PSS GM Gen V V8 Engine GDI Pump and Camshaft Measurement Tool Operating Instructions

For use with GM LT1, LT4, LT5, L83, L86, L87, L84, L8T and LT2 engines

Kit	Part number
GDI pump and cam measurement tool, no indicator included	A-800-0-1061
GDI pump and cam measurement tool kit, with digital indicator	A-800-2-1062

1. About this tool

The Product & Service Solutions (PSS) GDI Pump and Camshaft Measurement Tool is a depth-gauge fixture for setting up the gasoline direct injection (GDI) high-pressure fuel pump drive on GM Gen V V8 engines.

The tool performs four measurements:

- **Camshaft GDI lobe lift with the camshaft installed in the engine** — measured through the pump mounting pad, which is part of the valley cover, with the cover bolted down and the roller lifter (also called the roller follower) in place.
- **Depth to the lifter at base circle and at peak lift** — base circle feeds preload, peak lift feeds clearance to end of travel, and the difference between them is lobe lift.
- **GDI pump free length and available piston travel** — measured with the pump off the engine, using the standoffs.
- **Camshaft GDI lobe lift and base circle diameter with the camshaft out of the engine** — measured on V-blocks, before the camshaft is installed.

Sections 7 through 9 cover the measurements. Section 10 turns them into lobe lift, available travel, pump free length, preload and clearance to end of travel. Section 11 explains what those numbers mean and how to correct them.

Why this matters

The GDI pump piston, which pump manufacturers generally call the plunger, has a fixed amount of travel. The camshaft lobe uses part of it as lift. Whatever is left over is split between preload at base circle and clearance at peak lift.

Unlike the hydraulic roller lifters used in the valvetrain, the GDI pump lifter is purely mechanical. There is no lash adjuster and no way for it to take up clearance, so any lash in the stack stays there.

As long as preload is positive, the pump piston stays in contact with the lifter through the whole cycle and the pump delivers its full stroke.

At zero preload the gap becomes lash. The pump piston and lifter separate and come back together under load three times per camshaft revolution, and that impact damages the lifter, the camshaft lobe and the pump piston. A noisy GDI pump is often the first sign. Lash also subtracts directly from the stroke the pump sees, so the pump delivers less fuel due to its reduced stroke. It can also cause engine control module (ECM) control issues, because the piston movement is no longer timed to the camshaft movement the way the ECM expects.

Too much preload and the pump piston reaches the end of its travel at or before peak lift. The drive then binds against a hard stop three times per camshaft revolution. This failure mode tends to develop far faster than the wear or damage that occurs due to the presence of lash in the system, and it has the potential to be more severe: a hard bind can break the lifter, the camshaft lobe, the pump, or the engine block.

OEM stock combinations of parts are acceptable as assembled and generally do not need these measurements. Any combination involving an aftermarket camshaft, an aftermarket pump, or a modified OEM or aftermarket valley cover must be measured.

2. Kit contents

Description	Part number	Qty	Note
GDI pump and cam tool, indicator holder	A-800-3-1073	1	Referred to in this document as **the flange**
GDI pump and cam tool, holder stand-off	A-800-3-1074	2	Referred to in this document as **the standoffs**
GDI pump and cam tool, V-block	A-800-3-1075	2	
Flange head bolt, M8 x 1.25, 20 mm	94453A333	4	For standoff assembly
Flange head bolt, M8 x 1.25, 40 mm	94453A337	2	For flange to valley cover
Set screw, 10-32 x 3/8 in	91375A440	1	For securing the indicator in the flange, 3/32 in hex
i-Gaging digital indicator, 0 to 1 in	35-128	1	Supplied with A-800-2-1062 only

2.1 Required tools, not supplied

- 3/32 in hex key
- 10 mm socket, for the measurement tool fasteners
- Ratchet wrench
- Torque wrench
- A flat reference surface, large enough to take both V-blocks and the camshaft. A surface plate is ideal
- A crank bolt socket and ratchet, for rotating the engine by hand
- An arbor press or drill press for the pump travel measurement
- Precision parallels or equivalent blocks to support the pump clear of the solenoid connector
- A micrometer, if you intend to measure the camshaft journal diameter rather than use the published value

2.2 Required parts, not supplied

- New high-pressure fuel pump gasket
  - GM considers the pump gasket to be a one time use gasket. More than one gasket design exists, so make sure to get the correct gasket for your particular pump. See section 13.3
- New fuel feed intermediate pipe
  - The pipe must be replaced whenever its fittings are loosened

2.3 Additionally required, depending on the measured result

- Machined or alternate valley cover
- Alternate thickness pump flange
- Lash cap

3. Safety and cleanliness

Read before starting

Cleanliness is the highest priority. The GDI high-pressure fuel system will not tolerate debris. Cover every opening in the engine, the low-pressure and high-pressure fuel lines, and the pump whenever they are open. Clean the area around the pump mounting pad before removing the pump.

Relieve fuel system pressure before opening any fuel line. Both the low-pressure and high-pressure sides hold pressure after shutdown.

Do not rotate the engine under power with the tool bolted to the pump mounting pad. Rotate by hand only.

