



Holley GM LS Race Single-Plane Intake Manifold Kits

300-255 / 300-255BK	LS1/2/6 Port-EFI - w/ Fuel Rails	4150 Flange
300-256 / 300-256BK	LS1/2/6 Carbureted/TB EFI	4150 Flange
300-290 / 300-290BK	LS3/L92 Port-EFI - w/ Fuel Rails	4150 Flange
300-291 / 300-291BK	LS3/L92 Carbureted/TB EFI	4150 Flange
300-294 / 300-294BK	LS1/2/6 Port-EFI - w/ Fuel Rails	4500 Flange
300-295 / 300-295BK	LS1/2/6 Carbureted/TB EFI	4500 Flange

IMPORTANT: Before installation, please read these instructions completely.

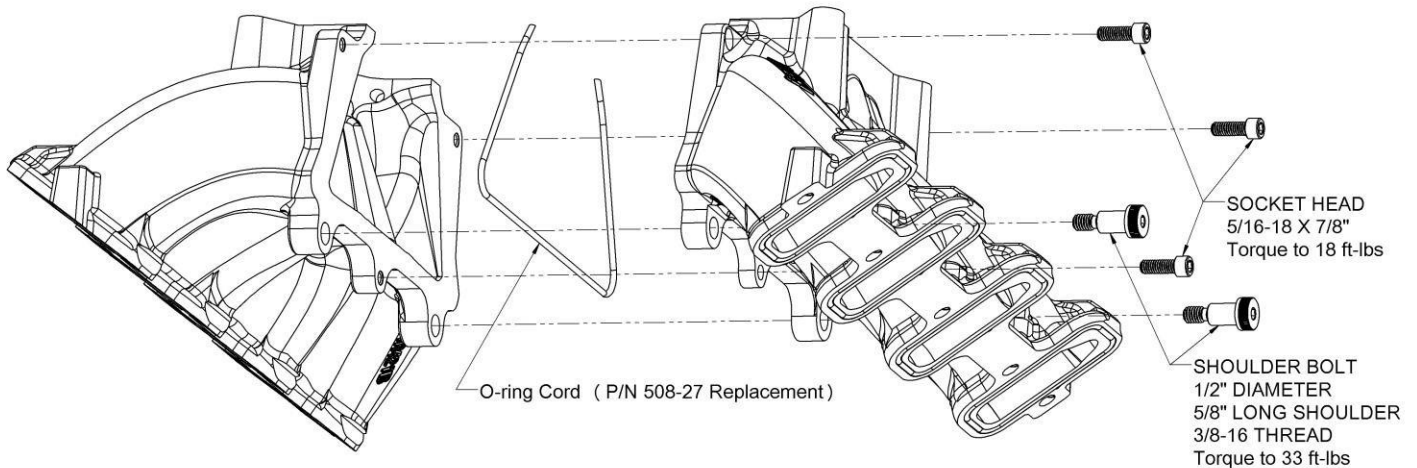
APPLICATIONS:

The Holley LS Race single-plane intake manifolds are designed for GM LS Gen III and IV engines, utilized in numerous performance applications, and are intended for carbureted, throttle body EFI, or direct-port EFI setups.

The LS Race single-plane intake manifolds are designed for hi-performance/racing engine applications, 5.3 to 6.2+ liter displacement, and maximum engine speeds of 6000-7000 rpm, depending on the engine combination. This single-plane design provides optimal performance across the RPM spectrum while providing maximum performance up to 7000 rpm. These intake manifolds are for use on non-emissions controlled applications only, and will not accept stock components and hardware. Port EFI versions may not be compatible with all throttle body linkages. When installing the throttle body, make certain there is a minimum of 1/4" clearance between all linkage and the fuel rail.

SPLIT DESIGN:

The Holley LS Race manifold incorporates a split feature, which allows disassembly of the intake for direct access to internal plenum and port surfaces, making custom porting and matching a snap. With a shouldered bolt locator and O-ring seal, reassembly is simple and precise. This feature was previously found only on the most expensive race intakes.



EMISSIONS EQUIPMENT:

Holley LS Race single-plane intake manifolds do not accept any emission control devices and is not legal for sale or use on motor vehicles with pollution-controlled equipment.

