

Wednesday, March 22, 2000 09:25PM

## TROUBLE SHOOTING - BASIC PROCEDURES

### Article Text (p. 2)

1993 Volkswagen Corrado

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## BRAKE SYSTEM 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.

### 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
	Loose suspension parts	See SUSPENSION

AA

Noises Without Brakes Applied	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
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	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
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Rear drums out-of-round	Reface or replace drums
-------------------------	-------------------------

Disc pad reversed, steel against rotor	Remove and reinstall pad
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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 or BRAKE SYSTEM
-----------------------------	--------------------------------------

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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 specif-  
ication, 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

AA

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

AA

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

AA

## HOT STARTING SYMPTOMS

### BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

AA

CONDITION

POSSIBLE CAUSE

CORRECTION

AA

Engine Won't  
Start

Engine flooded

Allow fuel to  
evaporate

AA

## COLD ENGINE DRIVEABILITY SYMPTOMS

### BASIC COLD ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

AA

CONDITION

POSSIBLE CAUSE

CORRECTION

AA

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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Reset fast idle cam  
see FUEL SYSTEMS

Acceleration Sag  
or Stall

Replace choke  
control switch

Reset choke vacuum  
kick see, FUEL  
SYSTEMS

Adjust float level,  
FUEL SYSTEMS

Repair or replace  
pump see FUEL  
SYSTEMS

Inspect lockout  
adjustment, see FUEL  
SYSTEMS

Sag or Stall  
After Warmup

Replace choke  
control switch, see  
FUEL SYSTEMS

Replace pump, see  
FUEL SYSTEMS

Adjust float level,  
see FUEL SYSTEMS

## Backfiring & Black Smoke

Remove restriction

## WARM ENGINE DRIVEABILITY SYMPTOM

[illegible]

## CORRECTION

## Hesitation With Small Amount of Gas Pedal Movement

Inspect vacuum lines

Replace pump, see  
FUEL SYSTEMS

Reset float level,  
see,FUEL SYSTEMS

Inspect and/or  
replace rods, see

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#### FUEL SYSTEMS

Carburetor idle or transfer system plugged	Inspect system and remove restriction
--	---------------------------------------

Frozen or binding heated air inlet	Inspect heated air door for binding
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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
-----------------------------	-------------------------------------

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

AA

Vehicle Will Not Start	Dead battery	Check battery cells, alternator belt tension and alternator output
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Loose or corroded battery connections	Check all charging system connections
---------------------------------------	---------------------------------------

Ignition circuit or switch	Check and replace as
----------------------------	----------------------



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malfunction		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 ALTERNATOR article

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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 battery

See On-Vehicle Tests and Bench Tests in

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#### ALTERNATOR article

Add-on electrical accessories    Install larger  
exceeding alternator capacity    alternator

AA

Battery	Defective battery	Check alternator
Overcharged-		output and repair as
Uses Too Much		necessary
Water		

Defective alternator	See On-Vehicle Test and Bench Tests in ALTERNATOR article
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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
	Loose/bent clutch disc	Replace clutch disc

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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

AA

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

AA

Rattling	Weak or broken release lever spring	Replace spring and check alignment
	Damaged pressure plate	Replace pressure plate

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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

AA

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

AA

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

AA

Noisy

Dry release bearing

Lubricate or replace  
release bearing

Dry or worn pilot bearing

Lubricate or replace  
bearing

Worn input shaft bearing

Replace bearing

AA

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

AA

## 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
	Damaged Radiator Seam	Replace/Repair Radiator

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Leaky Thermostat Cover

Replace Thermostat  
Cover

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

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.

