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Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

WHY KINSLER ?

BECAUSE THEY DO IT RIGHT

Three-piece unit to fit Chevrolet and Pontiac small block V8

THE FEATURES THAT MAKE THE DIFFERENCE

1) **Three Piece Manifold** The two sides of the manifold and the valley plate are completely separate.

   A) **Allows a perfect fit** against the cylinder head even with a decked block or angle milled heads, or if something just isn't right somewhere. No more angle milling of the manifold!

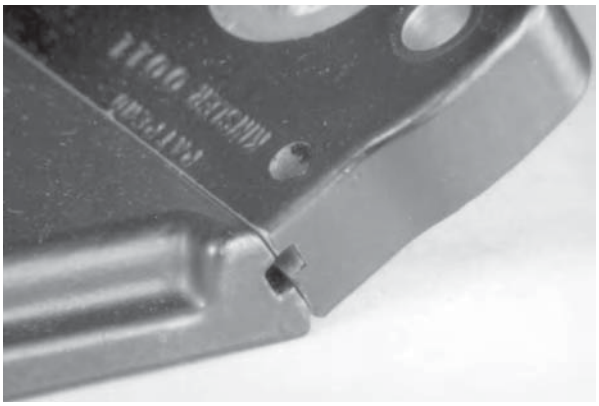
   B) **Raising the ports** In the past, if someone wanted to raise the ports in their manifold, say .200", they had to add material to the outside of the manifold, then grind the roof higher, then fill the floor. When they were finally done, they had a compromise in the performance, as they had sharpened the curvature of the short side of the runner.

   The Kinsler Solution: Kinsler manifolds are machined to bolt directly onto the cylinder heads, with precisely aligned ports. A Kinsler manifold can be machined to standard port profiles, variations of them, or to your special port layout.

   If you have a super high port, or a very large or small port, Kinsler can custom machine one of our manifold blanks to bolt right onto your heads.

Let's say you own a Kinsler Three-piece manifold for a small block Chevrolet, but you want to use it on a special head with ports that are moved up .300" higher than your old heads. Simply elongate or reposition the bolt holes and slide the manifold up the head .300". This keeps the runner design in the manifold untouched for peak performance, and saves you a ton of time and work!

A nice touch is that every manifold is supplied with 1/4" dowel pin holes at each end, so the manifold can be positioned just right over the cylinder head ports, then a hole can be drilled in the head to match the dowel pin holes. To take care of the gap between the raised manifold and the valley plate, simply make an aluminum strip with a seal groove and bolt it to the lower edge of the manifold...or we can machine the strips. Up to a 3/8" gap can simply be filled with silicone.



Mating seal grooves

C) Correct for core shift in your heads Since it is easy to move each manifold up or down, forward or rearward, perfect alignment can be obtained with cylinder heads that don't have the ports properly located. (This is a common problem, especially with production heads).

D) Sealing it up Both the manifold and the valley plate have grooves for sealing them to each other. The valley plate has sealing grooves on the bottom side at the front and rear for sealing it to the top of the engine block. Simply squeeze silicone sealer into all the grooves and assemble. The valley plate also has a 10-32 bolt hole at the front and rear, giving the option of bolting it to the top of the engine block.

2) **Runner Design** We constantly work with top engine developers to keep refining our runner designs. We change them whenever we find one that will work better. We can also make one to your specifications and make it work for you.

Small block Chevy port close-up

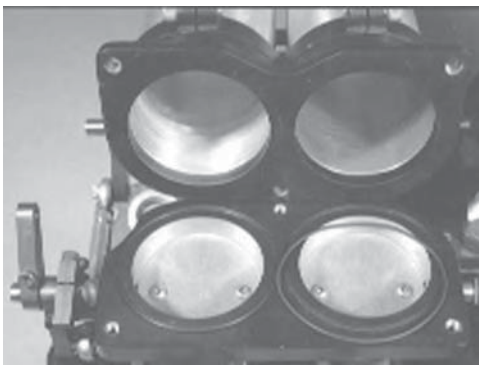
3) **Precision Ports** Even in the racing industry, most manifolds come with as-cast ports, and they are often not in the proper location. Every manifold we make has the ports machine-cut exactly to its print. To ensure precise location of the bolt holes to the ports, they are both cut while the manifold is in the same fixture.

4) **Port Wall Angles** We pay a lot of attention to the angle of the roof, floor, and the two walls as they meet the gasket face. If the wall angles in the manifold do not match those in the cylinder head, the air will not flow as well as it could.

5) **Blended Ports** After the ports are milled in, they are very carefully hand blended to the runner in the casting for a totally smooth transition. Most top engine developers have found that further porting work does not give them a power increase.

6) **Separate Ramtube Adapters** hold the ramtubes to the manifold. The ramtubes are secured by pinch clamps for easy removal to service air filters, etc.

If you break a Pinch Clamp, you can simply install a new adapter.



Manifold o-ring detail

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Tuning: All the adapters on the same model manifold have the same bolt pattern, so if you want to try different diameter ramtubes, simply bolt on another set of adapters and tubes. It is another way to tailor the shape of the engine's power curve.

Sealing: The ramtubes are sealed to the adapter with an o-ring seated into the inside diameter of the adapter. The adapters are sealed to the manifold with o-rings that seat into the top of the manifold. These o-rings keep out dirt and water to prolong engine life, and there are no gaskets to blow out.

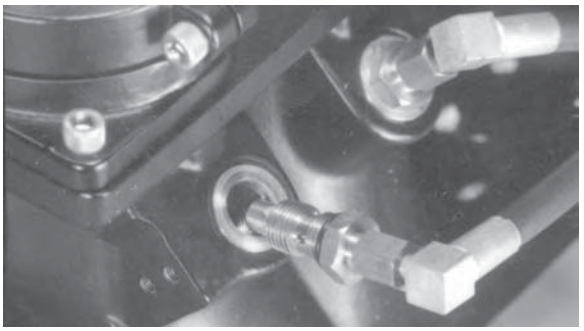
Traditional bell

180°

Ramtube adapters

7) **Ramtubes** Our ramtubes are made from high quality aluminum to resist denting while maintaining their light weight. While this is more costly, they are truly a superior piece. If our 180^0 ramtubes are shortened, they will slip into our adapters without having to turn the outside diameter, as they are made with the proper diameter all the way up the tube. If our traditional ramtubes are shortened, they must have the base remachined to fit the adapters, Part #7898, see Ramtubes Page #57-58.

8) **Universal Nozzle Boss** Most Kinsler manifolds are available with bosses that are tapped 13/16-16. These accept our adapter inserts to accommodate any type of nozzle/injector, (i.e. constant flow, EFI, Lucas, etc). To change from one type of nozzle or injector to another, simply remove the old inserts and install a new set. We also have dual bosses available on most of our units, and bolt-on bosses to go on the runners of any other brand or type of manifold.



1/2-20 thread brass inserts for constant flow nozzles

9) **Magnesium** alloy manifolds and top adapters are available for most manifold models to reduce over 1/3 of the casting weight.

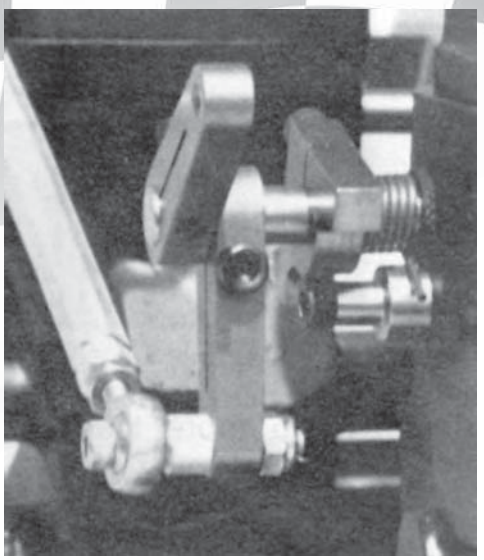
Caution: Magnesium is badly corroded by water or liquid alcohol. Monitor the magnesium where it contacts the engine coolant. Alcohol must not sit in a runner for more than a few hours.

Only aluminum manifolds should be ordered for off-road or marine use!!!

Weights shown refer to a manifold side casting without throttle shafts, plates, or linkage.

Aluminum

Magnesium *Magnesium Xtra - Light*



Throttle arm, stop, and spring

10) **Throttle Shafts** Our standard throttle shafts are a milled-on-one-side style made from a high strength steel alloy, then hard-nickel plated for added wear resistance. We offer stainless steel as an option for maximum corrosion resistance, for boats operating in salt water, etc. Optional back-cut shafts, and streamline butterflies are available for increased air flow, see Pages #55-56.

11) **Bronze Bushings** All of our manifolds and throttle bodies come standard with bronze throttle shaft bushings for extra smooth throttle operation and resistance to wear.

12) **Throttle Arms & Stops** These are heavy-duty to prevent slippage! Machined from 2024 high-strength aluminum and anodized blue. Grade 8 high-strength cap screws are used for clamping.

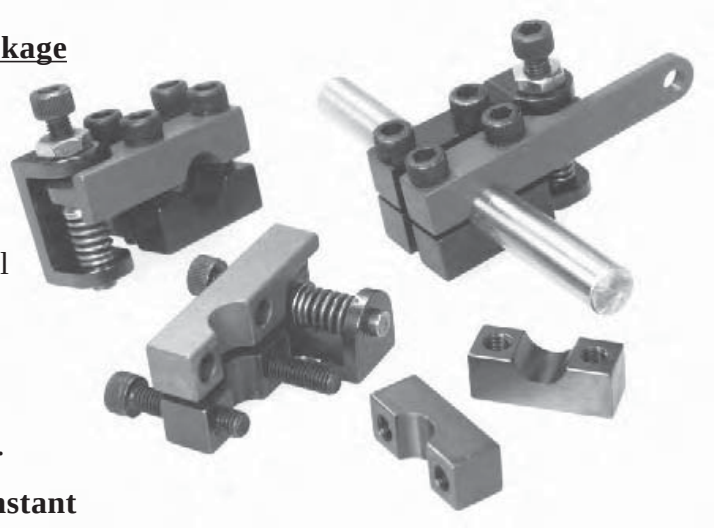
13) **Torsion Safety Springs** are available to help close the throttles in case your throttle linkage becomes disconnected.

For safety these should **never** be used as the only throttle return spring(s). You must use a separate spring(s) to return the throttles.

For safety there **must** also be a toe strap on the throttle pedal so the throttle can be pulled shut using your foot in case the return springs break.

14) **Rod Ends** A small part, but so very important. We use high quality rod ends to give you the reliability and resistance to wear that you need in your race vehicle. The rod end has a plated body, chromate treated steel race and a heat treated alloy steel hard-chrome plated ball.