IGNITION CONTROL:

For carbureted or EFI systems which require a separate, stand-alone ignition, it is recommended to use an MSD LS ignition controller MSD P/N 6014. The MSD ignition controller will function with the OE crank trigger (24x or 58x), cam sensor, and ignition coils. Go to www.msddignition.com for more information.

ELECTRONIC FUEL INJECTION:

EFI intake versions are intended for use with multi-point or direct-port electronic fuel injection. Carbureted intake manifolds are intended for carbureted or Throttle Body Injection (TBI) applications. 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 controlled fuel injected application ranging from street, to heads-up competitive racing, forced induction or nitrous. Go to www.holley.com for a full selection of EFI engine management systems, components, and accessories available for your GM LS engine and the Holley LS Race single-plane intake manifold.

DIMENSIONS:

LS1/2/6 (4150 and 4500 flange) applications:

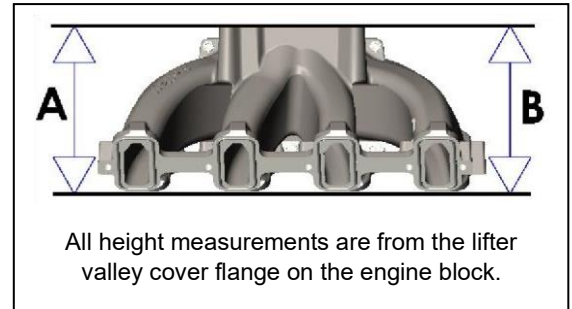
- Port Size – 3.28" Height x 1.10" Wide
- Port Flange O-Rings – .139" Round, Size 2-234, FKM, set of 8
- Split Flange O-Ring – .139" Round, 19.1" approximate cut length, FKM

LS LS3/L92 (4150 flange) applications:

- Port Size– 2.59" Height x 1.28" Wide
- Port Flange O-Rings – .139" Round, Size 2-232, FKM, set of 8
- Split Flange O-Ring – .139" Round, 18.5" approximate cut length, FKM

Common:

- A-B Height (All) – A & B – 7.3" (0° carb flange angle)
- Carburetor Flange (4150 Carbureted or EFI) – Standard for up to 1-3/4" diameter throttle bores
- Carburetor Flange (4500 Carbureted or EFI) – Standard for up to 2-1/4" diameter throttle bores
- As-Cast Runner Cross-Sectional Area (All) – 3.5 in² at the runner entry tapered to 2.9 in² at the flange exit
- Vacuum Port Size and Thread (All) – (2) 1/8, (1) 1/4, and (1) 3/8, NPT ports at the carb flange
- LS Style MAP Sensor Port (Direct-port EFI manifolds only)



Hardware included:

300-255 300-255BK	300-256 300-256BK	300-290 300-290BK	300-291 300-291BK		
QTY.	QTY.	QTY.	QTY.	HARDWARE	APPLICATION
300-294 300-294BK	300-295 300-295BK				
10	10	10	10	M6 X 12 FLAT WASHER	INTAKE MOUNTING
		6	6	M6 X 1.0 X 50MM HEX HEAD SCREW	INTAKE MOUNTING
		4	4	M6 X 1.0 X 100MM HEX HEAD SCREW	INTAKE MOUNTING
4		4		5/16 SPLIT LOCK WASHER	FUEL RAIL BRACKETS
4		4		5/16-24 X 7/8" HEX HEAD SCREW	FUEL RAIL BRACKETS
4		4		5/16-18 X 1-3/8" HEX HEAD SCREW	FUEL RAIL BRACKETS
4		4		5/16-18 NYLON LOCKING NUT	FUEL RAIL BRACKETS
1		1		1/4-20 X 1.00" BUTTON HEAD SCREW	MAP SENSOR SCREW

INSTALLATION INSTRUCTIONS:

Installation on Modified Engine Components –

The LS Race single-plane intake manifolds are designed to provide maximum performance on hi-performance and racing spec engine applications. The intake manifold will have the best fitment when the block and cylinder heads are machined to standard OE dimensions. These intakes produce optimal benefits when matched to performance-ported heads. 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.

