Assembly Check List, Pontiac V-8

This procedure was written to aid the assembly of a motor and to serve as a future reference to what work was – or was not – performed, specifications, and what parts were used. It is primarily directed towards the Pontiac V-8, but may be of use towards other makes as well. The steps are arranged in an order that I find logical, but by no means should the order presented be taken to be the only possible order.

No torque values or any other specifications have been provided. Some builders may have personal specifications they wish to use, while others may wish to obtain specifications from some other reference source. I strongly suggest that ALL specifications be verified by a second, unrelated, reference.

All blanks may not be applicable to your specific engine. I suggest that *no blanks be left*, but to enter "*N/A*" for "not applicable", "*N/M*" for "not measured", and "*?*" for anything you are unsure of. If more than one person is doing the assembly, it would be beneficial if each person *initialed* the steps they complete in lieu of simply "checking off" the step.

Steps/measurements that are needed for calculating compression ratio have been positively identified by a " *** ". For ease of calculation, I recommend using the "Compression Calculator" that can be found on the "Restoration" page of the "Classical Pontiac" website, **www.classicalpontiac.com** or at **www.wallaceracing.com**

I, the author, accept no liability for the use of this document. By using this document, the user accepts all liability.

Machine shop used: Name: _____
Address: _____
_____
Phone Number: _____

Head work by: Name: _____
Address: _____
_____
Phone Number: _____

Engine assembled by: Name: _____
Address: _____
_____
Phone Number: _____

Reference documents: _____
_____
_____

Block Prep

If any deburring/polishing to the block is to be done, such as in the lifter valley, I suggest doing so BEFORE the block is taken to the machine shop. This is to minimize the chances of metal shavings and debris contaminating the block after cleaning.

Cam bearings installed and cam test fitted? [Y / N]
[*this is usually done at the machine shop, when picking up the block*]

Deck Plate used for bore/hone [Y / N]
Block line-bored/honed [Y / N]
Amount block decked: _____" [if known]
If using stroker crankshaft then test fit crankshaft, grind block for clearance if needed. [Y / N]
Edges filed off of sharp edges [Y / N]
All bolt-holes thread chased & cleaned [Y / N]
Oil passages rifle-brushed [Y / N]
Block washed ___times with _____ (cleaner)
Interior oil gallery plug (from **NOTE** below) has been installed
[Y / N] and [not drilled / drilled to _____"]
NOTE! The "interior oil gallery plug" *is located at passenger side, rear-most lifter supply oil gallery plug was installed. This is NOT the plug at the back of the block, rather it isaccessed THROUGH the plug at the back of the block. The main eason to drill a SMALL hole in the plug above is to provide a flowof oil to the distributor/camshaft gear interface when using a roller camshaft. This hole also eliminates the "dead-head" situation and allows the oil to flush out small debris that may migrate to this area.*
Remaining oil gallery plugs installed [Y / N]
Brand _____ Part # _____
Freeze Plugs: Brass ___ Steel ___ Sealant (if any) _____
Install dip-stick tube (middle piece, in block) [Y / N]
[*the tube will be very difficult to install after the crankshaft is installed*]

Date section completed: _____
Notes: _____
_____
_____
_____
_____

Crank Prep

Main [bolts/studs], brand/part # _____/_____
Bearing brand/part #'s: main _____/_____; rod _____/_____
Oil holes chamfered [Y / N]
Journals turned: main _____; rod _____
Journals and oil passages cleaned [Y / N]
***Offset ground [Y / N] by _____"
Rear seal type/part #, sealant used, installation notes:
_____

_____

_____
Bearing prep (if any) _____

Assembly lube used on crank/bearings _____
Rear seal lubricated [Y / N] with _____
Lube used on main cap bolts (or studs) _____
Main caps [2 / 4]-bolt brand/part# _____/_____
Main bearing clearances:
1_____; 2_____; 3_____; 4_____; 5_____
Main cap torque steps ___, ___, ___, ___, ___, ___.

