

# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text

1991 Volkswagen Passat  
For Volkswagen Technical Site  
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Wednesday, August 25, 1999 09:06PM

### ARTICLE BEGINNING

#### GENERAL TROUBLE SHOOTING

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

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### BRAKE SYSTEM TROUBLE SHOOTING

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#### BRAKE SYSTEM TROUBLE SHOOTING CHART

AA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AA		
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
AA		
Noises Without Brakes Applied	Loose suspension parts	See SUSPENSION
	Front linings worn out	Replace linings
	Dust or oil on drums or rotors	See DRUM, DISC BRAKES or BRAKE SYSTEM
AA		
Noises With Brakes Applied	Insulator on outboard shoe damaged	See DISC BRAKES or BRAKE SYSTEM
	Incorrect pads or linings	Replace pads or linings
AA		
Brake Rough, Chatters or Pulsates	Excessive lateral runout	Check rotor runout

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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

AA

#### 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 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

AA

#### 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

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or BRAKE SYSTEM

Improper brake fluid

Replace brake fluid

AA

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

AA

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

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

AA

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

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Binding brake pedal

See DISC, DRUM BRAKES  
or BRAKE SYSTEM

AA

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

AA

## CARBURETOR TROUBLE SHOOTING:

READ THIS FIRST:

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## COLD START SYMPTOMS

### BASIC COLD START SYMPTOMS TROUBLE SHOOTING CHART

AA

CONDITION

POSSIBLE CAUSE

CORRECTION

AA

Engine Won't  
Start

Choke not closing

Check choke  
operation, see  
FUEL SYSTEMS

Choke linkage bent

Check linkage, see  
FUEL SYSTEM

AA

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 specifi-  
cation, see TUNE-UP

Fast idle cam index  
incorrect

Reset fast idle cam  
index, see FUEL  
SYSTEMS

Vacuum leak

Inspect vacuum  
system for leaks

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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  
incorrect

Reset fast idle cam  
index, see FUEL  
SYSTEMS

Hot fast idle RPM too low

Reset fast idle RPM,  
see TUNE- UP

### HOT STARTING SYMPTOMS

#### BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

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

### COLD ENGINE DRIVEABILITY SYMPTOMS

#### 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

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	Fast idle cam index incorrect	Reset fast idle cam see FUEL SYSTEMS
AA		
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
AA		
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
AA		
Backfiring & Black Smoke	Plugged heat crossover system	Remove restriction
AA		

### WARM ENGINE DRIVEABILITY SYMPTOM

#### BASIC WARM ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

AA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AA		
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	Inspect and/or

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binding	replace rods, see FUEL SYSTEMS
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Carburetor idle or transfer system plugged	Inspect system and remove restriction
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Frozen or binding heated air inlet	Inspect heated air door for binding
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AA

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
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Defective fuel pump, lines or filter	Inspect pump, lines and filter
---	-----------------------------------

Air door setting incorrect	Adjust air door setting, see FUEL
----------------------------	--------------------------------------

AA

## CHARGING SYSTEM TROUBLE SHOOTING

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### BASIC CHARGING SYSTEM TROUBLE SHOOTING CHART

AA

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
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	Ignition circuit or switch malfunction	Check and replace as necessary
AA		
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 ALTERNATOR article
AA		
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
AA		
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
AA		
Lights or Fuses Burn Out Frequently	Defective alternator wiring	See On-Vehicle Tests in ALTERNATOR article
	Defective regulator	See Regulator Check in

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### ALTERNATOR article

Defective battery

Check and replace as necessary

AA

Ammeter Gauge      Loose or worn drive belt  
Shows Discharge

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

AA

Noisy                      Loose drive pulley  
Alternator

Tighten drive pulley attaching nut

Loose mounting bolts

Tighten all alternator mounting bolts

Worn or dirty bearings

See Bearing Replacement  
ALTERNATOR article

Defective diodes or stator

See Bench Test in ALTERNATOR article

AA

Battery Does              Loose or worn drive belt  
Stay Charged

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

See On- Vehicle Tests

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battery

and Bench Tests in  
ALTERNATOR article

Add-on electrical accessories    Install larger  
exceeding alternator capacity    alternator

