

TROUBLE SHOOTING - BASIC PROCEDURES

1995 Toyota 4Runner

GENERAL TROUBLE SHOOTING

* PLEASE READ THIS FIRST *

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

ACCESSORIES & ELECTRICAL

CHARGING SYSTEM TROUBLE SHOOTING

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BASIC CHARGING SYSTEM TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---|--|---|
| Vehicle Will Not Start | Dead battery | Check battery cells, alternator belt tension and alternator output |
| | Loose or corroded battery connections | Check all charging system connections |
| | Ignition circuit or switch malfunction | Check and replace as necessary |
| Alternator Light Stays On With Engine Running | Loose or worn alternator drive belt | Check alternator drive tension and condition, See Belt Adjustment in TUNE-UP article in the TUNE-UP section |
| | Loose alternator wiring connections | Check all charging system connections |
| | Short in alternator light wiring | See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section |
| | Defective alternator stator or diodes | See Bench Tests in ALTERNATOR article |
| | Defective regulator | See Regulator Check in |

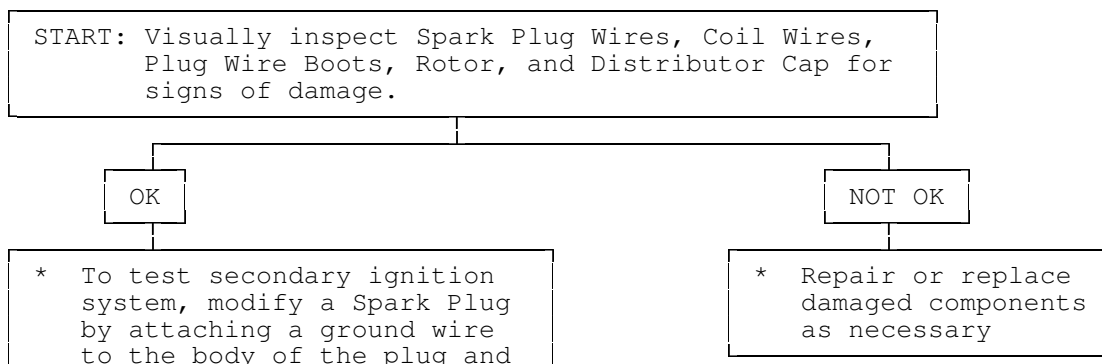
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| | | ALTERNATOR article |
| Alternator Light Stays Off With Ignition Switch ON | Blown fuse | See WIRING DIAGRAMS |
| | Defective alternator | See Testing in ALTERNATOR article |
| | Defective indicator light bulb or socket | See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section |
| Alternator Light Stays OFF With Ignition Switch ON | Short in alternator wiring | See On-Vehicle Tests in ALTERNATOR article |
| | Defective rectifier bridge | See Bench Tests in ALTERNATOR article |
| Lights or Fuses Burn Out Frequently | Defective alternator wiring | See On-Vehicle Tests in ALTERNATOR article |
| | Defective regulator | See Regulator Check in ALTERNATOR article |
| | Defective battery | Check and replace as necessary |
| Ammeter Gauge Shows Discharge | Loose or worn drive belt | Check alternator drive belt tension and condition. See Belt Adjustment in TUNE-UP article in the TUNE-UP section |
| | Defective wiring | Check all wires and wire connections |
| | Defective alternator or regulator | See Bench Tests and On-Vehicle Tests in ALTERNATOR article |
| | Defective ammeter, or improper ammeter wiring connection | See Testing in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section |
| Noisy Alternator | Loose drive pulley | Tighten drive pulley attaching nut |
| | Loose mounting bolts | Tighten all alternator mounting bolts |
| | Worn or dirty bearings | See Bearing Replacement ALTERNATOR article |

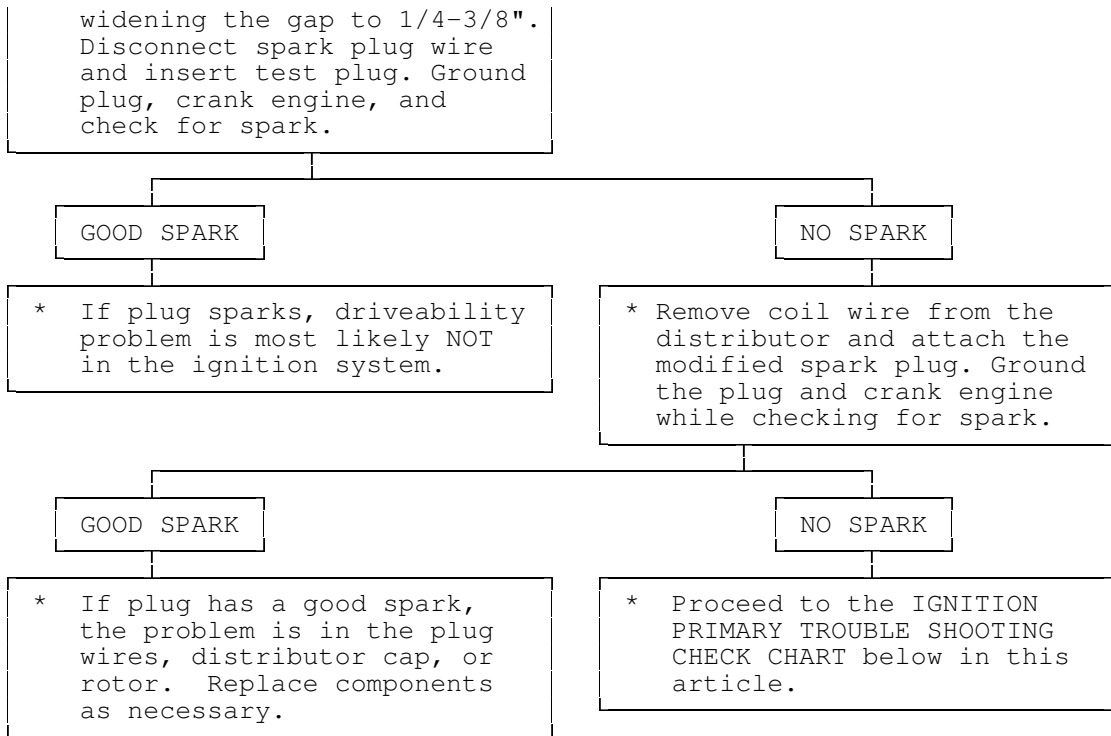
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|--|---|--|
| | Defective diodes or stator | See Bench Test in ALTERNATOR article |
| Battery Does Stay Charged | Loose or worn drive belt | Check alternator drive belt tension and condition. See Belt Adjustment in appropriate TUNE-UP article in the TUNE-UP section |
| | Loose or corroded battery connections | Check all charging system connections |
| | Loose alternator connections | Check all charging system connections |
| | Defective alternator or battery | See On-Vehicle Tests and Bench Tests in ALTERNATOR article |
| | Add-on electrical accessories exceeding alternator capacity | Install larger alternator |
| Battery Overcharged- Uses Too Much Water | Defective battery | Check alternator output and repair as necessary |
| | Defective alternator | See On-Vehicle Test and Bench Tests in ALTERNATOR article |
| | Excessive alternator voltage | Check alternator output and repair as necessary |

IGNITION SYSTEM TROUBLE SHOOTING

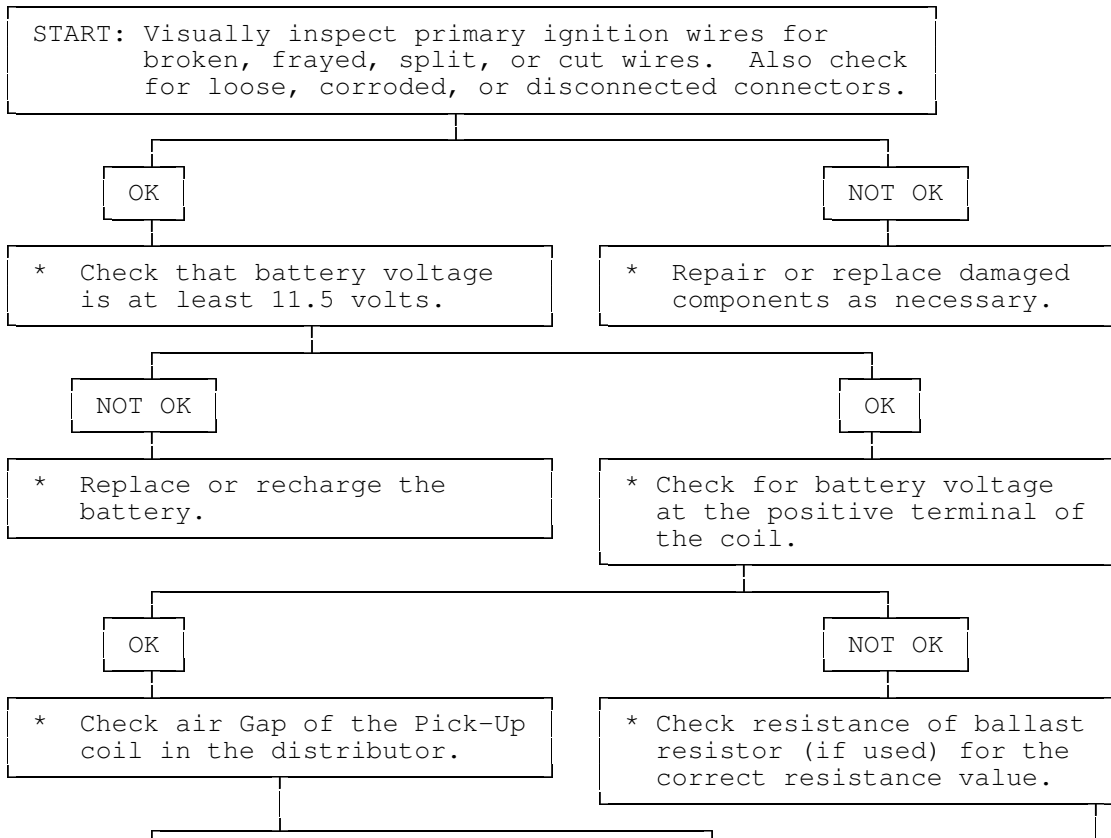
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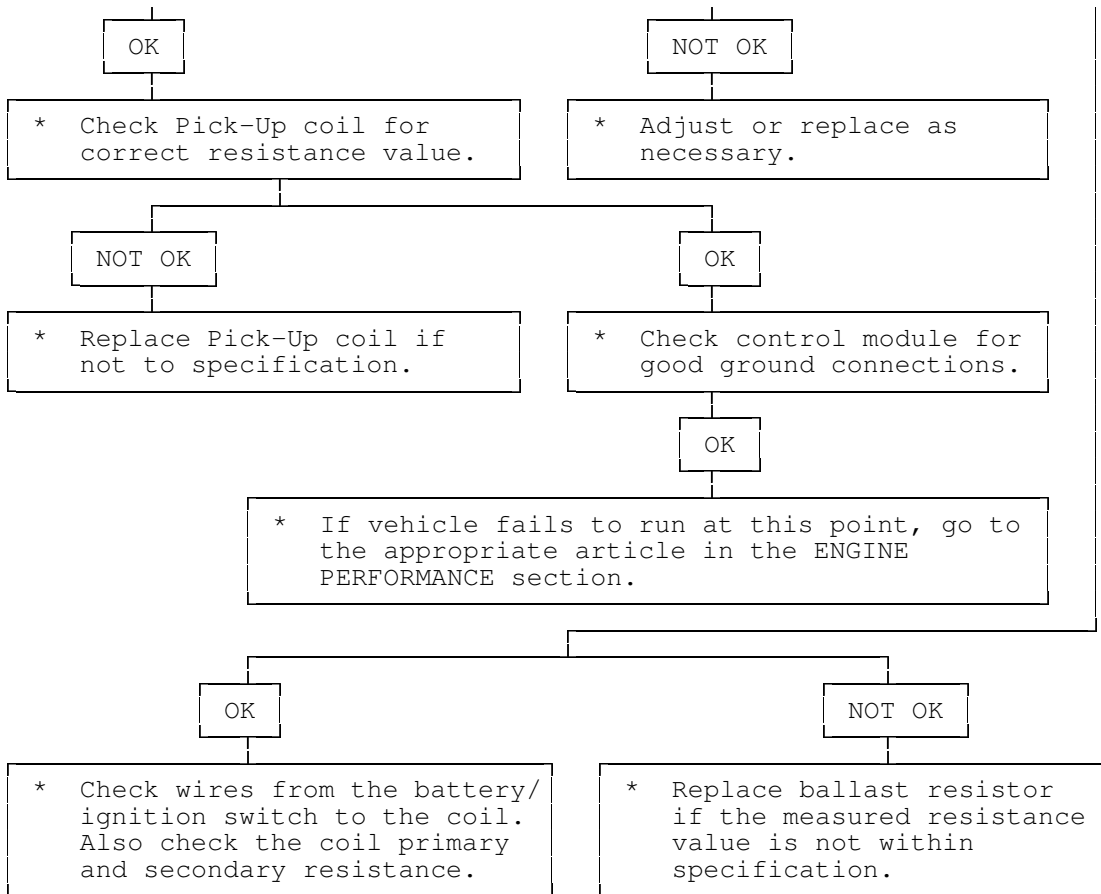
Ignition Secondary Trouble Shooting Chart