15) **Billet Spring-Screw Universal Throttle Shaft Linkage** The throttle shafts can be split in between the runners of the manifold and our patented Spring Screw linkage installed to ensure bind-free operation regardless of uneven installation bolting, (which will distort any manifold) or engine heating, (any brand of aluminum or magnesium manifold will grow quicker as it heats than the steel throttle shaft does). This goes a long way to get rid of the old stuck-throttle-into-the-wall blues! Optional on most of our manifolds and we have kits that will allow installation of this linkage on any brand of manifold.



16) **Fuel Metering** Our manifolds are available for **Constant Flow**, **Electronic (EFI)**, or **Lucas Mechanical.**

17) **Special Customizing** For an additional charge we will do just about anything you want... special paint, anodized colors, polishing, machining, etc.

Summary:

No one else offers a system that even approaches the ***quality*** that we have described, and no one else gives you as much value per dollar. Top engine builders and racers tell us that these systems not only outperform anything else presently on the market, but that our calibrations let them dial the engine in so quickly that ***the time, wear and tear they save*** makes our system truly inexpensive compared to other brands they have used. They tell us that our manifolds not only work better, but that the precisely located, cut, and blended ports alone ***saves them more than the difference in cost between our manifold and those of our competitors.***

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FUEL METERING

We not only make our own complete line of metering equipment, but keep many other brands in stock. We carry all three basic types: Constant Flow, EFI, and Lucas Mechanical. We can set up any brand of manifold to work with any type or brand of metering. We are glad to supply any seperate components you need, or take your pieces and fit them into a complete system. We service fuel systems for engines with any number of cylinders or rotors, from lawn mower engines to blown alcohol.

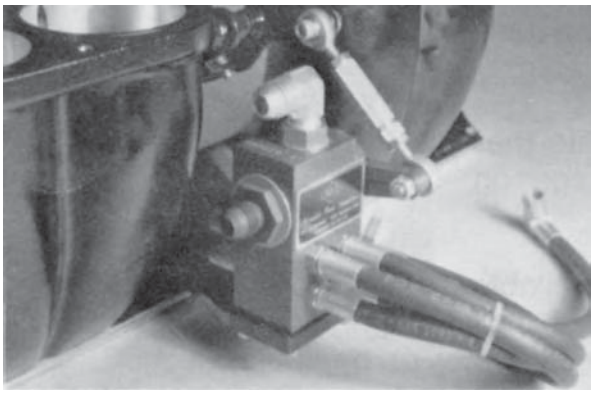
Flow Test and Calibration Service for Constant Flow, EFI, and Lucas:

We offer flow testing to qualify each component, then a detailed calibration of the overall system tailored to the particular engine combination, fuel, and use. Having calibrated thousands of systems, we have the experience necessary to get the fuel curve very close just as the unit is bolted on. We also offer this service and reconditioning for other brands, new or used.

1) **Constant Flow Metering** Used for many applications as it is very versatile, relatively inexpensive and the most rugged and reliable. We can supply components and systems to meter any type of fuel for any application. We can take a basic system of any brand and add extra components and metering circuits to it to make it perform better for a particular use.

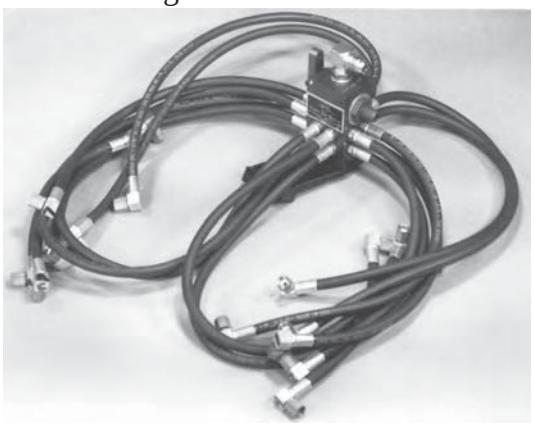
   A) Nozzles: We make nozzles for gasoline, alcohol, and nitromethane for use on normally aspirated (unblown), supercharged, and turbocharged engines. All of Kinsler nozzles are flow tested at *four* pressures, matched, then stamped with a flow code, see Pages #78-81.

   B) Precision Distribution Barrel Valves: The Kinsler line of barrel valves have been developed with spools that are computer contoured to give proper metering for part throttle operation. Other brands have no more than a simple ramp. We also make custom cut and flow tested spools to solve tough part throttle problems for your new or used units, see Pages #97-98.



Barrel valve mounted to a bracket attached to the manifold, this keeps the barrel valve off the hot valley plate

Most barrel valves are made by simply drilling the fuel inlet hole down from the top until it intersects the nozzle hose outlet holes that are drilled in from the side. These intersections are not only quite jagged, but the velocity of the fuel is too high to make the sharp turn out to the nozzle hoses. All of this creates great turbulence, which gives very poor fuel distribution. Kinsler barrel valves are made with a large cavity in the bottom, so the fuel can slow down and make the turn. We also do a careful job of deburring the inside of the cavity, as well as making the inlet to the nozzle hose fitting nicely radiused. This all results in excellent fuel distribution.



Optional 16-port barrel valve with nozzle hoses: allows the use of down nozzles and manifold port nozzles at the same time; or two nozzles in the manifold, ramtube, etc.

Xtra-Light barrel valve, hard anodized aluminum, cuts weight of the barrel valve in half. .. saves 1/4 pound

FUEL METERING

2) **Electronic Metering**

We sell various brands and types of electronic metering equipment to suit every application from street rods to Indy cars. We can adapt any brand and type of electronic system to any manifold.

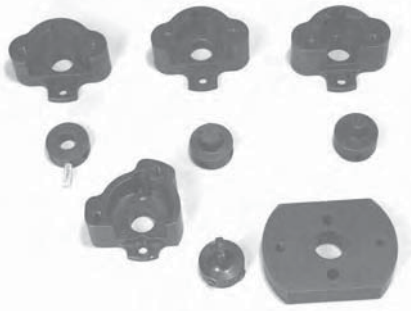
A) Fuel Rails We have the best selection in the industry: 8AN fitting size (.685" ID) and 12AN fitting size (.970" ID) for very high output engines; Pg 141. Mounting hardware and fuel rail fittings; Pg 141, 143. Stainless rails in 8AN fitting size (.655" ID), with custom up to 1.5" OD; corrosion proof with methanol, Pg 143. Hard anodized aluminum custom modular fuel rails, as we did for the GM Indy 500/IRL engines from 1996-2003; Pg 142. We make our rails smooth on the outside… the finned ones may look "racier", but they absorb more heat from the hot air around the engine and carry it back to the tank in the bypass fuel, which is bad.

Aluminum fuel rail for use with gasoline with standard mount stanchion

Stainless steel fuel rail, silver soldered for use with alcohol with special clamp mount

B) Throttle Position Sensor We can machine any corner of our manifolds to accept our universal bolt-on TPS adapter. We have adapters for most types of sensors. We also offer a remote sensor mount which is actuated by a hex rod, see Page #149.

TPS boss and driver

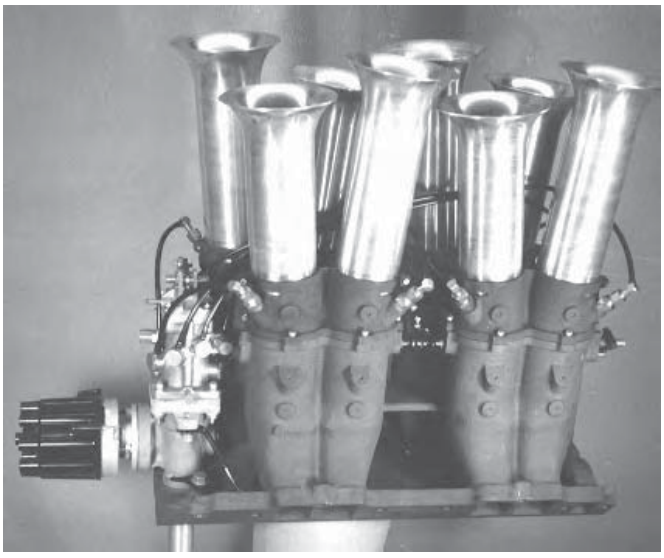


Several types of TPS adapters and drives

#7086 Kinsler remote TPS mount assembly

C) Vacuum Ports We can drill and tap the runners and supply plumbing and a junction block for vacuum modulated metering, vacuum accessories, or a remote idle air control (IAC) motor housing. We have the remote housings and idle air motors, see Page #145.

3) **Lucas Mechanical Metering** was developed and manufactured by the Lucas Aerospace Division in England. It was quite popular from 1955 to 1980 on Grand Prix, Can-Am, and other top performing sport racing cars, as well as almost all of the World Champion Offshore Powerboats. It was the ultimate because it is timed, has precise distribution, and meters the fuel even at cranking, thus preventing the engine from getting washed down. Electronic metering has taken over for the premium applications, but Lucas is still used on vintage road race cars. We continue to provide complete rebuilding service, and have a good supply of used and new-old-stock metering units and parts.



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TRADITIONAL CHEVROLET SMALL BLOCK V8 MANIFOLD

Constant flow fuel metering installed

Refer to three additional small block models on following pages

Standard Throttle Size	Optional Throttle Sizes
2 3/16"	2"
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 9/16"
	2 5/8"

Other Small Block Chevrolet Manifolds

For use with electronic fuel injection, Kinsler extruded aluminum fuel rails installed

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

CONSTANT FLOW METERING

- Kinsler precision barrel valve with fittings, mounting bracket, and linkage to throttle shaft
- Kinsler designed, computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 1" 'AS' style deflectors
- Kinsler assembled nozzle hoses with 90° ends
- Kinsler brass 1/2-20 thread universal nozzle boss inserts

EFI

- Kinsler universal boss inserts for EFI injectors
- Machined for fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

LUCAS MECHANICAL

- Kinsler universal boss inserts for Lucas mechanical injection nozzles
- Throttle shaft and throttle arm set up for linkage to actuate cam on Lucas metering unit

