

# COLT 2310, 2510, AND 2712 COMPACT TRACTORS

## CHAPTER 9 TROUBLE SHOOTING AND ANALYSIS

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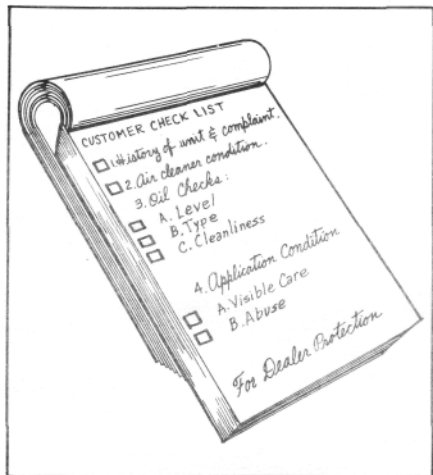


Figure 9-A-1

**9-A-1 UPON RECEIVING AN ENGINE FOR REPAIR.** Learn the history of the unit from the customer. While the customer is present follow the suggested procedure below.

1. Note customer's complaints through an interview.
2. Check air cleaner condition.
  - a. How Dirty?
  - b. Is air cleaner, base, cover and element present and in good condition?
3. Check oil.
  - a. Is level correct — too high, too low?
  - b. Is oil sludged and gritty — (black oil is normal) See Paragraph 5-C-1.
  - c. What type of oil is used?  
Note: Brand, test weight, A.P.I. Classification.
4. The engine and application condition
  - a. Is the unit clean — free from oil and dirt?
  - b. Are the cooling fins clean and free from accumulated clippings, etc.
  - c. Is the application well lubricated?
  - d. Are blades sharp and balanced?
  - e. Are all fasteners in place and tight?

**9-B-1 TROUBLESHOOTING.** Below is a list of common problems and remedies. Follow a uniform procedure to locate and eliminate the causes.

**A. ENGINE FAILS TO START OR STARTS WITH DIFFICULTY**

Cause	Remedy
No fuel in tank.	Fill tank with clean, fresh fuel.
Shut-off valve closed.	Open valve.
Obstructed fuel line.	Clean fuel screen and line. If necessary, remove and clean carburetor.
Tank cap vent obstructed.	Open vent in fuel tank cap.
Water in fuel.	Drain tank. Clean carburetor and fuel lines. Dry spark plug electrodes. Fill tank with clean, fresh fuel.
Engine over-choked.	Close fuel shut-off and pull starter until engine starts. Reopen fuel shut-off for normal fuel flow.
Improper carburetor adjustment.	Adjust carburetor. (See paragraph 2-B-1).
Loose or defective magneto wiring.	Check magneto wiring for shorts or grounds; repair if necessary.
Faulty magneto.	Check timing, point gap, and if necessary, overhaul magneto (See paragraph 8-A-3).
Spark plug fouled.	Clean and regap spark plug.
Spark plug porcelain cracked.	Replace spark plug.
Poor compression.	Check compression (par. 9-D-1) and make necessary repairs.

**B. ENGINE KNOCKS**

Cause	Remedy
Carbon in combustion chamber.	Remove cylinder head or cylinder and clean carbon from head and piston.
Loose or worn connecting rod.	Replace connecting rod (par. 5-C-1).
Loose flywheel.	Check flywheel key and keyway; replace parts if necessary. Tighten flywheel nut to proper torque (Table of Specifications).
Worn cylinder.	Recondition cylinder (par. 4-A-1, 5-A-1, 5-B-1 and Fig. 5-A-3).
Improper magneto timing.	Time ignition (par. 8-A-3).
Excessive main bearing end play.	Readjust to correct crankshaft end play (par. 7-A-8 thru 7-A-15).