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

AA

Engine Won't

Bad battery connections  
or dead batteries

Check connections  
and/or replace  
batteries

Crank

Bad starter connections  
or bad starter

Check connections  
and/or replace  
batteries



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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 position	Check solenoid and connections
--	---	-----------------------------------

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AA

Engines Starts/	Incorrect slow idle	Reset slow idle, see
Idles Rough W/out	adjustment	TUNE-UP
Smoke or Noise	Injection line fuel leaks	Check lines and
		connections
	Fuel return system blocked	Check lines and
		connections
	Air in fuel system	Bleed air from system
	Incorrect or contaminated	Replace fuel
	fuel	
	Injector nozzle malfunction	Check nozzles, see
		FUEL SYSTEMS

AA

Engines Starts	Injection pump timing	Reset pump timing, see
and Idles Rough	incorrect	FUEL SYSTEMS
W/out Smoke or	Engine not fully broken in	Put more miles on
Noise, But Clears		engine
After Warm-Up	Air in system	Bleed air from system
	Injector nozzle malfunction	Check nozzles, see
		FUEL SYSTEMS

AA

Engine Idles	Blocked fuel filter	Replace fuel filter
Correctly,	Injection pump timing	Reset pump timing, see
Misfires Above	incorrect	FUEL SYSTEMS
Idle	Incorrect or contaminated	Replace fuel
	fuel	

AA

Engine Won't	Fast idle adjustment	Reset fast idle, see
Return To Idle	incorrect	TUNE-UP
	Internal injection pump	Replace injection pump,
	malfunction	see FUEL SYSTEMS
	External linkage binding	Check linkage and
		remove binding

AA

Fuel Leaks On	Loose or broken fuel line	Check lines and
Ground		connections
	Internal injection pump	Replace injection pump,
	seal leak	see FUEL SYSTEMS

AA

Cylinder	Injector nozzles sticking	Test injectors, see
Knocking Noise	open	FUEL SYSTEMS
	Very low nozzle opening	Test injectors and/or
	pressure	replace

AA

Loss of Engine	Restricted air intake	Remove restriction
Power	EGR valve malfunction	Replace EGR valve
	Blocked or damaged exhaust	Remove restriction
	system	and/or replace
		components
	Blocked fuel tank filter	Replace filter
	Restricted fuel filter	Remove restriction
		and/or replace filter

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Excessive Noise	Loose pump-to-drive assembly screws	Tighten screws
	Loose tube on pump assembly	Tighten tube
	Valves not functioning properly	Replace valves

Seal

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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 damaged or scored badly, the gear set must be replaced. If metal has

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broken loose, the carrier and housing must be cleaned to remove particles that could cause damage.

#### **KNOCK**

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

#### **CLUNK**

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

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

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

3) Measure the length of the chalk mark, which is the total axle backlash. If backlash is one inch or less, drive axle is not the source of clunk noise.

#### **BEARING WHINE**

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

#### **BEARING RUMBLE**

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

#### **CHATTER ON TURNS**

This is a condition where the entire front or rear of vehicle vibrates when vehicle is moving. The vibration is plainly felt as well

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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

CONDITION	POSSIBLE CAUSE	CORRECTION
Knocking or Clunking	Differential Side Gear Clearance	Check Clearance
	Worn Pinion Shaft	Replace Pinion Shaft
	Axle Shaft End Play	Check End Play

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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

## FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING

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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 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

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#### 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
Low fuel pressure		Test pressure regul-



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ator 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

Open coolant temperature

Test sensor and

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[illegible]

Check for engine overheating problems	Low coolant, loose belts or electric cooling fan inoperative
--	---

[illegible]

NOTE: For additional electronic fuel injection trouble shooting information, see the appropriate article in the ENGINE PERFORMANCE section (not all vehicles have Computer Engine

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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

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

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regulator valve faulty	Replace pressure regulator valve
Auto. Trans. fluid level too low	Add fluid as necessary
Improper vacuum diverter valve operation	Replace vacuum diverter valve
Vacuum leaks	Inspect vacuum system and repair as required
Leaking piston rings	Replace piston rings, See ENGINES

AA

Faulty High Speed Operation	Low fuel pump volume	Replace fuel pump
	Leaking valves or worn	Replace valves and/or springs, See ENGINES
	Incorrect valve timing	Reset valve timing, See ENGINES
	Intake manifold restricted	Remove restriction
	Worn distributor shaft	Replace distributor

AA

Faulty Acceleration	Improper fuel pump stroke	Remove pump and reset pump stroke
	Incorrect ignition timing	Reset ignition timing, See TUNE-UP
	Leaking valves	Replace valves, See ENGINES
	Worn fuel pump diaphragm or piston	Replace diaphragm or piston