The flow control solenoid valve, also known as the spill valve, stands above the top face of the pump and its connector is easily broken. The valve is not sold as a service part, so damaging it means replacing the entire pump. Support the pump on parallels that clear the connector.

The measurements in this document are diagnostic. Interpreting them and acting on them is the installer's responsibility. Product & Service Solutions LLC provides no warranty and accepts no responsibility for damage to the pump, camshaft, lifter, engine or vehicle arising from the use of this tool or from any installed height, whether that height falls inside or outside the component manufacturer's limits.

4. Installing the indicator in the flange

1. Insert the depth indicator fully into the flange (A-800-3-1073) until it seats.
2. Secure the indicator with the supplied 10-32 x 3/8 in set screw using a 3/32 in hex key. Snug only. Overtightening will distort the indicator stem and bind the spindle.
3. Confirm the spindle moves freely through its full stroke and returns cleanly.

The indicator's moving rod is referred to throughout this document as the spindle. It is also commonly called the plunger. The removable end that touches the part being measured is the contact point, and the fixed body clamped in the flange bore is the stem.

5. Measurement convention

Indicator direction

Some digital indicators count up as the spindle extends out of the tool, while others count up as the spindle is pushed back in. Some models can be switched between the two, and many cannot. An analog dial indicator works as well. Whichever type you use, its travel range must cover the readings being taken.

An indicator that counts in either direction works with this tool and gives correct results. Use whichever indicator you have and whichever direction you prefer. The procedure records a reference reading at each setup and works from the difference, so the direction of the display never enters the calculation.

What does matter is that the indicator must not shift in or out of the flange once the reference reading is taken, and you must not zero the indicator part way through a set of readings. If either happens, retake the reference reading for that set.

To match the units convention of this document, set the indicator to millimeters. Values are given in millimeters, with the inch equivalent in parentheses. Note that every formula also works in inches provided every value, including the tool constants, is in inches.

Camshaft position	Lifter	Resulting pump piston position	Spindle travel
Base circle	At its lowest point	Bottom dead center (BDC) of its stroke	Longest
Peak lobe lift	At its highest point	Top dead center (TDC) of its stroke	Shortest

Bottom dead center and top dead center here describe the pump piston, not the pistons in the engine block.

Does zeroing matter?

No, provided you record the reference reading F for each setup and subtract it from every reading taken in that setup. Zeroing the indicator at the reference simply does that subtraction for you.

What does matter is that F belongs to one setup. A reference taken before the pump readings does not apply to the in-engine readings, because the indicator was removed and reinstalled in between. Preload combines a reading from each, so both setups need their own reference recorded.

5.1 Check the reference as you go

Accidentally zeroing the indicator is easy to do and leaves no trace on the display. Part way through a long set of readings, and again before you rely on the results, put the tool back on the flat surface and confirm it still reads the reference value you recorded. Any other known dimension works equally well.

If the reference has moved, the readings taken since it moved are not comparable to the ones taken before. Retake the reference and repeat that set.

6. Measurement overview

Measurement	Camshaft	Output	Section
Depth to the lifter at base circle and at peak lift	Installed in the engine	Lobe lift, and the depths used for preload	7
Pump readings, free and bottomed	Not used for this measurement	Pump free length, available piston travel	8
Readings on the journal, lobe base circle and lobe peak	Out of the engine, on V-blocks	Lobe lift, base circle diameter, peak lift diameter	9

6.1 Measurement variables

Every variable used in this document is a value you either measure or supply. All of them have a space on the record sheet in section 15, and they are also the input fields on the PSS calculator page. Calculated results are named in words rather than letters, so any letter appearing in a formula is something you measured or supplied.

Variable	Measurement	Taken during
F	Reference reading, tool flat on a surface	In-engine and pump setups
L BC	Depth to lifter at base circle	In-engine
L PL	Depth to lifter at peak lift	In-engine
R F	Pump reading, piston free	Pump
R C	Pump reading, piston at end of travel	Pump
J	Reading on the camshaft journal	V-block
B	Reading at lobe base circle	V-block
K	Reading at lobe peak lift	V-block
G	Gasket thickness	Measured, or PSS default from section 13.3
C	Lash cap thickness, 0 if none fitted	As fitted
D J	Camshaft journal diameter	Measured, or PSS default

The tool also has two fixed dimensions that never change and are never entered by the customer: the preload constant, 25.40 mm (1.000 in), and the free length constant, 44.45 mm (1.750 in). Both are derived from the 63.50 mm (2.500 in) standoff length, shown as S on the figures, and the 19.05 mm (0.750 in) flange to spring support length, shown as E.

The in-engine and pump measurements together give preload. The V-block measurement characterizes a camshaft on the bench and does not, on its own, give preload. PSS recommends verifying preload in the engine with the actual valley cover and pump that will be used in the finished build.

The gasket is not measured
All measurements in this document are taken without a gasket. Gasket thickness is entered into the calculation as a number instead. Measure your own gasket and use that value, or use the PSS default value in section 13.3. See section 11.1 if you want to verify a result with the gasket installed.