Kinsler manifolds are made for EFI ... not converted

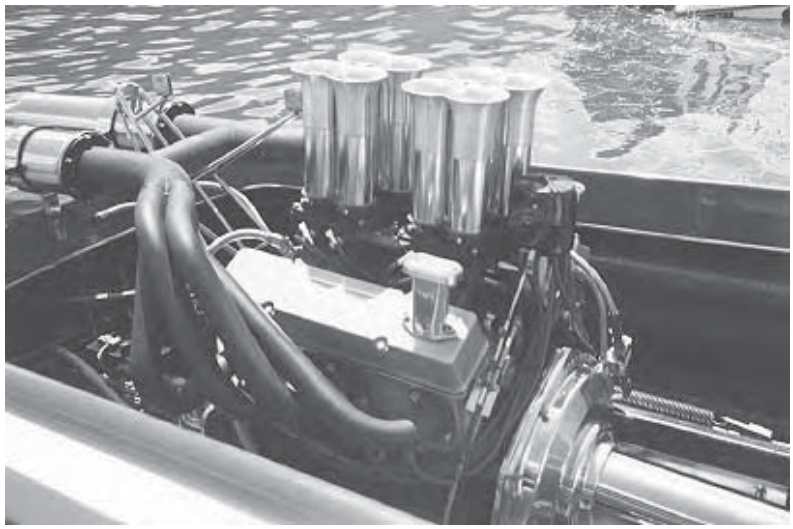
TRADITIONAL CHEVROLET SMALL BLOCK V8 MANIFOLD - CONTINUED -

OPTIONS

- Kinsler billet spring-screw universal throttle shaft linkage
- Back cut throttle shafts for increase air flow
- Streamlined Throttle Plates
- Valley plate for use on tall or custom deck engine blocks
- Aluminum or stainless steel fuel rails for EFI
- Longer nozzle hoses for 'down' nozzles
- 16-port barrel valve (outlet block-off plugs available)
- 16-nozzle system; barrel valve, nozzle hoses, nozzles
- Barrel valve with 6 AN outlet ports
- Special linkage setups for ease of customer installation
- Angled ramtube adapters so K&N air filters can be installed
- Delete bosses from manifold castings, to save weight!
- 'XTRA-LIGHT' package on manifold castings
- 'XTRA-LIGHT' barrel valve assembly
- Titanium ramtube adapter bolts to save weight

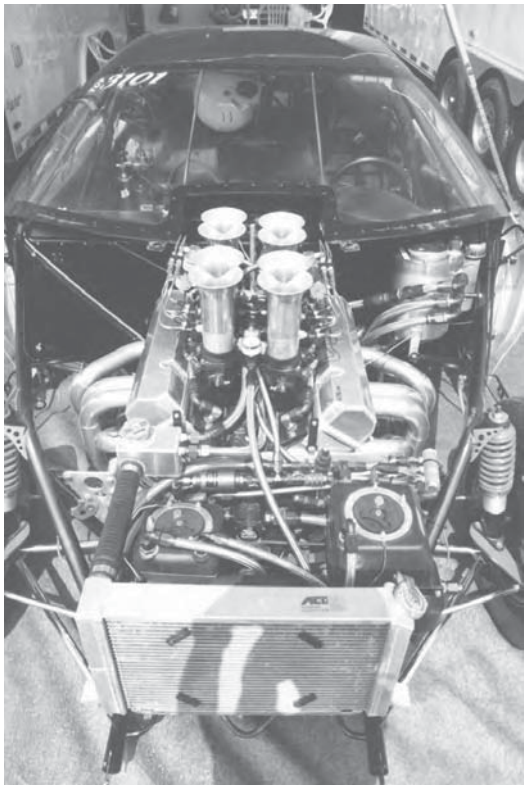
Other Small Block Chevrolet Manifolds

'XTRA LIGHT'
2 5/8" throttle size manifold,
nozzle bosses removed from castings,
optional port profile- All Pro 285 stage II



Championship ski boat, engine built by
Performance Wholesale in Queensland, Australia

Small block Chevy manifold with Lucas Mechanical fuel injection, note the nozzle bosses in ramtubes,
see Page # 54



Wilkins Motorsport IHRA Top Sportsman '99 Camaro

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STANDARD PORT CONFIGURATIONS FOR CHEVROLET SMALL BLOCK V8

We offer our manifold to fit many standard port profiles, optional port profiles, or your custom port profile. If your cylinder head is not listed it doesn't mean we don't make it; call us.

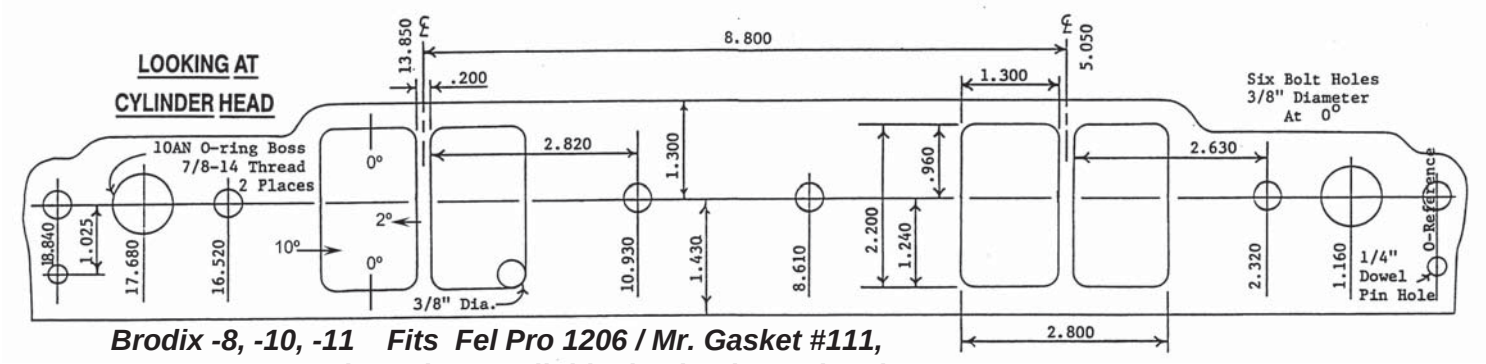
STANDARD PORT PROFILES

Chevrolet : Bowtie (Fel Pro 1205 Gasket)
Brodix : -8, -10, -11 , (Fel Pro 1206),
ASCS, -11X, -11RI,
-12 (Fel Pro 1209)
Dart : 220
Edelbrock : standard 23^0
World Products : Sportsman II
AFR : standard 23^0

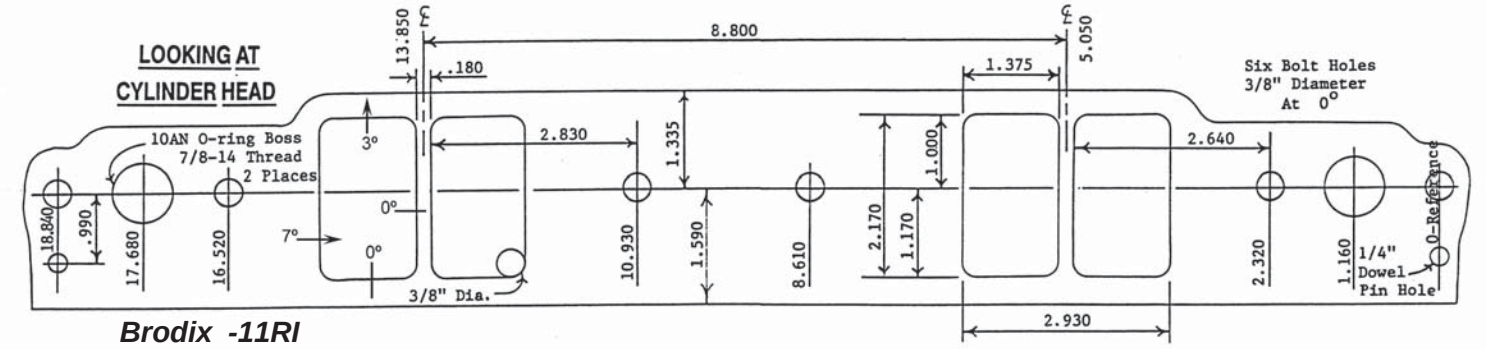
SHOWN ARE THREE OF THE STANDARD PORT PROFILES :

A FEW OF OUR MORE POPULAR OPTIONAL PORT PROFILES

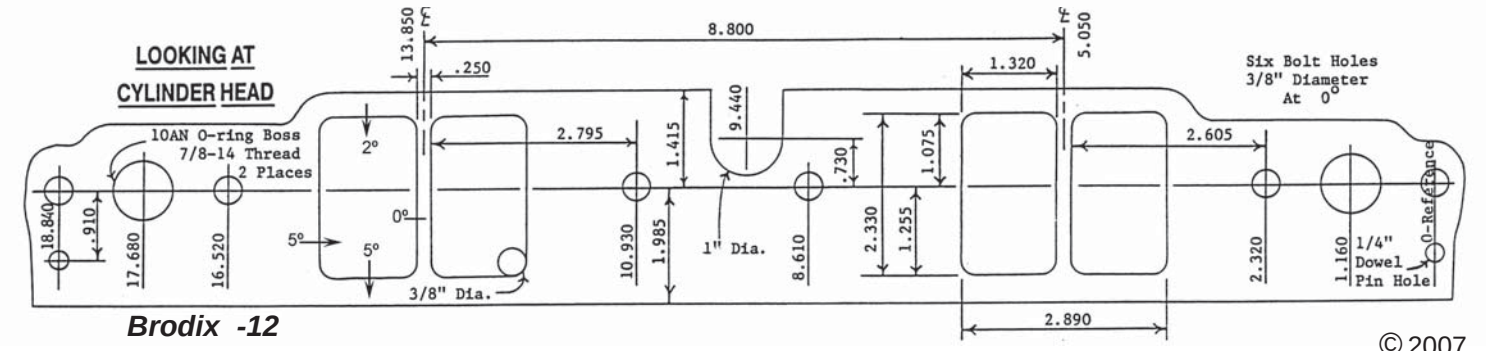
Brodix : -12B, -12RI, All 12x12, & GB-2000
Dart Oldsmobile : 14°, 18°
Weldtech : 10X, 247, 262, 285 RVR, 287, 299,18°,
Hut 1, Hut 1.1, Hut 2, 12x12 - 275,286,296.
Chevrolet : 18-degree standard and raised port
All-Pro : 227, 245, 265, 270JJ, 285 Stage II and III
Alan Johnson Perf. Eng. : 12^0, 18^0, 21^0, and 23^0
World Products : S/RTorquer
Pro-Action Heads : Pro 23°, Pro 14° - 254, 265, 285, & 300
Chapman : 10X, 12, 12x12, and 18^o
Totally custom...to your specifications



Brodix -8, -10, -11 Fits Fel Pro 1206 / Mr. Gasket #111, most common Chevrolet small block aluminum heads



Brodix -11RI



Brodix -12

Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

CHEVROLET SMALL BLOCK V8

Dragon Claw

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 3/4"
2 5/8"	2.9"
2 11/16"	3.0"
2 13/16"	

3.0" MAX. THROTTLE !!

