

Volvo 850 troubleshoot guide

Volvo 850 service & repair manual

TROUBLE SHOOTING – BASIC PROCEDURES

1995 Volvo 850

GENERAL TROUBLE SHOOTING

*** PLEASE READ THIS FIRST ***

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ACCESSORIES & ELECTRICAL

CHARGING SYSTEM TROUBLE SHOOTING

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BASIC CHARGING SYSTEM TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Vehicle Will Not Start Dead battery Check battery cells, Start alternator belt tension and alternator output
Loose or corroded battery Check all charging connections system connections
Ignition circuit or switch Check and replace as malfunction necessary
condition, See Belt

Alternator Light	Loose	or worn alternator	Check alternator drive
Stays On With	drive	belt	tension and
Engine Running			
			Adjustment in TUNE-UP
			article in the
	Loose	alternator wiring	TUNE-UP section Check all charging

connections system connections

Short in alternator light See Indicator Warning wiring Lights in STANDARD

INSTRUMENTS in the ACCESSORIES & EQUIPMENT section

Defective alternator stator See Bench Tests in or diodes ALTERNATOR article

Defective regulator See Regulator Check in

ALTERNATOR article

Alternator Blown fuse See WIRING DIAGRAMS Light Stays Off
With Ignition
Switch ON

Defective alternator See Testing in
ALTERNATOR article

Defective indicator light See Indicator Warning bulb or socket Lights in STANDARD
INSTRUMENTS in the ACCESSORIES & EQUIPMENT section

Alternator Short in alternator wiring See On-Vehicle Tests Light Stays OFF in ALTERNATOR article With
Ignition
Switch ON

Defective rectifier bridge See Bench Tests in
ALTERNATOR article

Lights or Fuses Defective alternator wiring See On-Vehicle Tests Burn Out in ALTERNATOR article
Frequently

Defective regulator See Regulator Check in
ALTERNATOR article

Defective battery Check and replace as necessary

Ammeter Gauge Shows Discharge	Loose or worn drive	belt	Check alternator drive belt tension and condition. See Belt Adjustment in TUNE-UP article in the TUNE-UP section
	Defective wiring	Check all wires and wire connections	
	Defective alternator or regulator	See Bench Tests and On-Vehicle Tests in ALTERNATOR article	
	Defective ammeter, or improper ammeter wiring connection	See Testing in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section	
Noisy Alternator	Loose drive pulley	Tighten drive pulley attaching nut	
	Loose mounting bolts	Tighten all alternator mounting bolts	
	Worn or dirty bearings	See Bearing	
		Replacement	
		ALTERNATOR article	

Defective diodes or stator See Bench Test in
ALTERNATOR article

belt tension and

Battery Does	Loose	or	worn drive	belt	Check alternator drive
Stay Charged					
	condition. See				
	Belt Adjustment in				
	appropriate TUNE-UP				
	article in the				
	TUNE-UP section				

Loose or corroded battery Check all charging connections system connections
Loose alternator connections Check all charging system connections
Defective alternator or See On-Vehicle Tests battery and Bench Tests in
ALTERNATOR article
Add-on electrical accessories Install larger exceeding alternator capacity alternator
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
Excessive alternator voltage Check alternator output and repair as necessary

IGNITION SYSTEM TROUBLE SHOOTING

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articles available in the section(s) you are accessing.
Ignition Secondary Trouble Shooting Chart
START: Visually inspect Spark Plug Wires, Coil Wires, Plug Wire Boots, Rotor, and Distributor Cap for
signs of damage.
OK NOT OK

damaged components
as necessary

* To test secondary ignition	* Repair or replace
system, modify a Spark Plug	
by attaching a ground wire	
to the body of the plug and	

widening the gap to 1/4-3/8". Disconnect spark plug wire
and insert test plug. Ground plug, crank engine, and
check for spark.

GOOD SPARK NO SPARK

* If plug sparks, driveability * Remove coil wire from the problem is most likely NOT distributor and attach the in the ignition system. modified spark plug. Ground the plug and crank engine while checking for spark.

PRIMARY TROUBLE SHOOTING

CHECK CHART below in this article.

* GOOD SPARK	* NO SPARK
If plug has a good spark,	Proceed to the IGNITION
the problem is in the plug	
wires, distributor cap, or	
rotor. Replace components	
as necessary.	

Ignition Primary Trouble Shooting Chart

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

OK NOT OK

components as necessary.

* Check	that battery voltage	* Repair or replace damaged
is at	least 11.5 volts.	

NOT OK OK

* Replace or recharge the * Check for battery voltage battery. at the positive terminal of the coil.

OK NOT OK

* Check air Gap of the Pick-Up * Check resistance of ballast coil in the distributor. resistor (if used) for the correct resistance value.

OK NOT OK

necessary.

* Check Pick-Up coil	for	* Adjust or replace as
correct resistance	value.	

NOT OK OK

* Replace Pick-Up coil if * Check control module for not to specification. good ground connections.

OK

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

OK NOT OK

if the measured resistance
value is not within
specification.

*	Check wires from the battery/	*	Replace ballast resistor
	ignition switch to the coil.		
	Also check the coil primary		
	and secondary resistance.		

STARTER TROUBLE SHOOTING

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BASIC STARTER TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Starter Fails Dead battery or bad Check battery charge to Operate connections between and all wires and

starter and battery connections to starter

Ignition switch faulty Adjust or replace or misadjusted ignition switch

Open circuit between Check and repair wires starter switch ignition and connections as terminal on starter relay necessary

Starter relay or starter See Testing in STARTER
defective article

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

but Engine		
Does Not Rotate		
	Broken clutch housing	See STARTER article

Pinion shaft rusted or See STARTER article dry

Engine basic timing See Ignition Timing in incorrect TUNE-UP article

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

Starter Will Not Faulty overrunning See STARTER article

Crank Engine clutch

Broken clutch housing See STARTER article

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

Armature shaft sheared See STARTER article or reduction gear teeth stripped

Weak battery Charge or replace battery as necessary

See On-Vehicle Tests in STARTER article

Check all ground connections for tight and clean connections

Charge or replace

battery as necessary

	Faulty solenoid		
	Poor grounds		
	Ignition switch or misadjusted	faulty	Adjust or replace ignition switch as necessary
Starter Cranks	Battery weak or		
Engine Slowly	defective		

Engine overheated See ENGINE COOLING SYSTEM article

Engine oil too heavy Check that proper viscosity oil is used

Poor battery-to-starter Check that all connections between battery and starter are clean and tight

Current draw too low or See Bench Tests in too high STARTER article

Bent armature, loose pole See STARTER article shoes screws or worn bearings

Burned solenoid contacts Replace solenoid

Faulty starter Replace starter

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

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

Broken starter clutch See STARTER article

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

Weak drive assembly See STARTER article thrust spring

Weak hold-in coil See Bench Tests in

STARTER article

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

Poor point assembly ground See Testing in STARTER

article

Defective pull-in coil Replace starter solenoid

Charge or replace battery as necessary

Check all wiring and connections leading to relay

switch

Starter Relay Does Not Close	Dead battery		
	Faulty wiring		
	Neutral safety	switch	Replace neutral safety
	faulty		

Starter relay faulty Replace starter relay

Starter Drive	Starter motor loose on	Tighten starter
Will Not	mountings	attach bolts
Disengage		
	Worn drive end bushing	See STARTER article

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

Drive yolk return spring Replace return spring broken or missing

Faulty ignition switch Replace ignition switch

Insufficient clearance Replace starter between winding leads to solenoid solenoid terminal and main contact in solenoid

Starter clutch not Replace starter clutch disengaging

Ignition starter switch Replace ignition switch contacts sticking

Starter Relay Faulty solenoid switch, Check all wiring Operates but switch connections or between relay and Solenoid Does Not solenoid or replace

relay or solenoid as necessary

Broken lead or loose Repair wire or wire soldered connections connections as necessary

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

Solenoid contacts Clean contacts or corroded replace solenoid

Faulty wiring Check all wiring leading to solenoid

Broken connections inside Repair connections or switch cover replace solenoid

Open hold-in wire Replace solenoid

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

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

Normally

High Pitched Distance too small between

Whine After Engine starter pinion and flywheel

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

Normally

AIR CONDITIONING & HEAT

AIR CONDITIONING TROUBLE SHOOTING

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BASIC AIR CONDITIONING TROUBLE SHOOTING CHART CONDITION POSSIBLE CAUSE

Compressor Not Working Compressor clutch circuit open.

Compressor clutch coil inoperative. Poor clutch ground connection.

