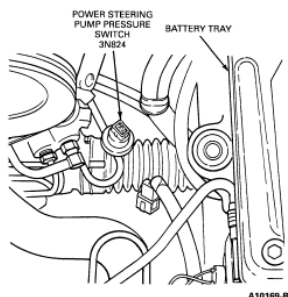


Engine Assembly, Aerostar**SPECIAL SERVICE TOOL(S)
REQUIRED**

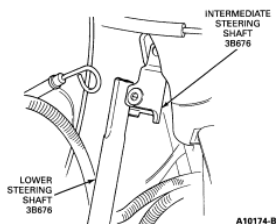
Description	Tool Number
Fan Clutch Holding Tool	T84T-6312-C
Fan Clutch Nut Wrench	T84T-6312-D
Clutch Coupling Tool	T88T-70522-A

Removal

1. Disconnect positive and negative battery cables from battery terminals. Remove the retaining bolt from battery cable support-to-frame bracket at left front of engine. Secure cables to engine .
2. Loosen radiator drain cock and drain coolant from radiator . Refer to [Section 03-03](#).
3. Disconnect PCV closure hose at engine air cleaner outlet tube (9B659) . Release clips retaining air cleaner tap. Loosen air cleaner outlet duct clamp at throttle body (9E926) and remove air cleaner top and air cleaner outlet tube together.
4. Remove vacuum supply hoses from:
 - a. Power brake booster (2005).
 - b. Cruise control at check valve near throttle linkage (if equipped).
 - c. Manifold absolute pressure sensor (MAP sensor) (9F479).
 - d. Heater and air conditioner supply hose at A/C vacuum check valve (19A563) near A/C vacuum reservoir tank and bracket (19A566) .
5. Secure vacuum hoses to engine.
6. Remove upper radiator hose (8260) and lower radiator hose (8286) .



7. Disconnect power steering pressure switch (PSP switch) (3N824) .
8. Remove power steering pressure hose (3A719) from clips in fan shroud (8146) .
9. Remove two screws holding fan shroud to radiator and pull fan shroud out of lower clips. Rest fan shroud on radiator fan.
10. Disconnect automatic transmission cooler lines, if so equipped, from radiator .
11. Remove two radiator upper retaining bolts and lift radiator from core support.
12. Remove fan shroud from engine compartment.
13. Disconnect fuel charge wiring connectors at top center of dash panel.
14. Loosen clamps and disconnect heater supply hose at hot water heater elbow connection (18599) in lower intake manifold. Disconnect heater return hose at water pump.

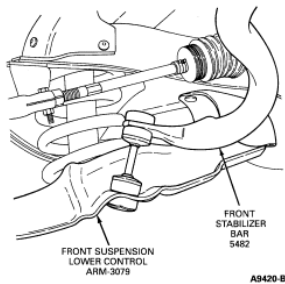


15. Loosen retaining bolt and disconnect steering column at intermediate shaft.
16. Determine which type of air conditioning refrigerant is used in the vehicle. Follow the procedure for that specific refrigerant as outlined in [Section 12-00](#) to drain air conditioning system and recycle refrigerant.

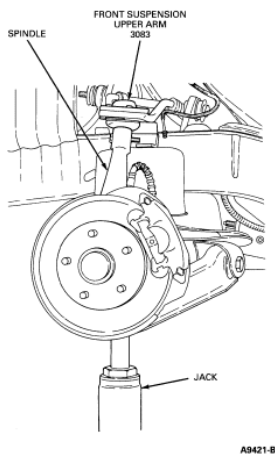
NOTE: All openings in the air conditioning system must be capped to keep dirt, foreign material, and excess moisture out of the system.

17. Disconnect air conditioner liquid line at condenser and suction line from accumulator.
18. Disconnect canister purge hose at fuel vapor canister (9D653) under engine air cleaner base and secure to engine .
19. Release fuel system pressure as outlined in [Section 03-04A](#).