Other Small Block Chevrolet Manifolds	
LS1/LS6	Page #19
Dart/Buick	Page #22
SB2 and SB2-2	Page #21
Brodix Canted Valve	Page #22
Symmetrical Port	Page #21
Vintage	Page #23

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

CONSTANT FLOW METERING

- Kinsler precision barrel valve with fittings, mounting bracket, and linkage to throttle shaft
- Kinsler designed, computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 1" 'AS' style deflectors
- Kinsler assembled nozzle hoses with 90° ends
- Machining of one nozzle location - inboard or outboard; includes 1/2-20 thread brass universal nozzle boss inserts and sintered bronze air filters

EFI

- Kinsler universal boss inserts for EFI injectors
- Machined for fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

LUCAS MECHANICAL

- Kinsler universal boss inserts for Lucas mechanical injection nozzles
- Throttle shaft and throttle arm set up for linkage to actuate Cam on Lucas metering unit

Kinsler Dragon Claw manifold with optional Jackshaft linkage kit and 16 nozzle system

STANDARD PORT PROFILES

Alan Johnson Perf. Engr.: 12° 280 & 306
All Pro : 270, 285, 286 series
Brodix : GB2000 series
Pro-Action: 14° 285

Custom Port Profiles: For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

Extra wide throttle shaft bushing

Extend the service life under severe racing conditions. .300" min. width between the throttle bores on a 3.0" bore unit!!

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CHEVROLET SMALL BLOCK V8

Dragon Claw

- CONTINUED -

OPTIONS

- Kinsler billet Spring-Screw universal throttle shaft linkage
- Back cut throttle shafts for increase air flow
- Streamlined Throttle Plates
- Valley plate for use on tall or custom deck engine blocks
- Aluminum or stainless steel fuel rails for EFI
- Longer nozzle hoses for 'down' nozzles
- 16-port barrel valve (outlet block-off plugs available)
- 16-nozzle system; barrel valve, nozzles, nozzle hoses
- Barrel valve with 6 AN outlet ports
- Jackshaft linkage kit: stainless steel or titanium cross shaft
- Special linkage setups for ease of customer installation
- Angled ramtube adapters so K&N air filters can be installed
- Machining of second nozzle boss location on manifold - inboard or outboard; includes 1/2-20 thread brass universal nozzle boss inserts and sintered bronze air filters
- Delete bosses from manifold castings, to save weight!
- 'XTRA-LIGHT' package on manifold castings
- 'XTRA-LIGHT' barrel valve assembly
- Titanium ramtube adapter bolts
- Custom name tag

Dragon Claw for 'street' application with EFI

2-piece adjustable pulling arm included with Jackshaft linkage kit

Nozzle lines with 45 degree ends and aluminum banjos with air filters for 'down' nozzles in cylinder head

Inboard nozzle location

Contoured flange detail

Terry McCarl's Wesmar/Kinsler powered World of Outlaw sprint car

CHEVROLET SMALL BLOCK V8

360 ASCS Dragon Claw

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 3/8"
	2 7/16"
	2 5/8"

Other Small Block Chevrolet Manifolds	
LS1/LS6	Page #19
Dart/Buick	Page #22
SB2 and SB2-2	Page #21
Brodix Canted Valve	Page #22
Symmetrical Port	Page #21
Vintage	Page #23

STANDARD FEATURES

- ASCS port profile with standard bolt location and port window
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept constant flow, EFI, or Lucas nozzles
- Dual milled precision ground milled style one-piece hard-nickel plated throttle shafts
- Jackshaft linkage kit
- Magnesium or aluminum

CONSTANT FLOW METERING

- Kinsler precision barrel valve with fittings, mounting bracket, and linkage to throttle shaft
- Kinsler designed, computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 5 1/2" 'AS' style deflectors
- Kinsler assembled nozzle hoses with 45° ends
- Machining of one nozzle location - inboard or outboard; includes 1/2-20 thread brass universal nozzle boss inserts and sintered bronze air filters

Detail on manifold runners

Change 5 1/2" nozzles without removing manifold from engine

Runners machined for magneto clearance

Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

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CHEVROLET SMALL BLOCK V8

360 ASCS Dragon Claw

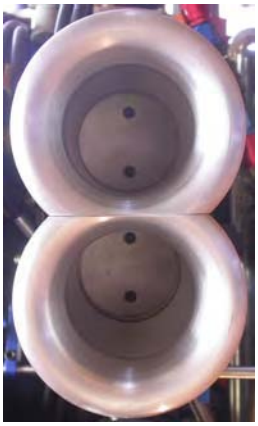
OPTIONS

- CONTINUED -

- Streamlined Throttle Plates
- Valley plate for use on tall or custom deck engine blocks
- Longer nozzle hoses for 'down' nozzles
- 16-port barrel valve (outlet block-off plugs available)
- 16-nozzle system; barrel valve, nozzles, nozzle hoses
- Barrel valve with 6AN outlet ports
- Special linkage setups for ease of customer installation
- Angled ramtube adapters so K&N air filters can be installed
- Machining of 'second' nozzle boss location on manifold - inboard or outboard; includes 1/2-20 thread brass universal nozzle boss inserts and sintered bronze air filters
- Delete bosses from manifold castings, to save weight!
- 'XTRA-LIGHT' package on manifold castings
- 'XTRA-LIGHT' barrel valve assembly
- Titanium ramtube adapter bolts to save weight
- Custom name tag

Shown with optional 'outboard' nozzle location

Restrictor tube insert



Ramtubes without restrictors

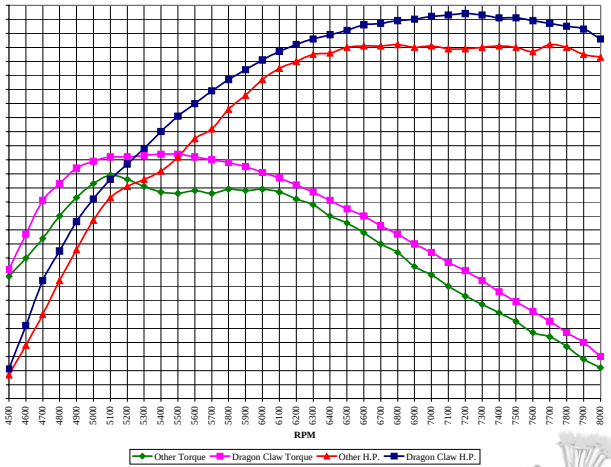
Dropping in restrictor

Ramtubes with restrictors

O-ring seal for manifold to ramtube adapter and backcut throttle shaft

Cut away to show o-ring seal for ramtube to ramtube adapter

'Smooth torque and power curve' obtained with the Kinsler 360 ASCS Dragon Claw manifold



CHEVROLET SMALL BLOCK V8

Monster Manifold

3.0" MAX. THROTTLE !!

Standard Throttle Size	Optional Throttle Sizes
2 11/16"	2 3/4"
	2 13/16"
	2.9"
	3.0"

Other Small Block Chevrolet Manifolds	
LS1/LS6	Page #19
Dart/Buick	Page #22
SB2 and SB2-2	Page #21
Brodix Canted Valve	Page #22
Symmetrical Port	Page #21
Vintage	Page #23

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

CONSTANT FLOW METERING

- Kinsler precision barrel valve with fittings, mounting bracket, and linkage to throttle shaft
- Kinsler designed, computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 1" 'AS' style deflectors
- Kinsler assembled nozzle hoses with 90° ends
- Kinsler brass 1/2-20 thread universal nozzle boss inserts

EFI

- Kinsler universal boss inserts for EFI injectors
- Machined for fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

LUCAS MECHANICAL

- Kinsler universal boss inserts for Lucas mechanical injection nozzles
- Throttle shaft and throttle arm set up for linkage to actuate cam on Lucas metering unit

Craig Dollansky driving the Karavan Motorsports #7 sprint car. photo by: Matt Hill

STANDARD PORT PROFILES

Alan Johnson Perf. Engr.: 12° 280 & 306
All Pro : 270, 285, 286 series
Brodix : GB2000 series
Pro-Action: 14° 285

Monster manifold with optional polished billet aluminum radius plates

Extra wide throttle shaft bushing

Extend the service life under severe racing conditions. .300" min. width between the throttle bores on a 3.0" bore unit !!

Custom Port Profiles:

For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

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CHEVROLET SMALL BLOCK V8

Monster Manifold - CONTINUED -

OPTIONS

- Polished billet aluminum radiused entry plates
- Back cut throttle shafts for increase air flow
- Streamlined Throttle Plates
- Valley plate for use on tall or custom deck engine blocks
- Aluminum or stainless steel fuel rails for EFI
- Longer nozzle hoses for 'down' nozzles
- 16-port barrel valve (outlet block-off plugs available)
- 16-nozzle system; barrel valve, nozzles, nozzle hoses
- Barrel valve with 6 AN outlet ports
- Jackshaft linkage kit: stainless steel or titanium cross shaft
- Special linkage setups for ease of customer installation
- Angled ramtube adapters so K&N air filters can be installed
- Optional 'low-boss' nozzle boss location - lower on runner
- Delete bosses from manifold castings, to save weight!
- 'XTRA-LIGHT' package on manifold castings
- 'XTRA-LIGHT' barrel valve assembly
- Titanium ramtube adapter bolts to save weight

Jackshaft linkage kit and 16 nozzle system installed with optional silver paint

Polished billet aluminum radiused inlet plates installed

Optional 'low-boss' nozzle location

Dean Carter:
NHRA World Champion in Competition Eliminator

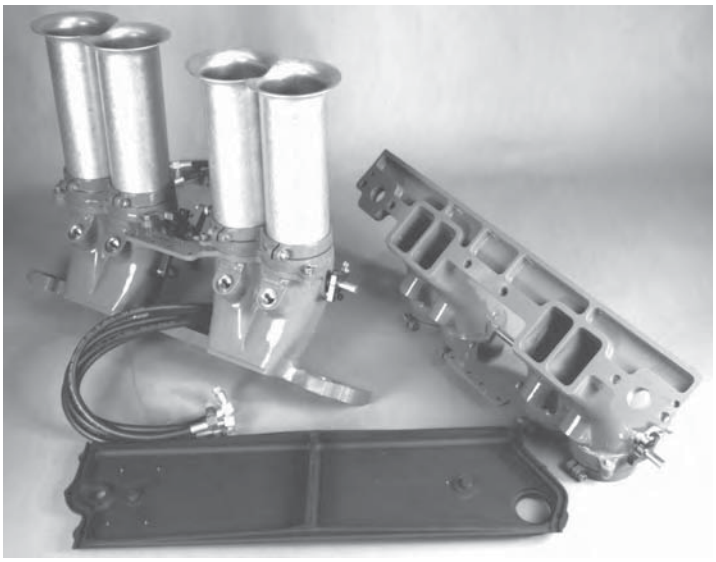
First A/Nostalgia Dragster in the 6's

KINSLER "XTRA LIGHT" MANIFOLDS

When Weight Savings is a Must!