6.2 Recording and calculating

Section 15 is a record sheet that prints on one sheet of paper, front and back, with a space for every variable in the table above. Fill it in as you work. Preload combines readings taken in two separate setups, and the sheet keeps each reading with the reference reading it belongs to. Additional copies can be printed from gditool.com.

When the sheet is filled in, you can work the formulas in section 10 by hand, or enter the values at gditool.com and have the calculations done for you. Either way the inputs are the same, which is why the sheet is worth filling in even if you intend to use the calculator.

7. In-engine measurement, camshaft installed

Setup required before starting:

- Camshaft installed in the engine.
- GDI pump roller lifter installed in its bore in the block.
- Valley cover installed and bolted down, to its final torque.
- **No gasket** fitted under the tool flange. Gasket thickness is entered in the calculation, not measured.
- The GDI pump removed.

Use the valley cover you intend to run
Many aftermarket valley covers do not have the same pump mounting pad thickness as the original equipment manufacturer (OEM) cover. Pad thickness feeds directly into preload, one for one. A cover with a pad 0.5 mm thinner puts the pump 0.5 mm closer to the camshaft and adds 0.5 mm of preload; a thicker pad takes the same amount away.

Record every reading on the worksheet in section 15 as you take it. When the sheet is complete you can work the formulas in section 10 or enter the values at gditool.com and have the results calculated for you.

1. **Record the reference.** With no spring installed on the flange assembly, set the tool on a flat surface so the contact point is flush with the spring support end face, and record the reading as F.

2. **Install the conical outer spring.** Remove the conical outer spring, also called the lifter return spring, from the GDI pump and fit it onto the tool's spring support. The large end goes against the spring support. The spring holds the roller lifter against the camshaft and prevents a false reading from a lifter that is not fully seated.
3. **Mount the tool.** Secure the tool to the pump mounting pad on the valley cover with the two 40 mm flange head bolts and tighten to 25 N·m (18 lb-ft). Confirm the contact point sits over the lifter centerline before tightening.
4. **Find base circle.** Rotate the engine by hand and watch the display. The reading reverses direction twice per lobe, once at base circle and once at peak lift. Base circle is the turning point where the spindle stands furthest out of the tool. The lifter is then at its lowest point on the lobe and the pump piston would be at bottom dead center.
5. **Record the base circle depth, L_{BC}.** Rotate slightly each way past the turning point to confirm you are at the true extreme and not on the flank.

   Example reading: L_{BC} = 14.58 mm (0.574 in)

6. **Find peak lift.** Continue rotating to the next turning point, where the spindle is pushed furthest back into the tool. That is peak lobe lift, and the pump piston would be at top dead center.
7. **Record the peak lift depth, L_{PL}.** Rotate slightly each way to confirm the extreme, the same as at base circle.

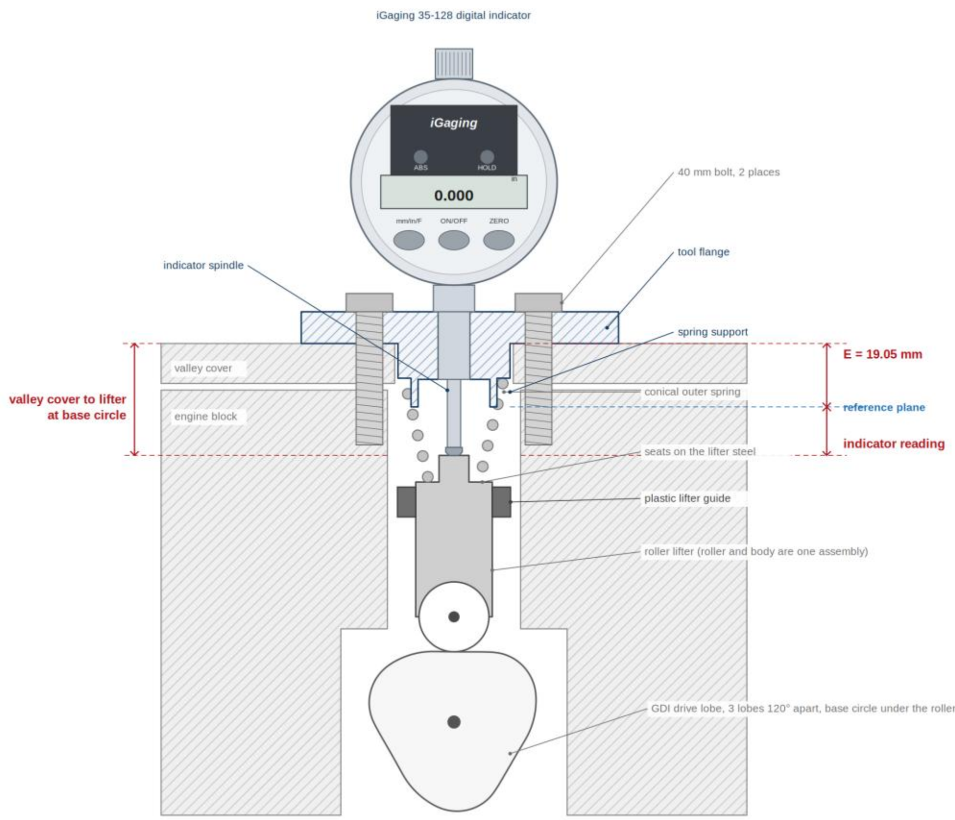
   Example reading: L_{PL} = 8.92 mm (0.351 in)

8. **Repeat for the remaining two lobes.** The Gen V GDI lobe is a three-lobe form. Recording all three gives an average and shows lobe-to-lobe variation.

$$\text{Lobe lift} = L_{BC} - L_{PL} = 14.58 - 8.92 = 5.66 \text{ mm } (0.223 \text{ in})$$

Keep L_{BC} and L_{PL} as well as the lift. The lift alone does not give preload; the absolute depths do.

