

ENGINE - 3TNV76 DIAGNOSTICS

Excessive Fuel Consumption

Symptom: Excessive Fuel Consumption

Problem	Cause - Solution
1. Compression leakage from valve seat.	a. Grind valve seat; regrind valves.
2. Engine running too cool.	a. Check thermostat.
3. Excessive volume of fuel injected.	a. Check fuel injector pump and injectors.
4. Poor fuel injection pattern.	a. Clean or replace fuel injector nozzles.

Incorrect Manifold Pressure

Symptom: Low Manifold Pressure

Problem	Cause - Solution
1. Clogged air filter.	a. Clean or replace air filter.
2. Engine at high altitude/temperature.	a. Use higher output engine.
3. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.
4. Compression leakage from valve seat	a. Grind valve seat; regrind valves.
5. Seized intake/exhaust valve.	a. Replace valve and check valve guide.

Symptom: High Manifold Pressure

Problem	Cause - Solution
1. Excessive volume of fuel injected.	a. Check fuel injector pump and injectors.

Low Engine Compression

Symptom: Low Engine Compression

Problem	Cause - Solution
1. Oil filter clogged.	a. Replace oil filter.
2. Improper engine oil viscosity/type.	a. Replace engine oil and filter.
3. Excessive volume of fuel injected.	a. Check fuel injector pump and injectors.
4. Compression leakage from valve seat.	a. Grind valve seat; regrind valves.
5. Intake/Exhaust valves worn.	a. Check valve guides and stems.
6. Seized intake/exhaust valve.	a. Replace valve and check valve guide.
7. Piston ring, piston or cylinder worn.	a. Bore or hone cylinder and replace piston.
8. Broken or seized piston ring.	a. Replace rings and check cylinder.
9. Crankshaft pin or bearing seized.	a. Regrind crank and replace bearings.
10. Piston ring end gaps not correct.	a. Stagger piston ring gaps.
11. Piston rings installed incorrectly.	a. Install piston rings correctly.
12. Foreign matter in combustion chamber.	a. Remove head and inspect for damage.

Engine Starting Problem

Symptom: Engine Does Not Start

Problem	Cause - Solution
1. Battery voltage low.	a. Recharge battery.
2. Starting motor defective.	a. Repair or replace starting motor.
3. Alternator defective.	a. Repair or replace alternator.
4. Open circuit in wiring.	a. Repair wiring.
5. Faulty fuel shutoff solenoid circuit or fuel shutoff solenoid.	a. Test electrical circuit, replace fuel shutoff solenoid.
6. Fuel filter clogged.	a. Replace fuel filter.

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Symptom: Engine Does Not Start

Problem	Cause - Solution
7. Clogged or cracked fuel lines.	a. Clean or replace fuel lines.
8. Fuel volume to injection pump low.	a. Check or replace fuel transfer pump.
9. Water in fuel.	a. Check and repair.
10. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.
11. Improper timing between injection pump, intake and exhaust valves.	a. Adjust valve clearance. Check valve timing.
12. Seized intake/exhaust valve.	a. Replace valve and check valve guide.
13. Broken or seized piston ring.	a. Replace rings and check cylinder.
14. Piston ring, piston or cylinder worn.	a. Bore or hone cylinder and replace piston.
15. Crankshaft pin or bearing seized.	a. Regrind crank and replace bearings.
16. Air entering fuel system.	a. Check and repair fuel supply system.

Symptom: Engine Starts But Does Not Continue Running - Exhaust Smoke Absent

Problem	Cause - Solution
1. Fuel filter clogged.	a. Replace fuel filter.
2. Clogged or cracked fuel lines.	a. Clean or replace fuel lines.
3. Water in fuel.	a. Check and repair.
4. Air entering fuel system.	a. Check and repair fuel supply system.
5. Fuel volume to injection pump low.	a. Check or replace fuel transfer pump.
6. Improper engine oil viscosity/type.	a. Replace engine oil and filter.
7. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.
8. Crankshaft pin or bearing seized.	a. Regrind crank and replace bearings.

Symptom: Engine Starts But Does Not Continue Running - Exhaust Smoke Absent

Problem	Cause - Solution
9. Piston ring end gaps not correct.	a. Stagger piston ring gaps.
10. Governor not functioning properly.	a. Repair or replace governor.
11. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.

Symptom: Engine Starts But Does Not Continue Running - Excess Exhaust Smoke

Problem	Cause - Solution
1. Clogged air filter.	a. Clean or replace air filter.
2. Seized intake/exhaust valve.	a. Replace valve and check valve guide.
3. Broken or seized piston ring.	a. Replace rings and check cylinder.
4. Piston ring, piston or cylinder worn.	a. Bore or hone cylinder and replace piston.

Engine Operation Poor

Symptom: Low Engine Output - Exhaust Color Normal

Problem	Cause - Solution
1. Fuel filter clogged.	a. Replace fuel filter.
2. Air entering fuel system.	a. Check and repair fuel supply system.
3. Clogged or cracked fuel lines.	a. Clean or replace fuel lines.
4. Wrong type of fuel.	a. Drain and replace fuel.
5. Fuel volume to injection pump low.	a. Check or replace fuel transfer pump.
6. Improper engine oil viscosity/type.	a. Replace engine oil and filter.
7. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.
8. Compression leakage from valve seat.	a. Grind valve seat; regrind valves.
9. Seized intake/exhaust valve.	a. Replace valve and check valve guide.

