

[Table Of Contents](#)

Acknowledgments

Introduction

Chapter 1: Engine Component Cleaning

Airless Shot Blasters

Hot Tank Cleaning

Jet Spray Cabinets

Cold Solvent Wash

Ovens

Soap and Water

Media Blasting

Soda Cabinet Blasting

Blasting Media

Tumbling and Vibratory Cleaning

Ultrasonic Cleaning

Cleaning with Hand and Power Tools

Chapter 2: Precision Measurement Tools

Micrometer

Dial Indicator

Dial Bore Gauge

Mounting a Bore Gauge with a Setting Fixture

Depth Gauge

Internal Caliper Gauge

Measuring Pushrod Length

Valvespring Height Gauge

Valveseat Runout Gauge

Precision Straightedge

Rod Bolt Stretch Gauge

Torque-Plus-Angle

Ultrasonic Thickness Gauge

Torque Wrenches

Cam Lobe Checker

Chapter 3: Cylinder Block Disassembly and Inspection

Step by Step

Block Inspection

Crankshaft Inspection

Rod Inspection

Cam Inspection

Pushrod Inspection

Rocker Arm Inspection

Cylinder Head Inspection

Chapter 4: Cylinder Block Machining

Rough Edge and Obstruction Deburring

Main Bore Align Honing

Cylinder Boring and Honing

Cylinder Sleaving

Lifter Bore Honing and Bushings

Block Deck Resurfacing

Threaded Hole Preparation

Block Blueprinting

Chapter 5: Crankshaft Measurement, Grinding and Preparation

Measuring the Crankshaft

Selecting the Grinding Wheel

Dressing the Wheel

Straightening the Crank

Grinding and Polishing the Journals

Grinding the Flywheel

Chapter 6: Connecting Rod Inspection and Reconditioning

Inspecting Connecting Rods

Measuring Rod Bore Diameter

Measuring Center-to-Center Length

Checking for Bend and Twist

Reconditioning Connecting Rods

Chapter 7: Pushrods and Lifters

Measuring for Pushrod Length

Chapter 8: Pistons

Measuring Piston Skirts

Checking Ring-to-Piston Fit

Modifying Domes

Checking Valve-to-Piston Clearance

File Fitting Rings

Chapter 9: Cylinder Head Inspection, Service and Machining

Resurfacing the Deck

Measuring Chamber Volume

Installing New Guide Liners

Refacing Valves and Seats

Measuring Valvespring Height

Measuring Valvestem Height

Checking Spring Pressure

Porting Cylinder Heads

Final Assembly

Chapter 10: Engine Block CNC Machining

Milling the Block

CNC Terminology

Chapter 11: Port Machining

Ports and Runners

Verifying and Monitoring with a Flow Bench

Port Matching

Intake Manifold Plenums

Intake Port Surface

Extrusion Honing

Chapter 12: Engine Balancing

Out-of-Balance Forces on the Crank

Connecting Rods

Pistons

Engine Styles

Bobweights

4-Cylinder Inline Engines

Crankshaft

Under- versus Over Balancing

External versus Internal Balancing

Dampeners and Flywheels

Chapter 13: Clearance Checking

Main Bearings

Rod Bearings

Cam Bearings

Cam Thrust

Piston-to-Wall Clearance

Rod Sideplay

Lifter Bore

Crank-to-Block Clearance

Rod-to-Block Clearance

Piston Ring Gap

Crank Thrust

Valve-to-Piston Clearance

Chapter 14: Final Assembly

Cleaning

Cam

Upper Main Bearings

Crankshaft and Rear Seal

Main Caps and Lower Bearings

Pistons and Rods

Timing
Oil Pump and Pickup
Lifters
Heads
Pushrods and Rocker Arms
Intake Manifold
Distributor
Timing Cover, Rear Cover, Oil Pan and Valvecovers
Water Pump
Crankshaft Balancer