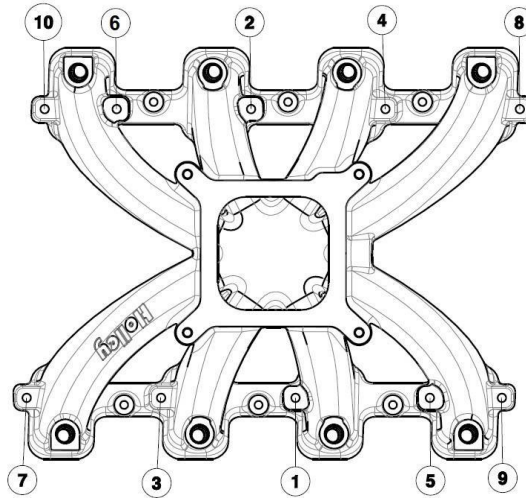
- The bolt holes in the intake manifold may need to be slotted to allow the fastener to properly pass through the mounting holes. The fasteners must thread freely into the cylinder head while passing through the mounting holes or the manifold may not seal properly onto the cylinder head surfaces when the fasteners are tightened.
- As the O-ring grooves are located in the intake manifold mounting flanges, material may not be removed without jeopardizing the sealing of the manifold. Any material removal required to align the port flange openings should be removed from the cylinder head, not the intake manifold.
- When port matching the intake manifold to the cylinder head, care should be taken not to break into or damage the O-ring groove, or the O-ring seal will not be effective. The intake manifold mounting surfaces on the cylinder heads should be in good condition and free of nicks or scratches, where the sealing O-rings will seat to ensure proper sealing.

Installation of the Intake Manifold –

1. Before installing the intake manifold, perform a test fit without the sealing O-rings installed. Make sure the appropriate bolts (supplied) thread freely into the cylinder heads through the intake manifold mounting holes. The flange should seat properly and the bolts, without washers installed, should not bottom out in the threaded holes.
2. Check the alignment of the intake manifold port opening to the cylinder head port. Make any necessary adjustments to match alignment as closely as possible to ensure maximum performance from the manifold.
3. Test fit the carburetor/throttle body, fuel and vacuum plumbing, throttle linkage, wiring, etc. to ensure there are no fitment issues before performing the final intake manifold installation.
4. For final installation, install the eight port O-rings (provided) into the mounting flange O-ring grooves. Applying a silicone lubricant to the O-rings will help with installation.
5. Place the intake manifold on the cylinder head mounting flanges. Be sure that all O-rings are still in the grooves and are not being crushed between the flanges.
6. Apply a small amount of engine oil to the threads, install the mounting bolts and washers into the manifold mounting holes, and thread into the cylinder heads. Tighten the bolts lightly per the tightening sequence (see the tightening sequence diagram below), until the O-rings are compressed and the bolts are seated.

WARNING! The M6x1 threads in the aluminum cylinder head will not withstand abuse. Care must be taken to ensure proper thread engagement before tightening the fasteners to the proper specifications.

7. In two steps, tighten the mounting bolts, first to 50 in-lbs and then to 106 in-lbs (8.8 ft-lbs) following the tightening sequence diagram below.



Manifold Tightening Sequence

There are (x2) 1/8", (x1) 1/4", flange on the manifold for a are connected to the plenum brakes, vacuum reservoir, etc. provide vacuum sources and Crankcase Ventilation). It is manifold carb flange as a route PCV to the proper port ensure proper distribution of the crankcase oil vapor into the intake manifold. Confirm that all unused vacuum ports on the intake manifold and the carburetor or throttle body are plugged or capped. NPT plugs for the manifold have been provided for this purpose.

and (x1) 3/8", NPT ports below the carb vacuum source (**Figure 1**). These ports of the manifold and can be used for power The carburetor or throttle body may also ports for plumbing a PCV (Positive preferable to use the ports below the vacuum supply, not for PCV. It is best to on the carburetor or throttle body to

NOTE: On direct-port EFI manifolds, an LS Style MAP (Manifold Absolute Pressure) sensor port is available. Remove the cover plate if utilizing this port (**Figure 2**). Torque supplied 1/4-20 x 1 sensor bolt to 9 ft./lbs.

