

NATEF Priority		Task	Completed	Notes	Weight	
<b>Engine identification</b>						
A2	P1	Check for bulletins and service records			1	✓
A3	P1	ID components using casting numbers			1	
A1	P1	Complete repair order			1	
<b>Diagnosis</b>						
A1	P1	Interpret engine concern			1	
A8	P1	Power balance test			1.5	✓
A10	P1	Cylinder leakage test			1.5	✓
A9	P1	Compression test (cranking and running)			1.5	✓
D3	P1	Block check & cooling system pres test			1	✓
A4	P1	Inspect engine for oil, coolant, & fuel leaks			1	✓
A5	P2	Check noises and vibrations			1	✓
A7	P1	Check engine vacuum			1	✓
1		Test exhaust-back pressure			1	✓
A6	P2	Diagnose oil and coolant consumption			1	
D1	P1	Check oil pressure			1	✓
D14	P1	Identify causes of engine overheating			1	✓
<b>Disassembly and Cleaning</b>						
C1	P2	Blocks			1.5	
2		Cylinder head assm.			1.5	
C7	P2	Inspect main and rod bearings			1	
<b>Crack Detection and Repair</b>						
3		Magnaflux: Cylinder head, dry			1	✓
4		Cylinder head, dye penetrant			1	✓
5		Crankshaft				
6		Connecting rods			1	
7		Flywheel			1	
C2	P2	Block, dry			1	✓
		Pressure test:				
8		Cylinder head			2	
9		Block			2	
		Ceramic seal:				
10		Cylinder head				
11		Block				
		Crack repair				
12		Pin			2	
13		Spray weld			2	
<b>Cylinder Head Reconditioning</b>						
B6	P3	Inspect valves & seats			1	
B3	P2	Inspect springs & retainers			1	✓
B5	P3	Inspect and measure valve guides			1	
B14	P2	Inspect camshaft journals and lobes			1	✓
B15	P3	Inspect cam bearings			1	
B8	P3	Measure spring and stem heights			1	
B10	P2	Inspect lifters			1	
B7	P3	Measure guide to seat concentricity			1	
B9	P2	Inspect rockers, pushrods, and rocker pivots			1	
14		Grind valves			1	✓
14s	P3	Grind valve seats & check concentricity			1.5	✓
15		Cut valve seats			3	
		Valve guide repairs:				
16		Hone to fit			1	
17		Ream for oversize stems			1	
18		Knurl/roller knurl & ream			1	✓
19		R & R, cast iron head			2	
20		R & R, aluminum head			2	

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21		B & I guide bushings			2	
22		B & I thin-wall bronze liners			2	✓
		Seat repairs:				
23		R & R seat			1	
24		B & I seat			1.5	✓
25		Machine insert to fit			estimate	
26		Rocker stud R & R			2	
27		Rocker arms; reface			1	
28		Seals; machining for positive type			1	
29		Straighten head			2	✓
30		Line Bore, OHC			2	
31		Welding: Arc, Mig, Tig			1	
<b>Resurfacing</b>						
32		Deck side of head			1	
33		Cam side of head			1	
34		Intake side of head			1	
35		Exhaust side of head			1	
36		Diesel head			1	
37		In-line block			1	✓
38		V-Block			2	✓
39		With liners, flanged sleeves				✓
40		With timing cover; OHC			1	✓
		Manifolds:				
41		Intake, V-block			1	
42		Intake, In-line			1	
43		Exhaust			1	
		Flywheels				
44		Flat			1	
45		Stepped			1.5	
46		R & R Ring gear			1	
<b>Cylinders</b>						
C4	P2	Inspect cylinder walls and measure			1	
C3	P2	Inspect & clean all internal & external threads			1	
C5	P2	Deglaze cylinder walls			1	
C6	P3	Inspect cam bearings and determine action			1	
C10	P2	Determine piston to cylinder clearance			1	
C13	P2	Inspect aux/balance shaft			1	
47		Knurl and fit pistons			1	✓
48		Bore			2	
49		Hone oversize			2	✓
50		Torque-plate hone			3	✓
51		B & I sleeve			2.5	
<b>Line Honing Blocks</b>						
		Gauge main bores			1	
52		Grind main caps			1	✓
53		Refit cap to registers			1	✓
54		Line hone mains			2.5	✓
<b>Crankshaft Services</b>						
C7	P2	Inspect & measure crankshaft			1	✓
55		Chamfer oil holes			1	
56		Clean and polish			1	
57		Straighten			1	
58		R & R oil plugs			Sublet	
59		Grind			Sublet	
60		Weld/grind			Sublet	
61		Repair keyway			Sublet	
62	ge 2	Knurl snout, regrind			Sublet	10/10/12