AA

Intake Backfire	Improper ignition timing	Reset ignition timing, See TUNE-UP
	Faulty accelerator pump discharge	Replace accelerator pump
	Improper choke operation	Check choke and adjust as required
	Defective EGR valve	Replace EGR valve
	Fuel mixture too lean	Reset air/fuel mixture, See TUNE-UP
	Choke valve initial clearance too large	Reset choke valve initial clearance

AA

Exhaust Backfire	Vacuum leak	Inspect and repair vacuum system
	Faulty vacuum diverter valve	Replace vacuum diverter valve
	Faulty choke operation	Check choke and adjust as required
	Exhaust system leak	repair exhaust system leak

AA

Engine	Ignition timing too far	Reset ignition timing,
--------	-------------------------	------------------------

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Detonation	advanced	See TUNE-UP
	Faulty ignition system	Check ignition timing, See TUNE-UP
	Spark plugs loose or faulty	Retighten or replace plugs
	Fuel delivery system clogged	Inspect lines, pump and filter for clog
	EGR valve inoperative	Replace EGR valve
	PCV system inoperative	Inspect and/or replace hoses or valve
	Vacuum leaks	Check vacuum system and repair leaks
	Excessive combustion chamber deposits	Remove built-up deposits
	Leaking, sticking or broken valves	Inspect and/or replace valves
AA		
External Oil Leakage	Fuel pump improperly seated or worn gasket	Remove pump, replace gasket and seat properly
	Oil pan gasket broken or pan bent	Straighten pan and replace gasket
	Timing chain cover gasket broken	Replace timing chain cover gasket
	Rear main oil seal worn	Replace rear main oil seal
	Oil pan drain plug not seated properly	Remove and reinstall drain plug
	Camshaft bearing drain hole blocked	Remove restriction
	Oil pressure sending switch leaking	Remove and reinstall sending switch
	AA	
	Worn valve stems or guides	Replace stems or guides, See ENGINES
	Valve "O" ring seals damaged	Replace "O" ring seals, See ENGINES
Excessive Oil Consumption	Plugged oil drain back holes	Remove restrictions
	Improper PCV valve operation	Replace PCV valve
	Engine oil level too high	Remove excess oil
	Engine oil too thin	Replace thicker oil
	Valve stem oil deflectors damaged	Replace oil deflectors
	Incorrect piston rings	Replace piston rings, See ENGINES
	Piston ring gaps not staggered	Reinstall piston rings, See ENGINES
	Insufficient piston ring tension	Replace rings, See ENGINES
	Piston ring grooves or oil	Replace piston rings,

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return slots clogged	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

AA

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

AA

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

AA

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

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AA

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

AA

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

AA

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

AA

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 ENGINES

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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

AA

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

AA

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

AA

Broken Pistons/Rings	Undersize pistons	Replace with larger pistons, See ENGINES
	Wrong piston rings	Replace with correct rings, See ENGINES
	Out-of-round cylinder bore	Re-bore cylinder bore



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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

AA

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

AA

## HEATER SYSTEM TROUBLE SHOOTING

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### BASIC HEATER SYSTEM TROUBLE SHOOTING CHART

AA

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.

AA

Too Much Heat	ù Improperly adjusted cables.
	ù Sticking heater control valve.
	ù No vacuum to heater control valve.
	ù Temperature door stuck open.

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AA

Air Flow Changes During

Acceleration

ù Vacuum system leak.

ù Bad check valve or reservoir.

AA

Air From Defroster At All

Times

ù Vacuum system leak.

ù Improperly adjusted control cables.

ù Inoperative vacuum motor.

AA

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.

