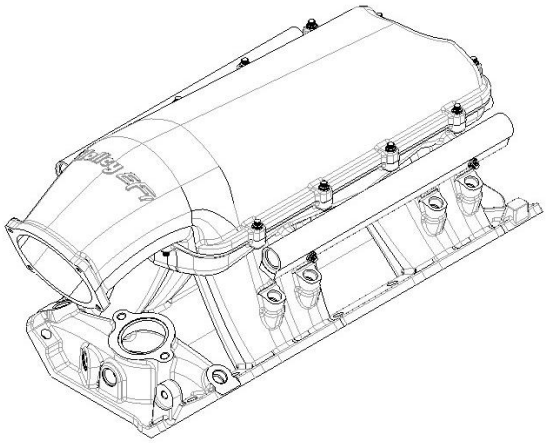
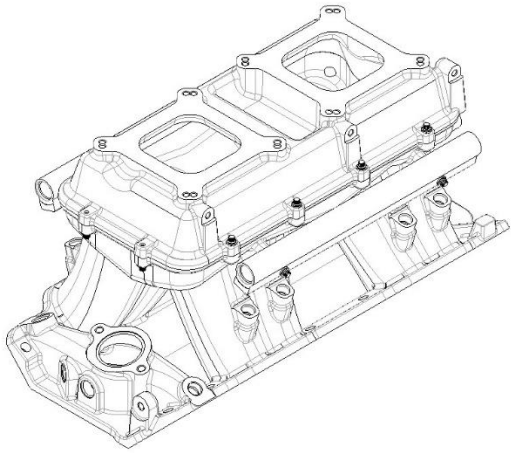
Holley Hi-Ram Intake Manifold Kits
For Big Block Chevrolet Engines

Holley P/N	Engine Application & Induction Configuration
300-945	SBC/BBC Hi-Ram, Plenum Top Kit, 2 x 4150 Square Bore, up to 1-3/4" throttle bores
300-946	SBC/BBC Hi-Ram, Plenum Top Kit, 1 x 105mm LS Throttle Body (longitudinal mount)
300-961	BBC Hi-Ram, Rect.-Port, EFI, Base Manifold Only, with Fuel Rails
300-963	BBC Hi-Ram, Rect.-Port, EFI, 1 x 105mm LS Throttle Body (longitudinal mount)
300-964	BBC Hi-Ram, Rect.-Port, EFI, 2 x 4150 Square-Bore (side or inline mount)

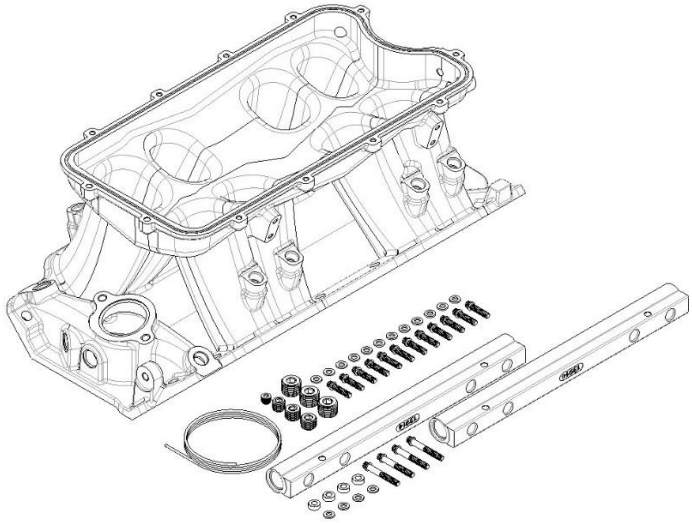
Installation Instructions – 199R12515



300-963



300-964



300-961

Congratulations on your purchase of a Holley Big Block Chevy Hi-Ram intake manifold kit! Read and follow these instructions before and during the installation to preserve the warranty. Be certain that all the required parts and tools are on hand before beginning the intake manifold assembly to the engine.