Holley EFI LS main harnesses have a map sensor connecter designed for use with an LS1/2 style map sensor. The 558-416 is an adapter harness that can be used to adapt any LS harness that uses a LS1/2 MAP sensor connection to a LS3 MAP, which is recommended for this manifold.

LS3 MAP sensor, GM P/N 12591290, will cover naturally aspirated (1 bar) applications; an LS9 MAP sensor (post blower), GM P/N 12592525 (red label) should cover forced induction applications up to 3 Bar. The LS3 MAP sensor does not have the same absolute pressure measurement to voltage output range as a LS1 or LS2 MAP sensor. An ECU set up for the manifold absolute pressure to voltage output of the LS1 or LS2 MAP sensor will need to recalibrate to properly operate the engine with the LS3 MAP sensor. Consult the ECU manufacturer or tuner for the proper ECU MAP sensor calibration for the MAP sensor that you plan to use. If the use of a GM bolt-on type MAP sensor is not desired, the MAP port can be tapped 1/4 NPT, and a fitting used in the port to plumb a hose to a MAP sensor mounted at some other location. The LS1 or LS2 MAP sensor can be mounted with a simple hand-made sheet metal bracket and a hose connected to the nipple that is on the MAP sensor with the grommet seal removed.

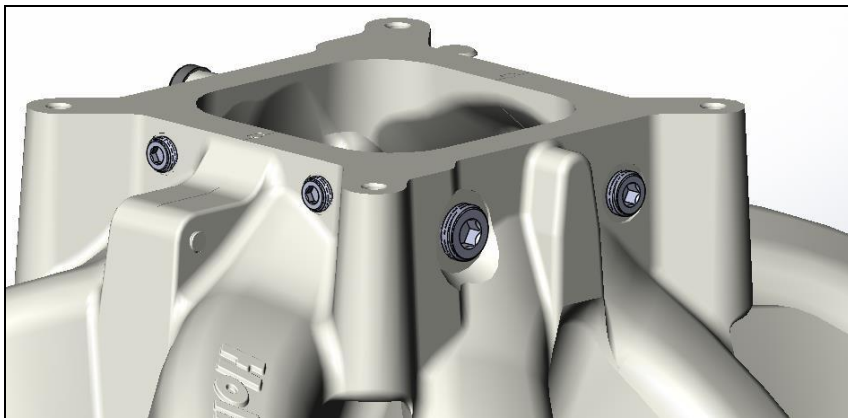


Figure 1

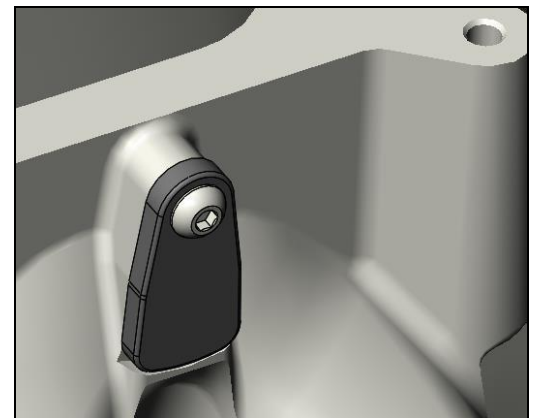


Figure 2

Installation of the Fuel Rails –

Direct-port EFI versions of the LS Race Single-Plane intake manifold require a specific fuel rail design. Fuel rails are mounted to the intake manifold by two brackets per fuel rail. Two different length bracket sets are included; the long brackets are for mounting the fuel rails at a height for Bosch style EV1 type fuel injectors. The short brackets are for mounting the fuel rails at a height for GM OE LS7 fuel injectors. When using the OE GM LS7 injector, the O-ring on the outlet (intake manifold) end of the injector must be changed to the O-ring supplied in the short bracket pack.