AA

## IGNITION SYSTEM TROUBLE SHOOTING

PLEASE READ THIS FIRST:

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## IGNITION SECONDARY TROUBLE SHOOTING CHART

ÜAAÄ;

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

AAÜ

ÜAAÄ;

ÜÄÄÄÄ;

³ OK ³

ÄÄÄÄÜ

ÜAAÄ;

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  
³ widening the gap to 1/4-3/8". ³

ÜÄÄÄÄÄÄ;

³ NOT OK ³

ÄÄÄÄÄÄÜ

ÜAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAÄ;

³ \* Repair or replace ³  
³ damaged components ³  
³ as necessary ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAÜ

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3 Disconnect spark plug wire 3  
3 and insert test plug. Ground 3  
3 plug, crank engine, and 3  
3 check for spark. 3

AAUU

UAAA;

UAAAAAAAAAA;

3 GOOD SPARK 3

AAAAAAAAAAUU

UAAA;

3 \* If plug sparks, driveability 3  
3 problem is most likely NOT 3  
3 in the ignition system. 3

AAUU

UAAA;

UAAAAAAAAAA;

3 GOOD SPARK 3

AAAAAAAAAAUU

UAAA;

3 \* If plug has a good spark, 3  
3 the problem is in the plug 3  
3 wires, distributor cap, or 3  
3 rotor. Replace components 3  
3 as necessary. 3

AAUU

UAAAAAAAAAA;

3 NO SPARK 3

AAAAAAAAAAUU

UAAA;

3 \* Remove coil wire from the 3  
3 distributor and attach the 3  
3 modified spark plug. Ground 3  
3 the plug and crank engine 3  
3 while checking for spark. 3

AAUU

UAAAAAAAAAA;

3 NO SPARK 3

AAAAAAAAAAUU

UAAA;

3 \* Proceed to the IGNITION 3  
3 PRIMARY TROUBLE SHOOTING 3  
3 CHECK CHART below in this 3  
3 article. 3

AAUU

### IGNITION PRIMARY TROUBLE SHOOTING CHART

UAAA;

3 START: Visually inspect primary ignition wires for 3  
3 broken, frayed, split, or cut wires. Also check 3  
3 for loose, corroded, or disconnected connectors. 3

AAUU

UAAA;

UAAA;

3 OK 3

AAAAUU

UAAAAAAAA;

3 NOT OK 3

AAAAUU

UAAA;

3 \* Check that battery voltage 3  
3 is at least 11.5 volts. 3

AAUU

UAAA;

3 \* Repair or replace damaged 3  
3 components as necessary. 3

AAUU

UAAA;

UAAAA;

3 NOT OK 3

AAAAUU

UAAA;

3 OK 3

AAAAUU

UAAA;

3 \* Replace or recharge the 3  
3 battery. 3

AAUU

UAAA;

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

AAUU



## TROUBLE SHOOTING - BASIC PROCEDURES

### Article Text (p. 37)

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refer to SUBJECT, DIAGNOSTIC, or TESTING articles available  
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#### BASIC MANUAL STEERING GEAR TROUBLE SHOOTING CHART

AA

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

AA

Rattle or Chuckling 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
--	---------------------------------------	-------------------------------

AA

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

	Excessive Pitman shaft-to- ball nut lash	Repair as necessary
--	---	---------------------

AA

Poor Returnability	Lack of lubricant in ball joint or linkage	Lubricate and service systems
-----------------------	---	----------------------------------

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### Article Text (p. 38)

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Binding in linkage or ball joints	See STEERING LINKAGE and SUSPENSION article
-----------------------------------	---

Improper front end alignment	See WHEEL ALIGNMENT article
------------------------------	-----------------------------

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

Tie rod binding	Inflate to proper pressure
-----------------	----------------------------

Shaft seal rubbing shaft	See STEERING COLUMN article
--------------------------	-----------------------------

AA

Excessive Vertical Motion	Improper tire pressure	Inflate to proper pressure
---------------------------	------------------------	----------------------------

Tires, wheels or rotors out of balance	Balance tires then check wheels and rotors
--	--

Worn or faulty shock absorbers	Check and replace if necessary
--------------------------------	--------------------------------

Loose tie rod ends or steering	Tighten or replace if necessary
--------------------------------	---------------------------------

Loose or worn wheel bearings	See SUSPENSION article
------------------------------	------------------------

AA

Steering Pulls to One Side	Improper tire pressure	Inflate to proper pressure
----------------------------	------------------------	----------------------------

Front tires are different sizes	Rotate or replace if necessary
---------------------------------	--------------------------------