APPLICATIONS:

300-961, 300-963, 300-964 intake manifolds are designed for 1965 & later 396-502+cid Mark IV, V, & VI standard 9.800" deck height Big Block Chevrolet engines equipped with rectangle port cylinder heads. These manifolds will work with any 9.800" deck height BBC engine equipped with aftermarket cylinder heads, if the heads have standard rectangle port flange opening and bolt hole locations. A modified hood will be required for most vehicle applications.

Plenum top kits 300-945 and 300-946, available separately, fit the Small Block Chevy and Big Block Chevy Hi-Ram top-feed plenum base intake manifolds.

EMISSIONS EQUIPMENT:

Holley Hi-Ram intake manifolds do not accept any emission-control devices. This part is not legal for sale or use for motor vehicles with pollution-controlled equipment.

DISTRIBUTORS:

Holley small block and big block Chevy Hi-Ram intake manifolds are only compatible with early model GM small cap or aftermarket small cap distributors. Large cap HEI type distributors will not clear the intake manifold plenum.

ELECTRONIC FUEL INJECTION:

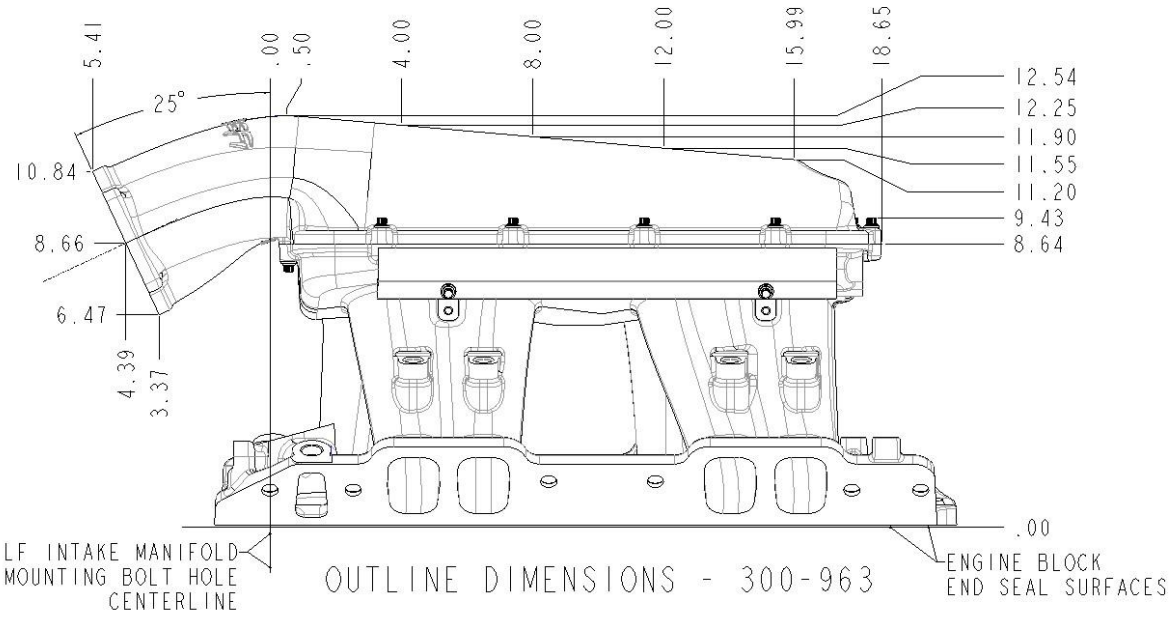
These intake manifolds are intended for use with electronic fuel injection. Holley EFI has a full line of engine management systems, throttle bodies, fuel injectors, and other installation components required to successfully set-up and operate an electronically fuel injected engine for applications ranging from street to heads-up competitive racing with forced induction or nitrous. Go to the Holley EFI home page within www.holley.com for a full description of EFI engine management systems, EFI components, and accessories available for your GM BBC engine and the Holley EFI intake manifolds.

