



Ingersoll

**TROUBLESHOOTING
THE ENGINE
Service Manual 8-55130**

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INTRODUCTION

This service manual section, "Troubleshooting the Engine" contains a concise listing of Symptom--Possible Cause--Probable Remedy for many engine problems.

Use an orderly process of elimination when troubleshooting. First eliminate the possible causes that are easy to check or test. Then move into the more complex areas that may require disassembly or more difficult tests.

Refer to the appropriate service manual for proper repair procedures. Refer to the electrical system service manual for troubleshooting the tractor electrical system. (The ignition system is the only electrical area covered in this service manual.)

A. ENGINE FAILS TO START - FUEL RELATED (ENGINE CRANKS PROPERLY)

CAUSE	REMEDY
1. No fuel in tank.	Fill tank with clean, fresh fuel.
2. Water in fuel.	Drain tank, lines, carburetor. Fill tank with clean, fresh fuel. Dry spark plug(s).
3. Fuel shut off valve closed (if equipped).	Open fuel shut off valve.
4. Vent in fuel tank cap restricted or wrong cap on tank.	Clean vent. Use properly vented cap.
5. Obstructed fuel line, filter screen in tank outlet fitting or auxiliary filter.	Clean or replace fuel line or filter as required.
6. Fuel line collapsed, pinched or kinked.	Route fuel line to eliminate kinks and pinch points. Replace soft rubber hose with one with fabric reinforcement if required.
7. Fuel line routed "high" preventing flow on gravity feed systems.	Route fuel line to eliminate "high" points and air locks.
8. Fuel line loose at fuel pump inlet or connected to wrong nipple.	Secure fuel line with a good hose clamp, check connections and change if incorrect.
9. Faulty fuel pump. (Pump worn, damaged or misassembled.)	Repair or replace fuel pump as required. Inspect diaphragm, spring and check valves (or reed valves).
10. If equipped with a vacuum operated fuel pump. Vacuum line between fuel pump and engine block loose or leaking. (For Model 646 - vacuum line filling with oil.)	Replace, reposition, or clamp vacuum line as required.
11. If equipped with a vacuum operated fuel pump. Lack of crankcase vacuum.	Measure crankcase vacuum with "U" - tube manometer. If crankcase is pressurized, clean breather, check for air leaks and excessive blowby.
12. Vapor lock.	Check for leaking exhaust connections, plugged cooling air screen of fins or other causes of high under hood temperatures.
13. Improper carburetor adjustments.	Adjust carburetor.
14. Excessively lean mixture.	a. Choke not closing. Check for loose clip (Onan) or interference with hood (Kohler). b. Carburetor gasket or intake manifold gaskets leaking. Cracked intake manifold. Repair or replace as required.
15. Engine overchoked (flooded).	Open choke. Dry spark plug electrodes or let engine stand for 15 to 30 minutes. Check for plugged air cleaner.
16. Dirt in needle valve.	Clean needle valve/seat.
17. Float sticking in carburetor bowl.	Inspect float. (Foam floats used in some Model 446, 448, 648 can swell and stick if fuel containing alcohol is used.)

B. ENGINE FAILS TO START - NO SPARK - ENGINE CRANKS PROPERLY

CAUSE	REMEDY
1. Fouled or faulty spark plug.	Clean and re-gap or replace spark plug. Change oil if raw fuel has diluted it.
2. High tension lead grounded or open (or high resistance in lead).	Test high tension lead for continuity. Replace if necessary. (On Kohler equipped tractors check for clearance and possible grounding between hood and spark plug boot.)
3. On battery ignition models wire from coil " - " terminal to points open or shorted to ground.	Check for opens and shorts to ground. Replace wire if required. (Open points prior to this check.)
4. On battery ignition models - no battery voltage to coil " + " terminal.	Check for open circuit to coil " + " terminal.
5. a. Points dirty or corroded. b. Points oily.	a. Clean or replace points. b. Eliminate source of oil. Crankcase pressure. Seal screw threads (Oran). Worn plunger or plunger hole.
6. Points not opening and closing.	Check for stuck or worn point push rod. Set point gap.
7. Condenser shorted to ground or open.	Test and replace condenser. (Engine may run erratically if condenser is open.)
8. Defective coil.	Replace coil.
9. For magneto ignition models (and 444 1968 solid state only). Magneto (kill) wire grounded.	Check for shorts to ground and a defective key switch. Replace wire or switch as required.
10. For magneto ignition models - loose or defective magneto wiring or magneto.	Check magneto wiring for shorts or grounds - check timing and point gap. Repair if necessary.

C. ENGINE FAILS TO START - COMPRESSION RELATED

NOTE: If using a compression gauge be sure to:

- a. have choke and throttle fully open and air cleaner element removed.
- b. have battery fully charged.
- c. have engine warm (or at room temperature).

