FAILURE ANALYSIS REPORT

Customer: _____ Model # _____ Serial # _____

Date of Purchase: _____ Manufacturing Date *(On emissions label)*: _____

VISUAL CHECKS & TESTING *(Before Engine Disassembly)*

1. ☐ Make a quick visual inspection of the machine:
   - ☐ Clean & appears in good condition? ☐*Yes* ☐*No*
   - ☐ Dirty or in poor looking condition? ☐*Yes* ☐*No*

   _____

   _____
2. ☐ Check for engine/equip. maintenance problems:
   - ☐ Dirty or damaged air filter element? ☐*Yes* ☐*No*
   - ☐ Dirt in air filter housing? ☐*Yes* ☐*No*
   - ☐ Engine cooling blockage? ☐*Yes* ☐*No*
   - ☐ Oil or fuel leaks? ☐*Yes* ☐*No*
   - ☐ Excessive engine loads? ☐*Yes* ☐*No*
     Missing string cut-offs, dull chain, missing blow tubes, etc.

   _____

   _____
3. ☐ Spark plug part number? _____
   - ☐ Correct type and heat range? ☐*Yes* ☐*No* _____
   - ☐ Firing end? *soot, heavy carbon, cracked insulator, etc.*

   _____
4. ☐ What is cold engine compression? _____psi
   - ☐ Specs: _____min _____ max
     Keep pulling the starter rope until needle stops rising.

   _____
5. ☐ What is the condition of the fuel mix?
   - ☐ Is fuel mixed correctly? ☐*Yes* ☐*No* _____
   - ☐ Is fuel stale? ☐*Yes* ☐*No* _____
   - ☐ What is the ethanol content? _____%

   _____

   _____
6. ☐ Pull the fuel filter and check its condition:
   - ☐ Dirty or plugged fuel filter? ☐*Yes* ☐*No*

   _____
7. ☐ Pressure test fuel line & carb up to 10psi *(.7 bar)*
   If pressure does not hold, hook up to carb inlet and retest

   _____
8. ☐ Check for engine crankcase pressure/vac leaks:
   - ☐ Will the engine hold 7psi (.5 bar) for 1-minute?
     Look for leaks by spraying engine with soapy solution.
   - ☐ Can the engine hold 14" (.5 bar) vac for 1-min?
     Good pressure test, failed vac test = leaking crank seals

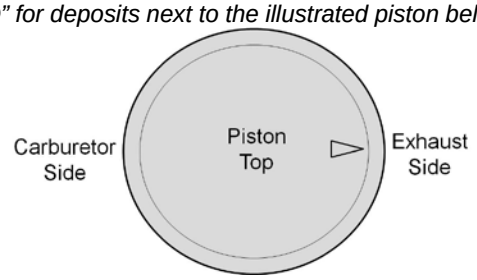
   _____
9. ☐ Pull the muffler and check for exhaust restrictions:
   - ☐ Spark screen restricted ☐ Exhaust port restricted

   _____

ENGINE ANALYSIS *(After Engine Is Disassembled)*

10. ☐ What is the condition of the piston? _____
    - ☐ Scored (S) ☐ Worn (W) ☐ Deposits (D)

    Locate piston damage by marking "S" for scored, "W" for worn & "D" for deposits next to the illustrated piston below



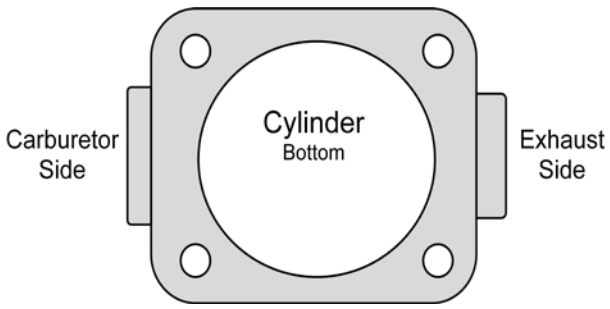
11. ☐ Signs of lubrication under piston skirt? ☐*Yes* ☐*No*
12. ☐ Does piston have mechanical damage? ☐*Yes* ☐*No*
    - ☐ Cause of piston damage? – *Pin clip, broken ring, etc*