Fan belts loose.

Thermostatic switch inoperative. Thermostatic switch not adjusted. Ambient temperature switch open.

Superheat fuse blown.

Excessive Noise or Vibration Missing or loose mounting bolts.

Bad idler pulley bearings.

Fan belts not tightened correctly. Compressor clutch contacting body. Excessive system pressure.

Compressor oil level low.

Damaged clutch bearings. Damaged reed valves. Damaged compressor.

Insufficient or No Cooling;

Compressor Working Expansion valve inoperative.

Heater control valve stuck open. Low system pressure.

Blocked condenser fins. Blocked evaporator fins. Vacuum system leak.

Vacuum motors inoperative.

Control cables improperly adjusted. Restricted air inlet.

Mode doors binding.

Blower motor inoperative. Temperature above system capacity.

HEATER SYSTEM TROUBLE SHOOTING

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BASIC HEATER SYSTEM TROUBLE SHOOTING CHART CONDITION POSSIBLE CAUSE Insufficient, Erratic, or No Heat Low Coolant Level

Incorrect thermostat.

Restricted coolant flow through heater core.

Heater hoses plugged. Misadjusted control cable. Sticking heater control valve. Vacuum hose leaking.

Vacuum hose blocked.

Vacuum motors inoperative. Blocked air inlet.

Inoperative heater blower motor. Oil residue on heater core fins. Dirt on heater core fins.
 Too Much Heat Improperly adjusted cables.
 Sticking heater control valve.
 No vacuum to heater control valve. Temperature door stuck open.
 Air Flow Changes During
 Acceleration Vacuum system leak.
 Bad check valve or reservoir.
 Air From Defroster At All
 Times Vacuum system leak.
 Improperly adjusted control cables. Inoperative vacuum motor.
 Blower Does Not Operate
 Correctly Blown fuse.
 Blower motor windings open. Resistors burned out.
 Motor ground connection loose. Wiring harness connections loose. Blower motor switch inoperative.
 Blower relay inoperative.
 Fan binding or foreign object in housing.
 Fan blades broken or bent.

BRAKES

BRAKE SYSTEM TROUBLE SHOOTING

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BRAKE SYSTEM TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION Brakes Pull Left
 or Right Incorrect tire pressure Inflate tires to proper
 pressure

Front end out of alignment See WHEEL ALIGNMENT Mismatched tires Check tires sizes Restricted brake
 lines

or hoses Check hose routing

Loose or malfunctioning
 caliper See DISC BRAKES or

BRAKE SYSTEM

Bent shoe or oily linings See DRUM BRAKES or
BRAKE SYSTEM

Malfunctioning rear brakes See DRUM, DISC BRAKES
 or **BRAKE SYSTEM**

Noises Without

Loose suspension parts See SUSPENSION

Brakes Applied Front linings worn out Replace linings
 Noises With

Dust or oil on drums See DRUM, DISC BRAKES
 or rotors or **BRAKE SYSTEM**

Brakes Applied Insulator on outboard See DISC BRAKES or shoe damaged **BRAKE SYSTEM**

Incorrect pads or linings Replace pads or linings

Brake Rough, Chatters

or Pulsates Excessive lateral runout Check rotor runout

Parallelism not to specifications Reface or replace rotor
Wheel bearings not adjusted See SUSPENSION
Rear drums out-of-round Reface or replace drums
Excessive Pedal
Disc pad reversed, steel
against rotor Remove and reinstall pad
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
Excessive Pedal
Worn drums Reface or replace drums
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
Pedal Travel
Improper brake fluid Replace brake fluid
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
Dragging
Wheel cylinder piston
sticking See DRUM BRAKES or
BRAKE SYSTEM
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
Brakes Grab or
Uneven Braking
Brake pedal not returning See DISC, DRUM BRAKES
freely BRAKE SYSTEM
Action Malfunction of combination See CONTROL VALVE or valve BRAKE SYSTEM
Malfunction of power brake See POWER BRAKE UNITS
unit or BRAKE SYSTEM
Pulsation or
Binding brake pedal See DISC, DRUM BRAKES
or BRAKE SYSTEM
Roughness Uneven pad wear caused by See DISC BRAKES or caliper BRAKE SYSTEM
Uneven rotor wear See DISC BRAKES or
BRAKE SYSTEM
Drums out-of-round Reface or replace drums

ENGINE MECHANICAL

COOLING SYSTEM TROUBLE SHOOTING

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COOLING SYSTEM TROUBLE SHOOTING

CONDITION POSSIBLE CAUSE CORRECTION Overheating Coolant Leak Fill/Pressure Test
System

A/C Condenser Fins Clogged Remove/Clean Condenser

Radiator Fins Clogged Remove/Clean Radiator Thermostat Stuck Closed Replace Thermostat Clogged
Cooling System

Passages Clean/Flush Cooling
System

Water Pump Malfunction Replace Water Pump Fan Clutch Malfunction Replace Fan Clutch Retarded
Ignition Timing Reset Ignition Timing

Cooling Fan Malfunction Test Cooling Fan/ Circuit

Cooling Fan Motor

Malfunction Test Fan Motor

Cooling Fan Relay

Malfunction Test Fan Relay

Faulty Radiator Cap Replace Radiator Cap Broken/Slipping Fan Belt Replace Fan Belt Restricted Exhaust
Repair Exhaust System

Corrosion Impurities In Coolant Clean/Flush System

Coolant Leakage Damaged hose Replace Hose

Leaky Water Pump Replace Water Pump Damaged Radiator Seam Replace/Repair Radiator Leaky
 Thermostat Cover Replace Thermostat
 Cover
 Cylinder Head Problem Check Head/Head Gasket
 Leaky Freeze Plugs Replace Freeze Plugs
 Recovery System Inoperative
 Loose and/or Defective
 Radiator Cap Replace Radiator Cap
 Overflow Tube Clogged
 and/or Leaking Repair Tube
 Recovery Bottle Vent
 Restricted Clean Vent
 No Heater Core Flow
 Collapsed Heater Hose Replace Heater Hose
 Plugged Heater Core Clean/Replace Heater
 Core
 Faulty Heater Valve Replace Heater Valve

GASOLINE ENGINE – MECHANICAL TROUBLE SHOOTING

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BASIC GASOLINE ENGINE – MECHANICAL TROUBLE SHOOTING CHART CONDITION POSSIBLE CAUSE CORRECTION

	Incorrect ignition timing Leaking valves Worn fuel pump diaphragm or piston	Reset ignition timing, See TUNE-UP Replace valves, See ENGINES Replace diaphragm or piston
Intake Backfire	Improper ignition timing Faulty accelerator pump	Reset ignition timing, See TUNE-UP Replace accelerator
	discharge Improper choke operation Defective EGR valve Fuel mixture too lean Choke valve initial clearance too large	pump Check choke and adjust as required Replace EGR valve Reset air/fuel mixture, See TUNE-UP Reset choke valve initial clearance
Exhaust Backfire	Vacuum leak	Inspect and repair vacuum system

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

	switch leaking	sending switch
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Excessive Oil Worn valve stems or guides Replace stems or
Consumption guides, See ENGINES Valve "O" ring seals Replace "O" ring seals, damaged See ENGINES
Plugged oil drain back holes Remove restrictions Improper PCV valve Replace PCV valve operation
Engine oil level too high Remove excess oil Engine oil too thin Replace thicker oil Valve stem oil
deflectors Replace oil deflectors damaged
Incorrect piston rings Replace piston rings, See ENGINES
Piston ring gaps not Reinstall piston rings, staggered See ENGINES
Insufficient piston ring Replace rings, See tension ENGINES
Piston ring grooves or oil Replace piston rings, return slots clogged See ENGINES
Piston rings sticking in Replace piston rings, grooves See ENGINES
Piston ring grooves Replace piston and excessively worn rings, See ENGINES Compression rings installed
Replace compression upside down rings correctly, See
ENGINES
Worn or scored cylinder Rebore cylinders or walls replace block Mismatched oil ring Replace oil ring
expander and rail expander and rail, See
ENGINES
Intake gasket dowels too Replace intake gasket long dowels
Excessive main or connecting Replace main or rod bearing clearance connecting rod
bearings, See ENGINES
No Oil Pressure Low oil level Add oil to proper level Oil pressure sender or Replace sender or gauge
gauge broken
Oil pump malfunction Remove and overhaul oil pump, See ENGINES
Oil pressure relief valve Remove and reinstall sticking valve
Oil pump passages blocked Overhaul oil pump, See
ENGINES
Oil pickup screen or tube remove restriction blocked
Loose oil inlet tube Tighten oil inlet tube
Loose camshaft bearings Replace camshaft bearings, See ENGINES
Internal leakage at oil Replace block or passages cylinder head
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 Reduce oil pump clearance clearance, See ENGINES Oil pickup tube or screen
Remove restrictions blocked
Main, rod or cam bearing Replace bearing to clearance excessive reduce clearance, See
ENGINES
High Oil Improper grade of oil Replace with proper oil
Pressure Oil pressure relief valve Eliminate binding stuck closed
Oil pressure sender or Replace sender or gauge gauge faulty
Noisy Main Inadequate oil supply Check oil delivery to
Bearings main bearings
Excessive main bearing Replace main bearings, clearance See ENGINES
Excessive crankshaft end Replace crankshaft, See play ENGINES
Loose flywheel or torque Tighten attaching bolts converter
Loose or damaged vibration Tighten or replace damper vibration damper Crankshaft journals Re-grind
crankshaft out-of-round journals
Excessive belt tension Loosen belt tension
Noisy Connecting Excessive bearing clearance Replace bearing, See
Rods or missing bearing ENGINES