HOLLEY SHOP BY ENGINE:

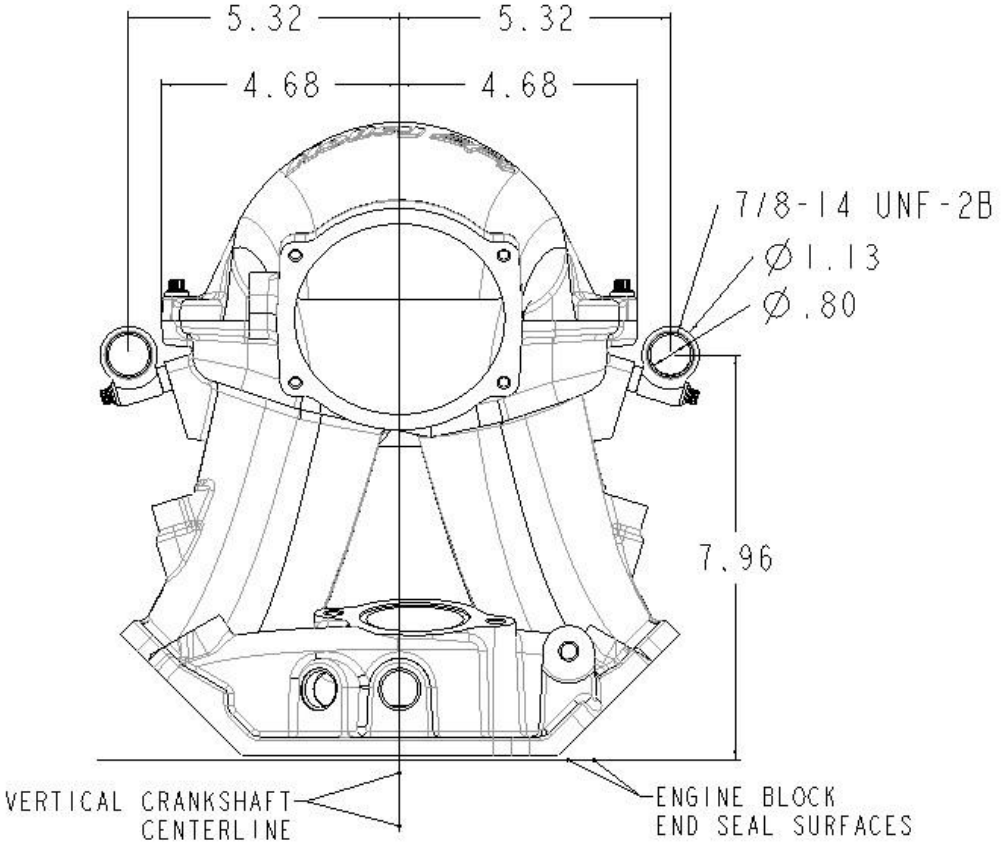
Go to https://www.holley.com/products/shop_by_engine/chevrolet_big_block/ for a full range of Holley Performance Brands products specifically for the Chevrolet Big Block engine platform.

BIG BLOCK CHEVY HI-RAM DIMENSIONS AND SPECIFICATIONS:

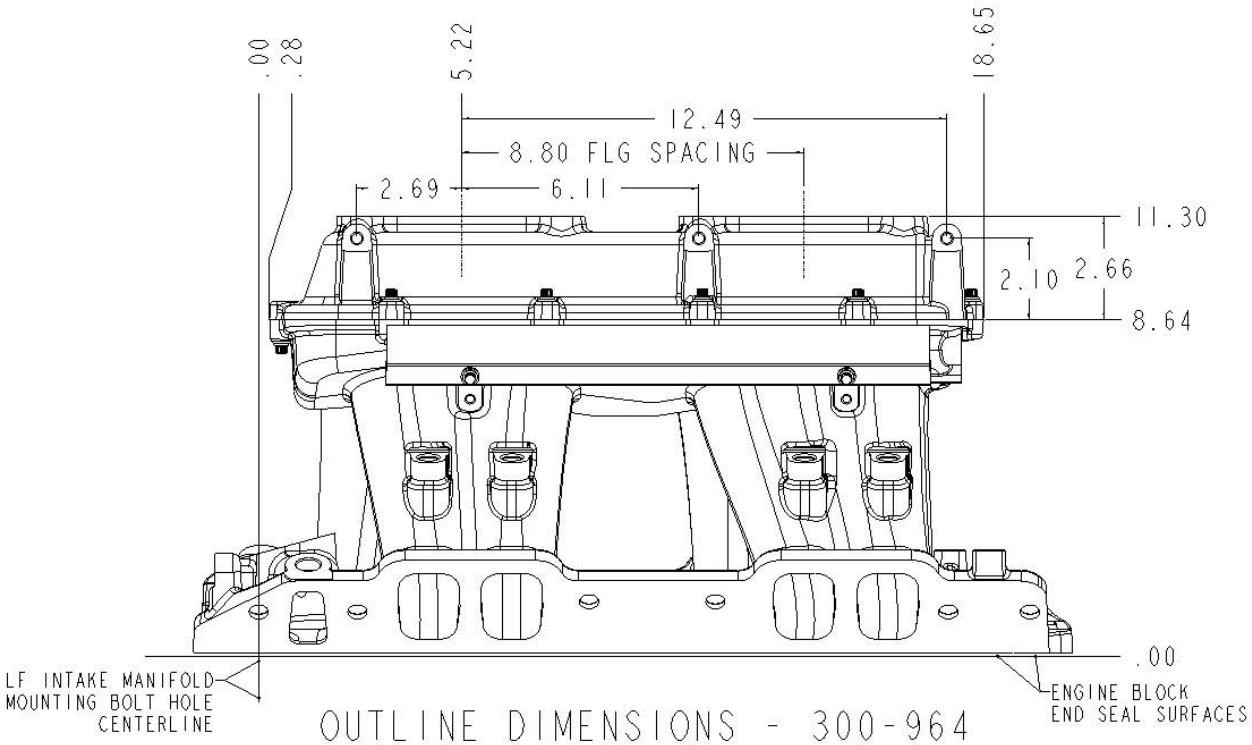
DIMENSIONS



OUTLINE DIMENSIONS - 300-963



OUTLINE DIMENSIONS - 300-963



OUTLINE DIMENSIONS - 300-964

SPECIFICATIONS

- As-Cast Port Flange Opening Dimensions – 2.40” Tall X 1.60” Wide
- Port Flange Opening Dimensions as Port-Matched to the Recommended Gasket Size – 2.55” Tall X 1.85” Wide
- Runner Inlet Cross-Sectional Area – 5.31 square inches
- Un-Port-Matched Runner Exit Cross-Sectional Area – 3.47 square inches
- Runner Cross-Sectional Area Distribution – Tapered, 4.4 degree equivalent total included taper angle
- Intake Manifold Runner Length (Avg.) – 6.50 inches (total diff. long to short .19”)
- Plenum Volumes: 300-963 – 519 cubic inches; 300-964 – 394.5 cubic inches
- Plenum Volume Increase per inch of Plenum Flange Spacer Thickness – 120 cubic inches

HOLLEY BIG BLOCK CHEVY HI-RAM KIT CONTENTS:

300-945

- ❑ 1 – Plenum Top

300-946

- ❑ 1 – Plenum Top
- ❑ 1 – Gasket, 105mm LS Throttle Body, Holley Service P/N 508-24
- ❑ 1 – Throttle cable bracket
- ❑ 2 – 1/4-20 x 5/8” low profile socket head screws

300-961

- ❑ 1 – Base Intake Manifold
- ❑ 1 – Fuel Rail Kit
- ❑ 1 – Installation Kit
- ❑ 1 – Installation Instructions

300-963

- ❑ 1 – Base Intake Manifold Kit (300-961)
- ❑ 1 – Plenum Top Kit (300-946)

300-964

- ❑ 1 – Base Intake Manifold Kit (300-961)
- ❑ 1 – Plenum Top Kit (300-945)