CAUSE	REMEDY
1. Head gasket leaking.	Replace head gasket. Tighten cylinder head bolts to specified torque. Replace bolts or studs if torque does not hold. Check for warp in head or block.
2. Valve stuck open or leaking.	<ol style="list-style-type: none">a. Remove head. Check for burned or leaking valve.b. Remove head. Check for foreign object or deposits trapped between valve and seat.c. Check for proper valve lash adjustment.d. Check for loose keeper or other obstruction in valve chamber.e. If valve sticks open only when hot, remove valve and ream valve guides.
3. Worn rings and cylinder bore.	Hone or rebore engine as required. Wash thoroughly with soap and water. Replace piston/rings as required.
4. Automatic compression release not closing (Kohler equipped tractors).	Repair automatic compression release.
5. Excessive paracitic load.	Check for winter starting requirements - Light weight oil, etc. Check for hyd. PTO engaged. Kohler - check for ACR not opening.

D. ENGINE MISFIRES

CAUSE	REMEDY
1. Condenser connected to wrong coil terminal, faulty condenser, or condenser missing.	Condenser must be connected to the coil "—" terminal. This is the same terminal as the wire to the breaker points. Replace condenser if faulty.
2. Spark plug gap too narrow.	Set spark plug gap to .35" for Kohler engines. Use correct spark plug and spark plug gap. Check specifications.
3. Point gap wrong or dirty.	Clean points, set proper gap.
4. Point push rod worn or sticking.	Clean or replace rod as required.
5. Wrong coil installed.	Check specifications. Install correct coil.
6. Improper carburetor adjustment.	Adjust carburetor.
7. Carburetor or manifold gasket leaking.	Check and tighten or replace gasket as required. Tighten to proper torque only.
8. Improper valve clearance.	Adjust valve clearance.
9. Weak valve spring, valve sticking in guide or wrong spring installed. Valve keeper loose or dislodged.	Replace valve spring or ream valve guide as required. Check keepers.

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E. ENGINE LACKS POWER

CAUSE	REMEDY
1. Lack of lubrication or crankcase overfull.	Fill crankcase to the proper level.
2. Choke partially closed.	Open choke.
3. Dirty air cleaner.	Clean or replace air cleaner.
4. Improper carburetor adjustment.	Adjust carburetor.
5. Carburetor dirty or damaged.	Clean and repair carburetor.
6. Improper governor adjustment or governor malfunctioning.	Check governor adjustment and function.
7. Ignition improperly timed. Faulty coil, dirty points or push rod sticking.	Adjust ignition timing. Check coil and push rod. Clean or replace points.
8. Head gasket leaking.	If head or cylinder not warped, replace gasket. Tighten head bolts to proper torque.
9. Valves leaking.	Grind valves and valve seats.
10. Worn piston rings or bore.	Replace piston rings. Hone or rebore engine as required.
11. Twin cylinder engine - firing on one cylinder only.	Check for cause and repair.
12. Excessive parasitic load on engine.	Check hydraulic connections, mower bearings, etc.
13. 10 HP Kohler only - low compression cylinder head.	Remove head and check depth. Should be .022" to 0.32" (0.56 to 0.81 mm) deep.
14. Carbon in combustion chamber.	Remove cylinder head and clean carbon from head and piston.

F. ENGINE OVERHEATS

CAUSE	REMEDY
1. Air flow obstructed.	Remove any obstructions from air passages in shrouds and tractor heat exchanger if equipped.
2. Cooling fins clogged.	Remove sheet metal and clean cooling fins.
3. One or more air cooling baffles missing.	Install all air baffles properly.
4. Leaking exhaust system allowing recirculation of hot air.	Seal exhaust system.
5. Excessive load on engine.	Check operation of associated equipment. Reduce excessive load. Reduce ground speed, raise mower, check for seized pulley bearings, etc.
6. Lack of lubrication/or crankcase overfull.	Fill crankcase to proper level.
7. Engine running at reduced throttle setting and lugging.	Advance throttle to prevent engine from lugging. Reduce excessive load.
8. Carburetor improperly adjusted.	Adjust carburetor.
9. Ignition improperly timed.	Adjust ignition timing. (Use automotive timing light.)
10. Carbon in combustion chamber.	Remove cylinder head and clean carbon from head and piston.
11. Valves not opening fully.	Adjust lash. Check for worn cam shaft lobes.

G. ENGINE SURGES, RUNS UNEVENLY OR STOPS AFTER A SHORT TIME

NOTE: A small amount of governor hunting or surging is normal when the engine is under no load.