Wheel bearings not adjusted properly	See FRONT SUSPENSION article
--------------------------------------	------------------------------

Bent or broken suspension components	See FRONT SUSPENSION article
--------------------------------------	------------------------------

Improper wheel alignment	See WHEEL ALIGNMENT article
--------------------------	-----------------------------

Brakes dragging	See BRAKES article
-----------------	--------------------

AA

Instability	Low or uneven tire pressure	Inflate to proper pressure
-------------	-----------------------------	----------------------------

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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

AA

## 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

AA

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

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thrust bearing adjustment

Free play in pot coupling      See STEERING COLUMN  
article

Worn shaft serrations      See STEERING COLUMN  
article

AA

Growl in      Excessive pressure in      Restricted hoses, see  
Steering Pump      hoses      POWER STEERING GEAR  
article

Scored pressure plates      See POWER STEERING GEAR  
article

Scored thrust plates or      See POWER STEERING GEAR  
rotor      article

Extreme wear of cam ring      See POWER STEERING GEAR  
article

AA

Rattle in      Vanes not installed      See POWER STEERING PUMP  
Steering Pump      article

Vanes sticking in rotor      See POWER STEERING PUMP  
article

AA

Swish noise in      Defective flow control      See POWER STEERING PUMP  
Pump      valve      article

AA

Groan in      Air in fluid      See POWER STEERING PUMP  
Steering Pump      article

Poor pressure hose      Tighten and check,  
connection      replace if necessary

AA

Squawk When      Damper "O" ring on valve      See POWER STEERING PUMP  
Turning      spool cut      article

AA

Moan or Whine      Pump shaft bearing scored      Replace bearing and  
in Pump      fluid

Air in fluid or fluid      See POWER STEERING PUMP  
level low      article

Hose or column grounded      Check and replace if  
necessary

Cover "O" ring missing      See POWER STEERING PUMP  
or damaged      article

Valve cover baffle      See POWER STEERING PUMP



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missing or damaged	article
Interference of components in pump	See POWER STEERING PUMP article

Loose or poor bracket alignment	Correct or replace if necessary
---------------------------------	---------------------------------

AA

Hissing When Parking	Internal leakage in steering gear	Check valved assembly first
----------------------	-----------------------------------	-----------------------------

AA

Chirp in Steering Pump	Loose or worn power steering belt	Adjust or replace if necessary
------------------------	-----------------------------------	--------------------------------

AA

Buzzing When Not Steering	Noisy pump	See POWER STEERING PUMP article
---------------------------	------------	---------------------------------

Free play in steering shaft bearing	See STEERING COLUMN article
-------------------------------------	-----------------------------

Bearing loose on shaft serrations	See STEERING COLUMN article
-----------------------------------	-----------------------------

AA

Clicking Noise in Pump	Pump slippers too long	See POWER STEERING PUMP article
------------------------	------------------------	---------------------------------

Broken slipper springs	See POWER STEERING PUMP article
------------------------	---------------------------------

Excessive wear or nicked rotors	See POWER STEERING PUMP article
---------------------------------	---------------------------------

Damaged cam contour	See POWER STEERING PUMP article
---------------------	---------------------------------

AA

Poor Return of Wheel	Wheel rubbing against turn signal	See STEERING COLUMN SWITCHES article
----------------------	-----------------------------------	--------------------------------------

Flange rubbing steering gear adjuster	See STEERING COLUMN article
---------------------------------------	-----------------------------

Tight or frozen steering shaft bearing	See STEERING COLUMN article
--	-----------------------------

Steering gear out of adjustment	See POWER STEERING GEAR article
---------------------------------	---------------------------------

Sticking or plugged spool valve	See POWER STEERING PUMP article
---------------------------------	---------------------------------

Improper front end alignment	See WHEEL ALIGNMENT article
------------------------------	-----------------------------

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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
AA	
High internal pump leakage	See POWER STEERING PUMP article
Power steering pump belt slipping	Adjust or replace if necessary
Low fluid level	Check and fill to proper level
Engine idle speed to low	Adjust to correct

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		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
AA		
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
AA		
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 adjustment	See POWER STEERING GEAR article

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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