For Small Block Chevrolet, Mopar and Ford
Others available on Special Order

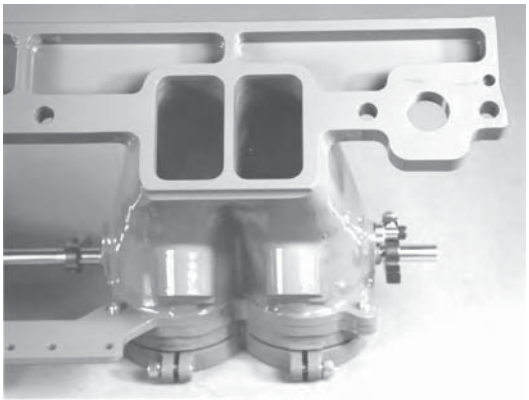
Steve Kinser, 19-time World of Outlaw Champion



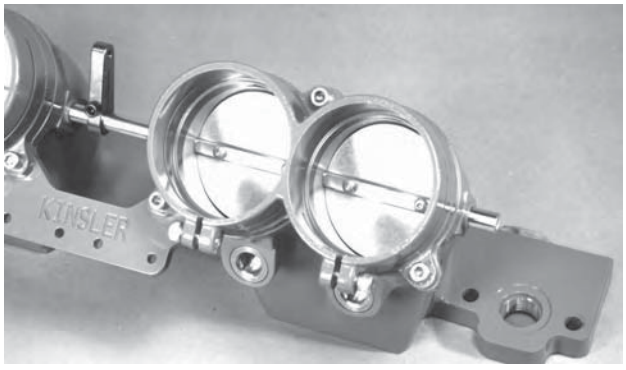
Xtra-Light package includes: valley plate with secondary ribs removed

3.5 POUNDS LIGHTER * than our standard small block V8 ***MAGNESIUM*** manifold !!!

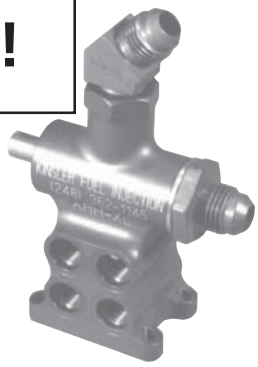
* *weight savings depends on port profile and throttle size*



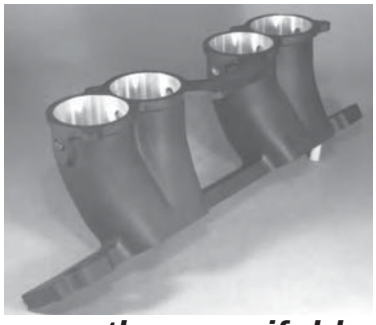
Details: The main bolting flange has deeply milled pockets in it, and has been mill contoured all around the outside. The top been contoured around the bores, as well as the ramtube adapters to remove significant material. The valley plate has the secondary ribs removed, the sides and remaining rib thinned out, and the top surface milled to .100" thick.



Engineered for Reliability: It would have been easier and less expensive to simply make a thinner flange to lighten the manifold, but the flange bending strength goes up as the square of the thickness, so twice as thick is four times as strong. This is why we kept the flange thick, but cut deep pockets into it - to give the best strength to weight combination.



Optional: XTRA-LIGHT barrel valve, hard-anodized aluminum, cuts the weight of the barrel valve in half... saves 1/4 pound



Also available without bosses on the manifold for maximum weight savings.

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CHEVROLET SMALL BLOCK V8
LS1, LS2, and LS6

Standard Throttle Size	Optional Throttle Sizes
2.0"	2 3/16"
	2 3/8"

Other Small Block Chevrolet Manifolds

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

EFI

- Kinsler universal boss inserts for EFI injectors
- Machined for fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

CONSTANT FLOW METERING

- Kinsler precision barrel valve with fittings, mounting bracket, and linkage to throttle shaft
- Kinsler designed, computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 1" 'AS' style deflectors
- Kinsler assembled nozzle hoses with 90° ends
- Kinsler brass 1/2-20 thread univeral nozzle boss inserts

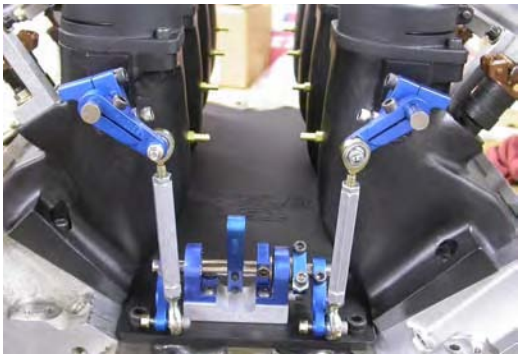
OPTIONS

- Upgrade to magnesium castings
- Machine manifold runners for nitrous nozzles
- Machine manifold runners for M.A.P. reference and I.A.C. kits
- Billet aluminum valley plate
- Billet magnesium valley plate
- Upgrade manifold linkage to jackshaft linkage kit
- Upgrade manifold linkage with two billet spring screw links
- Upgrade manifold linkage with six billet spring screw links
- Upgrade - polished billet aluminum radius plates (replaces ram tubes and ram tube adapters)
- Extruded aluminum or stainless steel fuel rails

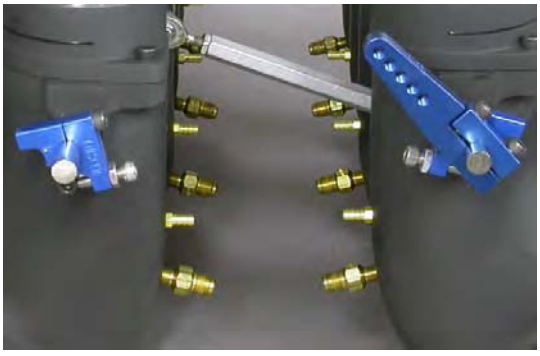
Available for LS1/LS6 and LS2- billet aluminum or magnesium center plate

Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

Billet aluminum or magnesium valley plate



Jackshaft linkage kit available



Manifold runners machined for M.A.P. reference (upper fitting) and I.A.C. (lower fitting) kits

OTHER KINSLER SMALL BLOCK CHEVROLET MANIFOLDS

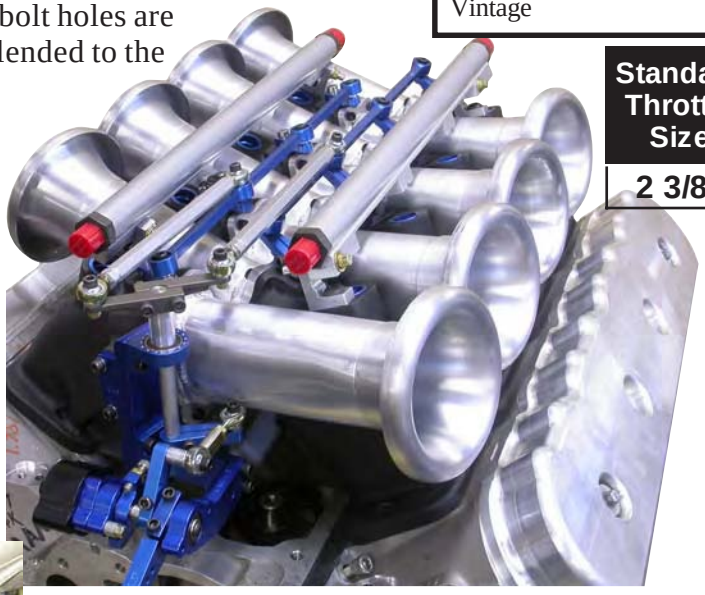
LS7

Standard Throttle Size	Optional Throttle Sizes
2 3/8"	2 1/4"
	2 7/16"
	2 1/2"
	2 5/8"
	2 11/16"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium standard, aluminum on special order

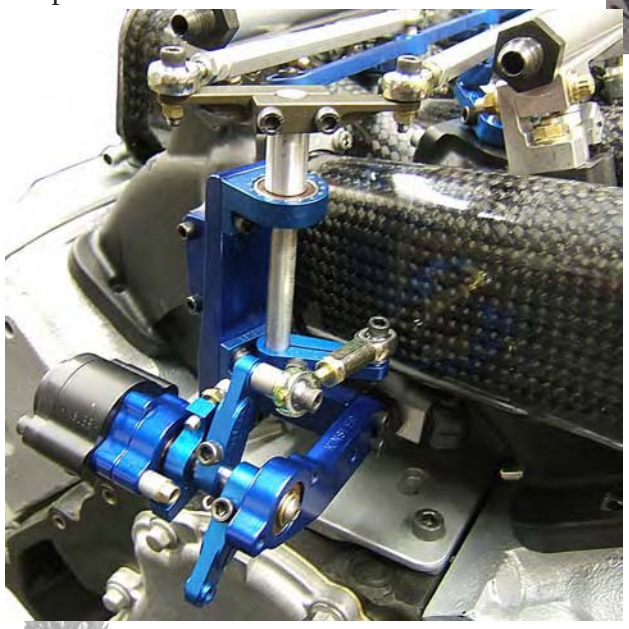
LS7 Cross- Ram



Standard Throttle Size	Optional Throttle Sizes
2 3/8"	2"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Fits LS3 and L92 cylinder heads
- Upper & lower (hidden) injector locations
- Available IAC rail system, uses either upper or lower inkector location
- Transverse and counter-rotating individual throttle shafts
- Magnesium standard, aluminum on special order



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OTHER KINSLER SMALL BLOCK CHEVROLET MANIFOLDS

C5-R (race head)

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium standard, aluminum on special order

Standard Throttle Size	Optional Throttle Sizes
2 3/8"	2 1/4"
	2 7/16"
	2 1/2"
	2 5/8"
	2 11/16"

With EFI metering

Chevrolet's C5-R Corvette using Kinsler's C5-R manifold on a Katech engine has won the production sports car class at the 24 hours of Le Mans three years in a row

SB2 and SB2-2

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 3/8"
	2 7/16"
	2 5/8"
	2 11/16"

Clements Racing Engines SB2 for World Sports Car road racing

CHEVROLET SYMETRICAL PORT

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 5/8"
	2 11/16"

With constant flow metering

OTHER SMALL BLOCK CHEVROLET MANIFOLDS

BRODIX BD-2000

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 5/8"
	2 11/16"

With constant flow metering

DART - BUICK

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 5/8"
	2 11/16"

With constant flow metering

Riolo Racing Engines small block Chev with Dart - Buick cylinder heads

BRODIX CANTED VALVE

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 3/8"
	2 7/16"
	2 5/8"
	2 11/16"

With constant flow metering

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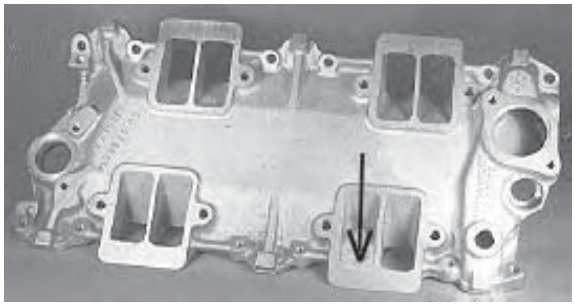
VINTAGE KINSLER SMALL BLOCK CHEVROLET V8

This was widely used from 1967 till 1986, when we introduced our first three piece manifold. Still available for the person who needs the "vintage" look. Constant Flow or Lucas available.