CAUSE	REMEDY
1. SEE "ENGINE FAILS TO START" SECTION OF THIS MANUAL.	
2. Governor sensitivity spring in wrong hole.	Install spring correctly.
3. Governor parts binding.	Repair governor parts as required.
4. Carburetor throttle shaft binding.	Clean, lubricate or deburr throttle shaft as required.

H. ENGINE VIBRATES EXCESSIVELY OR NORMAL VIBRATION TRANSMITTED TO TRACTOR FRAME

CAUSE	REMEDY
1. Low idle speed too slow.	Adjust idle speed to correct RPM.
2. Engine not securely mounted.	Tighten loose mounting bolts. Check for worn rubber mounts.
3. Associated equipment out of balance.	Check associated equipment.
4. Loose blade adapter and/or pulley.	Tighten loose parts.
5. Excessive run out of attachment drive clutch hub.	Inspect surface where hub mounts to flywheel. Replace hub or remove burrs from flywheel as required.
6. Loose flywheel.	Inspect crankshaft, flywheel, and key. Replace damaged components. Tighten to proper torque.
7. Bent crankshaft.	Replace crankshaft.
8. Worn balance gear bearings (early Kohler 14 HP).	Replace balance gears.
9. Attachment drive clutch guide hitting oil pan.	Reform guide to obtain clearance.
10. Mounting bolts backed out and touching tractor frame.	Check and tighten mounting bolts.

I. BREATHER PASSING OIL (PRESSURE IN CRANKCASE - HIGH OIL CONSUMPTION)

CAUSE	REMEDY
1. Engine speed too fast.	Use tachometer to adjust correct RPM. High idle is 3600 RPM.
2. Loose oil fill cap. Gasket or o-ring damaged or missing.	Install new gasket or o-ring and tighten cap securely.
3. Oil level too high.	Check oil level - Turn dipstick cap into receptacle for accurate level reading. DO NOT fill above full mark.
4. Breather assembly damaged.	Check breather assembly and replace damaged parts.
5. Breather assembly dirty.	Clean breather assembly thoroughly in solvent.
6. Drain hole in breather assembly clogged.	Clean hole with wire to allow oil to return to crankcase.
7. Breather assembly installed upside down/incorrectly.	Check service manual for proper assembly.
8. Breather assembly loose or gaskets leaking.	Install new gaskets and tighten to the correct torque.
9. Damaged or worn oil seals on ends of crankshaft. (Worn front main bearings on Onan.)	Replace seals.
10. Piston ring end gaps aligned.	Stagger end gaps 90° apart.
11. Rings not seated properly or bore scratched or worn resulting in excessive blowby.	Check for worn or out of round cylinder. Hone or rebore as required. Replace rings. Break in new rings with engine working under a varying load.
12. Restricted air cleaner element. For engines with breather venting inside air cleaner.	Clean or replace the air cleaner element.
13. For Onan Models BF, B43 and B48 engines only:	See Onan Engine Service Manual:
a. Oil pressure relief valve plunger missing.	Install oil pressure relief valve plunger.
b. Plug for cross drilling missing.	Install plug for cross drilling.
c. Plug in oil pump missing.	Install plug in oil pump.
14. Oil pan or other gasket leaking.	Replace gaskets as required.
15. On Kohler equipped tractors - hole from crankcase to valve chamber closed. (Crankcase pressure can cause dipstick to pop out. Oil will leak from governor shaft but not breather.)	Clear hole of casting slag.
16. Worn valve guides.	Replace valve guides.
17. Only one cylinder firing on twin cylinder engines.	Repair as required.

J. ENGINE KNOCKS

CAUSE	REMEDY
1. Improper spark plug gap. 2. Improper ignition timing. 3. Engine or engine mounting bolts loose and striking tractor frame or attachment drive clutch rod retainer. 4. Carbon in combustion chamber. 5. Worn cylinder bore or piston. 6. Loose or worn crankshaft and/or connecting rod. Loose flywheel. 7. Crankshaft or camshaft end play too large.	Set the spark plug to the correct gap. Time ignition. Tighten mounting bolts. Replace engine mounts if worn or damaged. Remove cylinder head and clean carbon from head and piston. Rebore or replace block. Repair or replace crankshaft and replace connecting rod. Check flywheel key and keyway; replace parts if necessary. Tighten flywheel nut to proper torque. Shim crankshaft and/or camshaft to specification.

K. ENGINE OVERSPEEDS

CAUSE	REMEDY
1. Throttle high idle stop loose or misadjusted. 2. Governor arm (or other linkage) loose or disconnected. 3. Governor arm misadjusted. 4. Internal governor parts loose or broken.	Adjust and tighten high idle stop. Connect and tighten governor arm or linkage. Adjust governor. Disassemble engine and repair as required.

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