1. Place the appropriate brackets in position. Before installing the fasteners, apply a drop of oil to the threads of the hex head cap screws. Attach the brackets to the intake manifold with the 5/16 x 7/8" long hex head cap screws and lock washers (**Figure 3**). Temporarily position the fuel rail in the brackets to confirm parallelism of the brackets.
2. Tighten the mounting fasteners in two steps, 7 ft-lbs for the first step and 12-15 ft-lbs for the second step.
3. Apply a silicone lubricant to the O-ring on the inlet end of fuel injectors and insert the fuel injector into the fuel rail port. To insert the injector without tearing the O-ring, gently rock the injector in the inlet of the port while applying pressure until the injector seats fully into the rail.
4. With the lettering on the fuel rail oriented outward, position the injectors to properly orient the wiring connector. Apply silicone lubricant to the injector outlet O-rings and insert all four injectors into injector bosses in the intake manifold. Apply gentle downward pressure on the fuel rail until the injectors are fully seated into the port.
5. Attach the fuel rails to the brackets with the 5/16-18 x 1-3/8" hex head cap screws (**Figure 4**). Tighten the fuel rail fasteners to 1215 ft-lbs.

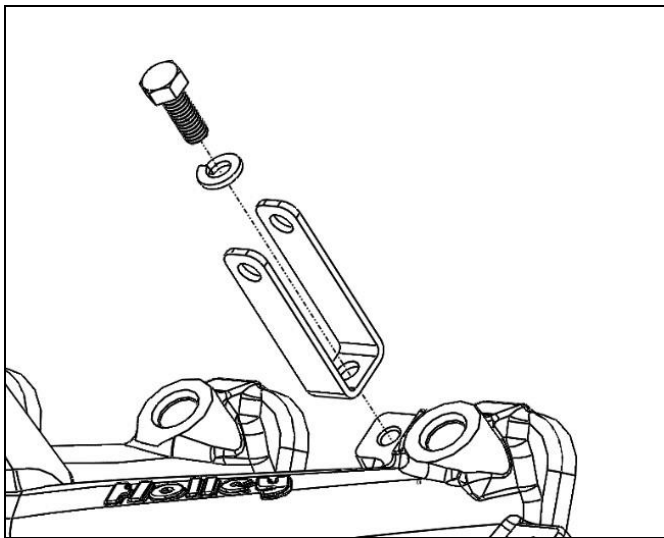


Figure 3

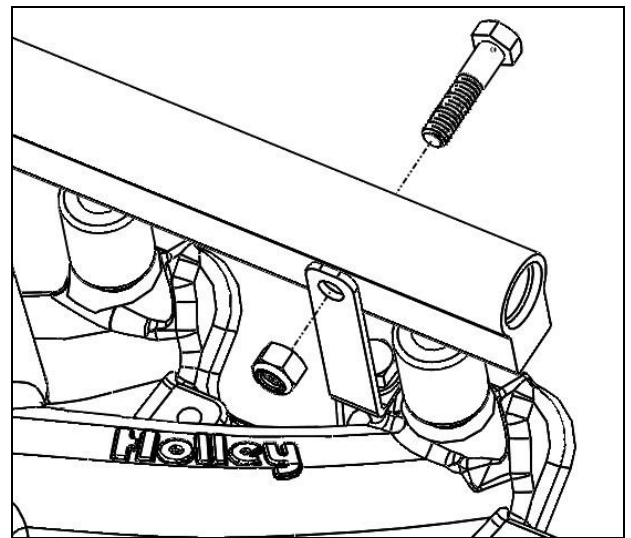
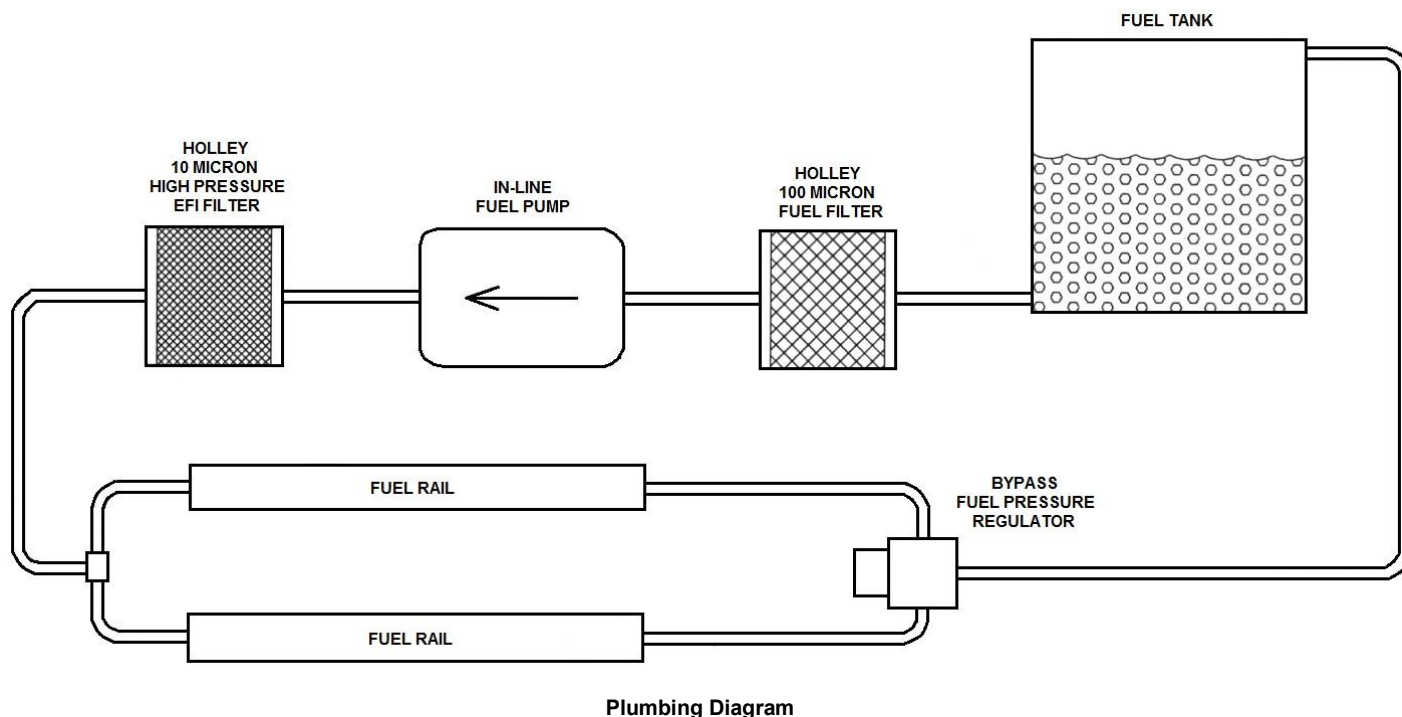


Figure 4