Crankshaft rod journal Re-grind crankshaft out-of-round journal
 Misaligned connecting rod Remove rod or cap and or cap realign
 Incorrectly tightened rod Remove and re-tighten bolts rod bolts
 Noisy Pistons Excessive piston-to-bore Install larger pistons, and Rings clearance 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 Replace with larger or loose or tight smaller rings
 Carbon build-up on piston Remove carbon
 Noisy Valve Worn or bent push rods Replace push rods, See Train ENGINES
 Worn rocker arms or bridged Replace push rods, See pivots ENGINES
 Dirt or chips in valve Remove lifters and lifters remove dirt/chips Excessive valve lifter Replace valve lifters, leak-down See ENGINES
 Valve lifter face worn Replace valve lifters, See ENGINES
 Broken or cocked valve replace or reposition springs springs
 Too much valve stem-to-guide Replace valve guides, clearance See ENGINES
 Valve bent Replace valve, See ENGINES
 Loose rocker arms Retighten rocker arms, See ENGINES
 Excessive valve seat Reface valve seats, See run-out ENGINES

	Missing valve lock Excessively worn camshaft lobes Plugged valve lifter oil holes Faulty valve lifter check ball Rocker arm nut installed upside down Valve lifter incorrect for engine Faulty push rod seat or lifter plunger	Install new valve lock Replace camshaft, See ENGINES Eliminate restriction or replace lifter Replace lifter check ball, See ENGINES Remove and reinstall correctly Remove and replace valve lifters Replace plunger or push rod
Noisy Valves	Improper valve lash Worn or dirty valve lifters Worn valve guides Excessive valve seat or	Re-adjust valve lash, See ENGINES Clean and/or replace lifters Replace valve guides, See ENGINES Reface seats or valve
	face run-out Worn camshaft lobes Loose rocker arm studs Bent push rods Broken valve springs	face Replace camshaft, See ENGINES Re-tighten rocker arm studs, See ENGINES Replace push rods, See ENGINES

		Replace valve springs, See ENGINES
Burned, Sticking or Broken Valves	Weak valve springs or warped valves Improper lifter clearance Worn guides or improper guide clearance Out-of-round valve seats or improper seat width Gum deposits on valve stems, seats or guides Improper spark timing	Replace valves and/or springs, See ENGINES Re-adjust clearance or replace lifters Replace valve guides, See ENGINES Re-grind valve seats Remove deposits Re-adjust spark timing
Broken Pistons/Rings	Undersize pistons Wrong piston rings Out-of-round cylinder bore	Replace with larger pistons, See ENGINES Replace with correct rings, See ENGINES Re-bore cylinder bore
	Improper connecting rod alignment Excessively worn ring grooves Improperly assembled piston pins Insufficient ring gap clearance Engine overheating Incorrect ignition timing	Remove and realign connecting rods Replace pistons, See ENGINES Re-assemble pin-to -piston, See ENGINES Install new rings, See ENGINES Check cooling system Re-adjust ignition timing, See TUNE-UP
Excessive	Leaks at manifold to	Replace manifold or
Exhaust Noise	head, or to pipe	pipe gasket
	Exhaust manifold	Replace exhaust

cracked or broken manifold, See ENGINES

ENGINE PERFORMANCE

CARBURETOR TROUBLE SHOOTING:

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BASIC COLD START SYMPTOMS TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Check choke operation, see FUEL SYSTEMS

Check linkage, see FUEL SYSTEM

Engine Start	Won't	Choke	not closing		
		Choke	linkage bent		
Engine Starts,	Choke	vacuum kick	setting	Check setting and	

Then Dies too wide adjust see, FUEL SYSTEMS

Fast idle RPM too low Reset RPM to specification, see TUNE-UP

Fast idle cam index Reset fast idle cam incorrect index, see FUEL SYSTEMS

Vacuum leak Inspect vacuum system for leaks

Low fuel pump outlet Repair or replace pump, see FUEL SYSTEMS

Low carburetor fuel level Check float setting see FUEL SYSTEM

Engine Quits	Choke vacuum kick setting	Reset vacuum kick
Under Load	incorrect	setting, see FUEL
		SYSTEMS

Fast idle cam index Reset fast idle cam incorrect index, see FUEL SYSTEM

Incorrect hot fast idle Reset fast idle RPM, speed RPM see TUNE-UP

Engine Starts,	Choke vacuum kick set too	Reset vacuum kick,
Runs Up, Then	narrow	see FUEL SYSTEMS
Idles, Slowly		
With Black Smoke	Fast idle cam index	Reset fast idle cam

incorrect index, see FUEL SYSTEMS

Hot fast idle RPM too low Reset fast idle RPM, see TUNE-UP

BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

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

BASIC COLD ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART CONDITION POSSIBLE CAUSE CORRECTION

Defective choke control switch Replace choke control switch, see FUEL SYSTEMS

Plugged heat crossover Remove restriction

system

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

BASIC WARM ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART CONDITION POSSIBLE CAUSE CORRECTION

Hesitation With Vacuum leak Inspect vacuum lines

Small Amount of

Gas Pedal Movement

Accelerator pump weak or Replace pump, see inoperable FUEL SYSTEMS

Float level setting too low Reset float level, see, FUEL SYSTEMS

Metering rods sticking or Inspect and/or binding replace rods, see FUEL SYSTEMS

Carburetor idle or transfer Inspect system and system plugged remove restriction

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

Hesitation With Defective accelerator pump Replace pump, see Heavy Gas Pedal FUEL SYSTEMS Movement

Metering rod carrier Remove restriction sticking or binding

Large vacuum leak Inspect vacuum system and repair leak
Float level setting too Reset float level, low see FUEL SYSTEMS
Defective fuel pump, lines Inspect pump, lines or filter and filter
Air door setting incorrect Adjust air door setting, see FUEL

DIESEL ENGINE TROUBLE SHOOTING

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

BASIC DIESEL ENGINE TROUBLE SHOOTING CHART

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

batteries

Bad starter connections Check connections or bad starter and/or replace
batteries

Engine Cranks Bad battery connections Check connections Slowly, Won't or dead batteries and/or
replace Start batteries

Engine oil too heavy Replace engine oil

Engine Cranks Glow plugs not functioning Check glow plug system, Normally, But see FUEL SYSTEMS

Will Not Start Glow plug control not Check controller, see functioning FUEL SYSTEMS

Fuel not injected into Check fuel injectors, cylinders 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 Replace fuel fuel

Incorrect injection pump Re-adjust pump timing, timing see FUEL SYSTEMS

Low compression Check valves, pistons, rings, see ENGINES

Injection pump malfunction Inspect and/or replace injection pump

Engine Starts, Incorrect slow idle Reset idle adjustment, Won't Idle adjustment see TUNE-UP

Fast idle solenoid Check solenoid and malfunctioning 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 Reset pump timing, see incorrect FUEL SYSTEMS