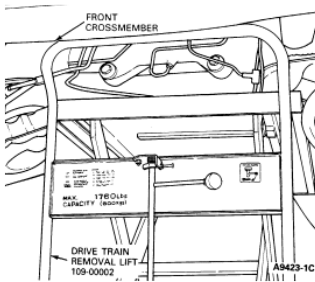
20. Remove oil level indicator (7A020) .
21. Place a piece of 4x4 wooden block or other suitable material between the rear of the engine cradle and the forward surface of the oil pan sump to keep the engine from tilting rearward and damaging components when removing the transmission.
22. Remove transmission as outlined in [Section 07-01](#) for automatic transmission and [Section 07-03](#) for manual transmission.
23. Loosen and remove exhaust manifold stud nuts. Remove bolts retaining three-way catalytic converter (5E212) to muffler (5230) . Disconnect and remove muffler and three-way catalytic converter . Refer to [Section 09-00](#) for specific removal and installation procedures.
24. Remove wheel hub bolt nuts (1012) and remove both front wheel (1007) and tire assemblies.
25. Remove dash panel ground cables (14303) . One is located on cylinder head just behind power steering pump (3A674) . The other is located just above where exhaust manifold (9430) and three-way catalytic converter connect.
26. Remove nuts and disconnect front stabilizer bar (5482) from front suspension lower arms (3079) . Discard nuts.



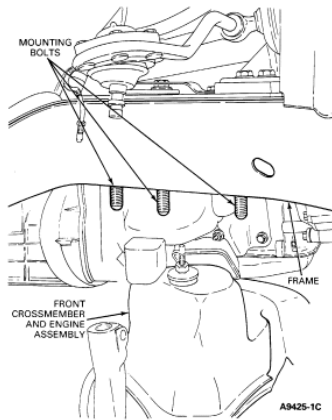
27. Remove front disc brake calipers (2B120) as outlined in [Section 06-03](#) and secure to front suspension upper arms (3083)
28. Disconnect fuel lines along left frame rail near engine mounts as outlined in [Section 03-04A](#).
29. Position a jack under front suspension lower arm and raise arm until tension is applied to front coil spring (5310) . Remove bolt and nut retaining spindle to front suspension upper arm ball joint. Slowly lower jack under front suspension lower arm to disconnect spindle from ball joint.



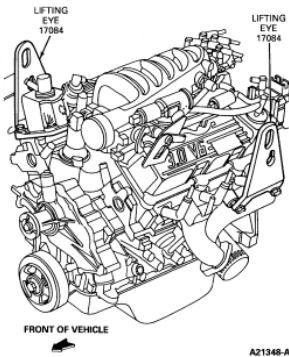
30. Position Drive Train Removal Lift 109-00002 or equivalent under crossmember and engine .
31. Lower vehicle until crossmember rests on removal lift. Place wood blocks under front crossmember and rear of cylinder block to keep engine and crossmember assembly level. Install safety chains around crossmember and lift.



32. Remove three nuts from bolts that retain engine crossmember assembly to frame on each side of vehicle.



33. Lower engine out of vehicle, making sure A/C compressor (19703) and wiring harnesses and hoses do not interfere with the process.
34. When engine and crossmember assembly are clear, roll lift out from under vehicle.
35. Attach Engine Lifting Eyes D81L-6001-D or equivalent to left rear cylinder head with a bolt.
36. The engine lifting eye should still be on the right cylinder head. If not, install a second lifting bracket.



CAUTION: The support hook or chain must angle rearward to the rear attaching point. Damage will result if chain runs across throttle cable or throttle valve mechanism.

NOTE: When only two support points are used, the engine assembly will hang slightly down at the rear with the transmission attached. With the transmission removed, the engine assembly will hang slightly down at the front because of the weight of the accessories.

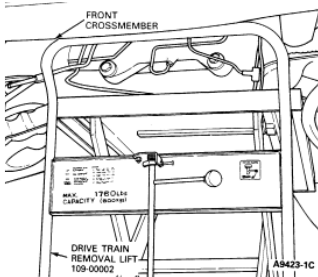
37. To eliminate tilt:
 - a. For forward tilt, attach a chain from the left (front) support bar to the stud on the No. 4 exhaust runner.
 - b. For rearward tilt, attach a chain from the right (rear) support bar to the exhaust manifold between the No. 2 and No. 3 exhaust runner.

Installation

1. Connect a chain to each lifting eye and attach to a floor crane.
2. Remove attaching bolts and remove engine from work stand.
3. With front crossmember securely positioned on Drive Train Removal Lift 109-0002 or equivalent, slowly lower engine until motor mount studs are piloted in crossmember holes. Install retaining nuts and tighten to 96-127 Nm (71-94 ft-lb). Remove chain.

NOTE: Install wood blocks under oil pan (6675) and crossmember.