    _____
13. ☐ Does the piston have worn ring grooves? ☐*Yes* ☐*No*
    - ☐ Piston ring side clearance? _____

    .004" (.1mm) to .006" (.15mm) limit on most engines
14. ☐ What is the condition of the piston rings? _____
    - ☐ Stuck piston ring? ☐*Yes* ☐*No*
    - ☐ Cause of stuck ring? ☐*Deposits* ☐*Scoring*
    - ☐ Broken piston ring? ☐*Yes* ☐*No*
    - ☐ Break cause: ☐*Damage* ☐*Ring wear* ☐Groove wear

    _____
15. ☐ What is the condition of the cylinder? _____
    - ☐ Scored (S) ☐ Worn below plating (W)

    Locate cylinder damage by marking "S" for scored, "W" for wear



16. ☐ Check condition of crankcase:
    - ☐ Are there signs of lubrication inside? ☐*Yes* ☐*No*
    - ☐ Dirt and debris inside crankcase? ☐*Yes* ☐*No*
    - ☐ Deposits inside crankcase? ☐*Yes* ☐*No*

    _____
17. ☐ Check for loose, rough or damaged bearings:
    - ☐ Defective main bearings? ☐*Drive side* ☐*Starter side*
    - ☐ Bad crankpin bearing? ☐ Piston pin bearing?

FAILURE ANALYSIS REPORT

ENGINE FAILURE CAUSES

☐ RAW GAS

Intake scored

Heavy exhaust score

☐ Caused by running the engine on raw fuel
☐ Heavy dry piston score *(Wraps around much of piston)*
☐ Score often wraps around piston even to intake side
☐ Crankcase often dries out when opened up

☐ OVER HEATING

Intake side heat discoloration

Exhaust discolored & scored

☐ Can be caused by blocked engine cooling air intake
☐ Other causes include heavy engine load
☐ Restricted exhaust will contribute to over heating
☐ Oil breakdown darkens piston (*Early stage rings stay free)*
☐ Heat expands piston past limits scoring piston
☐ Extreme heat can cause detonation & pre-ignition

☐ DIRT INGESTION

High piston intake wear

Cylinder worn below plating

☐ Look for signs of dirt ingested through air filter housing
☐ High piston & cylinder wear (*Especially on the intake side)*
☐ Heavy scaly carbon on top of piston *(May be tan in color)*
☐ Heavy carbon in exhaust port
☐ High piston ring & ring groove wear *(Can break ring)*
☐ Dirt usually in crankcase & bearing wear possible

ENGINE FAILURE CAUSES

☐ LEAN SEIZE

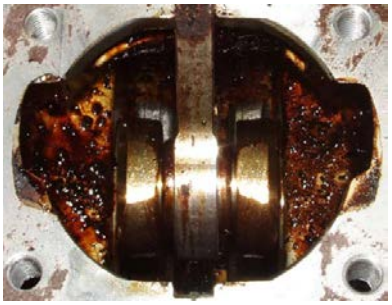
Intake side looks good

Spot score exhaust side

☐ Caused by over lean carb adjustment, fuel restriction or air leak
☐ Spot score on piston exhaust side *(Sticks piston ring)*
☐ Intake side of piston looks good *(Light intake score possible)*
☐ Heavy exhaust score possible *(If engine continues to run)*

☐ STALE FUEL

Varnished Piston



Varnish also inside crankcase

☐ Caused by running engine on old fuel *(Note varnish smell)*
☐ Heavy varnish deposits all around piston
☐ Varnish usually sticks piston rings
☐ Varnish deposits also inside crankcase
☐ Stuck rings can cause exhaust side piston scoring

☐ UNCERTIFIED 2-STROKE OIL

Deposits on piston skirt

Stuck piston rings

☐ Caused by running an engine on uncertified 2-Stroke oil
☐ Dark deposits all around piston
☐ Stuck piston rings *(Caused by carbon in ring grooves)*
☐ Carbon can plug exhaust port & spark screen
☐ Crankcase usually stays clean

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