Figure 1 — Block measurements



7.1 Comparing the three lobes

Compare the three lobes against each other. A spread of more than 0.05 mm (0.002 in) between the highest and lowest lobe should put the data in question. That figure is a total spread, the difference between the largest and smallest value, not a plus or minus figure.

The 0.05 mm figure is not a camshaft machining tolerance on its own. It is a stack-up of several sources: lobe-to-lobe machining differences, camshaft bearing and camshaft runout, and the repeatability of this measurement method and the indicator being used. Check the setup before the camshaft. A lifter not fully seated in its bore, or a tool not centered over it, will produce lobe-to-lobe differences that have nothing to do with the camshaft.

The 0.05 mm figure also assumes a new camshaft. On a used camshaft, inspect the lobes, then measure again and see whether the same variation repeats on the same lobes. Variation that repeats is in the part. Variation that moves is in the setup.

8. Pump measurement, free length and available travel

This section is done with the pump off the engine. It establishes how much piston travel the pump actually has. Lobe lift, preload and clearance to end of travel all have to fit within that travel.

> **Handle the spring retainer with care**
>
> The spring retainer is pressed onto the piston and has no other retaining feature. It is easy to load the retainer instead of the piston, move the retainer on the piston, and ruin the pump. Confirm the contact point is on the end of the piston, not on the spring retainer, before applying any load.
>
> Use no more force than it takes to reach the stop. Beyond that point the piston is against its limit and further force damages the pump, the indicator, or both.
>
> Take particular care with a high-ratio arbor press or a hydraulic press. Both multiply hand force by enough that you can apply hundreds of pounds without feeling it, and neither gives any indication that the piston has already bottomed.

8.1 Free length

1. **Record the reference.** Set the tool on a flat surface so the contact point is flush with the spring support end face, and record the reading as F.
2. **Leave the conical outer spring off.** The outer spring acts between the pump's spring support and the roller lifter. No lifter is involved in this measurement, so the spring serves no purpose here. Do not fit it to the pump or to the tool flange. Only the pump's own inner spring and its retainer are present.
3. **Mount the standoffs.** Fit the two standoffs (A-800-3-1074) to the pump mounting flange with no gasket, using two of the 20 mm flange head bolts.
4. **Mount the tool to the standoffs.** Secure the flange and indicator assembly to the free ends of the standoffs with the remaining two 20 mm flange head bolts. Check orientation carefully. The pump flange bolt holes are not evenly spaced about the pump centerline, and neither is the tool. The contact point must land directly on the piston centerline.

5. **Support the pump.** Place the assembly in an arbor press or drill press with the tool facing up and the flat top face of the pump down. Support the pump on precision blocks or parallels that clear the flow control solenoid valve connector, which stands above the top face.
6. **Take up the free play.** Press the tool down until the contact point just touches the end of the pump piston. The end of the piston sits recessed in the center of the spring retainer, so the contact point reaches down inside the retainer to touch it. Contact the piston only. Do not rest the contact point on the retainer.
7. **Record the free reading, R_F.**

Example reading, LT1 pump: R_F = 8.59 mm (0.338 in)

8.2 Available travel

> **Applying load through the indicator**
>
> PSS has verified with the manufacturer of the digital indicator supplied with kit A-800-2-1062 that it is safe to apply force to the top of the spindle when using an arbor press or drill press to compress the pump piston. If you are supplying your own indicator, verify with its manufacturer that this load will not damage it.

1. **Compress the piston.** Use the arbor press ram, or the chuck of a drill press, to press down on the top of the indicator spindle with light force until the piston reaches the end of its travel.
2. **Record the reading, R_C.**

   Example reading: R_C = 18.03 mm (0.710 in)

Depending on pump type, the end of piston travel is set by one of the following. None of them is a place to run the pump, but they do not all stop the same way:

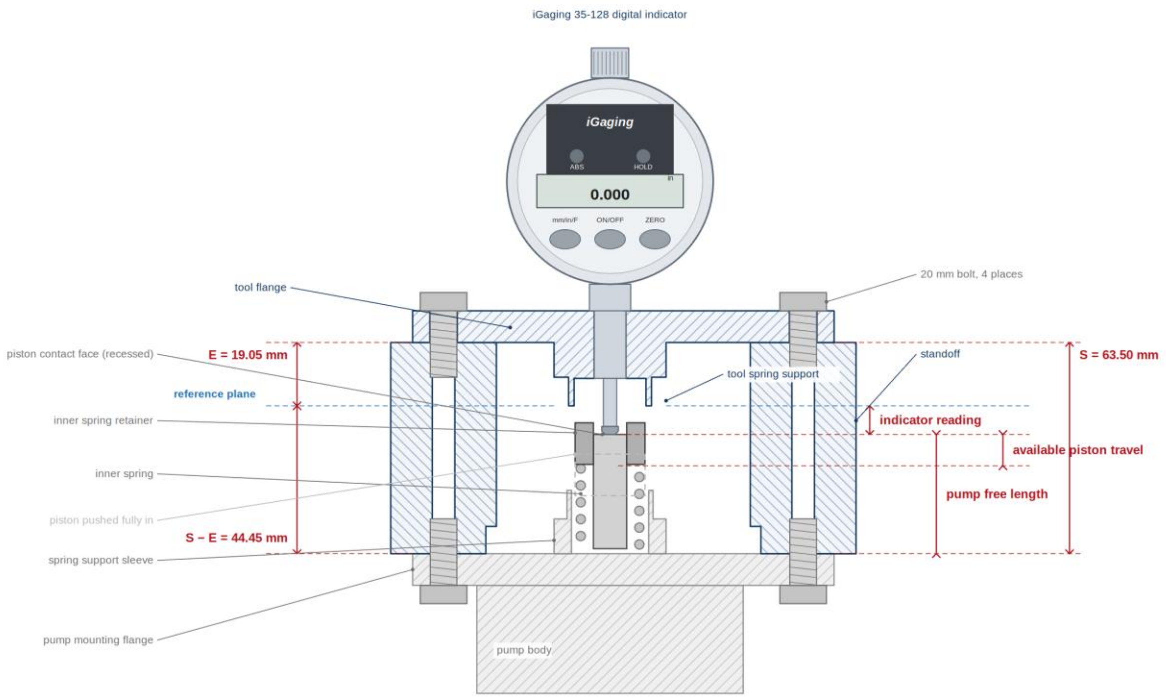
- **Piston contact** — the piston reaches the end of its bore inside the pump. This is a true hard stop and gives the most repeatable reading.
- **Spring coil bind** — the spring coils stack solid. The coils contact one another progressively rather than all at once, so this is a range rather than a single point, and the reading will depend somewhat on how hard you press.
- **Retainer contact** — the spring retainer comes up against the piston seal, which is fixed in the pump body. Firmer than coil bind, softer than piston contact.

Where the stop is progressive, use light and consistent pressure and take the reading at the point where further force produces little further movement.

Available travel = $R_C - R_F$ = 18.03 − 8.59 = 9.44 mm (0.372 in)

Because both readings share the same reference, the standoff length cancels out of available travel.

Figure 2 — Pump measurements



9. V-block measurement, camshaft off the engine

This section gives lobe lift and base circle diameter on a camshaft that is out of the engine. It is the right way to verify a camshaft on arrival, or to compare camshafts. It does not give preload, because preload also depends on the block, the valley cover, the lifter and the pump.

> **Setup accuracy governs the result**
>
> Work on a surface plate or other known flat surface. A bench top is not adequate.
>
> The V-blocks must be square to each other and in line with each other, and must not be staggered. Angles, offsets and misalignment all produce wrong numbers that look plausible.

9.1 Assembly

1. Assemble the flange and standoffs with two of the 20 mm flange head bolts. The standoffs have flats. The flats face the V-blocks.
2. Hand tighten, then align the flats on the standoffs to the flats in the V-blocks and seat them. Only then tighten fully.
3. Check orientation. The indicator centerline must line up with the camshaft centerline.
4. Set the camshaft in the V-blocks so the GDI lobe group and the adjacent journal are both accessible.

This setup needs no reference reading on a flat surface. The camshaft journal is the reference, and every lobe reading is a radius difference from it.

9.2 Journal reference

1. Position the tool over the camshaft bearing journal closest to the GDI lobe. On the Gen V V8 this is the rear journal.
2. Rotate the camshaft one full turn, without sliding it forward or back, and watch the reading. It should not change. If it does, the camshaft is not seated, the V-blocks are not aligned, or the work surface is not flat. Fix that before continuing.
3. **Zero the indicator here, or record the reading as J.** Zero now represents the camshaft journal diameter.
4. **Measure the journal outside diameter with a micrometer and record it as D_J.** The tool does not measure this dimension. If you do not have a micrometer, use the PSS default value in section 13.1.

9.3 Lobe readings

1. Slide the flange and standoff assembly along the V-blocks until the contact point is centered on the GDI pump lobe, taking care not to move the camshaft along its axis.
2. **Base circle** is the position whose reading is furthest from the journal reading. Rotate the camshaft slightly each way to confirm you are at the true extreme and not on the flank. Record it as B.

3. **Peak lift** is the position whose reading is closest to the journal reading. Rotate the camshaft slightly each way to confirm the extreme. Record it as K.
4. Repeat at the other two lobes. The same repeatability test in section 7.1 applies here.