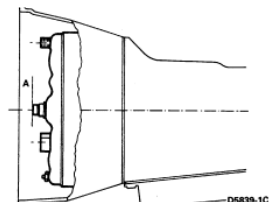
4. Roll removal lift under vehicle. Make sure vehicle is supported on hoist. Align lift, engine and crossmember assembly so three mounting bolts on each side of frame are in alignment with holes in crossmember.



5. Lower vehicle slowly so bolts are piloted in crossmember holes. Raise lift or lower hoist so crossmember is against frame. Install nuts retaining crossmember to frame and tighten to 196-264 Nm (145-195 ft-lb). Raise vehicle and remove lift.

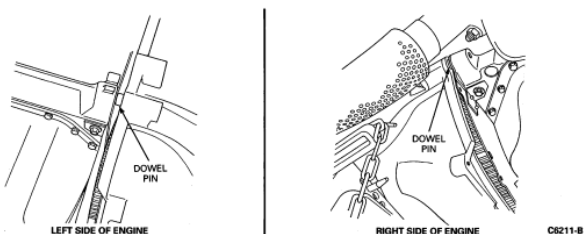
NOTE: Make sure torque converter (7902) rotates freely and is not bound up.

6. When the torque converter is fully installed, check dimension A.
 - minimum: 10.23mm (7/16 inch)
 - maximum: 14.43mm (9/16 inch)
7. On automatic transmissions, position torque converter to transmission making sure converter hub is fully engaged in front pump support and gear (7A103) .



8. Install transmission on a jack and position a safety chain around case (7005) . Lift transmission to position in vehicle. Make sure input shaft (7017) engages clutch release hub and bearing (7548) in flywheel (6375) . The case must be piloted in dowel pins in cylinder block .

Engine Block Dowel Pin Locations

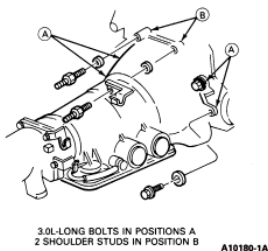


9. Install bolts retaining case to cylinder block . Tighten bolts to 38-51 Nm (28-38 ft-lb).
10. Position converter access cover and engine rear plate (7007) on converter housing. Install and tighten attaching bolts to 16-22 Nm (12-16 ft-lb).
11. For automatic transmissions, once torque converter is properly installed, place transmission on jack and secure with safety chains.
12. Rotate torque converter so drive studs are in alignment with holes in flywheel .
13. Lift transmission into position to connect transmission oil cooler inlet tube (7A030) and oil cooler tube (7A031) to case .

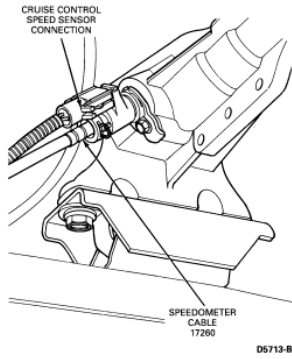


CAUTION: While moving transmission forward, to avoid damage, do not allow transmission to get into nosed-down position as this will cause converter to move forward and disengage from pump gear. The converter must rest squarely against flywheel. This indicates that converter pilot is not binding in engine crankshaft.

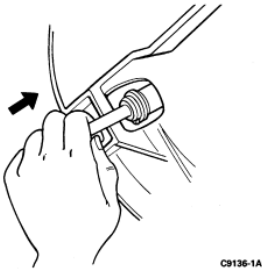
14. Move torque converter and transmission forward into position being careful not to damage flywheel and converter pilot. The converter housing (7976) is piloted into position by dowels in rear of cylinder block .
15. Install converter housing-to-engine attaching fasteners. Tighten to 38-51 Nm (28-38 ft-lb).



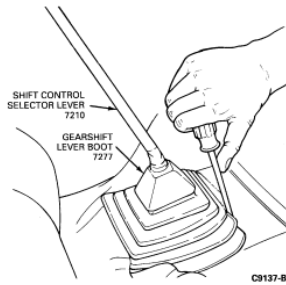
16. If removed, install rear engine support insulator (6068) to transmission. Tighten bolts to 81-108 Nm (60-80 ft-lb).
17. Position rear engine support (6A023) in two rear engine support brackets (6096) . Markings on rear engine support indicate direction of installation. Install nuts and bolts and tighten to specification. Refer to [Section 02-03](#) for specific procedures.
18. Lower transmission slowly so the insulator studs are installed in proper slots in rear engine support . Install nuts and tighten to 97-127 Nm (71-94 ft-lb). Remove safety chain and remove transmission jack.
19. Position starter motor (11002) on housing. Install dash panel ground cable and starter ground strap. Tighten mounting bolts to 21-27 Nm (15-20 ft-lb). Connect starter relay cable (14431) and tighten nut and washer.
20. Position transmission shift cable and bracket (7E395) in transmission shift cable bracket (7B229) on transmission case. Press end of cable on ball stud on lower portion of manual valve detent lever (7A115) . Install retainer in transmission shift cable bracket .
21. On manual transmission, install speedometer cable (17260) (conventional speedometer) or connect wire (electronic speedometer). Connect backup lamp switch (15520) and manual lever position switch (MLP switch) (7G072) wires to senders on transmission.