NOTE: *rotate crank at end of each torque step to verifythere is no binding and that crankshaft rotates smoothly.*

Main cap final torques: 1-4 _____; rear _____
Source(s) for torque specs _____
Final torque double check:

	Front	2	3	4	Rear
pass. side	___	___	___	___	___
drvr. side	___	___	___	___	___

Crankshaft endplay measurement: _____ "

Date section completed: _____
Notes: _____
_____
_____
_____
_____

Pistons, Rods and Lower-End

SUGGESTION: *If degreeing the camshaft, install ONLY piston #1 and procede to camshaft installation. With only the one piston installed, it will be easier & smoother to rotate the crankshaft.*

Pistons: brand/part # _____/_____

Piston pins: brand/part #/weight _____

***Piston valve relief/dish/dome volume _____cc's

Piston prep (pins fitted, polishing, coatings, etc.): _____

_____

Diameters: bore/***piston*** (enter "N/C" if not checked)

1 - _____/_____ 3 - _____/_____ 5 - _____/_____ 7 - _____/_____

2 - _____/_____ 4 - _____/_____ 6 - _____/_____ 8 - _____/_____

***Average final bore size _____"

Final piston to bore clearance (bore – *piston* = clearance)

1 - _____ 3 - _____ 5 - _____ 7 - _____

2 - _____ 4 - _____ 6 - _____ 8 - _____

Rods: brand/type _____

Shot peened [Y / N] ; Polished [Y / N]

Resized [Y / N]

Rod bolts: brand/part # _____/_____

Rings: brand/part # _____/_____

Ring gap (mark here ___ if rings installed w/o measure):

Top 1 ____ 3 ____ 5 ____ 7 ____

2 ____ 4 ____ 6 ____ 8 ____ > 0.0___" gap

2nd 1 ____ 3 ____ 5 ____ 7 ____

2 ____ 4 ____ 6 ____ 8 ____ > 0.0___" gap

Oil – check the scraper rings to verify they have at least 0.015" gap

1 ____ 3 ____ 5 ____ 7 ____

2 ____ 4 ____ 6 ____ 8 ____

Ring clock position:

Driver's side - top ___o'clock; 2nd ___o'clock

Passenger - top ___ o'clock; 2nd ___o'clock

Type of lube used on pistons skirts/rings: _____

Rod bearing prep: _____

Lube used on rod bearings: _____

NOTE: *remember protective caps for rod bolts during piston/rod installation.*

Pistons, Rods and Lower-End cont.

Rod bolts tightened to:
a final stretch of 0.0_____"; or
a final torque of _____, using _____ as lube.
Rod bearing final clearances:
1_____ 3_____ 5_____ 7_____
2_____ 4_____ 6_____ 8_____
Rotate crankshaft after each journal pair of rods/pistons are completed to verify nothing is binding.
Clearance between each rod pair.
1/2 _____, 3/4 _____, 5/6 _____, 7/8 _____
***Final deck heights:
1_____ 3_____ 5_____ 7_____
2_____ 4_____ 6_____ 8_____

Oil pump: brand/part # _____/_____
Oil pump driveshaft: [new / re-use old] brand/part# _____/_____
NOTE: *remember to install driveshaft with pump at this time. Grinding the ears off the shaft to make it fit from the top can cause other problems later on.*

Any oil pump prep (blueprinting, polish, etc.) _____
Pick up screen: pressed on ___, [welded / brazed] on ___
clearance to oil pan _____".
Oil pump bolts torqued to _____.

If using a windage tray, it should be installed now, along with the lower dipstick tube. Turn crank several revolutions to verify there is no interference between the tray and crankshaft or connecting rods - [Y / N]

Locking compound used on windage tray bolts - [Y / N] type: _____

Piston to valve clearances intake/exhaust [____ not checked]
1 - ____/____ 3 - ____/____ 5 - ____/____ 7 - ____/____
2 - ____/____ 4 - ____/____ 6 - ____/____ 8 - ____/____