### C. ENGINE MISSES UNDER LOAD

Cause	Remedy
Spark plug fouled.	Clean and regap spark plug.
Spark plug porcelain cracked.	Replace spark plug.
Improper spark plug gap.	Regap spark plug.
Pitted magneto breaker points.	Clean and dress breaker points. Replace badly pitted breaker points. (par. 8-A-3).
Magneto breaker arm sluggish.	Clean and lubricate breaker point rod and arm. Check for spring tension.
Faulty condenser.	Check condenser on a tester (par. 8-B-4); replace if defective.
Improper carburetor adjustment.	Adjust carburetor (par. 2-B-1).
Improper valve clearance.	Adjust valve clearance (par. 6-A-1 and 6-A-4).
Weak valve spring.	Replace valve spring (par. 6-A-3).

### D. ENGINE LACKS POWER

Cause	Remedy
Choke partially closed.	Open choke.
Improper carburetor adjustment.	Adjust carburetor (par. 2-B-1).
Magneto improperly timed.	Time engine (par. 8-A-3).
Loss of compression.	Check compression (par. 9-D-1) and make necessary repairs.
Lack of lubrication.	Fill crankcase to the proper level.
Air cleaner restricted.	Clean air cleaner (par. 2-A-1 or 2-A-2).
Valves leaking.	Grind valves.
Valve timing inaccurate.	Check timing marks on camshaft and crankshaft gear (par. 6-B-2).
Carburetor dirty or damaged.	Clean and repair carburetor. See Carburetor Chapter II.
Ignition system malfunction.	Check and repair system. See Ignition Chapter 8.

### E. ENGINE OVERHEATS

Cause	Remedy
Engine improperly timed.	Time engine (par. 8-A-3).
Carburetor improperly adjusted (lean).	Adjust carburetor (par. 2-B-1).
Air flow obstructed.	Remove any obstructions from air passages in shrouds. (par. 1-A-4).

# ENGINE OVERHEATS (Cont.)

Cause	Remedy
Cooling fins clogged.	Clean cooling fins. (par. 1-A-4).
Excessive load on engine.	Check operation of associated equipment. Reduce excessive load (par. 1-B-2, Point 5).
Carbon in combustion chamber.	Remove cylinder head and clean carbon from head and piston.
Lack of lubrication.	Fill crankcase to proper level.

## F. ENGINE SURGES OR RUNS UNEVENLY

Cause	Remedy
Fuel tank cap vent hole clogged.	Open vent hole.
Governor parts sticking or binding.	Clean, and if necessary repair governor parts.
Carburetor throttle linkage or throttle shaft and/or butterfly binding or sticking.	Clean, lubricate, or adjust linkage and deburr throttle shaft or butterfly.
Governor not properly adjusted.	Adjust governor (par. 2-C-5).
Carburetor not properly adjusted.	Adjust carburetor (par. 2-B-1).

## G. ENGINE VIBRATES EXCESSIVELY

Cause	Remedy
Engine not securely mounted.	Tighten loose mounting bolts (par. 1-B-2).
Bent crankshaft.	Replace crankshaft.
Associated equipment out of balance.	Check associated equipment.

## H. ENGINE USES EXCESSIVE AMOUNT OF OIL

Cause	Remedy
Engine speed too fast.	Using tachometer adjust engine RPM to spec. (par. 2-C-6 and 2-C-7).
Oil level too high.	Check level — turn dipstick cap tightly into receptacle for accurate level reading.
Oil filler cap loose or gasket damaged causing spillage out of breather.	Replace ring gasket under cap and tighten cap securely.
Breather mechanism damaged or dirty causing leakage.	Replace breather assembly (see par. 4-A-5).
Drain hole in breather box clogged causing oil to spill out of breather.	Clean hole with wire to allow oil to return to crankcase (see par. 6-A-1).
Gaskets damaged or gasket surfaces nicked causing oil to leak out.	Clean and smooth gasket surfaces. Always use new gaskets.