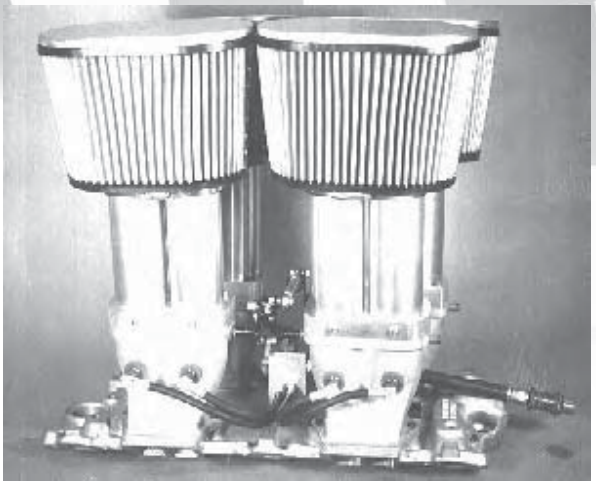
STANDARD FEATURES

- 2 1/4" (2.250") and 2 7/16" (2.437") throttle sizes.
- Aluminum base plate; seals hot engine oil from backside of runners (cooler incoming air charge gives more horsepower).
- Bronze throttle shaft bushings and our spring-screw universal throttle shaft linkage.
- Standard Chevrolet type water crossover with thermostat housing; gives maximum water flow for excellent cooling.
- Extra rib of material around the throttle bore area helps prevent distortion that causes throttle sticking on other brands.
- Aluminum or magnesium runners.

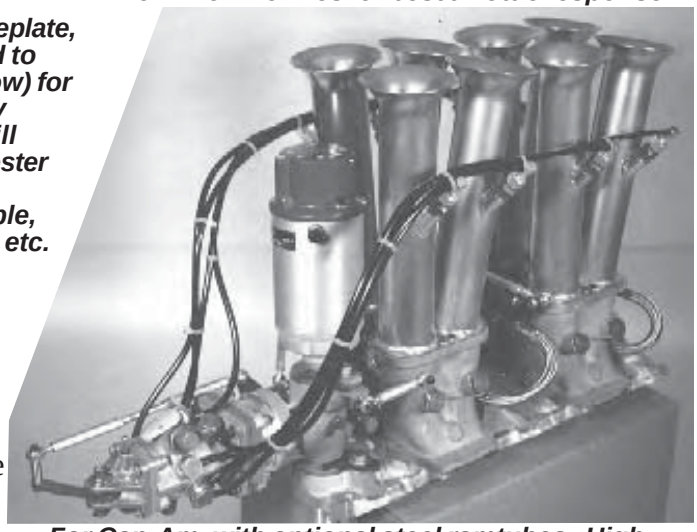


These manifolds were built on a GM Rochester FI baseplate, with metal added to the port (see arrow) for use on later Chev heads.... This will also adapt Rochester FI to later heads. These are available, also the runners, etc.

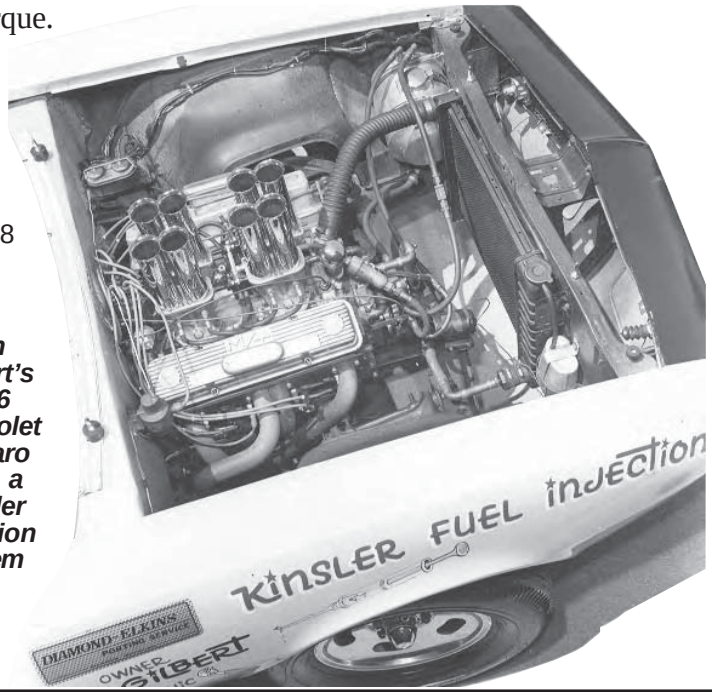
Excellent for road and oval track racing... you now need larger throttles for drag racing. Some brands of manifolds don't have a good flowing runner, so they use a very large throttle to get good top end power, but then the runner is so big that it has little low end torque, thus poor performance out of the turns. The runner in this manifold flows efficiently, allowing a medium size throttle to give excellent top end power while maintaining superior low end torque.



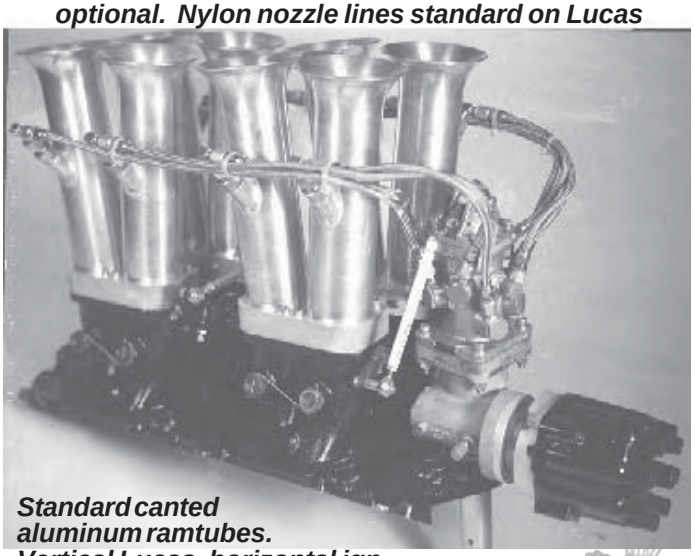
For Dirt Track, with constant flow. Straight up ramtubes to use K&N air filters that cover two tubes each; gives 1/4 the air flow restriction as running one air cleaner on each tube. The bells are retained inside the air cleaners for best air flow. Low nozzles for best throttle response



For Can-Am, with optional steel ramtubes. High placed nozzles for best top end power. Horizontal Lucas with vertical Vertex. Horizontal Vertex optional. Nylon nozzle lines standard on Lucas



Jim Gilbert's 1966 Chevrolet Camaro with a Kinsler injection system

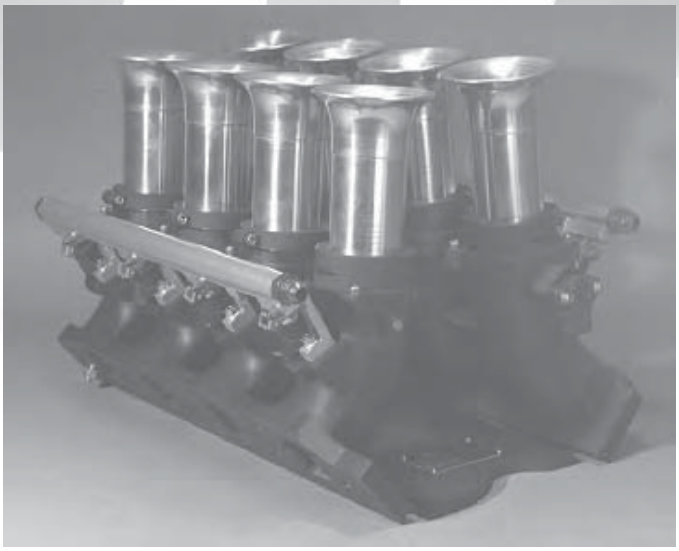


Standard canted aluminum ramtubes. Vertical Lucas, horizontal ign. Optional stainless braid teflon lines

FORD SMALL BLOCK V8

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2"
2 1/2"	2 3/16"
	2 3/8"
	2 7/16"
	2 9/16"
	2 5/8"
	2 11/16"

AVAILABLE FOR
SVO, Yates, TFS, Chapman
OR
WINDSOR STYLE
CYLINDER HEADS



Ford SVO port profile Kinsler aluminum rails for EFI

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Billet valley plate for 9.2"W, 9.5"W, 351C, or 289/302 block (8.2")
- Magnesium or aluminum

EFI

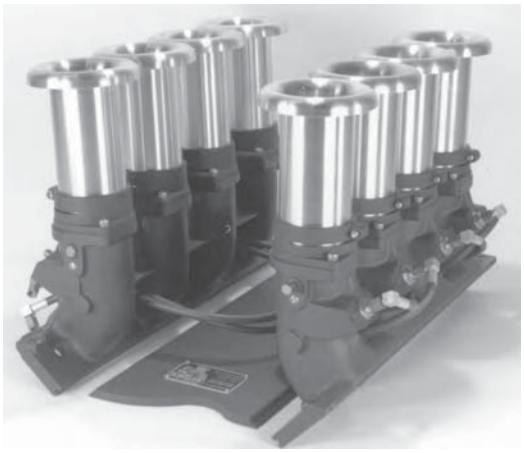
- Kinsler universal nozzle boss inserts for EFI injectors
- Machined for Kinsler fuel rail mounting stanchion studs
- Kinsler bolt-on TPS boss and drive coupler

Windsor port profile with 2.0" throttle and EFI for street application

CONSTANT FLOW METERING

- Kinsler precision distribution barrel valve with fittings, mounting bracket, and linkage hardware
- Kinsler designed and computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread
- Kinsler built nitrile nozzle lines with 90-degree hose ends
- Kinsler brass 1/2-20 thread universal nozzle boss inserts

Michael Muray's EFI Boss street machine



SVO port profile with 2 5/8" throttle size and constant flow metering

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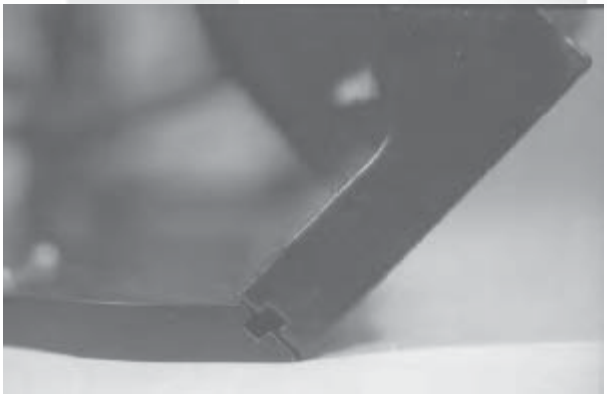
FORD SMALL BLOCK V8 - CONTINUED -