Ignition Primary Trouble Shooting Chart





STARTER TROUBLE SHOOTING

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BASIC STARTER TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--------------------------|--|---|
| Starter Fails to Operate | Dead battery or bad connections between starter and battery | Check battery charge and all wires and connections to starter |
| | Ignition switch faulty or misadjusted | Adjust or replace ignition switch |
| | Open circuit between starter switch ignition terminal on starter relay | Check and repair wires and connections as necessary |
| | Starter relay or starter defective | See Testing in STARTER article |

| | | |
|---|---|--|
| | Open solenoid pull-in wire | See Testing in STARTER article |
| Starter Does Not Operate and Headlights Dim | Weak battery or dead cell | Charge or replace battery as necessary |
| | Loose or corroded battery connections | Check that battery connections are clean and tight |
| | Internal ground in starter windings | See Testing in STARTER article |
| | Grounded starter fields | See Testing in STARTERS |
| | Armature rubbing on pole shoes | See STARTER article |
| Starter Turns but Engine Does Not Rotate | Starter clutch slipping | See STARTER article |
| | Broken clutch housing | See STARTER article |
| | Pinion shaft rusted or dry | See STARTER article |
| | Engine basic timing incorrect | See Ignition Timing in TUNE-UP article |
| | Broken teeth on engine flywheel | Replace flywheel and check for starter pinion gear damage |
| Starter Will Not Crank Engine | Faulty overrunning clutch | See STARTER article |
| | Broken clutch housing | See STARTER article |
| | Broken flywheel teeth | Replace flywheel and check for starter pinion gear damage |
| | Armature shaft sheared or reduction gear teeth stripped | See STARTER article |
| | Weak battery | Charge or replace battery as necessary |
| | Faulty solenoid | See On-Vehicle Tests in STARTER article |
| | Poor grounds | Check all ground connections for tight and clean connections |
| | Ignition switch faulty or misadjusted | Adjust or replace ignition switch as necessary |
| Starter Cranks Engine Slowly | Battery weak or defective | Charge or replace battery as necessary |

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|---|--|
| Engine overheated | See ENGINE COOLING SYSTEM article |
| Engine oil too heavy | Check that proper viscosity oil is used |
| Poor battery-to-starter connections | Check that all between battery and starter are clean and tight |
| Current draw too low or too high | See Bench Tests in STARTER article |
| Bent armature, loose pole shoes screws or worn bearings | See STARTER article |
| Burned solenoid contacts | Replace solenoid |
| Faulty starter | Replace starter |

| | | |
|---|--|---|
| Starter Engages Engine Only Momentarily | Engine timing too far advanced | See Ignition Timing in TUNE-UP article |
| | Overrunning clutch not engaging properly | Replace overrunning clutch. See STARTER article |
| | Broken starter clutch | See STARTER article |
| | Broken teeth on engine flywheel | Replace flywheel and check starter pinion gear for damage |
| | Weak drive assembly thrust spring | See STARTER article |
| | Weak hold-in coil | See Bench Tests in STARTER article |

| | | |
|-------------------------------|----------------------------|--------------------------------|
| Starter Drive Will Not Engage | Defective point assembly | See Testing in STARTER article |
| | Poor point assembly ground | See Testing in STARTER article |
| | Defective pull-in coil | Replace starter solenoid |

| | | |
|------------------------------|------------------------------|---|
| Starter Relay Does Not Close | Dead battery | Charge or replace battery as necessary |
| | Faulty wiring | Check all wiring and connections leading to relay |
| | Neutral safety switch faulty | Replace neutral safety switch |
| | Starter relay faulty | Replace starter relay |

| | | |
|---|--|---|
| Starter Drive Will Not Disengage | Starter motor loose on mountings | Tighten starter attach bolts |
| | Worn drive end bushing | See STARTER article |
| | Damaged engine flywheel teeth | Replace flywheel and starter pinion gear for damage |
| | Drive yolk return spring broken or missing | Replace return spring |
| | Faulty ignition switch | Replace ignition switch |
| | Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid | Replace starter solenoid |
| | Starter clutch not disengaging | Replace starter clutch |
| Starter Relay Operates but Solenoid Does Not | Ignition starter switch contacts sticking | Replace ignition switch |
| | Faulty solenoid switch, switch connections or | Check all wiring between relay and solenoid or replace relay or solenoid as necessary |
| Solenoid Plunger Vibrates When Switch is Engaged | Broken lead or loose soldered connections | Repair wire or wire connections as necessary |
| | Weak battery | Charge or replace battery as necessary |
| | Solenoid contacts corroded | Clean contacts or replace solenoid |
| | Faulty wiring | Check all wiring leading to solenoid |
| | Broken connections inside switch cover | Repair connections or replace solenoid |
| Low Current Draw | Open hold-in wire | Replace solenoid |
| High Pitched Whine During Cranking Before Engine Fires but Engine Fires and Cranks Normally | Worn brushes or weak | Replace brushes or brush springs as necessary |
| | Distance too great between starter pinion and flywheel | Align starter or check that correct starter and flywheel are being used |
| High Pitched Whine After Engine | Distance too small between starter pinion and flywheel | |

Fires With Key released. Engine Fires and Cranks Normally Flywheel runout contributes to the intermittent nature

AIR CONDITIONING & HEAT

AIR CONDITIONING TROUBLE SHOOTING

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BASIC AIR CONDITIONING TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE |
|---|---|
| Compressor Not Working | <ul style="list-style-type: none">• Compressor clutch circuit open.• Compressor clutch coil inoperative.• Poor clutch ground connection.• Fan belts loose.• Thermostatic switch inoperative.• Thermostatic switch not adjusted.• Ambient temperature switch open.• Superheat fuse blown. |
| Excessive Noise or Vibration | <ul style="list-style-type: none">• Missing or loose mounting bolts.• Bad idler pulley bearings.• Fan belts not tightened correctly.• Compressor clutch contacting body.• Excessive system pressure.• Compressor oil level low.• Damaged clutch bearings.• Damaged reed valves.• Damaged compressor. |
| Insufficient or No Cooling; Compressor Working | <ul style="list-style-type: none">• Expansion valve inoperative.• Heater control valve stuck open.• Low system pressure.• Blocked condenser fins.• Blocked evaporator fins.• Vacuum system leak.• Vacuum motors inoperative.• Control cables improperly adjusted.• Restricted air inlet.• Mode doors binding.• Blower motor inoperative.• Temperature above system capacity. |

HEATER SYSTEM TROUBLE SHOOTING

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problem symptoms. For model-specific Trouble Shooting, refer to DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC HEATER SYSTEM TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE |
|--------------------------------------|--|
| Insufficient, Erratic, or No Heat | <ul style="list-style-type: none"> • Low Coolant Level • Incorrect thermostat. • Restricted coolant flow through heater core. • Heater hoses plugged. • Misadjusted control cable. • Sticking heater control valve. • Vacuum hose leaking. • Vacuum hose blocked. • Vacuum motors inoperative. • Blocked air inlet. • Inoperative heater blower motor. • Oil residue on heater core fins. • Dirt on heater core fins. |
| Too Much Heat | <ul style="list-style-type: none"> • Improperly adjusted cables. • Sticking heater control valve. • No vacuum to heater control valve. • Temperature door stuck open. |
| Air Flow Changes During Acceleration | <ul style="list-style-type: none"> • Vacuum system leak. • Bad check valve or reservoir. |
| Air From Defroster At All Times | <ul style="list-style-type: none"> • Vacuum system leak. • Improperly adjusted control cables. • Inoperative vacuum motor. |
| Blower Does Not Operate Correctly | <ul style="list-style-type: none"> • Blown fuse. • Blower motor windings open. • Resistors burned out. • Motor ground connection loose. • Wiring harness connections loose. • Blower motor switch inoperative. • Blower relay inoperative. • Fan binding or foreign object in housing. • Fan blades broken or bent. |

BRAKES

BRAKE SYSTEM TROUBLE SHOOTING

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BRAKE SYSTEM TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------------------------------|--|---------------------------------------|
| Brakes Pull Left or Right | Incorrect tire pressure | Inflate tires to proper pressure |
| | Front end out of alignment | See WHEEL ALIGNMENT |
| | Mismatched tires | Check tires sizes |
| | Restricted brake lines or hoses | Check hose routing |
| | Loose or malfunctioning caliper | See DISC BRAKES or BRAKE SYSTEM |
| | Bent shoe or oily linings | See DRUM BRAKES or BRAKE SYSTEM |
| | Malfunctioning rear brakes | See DRUM, DISC BRAKES or BRAKE SYSTEM |
| Loose suspension parts | See SUSPENSION | |
| Noises Without Brakes Applied | Front linings worn out | Replace linings |
| | Dust or oil on drums or rotors | See DRUM, DISC BRAKES or BRAKE SYSTEM |
| Noises With Brakes Applied | Insulator on outboard shoe damaged | See DISC BRAKES or BRAKE SYSTEM |
| | Incorrect pads or linings | Replace pads or linings |
| Brake Rough, Chatters or Pulsates | Excessive lateral runout | Check rotor runout |
| | Parallelism not to specifications | Reface or replace rotor |
| | Wheel bearings not adjusted | See SUSPENSION |
| | Rear drums out-of-round | Reface or replace drums |
| | Disc pad reversed, steel against rotor | Remove and reinstall pad |
| Excessive Pedal Effort | Malfunctioning power unit | See POWER BRAKES or BRAKE SYSTEM |
| | Partial system failure | Check fluid and pipes |
| | Worn disc pad or lining | Replace pad or lining |
| | Caliper piston stuck or | |

| | |
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| sluggish | See DISC BRAKES or BRAKE SYSTEM |
| Master cylinder piston stuck | See MASTER CYLINDERS or BRAKE SYSTEM |
| Brake fade due to incorrect pads for linings | Replace pads or linings |
| Linings or pads glazed | Replace pads or linings |
| Worn drums | Reface or replace drums |

Excessive Pedal Travel

| | |
|---------------------------------------|--|
| Partial brake system failure | Check fluid and pipes |
| Insufficient fluid in master cylinder | See MASTER CYLINDERS or BRAKE SYSTEM |
| Air trapped in system | See BRAKE BLEEDING or BRAKE SYSTEM |
| Rear brakes not adjusted | See Adjustments in DRUM BRAKES or BRAKE SYSTEM |
| Bent shoe or lining | See DRUM BRAKES or BRAKE SYSTEM |
| Plugged master cylinder cap | See MASTER CYLINDERS or BRAKE SYSTEM |
| Improper brake fluid | Replace brake fluid |

Pedal Travel Decreasing

| | |
|--------------------------------------|--------------------------------------|
| Compensating port plugged | See MASTER CYLINDERS or BRAKE SYSTEM |
| Swollen cup in master cylinder | See MASTER CYLINDERS or BRAKE SYSTEM |
| Master cylinder piston not returning | See MASTER CYLINDERS or BRAKE SYSTEM |
| Weak shoe retracting springs | See DRUM BRAKES BRAKE SYSTEM |
| Wheel cylinder piston sticking | See DRUM BRAKES or BRAKE SYSTEM |

Dragging Brakes

| | |
|---------------------------------------|-----------------------------------|
| Master cylinder pistons not returning | See MASTER CYLINDERS BRAKE SYSTEM |
| Restricted brake lines or hoses | Check line routing |
| Incorrect parking brake adjustment | See DRUM BRAKES BRAKE SYSTEM |

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|--|---------------------------------------|
| Parking Brake cables frozen | See DRUM BRAKES BRAKE SYSTEM |
| Incorrect installation of inboard disc pad | Remove and replace correctly |
| Power booster output rod too long | See POWER BRAKE UNITS BRAKE SYSTEM |
| Brake pedal not returning freely | See DISC, DRUM BRAKES BRAKE SYSTEM |

Brakes Grab or Uneven Braking
Action

| | |
|----------------------------------|--|
| Malfunction of combination valve | See CONTROL VALVE or BRAKE SYSTEM |
| Malfunction of power brake unit | See POWER BRAKE UNITS or BRAKE SYSTEM |
| Binding brake pedal | See DISC, DRUM BRAKES or BRAKE SYSTEM |

Pulsation or Roughness

| | |
|-----------------------------------|------------------------------------|
| Uneven pad wear caused by caliper | See DISC BRAKES or BRAKE SYSTEM |
| Uneven rotor wear | See DISC BRAKES or BRAKE SYSTEM |
| Drums out-of-round | Reface or replace drums |

ENGINE MECHANICAL

COOLING SYSTEM TROUBLE SHOOTING

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COOLING SYSTEM TROUBLE SHOOTING

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-------------|---------------------------------|----------------------------|
| Overheating | Coolant Leak | Fill/Pressure Test System |
| | A/C Condenser Fins Clogged | Remove/Clean Condenser |
| | Radiator Fins Clogged | Remove/Clean Radiator |
| | Thermostat Stuck Closed | Replace Thermostat |
| | Clogged Cooling System Passages | Clean/Flush Cooling System |

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|-----------------------------|---|------------------------------|
| | Water Pump Malfunction | Replace Water Pump |
| | Fan Clutch Malfunction | Replace Fan Clutch |
| | Retarded Ignition Timing | Reset Ignition Timing |
| | Cooling Fan Malfunction | Test Cooling Fan/ Circuit |
| | Cooling Fan Motor Malfunction | Test Fan Motor |
| | Cooling Fan Relay Malfunction | Test Fan Relay |
| | Faulty Radiator Cap | Replace Radiator Cap |
| | Broken/Slipping Fan Belt | Replace Fan Belt |
| | Restricted Exhaust | Repair Exhaust System |
| Corrosion | Impurities In Coolant | Clean/Flush System |
| Coolant Leakage | Damaged hose | Replace Hose |
| | Leaky Water Pump | Replace Water Pump |
| | Damaged Radiator Seam | Replace/Repair Radiator |
| | Leaky Thermostat Cover | Replace Thermostat Cover |
| | Cylinder Head Problem | Check Head/Head Gasket |
| | Leaky Freeze Plugs | Replace Freeze Plugs |
| Recovery System Inoperative | Loose and/or Defective Radiator Cap | Replace Radiator Cap |
| | Overflow Tube Clogged and/or Leaking | Repair Tube |
| | Recovery Bottle Vent Restricted | Clean Vent |
| No Heater Core Flow | Collapsed Heater Hose | Replace Heater Hose |
| | Plugged Heater Core | Clean/Replace Heater Core |
| | Faulty Heater Valve | Replace Heater Valve |

GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING

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BASIC GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------------------------|--|---|
| Engine Lopes At Idle | Intake manifold-to-head leaks | Replace manifold gasket, See ENGINES |
| | Blown head gasket | Replace head gasket, See ENGINES |
| | Worn timing gears, chain or sprocket | Replace gears, chain or sprocket |
| | Worn camshaft lobes | Replace camshaft, See ENGINES |
| | Overheated engine | Check cooling system, See COOLING |
| | Blocked crankcase vent valve | Remove restriction |
| | Leaking EGR valve | Repair leak and/or replace valve |
| Engine Has Low Power | Faulty fuel pump | Replace fuel pump |
| | Leaking fuel pump | Repair leak and/or replace fuel pump |
| | Excessive piston-to-bore clearance | Install larger pistons, See ENGINES |
| | Sticking valves or weak valve springs | Check valve train components, See ENGINES |
| | Incorrect valve timing | Reset valve timing, See ENGINES |
| | Worn camshaft lobes | Replace camshaft, See ENGINES |
| | Blown head gasket | Replace head gasket. See ENGINES. |
| | Clutch slipping | Adjust pedal and/or replace components, See ENGINES |
| | Engine overheating | Check cooling system, See COOLING |
| | Auto. Trans. pressure regulator valve faulty | Replace pressure regulator valve |
| | Auto. Trans. fluid level too low | Add fluid as necessary |
| | Improper vacuum diverter valve operation | Replace vacuum diverter valve |
| | Vacuum leaks | Inspect vacuum system and repair as required |
| Leaking piston rings | Replace piston rings, See ENGINES | |
| Faulty High Speed Operation | Low fuel pump volume | Replace fuel pump |
| | Leaking valves or worn | Replace valves and/or springs, See ENGINES |
| | Incorrect valve timing | Reset valve timing, See ENGINES |
| | Intake manifold restricted | Remove restriction |
| Faulty Acceleration | Worn distributor shaft | Replace distributor |
| | Improper fuel pump stroke | Remove pump and reset pump stroke |

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|---------------------------------------|---|---|
| | Incorrect ignition timing | Reset ignition timing, See TUNE-UP |
| | Leaking valves | Replace valves, See ENGINES |
| | Worn fuel pump diaphragm or piston | Replace diaphragm or piston |
| Intake Backfire | Improper ignition timing | Reset ignition timing, See TUNE-UP |
| | Faulty accelerator pump discharge | Replace accelerator pump |
| | Improper choke operation | Check choke and adjust as required |
| | Defective EGR valve | Replace EGR valve |
| | Fuel mixture too lean | Reset air/fuel mixture, See TUNE-UP |
| | Choke valve initial clearance too large | Reset choke valve initial clearance |
| Exhaust Backfire | Vacuum leak | Inspect and repair vacuum system |
| | Faulty vacuum diverter valve | Replace vacuum diverter valve |
| | Faulty choke operation | Check choke and adjust as required |
| | Exhaust system leak | repair exhaust system leak |
| Engine Detonation | Ignition timing too far advanced | Reset ignition timing, See TUNE-UP |
| | Faulty ignition system | Check ignition timing, See TUNE-UP |
| | Spark plugs loose or faulty | Retighten or replace plugs |
| | Fuel delivery system clogged | Inspect lines, pump and filter for clog |
| | EGR valve inoperative | Replace EGR valve |
| | PCV system inoperative | Inspect and/or replace hoses or valve |
| | Vacuum leaks | Check vacuum system and repair leaks |
| | Excessive combustion chamber deposits | Remove built-up deposits |
| Leaking, sticking or broken valves | Inspect and/or replace valves | |
| External Oil Leakage | Fuel pump improperly seated or worn gasket | Remove pump, replace gasket and seat properly |
| | Oil pan gasket broken or pan bent | Straighten pan and replace gasket |
| | Timing chain cover gasket broken | Replace timing chain cover gasket |
| | Rear main oil seal worn | Replace rear main oil seal |
| | Oil pan drain plug not seated properly | Remove and reinstall drain plug |
| | Camshaft bearing drain hole blocked | Remove restriction |
| | Oil pressure sending switch leaking | Remove and reinstall sending switch |

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| Excessive Oil Consumption | Worn valve stems or guides | Replace stems or guides, See ENGINES |
| | Valve "O" ring seals damaged | Replace "O" ring seals, See ENGINES |
| | Plugged oil drain back holes | Remove restrictions |
| | Improper PCV valve operation | Replace PCV valve |
| | Engine oil level too high | Remove excess oil |
| | Engine oil too thin | Replace thicker oil |
| | Valve stem oil deflectors damaged | Replace oil deflectors |
| | Incorrect piston rings | Replace piston rings, See ENGINES |
| | Piston ring gaps not staggered | Reinstall piston rings, See ENGINES |
| | Insufficient piston ring tension | Replace rings, See ENGINES |
| | Piston ring grooves or oil return slots clogged | Replace piston rings, See ENGINES |
| | Piston rings sticking in grooves | Replace piston rings, See ENGINES |
| | Piston ring grooves excessively worn | Replace piston and rings, See ENGINES |
| | Compression rings installed upside down | Replace compression rings correctly, See ENGINES |
| | Worn or scored cylinder walls | Rebore cylinders or replace block |
| | Mismatched oil ring expander and rail | Replace oil ring expander and rail, See ENGINES |
| | Intake gasket dowels too long | Replace intake gasket dowels |
| | Excessive main or connecting rod bearing clearance | Replace main or connecting rod bearings, See ENGINES |
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| No Oil Pressure | Low oil level | Add oil to proper level |
| | Oil pressure sender or gauge broken | Replace sender or gauge |
| | Oil pump malfunction | Remove and overhaul oil pump, See ENGINES |
| | Oil pressure relief valve sticking | Remove and reinstall valve |
| | Oil pump passages blocked | Overhaul oil pump, See ENGINES |
| | Oil pickup screen or tube blocked | remove restriction |
| | Loose oil inlet tube | Tighten oil inlet tube |
| | Loose camshaft bearings | Replace camshaft bearings, See ENGINES |
| Internal leakage at oil passages | Replace block or cylinder head | |
| <hr/> | | |
| Low Oil Pressure | Low engine oil level | Add oil to proper level |
| | Engine oil too thin | Remove and replace with thicker oil |
| | Excessive oil pump clearance | Reduce oil pump clearance, See ENGINES |
| | Oil pickup tube or screen blocked | Remove restrictions |
| | Main, rod or cam bearing clearance excessive | Replace bearing to reduce clearance, See |

ENGINES

| | | |
|-------------------------|---|---|
| High Oil Pressure | Improper grade of oil Oil pressure relief valve stuck closed Oil pressure sender or gauge faulty | Replace with proper oil Eliminate binding Replace sender or gauge |
| Noisy Main Bearings | Inadequate oil supply Excessive main bearing clearance Excessive crankshaft end play Loose flywheel or torque converter Loose or damaged vibration damper Crankshaft journals out-of-round Excessive belt tension | Check oil delivery to main bearings Replace main bearings, See ENGINES Replace crankshaft, See ENGINES Tighten attaching bolts Tighten or replace vibration damper Re-grind crankshaft journals Loosen belt tension |
| Noisy Connecting Rods | Excessive bearing clearance or missing bearing Crankshaft rod journal out-of-round Misaligned connecting rod or cap Incorrectly tightened rod bolts | Replace bearing, See ENGINES Re-grind crankshaft journal Remove rod or cap and realign Remove and re-tighten rod bolts |
| Noisy Pistons and Rings | Excessive piston-to-bore clearance Bore tapered or out-of-round Piston ring broken Piston pin loose or seized Connecting rods misaligned Ring side clearance too loose or tight Carbon build-up on piston | Install larger pistons, See ENGINES Rebore block Replace piston rings, See ENGINES Replace piston pin, See ENGINES Realign connecting rods Replace with larger or smaller rings Remove carbon |
| Noisy Valve Train | Worn or bent push rods Worn rocker arms or bridged pivots Dirt or chips in valve lifters Excessive valve lifter leak-down Valve lifter face worn Broken or cocked valve springs Too much valve stem-to-guide clearance Valve bent Loose rocker arms Excessive valve seat run-out | Replace push rods, See ENGINES Replace push rods, See ENGINES Remove lifters and remove dirt/chips Replace valve lifters, See ENGINES Replace valve lifters, See ENGINES replace or reposition springs Replace valve guides, See ENGINES Replace valve, See ENGINES Retighten rocker arms, See ENGINES Reface valve seats, See ENGINES |

| | | |
|-----------------------------------|---|--|
| | Missing valve lock | Install new valve lock |
| | Excessively worn camshaft lobes | Replace camshaft, See ENGINES |
| | Plugged valve lifter oil holes | Eliminate restriction or replace lifter |
| | Faulty valve lifter check ball | Replace lifter check ball, See ENGINES |
| | Rocker arm nut installed upside down | Remove and reinstall correctly |
| | Valve lifter incorrect for engine | Remove and replace valve lifters |
| | Faulty push rod seat or lifter plunger | Replace plunger or push rod |
| Noisy Valves | Improper valve lash | Re-adjust valve lash, See ENGINES |
| | Worn or dirty valve lifters | Clean and/or replace lifters |
| | Worn valve guides | Replace valve guides, See ENGINES |
| | Excessive valve seat or face run-out | Reface seats or valve face |
| | Worn camshaft lobes | Replace camshaft, See ENGINES |
| | Loose rocker arm studs | Re-tighten rocker arm studs, See ENGINES |
| | Bent push rods | Replace push rods, See ENGINES |
| | Broken valve springs | Replace valve springs, See ENGINES |
| Burned, Sticking or Broken Valves | Weak valve springs or warped valves | Replace valves and/or springs, See ENGINES |
| | Improper lifter clearance | Re-adjust clearance or replace lifters |
| | Worn guides or improper guide clearance | Replace valve guides, See ENGINES |
| | Out-of-round valve seats or improper seat width | Re-grind valve seats |
| | Gum deposits on valve stems, seats or guides | Remove deposits |
| | Improper spark timing | Re-adjust spark timing |
| Broken Pistons/Rings | Undersize pistons | Replace with larger pistons, See ENGINES |
| | Wrong piston rings | Replace with correct rings, See ENGINES |
| | Out-of-round cylinder bore | Re-bore cylinder bore |
| | Improper connecting rod alignment | Remove and realign connecting rods |
| | Excessively worn ring grooves | Replace pistons, See ENGINES |
| | Improperly assembled piston pins | Re-assemble pin-to-piston, See ENGINES |
| | Insufficient ring gap clearance | Install new rings, See ENGINES |
| | Engine overheating | Check cooling system |
| | Incorrect ignition timing | Re-adjust ignition timing, See TUNE-UP |
| Excessive Exhaust Noise | Leaks at manifold to head, or to pipe | Replace manifold or pipe gasket |
| | Exhaust manifold | Replace exhaust |

cracked or broken

manifold, See ENGINES

ENGINE PERFORMANCE

CARBURETOR TROUBLE SHOOTING:

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BASIC COLD START SYMPTOMS TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---|-------------------------------------|---|
| Engine Won't Start | Choke not closing | Check choke operation, see FUEL SYSTEMS |
| | Choke linkage bent | Check linkage, see FUEL SYSTEM |
| Engine Starts, Then Dies | Choke vacuum kick setting too wide | Check setting and adjust see, FUEL SYSTEMS |
| | Fast idle RPM too low | Reset RPM to specification, see TUNE-UP |
| | Fast idle cam index incorrect | Reset fast idle cam index, see FUEL SYSTEMS |
| | Vacuum leak | Inspect vacuum system for leaks |
| | Low fuel pump outlet | Repair or replace pump, see FUEL SYSTEMS |
| | Low carburetor fuel level | Check float setting see FUEL SYSTEM |
| Engine Quits Under Load | Choke vacuum kick setting incorrect | Reset vacuum kick setting, see FUEL SYSTEMS |
| | Fast idle cam index incorrect | Reset fast idle cam index, see FUEL SYSTEM |
| | Incorrect hot fast idle speed RPM | Reset fast idle RPM, see TUNE-UP |
| Engine Starts, Runs Up, Then Idles, Slowly With Black Smoke | Choke vacuum kick set too narrow | Reset vacuum kick, see FUEL SYSTEMS |
| | Fast idle cam index | Reset fast idle cam |

| | |
|---------------------------|----------------------------------|
| incorrect | index, see FUEL SYSTEMS |
| Hot fast idle RPM too low | Reset fast idle RPM, see TUNE-UP |

BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--------------------|----------------|-------------------------|
| Engine Won't Start | Engine flooded | Allow fuel to evaporate |

BASIC COLD ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---------------------------|-------------------------------------|--|
| Engine Stalls in Gear | Choke vacuum kick setting incorrect | Reset choke vacuum kick, see FUEL SYSTEMS |
| | Fast idle RPM incorrect | Reset fast idle RPM, see TUNE-UP |
| | Fast idle cam index incorrect | Reset fast idle cam see FUEL SYSTEMS |
| Acceleration Sag or Stall | Defective choke control switch | Replace choke control switch |
| | Choke vacuum kick setting incorrect | Reset choke vacuum kick see, FUEL SYSTEMS |
| | Float level incorrect (too low) | Adjust float level, FUEL SYSTEMS |
| | Accelerator pump defective | Repair or replace pump see FUEL SYSTEMS |
| | Secondary throttles not closed | Inspect lockout adjustment, see FUEL SYSTEMS |
| Sag or Stall After Warmup | Defective choke control switch | Replace choke control switch, see FUEL SYSTEMS |
| | Defective accelerator pump | Replace pump, see FUEL SYSTEMS |
| | Float level incorrect (too low) | Adjust float level, see FUEL SYSTEMS |
| Backfiring & Black Smoke | Plugged heat crossover system | Remove restriction |

BASIC WARM ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--|--|---|
| Hesitation With Small Amount of Gas Pedal Movement | Vacuum leak | Inspect vacuum lines |
| | Accelerator pump weak or inoperable | Replace pump, see FUEL SYSTEMS |
| | Float level setting too low | Reset float level, see, FUEL SYSTEMS |
| | Metering rods sticking or binding | Inspect and/or replace rods, see FUEL SYSTEMS |
| | Carburetor idle or transfer system plugged | Inspect system and remove restriction |
| | Frozen or binding heated air inlet | Inspect heated air door for binding |
| Hesitation With Heavy Gas Pedal Movement | Defective accelerator pump | Replace pump, see FUEL SYSTEMS |
| | Metering rod carrier sticking or binding | Remove restriction |
| | Large vacuum leak | Inspect vacuum system and repair leak |
| | Float level setting too low | Reset float level, see FUEL SYSTEMS |
| | Defective fuel pump, lines or filter | Inspect pump, lines and filter |
| | Air door setting incorrect | Adjust air door setting, see FUEL |

DIESEL ENGINE TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

NOTE: Diesel engines mechanical diagnosis is the same as gasoline engines for items such as noisy valves, bearings, pistons, etc. The following trouble shooting covers only items pertaining to diesel engines.

