

Yamato Reconditioning Standard

1. The Long Motor Assembly

Engine Block

Engine block is disassembled and all oil and water gallery plugs removed. Block is steam and chemically cleaned inside and out. The engine block including all threaded holes are inspected and tested to ensure suitability for reuse using magnetic particle crack detection.

- (a) The block top surface is verified in conformance with the engine manufacturer's specifications and parallel to the crankshaft centre-line or machined as per the following specifications:
 - (i) In certain instances, such as engines with removable liners, the surface may not require machining; but liner recesses (upper and lower) checked and machined as required, and the sealing surfaces verified to conform with the manufacturers specification.
 - (ii) The use of dry sleeves to restore worn cylinder bores are used where necessary in accordance with the manufacturer's specification.
 - (iii) The bores of wet sleeve engine blocks are verified to be correct for size and geometry and corrected by machine-honing to manufacturer's specification.
 - (iv) All other gasket or sealing faces on the block are checked for serviceability.
 - (v) The manufacturer's specification for deck liner height is achieved by machining where necessary.
- (b) All main bearing tunnels are measured and gauged for size, checked for ovality and taper alignment, and line bored as required to ensure correct fitment of the new replacement main bearings. Thrust locations checked and reclaimed or machined as required. All bearing Caps verified to have correct fit in block location including correct fit and fastening of any cross-bolting fasteners.
- (c) All cylinders are rebored to the manufacturer's limits of oversize and appropriate surface finish by machine honing.
(Yamato uses advanced plateau honing method to ensure minimum wear during bedding-in process and optimum long-life of the cylinder)
- (d) The condition of injector pump locating faces, spigots or housings are checked for alignment, flatness and thread conditions.

Crankshaft

- (a) All gallery plugs are removed and thoroughly cleaned and inspected for damage, including magnetic particle crack testing.
- (b) Hardness of journals are measured to verify conformance with manufacturer's specifications.
- (c) Crankshafts may not need grinding in order to restore the original manufacturer's specifications, however journal roundness, surface finish, taper and diameter is verified to be correct to the bearing manufacturers specifications.
- (d) Journals that are not within specifications are machine ground to the same relative undersize and finish. Thrust face condition is checked and built up as required. Rear main sealing surfaces are checked and refinished/resleeved as required. Crankshaft noses are inspected for wear and built up and machined as required.
- (e) Condition of the rear flywheel mounting face and associated thread and dowel holes and spigot diameters is checked for condition and alignment in accordance with manufacturer's specifications.

Camshaft

- (a) All gallery plugs are removed and thoroughly cleaned and inspected for damage, including magnetic particle crack testing. The camshaft reground or rebuilt in accordance with manufacturer's specification, or replaced/renewed.
- (b) Hydraulic cam followers are renewed or reconditioned and tested.
- (c) Mechanical followers are resurfaced if applicable, or replaced according to type.
- (d) Fuel lift pump lobes may be reground by the amount limited to retain full lift pump stroke.

Connecting rod assemblies

- (a) All conrods including bolts are checked for centre height, alignment and integrity, and for the presence of cracks.
- (b) The conrod journal bores are checked for ovality and taper and resized or replaced where necessary.
- (c) The piston end bore of fully floating pin types are rebushed and machined to the correct fit for the replacement gudgeon pin; the manufacturers test procedure for checking bush retention is followed. All parting faces are inspected for correct fit of mating and locating surfaces.

Balance shafts

When fitted, balance shafts are checked for integrity and alignment and repaired, reclaimed or replaced as required. Balancing shaft housings inspected and bearings renewed.

Cylinder Head

- (a) Cylinder head is disassembled and cleaned both inside and out to remove all foreign matter. All welch plugs are removed, and cylinder head inspected for damage. Cylinder head is also crack-tested, and hardness tested as appropriate. Cast iron type cylinder heads with cracks which may cause failure with future use are repaired or the cylinder head is replaced/renewed. Aluminium type cylinder heads with cracks are always replaced. Allowance is made for the possible use of non-magnetic valve seat inserts during crack detection procedure.
- (b) Cylinder head surface is ground and finished in accordance with manufacturer's specification.
- (c) Fire rings maintained at manufacturer's specification.
- (d) Pre-combustion chambers (where fitted) are cleaned and checked for integrity, looseness, and installed height. Cracked pre-combustion chambers are renewed.
- (e) New injector tubes are installed. Fuel and oil galleries are inspected and cleaned (where applicable)
- (f) Applicable to OHC engines, cam tunnels are measured for size and checked for ovality and taper and alignment. Cam tunnels are machine line bored where necessary, and camshaft bearings and bushes replaced.
- (g) All valve guides are replaced, or resleeved and machined.
- (h) Valve seats are cut to retain valve seat face concentric with the centre-line of the valve guide bore and to the correct masking height.
- (i) Where valve recession has occurred beyond acceptable limits, valve seat inserts are replaced with appropriate interference fit.
- (j) Valve faces remachined. Valve stems, collet grooves and tips inspected for wear and replaced/renewed where necessary. In all cases, correct valve train geometry is maintained after machining or replacement.