No fuel to injection pump Check fuel delivery system

Incorrect or contaminated Replace fuel fuel

Low compression Check valves, piston, rings, see ENGINES

Injection pump malfunction Replace injection pump, see FUEL SYSTEMS

Fuel solenoid closes in RUN Check solenoid and position connections

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

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

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

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

Fuel Leaks On Loose or broken fuel line Check lines and

Ground connections

Internal injection pump Replace injection pump, seal leak see FUEL SYSTEMS

Cylinder Injector nozzles sticking Test injectors, see

Knocking Noise open FUEL SYSTEMS

Very low nozzle opening Test injectors and/or pressure replace

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

Block vent in gas cap Remove restriction and/or replace cap

Tank-to-injection pump fuel Check fuel lines and supply blocked connections

Blocked fuel return system Remove restriction

Incorrect or contaminated Replace fuel fuel

Blocked injector nozzles Check nozzle for blockage, see FUEL SYSTEMS

Low compression Check valves, rings, pistons, see ENGINES

Loud Engine Basic timing incorrect Reset timing, see

Noise With Black FUEL SYSTEMS

Smoke EGR valve malfunction Replace EGR valve Internal injection pump Replace injection pump, malfunction see FUEL SYSTEMS

Cooling system leaksBelt slipping or damagedThermostat stuck closedHead gasket leakingCheck cooling system and repair leaks Check tension and/or replace beltRemove and replace thermostat, see ENGINE COOLING Replace head gasket

Injector pump fuel solenoidRemove and check

does not return fuel valvesolenoid and replace

	Incorrect injector pump housing pressure	Check pressure, see FUEL SYSTEMS	
Engine Overheating			
Oil Light on Idle	at	Low oil pump pressure Oil cooler or line	Check oil pump operation, see ENGINES Remove restriction
		restricted	and/or replace cooler
Engine Won't Shut Off			
		to OFF position	if needed

VACUUM PUMP DIAGNOSIS

Excessive Noise Loose pump-to-drive Tighten screws assembly screws

Loose tube on pump assembly Tighten tube Valves not functioning Replace valves properly

Oil Leakage	Loose end plug	Tighten end plug
	Bad seal crimp	Remove and re-crimp
		seal

FUEL INJECTION TROUBLE SHOOTING

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BASIC FUEL INJECTION TROUBLE SHOOTING CHART

circuit

CONDITION	POSSIBLE CAUSE	CORRECTION
Engine Won't Start (Crank	Cold start valve inoperative	Test valve and
Normally)		

Poor connection;vacuum or Check vacuum and wiring electrical connections
 Contaminated fuel Test fuel for water or alcohol
 Defective fuel pump relay Test relay and or circuit wiring
 Battery too low Charge and test battery

	Low fuel pressure	Test pressure regulator and fuel pump, check for restricted lines and filters
	No distributor reference pulses	Repair ignition system as necessary
	Open coolant temperature sensor circuit	Test sensor and wiring
	Shorted W.O.T. switch in T.P.S.	Disconnect W.O.T. switch, engine should start
	Defective ECM	Replace ECM
	Fuel tank residual pressure valve leaks	Test for fuel pressure drop after shut down
Hard Starting	Disconnected hot air tube to air cleaner	Reconnect tube and test control valve
	Defective Idle Air Control (IAC) valve	Test valve operation and circuit
	Shorted, open or misadjusted T.P.S.	Test and adjust or replace T.P.S.
	EGR valve open	Test EGR valve and control circuit
	Poor Oxygen sensor signal	Test for shorted or circuit
	Incorrect mixture from PCV system	Test PCV for flow, check sealing of oil filter cap
Poor High Speed Operation	Low fuel pump volume	Faulty pump or restricted fuel lines or filters
	Poor MAP sensor signal	Test MAP sensor, vacuum hose and wiring
	Poor Oxygen sensor signal	Test for shorted or open sensor or circuit

	Open coolant temperature sensor circuit	Test sensor and wiring
	Faulty ignition operation	Check wires for cracks or poor connections, test secondary voltage with oscilloscope
	Contaminated fuel	Test fuel for water

or alcohol

Intermittent ECM ground Test ECM ground connection for resistance

Restricted air cleaner Replace air cleaner

Restricted exhaust system Test for exhaust manifold back pressure

Poor MAF sensor signal Check leakage between sensor and manifold

If tester for ALCL hook-up is available check that VSS reading matches speedometer

open sensor or

	Poor	VSS signal		
Ping or Knock on	Poor	Knock sensor	signal	Test for shorted or
Acceleration				
				circuit

Poor Baro sensor signal Test for shorted or open sensor or circuit

Improper ignition timing See VEHICLE EMISSION CONTROL LABEL (where applicable)

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

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

IGNITION SYSTEM TROUBLE SHOOTING

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Ignition Secondary Trouble Shooting Chart

START: Visually inspect Spark Plug Wires, Coil Wires, Plug Wire Boots, Rotor, and Distributor Cap for signs of damage.

OK NOT OK

damaged components

as necessary

*	To test secondary ignition	*	Repair or replace
	system, modify a Spark Plug		

	by attaching a ground wire
	to the body of the plug and
	widening the gap to 1/4-3/8".
	Disconnect spark plug wire
	and insert test plug. Ground
	plug, crank engine, and
	check for spark.

GOOD SPARK NO SPARK

* If plug sparks, driveability * Remove coil wire from the problem is most likely NOT distributor and attach the in the ignition system. modified spark plug. Ground the plug and crank engine while checking for spark.

PRIMARY TROUBLE SHOOTING

CHECK CHART below in this

article.

* GOOD SPARK	* NO SPARK
If plug has a good spark,	Proceed to the IGNITION
the problem is in the plug	
wires, distributor cap, or	
rotor. Replace components	
as necessary.	

Ignition Primary Trouble Shooting Chart

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

OK NOT OK

components as necessary.

* Check	that battery voltage	* Repair or replace damaged
is at	least 11.5 volts.	

NOT OK OK

* Replace or recharge the * Check for battery voltage battery. at the positive terminal of the coil.

OK NOT OK

* Check air Gap of the Pick-Up * Check resistance of ballast coil in the distributor. resistor (if used) for the

correct resistance value.
OK NOT OK

necessary.

* Check Pick-Up coil	for	* Adjust or replace as
correct resistance	value.	

NOT OK OK

good ground connections.

* Replace Pick-Up coil if	* Check control module for
not to specification.	

OK

* If vehicle fails to run at this point, go to the appropriate article in the ENGINE PERFORMANCE section.
OK NOT OK

if the measured resistance
value is not within
specification.

* Check wires from the battery/	* Replace ballast resistor
ignition switch to the coil.	
Also check the coil primary	
and secondary resistance.	

STARTER TROUBLE SHOOTING

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BASIC STARTER TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Starter Fails Dead battery or bad Check battery charge to Operate connections between and all wires and starter and battery connections to starter

	Ignition switch faulty or misadjusted	Adjust or replace ignition switch
	Open circuit between starter switch ignition terminal on starter relay	Check and repair wires and connections as necessary
	Starter relay or starter defective	See Testing in STARTER

		article
	Open solenoid pull-in wire	See Testing in STARTER article
Starter Does Not Operate and Headlights Dim	Weak battery or dead cell	Charge or replace battery as necessary
	Loose or corroded battery connections	Check that battery connections are clean and tight
	Internal ground in starter windings	See Testing in STARTER article
	Grounded starter fields	See Testing in STARTERS
	Armature rubbing on pole shoes	See STARTER article
Starter Turns	Starter clutch slipping	See STARTER article
but Engine		
Does Not Rotate		
	Broken clutch housing	See STARTER article

Pinion shaft rusted or See STARTER article dry

Engine basic timing See Ignition Timing in incorrect TUNE-UP article

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

Starter Will Not Crank Engine	Faulty overrunning clutch	See STARTER article
	Broken clutch housing	See STARTER article
	Broken flywheel teeth	Replace flywheel and check for starter pinion gear damage
	Armature shaft sheared or reduction gear teeth stripped	See STARTER article
	Weak battery	Charge or replace battery as necessary
	Faulty solenoid	See On-Vehicle Tests in STARTER article
	Poor grounds	Check all ground

connections for tight and clean connections

Ignition switch faulty Adjust or replace or misadjusted ignition switch as necessary

Starter Cranks Battery weak or Charge or replace

Engine Slowly defective 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 Check that all connections between battery and starter are clean and tight

Current draw too low or See Bench Tests in too high STARTER article

Bent armature, loose pole See STARTER article shoes screws or worn bearings

Burned solenoid contacts Replace solenoid

Faulty starter Replace starter

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

Momentarily

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

Broken starter clutch See STARTER article

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

Weak drive assembly See STARTER article thrust spring

Weak hold-in coil See Bench Tests in STARTER article

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

Poor point assembly ground See Testing in STARTER article

Defective pull-in coil Replace starter solenoid

Starter Relay Dead battery Charge or replace

Does Not Close	Faulty wiring	battery as necessary Check all wiring and
		connections leading to relay
	Neutral safety switch faulty	Replace neutral safety switch
	Starter relay faulty	Replace starter relay
Starter Drive Will Not Disengage	Starter motor loose on mountings Worn drive end bushing	Tighten starter attach bolts See STARTER article
	Damaged engine flywheel teeth	Replace flywheel and starter pinion gear for damage
	Drive yolk return spring broken or missing	Replace return spring