BASIC DIESEL ENGINE TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--------------------|---|----------------------------------|
| Engine Won't Crank | Bad battery connections or dead batteries | Check connections and/or replace |

| | | |
|--|---|---|
| | Bad starter connections or bad starter | batteries Check connections and/or replace batteries |
| Engine Cranks Slowly, Won't Start | Bad battery connections or dead batteries Engine oil too heavy | Check connections and/or replace batteries Replace engine oil |
| Engine Cranks Normally, But Will Not Start | Glow plugs not functioning Glow plug control not functioning Fuel not injected into cylinders No fuel to injection pump Fuel filter blocked Fuel tank filter blocked Fuel pump not operating Fuel return system blocked No voltage to fuel solenoid Incorrect or contaminated fuel Incorrect injection pump timing Low compression Injection pump malfunction | Check glow plug system, see FUEL SYSTEMS Check controller, see FUEL SYSTEMS Check fuel injectors, see FUEL SYSTEMS Check fuel delivery system Replace fuel filter Replace fuel tank filter Check pump operation and/or replace pump Inspect system and remove restriction Check solenoid and connections Replace fuel Re-adjust pump timing, see FUEL SYSTEMS Check valves, pistons, rings, see ENGINES Inspect and/or replace injection pump |
| Engine Starts, Won't Idle | Incorrect slow idle adjustment Fast idle solenoid malfunctioning Fuel return system blocked Glow plugs go off too soon Injection pump timing incorrect No fuel to injection pump Incorrect or contaminated fuel Low compression Injection pump malfunction Fuel solenoid closes in RUN position | Reset idle adjustment, see TUNE-UP Check solenoid and connections Check system and remove restrictions See glow plug diagnosis in FUEL SYSTEMS Reset pump timing, see FUEL SYSTEMS Check fuel delivery system Replace fuel Check valves, piston, rings, see ENGINES Replace injection pump, see FUEL SYSTEMS Check solenoid and connections |
| Engines Starts/ Idles Rough W/out Smoke or Noise | Incorrect slow idle adjustment Injection line fuel leaks Fuel return system blocked | Reset slow idle, see TUNE-UP Check lines and connections Check lines and connections |

| | | |
|---|---|--|
| | Air in fuel system Incorrect or contaminated fuel Injector nozzle malfunction | Bleed air from system Replace fuel Check nozzles, see FUEL SYSTEMS |
| Engines Starts and Idles Rough W/out Smoke or Noise, But Clears After Warm-Up | Injection pump timing incorrect Engine not fully broken in Air in system Injector nozzle malfunction | Reset pump timing, see FUEL SYSTEMS Put more miles on engine Bleed air from system Check nozzles, see FUEL SYSTEMS |
| Engine Idles Correctly, Misfires Above Idle | Blocked fuel filter Injection pump timing incorrect Incorrect or contaminated fuel | Replace fuel filter Reset pump timing, see FUEL SYSTEMS Replace fuel |
| Engine Won't Return To Idle | Fast idle adjustment incorrect Internal injection pump malfunction External linkage binding | Reset fast idle, see TUNE-UP Replace injection pump, see FUEL SYSTEMS Check linkage and remove binding |
| Fuel Leaks On Ground | Loose or broken fuel line Internal injection pump seal leak | Check lines and connections Replace injection pump, see FUEL SYSTEMS |
| Cylinder Knocking Noise | Injector nozzles sticking open Very low nozzle opening pressure | Test injectors, see FUEL SYSTEMS Test injectors and/or replace |
| Loss of Engine Power | Restricted air intake EGR valve malfunction Blocked or damaged exhaust system Blocked fuel tank filter Restricted fuel filter Block vent in gas cap Tank-to-injection pump fuel supply blocked Blocked fuel return system Incorrect or contaminated fuel Blocked injector nozzles Low compression | Remove restriction Replace EGR valve Remove restriction and/or replace components Replace filter Remove restriction and/or replace filter Remove restriction and/or replace cap Check fuel lines and connections Remove restriction Replace fuel Check nozzle for blockage, see FUEL SYSTEMS Check valves, rings, pistons, see ENGINES |
| Loud Engine Noise With Black Smoke | Basic timing incorrect EGR valve malfunction Internal injection pump malfunction | Reset timing, see FUEL SYSTEMS Replace EGR valve Replace injection pump, see FUEL SYSTEMS |

| | | |
|-----------------------|--|---|
| | Incorrect injector pump housing pressure | Check pressure, see FUEL SYSTEMS |
| Engine Overheating | Cooling system leaks | Check cooling system and repair leaks |
| | Belt slipping or damaged | Check tension and/or replace belt |
| | Thermostat stuck closed | Remove and replace thermostat, see ENGINE COOLING |
| | Head gasket leaking | Replace head gasket |
| Oil Light on at Idle | Low oil pump pressure | Check oil pump operation, see ENGINES |
| | Oil cooler or line restricted | Remove restriction and/or replace cooler |
| Engine Won't Shut Off | Injector pump fuel solenoid does not return fuel valve to OFF position | Remove and check solenoid and replace if needed |

VACUUM PUMP DIAGNOSIS

| | | |
|-----------------|-------------------------------------|--------------------------|
| Excessive Noise | Loose pump-to-drive assembly screws | Tighten screws |
| | Loose tube on pump assembly | Tighten tube |
| | Valves not functioning properly | Replace valves |
| Oil Leakage | Loose end plug | Tighten end plug |
| | Bad seal crimp | Remove and re-crimp seal |

FUEL INJECTION TROUBLE SHOOTING

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BASIC FUEL INJECTION TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-------------------------------------|--------------------------------------|---|
| Engine Won't Start (Crank Normally) | Cold start valve inoperative | Test valve and circuit |
| | Poor connection; vacuum or wiring | Check vacuum and electrical connections |
| | Contaminated fuel | Test fuel for water or alcohol |
| | Defective fuel pump relay or circuit | Test relay and wiring |
| | Battery too low | Charge and test battery |

| | |
|---|---|
| Low fuel pressure | Test pressure regulator and fuel pump, check for restricted lines and filters |
| No distributor reference pulses | Repair ignition system as necessary |
| Open coolant temperature sensor circuit | Test sensor and wiring |
| Shorted W.O.T. switch in T.P.S. | Disconnect W.O.T. switch, engine should start |
| Defective ECM | Replace ECM |
| Fuel tank residual pressure valve leaks | Test for fuel pressure drop after shut down |

| | | |
|---------------|--|--|
| Hard Starting | Disconnected hot air tube to air cleaner | Reconnect tube and test control valve |
| | Defective Idle Air Control (IAC) valve | Test valve operation and circuit |
| | Shorted, open or misadjusted T.P.S. | Test and adjust or replace T.P.S. |
| | EGR valve open | Test EGR valve and control circuit |
| | Poor Oxygen sensor signal | Test for shorted or circuit |
| | Incorrect mixture from PCV system | Test PCV for flow, check sealing of oil filter cap |

| | | |
|---------------------------|---|--|
| Poor High Speed Operation | Low fuel pump volume | Faulty pump or restricted fuel lines or filters |
| | Poor MAP sensor signal | Test MAP sensor, vacuum hose and wiring |
| | Poor Oxygen sensor signal | Test for shorted or open sensor or circuit |
| | Open coolant temperature sensor circuit | Test sensor and wiring |
| | Faulty ignition operation | Check wires for cracks or poor connections, test secondary voltage with oscilloscope |
| | Contaminated fuel | Test fuel for water |

| | | |
|-------------------------------|---------------------------------------|--|
| | | or alcohol |
| | Intermittent ECM ground | Test ECM ground connection for resistance |
| | Restricted air cleaner | Replace air cleaner |
| | Restricted exhaust system | Test for exhaust manifold back pressure |
| | Poor MAF sensor signal | Check leakage between sensor and manifold |
| | Poor VSS signal | If tester for ALCL hook-up is available check that VSS reading matches speedometer |
| Ping or Knock on Acceleration | Poor Knock sensor signal | Test for shorted or open sensor or circuit |
| | Poor Baro sensor signal | Test for shorted or open sensor or circuit |
| | Improper ignition timing | See VEHICLE EMISSION CONTROL LABEL (where applicable) |
| | Check for engine overheating problems | Low coolant, loose belts or electric cooling fan inoperative |

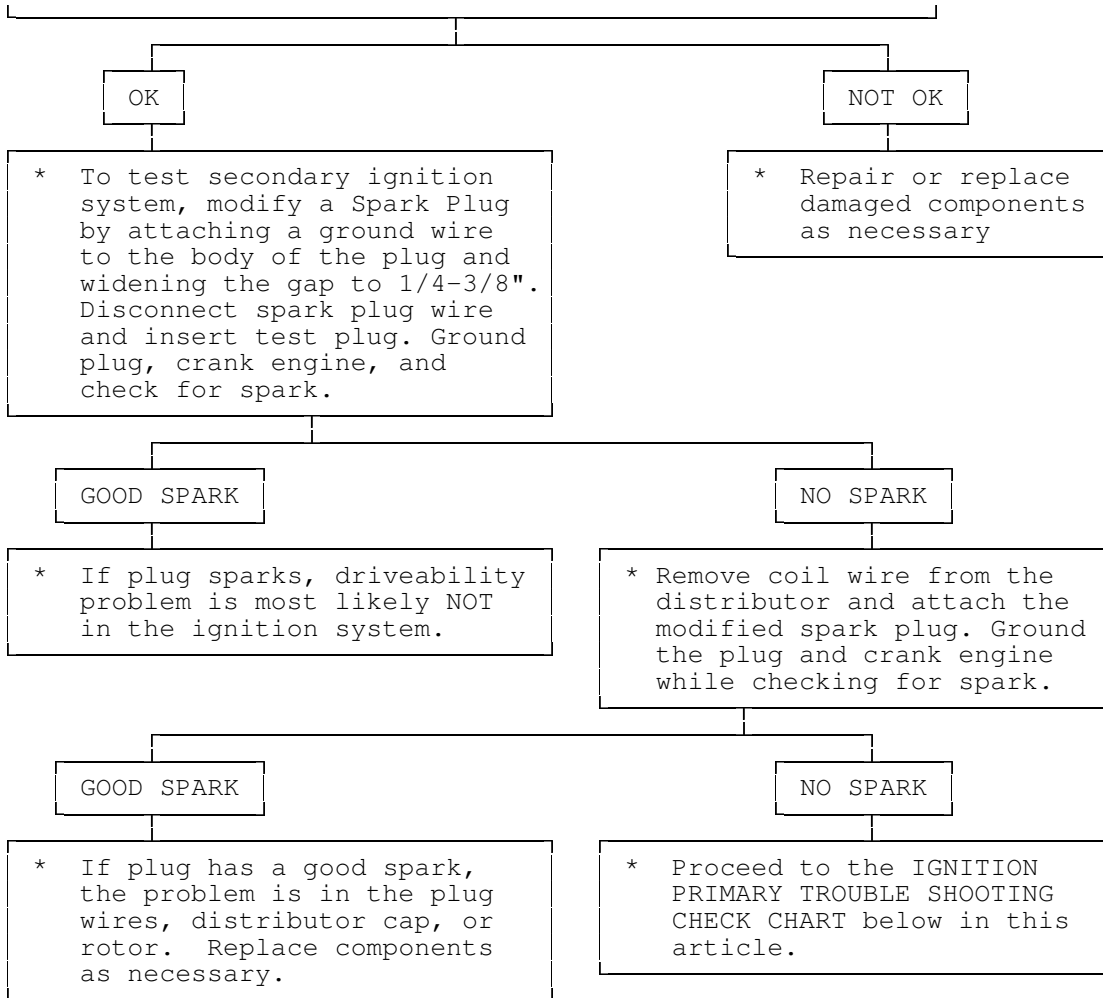
NOTE: For additional electronic fuel injection trouble shooting information, see the appropriate article in the ENGINE PERFORMANCE section (not all vehicles have Computer Engine Control articles). Information is provided there for diagnosing fuel system problems on vehicles with electronic fuel injection.

IGNITION SYSTEM TROUBLE SHOOTING

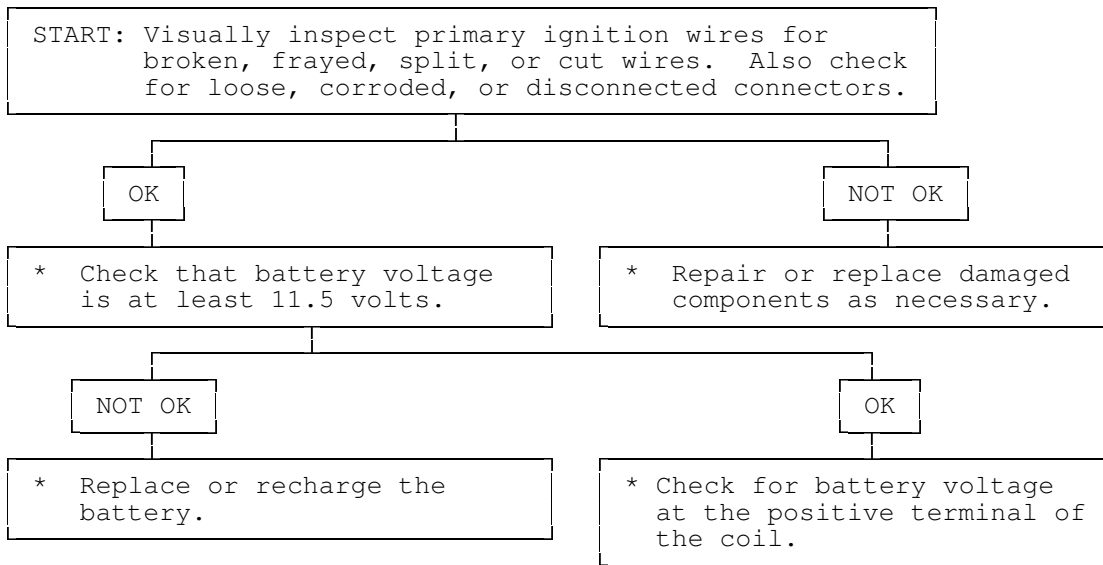
NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