AA

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

AA

## CLUTCH TROUBLE SHOOTING

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### BASIC CLUTCH TROUBLE SHOOTING CHART

AA

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

AA

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

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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
Incorrect clutch disc facing	Replace clutch disc
Engine loose in chassis	Tighten all mounting bolts
Failure to Release	
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

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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

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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

~~~~~

## COOLING SYSTEM TROUBLE SHOOTING

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#### COOLING SYSTEM TROUBLE SHOOTING

AA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AA		
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
	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
AA		
Corrosion	Impurities In Coolant	Clean/Flush System
AA		
Coolant Leakage	Damaged hose	Replace Hose
	Leaky Water Pump	Replace Water Pump

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Damaged Radiator Seam	Replace/Repair Radiator
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Leaky Thermostat Cover	Replace Thermostat Cover
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Cylinder Head Problem	Check Head/Head Gasket
-----------------------	------------------------

Leaky Freeze Plugs	Replace Freeze Plugs
--------------------	----------------------

AA

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

AA

No Heater Core Flow

Collapsed Heater Hose

Replace Heater Hose

Plugged Heater Core

Clean/Replace Heater  
Core

Faulty Heater Valve

Replace Heater Valve

AA

## DIESEL ENGINE TROUBLE SHOOTING

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**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

AA

CONDITION	POSSIBLE CAUSE	CORRECTION
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AA

Engine Won't Crank	Bad battery connections or dead batteries	Check connections and/or replace batteries
	Bad starter connections or bad starter	Check connections and/or replace

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

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	position	connections
Engines Starts/ Idles Rough W/out Smoke or Noise	Incorrect slow idle adjustment Injection line fuel leaks Fuel return system blocked Air in fuel system Incorrect or contaminated fuel Injector nozzle malfunction	Reset slow idle, see TUNE- UP Check lines and connections Check lines and connections 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	Remove restriction Replace EGR valve Remove restriction and/or replace components Replace filter Remove restriction

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### 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

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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

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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

**WARNING:** 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. For definitions of listed noises or sounds, see DRIVE AXLE - NOISE DIAGNOSIS.

#### DRIVE AXLE (RWD) TROUBLE SHOOTING

AA  
CONDITION POSSIBLE CAUSE CORRECTION  
AA

Knocking or Clunking

Differential Side Gear  
Clearance

Check Clearance

Worn Pinion Shaft

Replace Pinion Shaft

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Axle Shaft End Play                      Check End Play

Missing Gear Teeth                      Check Differential /  
Replace Gear

Wrong Axle Backlash                      Check Backlash

Misaligned Driveline                      Realign Driveline

AA

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

AA

Click/Chatter On Turns

Differential Side Gear  
Clearance                      Check Clearance

Wrong Turn On Plates (1)                      Replace Clutch Plates

Wrong Differential  
Lubricant (1)                      Change Lubricant

AA

Knock Or Click

Flat Spot on Rear  
Wheel Bearing                      Replace Wheel Bearing

AA

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.

AA

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### BASIC FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING CHART

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

### FUEL INJECTION TROUBLE SHOOTING

**WARNING:** 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 FUEL INJECTION TROUBLE SHOOTING CHART

AA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AA		
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

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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
---	---

AA

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
-----------------------------------	--

AA

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
---------------------------	--

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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

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**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.

## GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING

**WARNING:** 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 GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
Engine Lopes At Idle	Intake manifold-to-head leaks Blown head gasket  Worn timing gears, chain or sprocket Worn camshaft lobes  Overheated engine  Blocked crankcase vent valve Leaking EGR valve  Faulty fuel pump	Replace manifold gasket, See ENGINES Replace head gasket, See ENGINES Replace gears, chain or sprocket Replace camshaft, See ENGINES Check cooling system, See COOLING Remove restriction Repair leak and/or replace valve Replace fuel pump