AA

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

AA

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

AA

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

Internal leakage through piston end plug	See POWER STEERING GEAR article
---	------------------------------------

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

AA

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

AA

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

Unbalanced steering gear valve	See POWER STEERING GEAR article
-----------------------------------	------------------------------------

AA

Low Pressure Due to Steering Pump	Flow control valve stuck or inoperative	See POWER STEERING PUMP article
--------------------------------------	--	------------------------------------

Pressure plate not flat against cam ring	See POWER STEERING PUMP article
---	------------------------------------

Extreme wear of cam ring	Replace and check adjustments
--------------------------	----------------------------------

Scored plate, thrust plate or rotor	See POWER STEERING PUMP article
--	------------------------------------

Vanes not installed properly	See POWER STEERING PUMP article
---------------------------------	------------------------------------

Vanes sticking in rotor slots	See POWER STEERING PUMP article
----------------------------------	------------------------------------

Cracked/broken thrust or pressure plate	See POWER STEERING PUMP article
--	------------------------------------

AA

## 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, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available

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#### BASIC STARTER TROUBLE SHOOTING CHART

AA

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

AA

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

AA

Starter Does Not Operate and Headlights Dim	Weak battery or dead cell	Charge or replace battery as necessary
	Loose or corroded battery connections	Check that battery connections are clean and tight
	Internal ground in starter windings	See Testing in STARTER article
	Grounded starter fields	See Testing in STARTERS
	Armature rubbing on pole shoes	See STARTER article

AA

Starter Turns but Engine Does Not Rotate	Starter clutch slipping	See STARTER article
	Broken clutch housing	See STARTER article
	Pinion shaft rusted or dry	See STARTER article
	Engine basic timing incorrect	See Ignition Timing in TUNE-UP article
	Broken teeth on engine flywheel	Replace flywheel and check for starter pinion gear damage

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AA

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

AA

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

## TROUBLE SHOOTING - BASIC PROCEDURES

### Article Text (p. 48)

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	Faulty starter	Replace starter
AA		
Starter Engages Engine Only Momentarily	Engine timing too far advanced	See Ignition Timing in TUNE-UP article
	Overrunning clutch not engaging properly	Replace overrunning clutch. See STARTER article
	Broken starter clutch	See STARTER article
	Broken teeth on engine flywheel	Replace flywheel and check starter pinion gear for damage
	Weak drive assembly thrust spring	See STARTER article
	Weak hold-in coil	See Bench Tests in STARTER article
AA		
Starter Drive Will Not Engage	Defective point assembly	See Testing in STARTER article
	Poor point assembly ground	See Testing in STARTER article
	Defective pull-in coil	Replace starter solenoid
AA		
Starter Relay Does Not Close	Dead battery	Charge or replace battery as necessary
	Faulty wiring	Check all wiring and connections leading to relay
	Neutral safety switch faulty	Replace neutral safety switch
	Starter relay faulty	Replace starter relay
AA		
Starter Drive Will Not Disengage	Starter motor loose on mountings	Tighten starter attach bolts
	Worn drive end bushing	See STARTER article
	Damaged engine flywheel teeth	Replace flywheel and starter pinion gear for damage



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Drive yolk return spring broken or missing	Replace return spring
Faulty ignition switch	Replace ignition switch
Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid	Replace starter solenoid
Starter clutch not disengaging	Replace starter clutch
Ignition starter switch contacts sticking	Replace ignition switch

AA

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
--	--

AA

Solenoid Plunger Vibrates When Switch is Engaged	Weak battery	Charge or replace battery as necessary
--	--------------	---

Solenoid contacts corroded	Clean contacts or replace solenoid
-------------------------------	---------------------------------------

Faulty wiring	Check all wiring leading to solenoid
---------------	---

Broken connections inside switch cover	Repair connections or replace solenoid
---	---

Open hold-in wire	Replace solenoid
-------------------	------------------

AA

Low Current Draw	Worn brushes or weak	Replace brushes or brush springs as necessary
------------------	----------------------	---

AA

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
--	--	--

AA

High Pitched	Distance too small between
--------------	----------------------------

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[illegible][illegible]