6. Make sure the fuel rail and the fuel injectors are properly positioned. Gently rotate the injector back and forth to confirm that there is no load on the injector bodies. The injectors should also have a small amount of endplay (up and down movement), but the O-ring seals **MUST** stay inside the injector counter bores.
7. Repeat steps 1 thru 6 for the second fuel rail.

The Holley fuel rails are designed to provide sufficient 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 3/4-16 (AN-8) O-ring port.

- 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.



Installation of the Carburetors or Throttle Bodies –

1. When installing a carburetor or throttle body injection system, consult the manufacturer’s instructions for proper installation and tuning procedures. Test fit the carburetor or throttle body to the intake manifold gasket to ensure it will properly seal on the manifold mounting flange.
2. With the carburetor or throttle body mounted on the intake manifold and the throttle linkage connected, check that all throttle levers, linkage components, fuel lines, and vacuum lines have adequate clearance from the intake manifold and each other. Confirm that the throttle linkage has adequate return springs and that WOT is achieved when the throttle pedal is fully depressed.
3. Before starting the engine, run the fuel pump to build fuel pressure and confirm there are no fuel leaks and fuel pressure is correct. To prevent the engine from flooding with fuel, confirm there is no fuel running into the intake manifold from the carburetor boosters (proper needle and seat closing) or from the throttle body EFI fuel injectors (proper fuel injector closing).

