GenX™ Street/Strip Cylinder Heads for the GM LT1

Thank you for purchasing Trick Flow GenX Street/Strip aluminum cylinder heads for the GM LT1.

Please follow the steps outlined in this instruction manual to ensure that the installation of your new cylinder heads is done correctly and that they perform according to design.

Please read all of the enclosed information before beginning any work. If you have any questions regarding installation or the written materials supplied with your new heads, contact the Trick Flow technical department at 1-330-630-1555 for assistance, Monday through Friday from 9:00 am to 5:00 pm ET.

Project Overview

- ☐ Review all paperwork included in the installation packet
- ☐ Inspect the condition of all components
  Verify the part numbers and quantities of each product received (see Parts Checklist below)
- ☐ Mail the warranty card to Trick Flow
- ☐ Locate recommended tools
- ☐ Purchase any additional parts needed (See Additional Parts Required section-Do not purchase pushrods until the proper length is determined)
- ☐ Remove existing cylinder heads
- ☐ Clean and inspect the engine block
- ☐ Check header fitment to cylinder head on a workbench
- ☐ Verify that the temperature sending unit fits; locate an adapter if needed
- ☐ Check piston to valve clearance
- ☐ Check pushrod length
- ☐ Purchase the appropriate pushrods
- ☐ Install the new cylinder heads
- ☐ Adjust the valvetrain
- ☐ Make tuning adjustments
- ☐ Perform a proper break-in
- ☐ Test drive and enjoy!

Parts Checklist

You should have received the parts listed here. Please verify the part numbers and quantities of each component received.

- ☐ (1) Assembled cylinder head
- ☐ (1) Instruction packet
- ☐ (4) 5/16” Guideplates
- ☐ (8) 3/8” Rocker studs

If you are missing an item or a part was received in error, please contact Trick Flow at 1-330-630-1555, Monday through Friday from 9:00 am to 5:00 pm ET.

Recommended Tools

- ☐ Shop Manual for your vehicle
- ☐ Basic mechanics tool set (SAE / Metric sockets and combination wrenches)
- ☐ 0-100 ft.-lbs. torque wrench
- ☐ Timing light, vacuum gauge, and spark plug gap tool
- ☐ 7/16”-14 tap and tap handle
- ☐ Straightedge
- ☐ Feeler gauge
- ☐ Modeling clay
- ☐ Adjustable pushrod (TFS-9000 for hydraulic roller applications; TFS-9001 for flat tappet applications)
- ☐ Torque angle meter
- ☐ Solid mock up lifter

Additional Parts Required

These components are required to complete the installation of your new cylinder heads. Please refer to the Recommended Components chart on the Technical Specifications sheet for specific part numbers.

- ☐ Head gaskets
- ☐ Intake gaskets
- ☐ Exhaust gaskets
- ☐ Head bolts
- ☐ Intake bolts
- ☐ Exhaust bolts
- ☐ Moly lube
- ☐ Spark plugs
- ☐ RTV sealer
- ☐ Pushrods
- ☐ Rocker arms
- ☐ ½” pipe plug for blocking unused temperature sender hole
- ☐ Crossover tube washers
- ☐ Temperature sending unit adapter (if necessary)
- ☐ Thread locker
- ☐ Thread sealer

Installation Instructions

1) Cylinder Head Removal

Consult your shop manual for the proper cylinder head removal procedure for your vehicle. Taking notes, pictures, and even making a video of the disassembly will help you greatly when reinstalling brackets and routing vacuum lines.

NOTE: Be sure cylinder #1 is at TDC on the compression stroke.

2) Prepping the Block

With the old cylinder heads removed, inspect the cylinder bores for scratches, ridges, and cracks. If everything appears to be OK, put some paper towels in the cylinders to catch loose debris as the old head gaskets are scraped off the engine block's deck surface. Remove all traces of the gaskets and any oil or grease that may be present by wiping the surface with brake cleaner.

Check the deck surfaces for flatness by laying a straightedge across the deck lengthwise and sticking a .004" feeler gauge under it. If the feeler gauge fits anywhere under the straightedge, the block will need to be decked or head gasket failure will result.

Once the block decks have been cleaned and checked, use a 7/16"-14 tap to chase the threads in the head bolt holes. This will clean out old sealer and debris, which is extremely important for preventing leaks and torquing the heads down evenly on the block.