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shield

Tight steering universal joint      See STEERING COLUMN article

AA

High Shift      Column is out of alignment      See STEERING COLUMN article

Effort

Improperly installed dust shield      Adjust or replace

Seals or bearings not lubricated      See STEERING COLUMNS article

Mounting bracket screws too long      Replace with new shorter screws

Burrs on shift tube      Remove burrs or replace tube

Lower bowl bearing assembled wrong      See STEERING COLUMN article

Shift tube bent or broken      Replace as necessary

Improper adjustment of shift levers      See STEERING COLUMN article

AA

Improper Trans. Shifting      Sheared shift tube joint      Replace as necessary

Sheared lower shaft lever      Replace as necessary

Improper shift lever adjustment      See STEERING COLUMN article

Improper gate plate adjustment      See STEERING COLUMN article

AA

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

Broken weld nut on jacket      See STEERING COLUMN article

Instrument bracket capsule sheared      See STEERING COLUMN article

Column bracket/jacket bolts loose      Tighten bolts and check bracket

AA

Steering Locks in Gear      Release lever mechanism      See STEERING COLUMN article

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AA

### SUSPENSION TROUBLE SHOOTING

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#### BASIC SUSPENSION TROUBLE SHOOTING CHART

AA

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

AA

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

AA

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
	Worn upper ball joints	See Ball Joint Checking

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

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

## TUNE-UP TROUBLE SHOOTING - GAS ENGINE VEHICLES

### PLEASE READ THIS FIRST:

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.

### SPARK PLUG DIAGNOSIS

#### BASIC SPARK PLUG TROUBLE SHOOTING CHARTS

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

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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
AA	

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Wrong type of spark plug,  
too hot

Replace with correct  
spark plug, see  
ENGINE PERFORMANCE

AA

Chipped  
Insulators

Severe detonation

Check for over-  
advanced timing or  
combustion

Improper gapping  
procedure

Re-gap spark plugs

AA

Rust Colored  
Deposits

Additives in unleaded  
fuel

Try different fuel  
brand

AA

Water In Combustion  
Chamber

Blown head gasket or  
cracked head

Repair or replace  
head or head gasket

AA

## 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

AA

CONDITION

POSSIBLE CAUSE

CORRECTION

AA

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

AA

Engine Runs  
Rough

Fuel lines leaking or  
clogged

Tighten fitting,  
remove restriction

Initial timing incorrect

Reset ignition timing  
see ENGINE PERFORMANCE

Centrifugal advance  
malfunction

Repair distributor  
advance

Defective spark plugs or

Replace plugs or plug



## TROUBLE SHOOTING - BASIC PROCEDURES

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wiring		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
~~~~~		
One or More, But	Carburetor idle mixture	Readjust carburetor,

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Clean and/or replace  
valve