> **Why the readings are anchored on the journal**
> The journal is always the largest diameter on that part of the camshaft, because the camshaft has to pass through the bearing bores to be installed. So the lobe always reads on one side of the journal reading, whichever way your indicator counts.

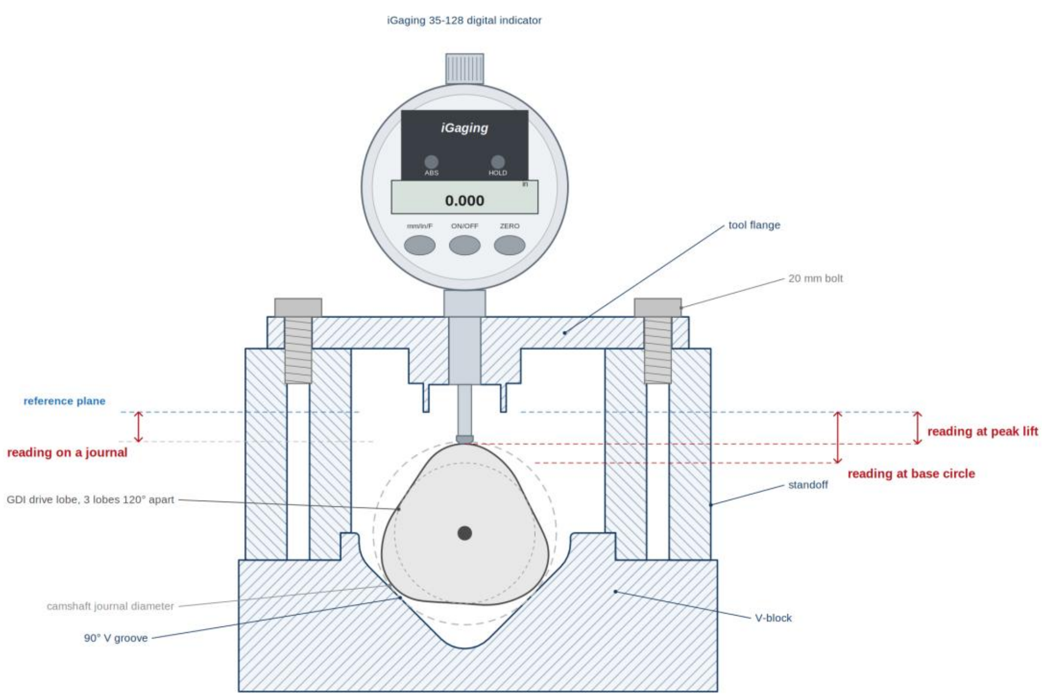


Figure 3 — Camshaft on the V-blocks

10. Calculations

If you would rather not work these by hand, enter the values from the record sheet in section 15 at gditool.com and the results are calculated for you.

All formulas below work in millimeters or in inches, provided every value including the tool constants is in the same units.

For the in-engine and pump measurements, each value entered below is the displayed reading minus the reference reading F for that setup, taken as an absolute value (magnitude). Subtract F first, then take the absolute value — the order is what matters. Using the absolute value of the displayed reading on its own is correct only when F happens to be zero.

For the V-block measurements there is no reference reading. Every value is a difference from the journal reading J, again taken as an absolute value. The direction is never in doubt: the lobe is always smaller in diameter than the journal, and base circle always reads further from the journal than peak lift.

10.1 Formulas

Lobe lift, in the engine = $L_{BC} - L_{PL}$

Lobe lift, on V-blocks = $B - K$

Base circle diameter = $D_J - 2 \times (B - J)$

Peak lift diameter = $D_J - 2 \times (K - J)$

Available piston travel = $R_C - R_F$

Pump free length = 44.45 mm (1.750 in) − R_F

Preload = 25.40 mm (1.000 in) − $R_F - L_{BC} + C - G$

Clearance to end of travel = $R_C + L_{PL}$ − 25.40 mm (1.000 in) + $G - C$

Base circle and peak lift diameters always subtract from the journal diameter, because a cam-in-block camshaft must pass through the bearing bores and so the whole lobe is smaller than the journal.

How the travel divides

Lobe lift + preload + clearance to end of travel = available piston travel.

Available travel is fixed by the pump and lobe lift is fixed by the camshaft, so every adjustment you can make moves the division between preload and clearance. A lash cap moves it one for one: add 0.25 mm of lash cap and preload rises 0.25 mm while clearance falls 0.25 mm.

A clearance of zero or less means the pump reaches the end of its travel before peak lift. A preload of zero or less means there is lash between the pump piston and the lifter.

10.2 Example calculation

Using the example readings from the in-engine and pump sections, with a 0.30 mm gasket and no lash cap:

Result	Calculation	Value
Lobe lift	14.58 − 8.92	5.66 mm (0.223 in)
Available piston travel	18.03 − 8.59	9.44 mm (0.372 in)
Pump free length	44.45 − 8.59	35.86 mm (1.412 in)
Preload	25.40 − 8.59 − 14.58 − 0.30	1.93 mm (0.076 in)
Clearance to end of travel	18.03 + 8.92 − 25.40 + 0.30	1.85 mm (0.073 in)

Check: Lobe lift + preload + clearance to end of travel = available piston travel

5.66 + 1.93 + 1.85 = 9.44 mm

With a lobe lift of 5.66 mm against 9.44 mm of available travel, 3.78 mm remains to divide between preload and clearance. A high-lift aftermarket camshaft on a stock pump leaves much less — a 7.85 mm lobe on a 9.0 mm pump leaves 1.15 mm for both.