Closeup of groove detail of manifold and valley plate (without silicone installed)

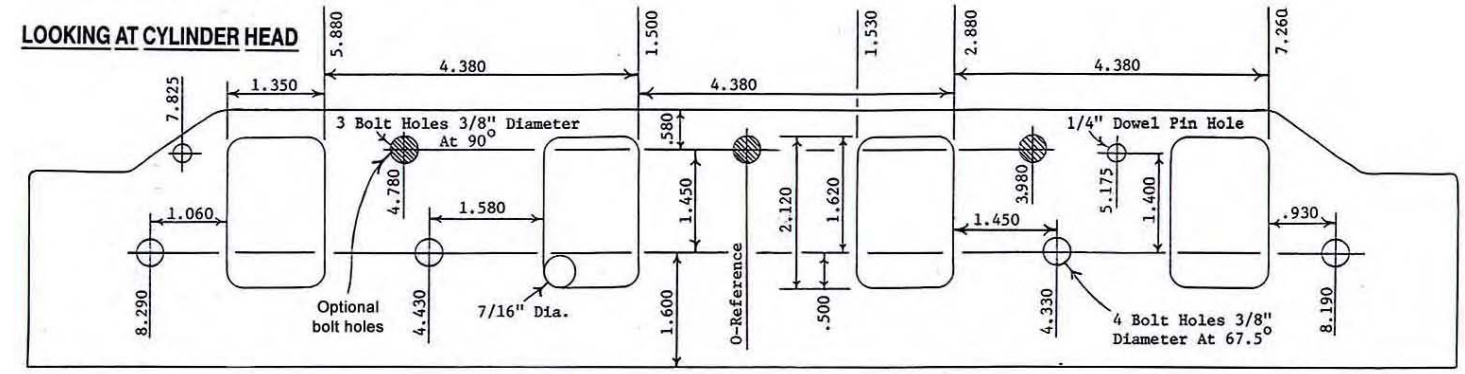
OPTIONS

- Kinsler billet spring-screw universal throttle shaft links.
- Back cut throttle shafts for increased air flow
- Valley plate for use on tall or custom deck engine blocks.
- Aluminum or stainless steel fuel rails for EFI
- 16-port barrel valve with block-off plugs
- 16-nozzle system; barrel valve, nozzle lines, nozzles
- Barrel valve with additional 6AN ports
- Special linkage setups for ease of customer installation
- 'Xtra-Light' package on manifold castings
- Titanium ramtube adapter bolts
- Machine manifold runners for nitrous nozzles
- Machine manifold runners for M.A.P. reference and I.A.C. kits

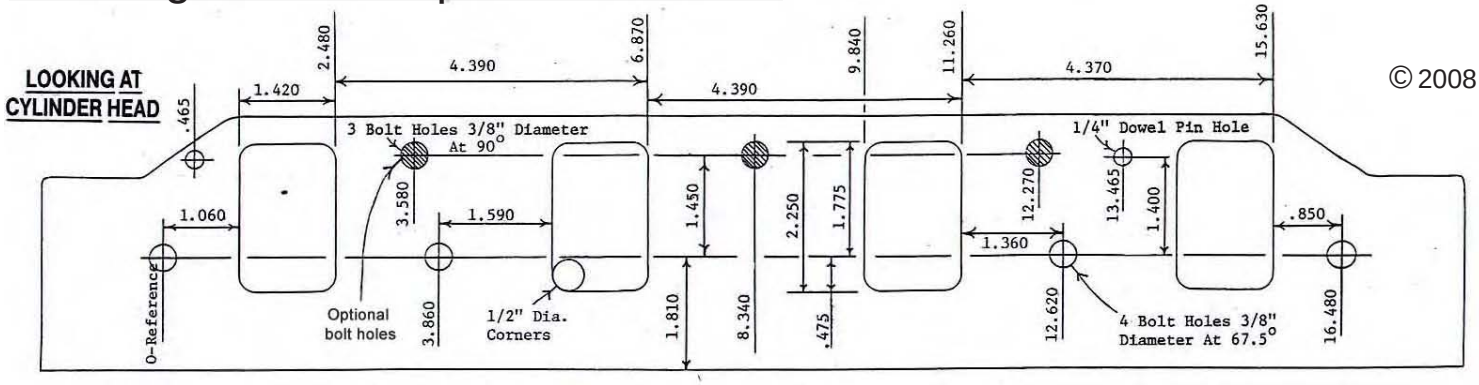
We offer our manifold to fit several standard port profiles, many optional port profiles, or your custom port profile. If your cylinder head is not listed, it doesn't mean we don't make it; call us.

Standard Port Profiles for Windsor are Fel Pro 1250 or 1262 gasket

Standard Port Profile for the SVO (C3) and TFS (shown below)



Optional Port Profiles: Yates Nascar (shown below), also C3H High Port, Chapman, SC1, etc.



Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

FORD MODULAR V8

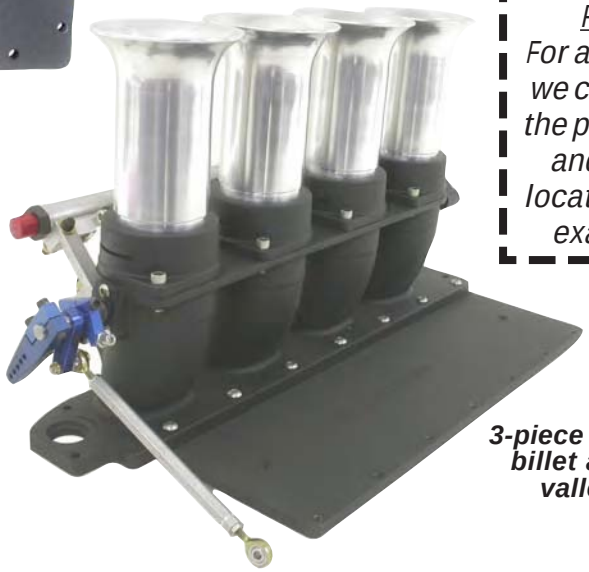
4-VALVE OVAL PORT

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2"
	2 3/16"
	2 3/8"
	2 7/16"
	2 1/2"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Billet center valley plate for 4.6 or 5.4
- Aluminum standard, magnesium on special order

Aluminum fuel rails and bolt-on TPS boss installed for EFI



3-piece design with billet aluminum valley plate

Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

3-VALVE OVAL PORT

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2"
	2 3/16"
	2 3/8"
	2 7/16"
	2 1/2"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 2-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Aluminum standard, magnesium on special order

Ford 3-valve manifold with optional 'inboard' injector bosses and custom blue air box adapters

4-VALVE GM MANIFOLDS

CADILLAC NORTHSTAR

STANDARD FEATURES

- Throttle size: 2 1/4"
- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Uses modular fuel rail
- Magnesium standard, aluminum on special order

OLDSMOBILE AURORA

STANDARD FEATURES

- Throttle size: 2 1/4"
- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 2-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium standard, aluminum on special order

INDY RACING LEAGUE

STANDARD FEATURES

- Throttle size: various
- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Uses modular fuel rail
- Magnesium standard, aluminum on special order

These manifolds were made for the Oldsmobile and Chevrolet IRL Indy Cars from 1997 to 2001. Used in conjunction with our Monster Mesh fuel and oil filters, mechanical fuel pumps and K-140 pressure relief valves, these engines won 96% of the races they entered and won 5 manufacturer championships.

CHEVROLET ONE PIECE BIG BLOCK V8

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Standard passenger block, 9.8" deck
- One piece design, sealed floor to keep hot engine oil away from backside of the runners, and sides left open to let air surround the runners
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Standard Chevrolet type water crossover with thermostat housing. Crossover has (3) boss areas for temperature sensing or coolant bypass
- Aluminum manifold and cast ramtube adapters

Traditional Kinsler big block Chevrolet manifold with optional 'low' nozzle location and nitrous nozzle ports

CONSTANT FLOW METERING

- Kinsler precision distribution barrel valve with fittings and linkage
- Kinsler designed and computer ground barrel valve spool
- Set of flowed and matched Kinsler nozzles
- Set of Kinsler nitrile nozzle hoses with 90-degree ends
- Nozzle boss positions: below throttle plates or high in ramtube adapter above the throttle bores

John Lohone's EFI big block Chevrolet. Note the mechanical fuel pump and 'lower' rail system for vacuum reference

EFI

- Machined to accept EFI injector
- Machined for Kinsler fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

LUCAS MECHANICAL TIMED

- Machined for Lucas 14mm nozzles
- Extra throttle shaft length and throttle arm for attachment of metering unit activation linkage

OPTIONS

- Truck block (10.2" deck), thick flanges, no spacers required
- Longer nozzle hoses for 'down' nozzles
- 16-port barrel valve with block-off plugs
- 16-nozzle system; barrel valve, lines, nozzles
- Barrel valve with 6 AN ports
- Stainless steel throttle shafts for marine use
- Special radiused entrance plates (replaces ramtubes and adapters)
- Special linkage setups for ease of customer installation
- Oval port manifold
- Machine manifold runners for nitrous nozzles
- Machine manifold runners for M.A.P. reference and I.A.C. kits

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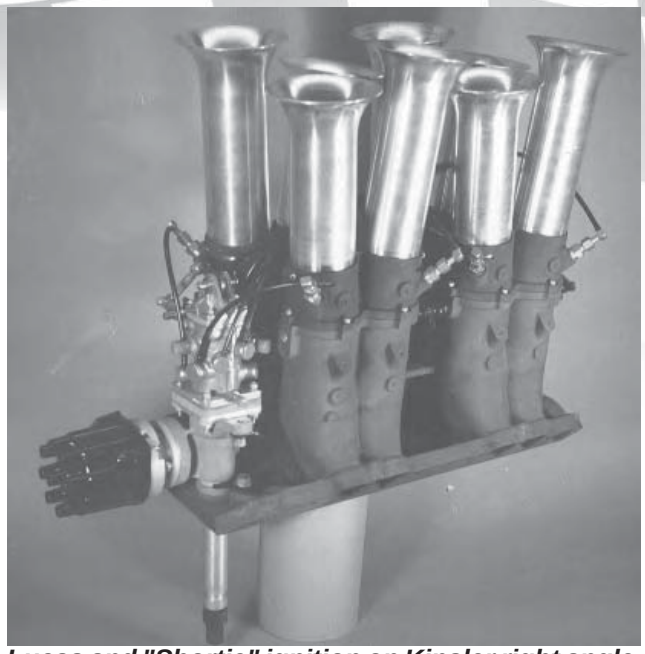
CHEVROLET ONE PIECE BIG BLOCK V8