```
Replace spark plug
wires
```

## Replace spark plugs

## Repair leak

## Replace spark plugs

## Replace spark plugs

Readjust carburetor,  
see ENGINE PERFORMANCE

## Replace plug wires

Replace coil

Determine cause and repair

Replace spark plugs

## Replace spark plugs

Replace distributor  
cap

Determine cause and repair

Determine cause and repair

## Replace spark plugs

## Replace spark plugs

## DRIVEABILITY PROBLEMS TROUBLE SHOOTING

[illegible]

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CONDITION	POSSIBLE CAUSE	CORRECTION
AA		
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
Detonation	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
	AA	
	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
AA		

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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
Faulty Acceleration	Incorrect idle mixture setting	Reset idle mixture, see ENGINE PERFORMANCE
	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
	Clogged idle transfer slots	Clean idle transfer slots, see FUEL
Faulty Low Speed Operation	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
	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Faulty High Speed Operation	Defective distributor centrifugal advance	Replace advance mechanism

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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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AA

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
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Vacuum leaks	Repair vacuum leaks
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Fuel lines clogged	Remove restriction
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AA

Hesitation	Cracked or broken vacuum hoses	Replace vacuum hoses
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Vacuum leaks	Repair Vacuum leaks
--------------	---------------------

Binding carburetor linkage	Eliminate binding
----------------------------	-------------------

Binding throttle linkage	Eliminate binding
--------------------------	-------------------

Binding choke linkage or fast idle cam	Eliminate binding
--	-------------------

Improper float setting	Readjust float setting, see FUEL
------------------------	----------------------------------

Cracked or broken ignition	Replace ignition
----------------------------	------------------

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wires	wires
AA	
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

AA

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

AA

Ping or Spark Knock	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
	Distributor centrifugal or vacuum advance malfunction	Check operation and replace as necessary

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Carburetor setting too lean	Readjust mixture setting, see ENGINE PERFORMANCE
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Vacuum leak	Eliminate vacuum leak
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EGR valve malfunction	Replace EGR valve
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AA

Poor Gasoline Mileage	Cracked or broken vacuum hoses	Replace vacuum hoses
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Vacuum leaks	Repair vacuum leaks
--------------	---------------------

Defective ignition wires	Replace wires
--------------------------	---------------

Incorrect choke setting	Readjust setting, see ENGINE PERFORMANCE
-------------------------	--

Defective vacuum advance	Replace vacuum advance
--------------------------	------------------------

Defective spark plugs	Replace spark plugs
-----------------------	---------------------

Binding carburetor power piston	Eliminate binding
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Dirt in carburetor jets	Clean and/or replace jets
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Incorrect float adjustment	Readjust float setting, see FUEL
----------------------------	----------------------------------

Defective power valve	Replace power valve, see ENGINE PERFORMANCE
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Incorrect idle speed	Readjust idle speed
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AA

Engine Stalls	Improper float level	Readjust float level
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Leaking needle valve and seat	Replace needle valve and seat
-------------------------------	-------------------------------

Vacuum leaks	Eliminate vacuum leaks
--------------	------------------------

AA

### 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 information is to provide a list of common causes to



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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.

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

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

#### 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

AA		
CONDITION	POSSIBLE CAUSE	CORRECTION
AA		
Premature Tire Wear	Improper tire inflation	Check tire pressure
	Front alignment out of tolerance	See ALIGNMENT SPECS in WHEEL ALIGNMENT section
	Suspension components worn	See SUSPENSION section
	Steering system components worn	See STEERING section
	Improper standing height	See WHEEL ALIGNMENT
	Uneven or sagging springs	See SUSPENSION section

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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
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AA

Pulls to One Side	Improper tire inflation	Check tire pressure
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Brake dragging	See BRAKE section
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Mismatched tires	See WHEEL ALIGNMENT
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Broken or sagging spring	See SUSPENSION section
--------------------------	------------------------

Broken torsion bar	See SUSPENSION section
--------------------	------------------------

Power steering valve not centered	See STEERING section
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Front alignment out of tolerance	See WHEEL ALIGNMENT section
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Defective wheel bearing	See WHEEL BEARINGS in SUSPENSION section
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Uneven sway bar links	See SUSPENSION section
-----------------------	------------------------

Frame bent	Check for frame damage
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Steering system bushing worn	See STEERING section
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AA

Hard Steering	Idler arm bushing too tight	See STEERING LINKAGE in STEERING section
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Ball joint tight or seized	See SUSPENSION section
----------------------------	------------------------

Steering linkage too tight	See STEERING LINKAGE in STEERING section
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Power steering fluid low	Add proper amount of fluid
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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

AA

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

AA

Front End Shimmy	Tire out of balance/round	Check tire balance
	Excessive wheel runout	See WHEEL ALIGNMENT
	Insufficient or improper caster	See WHEEL ALIGNMENT section
	Worn suspension or steering components	See SUSPENSION section
	Defective shock absorbers	Replace shock absorber
	Wheel bearings worn or loose	See WHEEL BEARING ADJ. in SUSPENSION section
	Power steering reaction	See STEERING section

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Bracket loose

Steering gear box (rack) mounting loose      See STEERING section

Steering gear adjustment loose      See STEERING section

Worn spherical joints      See SUSPENSION section

AA

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

Frame bent      Check frame for damage

AA

Camber Not Adjustable      Control arm bent      See SUSPENSION section

Frame bent      Check frame for damage

Hub & bearing not seated properly      See SUSPENSION section

AA

END OF ARTICLE