wheels on floor, remove the 3 isolation mount bolts and carefully raise body off engine and suspension. *CAUTION - DO NOT let suspension tip.*

1966-68 L6

Transmission is removed before removing engine. Proceed as follows:

1) Disconnect battery, drain cooling system, remove hood (scribe mark on hinges for installation) then disconnect all wires, hoses, and linkage from engine. Remove air cleaner, radiator, radiator shroud, fan, and pulley.

2) Raise car, drain crankcase, disconnect exhaust pipe at manifold flange and remove propeller shaft. Disconnect shift linkage and speedometer cable at transmission. Disconnect clutch linkage and remove cross shaft, if so equipped.

3) Remove transmission assembly. Remove front mount through bolts, raise engine to take weight off front mounts, then remove rear mount bolts and remove engine from car.

OLDSMOBILE TIGHTENING SPECIFICATIONS

1964-65 ALL MODELS

Application	Ft. Lbs.
Transmission Housing (V6 & 215" V8).....	20-25
Flywheel Housing (Upper).....	30-40
(Lower).....	8-12
Clutch or Converter Housing (300", 400", 425")....	50-55

F-85

Front Mount-to-Block.....	50-55
Front Mount-to-Crossbar.....	55-65
Rear Mount-to-Transmission.....	30-40
Rear Mount-to-Cross Support.....	20-34

Oldsmobile

Front Mount-to-Front Cover.....	40-60
Front Mount Bracket-to-Front Cover.....	28-38
Front Mount-to-Bracket.....	35-50
Front Mount-to-Frame.....	35-50
Front Mount-to-Block.....	50-55
Rear Mount-to-Flywheel.....	45-60
Rear Mount-to-Crossmember.....	40-56

1966-73 6 CYLINDER

Application	Ft. Lbs.
Front Mount Bracket to Engine.....	30
Front Mount to Bracket (Through Bolt).....	50
Front Mount Bracket to Frame.....	35
Transmission to Engine.....	30

1966-73 TORONADO

Application	Ft. Lbs.
Front Mount to Engine.....	70-75
Front Mount to Frame.....	30-35
Output Shaft Support to Engine.....	50-55
Brace Bolts.....	14
Transmission to Engine.....	55-60
Transmission Mount to Frame.....	55-60

1966-73 V8 (EXC. TORONADO)

Application	Ft. Lbs.
Front Mount to Engine.....	75-80
Omega (Right Front Mount).....	50
Front Mount Through Bolt.....	50-55
Rear Mount to Transmission.....	55-60
Omega.....	45
Rear Mount to Frame.....	55-60
Omega.....	45

Engine Removal

GENERAL MOTORS ENGINE REMOVAL (Cont.)

1969-73 L6

NOTE — Oldsmobile did not use a 6 cylinder in 1972.

1) Drain cooling system, disconnect battery cables, remove hood (mark hood hinges for reassembly) and remove radiator shroud.

2) Disconnect all wires, hoses, lines and linkages at engine and disconnect exhaust pipes at manifolds. If equipped with air conditioning or power steering, detach pump or compressor at engine (leave lines attached) and lay aside.

3) Remove upper radiator support and radiator, raise vehicle and on manual transmission models remove clutch equalizer.

NOTE — On 1969 manual transmission models the transmission will be removed before the engine. Disconnect and remove the propeller shaft and remove the transmission.

4) On all other models, remove transmission to engine attaching bolts and lower vehicle. Support transmission and remove engine front mount through bolts. Attach suitable engine lifting chain (BT-6606) and remove engine from vehicle.

PONTIAC (ALL MODELS)

1965 ALL ENGINES (EXC. TEMPEST V8)

Engine and transmission must be removed as a unit.

1) Disconnect battery, drain cooling system, remove hood (scribe mark on hinges for installation), then disconnect all wires, hoses, and linkages from engine. Remove air cleaner, radiator, fan, and pulley.

2) Raise car, drain crankcase, remove propeller shaft by removing universal joint U-bolts, and plug transmission extension housing. Remove four transmission lower mounting bolts, then disconnect speedometer cable and shift linkage. On Synchro-mesh cars, disconnect clutch cross shaft bracket at frame and disconnect clutch pushrod, spring and pedal linkage. On Auto. Trans. cars, remove transmission oil filler tube and disconnect modulator. On all cars, disconnect electrical lines from transmission.

3) Disconnect exhaust pipe from manifold, remove starter, fuel lines from fuel pump, then remove engine front mounting bolts. Lower car and remove engine and transmission assembly.

1965 TEMPEST V8

Engine and transmission must be removed as a unit.

1) Remove hood, drain and remove radiator.

2) Disconnect hoses and all accessible wires.

3) On Power Steering cars, remove pump belt and pump from mounting bracket and secure out of way.

4) Loosen muffler and tail pipe supports and disconnect exhaust pipe from exhaust manifolds. Wire exhaust pipe to engine rear support crossmember. Disconnect all linkages.

5) Remove speedometer cable at transmission. Remove propeller shaft drive line assembly and insert splined plug on transmission output shaft.

6) Raise engine and transmission assembly slightly to remove weight from engine insulators. Disconnect insulators from frame. Remove engine and transmission as an assembly by lifting forward and upward.

1966-73 ALL ENGINES

1) Disconnect battery cables, drain cooling system, remove hood (mark hinge locations), and disconnect engine wire harness and engine to body ground straps.

2) Remove air cleaner and fan shield. Disconnect radiator and heater hoses. On synchro-mesh vehicles, remove radiator. If equipped with power steering or air conditioning, remove pump and compressor from mounting brackets and set aside (with lines attached).

NOTE — On 1973 models, remove thermal override switch from rear of cylinder head.

3) Remove fan and pulley, disconnect accelerator control linkage and remove linkage support bracket. Disconnect transmission vacuum modulator line and power brake vacuum line at carburetor.

NOTE — On 1968-69 Firebird V8, equipped with air conditioning, remove windshield wiper motor.

4) Raise vehicle and drain crankcase. Disconnect fuel lines at fuel pump, exhaust pipes from manifolds, and starter wires from starter. On auto. trans. vehicles, remove converter cover and three converter retaining bolts, slide converter to rear. On synchro-mesh vehicles, disconnect clutch linkage, remove clutch cross shaft, starter and lower flywheel cover.

5) Remove four lower bellhousing bolts (two each side), disconnect transmission filler tube support and starter wire harness shield from cylinder heads. Remove two front motor mount bolts at frame, lower vehicle, and support transmission using a jack and a block of wood.

6) Remove two remaining bellhousing bolts, raise transmission slightly, and using suitable lifting equipment, remove engine.

PONTIAC TIGHTENING SPECIFICATIONS

1965-73

Application

Ft. Lbs.

Front

Insulator to Engine ①70

Insulator to Frame ②50

Insulator Through Bolt 45

Rear (1965 Only)

All Bolts 25-35

① — 1965-69 6 Cyl. & Tempest V8, 45-55 Ft. Lbs.

② — 1965-69 6 Cyl. & Tempest V8, 25-35 Ft. Lbs.