Carburetor Recommendations:

5.3 - 6.0 LITERS, STOCK ENGINE STREET APPLICATIONS:

0-80457SA	600 CFM, aluminum square-bowl, vacuum secondaries, electric choke, single fuel inlet
0-80458SA	600 CFM, aluminum V-bowl, vacuum secondaries, electric choke, dual fuel inlet
0-83670	670 CFM Street Avenger, aluminum V-bowl, vacuum secondaries w/Quick Change spring cap, 4-corner idle, electric choke
0-86670BK, BL, RD, HB	670 CFM Ultra Street Avenger, Street Avenger w/Billet baseplate and metering blocks

5.3 - 6.0+ LITERS, MILDLY MODIFIED ENGINE:

0-3310SA	750 CFM, aluminum V-bowl, vacuum secondaries, manual choke, dual fuel inlet, traditional 0-3310 perf.
0-80508SA	750 CFM, aluminum V-bowl, vacuum secondaries, electric choke, dual fuel inlet
0-83770	770 CFM Street Avenger, aluminum V-bowl, vacuum secondaries w/Quick Change spring cap, 4-corner idle, electric choke, dual fuel inlet
0-86770BK, BL, RD, HB	770 CFM Ultra Street Avenger, Street Avenger w/Billet baseplate and metering blocks
0-82750	750 CFM Street HP Vac. Sec. – HP main body (no-choke), vacuum secondaries w/Quick Change spring cap

0-82751	750 CFM Street HP Mech. Sec. – HP main body (no-choke), vacuum secondaries w/Quick Change spring cap, 4-corner idle
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6.0+ LITERS, MODIFIED ENGINE, HI-PERF STREET/STRIP:

0-4779S or C	750 CFM Double Pumper, Mechanical Choke
0-4781S or C	850 CFM Double Pumper, Mechanical Choke (recommended only for all-out WOT performance application, 400+ c.i.)
0-80496-1	950 CFM HP, HP main body (no choke), screw-in air bleeds, 4-corner idle, 1-3/4" throttle bore, & 1-3/8" venturi dia.
0-80803BKX, RDX, HBX	750 CFM Alum. Ultra XP (all new design – see www.holley.com), 1-3/4" throttle bore & 1-3/8" venturi dia.
0-80804BKX, RDX, HBX	850 CFM Aluminum Ultra XP (all new design - see www.holley.com), 1-3/4" throttle bore & 1-9/16" venturi (recommended only for all-out WOT performance application, 400+ c.i.)

For more carburetor configuration, tuning, linkage, fuel line recommendations and testing results go to www.holley.com. Carburetors and all other complimentary components are available for direct sale on the Holley website.

Throttle Linkage, Cable Brackets, and Fuel Line Recommendations:

534-202	Throttle Position Kit for Electric Choke Carburetors – used for supplying a TPS signal for electronic automatic transmission controllers.
20-88	Carburetor Throttle Cable Bracket – 4150 & 4160 carburetors, includes return springs, throttle cable mount only – does mount a trans kickdown cable.
20-95	Throttle and Trans Kickdown Cable Bracket – 4150 & 4160 carburetors and 700R-4 transmissions.

Throttle linkage, cable brackets, fuel line kits, and other accessories are available or under development at this time. To see what parts are available and search for new products, please consult the Holley website. www.holley.com

Intake Manifold Service Parts:

Common:	
508-27	Split Flange O-Ring - .139" Round, 19.1" approximate cut length, FKM
534-104	Fuel Injector O-Rings, Set of 16, O-ring supplied in manifold kits to adapt LS7 injectors

LS1/2/6 (4150 flange) applications:	
508-28	Port Flange O-Rings - .139" Round, Size 2-234, FKM, set of 8
508-30	Replacement Fuel Rail Kit
508-31	Replacement Hardware and Bracket Kit (Natural)
508-32	Replacement Hardware and Bracket Kit (Black-BK)

LS LS3/L92 (4150 flange) applications:	
508-29	Port Flange O-Rings - .139" Round, Size 2-232, FKM, set of 8
508-35	Replacement Fuel Rail Kit
508-33	Replacement Hardware and Bracket Kit (Natural)
508-34	Replacement Hardware and Bracket Kit (Black-BK)

LS1/2/6 (4500 flange) applications:	
508-28	Port Flange O-Rings - .139" Round, Size 2-234, FKM, set of 8
508-30	Replacement Fuel Rail Kit
508-41	Replacement Hardware and Bracket Kit (Natural)
508-42	Replacement Hardware and Bracket Kit (Black-BK)

Holley Technical Support 1801 Russellville Road, Bowling Green, KY 42101 270-781-9741 or www.holley.com