11. Interpreting the results

11.1 Target values

Verify the preload and clearance specifications with the pump, camshaft or engine supplier. Any one of them may publish figures for the combination, and a published specification governs.

Where none of them publishes anything, use these minimums:

- **Preload at base circle, 0.50 mm (0.020 in) minimum.** This keeps the pump piston in contact with the lifter through the whole cycle, so there is no lash, no impact between the piston and the lifter, and the pump delivers its full stroke.
- **Clearance to end of travel at peak lift, 0.50 mm (0.020 in) minimum.** This keeps the pump piston clear of its internal stop at peak lift, and leaves margin for thermal expansion of the stack, component tolerances, and measurement error.

Where all three lobes were measured, check these targets against the worst case rather than the average. Minimum preload occurs at the lobe with the largest L_{BC}, because a greater depth to the lifter at base circle leaves less preload. Minimum clearance occurs at the lobe with the smallest L_{PL}, because a smaller depth at peak lift means the piston is pushed further in. These can be different lobes, so take each figure from whichever lobe produces it. The average of the three describes the camshaft; it does not govern whether the combination is safe to run.

> **0.50 mm is a floor, not a target**
>
> Both figures are minimums, and they are low. More clearance is preferred at both ends. Treat 0.50 mm as the point below which the combination should not be run at all, not as the number to aim for.
>
> It is a floor you can actually measure. A preload or clearance result carries roughly ±0.05 mm (0.002 in) of measurement uncertainty, so 0.50 mm sits about ten times above the noise in the reading. A result that lands on the minimum is genuinely at the minimum, not an artifact of the measurement.

Published specifications run well above that floor. As one example, the Stanadyne RGX pump installation guide, specification 70640 Rev 1 dated 13 April 2026, calls for an installed plunger preload of 1.20 to 1.80 mm (0.047 to 0.070 in), and requires the installation measurements to be submitted through the Stanadyne portal for the product to be registered. That guide publishes no clearance figure. It constrains the other end of the travel by limiting the camshaft instead, with a maximum tested lobe lift of 8.2 mm and a recommended lobe lift of 7.85 mm. Check the current revision of any supplier document before relying on the numbers in it.

> **Optional check when the result is marginal**
>
> Gasket thickness is the one part of the stack this procedure does not measure directly, though the practical risk is small. A single-layer steel gasket compresses very little, and any difference between its

free and installed thickness is likely to fall at or below the ±0.05 mm (0.002 in) repeatability of the measurement itself. The check is mainly worth doing if you have reason to think the gasket is not the thickness you entered, or where more than one gasket is stacked — a stack multiplies any per-gasket error by the number of gaskets, and a miscount is a full gasket thickness. Repeat the in-engine measurement with the actual gasket or gaskets fitted under the tool flange, torqued to the same 25 N·m (18 lb-ft) used for the pump. The tool flange is the same plate and bolt pattern as the pump flange, so the gaskets sit in the same joint they will occupy in service.

With the gasket in the stack it is already accounted for in the reading. Use preload = 25.40 mm − R F − L BC + C, and do not subtract G as well. Doing so counts the gasket twice and understates preload by the gasket thickness.

If the two results agree within your measurement repeatability, the value used for G is sound. If they disagree, the installed thickness of that gasket is not what you entered, and the gasket-in-place result is the one to use.

Before relying on this check, confirm with the pump or gasket supplier whether a gasket that has been clamped once may still be installed.

11.2 Correcting the result

Adjustment	Preload	Ratio
Machine the OEM valley cover pad	Increase	1:1 with material removed
Thinner pump flange	Increase	1:1
Thicker pump flange	Decrease	1:1
Aftermarket valley cover	Either way — measure it	1:1 with pad thickness difference
Lash cap on the lifter tip	Increase	1:1 with cap thickness

Clearance to end of travel moves the opposite way by the same amount in every case. Remeasure whatever combination you end up with.

A lash cap adds a part to the drive, and with it another interface to wear and another thing to come loose. It is not the first choice. Where a lash cap is the only practical way to reach the required preload, confirm first that the pump manufacturer permits one and that the pump design accepts it.

Machining is not reversible. If a cut overshoots, the part is scrapped. Take the cut in steps and remeasure.

Check whether a lash cap can be used at all

A lash cap can be ruled out two different ways. The pump manufacturer may prohibit one, or the hardware may simply not accept one — the end of the piston is recessed inside the spring retainer, so a cap larger in diameter than that recess bears on the retainer rather than on the piston.

The Stanadyne RGX pump installation guide, specification 70640 Rev 1 dated 13 April 2026, cites both: it states that the retainer is not designed to accommodate a lash cap, and that fitting one constitutes improper installation.