	Faulty ignition switch	Replace ignition switch
	Insufficient clearance between winding leads to solenoid terminal and main contact in solenoid	Replace starter solenoid
	Starter clutch not disengaging	Replace starter clutch
	Ignition starter switch contacts sticking	Replace ignition switch
Starter Relay Operates but Solenoid Does Not	Faulty solenoid switch, switch connections or	Check all wiring between relay and solenoid or replace relay or solenoid as necessary
	Broken lead or loose	Repair wire or wire

soldered connections connections as necessary

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

Solenoid contacts Clean contacts or corroded replace solenoid

Faulty wiring Check all wiring leading to solenoid

Broken connections inside Repair connections or switch cover replace solenoid

Open hold-in wire Replace solenoid

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

High Pitched Whine Distance too great Align starter or check During Cranking between starter that

correct starter Before Engine pinion and flywheel and flywheel are being Fires but Engine used

Fires and Cranks

Normally

High Pitched Distance too small between Whine After Engine starter pinion and flywheel Fires With Key

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

Normally

TUNE-UP TROUBLE SHOOTING – GAS ENGINE VEHICLES

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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 SPARK PLUG TROUBLE SHOOTING CHARTS

CONDITION POSSIBLE CAUSE CORRECTION Normal Spark Light Tan or Gray deposits No Action

Plug Condition

Electrode not burned or No Action fouled

mixture, see ENGINE PERFORMANCE section

Replace choke

Cold Fouling or	Gap tolerance not	changed	No Action
	Overrich air/fuel	mixture	Adjust air/fuel
Carbon Deposits			

	Faulty choke		
			assembly, see ENGINE
			PERFORMANCE section

Clogged air filter Clean and/or replace air filter

Incorrect idle speed or Reset idle speed and/
dirty carburetor or clean carburetor

Faulty ignition wires Replace ignition wiring

pistons

	Prolonged operation at idle	Shut engine during long	off idle
	Sticking valves or worn valve guide seals	Check valve	train
Wet Fouling	Worn rings and pistons	Install new	rings and
or Oil Deposits			

Deposits in combustion chamber becoming fused to electrodeClean combustion chamber of deposits

Engine overheatingWrong type of fuelCheck cooling systemReplace with correct

	Excessive cylinder wear	Rebore or replace block	
	Excessive valve guide clearance	Worn or loose bearing	
Gap Bridged			
Blistered Electrode			
			fuel
		Loose spark plugs	Retighten spark plugs
		Over-advanced ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Pre-Ignition	or	Incorrect type of fuel	Replace with correct

Melted Electrodes fuel

Incorrect ignition timing Reset ignition timing see ENGINE PERFORMANCE

	Burned valves	Replace valves
	Engine Overheating	Check cooling system

	Wrong type of spark plug,	Replace with correct
	too hot	spark plug, see ENGINE PERFORMANCE
Chipped Insulators	Severe detonation	Check for over- advanced timing or combustion
	Improper gapping procedure	Re-gap spark plugs
Rust Colored Deposits	Additives in unleaded fuel	Try different fuel brand
Water In Combustion Chamber	Blown head gasket or cracked head	Repair or replace head or head gasket

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

BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS

CONDITION POSSIBLE CAUSE CORRECTION Engine Won't Open circuit between Repair circuit

	ignition switch Open circuit between	Repair circuit
	ignition switch and starter solenoid	
Engine Runs Rough	Fuel lines leaking or clogged	Tighten fitting, remove restriction
	Initial timing incorrect	Reset ignition timing see ENGINE PERFORMANCE
	Centrifugal advance malfunction	Repair distributor advance
	Defective spark plugs or wiring	Replace plugs or plug wiring
Component Failure	Spark arc-over on cap, rotor or coil	Replace cap, rotor or or coil
	Defective pick-up coil	Replace pick-up coil
	Defective ignition coil	Replace ignition coil
	Defective vacuum unit	Replace vacuum unit

	Defective control module	Replace control module
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BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS – USING OSCILLOSCOPE PATTERNS

CONDITION POSSIBLE CAUSE CORRECTION Firing Voltage Retarded ignition timing Reset ignition

Lines are the Same, timing, see ENGINE

but Abnormally High PERFORMANCE section

Fuel mixture too lean Readjust carburetor, see ENGINE PERFORMANCE

High resistance in coil Replace coil wire wire

Corrosion in coil tower Clean and/or replace terminal coil

Corrosion in distributor Clean and/or replace coil terminal distributor cap

Firing Voltage Fuel mixture too rich Readjust carburetor, Lines are the Same see ENGINE PERFORMANCE

but Abnormally Low

Breaks in coil wire causing Replace coil wire arcing

Cracked coil tower causing Replace coil arcing

Low coil output Replace coil

Low engine compression Determine cause and repair

One or More, But Carburetor idle mixture Readjust carburetor, Not All Firing not balanced see ENGINE PERFORMANCE Voltage Lines are

Higher Than Others EGR valve stuck open Clean and/or replace valve

High resistance in spark Replace spark plug plug wires wires

	Cracked or broken spark plug insulator	Replace spark plugs
	Intake vacuum leak	Repair leak
	Defective spark plugs	Replace spark plugs
	Corroded spark plug terminals	Replace spark plugs
One or More, But Not All Firing Voltage Lines Are Lower Than Others	Curb idle mixture not balanced Breaks in plug wires causing arcing	Readjust carburetor, see ENGINE PERFORMANCE Replace plug wires
	Cracked coil tower causing arcing	Replace coil
	Low compression	Determine cause and repair
	Defective spark plugs	Replace spark plugs
	Corroded spark plugs	Replace spark plugs
Cylinders Not Firing	Cracked distributor cap terminals	Replace distributor cap

	Shorted spark plug wire	Determine cause and repair
	Mechanical problem in engine	Determine cause and repair
	Defective spark plugs	Replace spark plugs
	Spark plugs fouled	Replace spark plugs

BASIC DRIVEABILITY PROBLEMS TROUBLE SHOOTING TABLE CONDITION POSSIBLE CAUSE CORRECTION

Hard Starting Binding carburetor linkage Eliminate binding Binding choke linkage Eliminate binding

Binding choke piston Eliminate binding

Restricted choke vacuum Check vacuum lines for blockage

see ENGINE PERFORMANCE

	Worn or dirty needle valve and seat	Clean carburetor, see ENGINE PERFORMANCE
	Float sticking	Readjust or replace float see the ENGINE PERFORMANCE section
	Incorrect choke adjustment	Reset choke adjustment see ENGINE PERFORMANCE
	Defective coil	Replace coil
	Improper spark plug gap	Regap spark plugs
	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
Detonation	Over-advanced ignition timing	Reset ignition timing see ENGINE PERFORMANCE
	Defective spark plugs	Replace spark plugs
	Fuel lines clogged	Clean fuel lines
	EGR system malfunction	Check and repair EGR system
	PCV system malfunction	Repair PCV system
	Vacuum leaks	Check and repair vacuum system
	Loose fan belts	Tighten or replace fan belts, see ENGINE PERFORMANCE
	Restricted airflow	Remove restriction
	Vacuum advance malfunction	Check distributor operation

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

Engine cold and choke too Adjust choke and

lean allow engine to warm- up

Defective spark plugs Replace spark plugs

Defective coil Replace coil

slots, see FUEL

Faulty Low Speed	Clogged idle transfer slots	Clean idle transfer
Operation		

Restricted idle air bleeds Disassemble and clean and passages carburetor, see FUEL

Clogged air cleaner Replace air filter Defective spark plugs Replace spark plugs Defective ignition wires

Replace ignition wire

see ENGINE PERFORMANCE

Defective distributor cap Replace distributor cap

Faulty High Speed Incorrect ignition timing Reset ignition timing

Operation see ENGINE PERFORMANCE

Defective distributor Replace advance

	centrifugal advance	mechanism
	Defective distributor	Replace advance unit
	vacuum advance	
	Incorrect spark plugs or plug gap	Check gap and/or replace spark plugs
	Faulty choke operation	Check choke and repair as required

