8) 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.

NOTE: On late model EFI engines, it is recommended you test fit the upper intake before prelubing the valvetrain (see note on Figure 8). This will allow you to minimize the time between prelubing and initial startup.

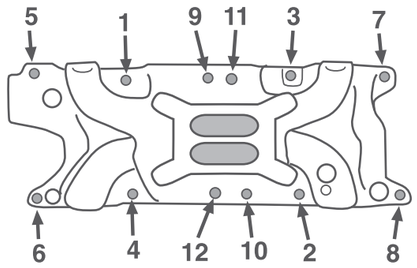

Figure 7

Reinstall the intake manifold, then torque it down in the sequence shown above. The same sequence is used for EFI lower intake.

Intake Manifold Tips

Apply a 1/4" bead of Permatex Ultra Black RTV sealer to the intake manifold (manifold base on EFI engines) 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 the Ultra Black RTV to help prevent water leaks. Apply a small amount of motor oil to the intake bolts and gradually torque them to 22 ft-lbs. in the sequence shown in Figure 7.

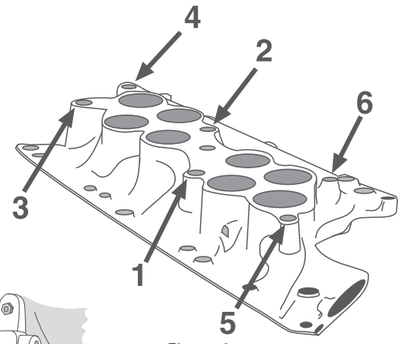

Figure 9

On EFI engines, place the upper manifold on the base and torque the bolts to 20 ft.-lbs. in the sequence shown in Figure 9

NOTE: On 5.0L EFI engines, the EGR valve boss may require some modification to clear the valve covers. See Figure 8.

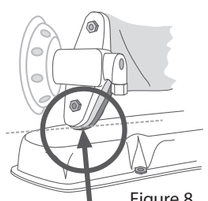

Figure 8

Check valve cover to upper intake manifold clearance to be sure they don't interfere.

8) REASSEMBLING THE REST OF THE ENGINE (CONT.)

Exhaust Manifold/Header Tips

Lay your straightedge across the mating flange of the exhaust manifolds/headers to make sure they are flat. If they are not, they need to be milled flat before you continue. 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 are loose, 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.

9) PRELUBING THE VALVETRAIN

The valvetrain is now ready to be prelubed. Start by lubricating the rocker arms, valve springs, and valve stems with about 1/2 quart of oil per head. Use an oil squirt can to get inside the valve spring and lube the valve stem and seal area.

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

The valve cover rails of the Twisted Wedge cylinder heads have been raised approximately .350" to provide clearance for roller rocker arm polylocks, making the valve covers sit higher. Adjustments to accessories that mount on or cross over the valve covers may be necessary during reassembly. See Figure 8.

10) BREAK-IN AND TUNING

After the valve covers are installed, reassemble the remainder of the engine and align the distributor rotor to the mark you made on the firewall during disassembly. This will permit the engine to start as quickly as possible.

To ensure long life and trouble-free use, allow 2-4 hours of normal driving time before running the engine hard. This will break the valvetrain in properly. If you installed a new camshaft, change the oil after 30 minutes of operation. This will help to remove small particles that are shorn off during the break-in process. After a proper break-in has been completed, you can use synthetic engine oil if you wish.

NOTE: Trick Flow recommends the total timing be set between 34 to 36 degrees for maximum power. However, the optimal timing setting may vary for your particular engine combination, driving style, and the weather conditions.

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TFS-IN-5 Rev. 3

Instruction Manual

Twisted Wedge® Cylinder Heads for Small Block Ford

Thank you for purchasing Trick Flow Twisted Wedge aluminum cylinder heads for small block Ford.

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 cylinder 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

Use this checklist to organize the installation of your new cylinder heads.