After cleaning the head bolt hole threads, carefully remove the paper towels from the cylinders and discard. Using new paper towels, clean the cylinders and coat the cylinder walls with a thin film of engine oil to protect them from corrosion.

3) Checking Header Clearance

Place one of the new cylinder heads on a suitable work stand and install the recommended spark plugs (refer to the Recommended Components chart in the Technical specifications sheet for specific part numbers). Bolt the headers to the cylinder head and check for any interference. Repeat this procedure with the other cylinder head.

Trick Flow recommends using spark plug wires with 90 degree spark plug boots on header equipped small block Chevy engines. Now is the time to make sure the vehicle's temperature sending unit will work with the ½"-14 NPT threaded hole in the cylinder heads. If the vehicle's sender doesn't fit, locate a suitable replacement or use an adapter bushing to make the sending unit work (refer to the Recommended Components chart on the Technical Specifications sheet for specific part numbers).

4) Checking Piston-to-Valve Clearance and Valvetrain Geometry

If you choose to use the stock camshaft in your engine, and it has not been moved from its factory position, you do not have to check piston-to-valve clearance. If you have an aftermarket camshaft or are reinstalling a camshaft (especially with a multi-keyway timing set), you must follow this procedure to assure safe operating clearances between your pistons and valves:

A) Rotate the crankshaft until the engine is on the compression stroke of the #1 cylinder. Place a solid mock up lifter in the lifter bore of the valve that you will be measuring. Be sure that the mock up lifter is the same height as the lifters that will be installed in the engine later.

B) Place a few 1/4" thick strips of modeling clay across the upper half of the piston. Put a light coat of oil on top of the modeling clay and the valves in the cylinder head to keep the clay and valve from sticking. Place the head gasket you will be using on the block and bolt the head on with five or six head bolts.

C) Install the rocker arm studs, guideplate, and the rocker arm for the valve you are checking (intake or exhaust). Next, set your adjustable pushrod tool to the proper length for your combination and tighten the rocker to zero lash, rotate the crankshaft at least twice, remove the cylinder head.

D) This is also a good time to verify proper pushrod length and valvetrain geometry. The procedure can be found in the bulletin titled "How to Optimize Pushrod Length for Better Performance".

E) Gently cut the clay into slices and look for the thinnest section of the valve impression. The impression is a 3D representation of the clearance between the piston and valve. Carefully measure the thickness of the clay with a machinist's scale or calipers. The intake valve side of the clay should have .080" or more of clearance, and the exhaust should have .100" or more of clearance.

F) When you have completed these procedures, rotate the crankshaft until the #1 piston is at TDC on the compression stroke.

NOTE: Reference the maximum recommended valve lift for the valve springs in the Technical Specifications sheet before purchasing an aftermarket camshaft.

5) Installing the New Cylinder Heads

With the block deck surfaces and cylinders clean and all checks completed, position the head gaskets on the block per the manufacturer's markings.

Don't be alarmed if some of the holes in the block are restricted by a smaller hole in the gasket. This is done intentionally to regulate coolant flow.

Position each cylinder head evenly on the block's dowel pins so that each head lies flat against the gasket. Next, place hardened head bolt washers over each bolt hole. Head bolt washers are required to prevent galling of the aluminum and to get accurate torque readings. Once they are in place, place a small amount of ARP moly lube on the top of all washers.

Place thread sealer on the head bolts, and torque the head studs in the three stages shown, following the sequence shown in Figure 1 on the following page.

NOTE: For head stud installation, follow the head stud manufacturer's instructions.

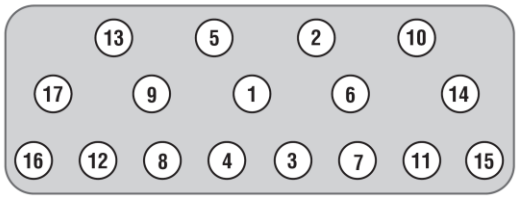


Figure 1

Stage One: 22 ft.-lbs.
Stage Two: Tighten the long and medium bolts as additional 80 degrees using a torque angle meter.
Stage Three: Tighten the short length bolts an additional 67 degrees using a torque angle meter.

A cold re-torque after the initial break in period is not required to maintain head gasket integrity and combustion seal, but can be done if desired.

6) Installing and Adjusting the Valvetrain

Place the proper length, hardened pushrods into the pushrod holes. Use Permatex 3H Aviation Form-a-Gasket to coat the base threads of the rocker studs, and then put the guideplates on. Do not tighten the guideplates down completely and leave the connecting bolt loose. If the rocker studs break into the intake ports, use Teflon tape on the threads.