INSTALLATION KIT IN 300-961

- ❑ 1 – 4.5 ft – O-ring Cord, 3/32” Dia. Round Section Viton, Plenum Flange Seal, Holley Service P/N 508-21
- ❑ 1 – 1/8 NPT Hex Steel Pipe Plug
- ❑ 1 – 1/4 NPT Hex Steel Pipe Plug
- ❑ 2 – 3/8 NPT Hex Steel Pipe Plug
- ❑ 3 – 1/2 NPT Hex Steel Pipe Plug
- ❑ 12 – 1/4-20 x 1” 12-point cap screws
- ❑ 12 – 1/4” Washers

FUEL RAIL KIT IN 300-961

- ❑ 2 – Fuel Rails, High Volume, Configured with 7/8-14 O-ring Ports (AN-10)
- ❑ 4 – Fuel Rail Spacers
- ❑ 4 – Screws, 12-Point Cap, 1/4-20 1.75” Long, Fuel Rail to Intake Manifold

ADDITIONAL PARTS REQUIRED FOR MANIFOLD INSTALLATION:

It may be necessary to purchase some of the parts listed below (or the equivalent) in order to properly complete the manifold installation. Determination of equivalency is the responsibility of the consumer, and Holley does not assume that responsibility.

A. Intake manifold gasket set, Mr. Gasket 5817 (0.060" thick) is recommended, or Mr. Gasket 5819 (0.120" thick) if a thicker gasket is required
B. Thermostat housing gasket – Mr. Gasket 738G or 740C
C. Gasket contact adhesive/sealant, Gascacinch #440-A is recommended
D. Silicone RTV, such as Mr. Gasket 78080G
E. Pipe thread sealant, such as Earl's P/N D024ERL
F. Intake manifold bolt kit with .090-.120" thick hardened washers.
G. Super glue (Cyanoacrylate)

INSTALLATION INSTRUCTIONS: (Remember to always measure twice and cut once)

The Hi-Ram modular intake manifolds are designed to provide maximum performance for racing engines. The intake manifold will have the best fitment when the engine block and cylinder heads are machined to standard OE dimensions. If the engine block or cylinder head deck surfaces have been milled significantly, the alignment of the mounting bolt holes and the port flange openings to the cylinder head may be shifted and not match-up satisfactorily. If your engine has had the cylinder head or engine block deck surfaces milled, the following may be necessary for proper intake manifold installation.

- The bolt holes in the intake manifold may need to be slotted to allow the fastener to properly pass through the manifold mounting holes. The mounting fasteners must freely thread into the cylinder head while passing through the mounting holes or the manifold may not seat properly onto the cylinder head port flange gaskets when the fasteners are tightened.
- In extreme situations of milled deck faces of the cylinder head and/or block, milling the intake manifold mounting flanges may be required to correct the port flange alignment of the manifold to the head ports. If the manifold port flanges are machined, then the height of the distributor may need to be adjusted by shimming up distributor or using a distributor with an adjustable mounting collar.
- If the cylinder head openings and/or mounting bolt holes are too high compared to the manifold port openings or bolt holes, a thicker intake gasket may be used to correct the port and /or bolt hole alignment.

INSTALLATION OF BASE INTAKE MANIFOLD:

1. Before installing the intake manifold base, perform a test fit of the intake manifold with intake manifold gaskets in position. Make sure that the mounting bolts thread freely into the cylinder heads through the intake manifold mounting holes and that the mounting flanges seat properly.

2. Check that the mounting bolts are of the correct length, first that the bolts will thread all the way in and seat on the manifold flange with no washer to ensure the bolt with the washer will not bottom in the threaded hole of the cylinder head. Also make sure that with the washers installed each mounting bolt has 5/8-3/4" (9-12 turns) of thread engagement. Thread engagement is especially important when mounting the intake manifold to aluminum cylinder heads

3. Check the port opening alignment. Test fit the plenum top, fuel and vacuum plumbing, throttle linkage, distributor, wiring, etc. to ensure there are not any fit issues before performing the final intake manifold installation.