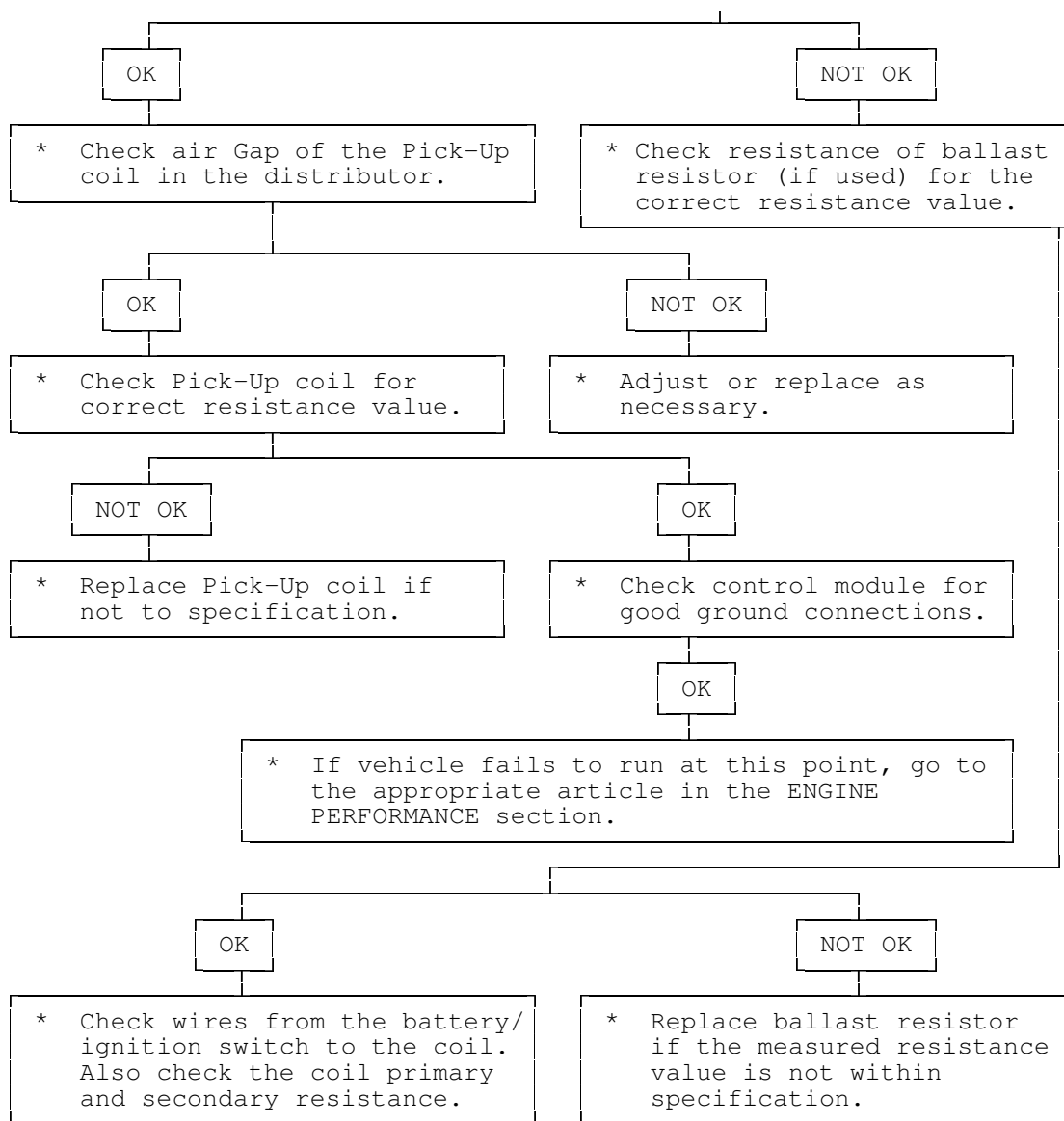
Ignition Secondary Trouble Shooting Chart

| |
|---|
| <p>START: Visually inspect Spark Plug Wires, Coil Wires, Plug Wire Boots, Rotor, and Distributor Cap for signs of damage.</p> |
|---|



Ignition Primary Trouble Shooting Chart





STARTER TROUBLE SHOOTING

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BASIC STARTER TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--------------------------|---|---|
| Starter Fails to Operate | Dead battery or bad connections between starter and battery | Check battery charge and all wires and connections to starter |

| | | |
|---|--|---|
| | Ignition switch faulty or misadjusted | Adjust or replace ignition switch |
| | Open circuit between starter switch ignition terminal on starter relay | Check and repair wires and connections as necessary |
| | Starter relay or starter defective | See Testing in STARTER article |
| | Open solenoid pull-in wire | See Testing in STARTER article |
| Starter Does Not Operate and Headlights Dim | Weak battery or dead cell | Charge or replace battery as necessary |
| | Loose or corroded battery connections | Check that battery connections are clean and tight |
| | Internal ground in starter windings | See Testing in STARTER article |
| | Grounded starter fields | See Testing in STARTERS |
| | Armature rubbing on pole shoes | See STARTER article |
| Starter Turns but Engine Does Not Rotate | Starter clutch slipping | See STARTER article |
| | Broken clutch housing | See STARTER article |
| | Pinion shaft rusted or dry | See STARTER article |
| | Engine basic timing incorrect | See Ignition Timing in TUNE-UP article |
| | Broken teeth on engine flywheel | Replace flywheel and check for starter pinion gear damage |
| Starter Will Not Crank Engine | Faulty overrunning clutch | See STARTER article |
| | Broken clutch housing | See STARTER article |
| | Broken flywheel teeth | Replace flywheel and check for starter pinion gear damage |
| | Armature shaft sheared or reduction gear teeth stripped | See STARTER article |
| | Weak battery | Charge or replace battery as necessary |
| | Faulty solenoid | See On-Vehicle Tests in STARTER article |
| | Poor grounds | Check all ground |

connections for
tight and clean
connections

Ignition switch faulty
or misadjusted

Adjust or replace
ignition switch as
necessary

Starter Cranks
Engine Slowly

Battery weak or
defective

Charge or replace
battery as necessary

Engine overheated

See ENGINE COOLING
SYSTEM article

Engine oil too heavy

Check that proper
viscosity oil
is used

Poor battery-to-starter
connections

Check that all
between
battery and starter are
clean and tight

Current draw too low or
too high

See Bench Tests in
STARTER article

Bent armature, loose pole
shoes screws or worn
bearings

See STARTER article

Burned solenoid contacts

Replace solenoid

Faulty starter

Replace starter

Starter Engages
Engine Only
Momentarily

Engine timing too far
advanced

See Ignition Timing in
TUNE-UP article

Overrunning clutch not
engaging properly

Replace overrunning
clutch. See STARTER
article

Broken starter clutch

See STARTER article

Broken teeth on engine
flywheel

Replace flywheel and
check starter pinion
gear for damage

Weak drive assembly
thrust spring

See STARTER article

Weak hold-in coil

See Bench Tests in
STARTER article

Starter Drive
Will Not Engage

Defective point assembly

See Testing in STARTER
article

Poor point assembly ground

See Testing in STARTER
article

Defective pull-in coil

Replace starter
solenoid

Starter Relay

Dead battery

Charge or replace

| | | |
|--|--|---|
| Does Not Close | | battery as necessary |
| | Faulty wiring | Check all wiring and connections leading to relay |
| | Neutral safety switch faulty | Replace neutral safety switch |
| | Starter relay faulty | Replace starter relay |
| Starter Drive Will Not Disengage | Starter motor loose on mountings | Tighten starter attach bolts |
| | Worn drive end bushing | See STARTER article |
| | Damaged engine flywheel teeth | Replace flywheel and starter pinion gear for damage |
| | Drive yolk return spring broken or missing | Replace return spring |
| | Faulty ignition switch | Replace ignition switch |
| | Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid | Replace starter solenoid |
| | Starter clutch not disengaging | Replace starter clutch |
| | Ignition starter switch contacts sticking | Replace ignition switch |
| Starter Relay Operates but Solenoid Does Not | Faulty solenoid switch, switch connections or | Check all wiring between relay and solenoid or replace relay or solenoid as necessary |
| | Broken lead or loose soldered connections | Repair wire or wire connections as necessary |
| Solenoid Plunger Vibrates When Switch is Engaged | Weak battery | Charge or replace battery as necessary |
| | Solenoid contacts corroded | Clean contacts or replace solenoid |
| | Faulty wiring | Check all wiring leading to solenoid |
| | Broken connections inside switch cover | Repair connections or replace solenoid |
| | Open hold-in wire | Replace solenoid |
| Low Current Draw | Worn brushes or weak | Replace brushes or brush springs as necessary |

| | | |
|--|--|--|
| High Pitched Whine During Cranking Before Engine Fires but Engine Fires and Cranks Normally | Distance too great between starter pinion and flywheel | Align starter or check that correct starter and flywheel are being used |
|--|--|--|

| | |
|--|--|
| High Pitched Whine After Engine Fires With Key released. Engine Fires and Cranks Normally | Distance too small between starter pinion and flywheel Flywheel runout contributes to the intermittent nature |
|--|--|

TUNE-UP TROUBLE SHOOTING - GAS ENGINE VEHICLES

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BASIC SPARK PLUG TROUBLE SHOOTING CHARTS

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|------------------------------------|---|---|
| Normal Spark Plug Condition | Light Tan or Gray deposits | No Action |
| | Electrode not burned or fouled | No Action |
| | Gap tolerance not changed | No Action |
| Cold Fouling or Carbon Deposits | Overrich air/fuel mixture | Adjust air/fuel mixture, see ENGINE PERFORMANCE section |
| | Faulty choke | Replace choke assembly, see ENGINE PERFORMANCE section |
| | Clogged air filter | Clean and/or replace air filter |
| | Incorrect idle speed or dirty carburetor | Reset idle speed and/or clean carburetor |
| | Faulty ignition wires | Replace ignition wiring |
| | Prolonged operation at idle | Shut engine off during long idle |
| | Sticking valves or worn valve guide seals | Check valve train |
| Wet Fouling or Oil Deposits | Worn rings and pistons | Install new rings and pistons |

| | | |
|-----------------------------------|--|---|
| | Excessive cylinder wear | Rebore or replace block |
| | Excessive valve guide clearance | Worn or loose bearing |
| Gap Bridged | Deposits in combustion chamber becoming fused to electrode | Clean combustion chamber of deposits |
| Blistered Electrode | Engine overheating | Check cooling system |
| | Wrong type of fuel | Replace with correct fuel |
| | Loose spark plugs | Retighten spark plugs |
| | Over-advanced ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
| Pre-Ignition or Melted Electrodes | Incorrect type of fuel | Replace with correct fuel |
| | Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
| | Burned valves | Replace valves |
| | Engine Overheating | Check cooling system |
| | Wrong type of spark plug, too hot | Replace with correct spark plug, see ENGINE PERFORMANCE |
| Chipped Insulators | Severe detonation | Check for over-advanced timing or combustion |
| | Improper gapping procedure | Re-gap spark plugs |
| Rust Colored Deposits | Additives in unleaded fuel | Try different fuel brand |
| Water In Combustion Chamber | Blown head gasket or cracked head | Repair or replace head or head gasket |

NOTE: Before diagnosing an electronic ignition system, ensure that all wiring is connected properly between distributor, wiring connector and spark plugs. Ignition problem will show up either as: Engine Will Not Start or Engine Runs Rough.

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--------------------|---|----------------|
| Engine Won't Start | Open circuit between distributor and bulkhead connector | Repair circuit |
| | Open circuit between bulkhead connector and | Repair circuit |

ignition switch

Open circuit between
ignition switch and
starter solenoid

Repair circuit

Engine Runs
Rough

Fuel lines leaking or
clogged

Tighten fitting,
remove restriction

Initial timing incorrect

Reset ignition timing
see ENGINE PERFORMANCE

Centrifugal advance
malfunction

Repair distributor
advance

Defective spark plugs or
wiring

Replace plugs or plug
wiring

Component Failure

Spark arc-over on cap,
rotor or coil

Replace cap, rotor or
or coil

Defective pick-up coil

Replace pick-up coil

Defective ignition coil

Replace ignition coil

Defective vacuum unit

Replace vacuum unit

Defective control module

Replace control module

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS - USING OSCILLOSCOPE PATTERNS

CONDITION

POSSIBLE CAUSE

CORRECTION

Firing Voltage
Lines are the Same,
but Abnormally High

Retarded ignition timing

Reset ignition
timing, see ENGINE
PERFORMANCE section

Fuel mixture too lean

Readjust carburetor,
see ENGINE PERFORMANCE

High resistance in coil
wire

Replace coil wire

Corrosion in coil tower
terminal

Clean and/or replace
coil

Corrosion in distributor
coil terminal

Clean and/or replace
distributor cap

Firing Voltage
Lines are the Same
but Abnormally Low

Fuel mixture too rich

Readjust carburetor,
see ENGINE PERFORMANCE

Breaks in coil wire causing
arcing

Replace coil wire

Cracked coil tower causing
arcing

Replace coil

Low coil output

Replace coil

Low engine compression

Determine cause and

| | | repair |
|--|--|---|
| One or More, But Not All Firing Voltage Lines are Higher Than Others | Carburetor idle mixture not balanced | Readjust carburetor, see ENGINE PERFORMANCE |
| | EGR valve stuck open | Clean and/or replace valve |
| | High resistance in spark plug wires | Replace spark plug wires |
| | Cracked or broken spark plug insulator | Replace spark plugs |
| | Intake vacuum leak | Repair leak |
| | Defective spark plugs | Replace spark plugs |
| Corroded spark plug terminals | Replace spark plugs | |
| One or More, But Not All Firing Voltage Lines Are Lower Than Others | Carburetor idle mixture not balanced | Readjust carburetor, see ENGINE PERFORMANCE |
| | Breaks in plug wires causing arcing | Replace plug wires |
| | Cracked coil tower causing arcing | Replace coil |
| | Low compression | Determine cause and repair |
| | Defective spark plugs | Replace spark plugs |
| Corroded spark plugs | Replace spark plugs | |
| Cylinders Not Firing | Cracked distributor cap terminals | Replace distributor cap |
| | Shorted spark plug wire | Determine cause and repair |
| | Mechanical problem in engine | Determine cause and repair |
| | Defective spark plugs | Replace spark plugs |
| | Spark plugs fouled | Replace spark plugs |