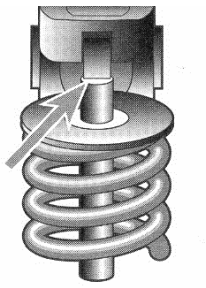


Figure 2

NOTE: Self-aligning rocker arms do not require guideplates. Instead, you must use shims or washers under your rocker studs. Typically a hardened head bolt washer will work. The approximate thickness required would be .120".

Place the rocker arms on the studs and verify that they are centered side to side. See Figure 2. Once the rocker arms are centered on the valves, gently remove the rocker arm and torque the rocker arm studs to 55 ft.-lbs. Place the rocker arm back on the stud to make sure that they didn't move during tightening. Now tighten the connecting bolt on the guide plate.

Adjust the valvetrain according to the camshaft manufacturer's recommendations. If you are using a hydraulic camshaft and no specifications are available, turn the rocker arm adjusting nuts ½ to ¾ of a turn past zero lash. For mechanical camshafts, you must use the correct lash specification determined by the camshaft manufacturer.

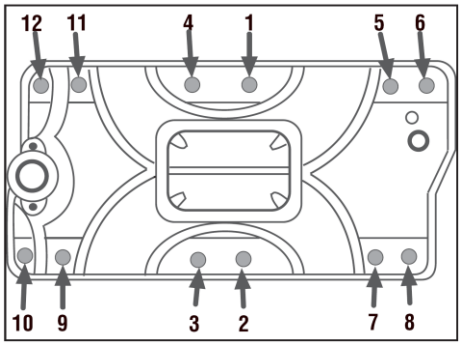
Use the following adjustment order for all types of camshafts. This is the easiest method to use since it requires only one turn of the crankshaft.

A) With the #1 piston at TDC on the exhaust stroke, adjust the exhaust rockers of cylinders #2, #5, #6 and #7, then the intake rockers of cylinders #3, #4, #6 and #8.
B) Turn the crankshaft 360 degrees (One full turn) until the #1 piston is at TDC on the compression stroke. Adjust the exhaust rockers of cylinders #1, #3, #4, and #8, then the intake rockers of cylinders #1, #2, #5 and #7.
C) Leave the #1 piston at TDC on the compression stroke for the rest of the assembly.

7) Reassembling the Rest of the Engine

Install as many items as you can without putting the valve covers on. This will allow you to prelube the valvetrain, which is explained in the Prelubing the Valvetrain section.

Intake Manifold Tips
Apply ¼" bead of Permatex Ultra Black RTV sealer to the intake manifold end rail surfaces. Do not use a gasket on the end rails, only the RTV sealer. Outline the water openings at the ends of the head with Ultra Black to help prevent water leaks. Apply a small amount of motor oil to the intake bolts and torque to factory specifications in the sequence shown below.



Exhaust Manifold/Header Tips
Lay your straightedge across the mating flange of the exhaust manifolds/headers to make sure they are flat. Put a small amount of motor oil on the exhaust bolts and tighten them down from the center out to the ends. This will permit the flange to be tightened evenly. After you run the engine a few times, retighten the exhaust bolts. If the bolts loosen up, the leaking exhaust gas will ruin the gasket.

NOTE: What may sound like a lifter tick is often an exhaust gas leak. Rule out exhaust leaks before tearing the intake off to replace the lifters.

8) Pre-lubing the Valvetrain

The valvetrain is now ready to be pre-lubed. Slowly pour a half quart of motor oil (per head) over the rocker arms, valve springs, and valve stems. Use an oil squirt can to get inside the valve spring and lube the valve stem and seal area. Reinstall the valve covers as soon as possible to keep contaminants out of the engine. The valve cover rails on the GenX cylinder heads have been raised approximately .300" to provide clearance for roller rocker arm polylocks. Adjustments to accessories that mount on or cross over the valve covers may be necessary.
If you are installing centerbolt-type valve covers with standard type roller rocker arms, you will have to reduce the width of the oil control baffles by squeezing them in the center until they clear.
After the valve covers are installed, reinstall the rest of the top end and accessories.

DO NOT START THE ENGINE IF THE TOP HALF OF THE ENGINE HAS NOT BEEN PRELUBED!