Engine Has Low Power	Leaking fuel pump  Excessive piston-to-bore clearance Sticking valves or weak valve springs Incorrect valve timing  Worn camshaft lobes  Blown head gasket  Clutch slipping  Engine overheating	Repair leak and/or replace fuel pump Install larger pistons, See ENGINES Check valve train components, See ENGINES Reset valve timing, See ENGINES Replace camshaft, See ENGINES Replace camshaft, See ENGINES Adjust pedal and/or replace components, See ENGINES Check cooling system, See COOLING

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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
~~~~~		
External Oil Leakage	Excessive combustion chamber deposits	Remove built-up deposits
	Leaking, sticking or broken valves	Inspect and/or replace valves
	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
~~~~~		
Excessive Oil Consumption	Camshaft bearing drain hole blocked	Remove restriction
	Oil pressure sending switch leaking	Remove and reinstall sending switch
	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

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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

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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

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High Oil Pressure	Improper grade of oil	Replace with proper oil
	Oil pressure relief valve stuck closed	Eliminate binding
	Oil pressure sender or	Replace sender or gauge

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gauge faulty

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Noisy Main Bearings	Inadequate oil supply	Check oil delivery to main bearings
	Excessive main bearing clearance	Replace main bearings, See ENGINES
	Excessive crankshaft end play	Replace crankshaft, See ENGINES
	Loose flywheel or torque converter	Tighten attaching bolts
	Loose or damaged vibration damper	Tighten or replace vibration damper
	Crankshaft journals out-of-round	Re-grind crankshaft journals
	Excessive belt tension	Loosen belt tension

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Noisy Connecting Rods	Excessive bearing clearance or missing bearing	Replace bearing, See ENGINES
	Crankshaft rod journal out-of-round	Re-grind crankshaft journal
	Misaligned connecting rod or cap	Remove rod or cap and realign
	Incorrectly tightened rod bolts	Remove and re-tighten rod bolts

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Noisy Pistons and Rings	Excessive piston-to-bore clearance	Install larger pistons, See ENGINES
	Bore tapered or out-of-round	Rebore block
	Piston ring broken	Replace piston rings, See ENGINES
	Piston pin loose or seized	Replace piston pin, See ENGINES
	Connecting rods misaligned	Realign connecting rods
	Ring side clearance too loose or tight	Replace with larger or smaller rings
	Carbon build-up on piston	Remove carbon

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Noisy Valve Train	Worn or bent push rods	Replace push rods, See ENGINES
	Worn rocker arms or bridged pivots	Replace push rods, See ENGINES
	Dirt or chips in valve lifters	Remove lifters and remove dirt/chips
	Excessive valve lifter leak-down	Replace valve lifters, See ENGINES
	Valve lifter face worn	Replace valve lifters, See ENGINES
	Broken or cocked valve springs	replace or reposition springs
	Too much valve stem-to-guide clearance	Replace valve guides, See ENGINES
	Valve bent	Replace valve, See

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		ENGINES
Loose rocker arms		Retighten rocker arms, See ENGINES
Excessive valve seat run-out		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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Broken Pistons/Rings	Undersize pistons	Replace with larger pistons, See ENGINES
	Wrong piston rings	Replace with correct rings, See ENGINES

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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 cracked or broken	Replace exhaust manifold, See ENGINES

## HEATER SYSTEM TROUBLE SHOOTING

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### BASIC HEATER SYSTEM TROUBLE SHOOTING CHART

CONDITION	POSSIBLE CAUSE
-----------	----------------

Insufficient, Erratic, or No Heat

- ù Low Coolant Level
- ù Incorrect thermostat.
- ù Restricted coolant flow through heater core.
- ù Heater hoses plugged.
- ù Misadjusted control cable.
- ù Sticking heater control valve.
- ù Vacuum hose leaking.
- ù Vacuum hose blocked.
- ù Vacuum motors inoperative.
- ù Blocked air inlet.
- ù Inoperative heater blower motor.
- ù Oil residue on heater core fins.
- ù Dirt on heater core fins.

Too Much Heat

- ù Improperly adjusted cables.
- ù Sticking heater control valve.
- ù No vacuum to heater control valve.

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ù Temperature door stuck open.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Air Flow Changes During

Acceleration

ù Vacuum system leak.

ù Bad check valve or reservoir.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Air From Defroster At All

Times

ù Vacuum system leak.

ù Improperly adjusted control cables.

ù Inoperative vacuum motor.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Blower Does Not Operate

Correctly

ù Blown fuse.

ù Blower motor windings open.

ù Resistors burned out.

ù Motor ground connection loose.

ù Wiring harness connections loose.

ù Blower motor switch inoperative.

ù Blower relay inoperative.

ù Fan binding or foreign object  
in housing.

ù Fan blades broken or bent.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## IGNITION SYSTEM TROUBLE SHOOTING

PLEASE READ THIS FIRST:

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## IGNITION SECONDARY TROUBLE SHOOTING CHART

ÚAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA¿

3 START: Visually inspect Spark Plug Wires, Coil Wires, 3

3 Plug Wire Boots, Rotor, and Distributor Cap for 3

3 signs of damage. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAÙ

ÚAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA¿

ÚAAAA¿

3 OK 3

AAAAÙ

ÚAAAA¿

3 NOT OK 3

AAAAÙ

ÚAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA¿

3 \* To test secondary ignition 3

3 system, modify a Spark Plug 3

3 by attaching a ground wire 3

3 to the body of the plug and 3

ÚAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA¿

3 \* Repair or replace 3

3 damaged components 3

3 as necessary 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAÙ

3 \* Check for battery voltage 3  
3 at the positive terminal of 3  
3 the coil. 3

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

OK

AAAAA

AAAAA

NOT OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Check air Gap of the Pick-Up coil in the distributor.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Check resistance of ballast resistor (if used) for the correct resistance value.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Check Pick-Up coil for correct resistance value.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

NOT OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Adjust or replace as necessary.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

NOT OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Replace Pick-Up coil if not to specification.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Check control module for good ground connections.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* If vehicle fails to run at this point, go to the appropriate article in the ENGINE PERFORMANCE section.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

OK

AAAAA

AAAAA

NOT OK

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Check wires from the battery/ignition switch to the coil.

Also check the coil primary and secondary resistance.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

\* Replace ballast resistor if the measured resistance

value is not within specification.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## MANUAL STEERING GEAR 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 MANUAL STEERING GEAR TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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 knuckles	Tighten and check 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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Poor Returnability	Excessive Pitman shaft-to- ball nut lash	Repair as necessary
	Lack of lubricant in ball joint or linkage	Lubricate and service systems

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Binding in linkage or ball joints	See STEERING LINKAGE and SUSPENSION article
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Improper front end alignment	See WHEEL ALIGNMENT article
------------------------------	-----------------------------

Improper tire pressure	Inflate to proper pressure
------------------------	----------------------------

Tie rod binding	Inflate to proper pressure
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Shaft seal rubbing shaft	See STEERING COLUMN article
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Excessive Vertical Motion	Improper tire pressure	Inflate to proper pressure
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Tires, wheels or rotors out of balance	Balance tires then check wheels and rotors
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Worn or faulty shock absorbers	Check and replace if necessary
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Loose tie rod ends or steering	Tighten or replace if necessary
--------------------------------	---------------------------------

Loose or worn wheel bearings	See SUSPENSION article
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Steering Pulls to One Side	Improper tire pressure	Inflate to proper pressure
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Front tires are different sizes	Rotate or replace if necessary
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Wheel bearings not adjusted properly	See FRONT SUSPENSION article
--------------------------------------	------------------------------

Bent or broken suspension components	See FRONT SUSPENSION article
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Improper wheel alignment	See WHEEL ALIGNMENT article
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Brakes dragging	See BRAKES article
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Instability	Low or uneven tire pressure	Inflate to proper pressure
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## TROUBLE SHOOTING - BASIC PROCEDURES

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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

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## POWER STEERING TROUBLE SHOOTING

**WARNING:** 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 POWER STEERING TROUBLE SHOOTING CHART

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CONDITION	POSSIBLE CAUSE	CORRECTION
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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

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Loose sector shaft or thrust bearing adjustment	See POWER STEERING GEAR
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Free play in pot coupling	See STEERING COLUMN article
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Worn shaft serrations	See STEERING COLUMN article
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Growl in Steering Pump	Excessive pressure in hoses	Restricted hoses, see POWER STEERING GEAR article
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Scored pressure plates	See POWER STEERING GEAR article
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Scored thrust plates or rotor	See POWER STEERING GEAR article
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Extreme wear of cam ring	See POWER STEERING GEAR article
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Rattle in Steering Pump	Vanes not installed	See POWER STEERING PUMP article
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Vanes sticking in rotor	See POWER STEERING PUMP article
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Swish noise in Pump	Defective flow control valve	See POWER STEERING PUMP article
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Groan in Steering Pump	Air in fluid	See POWER STEERING PUMP article
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Poor pressure hose connection	Tighten and check, replace if necessary