BASIC DRIVEABILITY PROBLEMS TROUBLE SHOOTING TABLE

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---------------|----------------------------|---------------------------------|
| Hard Starting | Binding carburetor linkage | Eliminate binding |
| | Binding choke linkage | Eliminate binding |
| | Binding choke piston | Eliminate binding |
| | Restricted choke vacuum | Check vacuum lines for blockage |

| | |
|-------------------------------------|--|
| Worn or dirty needle valve and seat | Clean carburetor, see ENGINE PERFORMANCE |
| Float sticking | Readjust or replace float see the ENGINE PERFORMANCE section |
| Incorrect choke adjustment | Reset choke adjustment see ENGINE PERFORMANCE |
| Defective coil | Replace coil |
| Improper spark plug gap | Regap spark plugs |
| Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |

| | | |
|----------------------------|-------------------------------|--|
| Detonation | Over-advanced ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
| | Defective spark plugs | Replace spark plugs |
| | Fuel lines clogged | Clean fuel lines |
| | EGR system malfunction | Check and repair EGR system |
| | PCV system malfunction | Repair PCV system |
| | Vacuum leaks | Check and repair vacuum system |
| | Loose fan belts | Tighten or replace fan belts, see ENGINE PERFORMANCE |
| | Restricted airflow | Remove restriction |
| Vacuum advance malfunction | Check distributor operation | |

| | | |
|-----------|--|--|
| Dieseling | Binding carburetor linkage | Eliminate binding |
| | Binding throttle linkage | Eliminate blinding |
| | Binding choke linkage or fast idle cam | Eliminate binding |
| | Defective idle solenoid | Replace idle solenoid see ENGINE PERFORMANCE |
| | Improper base idle speed | Reset idle speed, see see ENGINE PERFORMANCE |
| | Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
| | Incorrect idle mixture setting | Reset idle mixture, see ENGINE PERFORMANCE |

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|---------------------|---------------------------|--|
| Faulty Acceleration | Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
|---------------------|---------------------------|--|

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|-----------------------------|---|--|
| | Engine cold and choke too lean | Adjust choke and allow engine to warm-up |
| | Defective spark plugs | Replace spark plugs |
| | Defective coil | Replace coil |
| Faulty Low Speed Operation | Clogged idle transfer slots | Clean idle transfer slots, see FUEL |
| | Restricted idle air bleeds and passages | Disassemble and clean carburetor, see FUEL |
| | Clogged air cleaner | Replace air filter |
| | Defective spark plugs | Replace spark plugs |
| | Defective ignition wires | Replace ignition wire see ENGINE PERFORMANCE |
| | Defective distributor cap | Replace distributor cap |
| Faulty High Speed Operation | Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
| | Defective distributor centrifugal advance | Replace advance mechanism |
| | Defective distributor vacuum advance | Replace advance unit |
| | Incorrect spark plugs or plug gap | Check gap and/or replace spark plugs |
| | Faulty choke operation | Check choke and repair as required |
| | Clogged vacuum passages | Remove restrictions |
| | Improper size or clogged main jet | Check jet size and clean, see FUEL |
| | Restricted air cleaner | Check filter and replace as necessary |
| | Defective distributor cap, rotor or coil | Replace cap, rotor or coil |
| Misfire at All Speeds | Defective spark plugs | Replace spark plugs |
| | Defective spark plug wires | Replace spark plug wires |
| | Defective distributor cap, rotor, or coil | Replace cap, rotor, or coil |
| | Cracked or broken vacuum hoses | Replace vacuum hoses |

| | | |
|---------------------------------|---|---|
| | Vacuum leaks | Repair vacuum leaks |
| | Fuel lines clogged | Remove restriction |
| Hesitation | Cracked or broken vacuum hoses | Replace vacuum hoses |
| | Vacuum leaks | Repair Vacuum leaks |
| | Binding carburetor linkage | Eliminate binding |
| | Binding throttle linkage | Eliminate binding |
| | Binding choke linkage or fast idle cam | Eliminate binding |
| | Improper float setting | Readjust float setting, see FUEL |
| | Cracked or broken ignition wires | Replace ignition wires |
| Rough idle, Missing or Stalling | Incorrect curb idle or fast idle speed | Reset idle speed, see see ENGINE PERFORMANCE |
| | Incorrect basic timing | Reset ignition timing see ENGINE PERFORMANCE |
| | Improper idle mixture adjustment | Reset idle mixture, see ENGINE PERFORMANCE |
| | Improper feedback system operation | Check feedback system see ENGINE PERFORMANCE |
| | Incorrect spark plug gap | Reset spark plug gap, see ENGINE PERFORMANCE |
| | Moisture in ignition components | Dry components |
| | Loose or broken ignition wires | Replace ignition wires |
| | Damaged distributor cap or or rotor | Replace distributor cap or rotor |
| | Faulty ignition coil | Replace ignition coil |
| | Fuel filter clogged or worn | Replace fuel filter |
| | Damaged idle mixture screw | Replace idle mixture screw, see FUEL |
| | Improper fast idle cam adjustment | Reset fast idle cam adjustment, see TUNE-see ENGINE PERFORMANCE |
| | Improper EGR valve operation | Replace EGR valve |
| | Faulty PCV valve air flow | Replace PCV valve |
| | Choke binding or improper choke setting | Reset choke or eliminate binding |

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|---|---|
| Vacuum leak | Repair vacuum leak |
| Improper float bowl fuel level | Reset float adjustment, see FUEL |
| Clogged air bleed or idle passages | Clean carburetor passages, see FUEL |
| Clogged or worn air cleaner filter | Replace air filter |
| Faulty choke vacuum diaphragm | Replace diaphragm, see ENGINE PERFORMANCE |
| Exhaust manifold heat valve inoperative | Replace heat valve |
| Improper distributor spark advance | Check distributor operation |
| Leaking valves or valve components | Check and repair valvetrain |
| Improper carburetor mounting | Remove and remount carburetor |
| Excessive play in distributor shaft | Replace distributor |
| Loose or corroded wiring connections | Repair or replace as required |

| | | |
|---------------------------------|----------------------------------|-------------------------------------|
| Engine Surges | Improper PCV valve airflow | Replace PCV valve |
| | Vacuum leaks | Repair vacuum leaks |
| | Clogged air bleeds | Remove restriction |
| | EGR valve malfunction | Replace EGR valve |
| | Restricted air cleaner filter | Replace air filter |
| | Cracked or broken vacuum hoses | Replace vacuum hoses |
| | Cracked or broken ignition wires | Replace ignition wires |
| | Vacuum advance malfunction | Check unit and replace as necessary |
| Defective or fouled spark plugs | Replace spark plugs | |

| | | |
|---------------------|---|--|
| Ping or Spark Knock | Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
| | Distributor centrifugal or vacuum advance malfunction | Check operation and replace as necessary |
| | Carburetor setting too lean | Readjust mixture |

| | | |
|-----------------------|---------------------------------|---|
| | | setting, see ENGINE PERFORMANCE |
| | Vacuum leak | Eliminate vacuum leak |
| | EGR valve malfunction | Replace EGR valve |
| Poor Gasoline Mileage | Cracked or broken vacuum hoses | Replace vacuum hoses |
| | Vacuum leaks | Repair vacuum leaks |
| | Defective ignition wires | Replace wires |
| | Incorrect choke setting | Readjust setting, see ENGINE PERFORMANCE |
| | Defective vacuum advance | Replace vacuum advance |
| | Defective spark plugs | Replace spark plugs |
| | Binding carburetor power piston | Eliminate binding |
| | Dirt in carburetor jets | Clean and/or replace jets |
| | Incorrect float adjustment | Readjust float setting, see FUEL |
| | Defective power valve | Replace power valve, see ENGINE PERFORMANCE |
| | Incorrect idle speed | Readjust idle speed |
| Engine Stalls | Improper float level | Readjust float level |
| | Leaking needle valve and seat | Replace needle valve and seat |
| | Vacuum leaks | Eliminate vacuum leaks |

VACUUM PUMP - DIESEL TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

NOTE: Diesel engines mechanical diagnosis is the same as gasoline engines for items such as noisy valves, bearings, pistons, etc. The following trouble shooting covers only items pertaining to diesel engines.

VACUUM PUMP (DIESEL) TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

| | | |
|-----------------|-------------------------------------|--------------------------|
| Excessive Noise | Loose pump-to-drive assembly screws | Tighten screws |
| | Loose tube on pump assembly | Tighten tube |
| | Valves not functioning properly | Replace valves |
| Oil Leakage | Loose end plug | Tighten end plug |
| | Bad seal crimp | Remove and re-crimp seal |

MANUAL TRANSMISSION

MANUAL TRANSMISSION TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

MANUAL TRANSMISSION/TRANSAXLE TROUBLE SHOOTING

| Condition | Possible Cause |
|--|--|
| Noisy In Forward Gears | .Low gear oil level, .Loose bell housing bolts, .Worn bearings or gears |
| Clunk On Deceleration (FWD Only) | .Loose engine mounts, .Worn inboard CV joints, .Worn differential pinion shaft, .Side gear hub counterbore in case worn oversize |
| Gear Clash When Shifting Forward Gears | .Clutch Out Of Adjustment, .Shift linkage damaged or out of adjustment, .Gears or synchronizers damaged, .Low gear oil level |
| Transmission Noisy When Moving (RWD Only) Quiet In Neutral With Clutch Engaged | .Worn rear outputshaft bearing |
| Gear Rattle | .Worn bearings, .Wrong gear oil, .Low gear oil, .Worn gears |
| Steady Ticking At Idle (Increases With RPM) | .Broken tooth on gear |
| Gear Clash When Shifting Forward Gears | .Worn or broken synchronizers |
| Loud Whine In Reverse | .Normal condition (1) |

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|--|--|
| Noise When Stepping On Clutch | .Bad release bearing, .Worn pilot bearing |
| Ticking Or Screeching As Clutch Is Engaged | .Faulty release bearing, .Uneven pressure plate fingers |
| Click Or Snap When Clutch Is Engaged | .Worn clutch fork, .Worn or broken front bearing retainer |
| Transmission Shifts Hard | .Clutch not releasing, .Shift mechanism binding, .Clutch installed backwards |
| Will Not Shift Into One Gear, Shifts Into All Others | .Bent shift fork, .Worn detent balls |
| Locked Into Gear, Cannot Shift | .Clutch adjustment, .Worn detent balls |
| Transmission Jumps Out Of Gear | .Pilot bearing worn, .Bent shift fork, .Worn gear teeth or face .Excessive gear train end play .Worn synchronizers .Missing detent ball spring .Shift mechanism worn or out of adjustment .Engine or transmission mount bolts loose or out of adjustment .Transmission not aligned |
| Shift Lever Rattle | .Worn shift lever or detents .Worn shift forks .Worn synchronizers sleeve |
| Shift Lever Hops Under Acceleration | .Worn engine or transmission mounts |

(1) - Most units use spur cut gears in reverse and are noisy

POWERTRAIN

CLUTCH TROUBLE SHOOTING

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BASIC CLUTCH TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---------------------------------|---|---|
| Chattering or Grabbing | Incorrect clutch adjustment | Adjust clutch |
| | Oil, grease or glaze on facings | Disassemble and clean or replace |
| | Loose "U" joint flange | See DRIVE AXLES article |
| | Worn input shaft spline | Replace input shaft |
| | Binding pressure plate | Replace pressure plate |
| | Binding release lever | See CLUTCH article |
| | Binding clutch disc hub | Replace clutch disc |
| | Unequal pressure plate contact | Replace worn/misaligned components |
| | Loose/bent clutch disc | Replace clutch disc |
| | Incorrect transmission alignment | Realign transmission |
| | Worn pressure plate, disc or flywheel | Replace damaged components |
| | Broken or weak pressure springs | Replace pressure plate |
| | Sticking clutch pedal | Lubricate clutch pedal & linkage |
| Failure to Release | Incorrect clutch disc facing | Replace clutch disc |
| | Engine loose in chassis | Tighten all mounting bolts |
| | Oil or grease on clutch facings | Clean or replace clutch clutch disc |
| | Incorrect release lever or pedal adjustment | See CLUTCH article |
| | Worn or broken clutch facings | Replace clutch disc |
| | Bent clutch disc or pressure plate | Replace damaged components |
| | Clutch disc hub binding on input shaft | Clean or replace clutch disc and/or input shaft |
| Binding pilot bearing | Replace pilot bearing | |
| Sticking release bearing sleeve | Replace release bearing and/or sleeve | |
| Binding clutch cable | See CLUTCH article | |

| | | |
|--------------------------|--|---|
| | Defective clutch master | Replace master cylinder |
| | Defective clutch slave | Replace slave cylinder |
| | Air in hydraulic system | Bleed hydraulic system |
| Rattling | Weak or broken release lever spring | Replace spring and check alignment |
| | Damaged pressure plate | Replace pressure plate |
| | Broken clutch return spring | Replace return spring |
| | Worn splines on clutch disc or input shaft | Replace clutch disc and/or input shaft |
| | Worn clutch release bearing | Replace release bearing |
| | Dry or worn pilot bearing | Lubricate or replace pilot bearing |
| | Unequal release lever contact | Align or replace release lever |
| | Incorrect pedal free play | Adjust free play |
| | Warped or damaged clutch disc | Replace damaged components |
| Slipping | Pressure springs worn or | Release pressure plate |
| | Oily, greasy or worn facings | Clean or replace clutch disc |
| | Incorrect clutch alignment | Realign clutch assembly |
| | Warped clutch disc or pressure plate | Replace damaged components |
| | Binding release levers or clutch pedal | Lubricate and/or replace release components |
| Squeaking | Worn or damaged release | Replace release bearing |
| | Dry or worn pilot or release bearing | Lubricate or replace assembly |
| | Pilot bearing turning in crankshaft | Replace pilot bearing and/or crankshaft |
| | Worn input shaft bearing | Replace bearing and seal |
| | Incorrect transmission alignment | Realign transmission |
| | Dry release fork between pivot | Lubricate release fork and pivot |
| Heavy and/or Stiff Pedal | Sticking release bearing sleeve | Replace release bearing and/or sleeve |

| | | |
|--------------------------|-----------------------------------|---------------------------------------|
| | Dry or binding clutch pedal hub | Lubricate and align components |
| | Floor mat interference with pedal | Lay mat flat in proper area |
| | Dry or binding ball/fork pivots | Lubricate and align components |
| | Faulty clutch cable | Replace clutch cable |
| Noisy Clutch Pedal | Faulty interlock switch | Replace interlock switch |
| | Self-adjuster ratchet noise | Lubricate or replace self-adjuster |
| | Speed control interlock switch | Lubricate or replace interlock switch |
| Clutch Pedal Sticks Down | Binding clutch cable | See CLUTCH article |
| | Springs weak in pressure plate | Replace pressure plate |
| | Binding in clutch linkage | Lubricate and free linkage |
| Noisy | Dry release bearing | Lubricate or replace release bearing |
| | Dry or worn pilot bearing | Lubricate or replace bearing |
| | Worn input shaft bearing | Replace bearing |
| Transmission Click | Weak springs in pressure plate | Replace pressure plate |
| | Release fork loose on ball stud | Replace release fork and/or ball stud |
| | Oil on clutch disc damper | Replace clutch disc |
| | Broken spring in slave cylinder | Replace slave cylinder |

DRIVE AXLE - NOISE DIAGNOSIS

Unrelated Noises

Some driveline trouble symptoms are also common to the engine, transmission, wheel bearings, tires, and other parts of the vehicle. Ensure cause of trouble actually is in the drive axle before adjusting, repairing, or replacing any of its parts.