# ENGINE USES EXCESSIVE AMOUNT OF OIL (Cont.)

Cause	Remedy
Valve guides worn excessively thus passing oil into combustion chamber.	Ream valve guide oversize and install 1/32" oversize valve (see par. 6-A-1).
Cylinder wall worn or glazed allowing oil to pass rings into combustion chamber.	Bore hole or deglaze cylinder as necessary (see par. 4-A-1, 4-A-2, 5-A-1 and 5-B-1).
Piston rings and grooves worn excessively.	Reinstall new rings and check land clearance and correct as necessary. (see par. 5-A-1 and 5-A-3).
Piston fit undersized.	Measure and replace as necessary. (See par. 5-A-2 and 5-A-3).
Piston oil control ring return holes clogged.	Remove oil control ring and clean return holes.
Oil passages obstructed.	Clean out all oil passages.

## I. OIL SEAL LEAKS

Cause	Remedy
Old seal hardens and is worn.	Replace old, hardened seal. (par. 7-B-1 and 7-B-2).
Crankshaft seal contact surface is slightly scratched causing seal to wear excessively.	Crankshaft seal rubbing surface must be smoothed before installing new seal. Use a fine crocus cloth. Care must be taken when removing seals.
Crankshaft seal contact surface is worn undersize causing seal to leak.	Check crankshaft size and replace if worn excessively.
Crankshaft bearing under seal is worn excessively causing crankshaft to wobble in oil seal.	Check crankshaft bearings for wear and replace if necessary. Par. 7-A-1
Seal outside seat in cylinder or side cover is damaged allowing oil to seep around outer edge of seal.	Visually check seal receptacle for nicks and damage. Replace P.T.O. cylinder cover or small cylinder cover on the magneto end, if necessary.
New seal installed without correct seal driver and not seating squarely in cavity.	Replace with new seal using proper tools and methods. (see par. 7-B-1 and 7-B-2).
New seal damaged upon installation.	Use proper seal protector tools and methods for installing another new seal. (see par. 7-B-1 and 7-B-2).
Bent crankshaft causing seal to leak.	Check crankshaft for straightness and replace if necessary.
Oil seal driven too far into cavity.	Remove seal and replace with new seal using the correct driver tool and procedures. (see par. 7-B-1 and 7-B-2).



# J. BREATHER PASSING OIL

Cause	Remedy
Engine speed too fast.	Use tachometer to adjust correct RPM. (See par. 2-C-6 and 2-C-7).
Loose oil fill cap or gasket damaged or missing.	Install new ring gasket under cap and tighten securely.
Oil level too high.	Check oil level — Turn dipstick cap tightly into receptacle for accurate level reading. DO NOT fill above full mark.
Breather mechanism damaged.	Check reed plate and assembly and replace complete unit. (See par. 4-A-5).
Breather mechanism dirty.	Clean thoroughly in solvent. Use new gaskets when reinstalling unit. (See par. 4-A-5).
Drain hole in breather box clogged.	Clean hole with wire to allow oil to return to crankcase. (See par. 4-A-1).
Piston ring end gaps aligned.	Rotate end gaps so as to be staggered 90° apart. (See par. 5-A-1 and 5-A-2).
Breather mechanism installed upside down.	Small or drain holes must be down to drain oil from mechanism (See par. 4-A-5).
Breather mechanism loose or gaskets leaking.	Install new gaskets and tighten securely.
Damaged or worn oil seals on end of crankshaft.	Replace seals (See par. 7-B-1 and 7-B-2).
Rings not seated properly.	Check for worn or out of round cylinder. Replace rings. Break in new rings with engine working under a varying load. Rings must be seated under high compression or in other words under varied load conditions. (See par. 5-B-1 and 5-B-2). (Also see 1-B-3).
Breather assembly not assembled correctly.	(See par. 4-A-5).
Cylinder cover gasket leaking.	Replace cover gaskets. (See Par. 7-A-8 through 7-A-15).

