

# PREDATOR 212cc ENGINE REBUILD PROJECT

***Complete Video Guide & Procedures***

Crescent Valley High School  
Engineering Fabrication Lab

**All 10 Videos with Timestamps**

Direct YouTube Links • No QR Codes

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# Quick Start Overview

This project has 3 major systems:

- **SYSTEM 1: DISASSEMBLY** – Remove all parts safely and methodically
- **SYSTEM 2: REASSEMBLY** – Put it back together with precise torque specs
- **SYSTEM 3: STARTUP** – Get the engine running and troubleshoot

## What You Need:

- Metric socket set • Torque wrenches • Feeler gauges • Flywheel holder • Safety gear

## Critical Success Factor:

**VALVE LASH ADJUSTMENT** – 80% of startup failures come from incorrect valve lash. Watch Part 7 at least twice.

## All Videos Available At:

<https://www.youtube.com/playlist?list=PLHmbvimXDzMkUtBNh-t3YaLlA1DOnHqJ->

# Safety Rules (Non-Negotiable)

## BEFORE YOU START:

- Safety glasses and work gloves required
- Know location of fire extinguisher
- Verify all tools are in good condition
- Review the relevant video TWICE before proceeding

## WHILE YOU WORK:

- Keep hands and hair away from rotating parts
- Use proper tool techniques (steady pressure, never jerk)
- Hot oil can burn – let engine cool before disassembly
- Clean up spills immediately
- Document every step in your notebook as you go

## STOP IF:

- Any bolt is stuck or stripped
- You're unsure about torque specifications
- The engine makes unusual sounds at startup
- You can't remember why you're doing a step

# SYSTEM 1: DISASSEMBLY

3-Step External-to-Internal Process

## Step 1: External Components

**Watch:**

Part 1: Tear Down - Part 1

<https://www.youtube.com/watch?v=ha6K8Bn9ELo&t=0m0s>

**Critical Timestamps:**

- 0:00 – Safety and fuel removal
- 8:00 – Spark plug and carburetor
- 15:00 – Valve cover removal

**Document:** Sketch the valve cover location, note bolt count, record removal sequence in notebook.

## Step 2: Internal Access

**Watch:**

Part 2: Tear Down - Part 2

<https://www.youtube.com/watch?v=NrXomEJPzqM&t=0m0s>

**Critical Timestamps:**

- 0:00 – Flywheel removal
- 10:00 – Stator and crankcase
- 18:00 – Internal access

**Document:** Take photos of internal layout. Record ALL measurements (piston location, rod position, valve stem height).

## Step 3: Component Removal

### Related Videos:

Part 5: Head & Valve Detail – <https://www.youtube.com/watch?v=Td-8jDXZ6KA&t;=0m0s>

Part 3: Installing Piston (shows reverse) – <https://www.youtube.com/watch?v=j2UvZuUYUEU&t;=0m0s>

### Critical Specs:

- Clean all parts thoroughly
- Inspect for wear or damage
- Label everything clearly

**Document:** Create detailed inventory of ALL components with condition notes. Mark any damaged parts.

# SYSTEM 2: REASSEMBLY

5-Step Internal-to-External Process (MOST CRITICAL SECTION)

## Step 1: Head Assembly

**Watch:**

Part 6: Head Reassembly

<https://www.youtube.com/watch?v=RFEy7g0iDEg&t;=0m0s>

**Critical Timestamps:**

- 0:00 – Valve/spring installation
- 5:00 – Head bolt sequence
- 9:00 – Torque specification

**Torque Specification:** Head bolts to 20-22 ft-lbs in diagonal sequence.

**Document:** Record torque value and sequence used.

## Step 2: Internal Assembly

**Watch:**

Part 4: Internal Reassembly

<https://www.youtube.com/watch?v=4sKIi20SJNI&t;=0m0s>

**Critical Timestamps:**

- 0:00 – Rod installation
- 7:00 – Timing mark alignment ■
- 12:00 – Crankcase closure