Non-Drive Axle Noises

A few conditions can sound just like drive axle noise and have to be considered in pre-diagnosis. The 4 most common noises are exhaust, tires, CV/universal joints and wheel trim rings.

In certain conditions, the pitch of the exhaust gases may sound like gear whine. At other times, it may be mistaken for a wheel bearing rumble.

Tires, especially radial and snow, can have a high-pitched tread whine or roar, similar to gear noise. Also, some non-standard tires with an unusual tread construction may emit a roar or whine.

Defective CV/universal joints may cause clicking noises or excessive driveline play that can be improperly diagnosed as drive axle problems.

Trim and moldings also can cause a whistling or whining noise. Ensure none of these components are causing the noise before disassembling the drive axle.

Gear Noise

A "howling" or "whining" noise from the ring and pinion gear can be caused by an improper gear pattern, gear damage, or improper bearing preload. It can occur at various speeds and driving conditions, or it can be continuous.

Before disassembling axle to diagnose and correct gear noise, make sure that tires, exhaust, and vehicle trim have been checked as possible causes.

Chuckle

This is a particular rattling noise that sounds like a stick against the spokes of a spinning bicycle wheel. It occurs while decelerating from 40 MPH and usually can be heard until vehicle comes to a complete stop. The frequency varies with the speed of the vehicle.

A chuckle that occurs on the driving phase is usually caused by excessive clearance due to differential gear wear, or by a damaged tooth on the coast side of the pinion or ring gear. Even a very small tooth nick or a ridge on the edge of a gear tooth is enough the cause the noise.

This condition can be corrected simply by cleaning the gear tooth nick or ridge with a small grinding wheel. If either gear is damaged or scored badly, the gear set must be replaced. If metal has broken loose, the carrier and housing must be cleaned to remove particles that could cause damage.

Knock

This is very similar to a chuckle, though it may be louder, and occur on acceleration or deceleration. Knock can be caused by a gear tooth that is damaged on the drive side of the ring and pinion gears. Ring gear bolts that are hitting the carrier casting can cause knock. Knock can also be due to excessive end play in the axle shafts.

Clunk

Clunk is a metallic noise heard when an automatic transmission is engaged in Reverse or Drive, or when throttle is applied or released. It is caused by backlash somewhere in the driveline, but not necessarily in the axle. To determine whether driveline clunk is caused by the axle, check the total axle backlash as follows:

- 1) Raise vehicle on a frame or twinpost hoist so that drive wheels are free. Clamp a bar between axle companion flange and a part of the frame or body so that flange cannot move.

- 2) On conventional drive axles, lock the left wheel to keep it from turning. On all models, turn the right wheel slowly until it is felt to be in Drive condition. Hold a chalk marker on side of tire about 12" from center of wheel. Turn wheel in the opposite direction until it is again felt to be in Drive condition.

- 3) Measure the length of the chalk mark, which is the total

axle backlash. If backlash is one inch or less, drive axle is not the source of clunk noise.

Bearing Whine

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by malfunctioning pinion bearings. Pinion bearings operate at drive shaft speed. Roller wheel bearings may whine in a similar manner if they run completely dry of lubricant. Bearing noise will occur at all driving speeds. This distinguishes it from gear whine, which usually comes and goes as speed changes.

Bearing Rumble

Bearing rumble sounds like marbles being tumbled. It is usually caused by a malfunctioning wheel bearing. The lower pitch is because the wheel bearing turns at only about 1/3 of drive shaft speed.

Chatter On Turns

This is a condition where the entire front or rear of vehicle vibrates when vehicle is moving. The vibration is plainly felt as well as heard. Extra differential thrust washers installed during axle repair can cause a condition of partial lock-up that creates this chatter.

Axle Shaft Noise

Axle shaft noise is similar to gear noise and pinion bearing whine. Axle shaft bearing noise will normally distinguish itself from gear noise by occurring in all driving modes (Drive, cruise, coast and float), and will persist with transmission in Neutral while vehicle is moving at problem speed.

If vehicle displays this noise condition, remove suspect axle shafts, replace wheel seals and install a new set of bearings. Re-evaluate vehicle for noise before removing any internal components.

Vibration

Vibration is a high-frequency trembling, shaking or grinding condition (felt or heard) that may be constant or variable in level and can occur during the total operating speed range of the vehicle.

The types of vibrations that can be felt in the vehicle can be divided into 3 main groups:

- * Vibrations of various unbalanced rotating parts of the vehicle.
- * Resonance vibrations of the body and frame structures caused by rotating of unbalanced parts.
- * Tip-in moans of resonance vibrations from stressed engine or exhaust system mounts or driveline flexing modes.

DRIVE AXLE - RWD TROUBLE SHOOTING

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DRIVE AXLE (RWD) TROUBLE SHOOTING

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

Knocking or Clunking

| | |
|----------------------------------|-------------------------------------|
| Differential Side Gear Clearance | Check Clearance |
| Worn Pinion Shaft | Replace Pinion Shaft |
| Axle Shaft End Play | Check End Play |
| Missing Gear Teeth | Check Differential/ Replace Gear |
| Wrong Axle Backlash | Check Backlash |
| Misaligned Driveline | Realign Driveline |

Clinking During Engagement

| | |
|--------------------------|-----------------------|
| Side Gear Clearance | Check Clearance |
| Ring and Pinion Backlash | Check Backlash |
| Worn/Loose Pinion Shaft | Replace Shaft/Bearing |
| Bad "U" Joint | Replace "U" Joint |
| Sticking Slip Yoke | Lube Slip Yoke |
| Broken Rear Axle Mount | Replace Mount |
| Loose Drive Shaft Flange | Check Flange |

Click/Chatter On Turns

| | |
|----------------------------------|-----------------------|
| Differential Side Gear Clearance | Check Clearance |
| Wrong Turn On Plates (1) | Replace Clutch Plates |
| Wrong Differential Lubricant (1) | Change Lubricant |

Knock Or Click

| | |
|---------------------------------|-----------------------|
| Flat Spot on Rear Wheel Bearing | Replace Wheel Bearing |
|---------------------------------|-----------------------|

Low Vibration At All Speeds

| | |
|-------------------------|-----------------------|
| Faulty Wheel Bearing | Replace Wheel Bearing |
| Faulty "U" Joint | Replace "U" Joint |
| Faulty Drive Shaft | Balance Drive Shaft |
| Faulty Companion Flange | Replace Flange |
| Faulty Slip Yoke Flange | Replace Flange |

(1) - Limited slip differential only.

FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING

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problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE |
|--------------------------------------|---|
| Grease Leaks | CV boot torn or cracked |
| Clicking Noise on Cornering | Damaged outer CV |
| Clunk Noise on Acceleration | Damaged inner CV |
| Vibration or Shudder on Acceleration | Sticking, damaged or worn CV Misalignment or spring height |

STEERING & SUSPENSION

MANUAL STEERING GEAR TROUBLE SHOOTING

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BASIC MANUAL STEERING GEAR TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---|---|----------------------------------|
| Rattle or Chucking Noise in Rack and Pinion | Rack and pinion mounting bracket loose | Tighten all mounting bolts |
| | Lack of/or incorrect lubricant | Correct as necessary |
| | Steering gear mounting bolts loose | Tighten all mounting bolts |
| Excessive Play | Front wheel bearing improperly adjusted | See FRONT SUSPENSION article |
| | Loose or worn steering linkage | See STEERING LINKAGE article |
| | Loose or worn steering gear shift | See MANUAL STEERING GEAR article |
| | Steering arm loose on gear shaft | See MANUAL STEERING GEAR article |
| | Steering gear housing bolts loose | Tighten all mounting bolts |
| | Steering gear adjustment too loose | See MANUAL STEERING GEAR article |
| | Steering arms loose on | Tighten and check |

| | |
|---|------------------------------------|
| knuckles | steering linkage |
| Rack and pinion mounting loose | Tighten all mounting bolts |
| Rack and pinion out of adjustment | See adjustment in STEERING article |
| Tie rod end loose | Tighten and check steering linkage |
| Excessive Pitman shaft-to-ball nut lash | Repair as necessary |

| | | |
|--------------------|--|---|
| Poor Returnability | Lack of lubricant in ball joint or linkage | Lubricate and service systems |
| | Binding in linkage or ball joints | See STEERING LINKAGE and SUSPENSION article |
| | Improper front end alignment | See WHEEL ALIGNMENT article |
| | Improper tire pressure | Inflate to proper pressure |
| | Tie rod binding | Inflate to proper pressure |
| | Shaft seal rubbing shaft | See STEERING COLUMN article |

| | | |
|---------------------------|--|--|
| Excessive Vertical Motion | Improper tire pressure | Inflate to proper pressure |
| | Tires, wheels or rotors out of balance | Balance tires then check wheels and rotors |
| | Worn or faulty shock absorbers | Check and replace if necessary |
| | Loose tie rod ends or steering | Tighten or replace if necessary |
| | Loose or worn wheel bearings | See SUSPENSION article |

| | | |
|----------------------------|--------------------------------------|--------------------------------|
| Steering Pulls to One Side | Improper tire pressure | Inflate to proper pressure |
| | Front tires are different sizes | Rotate or replace if necessary |
| | Wheel bearings not adjusted properly | See FRONT SUSPENSION article |
| | Bent or broken suspension components | See FRONT SUSPENSION article |
| | Improper wheel alignment | See WHEEL ALIGNMENT article |

| | | |
|-------------|---------------------------------|-----------------------------------|
| | Brakes dragging | See BRAKES article |
| Instability | Low or uneven tire pressure | Inflate to proper pressure |
| | Loose or worn wheel bearings | See FRONT SUSPENSION article |
| | Loose or worn idler arm bushing | See FRONT SUSPENSION article |
| | Loose or worn strut bushings | See FRONT SUSPENSION article |
| | Incorrect front wheel alignment | See WHEEL ALIGNMENT article |
| | Steering gear not centered | See MANUAL STEERING GEARS article |
| | Springs or shock | Check and replace if necessary |
| | Improper cross shaft | See MANUAL STEERING GEARS article |

POWER STEERING TROUBLE SHOOTING

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BASIC POWER STEERING TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|--------------------------|---|---------------------------------|
| Rattle or Chucking Noise | Pressure hoses touching engine parts | Adjust to proper clearance |
| | Loose Pitman shaft | Adjust or replace if necessary |
| | Tie rods ends or Pitman arm loose | Tighten and check system |
| | Rack and pinion mounts loose | Tighten all mounting bolts |
| | Free play in worm and | See POWER STEERING GEAR article |
| | Loose sector shaft or thrust bearing adjustment | See POWER STEERING GEAR |
| | Free play in pot coupling | See STEERING COLUMN article |

| | | |
|---------------------------|---------------------------------------|---|
| | Worn shaft serrations | See STEERING COLUMN article |
| Growl in Steering Pump | Excessive pressure in hoses | Restricted hoses, see POWER STEERING GEAR article |
| | Scored pressure plates | See POWER STEERING GEAR article |
| | Scored thrust plates or rotor | See POWER STEERING GEAR article |
| | Extreme wear of cam ring | See POWER STEERING GEAR article |
| Rattle in Steering Pump | Vanes not installed | See POWER STEERING PUMP article |
| | Vanes sticking in rotor | See POWER STEERING PUMP article |
| Swish noise in Pump | Defective flow control valve | See POWER STEERING PUMP article |
| Groan in Steering Pump | Air in fluid | See POWER STEERING PUMP article |
| | Poor pressure hose connection | Tighten and check, replace if necessary |
| Squawk When Turning | Damper "O" ring on valve spool cut | See POWER STEERING PUMP article |
| Moan or Whine in Pump | Pump shaft bearing scored | Replace bearing and fluid |
| | Air in fluid or fluid level low | See POWER STEERING PUMP article |
| | Hose or column grounded | Check and replace if necessary |
| | Cover "O" ring missing or damaged | See POWER STEERING PUMP article |
| | Valve cover baffle missing or damaged | See POWER STEERING PUMP article |
| | Interference of components in pump | See POWER STEERING PUMP article |
| | Loose or poor bracket alignment | Correct or replace if necessary |
| Hissing When Parking | Internal leakage in steering gear | Check valved assembly first |
| Chirp in Steering Pump | Loose or worn power steering belt | Adjust or replace if necessary |
| Buzzing When Not Steering | Noisy pump | See POWER STEERING PUMP article |