- c Review all paperwork included in the installation packet
- c Inspect the condition of all components
- c Verify the quantities of each product received (see Parts Checklist section)
- c Mail the warranty card to Trick Flow
- c Locate recommended tools
- c Purchase any additional parts needed (See the Additional Parts Required section—do not purchase pushrods until the proper length is determined)
- c Remove existing cylinder heads
- c Clean and inspect engine block
- c Check header fitment to cylinder head on workbench
- c Install new cylinder head locating dowels
- c Modify water transfer holes (351 SVO and all pre-1972 engine blocks only)
- c Verify the head bolt size for your application
- c Install threaded inserts or 5/8"–11 x 3/4" bolts in rear of cylinder heads [Twisted Wedge Street non-emissions applications only]
- c Check valve clearance and pushrod length
- c Purchase the proper length pushrods (see Pushrod Data Table sheet)
- c Install new cylinder heads on engine
- c Adjust valvetrain
- c Make tuning adjustments, perform proper break-in
- c Test drive and enjoy!

PARTS CHECKLIST

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

- c Two assembled cylinder heads
- c One instruction packet
- c Two packs of 5/16" guideplates, four per pack
- c Two packs of 3/8" rocker arms studs, eight per pack [Twisted Wedge Street heads]
- c Two packs of 7/16" rocker arms studs, eight per pack [Twisted Wedge Street/Strip heads]
- c Two 5/8"–11 threaded inserts [Twisted Wedge Street heads]

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

- c Shop manual for your vehicle
- c Basic mechanics tool set with SAE and metric size sockets and combination wrenches
- c 0-150 ft.-lbs. torque wrench
- c Quick disconnect tools for fuel connections (EFI engines)
- c Timing light, vacuum gauge, and spark plug gapper
- c 7/16"-14 tap or 1/2"-13 tap and tap handle
- c 3/16" and 17/32" drill bits and drill (not required for all applications)
- c Machinist's rule or dial indicator
- c Straightedge
- c Feeler gauge
- c Modeling clay
- c Adjustable pushrod
- c Solid mockup lifter

ADDITIONAL PARTS REQUIRED

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

- c Head gaskets
- c Head bolts
- c Exhaust bolts
- c RTV sealer
- c Thread sealer
- c Intake gaskets
- c Head bolt bushings
- c Moly lube
- c Pushrods
- c Thread locker
- c Exhaust gaskets
- c Intake bolts
- c Spark plugs
- c Rocker arms
- c Cylinder head locating dowels

Installation Instructions

1) PUSHROD AND ROCKER ARM RECOMMENDATIONS

High-quality, longer than stock, hardened pushrods must be used in all applications. Trick Flow strongly recommends that you verify the valve tip wear pattern. The procedure can be found in the technical bulletin titled "How to Optimize Pushrod Length for Better Performance."

After setting the rocker arm to the proper height, as explained in the Checking Piston-to-Valve Clearance and Valvetrain Geometry section. The pushrod length you obtain should be within .050" of the following lengths. Please refer to the Recommended Components section of the Technical Specifications sheet for rocker arm recommendations.

289/302		351W	
Camshaft Type	**Pushrod Length**	**Camshaft Type**	**Pushrod Length**
Hydraulic roller	6.750"	Hydraulic roller	8.050"
Hydraulic flat tappet	7.300"	Hydraulic flat tappet	8.600"

2) 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 bracketry and routing vacuum lines.

NOTE: Be sure cylinder #1 is at TDC on the compression stroke and mark the distributor's rotor position on the firewall before disassembly.

NOTE: If the Twisted Wedge cylinder heads are being installed on a 351W or 302 race block where 1/2"-13 head bolts are required, the head bolt hole restriction in the cylinder heads will need to be removed. This modification can be done using a drill and a 17/32" bit. For best results, drill from the head's deck surface to the valve cover side until the restriction is removed. Be sure that there are no chips or burrs remaining in or on the cylinder heads prior to installation.

3) 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 the OEM alignment dowels and all traces of any gaskets, 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 the correct size 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.

Next, install the new head alignment dowels, then place the new head gaskets on the engine block, as shown in **Figure 1.**

NOTE: The large coolant holes always go toward the rear of the engine block.