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Symptom: Low Engine Output - Exhaust Color Normal

Problem	Cause - Solution
10. Leaking cylinder head gasket.	a. Replace head gasket.
11. Crankshaft pin or bearing worn.	a. Re grind crank and replace bearings.

Symptom: Low Engine Output - Exhaust Color White

Problem	Cause - Solution
1. Water in fuel.	a. Check and repair.
2. Wrong type of fuel.	a. Drain and replace fuel.
3. Poor fuel injection pattern.	a. Clean or replace fuel injector nozzles.
4. Incorrect/retarded injection pump timing.	a. Check and adjust fuel injection pump timing.
5. Uneven volume of fuel injected.	a. Check fuel injector pump and injectors.
6. Broken or seized piston ring.	a. Replace rings and check cylinder.
7. Piston ring, piston or cylinder worn.	a. Bore or hone cylinder and replace piston.
8. Piston ring end gaps not correct.	a. Stagger piston ring gaps.
9. Piston rings installed incorrectly.	a. Install piston rings correctly.
10. Intake/Exhaust valves worn.	a. Check valve guides and stems.
11. Improper timing between injection pump, intake and exhaust valves.	a. Adjust valve clearance. Check valve timing.

Symptom: Low Engine Output - Exhaust Color Black

Problem	Cause - Solution
1. Clogged air filter.	a. Clean or replace air filter.
2. Engine running too hot.	a. Check thermostat, fan belt tension. b. Check cooling system for level/leaks. c. Clean exhaust pipe.
3. Water pump/alternator belt loose.	a. Adjust fan belt tension.
4. Wrong type of fuel.	a. Drain and replace fuel.
5. Poor fuel injection pattern.	a. Clean or replace fuel injector nozzles.

Symptom: Low Engine Output - Exhaust Color Black

Problem	Cause - Solution
6. Uneven or excess volume of fuel injected.	a. Check fuel injector pump and injectors.
7. Incorrect injection pump timing.	a. Check and adjust fuel injection pump timing.
8. Compression leakage from valve seat.	a. Grind valve seat; regrind valves.
9. Seized intake/exhaust valve.	a. Replace valve and check valve guide.
10. Improper timing between injection pump, intake and exhaust valves.	a. Adjust valve clearance. Check valve timing.
11. Engine at high altitude/temperature.	a. Use higher output engine.

Symptom: Engine Runs Rough

Problem	Cause - Solution
1. Loud knocking noise during combustion.	a. Advanced fuel injection pump timing - check and adjust fuel injection pump timing.
2. Uneven combustion sound.	a. Clogged air filter. Clean or replace air filter. b. Clogged exhaust pipe. Clean exhaust pipe. c. Water in fuel. Check and repair. d. Wrong type of fuel. Drain and replace fuel. e. Uneven volume of fuel injected. Check fuel injector pump and injectors. f. Poor fuel injection pattern. Clean or replace fuel injector nozzles.

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Symptom: Engine Runs Rough

Problem	Cause - Solution
3. Misfiring	<ul style="list-style-type: none"> a. Improper timing between injection pump, intake and exhaust valves - adjust valve clearance. Check valve timing. b. Improper intake or exhaust valve clearance - adjust valve clearance. c. Compression leakage from valve seat. Grind valve seat; regrind valves. d. Seized intake/exhaust valve. Replace valve and check valve guide. e. Broken or seized piston ring. Replace rings and check cylinder. f. Crankshaft pin or bearing worn or seized. Regrind crank and replace bearings. g. Connecting rod bolt loose. Check for damage and re-torque bolts. h. Foreign matter in combustion chamber. Remove head and inspect for damage. i. Excessive timing gear backlash. Measure timing gear backlash.
4. Engine surges during idle.	<ul style="list-style-type: none"> a. Water in fuel. Check and repair. b. Uneven volume of fuel injected. Check fuel injector pump and injectors. c. Poor fuel injection pattern. Clean or replace fuel injector nozzles. d. Governor not functioning properly. Repair or replace governor. e. Broken or seized piston ring. Replace rings and check cylinder. f. Crankshaft pin or bearing worn or seized. Regrind crank and replace bearings.

Symptom: Engine Runs Rough

Problem	Cause - Solution
5. Engine surges under load.	<ul style="list-style-type: none"> a. Water in fuel. Check and repair. b. Uneven volume of fuel injected. Check fuel injector pump and injectors. c. Poor fuel injection pattern. Clean or replace fuel injector nozzles. d. Governor not functioning properly. Repair or replace governor. e. Seized intake/exhaust valve. Replace valve and check valve guide. f. Crankshaft pin or bearing worn or seized. Regrind crank and replace bearings.
6. Excessive engine vibration	<ul style="list-style-type: none"> a. Uneven volume of fuel injected. Check fuel injector pump and injectors. b. Poor fuel injection pattern. Clean or replace fuel injector nozzles. c. Seized intake/exhaust valve. Replace valve and check valve guide. d. Broken or seized piston ring. Replace rings and check cylinder. e. Governor not functioning properly. Repair or replace governor. f. Crankshaft pin or bearing worn or seized. Regrind crank and replace bearings. g. Connecting rod bolt loose. Check for damage and re-torque bolts. h. Improper injection pump timing. Check and adjust valve pump timing.
7. Poor return to low speed.	<ul style="list-style-type: none"> a. Governor not functioning properly. Repair or replace governor.