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Squawk When Turning	Damper "O" ring on valve spool cut	See POWER STEERING PUMP article
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Moan or Whine in Pump	Pump shaft bearing scored	Replace bearing and fluid
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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
-----------------------------------	---------------------------------

## TROUBLE SHOOTING - BASIC PROCEDURES

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Valve cover baffle missing or damaged	See <b>POWER STEERING PUMP</b> article
------------------------------------------	-------------------------------------------

Interference of components in pump	See <b>POWER STEERING PUMP</b> article
---------------------------------------	-------------------------------------------

Loose or poor bracket alignment	Correct or replace if necessary
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Hissing When Parking	Internal leakage in steering gear	Check valved assembly first
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Chirp in Steering Pump	Loose or worn power steering belt	Adjust or replace if necessary
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Buzzing When Not Steering	Noisy pump	See <b>POWER STEERING PUMP</b> article
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Free play in steering shaft bearing	See <b>STEERING COLUMN</b> article
----------------------------------------	---------------------------------------

Bearing loose on shaft serrations	See <b>STEERING COLUMN</b> article
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Clicking Noise in Pump	Pump slippers too long	See <b>POWER STEERING PUMP</b> article
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Broken slipper springs	See <b>POWER STEERING PUMP</b> article
------------------------	-------------------------------------------

Excessive wear or nicked rotors	See <b>POWER STEERING PUMP</b> article
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Damaged cam contour	See <b>POWER STEERING PUMP</b> article
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Poor Return of Wheel	Wheel rubbing against turn signal	See <b>STEERING COLUMN</b> <b>SWITCHES</b> article
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Flange rubbing steering gear adjuster	See <b>STEERING COLUMN</b> article
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Tight or frozen steering shaft bearing	See <b>STEERING COLUMN</b> article
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Steering gear out of adjustment	See <b>POWER STEERING GEAR</b> article
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Sticking or plugged spool valve	See <b>POWER STEERING PUMP</b> article
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Improper front end	See <b>WHEEL ALIGNMENT</b>
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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
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
Increased Effort When Turning	High internal pump leakage
Wheel Fast	Power steering pump belt slipping
Foaming, Milky Power Steering Fluid, Low Fluid Level or Low Pressure	Low fluid level
	See POWER STEERING PUMP article
	Adjust or replace if necessary
	Check and fill to proper level

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Engine idle speed to 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

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      See POWER STEERING GEAR

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adjustment

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

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No Power When  
Parking

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

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No Power,  
Left Turn

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

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Right turn reaction seal "O" ring worn	See POWER STEERING GEAR article
-------------------------------------------	------------------------------------

Right turn reaction seal damaged	See POWER STEERING GEAR article
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Internal leakage through piston end plug	See POWER STEERING GEAR article
---------------------------------------------	------------------------------------

Internal leakage through side plugs	See POWER STEERING GEAR article
----------------------------------------	------------------------------------

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Lack of Effort in Turning	Left and/or right reaction seal sticking in cylinder head	Replace, see POWER STEERING GEAR article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Wanders to One Side	Front end alignment incorrect	See WHEEL ALIGNMENT article

Unbalanced steering gear valve	See POWER STEERING GEAR article
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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
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Cracked/broken thrust or pressure plate	See POWER STEERING PUMP article
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## STARTER TROUBLE SHOOTING

**WARNING:** 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,

## TROUBLE SHOOTING - BASIC PROCEDURES

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refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### 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
Starter Does Not Operate and Headlights Dim	Open solenoid pull-in wire	See Testing in STARTER article
	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
Starter Turns but Engine Does Not Rotate	Armature rubbing on pole shoes	See STARTER article
	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

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gear damage

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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
------------------------------------------	------------------------------------------------------