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63		Grind flange square			Sublet
64		Stress-relieve			Sublet
65		Dowel pin repairs			Sublet
<b>Connecting Rod &amp; Piston</b>					
C9	P2	Check condition of rod by piston & brg wear			1
C8	P2	Inspect main and rod bearings			1
C10	P2	Inspect skirts and ring lands			1
66		Gauge rod bores			1 ✓
67		R&R rod bolts			1 ✓
68		Grind parting lines			1 ✓
69		Resize housing bores			1 ✓
C10	P3	Assemble rods and pistons			1.5
C11	P3	R & R piston pins			1.5
70		Align			1
		Pin fitting:			
71		Oversize pins in rods			
72		Oversize pins in pistons			
73		Full floating pin bushings			1.5
74		Knurl pistons			1 ✓
<b>Balancing</b>					
75		Rods			1 ✓
76		Pistons and pins			1
77		Crankshaft, V-type			2.5 ✓
78		Crankshaft, in-line			1.5 ✓
79		Flywheel or flexplate			1
80		Clutch			1
81		Torque converter			1
<b>Thread Repair</b>					
A14	P1	Remove broken fastener			1
A14	P1	Remove broken drill, easy-out			1
A14	P1	Install Heli-Coil			1
A14	P1	Install Time-Sert threaded bushing			1
<b>Blueprinting Extras</b>					
83		Correct lifter bores			estimate
84		Correct main seal location			
85		Correct rocker geometry			
86		CC combustion chambers, surface			✓
87		Cross-drill crankshaft oil holes			
88		Degree camshaft			
89		Drill water passages			
90		Drill oil passages			
91		Fit steel main caps			
92		Flow test heads			
93		Install larger valves			
94		Lighten flywheel			
95		Machine valve bowls w/ bowl hogs			
96		Machine valve covers surfaces			
97		Machine for screw-in studs			
98		Measure casting thickness			
99		Plug block deck, drill water holes			
100		Port cylinder heads			
101		Port manifold			
102		Rods; correct length			
103		Spot-face head bolt holes			
104		Index, surface V-block			
<b>Assembly</b>					

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105		Straighten camshaft			1
106		Fit cam bearings			1
107		Fit auxiliary shaft bearings			1
D2	P2	Overhaul oil pump			1 ✓
C12	P1	Inspect, measure, & install piston rings			1
		Assemble cylinder heads:			
108		OHV			1.5
109		OHC, 2 valve			1.5
110		OHC, 4 valve			1.5
111		Vacuum test valve sealing			1 ✓
		Assemble short block:			
C15	P2	OHV			3
C15	P2	OHC			3
		Test in Dynamaster:			
113		Short block only			1.5
114		Long block			1.5
B16	P1	Establish cam timing and CMP indexing			2
		<b>In-Chassis:</b>			
A13	P1	Install engine covers using gaskets, etc.			estimate
		Engine installation:			
A11	P1	FWD			
A12	P3	RWD			
		Remove cylinder head(s):			
B1	P2	OHV In-line			
B1	P2	OHC In-line			
B1	P1	V-block			
B2	P1	Install cylinder head(s)			
B4	P2	R & R valve seals and inspect valve train			
115		R & R timing sets:			
B12	P2	OHV			
B13	P1	OHC, belt			
A15	P2	R & R engine mounts (116)			
C14	P2	Replace vibration damper			
117		Cooling system repairs:			
D6	P2	Inspect & replace thermostat			✓
D8	P1	R & R water pump			✓
D4	P1	R & R belts			✓
D5	P1	R & R hoses			
D9	P2	R & R radiator			
D10	P2	Inspect cooling fan			
118		R & R core plugs			
		Oil leak repair:			
119		Main seal			
120		Valve cover gasket			
121		Oil pan gasket			
122		Replace pressure switch			
D11	P3	Inspect auxiliary oil coolers			
123		Service PCV system			
		Exhaust system repairs:			
124		Repair or replace manifolds			
125		Install headers			
126		Re-torque cyl head			
127		30, 60K services			
B11	P1	Valve adjustment			
D13	P2	Change oil & filter			