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| | Free play in steering shaft bearing | See STEERING COLUMN article |
| | Bearing loose on shaft serrations | See STEERING COLUMN article |
| Clicking Noise in Pump | Pump slippers too long | See POWER STEERING PUMP article |
| | Broken slipper springs | See POWER STEERING PUMP article |
| | Excessive wear or nicked rotors | See POWER STEERING PUMP article |
| | Damaged cam contour | See POWER STEERING PUMP article |
| Poor Return of Wheel | Wheel rubbing against turn signal | See STEERING COLUMN SWITCHES article |
| | Flange rubbing steering gear adjuster | See STEERING COLUMN article |
| | Tight or frozen steering shaft bearing | See STEERING COLUMN article |
| | Steering gear out of adjustment | See POWER STEERING GEAR article |
| | Sticking or plugged spool valve | See POWER STEERING PUMP article |
| | Improper front end alignment | See WHEEL ALIGNMENT article |
| | Wheel bearings worn or loose | See FRONT SUSPENSION article |
| | Ties rods or ball joints binding | Check and replace if necessary |
| | Intermediate shaft joints binding | See STEERING COLUMN article |
| | Kinked pressure hoses | Correct or replace if necessary |
| | Loose housing head spanner nut | See POWER STEERING GEAR article |
| | Damaged valve lever | See POWER STEERING GEAR article |
| | Sector shaft adjusted too tight | See ADJUSTMENTS in POWER STEERING GEAR article |
| | Worm thrust bearing adjusted too tight | See ADJUSTMENTS in POWER STEERING GEAR article |
| Reaction ring sticking in cylinder | See POWER STEERING GEAR article | |

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| Reaction ring sticking in housing head | See POWER STEERING GEAR article |
| Steering pump internal leakage | See POWER STEERING PUMP article |
| Steering gear-to-column misalignment | See STEERING COLUMN article |
| Lack of lubrication in linkage | Service front suspension |
| Lack of lubrication in ball joints | Service front suspension |

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| Increased Effort When Turning Wheel Fast Foaming, Milky Power Steering Fluid, Low Fluid Level or Low Pressure | High internal pump leakage | See POWER STEERING PUMP article |
| | Power steering pump belt slipping | Adjust or replace if necessary |
| | Low fluid level | Check and fill to proper level |
| | Engine idle speed too low | Adjust to correct setting |
| | Air in pump fluid system | See POWER STEERING PUMP article |
| | Pump output low | See POWER STEERING PUMP article |
| Steering gear malfunctioning | See POWER STEERING GEAR article | |

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| Wheel Surges or Jerks | Low fluid level | Check and fill to proper level |
| | Loose fan belt | Adjust or replace if necessary |
| | Insufficient pump pressure | See POWER STEERING PUMP article |
| | Sticky flow control valve | See POWER STEERING PUMP article |
| | Linkage hitting oil pan at full turn | Replace bent components |

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|------------------------|------------------------------------|---------------------------------|
| Kick Back or Free Play | Air in pump fluid system | See POWER STEERING PUMP article |
| | Worn poppet valve in steering gear | See POWER STEERING PUMP article |
| | Excessive over center lash | See POWER STEERING GEAR article |
| | Thrust bearing out of adjustment | See POWER STEERING GEAR article |

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| Free play in pot coupling | See POWER STEERING PUMP article |
| Steering gear coupling loose on shaft | See POWER STEERING PUMP article |
| Steering disc mounting bolts loose | Tighten or replace if necessary |
| Coupling loose on worm shaft | Tighten or replace if necessary |
| Improper sector shaft adjustment | See POWER STEERING GEAR article |
| Excessive worm piston side play | See POWER STEERING GEAR article |
| Damaged valve lever | See POWER STEERING GEAR article |
| Universal joint loose | Tighten or replace if necessary |
| Defective rotary valve | See POWER STEERING GEAR article |

No Power When Parking

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| Sticking flow control valve | See POWER STEERING PUMP article |
| Insufficient pump pressure output | See POWER STEERING PUMP article |
| Excessive internal pump leakage | See POWER STEERING PUMP article |
| Excessive internal gear leakage | See POWER STEERING PUMP article |
| Flange rubs against gear adjust plug | See STEERING COLUMN article |
| Loose pump belt | Adjust or replace if necessary |
| Low fluid level | Check and add proper amount of fluid |
| Engine idle too low | Adjust to correct setting |
| Steering gear-to-column misaligned | See STEERING COLUMN article |

No Power, Left Turn

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|---|---------------------------------|
| Left turn reaction seal "O" ring worn | See POWER STEERING GEAR article |
| Left turn reaction seal damaged/missing | See POWER STEERING GEAR article |
| Cylinder head "O" ring damaged | See POWER STEERING PUMP article |

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| No Power, Right Turns | Column pot coupling bottomed | See STEERING COLUMN article |
| | Right turn reaction seal "O" ring worn | See POWER STEERING GEAR article |
| | Right turn reaction seal damaged | See POWER STEERING GEAR article |
| | Internal leakage through piston end plug | See POWER STEERING GEAR article |
| | Internal leakage through side plugs | See POWER STEERING GEAR article |
| Lack of Effort in Turning | Left and/or right reaction seal sticking in cylinder head | Replace, see POWER STEERING GEAR article |
| Wanders to One Side | Front end alignment incorrect | See WHEEL ALIGNMENT article |
| | Unbalanced steering gear valve | See POWER STEERING GEAR article |
| Low Pressure Due to Steering Pump | Flow control valve stuck or inoperative | See POWER STEERING PUMP article |
| | Pressure plate not flat against cam ring | See POWER STEERING PUMP article |
| | Extreme wear of cam ring | Replace and check adjustments |
| | Scored plate, thrust plate or rotor | See POWER STEERING PUMP article |
| | Vanes not installed properly | See POWER STEERING PUMP article |
| | Vanes sticking in rotor slots | See POWER STEERING PUMP article |
| | Cracked/broken thrust or pressure plate | See POWER STEERING PUMP article |

STEERING COLUMN TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC STEERING COLUMN TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|----------------------|-----------------------|---------------------------------|
| Noise in Steering | Coupling pulled apart | See STEERING COLUMNS article |

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| | Column not correctly aligned | See STEERING COLUMNS article |
| | Broken lower joint | Replace joint |
| | Horn contact ring not | See STEERING COLUMN article |
| | Bearing not lubricated | See STEERING COLUMN article |
| | Shaft snap ring not properly seated | Reseat or replace snap ring |
| | Plastic spherical joint not lubricated | See STEERING COLUMN article |
| | Shroud or housing loose | Tighten holding screws |
| | Lock plate retaining ring not seated | See STEERING COLUMN article |
| | Loose sight shield | Tighten holding screws |
| High Steering Shaft Effort | Column assembly misaligned | See STEERING COLUMN article |
| | Improperly installed dust shield | Adjust or replace |
| | Tight steering universal joint | See STEERING COLUMN article |
| High Shift Effort | Column is out of alignment | See STEERING COLUMN article |
| | Improperly installed dust shield | Adjust or replace |
| | Seals or bearings not lubricated | See STEERING COLUMNS article |
| | Mounting bracket screws too long | Replace with new shorter screws |
| | Burrs on shift tube | Remove burrs or replace tube |
| | Lower bowl bearing assembled wrong | See STEERING COLUMN article |
| | Shift tube bent or broken | Replace as necessary |
| Improper Trans. Shifting | Improper adjustment of shift levers | See STEERING COLUMN article |
| | Sheared shift tube joint | Replace as necessary |
| | Sheared lower shaft lever | Replace as necessary |
| | Improper shift lever adjustment | See STEERING COLUMN article |

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| | Improper gate plate adjustment | See STEERING COLUMN article |
| Excess Play in Column | Instrument panel bracket bolts loose | Tighten bolts and check bracket |
| | Broken weld nut on jacket | See STEERING COLUMN article |
| | Instrument bracket capsule sheared | See STEERING COLUMN article |
| | Column bracket/jacket bolts loose | Tighten bolts and check bracket |
| Steering Locks in Gear | Release lever mechanism | See STEERING COLUMN article |

SUSPENSION TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC SUSPENSION TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---|------------------------------------|---|
| Front End Noise | Loose or worn wheel | See Wheel Bearing Adjustment in SUSPENSION |
| | Worn shocks or shock mountings | Replace struts or strut mountings |
| | Worn struts or strut mountings | Replace struts or strut mountings |
| | Loose or worn lower control arm | See SUSPENSION |
| | Loose steering gear-to-frame bolts | See STEERING |
| | Worn control arm bushings | See SUSPENSION |
| | Ball joints not lubricated | Lubricate ball joints & see Ball Joint Checking in SUSPENSION |
| Front Wheel Shake, Shimmy, or Vibration | Tires or wheels out of balance | Check tire balance |
| | Incorrect wheel alignment | See WHEEL ALIGNMENT |
| | Drive shaft unbalanced | Check drive shaft balance |

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| | Loose or worn wheel bearings | See WHEEL ALIGNMENT |
| | Loose or worn tie rod ends | See SUSPENSION |
| | Worn upper ball joints | See Ball Joint Checking in SUSPENSION |
| | Worn shock absorbers | Replace shock absorbers |
| | Worn strut bushings | Replace strut bushings |
| Car Pulls to One Side | Mismatched or uneven tires | Check tire condition |
| | Broken or sagging springs | See SUSPENSION |
| | Loose or worn strut bushings | See SUSPENSION |
| | Improper wheel alignment | See WHEEL ALIGNMENT |
| | Improper rear axle alignment | Check rear axle alignment |
| | Power steering gear unbalanced | See STEERING |
| | Front brakes dragging | See BRAKES |
| Abnormal Tire Wear | Unbalanced tires | Check tire balance & rotation |
| | Sagging or broken springs | See SUSPENSION |
| | Incorrect front end alignment | See WHEEL ALIGNMENT |
| | Faulty shock absorbers | Replace shock absorbers |
| Scuffed Tires | Toe-In incorrect | See WHEEL ALIGNMENT |
| | Suspension arm bent or twisted | See appropriate SUSPENSION article |
| Springs Bottom or Sag | Bent or broken springs | See SUSPENSION |
| | Leaking or worn shock absorbers | Replace shock absorbers |
| | Frame misalignment | Check frame for damage |
| Spring Noises | Loose "U" Bolts | See SUSPENSION |
| | Loose or worn bushings | See SUSPENSION |
| | Worn or missing interliners | See SUSPENSION |
| Shock Absorber Noise | Loose shock mountings | Check & tighten mountings |
| | Worn bushings | Replace bushings |

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| | Air in system | Bleed air from system |
| | Undercoating on shocks | Remove undercoating |
| Car Leans or Sways on Corners | Loose stabilizer bar | See SUSPENSION |
| | Faulty shocks or mountings | Replace shocks or mountings |
| | Broken or sagging springs | See SUSPENSION |
| Shock Absorbers Leaking | Worn seals or reservoir tube crimped | See SUSPENSION |
| Broken Springs | Loose "U" bolts | See SUSPENSION |
| | Inoperative shock absorbers | Replace shock absorbers |

WHEEL ALIGNMENT TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

BASIC WHEEL ALIGNMENT TROUBLE SHOOTING CHART

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|---------------------|----------------------------------|--|
| Premature Tire Wear | Improper tire inflation | Check tire pressure |
| | Front alignment out of tolerance | See ALIGNMENT SPECS in WHEEL ALIGNMENT section |
| | Suspension components worn | See SUSPENSION section |
| | Steering system components worn | See STEERING section |
| | Improper standing height | See WHEEL ALIGNMENT |
| | Uneven or sagging springs | See SUSPENSION section |
| | Bent wheel | See WHEEL ALIGNMENT |
| | Improper torsion bar adjustment | See SUSPENSION section |
| | Loose or worn wheel bearings | See WHEEL BEARING ADJ. in SUSPENSION section |
| | Worn or defective shock | Replace shock absorbers |
| | Tires out of balance | Check tire balance |
| Pulls to One Side | Improper tire inflation | Check tire pressure |
| | Brake dragging | See BRAKE section |

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|-----------------------------------|--|
| Mismatched tires | See WHEEL ALIGNMENT |
| Broken or sagging spring | See SUSPENSION section |
| Broken torsion bar | See SUSPENSION section |
| Power steering valve not centered | See STEERING section |
| Front alignment out of tolerance | See WHEEL ALIGNMENT section |
| Defective wheel bearing | See WHEEL BEARINGS in SUSPENSION section |
| Uneven sway bar links | See SUSPENSION section |
| Frame bent | Check for frame damage |
| Steering system bushing worn | See STEERING section |

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| Hard Steering | Idler arm bushing too tight | See STEERING LINKAGE in STEERING section |
| | Ball joint tight or seized | See SUSPENSION section |
| | Steering linkage too tight | See STEERING LINKAGE in STEERING section |
| | Power steering fluid low | Add proper amount of fluid |
| | Power steering drive belt loose | See STEERING section |
| | Power steering pump defective | See STEERING section |
| | Steering gear out of adjustment | See STEERING section |
| | Incorrect wheel alignment | See WHEEL ALIGNMENT |
| | Damaged steering gear | See STEERING section |
| | Damaged suspension | See SUSPENSION section |
| Bent steering knuckle or supports | See SUSPENSION section | |

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| Vehicle "Wanders" | Strut rod or control arm bushing worn | See SUSPENSION section |
| | Loose or worn wheel bearings | See WHEEL BEARINGS in SUSPENSION section |
| | Improper tire inflation | Check tire pressure |
| | Stabilizer bar missing or defective | See SUSPENSION section |

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| | Wheel alignment out of tolerance | See Adjustment in WHEEL ALIGNMENT section |
| | Broken spring | See SUSPENSION section |
| | Defective shock absorbers | Replace shock absorbers |
| | Worn steering & suspension components | See SUSPENSION section |
| Front End Shimmy | Tire out of balance/round | Check tire balance |
| | Excessive wheel runout | See WHEEL ALIGNMENT |
| | Insufficient or improper caster | See WHEEL ALIGNMENT section |
| | Worn suspension or steering components | See SUSPENSION section |
| | Defective shock absorbers | Replace shock absorber |
| | Wheel bearings worn or loose | See WHEEL BEARING ADJ. in SUSPENSION section |
| | Power steering reaction Bracket loose | See STEERING section |
| | Steering gear box (rack) mounting loose | See STEERING section |
| | Steering gear adjustment loose | See STEERING section |
| Worn spherical joints | See SUSPENSION section | |
| Toe-In Not Adjustable | Lower control arm bent | See SUSPENSION section |
| | Frame bent | Check frame for damage |
| Camber Not Adjustable | Control arm bent | See SUSPENSION section |
| | Frame bent | Check frame for damage |
| | Hub & bearing not seated properly | See SUSPENSION section |