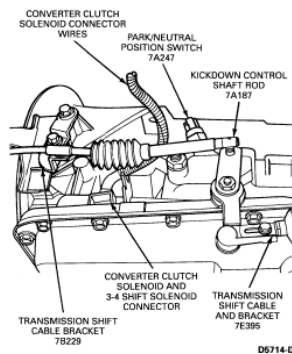
22. Remove cap from hydraulic clutch line. Insert the male coupling into the female coupling on the slave cylinder, and check that the connection is secure. If the clutch hydraulic system requires bleeding, refer to [Section 08-02](#).



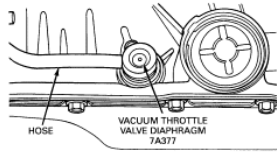
23. Install manual transmission shift control selector lever and housing (7210) to shifter and tighten bolt to 27-40 Nm (20-30 ft-lb).
24. Position gearshift lever boot (7277) on floor and install screws.



25. On automatic transmissions, install kickdown control shaft rod (7A187) and manual valve detent lever. Adjust manual valve detent lever, with shifter in overdrive position, refer to [Section 07-05](#).
26. Connect neutral start switch plug to switch. Install converter clutch solenoid connector.

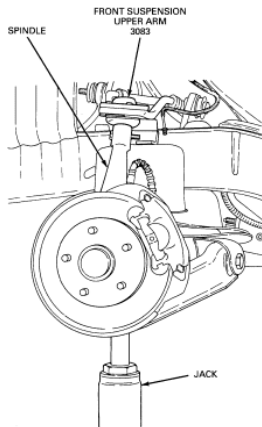


27. Connect vacuum hose to vacuum throttle valve diaphragm (7A377) on right side of automatic transmission.



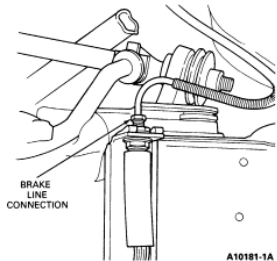
D5715-B

28. Insert speedometer cable into transmission and retain with a clamp. Tighten retaining screw to 2.25-2.82 Nm (20-25 in-lb).
29. Position a 22mm socket and breaker bar on crankshaft damper bolt. Rotate crankshaft clockwise (as viewed from front) to gain access to each of the torque converter studs. Install nut on each stud and tighten to 27-46 Nm (20-34 ft-lb).
30. Remove safety chains from around front suspension lower arm (3078) and spring seat.
31. Install a jack under front suspension lower arm . Slowly raise front suspension lower arm until front coil spring is under tension. Continue to raise arm until spindle upper arm can be connected to the lower arm ball joint. Install a new nut and bolt and tighten to 37-50 Nm (27-37 ft-lb).



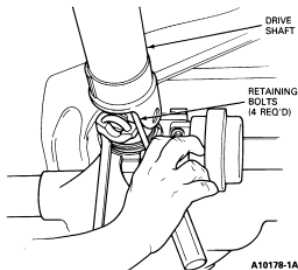
A9421-B

32. Connect front stabilizer bar to front suspension lower arm and front suspension lower arm . Install new bar nuts and tighten to 16-24 Nm (12-18 ft-lb).
33. Connect front brake and fuel line tubing (2269) to front brake hoses (2078) at frame brackets.



A10181-1A

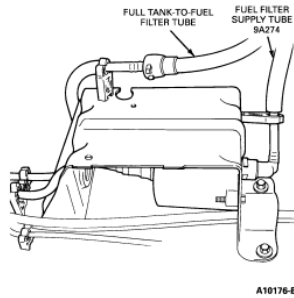
34. Install wheel and tire assemblies on rotors. Install and tighten wheel hub bolt nuts to 115-155 Nm (85-115 ft-lb).
35. Connect driveshaft (4A376) to rear axle (4001) and transmission observing alignment marks made during removal. Install nuts and bolts retaining driveshaft to rear axle end yoke.