4. Once the manifold fit to the engine is confirmed, apply a thin coat of gasket adhesive, Gascacinch, to the cylinder head side of the intake manifold gaskets and to the port flanges of the cylinder head and allow the adhesive to fully dry before applying the gaskets to the cylinder heads. Some gasket materials will absorb the first coat of gasket adhesive so a second thin coat of adhesive may need to be applied to the gaskets. Carefully position the gaskets in place on the cylinder heads. Once the gaskets are stuck to the cylinder head flanges repositioning the gasket will be difficult.

   Only use silicone RTV to seal the end seal surfaces of the intake manifold to the engine block. During the test fit of the manifold to the engine, note what is the gap between the intake manifold end seals and block, nominally the gap should be 5/64" +/- 1/32". Apply a 3/16" high bead of RTV to the length both engine block end seal surfaces with the ends of the RTV beads overlapping onto the manifold gaskets by about a 1/4".

   Place the intake manifold into position on the engine, confirm that the RTV is squeezed sufficiently on the end seals so there will be no leaks there when the RTV hardens.

5. Install the mounting bolts with washers into the cylinder heads. Apply thread lube or engine oil to the threads on blind threaded holes or thread sealant with PTFE where the threaded hole breaks out to have a possible oil leak, thread in the bolts until they are fully engaged hand tight.

6. Torque the mounting bolts using the sequence shown in the figure shown below. Tighten each bolt in several stages. Set final torque to 25 ft/lbs.

7. Install the thermostat or coolant outlet restrictor plate, thermostat housing gasket and the thermostat housing. Be sure that the thermostat housing has been cleaned of any old gasket material. Install any coolant hose fitting, temperature sensors, or pipe plugs in the intake manifold as needed using thread sealant with PTFE.

8. Install the distributor or cam syn with the mounting gasket, (usually suppled with intake manifold gasket set), and set to the desired orientation position confirming that the distributor can be rotated with no interference to the intake manifold to accommodate adjusting the spark timing. Also ensure that the depth of the distributor is such that the distributor drive gear is properly engaged with the gear teeth on the camshaft. Dual distributor hold-down bosses are available to provide convenient access to tighten or loosen the hold-down fastener.

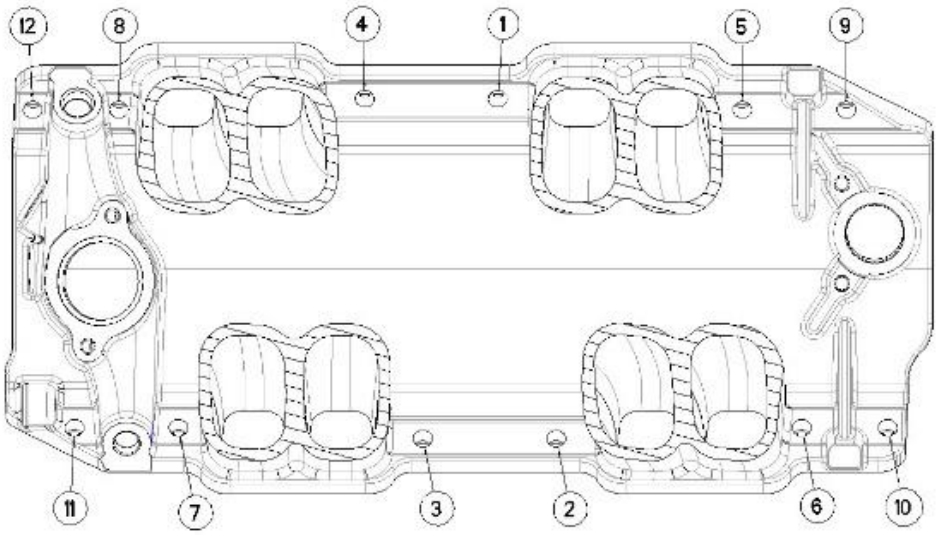


Figure – Intake Manifold Mounting Bolt Tightening Sequence

INSTALLATION OF THE PLENUM TOP:

1. Before installing the plenum top with the supplied O-ring cord. The cord will need to be cut to length and glued together.