- (k) Valve springs tested for quareness free height and spring force at installed height and valve open height. Springs are replaced, or correct installed height with valve spaces where necessary.

Miscellaneous components

Oil Pump

Disassembled, cleaned and inspected. Worn gears or pump assembly are replaced where necessary. Relief valve and spring renewed.

Rocker arm/shaft

Dismantled, cleaned and inspected. Components machined or renewed as necessary. Remove, inspect and replace worn pins in roller rocker assemblies.

Push Rods

Inspected for alignment, damage and wear and replaced as necessary.

The following renewed where supplied with engine:

- (i) Tooth Belts
- (ii) Timing chains
- (iii) Unhardened chain wheels

Timing Gears and Keys

Inspected and replaced as necessary

Assembly Procedure and new parts content

All components thoroughly cleaned, including internal galleries.

All running surfaces lubricated with appropriate lubricants.

All bolts, screws, nuts and mating threads and washers inspected for suitability of reuse. All tensions in accordance with manufacturer's specification and torque to yield (angle torque) specifications followed.

All valve retaining components (keepers, collets, valve rotators etc) inspected for serviceability and renewed where necessary.

Oil squirter holes and tubes checked for correct alignment.

Main, connecting rod and camshaft bearings and bushes replaced with new.

Piston deck-height checked and adjusted in accordance with manufacturer's specification.

Timing advancer mechanism checked for wear and correct operation.

Renew all pistons, gudgeon pins, piston rings, cylinder liners (where applicable), gaskets, o rings and oil seals.

All expandable plugs replaced with new.

Other new parts often found in Yamato recondition engines include:

Timing Gears, Oil Pump/Oil Pump Gears, Pre Combustion Chambers, Head Bolts, Valves and Guides, Rocker Shafts, Camshafts, Rocker Arm Bushes, Aluminium Timing Cases (on engines prone to cavitation) etc.

All new parts installed are genuine or reputable original equipment quality to ensure optimum performance and durability.

2. The Fully Fuelled Long Engine Assembly

Fuel Injectors are fully reconditioned in accordance with manufacturer's specification. New Nozzles and Washer kits are installed.

Fuel Injector Pump is fully reconditioned in accordance with manufacturer's specification and fitted to the engine.

Engine-mounted oil coolers and lines and hoses are cleaned and inspected. Units which cannot be cleaned are replaced. (where applicable).

3. Complete Engines

Fuel Injectors are fully reconditioned in accordance with manufacturer's specification. New Nozzles and Washer kits are installed.

Fuel Injector Pump is fully reconditioned in accordance with manufacturer's specification and fitted to the engine.

Turbocharger (where supplied) is dismantled, cleaned and checked according to manufacturer's specification. Lubrication supply plumbing inspected for cracks, connections verified to be leak-free, and cleaned. The rotating assembly balanced in accordance with manufacturers specification.

External oil feed pressure or return lines, internal oil coolers and associated connections interlinking with auxilliary units or between major engine components shall be dismantled, cleaned and inspected.

Water Pump overhauled with new spindle, impellor, bearings and seal, or assembly renewed.

New Thermostat/s fitted.

Harmonic Balancer serviced and/or renewed.

All drive belts (where installed) are renewed.

New fuel and oil filters installed.

All manifolds, housings and external components cleaned and checked to ensure serviceability and replaced where necessary.

All lines and hoses are thoroughly cleaned and inspected for serviceability and renewed where appropriate.

Electrical components such as Starter Motor and Alternator are tested and reconditioned/re-wired.

Engine-mounted oil coolers and lines and hoses are cleaned and inspected. Units which cannot be cleaned are replaced. (where applicable).