Date section completed: _____
Notes: _____
_____
_____
_____
_____

Camshaft

Brand _____ Grind # _____
Specs: Duration (gross)_____/_____ (0.050")_____/_____
(0.200")_____/_____
Lobe lift _____/_____ Lobe separation angle _____
Advance/Retard (circle one) ground into cam ____°
Advance/Retard (circle one) as installed ____°
Lifters: brand _____ part # _____
Timing chain: brand _____ part # _____
Type of lube applied to cam lobes _____
Camshaft retaining plate bolts torqued to _____
Locking compound used? [Y / N]
Install timing gears/chain, and degree cam now
Degreeing info: (for symmetrical lobed cams)
_____° at 0.___" before max intake lift
+ _____° at 0.___" after max intake lift
= _____ ÷ 2 = ____ = intake centerline
Fuel pump eccentric: new _____ or used _____
or eliminated for use of electric fuel pump _____.
Cam bolt torqued to _____. Type of locking compound
used _____

SUGGESTION: *Before removing the degreeing equipment, return #1 piston to exactly TDC. Install timing cover and damper, and verify the correlation between the timing pad and "zero" mark on damper.*

Timing cover (brand/part# _____/_____)
Install new seal on timing cover. Seal part # _____
Seal lubricated with _____
____Timing cover installed. Anti-seize on bolts [Y / N]
____Inspect harmonic damper for damage (i.e. cracks
around keyway, rubber deterioration, etc.)
Damper (brand/part# _____/_____) torqued to _____
SFI approved? [Y / N]

NOTE: *if only #1 piston has been installed, return to and complete the* **Pistons and Rods** *section.*

Date section completed: _____
Notes: _____
_____
_____
_____
_____

Heads & Valvetrain

Casting # _____ Date codes drvr/pssgr _____/_____
Ported by _____ to flow
____cfm at ____" valve lift at ___" of water (intake)
____cfm at ____" valve lift at ___" of water (exhaust)
Surfaced/milled _____" Intake face milled _____"
***Chamber volumes:
1 ____ 3 ____ 5 ____ 7 ____
2 ____ 4 ____ 6 ____ 8 ____
Pushrod holes enlarged for 1.65 rocker arms: [Y / N]
Exhaust crossover filled [Y / N] with _____.
Valve job angles (int) _____
(exh) _____
Valve guides [iron / bronze] [new / old] [honed / knurled]
Valve seals: intake _____; exhaust _____
Valve springs, brand/part #: int _____/exh_____
installed height (int/exh) _____/_____
Pressures: seat _____/_____ open _____/_____
Max safe valve lift ____/____
Coil bind at _____/_____ ; Retainer to seal _____/_____
Retainers: brand/part # _____/_____; material _____
Locks: brand/part # _____/_____ [7° / 10°]

Head fasteners [bolts/studs]: brand _____; part # _____
Head gasket: brand _____; part # _____
check for imperfections - drvr[Y / N]; pssgr[Y / N]
*** Head gasket compressed thickness 0.0____"
Head and cylinder deck cleaned with solvent [Y / N]
Lube used on head fastener threads _____
Head bolts torqued in steps of ___, ___, ___, ___, ___,
to a final torque of ____.
Rocker arms: brand _____; part # _____; ratio ____
Rocker studs: brand _____; part # _____; size ____
torqued to _____ with locking compound [Y / N]
Adjusting nuts: brand _____ ; part # _____

Pushrods: brand _____; part # _____; length _____
____ Install lifters, pre-lubed [Y / N] with _____
____ Install pushrods & rocker arm assemblies
Rocker arm (lash / preload) adjusted to _____
____ Install valley pan (brand/part# _____/_____).
New PCV grommet used [Y / N]

NOTE: *if using roller lifters, make sure the linkbar does not contact the backside of the valley pan.*

Heads & Valvetrain cont.

Date section completed: _____

Notes: _____

_____

_____

_____

_____

Buttoning it up

____Test fit oil pan

____Install oil pan & gaskets. Sealant used _____

(Flywheel / flexplate) brand/part # _____/_____

SFI approved [Y / N]

bolts torqued to _____

Locking compound used [Y / N]

NOTE: *installation of flexplate/flywheel will may not be possible while motor is mounted on some engine stands.*

Date section completed: _____

Notes: _____

_____

_____

_____

_____

At this point, I consider the engine "built". Intake, distributor, exhaust manifold.... and the remaining installations are rather straight forward, and do not fall in the scope of this document.

Courtesy of Lee Atkinson, www.LNLPD.com