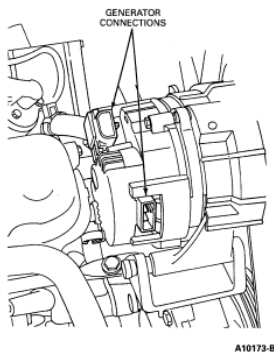
A10178-1A

36. Install new non-asbestos gaskets on right hand exhaust manifold , left hand exhaust manifold (9431) and catalytic converter. Install two nuts and bolts retaining three-way catalytic converter to muffler and tighten to 25-35 Nm (18-26 ft-lb). Install nuts retaining pipe to exhaust manifold and exhaust manifold . Tighten alternately to 34-46 Nm (25-34 ft-lb).
37. Connect electrical connector for heated oxygen sensor (HO2S) (9F472) .
38. Position two dash panel ground cables on engine and tighten two ground strap bolts.

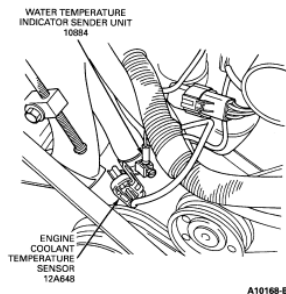
39. Connect fuel pump fuel supply and fuel return line at fuel injection supply manifold as outlined in [Section 03-04A](#).



40. Connect oil cooler tube and transmission oil cooler inlet tube at transmission if equipped with automatic transmission.
41. Route oil filler tube (7A228) from engine compartment to transmission. Connect to transmission.
42. Lower vehicle.
43. Connect oil pressure sender (9278) .
44. Install cover over engine compartment.
45. From inside engine compartment, in front of vehicle, connect two electrical connectors in back of generator (GEN) (10346) .



46. Connect vacuum supply hose to power brake booster .
47. Connect steering column at intermediate shaft. Install and tighten retaining bolt to 41-57 Nm (30-42 ft-lb).
48. Connect power steering pump power steering pressure switch .
49. Connect heater water hoses (18472) to ballast tube by matching chalk lines to specific inlet and outlet hoses.
50. Install fan shroud over fan blade (8600) and in position on radiator . Install and tighten four bolts.
51. Install radiator and attach retaining bolts; two on lower portion of radiator and two on upper portion.
52. Connect transmission oil cooler inlet tube and oil cooler tube to lower portion of radiator.
53. Connect hose to fuel vapor canister .



54. If equipped with air conditioning, un-tie A/C compressor (19D629) from vehicle sidemember.
55. Position A/C compressor on A/C compressor brace (2888) and attach with four retaining bolts; two on lower portion and two on upper portion.
56. Place drive belt (8620) into position and tighten generator adjusting arm (10145) to 47-63 Nm (35-46 ft-lb).
57. Connect accelerator cable (9A758) to ball stud located on throttle body . Connect cruise control cable, if equipped. Install accelerator control splash shield (9E766) .

58. Connect barometric manifold absolute pressure sensor vacuum line located on dash panel.



CAUTION: Fan clutch nut has left-hand thread. Turn counter-clockwise to tighten.

59. Install assembled fan clutch (8A616) and fan blade and tighten to 40-135 Nm (30-100 ft-lb) using Fan Clutch Holding Tool T84T-6312-C and Fan Clutch Nut Wrench T84T-6312-D.
60. Connect upper radiator hose and lower radiator hose to radiator .

NOTE: When the battery has been disconnected and reconnected, some abnormal drive symptoms may occur while the powertrain control module (PCM) (12A650) relearns its adaptive strategy. The vehicle may need to be driven 10 miles or more to relearn the strategy.

61. Connect battery ground cable (14301) to negative battery terminal.
 62. Install air cleaner outlet tube on engine air cleaner (ACL) (9600) and throttle body .
 63. Fill cooling system to specified level. Refer to [Section 03-03](#).
 64. Check and adjust all fluid levels. Refer to the appropriate sections.
 65. Bleed brakes. Refer to [Section 06-00](#).
 66. Check and, if required, adjust front alignment. Refer to [Section 04-00](#).
 67. Start and run engine to check for proper operation and leaks. Service as required.
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