	Clogged vacuum passages	Remove restrictions	
	Improper size or clogged main jet	Check jet size and clean, see FUEL	
	Restricted air cleaner	Check filter and replace as necessary	
	Defective distributor cap, rotor or coil	Replace cap, rotor or coil	
Misfire at Speeds	All	Defective spark plugs	Replace spark plugs
		Defective spark plug wires	Replace spark plug wires
		Defective distributor cap, rotor, or coil	Replace cap, rotor, or coil
		Cracked or broken vacuum hoses	Replace vacuum hoses

Vacuum leaks Repair vacuum leaks

Fuel lines clogged Remove restriction

Hesitation Cracked or broken vacuum Replace vacuum hoses hoses

Vacuum leaks Repair Vacuum leaks Binding carburetor linkage Eliminate binding Binding throttle linkage

Eliminate binding Binding choke linkage or Eliminate binding

fast idle cam

Improper float setting Readjust float setting, see FUEL

Cracked or broken ignition Replace ignition wires wires

Rough idle, Incorrect curb idle or fast Reset idle speed, see Missing or idle speed see ENGINE

PERFORMANCE Stalling

Incorrect basic timing Reset ignition timing see ENGINE PERFORMANCE

Improper idle mixture Reset idle mixture, adjustment see ENGINE PERFORMANCE

Improper feedback system Check feedback system operation see ENGINE PERFORMANCE

Incorrect spark plug gap Reset spark plug gap, see ENGINE PERFORMANCE

Moisture in ignition Dry components components

Loose or broken ignition Replace ignition wires wires

Damaged distributor cap or Replace distributor or rotor 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 Reset fast idle cam adjustment 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 Reset choke or

choke setting eliminate binding

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

Engine Surges	Cracked or broken vacuum hoses	Replace vacuum hoses
Engine Surges	Cracked or broken ignition wires	Replace ignition wires
Engine Surges	Vacuum advance malfunction	Check unit and replace as necessary
Engine Surges	Defective or fouled spark plugs	Replace spark plugs
Ping or Spark Knock	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
	Distributor centrifugal or vacuum advance malfunction	Check operation and replace as necessary
	Carburetor setting too lean	Readjust mixture
		setting, see ENGINE PERFORMANCE
	Vacuum leak	Eliminate vacuum leak
	EGR valve malfunction	Replace EGR valve
Poor Gasoline Mileage	Cracked or broken vacuum hoses	Replace vacuum hoses
	Vacuum leaks	Repair vacuum leaks
	Defective ignition wires	Replace wires
	Incorrect choke setting	Readjust setting, see ENGINE PERFORMANCE
	Defective vacuum advance	Replace vacuum advance
	Defective spark plugs	Replace spark plugs
	Binding carburetor power piston	Eliminate binding
	Dirt in carburetor jets	Clean and/or replace jets
	Incorrect float adjustment	Readjust float setting, see FUEL
	Defective power valve	Replace power valve, see ENGINE PERFORMANCE

	Incorrect idle speed	Readjust idle speed
Engine Stalls	Improper float level	Readjust float level
	Leaking needle valve and seat	Replace needle valve and seat
	Vacuum leaks	Eliminate vacuum
		leaks

VACUUM PUMP – DIESEL TROUBLE SHOOTING

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

VACUUM PUMP (DIESEL) TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

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

Bad seal crimp Remove and re-crimp seal

MANUAL TRANSMISSION

MANUAL TRANSMISSION TROUBLE SHOOTING

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MANUAL TRANSMISSION/TRANSAXLE TROUBLE SHOOTING Condition Possible Cause

Noisy In Forward Gears .Low gear oil level,

.Loose bell housing bolts,

.Worn bearings or gears

Clunk On Deceleration

(FWD Only) .Loose engine mounts,

.Worn inboard CV joints,

.Worn differential pinion shaft,
.Side gear hub counterbore in case worn oversize
Gear Clash When Shifting
Forward Gears .Clutch Out Of Adjustment,
.Shift linkage damaged or out of adjustment,
.Gears or synchronizers damaged,
.Low gear oil level
Transmission Noisy When
Moving (RWD Only) Quiet In
Neutral With Clutch Engaged .Worn rear outputshaft bearing
Gear Rattle .Worn bearings,
.Wrong gear oil,
.Low gear oil,
.Worn gears
Steady Ticking At Idle
(Increases With RPM) .Broken tooth on gear
Gear Clash When Shifting
Forward Gears .Worn or broken synchronizers
Loud Whine In Reverse .Normal condition (1)
Noise When Stepping On Clutch .Bad release bearing,
.Worn pilot bearing
Ticking Or Screeching As
Clutch Is Engaged .Faulty release bearing,
.Uneven pressure plate fingers
Click Or Snap When Clutch
Is Engaged .Worn clutch fork,
.Worn or broken front bearing retainer
Transmission Shifts Hard .Clutch not releasing,
.Shift mechanism binding,
.Clutch installed backwards
Will Not Shift Into One
Gear, Shifts Into All
Others .Bent shift fork,
.Worn detent balls
Locked Into Gear,
Cannot Shift .Clutch adjustment,
.Worn detent balls
Transmission Jumps Out
Of Gear .Pilot bearing worn,
.Bent shift fork,
.Worn gear teeth or face
.Excessive gear train end play
.Worn synchronizers
.Missing detent ball spring
.Shift mechanism worn or out of adjustment
.Engine or transmission mount bolts loose or out of adjustment
.Transmission not aligned
Shift Lever Rattle .Worn shift lever or detents
.Worn shift forks
.Worn synchronizers sleeve

Shift Lever Hops Under

Acceleration .Worn engine or transmission mounts

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

POWERTRAIN

CLUTCH TROUBLE SHOOTING

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BASIC CLUTCH TROUBLE SHOOTING CHART

Oil, grease or glaze onDisassemble and clean

Oil or grease on clutchClean or replace clutch

facingsclutch disc

CONDITION	POSSIBLE CAUSE	CORRECTION
Chattering	Incorrect clutch adjustment	Adjust clutch
Grabbing		
	facings	or replace
	Loose “U” joint flange	See DRIVE AXLES article
	Worn input shaft spline	Replace input shaft
	Binding pressure plate	Replace pressure plate
	Binding release lever	See CLUTCH article
	Binding clutch disc hub	Replace clutch disc
	Unequal pressure plate contact	Replace worn/misaligned components
	Loose/bent clutch disc	Replace clutch disc
	Incorrect transmission alignment	Realign transmission
	Worn pressure plate, disc or flywheel	Replace damaged components
	Broken or weak pressure springs	Replace pressure plate
	Sticking clutch pedal	Lubricate clutch pedal & linkage

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

Failure to
Release

Incorrect release lever or See CLUTCH article pedal adjustment

Worn or broken clutch Replace clutch disc facings

Bent clutch disc or Replace damaged pressure plate components

Clutch disc hub binding on Clean or replace clutch input shaft disc and/or input shaft

Binding pilot bearing Replace pilot bearing

Sticking release bearing Replace release bearing sleeve 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

Dry or binding clutch Lubricate and align pedal hub components

Floor mat interference Lay mat flat in proper with pedal area

switch

	Dry or pivots	binding ball/fork	Lubricate and align components
	Faulty	clutch cable	Replace clutch cable
Noisy Clutch	Faulty	interlock switch	Replace interlock
Pedal			

Self-adjuster ratchet Lubricate or replace noise self-adjuster

Speed control interlock Lubricate or replace switch interlock switch

Clutch Pedal Binding clutch cable See CLUTCH article

Sticks Down

Springs weak in pressure Replace pressure plate plate

Binding in clutch linkage Lubricate and free linkage

Noisy	Dry release bearing	Lubricate or replace release bearing
Noisy	Dry or worn pilot bearing	Lubricate or replace bearing
Noisy	Worn input shaft bearing	Replace bearing
Transmission Click	Weak springs in pressure plate	Replace pressure plate
	Release fork loose on ball stud	Replace release fork and/or ball stud
	Oil on clutch disc damper	Replace clutch disc
	Broken spring in slave	Replace slave cylinder

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

Knock

This is very similar to a chuckle, though it may be louder, and occur on acceleration or deceleration.

Knock can be caused by a gear tooth that is damaged on the drive side of the ring and pinion gears. Ring gear bolts that are hitting the carrier casting can cause knock. Knock can also be due to excessive end play in the axle shafts.

Clunk

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

- 1) Raise vehicle on a frame or twinpost hoist so that drive wheels are free. Clamp a bar between axle companion flange and a part of the frame or body so that flange cannot move.
- 2) On conventional drive axles, lock the left wheel to keep it from turning. On all models, turn the right wheel slowly until it is felt to be in Drive condition. Hold a chalk marker on side of tire about 12” from center of wheel. Turn wheel in the opposite direction until it is again felt to be in Drive condition.