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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
---------------------------------------------------------------	---------------------

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Burned solenoid contacts      Replace solenoid

Faulty starter      Replace starter

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Starter Engages      Engine timing too far      See Ignition Timing in  
Engine Only      advanced      TUNE-UP article  
Momentarily

Overrunning clutch not      Replace overrunning  
engaging properly      clutch. See STARTER  
article

Broken starter clutch      See STARTER article

Broken teeth on engine      Replace flywheel and  
flywheel      check starter pinion  
gear for damage

Weak drive assembly      See STARTER article  
thrust spring

Weak hold-in coil      See Bench Tests in  
STARTER article

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Starter Drive      Defective point assembly      See Testing in STARTER  
Will Not Engage      article

Poor point assembly ground      See Testing in STARTER  
article

Defective pull-in coil      Replace starter  
solenoid

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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      Replace neutral safety  
faulty      switch

Starter relay faulty      Replace starter relay

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Starter Drive      Starter motor loose on      Tighten starter  
Will Not      mountings      attach bolts  
Disengage

Worn drive end bushing      See STARTER article

Damaged engine flywheel      Replace flywheel and  
teeth      starter pinion gear for  
damage

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Drive yolk return spring broken or missing	Replace return spring
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Faulty ignition switch	Replace ignition switch
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Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid	Replace starter solenoid
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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
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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
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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
---------------------------------------------------------------------------------------------	--------------------------------------------------------	-------------------------------------------------------------------------

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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

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### STEERING COLUMN TROUBLE SHOOTING

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#### BASIC STEERING COLUMN TROUBLE SHOOTING CHART

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CONDITION	POSSIBLE CAUSE	CORRECTION
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Noise in Steering	Coupling pulled apart	See STEERING COLUMNS article
	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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
High Steering Shaft Effort	Column assembly misaligned	See STEERING COLUMN article

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Improperly installed dust shield Adjust or replace shield

Tight steering universal joint See STEERING COLUMN article

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High Shift Column is out of alignment See STEERING COLUMN article

Effort

Improperly installed dust shield Adjust or replace shield

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 adjustment of shift levers See STEERING COLUMN article

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Improper Trans. Sheared shift tube joint Replace as necessary

Shifting

Sheared lower shaft lever Replace as necessary

Improper shift lever adjustment See STEERING COLUMN article

Improper gate plate adjustment See STEERING COLUMN article

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Excess Play in Instrument panel bracket Tighten bolts and check Column bolts loose 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

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Steering Locks Release lever mechanism See STEERING COLUMN

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in Gear

article

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### SUSPENSION TROUBLE SHOOTING

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#### BASIC SUSPENSION TROUBLE SHOOTING CHART

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CONDITION	POSSIBLE CAUSE	CORRECTION
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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
	Loose or worn wheel bearings	See WHEEL ALIGNMENT
	Loose or worn tie rod ends	See SUSPENSION

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**Worn or missing interliners See SUSPENSION**

[illegible]

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### Article Text (p. 54)

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Shock Absorber Noise	Loose shock mountings	Check & tighten mountings
	Worn bushings	Replace bushings
	Air in system	Bleed air from system
	Undercoating on shocks	Remove undercoating
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Shock Absorbers Leaking	Worn seals or reservoir tube crimped	See SUSPENSION
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Broken Springs	Loose "U" bolts	See SUSPENSION
	Inoperative shock absorbers	Replace shock absorbers
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

## TUNE-UP TROUBLE SHOOTING - GAS ENGINE VEHICLES

PLEASE READ THIS FIRST:

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### SPARK PLUG DIAGNOSIS

#### BASIC SPARK PLUG TROUBLE SHOOTING CHARTS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Normal Spark Plug Condition	Light Tan or Gray deposits	No Action
	Electrode not burned or fouled	No Action
	Gap tolerance not changed	No Action