- Lay the O-ring cord into the groove on the plenum flange of the base manifold with the free ends overlapped.
- Mark the position of the cut to be made across both O-ring cord ends.
- Lay the O-ring cord on a flat surface with the ends overlapped and the marks aligned as they were when the marks were made.
- With a sharp razor blade, cut through both ends of the O-ring cord at the mark simultaneously.
- With a drop of super glue (Cyanoacrylate), bond the ends of the O-ring cord together. The glued joint should be smooth, not offset or kinked.
- To ensure sealing at the glued joint, apply a thin film of silicone RTV sealer around the O-ring at the glued joint, allowing the silicone to partially cure before installation of the joined O-ring cord in the groove.

2. Install the glued O-ring cord in the groove on the base intake manifold and set the plenum top in place.

3. Apply a drop of engine oil to each of the supplied 1/4-20 x 1” long 12-point cap screws. Thread each screw, along with a washer, through the plenum top and into the base manifold plenum flange, 12 places.

4. Gently tighten the fasteners evenly using the sequence shown below. Torque the fasteners to 75 in-lbs for the first step, then to the final toque of 130 in-lbs.

5. Install any hose fittings, sensors or pipe plugs, as needed into the intake manifold. Use thread sealant with PTFE on any NPT threads.

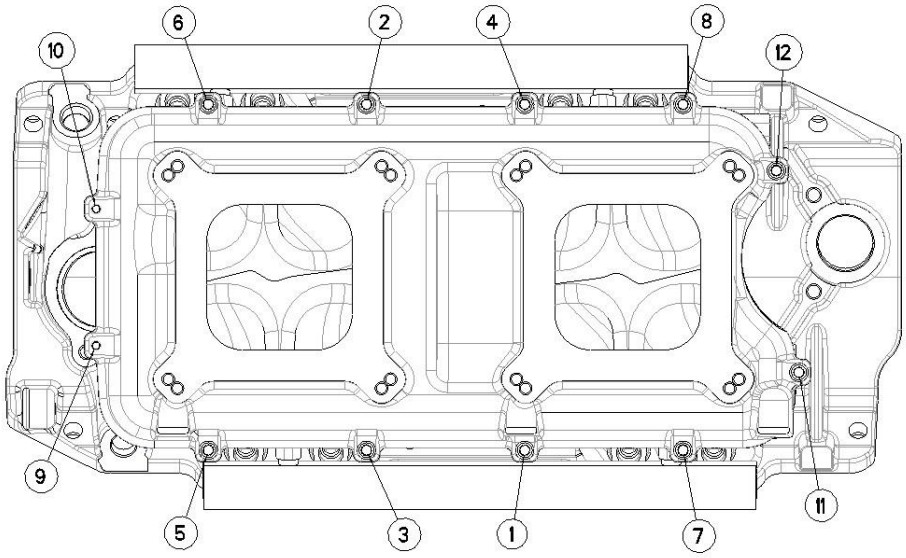


Figure – Plenum Top Tightening Sequence

Installation of the Fuel Rails

There are 2 sets of holes for mounting the fuel rails to the intake manifold. The upper holes are for mounting the fuel rails at a height for a Bosch style EV1 type fuel injector. The lower holes are for mounting the fuel rails at a height for GM LS7 style fuel injectors.

1. Apply a silicone lubricant to the O-ring on the inlet end of fuel injectors and insert the fuel injectors into the ports in the fuel rail. To insert the injector without tearing the O-ring, gently rock the injector in the inlet of the port while applying pressure to insert the injector.

2. Position the injectors to properly orient the wiring plugs, apply silicone lubricant to the injector outlet O-rings, and insert all four injectors into the injector bores in the base intake manifold, applying gentle downward pressure on the fuel rail.

3. Apply a drop of oil to the provided socket head cap screws and use them, along with the provided spacers to attach the fuel rail to the manifold.