#### 9-C-1 ENGINE TUNE-UP PROCEDURE.

- a. Inspect air cleaner; service or replace air cleaner if necessary. See Paragraph 2-A-1 and 2-A-2.
- b. Clean fuel lines, fuel filter and tank.
- c. Check engine compression. See Paragraph 9-D-1 and 9-D-2.
- d. Check spark plug; clean regap or replace.
- e. Check operation of governor. Adjust governor as described in paragraphs 2-C-5 to 2-C-7.
- f. Check magneto as described in Paragraphs 8-B-1 and 8-B-6. Adjust breaker point gap as described in paragraph 8-A-3. Inspect magneto, condenser, and breaker point connections.
- g. Fill crankcase with oil and fill fuel tank with clean regular gasoline.
- h. Start engine. If engine does not start, refer to trouble chart in preceding paragraph 9-B-1.
- i. Adjust carburetor as described in paragraph 2-B-5.
- j. Run engine, checking frequently for signs of improper operation.



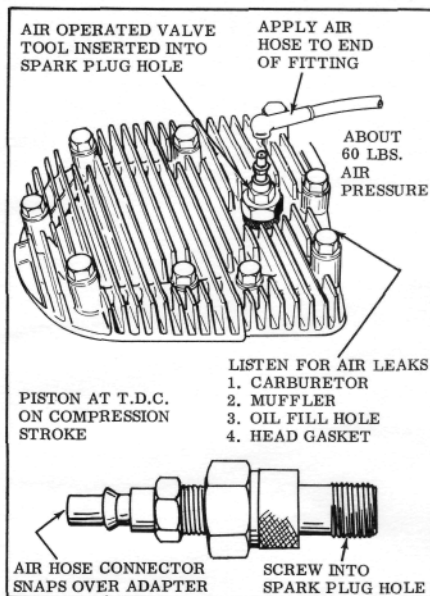


Figure 9-D-1

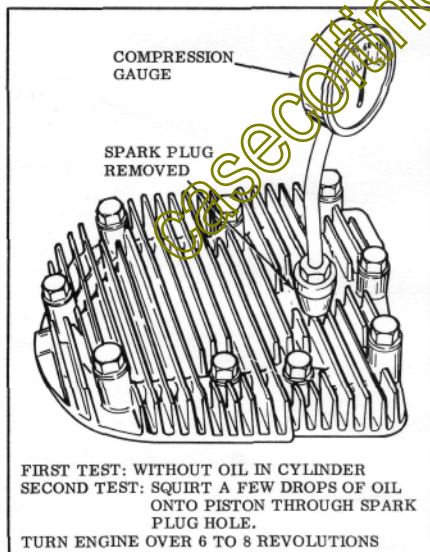


Figure 9-D-2

**9-D-1 COMPRESSION LEAK TEST.** A quick method to pinpoint compression leakage is to force compressed air into the combustion chamber and observe possible air leaks.

An "air operated valve tool" can be inserted in place of the spark plug. It contains a fitting which will adapt to a common air hose through which compressed air will pass. The tool can be obtained from most automotive supply centers.

Rotate the engine to T.D.C. on the compression stroke, this will close the valves. Secure the air hose adaptor into the spark plug hole. Force about 60 pounds of air pressure into the combustion chamber.

While air is being forced through the fitting listen for leakage at the following points:

1. Through muffler - Indicates leaky exhaust valve.
2. Carburetor - Indicates intake valve leak.
3. Remove oil filler plug and listen at fill hole - Air leakage at hole would indicate worn or damaged rings, piston or cylinder.
4. Around Head gasket - This would indicate damaged head gasket or warped head gasket surface. Apply a soapy solution around the head gasket area. The air bubbling through the solution will pinpoint the leak holes more quickly.

**9-D-2 COMPRESSION TEST METHOD II.** Use a standard compression gauge to check for compression loss. Insert end of gauge into the spark plug hole and crank over engine six to eight revolutions. The minimum gauge reading should be 60 pounds or more.

If compression reading is low, using this method of pinpointing the exact cause for leakage is difficult to determine. Rings, piston and cylinder condition can be checked by squirting a few drops of oil into the cylinder and retesting the compression. The oil will temporarily seal leakage around the rings if leakage is occurring at this point. If this test shows a high compression reading then all indications point to ring wear or damage. If little or no difference in reading results then the leak is either in the valves, head or some other area.

**IMPORTANT:** Carburetor throttle must be fully open when making compression tests.