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Cold Fouling or Carbon Deposits	Overrich air/fuel mixture	Adjust air/fuel mixture, see ENGINE

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#### 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
---------------	----------------

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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

### ELECTRONIC IGNITION DIAGNOSIS

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  
ignition switch

Repair circuit

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

## TROUBLE SHOOTING - BASIC PROCEDURES

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	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

## ELECTRONIC IGNITION DIAGNOSIS BY OSCILLOSCOPE PATTERN

### 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

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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		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
One or More, But Not All Firing Voltage Lines Are Lower Than Others	Curb 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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	

DRIVEABILITY PROBLEMS TROUBLE SHOOTING

BASIC DRIVEABILITY PROBLEMS TROUBLE SHOOTING TABLE

## TROUBLE SHOOTING - BASIC PROCEDURES

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
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

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Dieseling	Binding carburetor linkage	Eliminate binding
	Binding throttle linkage	Eliminate binding
	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
	Engine cold and choke too lean	Adjust choke and allow engine to warm-up
	Defective spark plugs	Replace spark plugs
	Defective coil	Replace coil

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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

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Faulty High Speed Operation	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
	Defective distributor centrifugal advance	Replace advance mechanism

## **TROUBLE SHOOTING - BASIC PROCEDURES**

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Defective distributor vacuum advance	Replace advance unit
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Incorrect spark plugs or plug gap	Check gap and/or replace spark plugs
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Faulty choke operation	Check choke and repair as required
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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
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Misfire at All Speeds	Defective spark plugs	Replace spark plugs
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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
--------------	---------------------

Hesitation	Fuel lines clogged	Remove restriction
------------	--------------------	--------------------

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
------------------------	----------------------------------

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	Cracked or broken ignition wires	Replace ignition wires
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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
	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

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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	Check operation and

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vacuum advance malfunction      replace as necessary

Carburetor setting too lean      Readjust mixture  
setting, see ENGINE  
PERFORMANCE

Vacuum leak      Eliminate vacuum leak

EGR valve malfunction      Replace EGR valve

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Poor Gasoline      Cracked or broken vacuum      Replace vacuum hoses  
Mileage      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      Eliminate binding  
piston

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

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Engine Stalls      Improper float level      Readjust float level

Leaking needle valve and      Replace needle valve  
seat      and seat

Vacuum leaks      Eliminate vacuum  
leaks

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## VACUUM PUMP - DIESEL TROUBLE SHOOTING

**WARNING:** 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

# TROUBLE SHOOTING - BASIC PROCEDURES

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

### WHEEL ALIGNMENT TROUBLE SHOOTING

WARNING: 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 Front alignment out of tolerance Suspension components worn Steering system components worn Improper standing height Uneven or sagging springs	Check tire pressure See ALIGNMENT SPECS in WHEEL ALIGNMENT section See SUSPENSION section See STEERING section See WHEEL ALIGNMENT See SUSPENSION section

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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
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
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

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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

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

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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

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Power steering reaction      See STEERING section  
Bracket loose

Steering gear box (rack)      See STEERING section  
mounting loose

Steering gear adjustment      See STEERING section  
loose

Worn spherical joints      See SUSPENSION section

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Toe-In Not      Lower control arm bent      See SUSPENSION section  
Adjustable

Frame bent      Check frame for damage  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Camber Not      Control arm bent      See SUSPENSION section  
Adjustable

Frame bent      Check frame for damage

Hub & bearing not seated      See SUSPENSION section  
properly

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

END OF ARTICLE