8) Break-In and Tuning

To ensure long life and trouble-free use, allow 2-4 hours of normal driving time before running the engine hard; this will break-in the valvetrain properly. If you installed a new camshaft, change the oil after 30 minutes of run time. This will help remove particles that are shorn off during the break-in process.

Technical Specifications

Head Material: A-356-T61 Aluminum
Comb. Chamber volume: M54: 54cc CNC profiled
10: 62cc As-Cast
Intake port volume: M54: 54cc Fast As Cast
10: 195cc Fast As Cast
Intake port dimensions: M54: 1.220" x 2.120"
10: 1.280" x 2.090"
Intake port location: Stock; **Exhaust:** Stock
Intake valve diameter: 2.020" (TFS-51400211)
Valve angles: M54: 21°, 10: 23°
Intake valve seat: M54: Ductile Iron (TFS-30300271)
10: Tungsten alloy (TFS-51400271)
Intake valve stem diameter: 11/32"
Exhaust port volume: M54: 67cc Fast As Cast
10: 75cc Fast As Cast
Exhaust port dimensions: 1.350" x 1.450" D-Shape
Exhaust valve diameter: 1.600" (TFS-51400212)
Exhaust valve seat: M54: Ductile iron (TFS-30300272)
10: Tungsten alloy (TFS-51400272)
Exhaust valve stem diameter: 11/32"
Valve guide material: Bronze Alloy (TFS-51400252)
Valve seal: Viton® fluoroelastomer (TFS-51400454)
Valve seat angles: 45° x multi-angle
Valve spring pockets: M54: 1.615"
10: 1.615", 1.500" (Center two)
Valve spring cups: 1.280" (TFS-31400433)
Valve spring retainers:
M54: Chromoly 7°x 1.250" O.D. (TFS-31400423)
10: Chromoly 7°x 1.375" O.D. (TFS-51400423)
Valve stem locks: 7° steel (TFS-51400444)
Valve springs: M54: (TFS-16306-16)
1.300" O.D. dual spring with damper
150 lbs. @ 1.800" installed height
450 lbs. @ 1.200" open
448 lbs. per inch rate
.600" maximum lift
10: (TFS-16315-16)
1.460" O.D. dual spring with damper
125 lbs. @ 1.800" installed height
376 lbs. @ 1.180" open
420 lbs. per inch rate
.600" maximum lift
Guide plates: M54: 5/16" (TFS-30400624)
10: 5/16" (TFS-30400623)
Push rod length: Longer than stock required,
Rocker studs: ARP 3/8" (TFS-51400613)
Minimum bore diameter: 4.000"
Weight each bare: 22 lbs. each
CARB E.O. number: D-369-1
Miscellaneous Info: Contains both LT1 and LT4 intake gasket alignment holes

Replacement Cylinder Heads

TFS-3041B010 Bare, 195cc, 23 degree, Forced induction engines.
TFS-3041B008-M54 Bare, 185cc, 21 degree, Fast As Cast

Recommended Components

Head gasket: TFS-30494040-040, 4.040" bore MLS
Fel Pro 1074, 4.125" bore
GM Performance 12553160, 4.000" bore
Mr. Gasket 5716, 4.100" bore

Intake gasket: LT1: Fel Pro 1284, Steel core laminate
LT4: GM Performance 12367777

Exhaust gasket: Fel Pro 1470

Head bolts/studs: ARP 134-3601, (6pt. bolts)
ARP 234-4301 (12pt. studs)

Rocker arms: TFS-31400510 (1.5 Ratio; 3/8" stud)

Pistons: Trick Flow brand available

Engine gasket kit: TFS-31400911

Head alignment dowels: TFS-31400911

A.I.R. passage threaded inserts: TFS-51400265

Spark plugs: Autolite 3924
Champion RC9YC
NGK 7373

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Airflow Results
GenX 185

Lift Value	Intake Flow CFM	Exhaust Flow CFM
.100"	65	48
.200"	132	111
.300"	195	151
.400"	236	182
.500"	258	198
.600"	260	206

Tests conducted at 28" of water (pressure).
Bore size: 4.030"; exhaust with 1¾" pipe.

Airflow Results
GenX 195

Lift Value	Intake Flow CFM	Exhaust Flow CFM
.100"	51	58
.200"	136	98
.300"	191	136
.400"	230	163
.500"	253	177
.600"	254	190

Tests conducted at 28" of water (pressure).
Bore size: 4.030"; exhaust with 1¾" pipe.