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

Bearing Whine

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by malfunctioning pinion bearings. Pinion

bearings operate at drive shaft speed. Roller wheel bearings may whine in a similar manner if they run completely dry of lubricant. Bearing noise will occur at all driving speeds. This distinguishes it from gear whine, which usually comes and goes as speed changes.

Bearing Rumble

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

Chatter On Turns

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

Axle Shaft Noise

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

If vehicle displays this noise condition, remove suspect axle shafts, replace wheel seals and install a new set of bearings.

Re-evaluate vehicle for noise before removing any internal components.

Vibration

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

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

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

DRIVE AXLE – RWD TROUBLE SHOOTING

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DRIVE AXLE (RWD) TROUBLE SHOOTING

CONDITION POSSIBLE CAUSE CORRECTION

Knocking or Clunking

Differential Side Gear

Clearance Check Clearance

Worn Pinion Shaft Replace Pinion Shaft Axle Shaft End Play Check End Play Missing Gear Teeth Check Differential/

Replace Gear

Wrong Axle Backlash Check Backlash

Misaligned Driveline Realign Driveline

Clinking During Engagement

Side Gear Clearance Check Clearance

Ring and Pinion Backlash Check Backlash Worn/Loose Pinion Shaft Replace Shaft/Bearing Bad "U" Joint
Replace "U" Joint Sticking Slip Yoke Lube Slip Yoke

Broken Rear Axle Mount Replace Mount

Loose Drive Shaft Flange Check Flange

Click/Chatter On Turns

Differential Side Gear

Clearance Check Clearance

Change Lubricant

	Wrong Turn On Plates	(1)	Replace Clutch Plates
	Wrong Differential Lubricant (1)		
Knock Or Click	Flat Spot on Rear		

Wheel Bearing Replace Wheel Bearing

Low Vibration At All Speeds

Faulty Wheel Bearing Replace Wheel Bearing

Faulty "U" Joint Replace "U" Joint Faulty Drive Shaft Balance Drive Shaft Faulty Companion Flange

Replace Flange Faulty Slip Yoke Flange Replace Flange

(1) – Limited slip differential only.

FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING

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BASIC FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE

Grease Leaks CV boot torn or cracked

Clicking Noise on Cornering Damaged outer CV Clunk Noise on Acceleration Damaged inner CV

Vibration or Shudder Sticking, damaged or worn CV

on Acceleration Misalignment or spring height

STEERING & SUSPENSION

MANUAL STEERING GEAR TROUBLE SHOOTING

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BASIC MANUAL STEERING GEAR TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Rattle or Chucking Noise in Rack and Pinion	Rack and pinion mounting bracket loose	Tighten all mounting bolts
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	Lack of/or incorrect lubricant	Correct as necessary
Rattle or Chucking Noise in Rack and Pinion	Steering gear mounting bolts loose	Tighten all mounting bolts
Excessive Play	Front wheel bearing improperly adjusted	See FRONT SUSPENSION article
	Loose or worn steering linkage	See STEERING LINKAGE article
	Loose or worn steering gear shift	See MANUAL STEERING GEAR article
	Steering arm loose on gear shaft	See MANUAL STEERING GEAR article
	Steering gear housing bolts loose	Tighten all mounting bolts
	Steering gear adjustment too loose	See MANUAL STEERING GEAR article
	Steering arms loose on	Tighten and check
	knuckles	steering linkage
	Rack and pinion mounting	Tighten all mounting
	loose	bolts
	Rack and pinion out of adjustment	See adjustment in STEERING article
	Tie rod end loose	Tighten and check steering linkage
	Excessive Pitman shaft-to- ball nut lash	Repair as necessary
Poor Returnability	Lack of lubricant in ball joint or linkage	Lubricate and service systems
	Binding in linkage or ball joints	See STEERING LINKAGE and SUSPENSION article
	Improper front end alignment	See WHEEL ALIGNMENT article

	Improper tire pressure	Inflate to proper pressure
	Tie rod binding	Inflate to proper pressure
	Shaft seal rubbing shaft	See STEERING COLUMN article
Excessive Vertical Motion	Improper tire pressure	Inflate to proper pressure
	Tires, wheels or rotors out of balance	Balance tires then check wheels and rotors
	Worn or faulty shock absorbers	Check and replace if necessary
	Loose tie rod ends or steering	Tighten or replace if necessary
	Loose or worn wheel bearings	See SUSPENSION article
Steering Pulls to One Side	Improper tire pressure	Inflate to proper pressure
	Front tires are different sizes	Rotate or replace if necessary
	Wheel bearings not adjusted properly	See FRONT SUSPENSION article
	Bent or broken suspension components	See FRONT SUSPENSION article
	Improper wheel alignment	See WHEEL ALIGNMENT
		article

Brakes dragging See BRAKES article

pressure

Instability	Low or uneven	tire	Inflate to proper
	pressure		

Loose or worn wheel See FRONT SUSPENSION bearings article

Loose or worn idler arm See FRONT SUSPENSION bushing article

Loose or worn strut See FRONT SUSPENSION bushings article

Incorrect front wheel See WHEEL ALIGNMENT alignment article

Steering gear not See MANUAL STEERING

centered GEARS article

Springs or shock Check and replace if necessary

Improper cross shaft See MANUAL STEERING GEARS article

POWER STEERING TROUBLE SHOOTING

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BASIC POWER STEERING TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION Rattle or Pressure hoses touching Adjust to proper

Tighten and check, replace if necessary

fluid

	Worn shaft serrations	See STEERING COLUMN article		
Growl in Steering Pump	Excessive pressure in hoses	Restricted hoses, see POWER STEERING GEAR article		
	Scored pressure plates	See POWER STEERING GEAR article		
	Scored thrust plates or rotor	See POWER STEERING GEAR article		
	Extreme wear of cam ring	See POWER article	STEERING	GEAR
Rattle in Steering Pump	Vanes not installed	See POWER article	STEERING	PUMP
	Vanes sticking in rotor	See POWER article	STEERING	PUMP
Swish noise in Pump	Defective flow control valve	See POWER article	STEERING	PUMP
Groan in	Air in fluid	See POWER	STEERING	PUMP

Steering Pump		article		
	Poor pressure hose connection			
Squawk When Turning	Damper "O" ring on spool cut	valve	See POWER STEERING PUMP article	
Moan or Whine	Pump shaft bearing	scored	Replace bearing and	
in Pump				

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

missing or damaged article

Interference of See POWER STEERING PUMP

components in pump article

Loose or poor bracket Correct or replace if alignment necessary

article

Hissing When Parking	Internal steering	leakage in gear	Check valved assembly first
Chirp in Steering Pump	Loose or steering	worn power belt	Adjust or replace if necessary
Buzzing When	Noisy pump	See POWER STEERING PUMP	
Not Steering			

Free play in steering See STEERING COLUMN

shaft bearing article

Bearing loose on shaft See STEERING COLUMN

serrations article

Clicking Noise in Pump	Pump slippers too long	See POWER article	STEERING	PUMP
	Broken slipper springs	See POWER article	STEERING	PUMP

	Excessive wear or nicked rotors	See POWER article	STEERING	PUMP
	Damaged cam contour	See POWER article	STEERING	PUMP
Poor Return Wheel	of	Wheel rubbing against turn signal	See STEERING COLUMN SWITCHES article	
		Flange rubbing steering gear adjuster	See STEERING COLUMN article	
		Tight or frozen steering shaft bearing	See STEERING COLUMN article	
		Steering gear out of adjustment	See POWER STEERING GEAR article	
		Sticking or plugged spool valve	See POWER STEERING PUMP article	
		Improper front end alignment	See WHEEL ALIGNMENT article	
		Wheel bearings worn or loose	See FRONT SUSPENSION article	
		Ties rods or ball joints binding	Check and replace if necessary	
		Intermediate shaft joints binding	See STEERING COLUMN article	
		Kinked pressure hoses	Correct or replace if necessary	
		Loose housing head spanner nut	See POWER STEERING GEAR article	
		Damaged valve lever	See POWER STEERING GEAR article	
		Sector shaft adjusted too tight	See ADJUSTMENTS in POWER STEERING GEAR article	