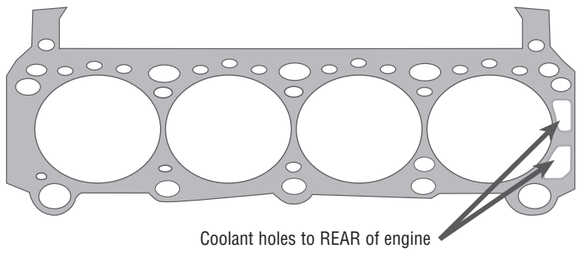


Figure 1

3) PREPPING THE BLOCK (CONT.)

If the cylinder heads are being installed on a 351 SVO or pre-1972 engine block, the coolant passages in the deck surface must be modified. This modification must be done to prevent overheating due to steam pockets forming in the high side of the block.

Start this procedure by taping off or otherwise covering the deck surface.

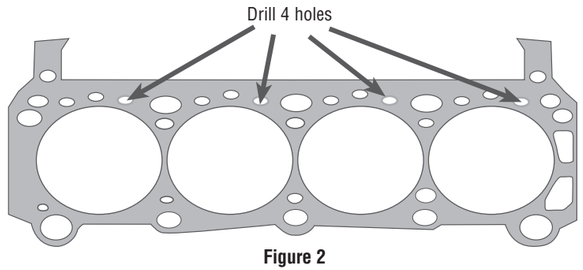


Figure 2

Using the head gasket as a template, drill into the water jacket at the locations shown in **Figure 2** with a 3/16" drill bit.

NOTE: If you purchased O-ring style heads, you must use Trick Flow TFS-51400901 or Fel-Pro 1006 Loc-Wire head gaskets. These gaskets feature a raised stainless steel ring that fits into a receiver groove machined into the deck surface of the cylinder head.

WARNING! OEM-style dome pistons will interfere with the Twisted Wedge cylinder heads' unique combustion chamber design. Conventional flat-top pistons will work, and many aftermarket piston manufacturers make Twisted Wedge-specific pistons for high-compression and high valve lift applications.

4) CHECKING HEADER CLEARANCE

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

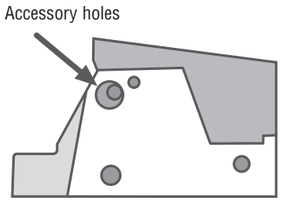


Figure 3

Next, install the threaded inserts in the rear of the heads (Twisted Wedge Street non-emissions applications only). Secure the inserts with a small amount of blue Loctite, as shown in **Figure 3.**

NOTE: If you want to install the threaded inserts on the Twisted Wedge Street heads, this is the time to do so. The inserts are nearly impossible to install once the heads are mounted on the engine in the chassis.

5) 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) Verify that the engine is still on the compression stroke of the #1 cylinder (both lifters will be in the down position). Place a solid mockup lifter in the lifter bore of the valve that you will be measuring. Be sure that the mockup lifter is the same height as the lifters that will be installed in the engine later.

5) CHECKING PISTON-TO-VALVE CLEARANCE AND VALVETRAIN GEOMETRY (CONT.)

B) Coat the top of the piston with a very thin layer of oil, then place a few 1/4" thick strips of modeling clay across the upper half of the piston. Place the head gasket you will be using on the block and bolt the head on with five or six head bolts.

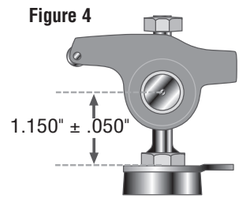
C) Install the rocker arm stud, guideplate, and the rocker arm for the valve you are checking (intake or exhaust). Next, set the adjustable pushrod tool to the appropriate length for your combination, as outlined in the Pushrod and Rocker Arm Recommendations section. Tighten the rocker to zero lash, rotate the crankshaft at least twice, and remove the cylinder head.

D) Carefully cut the clay into slices and look for the thinnest section of the valve impression. This 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" (5/64") or more of clearance, and the exhaust should have .100" (7/64") or more of clearance. Repeat the procedure for the other valve.

E) After you finish measuring the second valve, reinstall the cylinder head so you can verify proper pushrod length and valvetrain geometry. The procedure for measuring pushrod length can be found in the technical bulletin titled "How to Optimize Pushrod Length for Better Performance."