4. Tighten the mounting fasteners in two steps, 75 in-lbs for the first step and 130 in-lbs for the second step.

5. Once the fasteners are tightened, re-check and confirm the injectors are floating on the O-rings. Rotate the injectors back and forth confirming that there is no load on the injector bodies and that the injectors are sufficiently captured between the fuel fail and the intake manifold injector bosses, such that the injector cannot slide out of the fuel rail and lose the seal of the injector O-ring with the fuel rail.

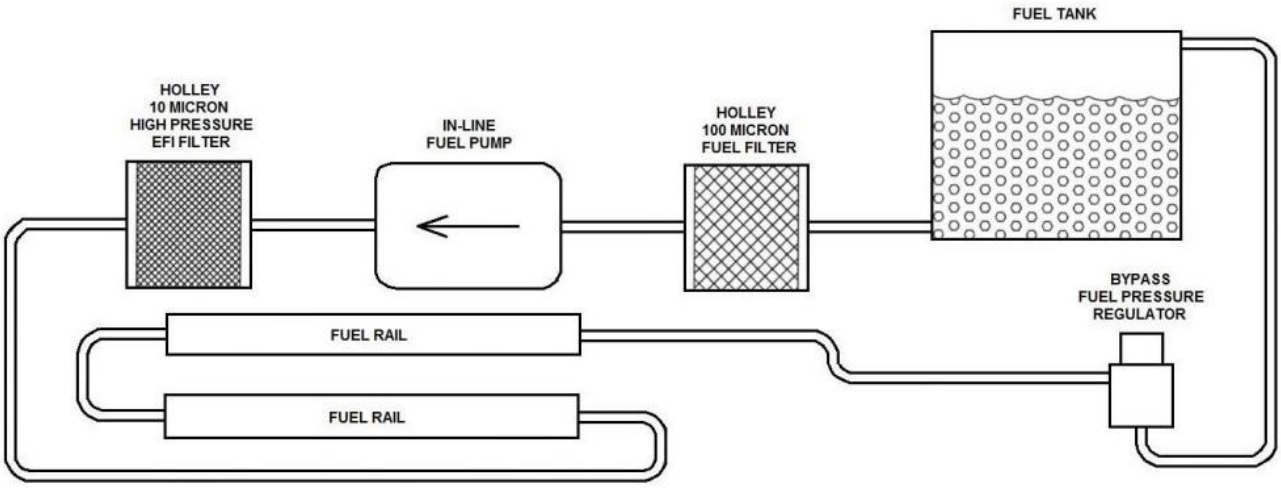
6. The fuel rail is designed to provide enough flow and volume to dampen fuel pressure oscillations and variations at the inlet of the fuel injectors. The fuel rails are machined to receive an adapter fitting for 7/8-14 (AN-10) O-ring port. Please go to https://www.holley.com/brands/earls/ for fuel system plumbing items needed for your installation.

    - For power levels below 700-750HP, AN-6 (3/8”) plumbing to and from the fuel rails should be sufficient.

    - For power levels above 750HP, AN-8 (1/2”) plumbing is recommended.

    - It is always recommended to only use tubular hose ends when a non-straight hose end is required.

7. Thoroughly check for fuel leaks.



Plumbing Diagram

CAUTION! Check to ensure that there is adequate clearance for the throttle linkage through range of travel.

IMPORTANT! Check for adequate hood clearance before closing the hood.

1. Operate the engine for 30 minutes. Allow the engine to cool and re-torque the manifold bolts to 25 ft./lbs. to ensure a tight seal to the engine.

GENERAL INFORMATION:

1. It is advisable to periodically recheck (every 6 months or 6000 miles) the torque on the manifold bolts to minimize the possibility of a manifold vacuum leak.

2. If the cylinder heads have been milled or the cylinder block “decked”, the cylinder head faces and the end surfaces of the manifold must be milled to compensate. This is necessary to maintain correct port alignment, minimize the possibility of manifold vacuum leaks, and ensure proper engine performance.

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