**CRITICAL:** Timing marks MUST align. If they don't, valve lash adjustment will fail.

**Document:** Verify and record timing mark alignment before closing crankcase.

## Step 3: CRITICAL – Valve Lash Adjustment ■■■

**Watch (watch TWICE):**

Part 7: Valve Lashing

<https://www.youtube.com/watch?v=ixVMH0u7C34&t;=0m0s>

**Critical Timestamps:**

- 0:00 – Finding Top Dead Center
- 2:30 – Feeler gauge use
- 5:00 – Adjustment procedure

**Specifications (EXACT):**

- Intake valve: 0.003" – 0.005"
- Exhaust valve: 0.004" – 0.006"

■■ This is the #1 reason engines won't start if incorrect.

**Document:** Record BOTH valve lash measurements. Get instructor verification before proceeding.

## Step 4: Exterior Assembly

### Watch:

Part 8: Exterior Reassembly

<https://www.youtube.com/watch?v=y6wgEWFvBWQ&t=0m0s>

### Critical Timestamps:

- 0:00 – Rocker arms installation
- 12:00 – Valve cover assembly
- 25:00 – Fuel system reconnection

### Critical Torque Values:

- Rocker arm bolts: 12-15 ft-lbs
- Valve cover bolts: 5-8 ft-lbs
- Carburetor bolts: 4-6 ft-lbs

**Document:** Record all torque values applied.

## Step 5: Final Assembly

### Watch:

Part 9: Flywheel Installation

<https://www.youtube.com/watch?v=t-kKTW-2ZqE&t=0m0s>

### Critical Specifications:

- Flywheel bolt: 25-30 ft-lbs (critical torque!)
- Verify flywheel rotates freely
- Check all electrical connections

**Document:** Record final torque specifications. Check that everything is secure.



# SYSTEM 3: STARTUP & TROUBLESHOOTING

## Pre-Startup Verification Checklist

- All bolts are tight (verify with torque wrench)
- Oil level is correct (check dipstick)
- Fuel tank is clean and has fresh gasoline
- Spark plug is clean and proper gap (0.028-0.034")
- Air filter is clean
- Valve lash measurements are recorded and verified
- All hoses are connected and secure

## If Engine Won't Start: Troubleshooting Flow

### 1. CHECK SPARK

- Remove spark plug
  - Check gap (0.028-0.034")
  - Test for spark (pull cord while grounded to engine)
- If no spark: Replace spark plug

### 2. CHECK FUEL

- Verify fuel is fresh (not stale)
  - Check carburetor has fuel
  - Prime carburetor (press primer bulb 5-10 times)
- If no fuel at carb: Clean fuel line, replace filter

### 3. CHECK VALVE LASH (80% of failures!)

- Rewatch Part 7: <https://www.youtube.com/watch?v=ixVMH0u7C34&t=0m0s>
  - Verify both valve lash measurements are correct
  - If wrong: Adjust and retest
- If still wrong: Get instructor help

**Document:** Record all troubleshooting attempts and results.

# Documentation & Assessment

## What You Must Document (in your notebook)

- Component inventory with condition notes
- All torque values used during reassembly
- Both valve lash measurements (with instructor verification)
- Photos of key reassembly steps
- Any troubleshooting attempts and results
- Reflection: What did you learn? What was hard? What would you do differently?

## How You're Graded (100 points total)

- Safety Adherence: 30 points (non-negotiable, daily observation)
- Documentation: 25 points (clear, complete, accurate)
- Measurements: 20 points (accuracy against specifications)
- Engine Startup: 15 points (runs after rebuild)
- Reflection: 10 points (thoughtful analysis of learning)

## Getting Help

### Troubleshooting Questions?

See docs/FAQ.md in the curriculum folder

### All Videos in One Place:

<https://www.youtube.com/playlist?list=PLHmbvimXDzMkUtBNh-t3YaLlAlDOnHqJ->

### Need Torque Specifications?

Reference docs/05-Torque-Specifications.md



*This curriculum is based on Mr. Hall's engine rebuild video series. All timestamps link directly to specific sections of each video.*

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