F) The ideal rocker height from the center of the rocker fulcrum down to the top of the guideplate should be 1.150" (+/- .050"), as shown in **Figure 4**. To check your rocker height, make sure the lifter is at its lowest position, then install your adjustable pushrod and set it to the same length that you used for checking piston-to-valve clearance. Next, place your rocker on the stud and adjust the pushrod length until you get the proper rocker height.

Figure 4



It is very important that this distance only be checked with pre-load in place on hydraulic cams or lash in place for mechanical cams.

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.

6) 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. As mentioned before, the large coolant holes always go towards the rear of the block; O-ringed heads must always use a Loc-Wire head gasket.

NOTE: Some head gaskets will have "UP" imprinted on one side, while others may have "FRONT" imprinted on them.

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.

NOTE: If you have a 351 SVO or pre-1972 engine block, see the Prepping the Block section about the addition of water transfer holes in the deck surface.

6) INSTALLING THE NEW CYLINDER HEADS (CONT.)

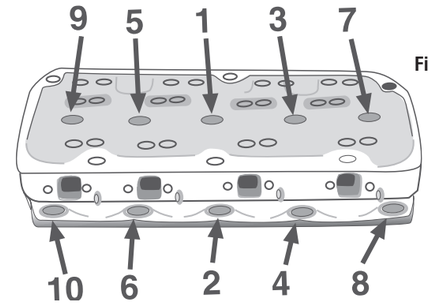


Figure 5

7/16" Head Bolts:		1/2" Head Bolts:	
Stage One:	35 ft.-lbs.	Stage One:	35 ft.-lbs.
Stage Two:	50 ft.-lbs.	Stage Two:	70 ft.-lbs.
Stage Three:	70 ft.-lbs.	Stage Three:	100 ft.-lbs.
Stage Four:	Tighten only the long bolts an additional 10 ft.-lbs.	Stage Four:	Tighten only the long bolts an additional 10 ft.-lbs.

Position each cylinder head evenly on the block's locating dowels so each head lies flat against the gasket. Next, place head bolt washers over each bolt hole. Once they are in place, put a small amount of ARP moly lube on the tops of all washers. Coat all the threads with Permatex 3H Aviation Form-a-Gasket (bolts) or blue Loctite (studs), following the manufacturer's directions for set-up time, and then place the bolts in their proper locations. Torque the bolts in the four stages shown, following the sequence in **Figure 5**.

It is not necessary to retorque the head bolts after initial break-in. For head stud installation, follow the head stud manufacturer's instructions.

NOTE: On engines that use torque-to-yield head bolts (1992½ and later), the head bolts must be replaced. Please refer to the Recommended Components section on the Technical Specifications sheet for part numbers.

7) INSTALLING AND ADJUSTING THE VALVETRAIN

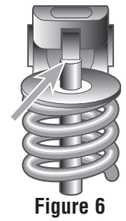


Figure 6

Place the proper length, hardened pushrods into the pushrod holes. Use oil to coat the base threads of the rocker studs, then put the guideplates on. With everything installed, torque the rocker arm studs to 55 ft.-lbs. Place the rocker arms on the studs, and verify that they are centered side-to-side. See **Figure 6**.

Adjust the valvetrain according to the camshaft manufacturer's specifications. If you are using a hydraulic camshaft and no specifications are available, turn the rocker arm adjusting nuts 1/2 to 3/4 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:

A) Following the proper firing order for your engine, turn the crankshaft until the first cylinder listed in the firing order is at TDC on the compression stroke. Both valves will be in the closed position.

B) Adjust the valves as described above, then rotate the crank exactly 1/4 turn and repeat for the next cylinder in the firing order.

C) After the valvetrain for all of the cylinders have been adjusted, leave the #1 piston at TDC on the compression stroke for the rest of the reassembly.

Firing Orders

289 and Standard 302/5.0L: 1, 5, 4, 2, 6, 3, 7, 8

351W and 5.0L HO: 1, 3, 7, 2, 6, 5, 4, 8