How to Optimize Pushrod Length For Better Performance

Instruction Manual

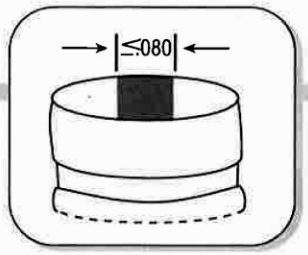

Figure 1

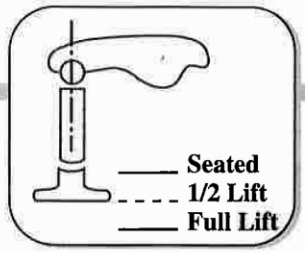

Figure 2

In an overhead valve V8 engine, the valvetrain multiplies and transfers the motion of the camshaft and lifters to the valves. The pushrods play a critical role in this transfer of motion.

Pushrod length greatly affects the efficiency of the motion transfer to the valves by altering the tip travel of the rocker arms. To provide maximum valvetrain efficiency with minimum side thrust against the valve guide, rocker arm tip travel on the valve stem should be .080" or less, as shown in **Figure 1.**

Measuring Pushrod Length

To determine the proper length pushrods for your application, you will need an adjustable checking pushrod, a machinist's rule, and the rocker arms to be used on the engine. If you are using roller rocker arms, a dial indicator will also be required.

As a general rule, longer pushrods will decrease rocker arm tip travel. This can be checked by marking one of the valve stem tips with bluing or a marker, then turning the engine over by hand a few times. This lets the rocker arm tip simulate a wear pattern on the valve stem tip. Next, take the rocker arm off; the amount of rocker arm tip travel will show up as a brightly colored stripe on the valve stem tip. Measure this stripe with the machinist's rule and make and test necessary pushrod length changes with the adjustable checking pushrod. If you can't get a tip travel measurement of .080" or less after trying several pushrod lengths, you will have to switch to another brand of rocker arms and start over.

When checking pushrod length with roller tip rocker arms, note the position of the roller tip on the valve stem when the valve is at one-half of its net lift. This is called half-lift centering; a dial indicator must be used to make this measurement. Ideally, the centerline of the rocker arm's roller tip should coincide with the centerline of the valve at one-half of its net lift—providing an equal amount of rocker arm tip travel on each half of the valve stem tip. A slightly off-center rocker arm tip position at half-lift is OK as long as tip travel is minimized. Refer to **Figure 2.**

It must be noted that using a different brand of rocker arms from those originally measured, even if they have the same ratio, could change the rocker arm tip travel (even if the same length pushrods are used). If either the rocker arms or pushrod length are changed, you must redetermine and reset pushrod length.

Taking the time to properly check pushrod length will reward you with better performance, less valvetrain wear, and reduced breakage. If you have questions about checking pushrod length or pushrod/rocker arm recommendations for your combination, contact the Trick Flow Technical Department at 1-330-630-1555, Monday through Friday from 9:00 am to 5:00 pm ET.

Trick Flow® Specialties

Ultimate Bolt-on Performance!

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Tallmadge, Ohio 44278

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Ultimate Bolt-On Performance® Lifetime Warranty

Trick Flow Specialties cylinder head castings are backed by a lifetime warranty. If a cylinder head casting fails to provide the original purchaser with complete satisfaction, Trick Flow Specialties will repair or replace it free of charge — guaranteed!

Moreover, the valves, valve guides, valve seats, valve job, valve springs, valve spring retainers, valve locks, rocker arm studs, guideplates, and valve stem seals included on assembled Trick Flow Specialties cylinder heads are warranted to the original purchaser to be free from defects in materials and workmanship for a period of two years from the date of purchase. All other Trick Flow Specialties products are warranted to be free from defects in materials and workmanship for a period of 90 days. There are no mileage limitations.

Extent of Warranty

Customers who believe they have a defective product should return it to the dealer from which they purchased or ship it freight prepaid to Trick Flow Specialties along with proof of purchase and a complete description of the problem. If a thorough inspection indicates defects in materials or workmanship, our sole obligation is to repair or replace the product.

This warranty is only if the product is properly installed, subjected to normal use and service, did not fail due to owner negligence or misuse, and has not been altered or modified.

Trick Flow Specialties warranties do not cover any installation or removal costs.

Trick Flow Specialties is not liable for consequential damages for breach of contract of any warranty in excess of the purchase price of the product sold.

PROPOSITION 65 WARNING

This product may contain one or more substances or chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

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