		Worm thrust bearing adjusted too tight	See ADJUSTMENTS in POWER STEERING GEAR article
		Reaction ring sticking	See POWER STEERING GEAR
		in cylinder	article
		Reaction ring sticking in housing head	See POWER STEERING GEAR article
		Steering pump internal leakage	See POWER STEERING PUMP article
		Steering gear-to-column misalignment	See STEERING COLUMN article
		Lack of lubrication in linkage	Service front suspension
		Lack of lubrication in ball joints	Service front suspension
Increased Effort When Turning Wheel Fast		High internal pump leakage Power steering pump belt	See POWER STEERING PUMP article Adjust or replace if
Foaming, Milky Power Steering Fluid, Low Fluid		slipping Low fluid level	necessary Check and fill to
Level or Low Pressure		Engine idle speed too low	proper level Adjust to correct
			setting
		Air in pump fluid system	See POWER STEERING PUMP article
		Pump output low	See POWER STEERING PUMP article
		Steering gear malfunctioning	See POWER STEERING GEAR

		article
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
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	See POWER STEERING GEAR
	adjustment	article

Free play in pot coupling See POWER STEERING PUMP article

Steering gear coupling See POWER STEERING PUMP loose on shaft article

Steering disc mounting Tighten or replace if bolts loose necessary

Coupling loose on worm Tighten or replace if shaft necessary

Improper sector shaft See POWER STEERING GEAR adjustment article

Excessive worm piston See POWER STEERING GEAR side play article

Damaged valve lever See POWER STEERING GEAR article

Universal joint loose Tighten or replace if necessary

	Defective rotary valve	See POWER article	STEERING	GEAR	
No Power Parking	When	Sticking flow control valve	See POWER article	STEERING	PUMP
		Insufficient pump pressure output	See POWER article	STEERING	PUMP
		Excessive internal pump leakage	See POWER article	STEERING	PUMP
		Excessive internal gear	See POWER article	STEERING	PUMP
		leakage	article		

Flange rubs against gear See STEERING COLUMN

adjust plug 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 See STEERING COLUMN

misaligned article

No Power, Left Turn	Left turn reaction seal "O" ring worn	See POWER article	STEERING	GEAR
	Left turn reaction seal damaged/missing	See POWER article	STEERING	GEAR
	Cylinder head "O" ring	See POWER article	STEERING	PUMP
	damaged	article		
No Power,	Column pot coupling	See STEERING COLUMN		
Right Turns	bottomed	article		

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

Right turn reaction seal See POWER STEERING GEAR

damaged article

Internal leakage through See POWER STEERING GEAR

piston end plug article

Internal leakage through See POWER STEERING GEAR

side plugs article

incorrectarticle

Lack of Effort in Turning	Left and/or right reaction seal sticking in cylinder head	Replace, see POWER STEERING GEAR article		
Wanders to	One	Front end alignment	See WHEEL	ALIGNMENT
Side				

Unbalanced steering See POWER STEERING GEAR gear valve article

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

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

Extreme wear of cam ring Replace and check adjustments

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

Vanes not installed See POWER STEERING PUMP properly article

Vanes sticking in rotor See POWER STEERING PUMP slots article

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

STEERING COLUMN TROUBLE SHOOTING

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BASIC STEERING COLUMN TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

article

Noise in	Coupling pulled apart	See STEERING COLUMNS
Steering		

Shifting

Improper gate plate See STEERING COLUMN adjustment article

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

Broken weld nut on jacket See STEERING COLUMN article

Instrument bracket capsule See STEERING COLUMN sheared article

Column bracket/jacket Tighten bolts and check bolts loose bracket

Steering Locks Release lever mechanism See STEERING COLUMN in Gear article

SUSPENSION TROUBLE SHOOTING

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BASIC SUSPENSION TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Front End Noise Loose or worn wheel See Wheel Bearing Adjustment in SUSPENSION

Worn shocks or shock Replace struts or strut mountings mountings

Worn struts or strut Replace struts or strut mountings mountings

Loose or worn lower control See SUSPENSION
arm

Loose steering gear-to- See STEERING
frame bolts

Worn control arm bushings See SUSPENSION

Ball joints not lubricated Lubricate ball joints & see Ball Joint Checking in SUSPENSION

Front Wheel Tires or wheels out of Check tire balance

Shake, Shimmy, balance or Vibration

Incorrect wheel alignment See WHEEL ALIGNMENT

Drive shaft unbalanced Check drive shaft balance

Loose or worn wheel See WHEEL ALIGNMENT
bearings

Loose or worn tie rod ends See SUSPENSION

Worn upper ball joints See Ball Joint Checking in SUSPENSION

Worn shock absorbers Replace shock absorbers

Worn strut bushings Replace strut bushings

Car Pulls to Mismatched or uneven tires Check tire condition
One Side

Broken or sagging springs See SUSPENSION

Loose or worn strut See SUSPENSION
bushings

Improper wheel alignment See WHEEL ALIGNMENT Improper rear axle Check rear axle
alignment alignment

Power steering gear See STEERING
unbalanced

Front brakes dragging See BRAKES

Abnormal Tire Unbalanced tires Check tire balance & Wear rotation

Sagging or broken springs See SUSPENSION Incorrect front end See WHEEL ALIGNMENT
alignment

Faulty shock absorbers Replace shock absorbers

Scuffed Tires Toe-In incorrect See WHEEL ALIGNMENT Suspension arm bent or See appropriate
twisted SUSPENSION article

Springs Bottom Bent or broken springs See SUSPENSION
or Sag

Leaking or worn shock Replace shock absorbers absorbers

Frame misalignment Check frame for damage

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

WHEEL ALIGNMENT TROUBLE SHOOTING

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BASIC WHEEL ALIGNMENT TROUBLE SHOOTING CHART

CONDITION POSSIBLE CAUSE CORRECTION

Premature Tire Improper tire inflation Check tire pressure

Wear

Front alignment out of See ALIGNMENT SPECS in tolerance WHEEL ALIGNMENT section

Suspension components worn See SUSPENSION section

Steering system components See STEERING section worn

Improper standing height See WHEEL ALIGNMENT Uneven or sagging springs See SUSPENSION section

Bent wheel See WHEEL ALIGNMENT Improper torsion bar See SUSPENSION section adjustment

Loose or worn wheel See WHEEL BEARING ADJ. bearings in SUSPENSION section

Worn or defective shock Replace shock absorbers

Tires out of balance Check tire balance

Pulls to One Improper tire inflation Check tire pressure

Side

Brake dragging See BRAKE section

Mismatched tires See WHEEL ALIGNMENT Broken or sagging spring See SUSPENSION section Broken
 torsion bar See SUSPENSION section
 Power steering valve not See STEERING section centered
 Front alignment out of See WHEEL ALIGNMENT
 tolerance section
 Defective wheel bearing See WHEEL BEARINGS in
 SUSPENSION section
 Uneven sway bar links See SUSPENSION section Frame bent Check for frame damage Steering system
 bushing See STEERING section
 worn
 Hard Steering Idler arm bushing too tight See STEERING LINKAGE
 in STEERING section
 Ball joint tight or seized See SUSPENSION section
 Steering linkage too tight See STEERING LINKAGE in
 STEERING section
 Power steering fluid low Add proper amount of fluid
 Power steering drive belt See STEERING section loose
 Power steering pump See STEERING section defective
 Steering gear out of See STEERING section adjustment

	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
Vehicle "Wanders"	Strut rod or control arm bushing worn	See	SUSPENSION section
	Loose or worn wheel	See	WHEEL BEARINGS in

bearings SUSPENSION section

Improper tire inflation Check tire pressure

Stabilizer bar missing or See SUSPENSION section defective

Wheel alignment out of See Adjustment in tolerance WHEEL ALIGNMENT section

Broken spring See SUSPENSION section Defective shock absorbers Replace shock absorbers Worn
 steering & suspension See SUSPENSION section
 components

Front End Shimmy Tire out of balance/round Check tire balance Excessive wheel runout See WHEEL
 ALIGNMENT Insufficient or improper See WHEEL ALIGNMENT
 caster section

Worn suspension or steering See SUSPENSION section components

Defective shock absorbers Replace shock absorber

Wheel bearings worn or See WHEEL BEARING ADJ. loose in SUSPENSION section

Power steering reaction See STEERING section

Bracket loose

Steering gear box (rack) See STEERING section mounting loose

Steering gear adjustment See STEERING section loose

Worn spherical joints See SUSPENSION section

Toe-In Not Lower control arm bent See SUSPENSION section

Adjustable

Frame bent Check frame for damage

Camber Not Control arm bent See SUSPENSION section

Adjustable

Frame bent Check frame for damage

Hub & bearing not seated See SUSPENSION section properly