Where a lash cap is ruled out, preload has to be corrected another way. That same guide directs the installer to remove material from the bottom of the pump flange to raise preload, and to add gaskets at 0.30 mm (0.012 in) each to lower it.

11.3 Before you install the pump

Pump removal and installation are covered by the OEM service information for your engine, or by your pump supplier. This document does not repeat them. Three points bear directly on what you have just measured:

- Confirm preload and clearance to end of travel meet the specification from the pump, camshaft or engine supplier, or the minimums in section 11.1 where none of them publishes one, before the pump goes on.
- The camshaft must be at base circle when the pump is installed.
- Alternately hand-tighten the two pump bolts one turn at a time until the pump is fully seated. Uneven tightening side-loads the pump piston and can damage it. The same applies in reverse on removal.

The high-pressure fuel pump gasket is not reusable. Fit a new one. Stacking gaskets is not preferred practice, and where a pump supplier does allow it as a preload correction, remember that each gasket takes 0.30 mm (0.012 in) of preload away at the same time it gains clearance. Follow the pump supplier's direction.

12. Troubleshooting

Symptom	Likely cause and action
Re-measuring gives a different value than recorded earlier in the same setup	The indicator was zeroed, or has moved in the flange bore, since the first reading, so the reference no longer applies. Put the tool back on the flat surface and confirm it still reads F. Retake the reference and repeat that set of readings.
Reading drifts while the camshaft is stationary	Spindle binding in the flange, set screw overtightened, or debris on the lifter face. Back the set screw off and confirm free spindle movement.
Reading changes as the camshaft is rotated on the journal	Camshaft not seated, V-blocks not aligned or staggered, or work surface not flat. Check the setup first, since it is the more common cause. If the setup is sound and the reading still changes, the journal may be out of round or the camshaft bent. GM's service limit for camshaft runout is 0.05 mm (0.002 in) total indicator reading.
Three lobes disagree by more than your repeatability	Check setup first. On the bench, misalignment or an uneven surface. In the engine, the lifter not seated or the tool not centered.
Lift measured in the engine differs from lift measured on the bench	Usually the lifter is not fully seated in its bore, or the tool is not centered on it.
Journal-to-base-circle difference is less than the lobe lift	The two lobe readings have been swapped, or they were taken from a different origin than the journal reading.

Symptom	Likely cause and action
Preload comes out negative or near zero	Recheck the measurement before the parts. Confirm the reference reading F for each setup, that the contact point landed on the piston rather than the spring retainer, and that the gasket value used matches the gasket that will be fitted. If the numbers hold, the stack is genuinely short, and the most common cause is a valley cover whose pump mounting pad is not OEM thickness. Repeat the in-engine measurement with a known OEM cover and compare L BC; the difference between the two readings is the pad thickness difference.
Pump measurement will not repeat	The contact point is landing on the spring retainer rather than the piston. Recheck tool orientation over the piston centerline.

13. Reference data

13.1 Camshaft journal diameter

Published journal outside diameter for the Gen V LT series camshaft is 54.990 to 55.015 mm (2.164 to 2.166 in). The PSS default is 55.00 mm (2.165 in). A measured value is preferred.

13.2 OEM camshaft GDI lobe lift

Engine	GDI lobe lift
LT1, L83, L86, L84, L87, LT2	5.70 mm (0.224 in)
LT4, LT5	5.99 mm (0.236 in)
L8T	6.40 mm (0.252 in)

13.3 Pump gasket thickness

GM part number	Model years	Inner feature	Thickness
12623308	2014–2026	Round	0.30 mm (0.012 in)
12679867	2019–2026	Square	0.30 mm (0.012 in)

12623308 is used on Gen 1 and Gen 2 Stanadyne pumps (LT1, LT4 and similar). Both thicknesses confirmed by direct measurement at PSS.

Because both measure the same, the choice between them does not change the preload calculation. It still matters that you fit the correct gasket for your particular pump — identify it by the inner feature. Where the gasket to be fitted is neither of these, measure it.

The PSS default value for G is 0.30 mm (0.012 in).

14. Revision history

Rev	Date	By	Change
1.0	17 Sept 2026	JH	Public release
1.01	17 Sept 2026	JH	Corrected a section cross-reference in 6.2, which pointed at the revision history instead of the record sheet

15. Measurement record

Record every reading here, then either work the formulas in section 10 or enter the values at gditool.com.

Engine or customer	Camshaft	Pump	Valley cover
Pump flange		**Gasket(s) — part number and quantity**	

Date	Measured by	Notes

In-engine

Reference F			
Lobe	**L BC**	**L PL**	**Lift (calculated)**
1			
2			
3			
Average			

Pump

Reference F	R F	R C	Available travel (calculated)

V-block, if used

Journal J			
Lobe	**Base circle B**	**Peak K**	**Lift (calculated)**
1			
2			
3			
Average			

Other inputs

Gasket G	Lash cap C	Journal diameter D J

Results (all calculated)

Pump free length	Preload	Clearance to end of travel
Base circle diameter	**Peak lift diameter**	**Lobe lift**

Go to gditool.com, or scan the code to get there, and enter the values from this sheet to have the calculations done for you. The same code is on either V-block.