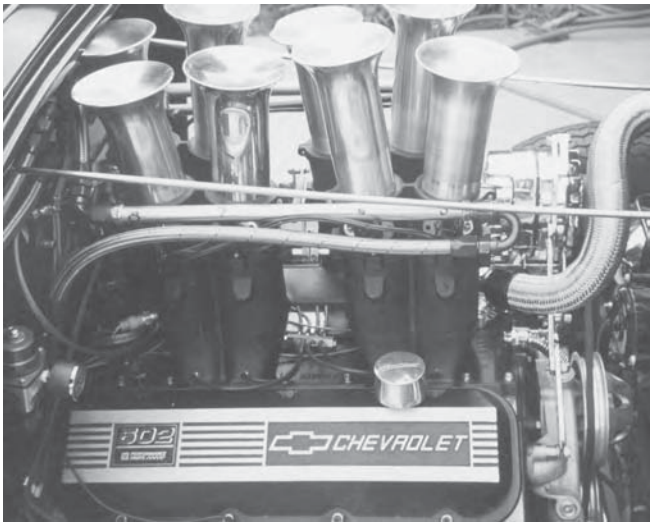
- CONTINUED -

He's flying!! Constant flow Kinsler in a flat-bottom boat



Lucas and "Shortie" ignition on Kinsler right angle drive. Note thick flange for use on truck block without using spacer plates... gives a stronger flange, saves the cost of the spacer plates, and eliminates water leaks! This combination has won many offshore powerboat championships

If one engine is good, two are even better; some use four!



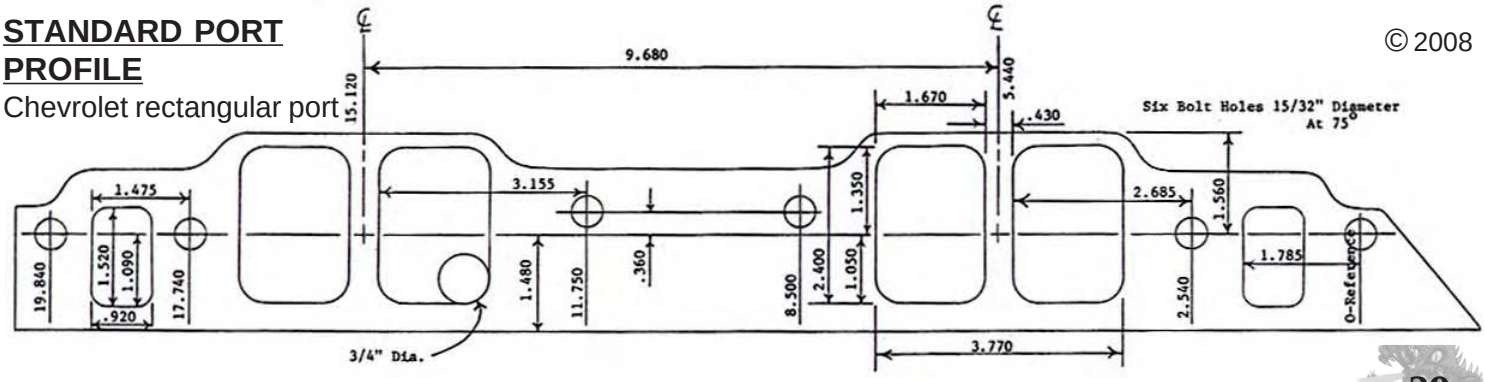
Mike Burton's Roadster with 502 CID big block Chevrolet and F.A.S.T. EFI management system

Custom Port Profiles:

For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

STANDARD PORT PROFILE

Chevrolet rectangular port



CHEVROLET THREE PIECE BIG BLOCK V8

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Valley plate for passenger or truck block
- 10 AN water ports at front and rear (other sizes available on special order) cut out for center water port where applicable
- Magnesium or aluminum

CONSTANT FLOW METERING

- Kinsler precision barrel valve with fittings, mounting bracket, and linkage to throttle shaft
- Kinsler designed, computer ground barrel valve spool
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 1" 'AS' style deflectors
- Kinsler assembled nozzle hoses with 90° ends
- Outboard nozzle location - includes 1/2-20 thread brass universal nozzle boss inserts and sintered bronze air filters

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 5/8"
	2 11/16"
	2 13/16"
	2.9"
	3.0"

Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs. We can do rectangular and oval ports.

EFI

- Kinsler universal boss inserts for EFI injectors
- Machined for fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

LUCAS MECHANICAL

- Kinsler universal boss inserts for Lucas mechanical injection nozzles
- Throttle shaft and throttle arm set up for linkage to actuate Cam on Lucas metering unit

OPTIONS

- Kinsler billet Spring-Screw universal throttle shaft linkage
- Back cut throttle shafts for increase air flow
- Streamlined Throttle Plates
- Valley plate for use on tall or custom deck engine blocks
- Aluminum or stainless steel fuel rails for EFI
- Jackshaft linkage kit: stainless steel cross shaft
- Canted ramtube adapters

Optional canted ramtube adapter

Big block Dragon Claw jackshaft linkage kit, pulls front to rear

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CROSS-RAM FOR CHEVROLET BIG BLOCK

Constant flow metering

EFI with aluminum fuel rails

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Standard passenger block, 9.8" deck
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Standard Chevrolet type water crossover with thermostat housing.
- Aluminum manifold and cast ramtube adapters

EFI

- Kinsler universal boss inserts for EFI injectors
- Machined for Kinsler fuel rail mounting stanchion stud
- Kinsler bolt-on TPS boss and drive coupler

CONSTANT FLOW METERING

- Kinsler precision distribution barrel valve with computer ground spool
- Nozzle hoses with 90-degree ends
- Nozzle boss position: low near valve cover or high near throttle bores

LUCAS MECHANICAL

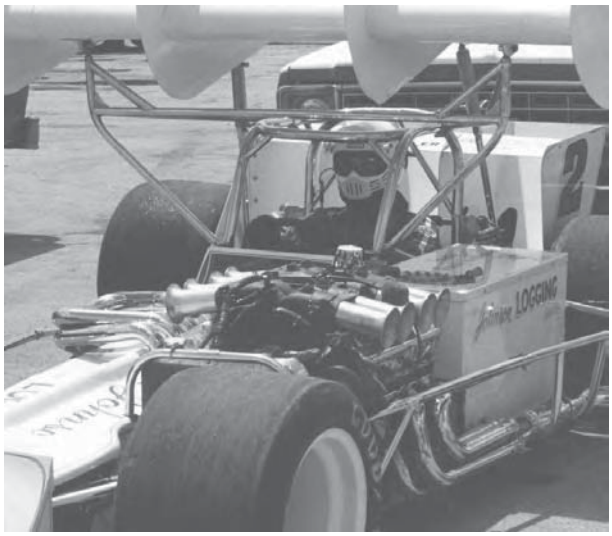
- Machined for Lucas 14mm nozzles
- Extra throttle shaft length and throttle arm to actuate Lucas unit

NOTE: Cross-ram manifolds are considerably more expensive than vertical manifolds. It takes a lot of extra work to develop runners that flow well, and the design, castings, and machining are considerably more complicated.

Standard Throttle Size	Optional Throttle Sizes
2 11/16"	2 3/8"

OPTIONS

- Magnesium manifold and ramtube adapters
- Stainless steel throttle shafts for marine use
- Special radiused entrance plates (replaces ramtubes and adapters)
- Machine manifold runners for nitrous nozzles
- Machine manifold runners for MAP reference and IAC kits for EFI

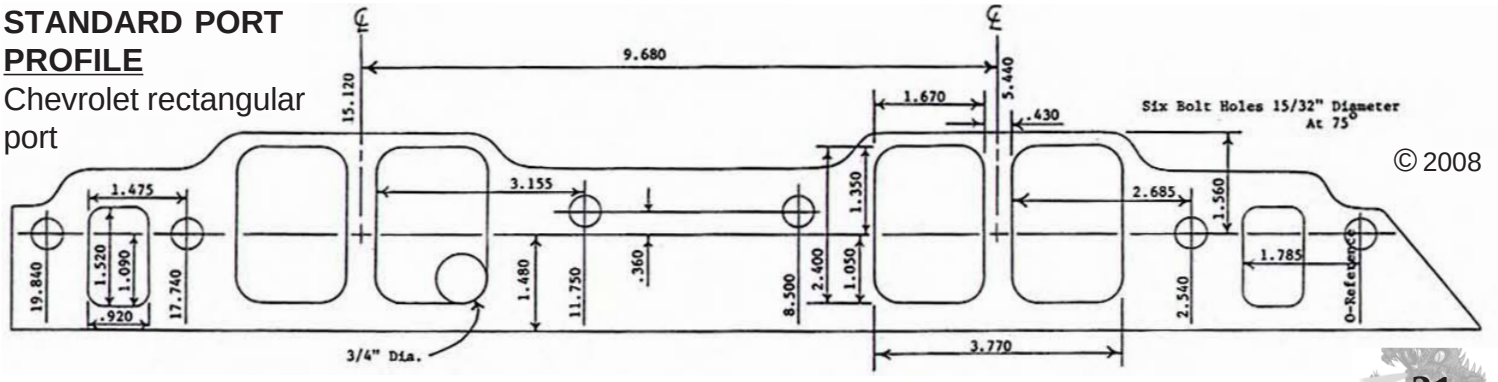


Using Kinsler cross-ram and Lucas timed mechanical injection (on gasoline !!!) Gary Balough in the Ferraiuolo Brothers' Grant King modified wins the Schaeffer 100 at Syracuse, New York. RESULT: banned both Lucas timed injection and gasoline at that track

Custom Port Profiles:
For an upcharge, we can machine the port windows and bolt hole locations to your exact specs.

STANDARD PORT PROFILE

Chevrolet rectangular port



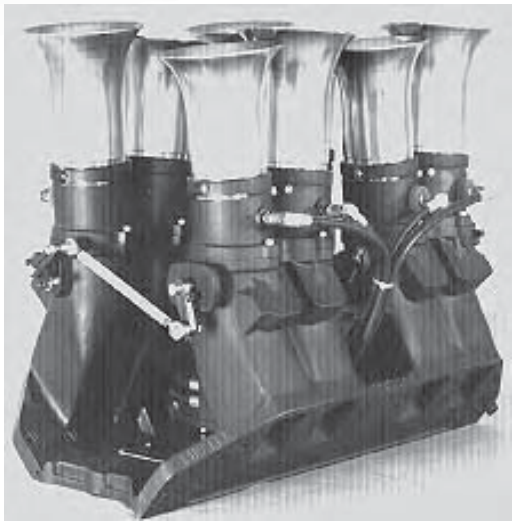
CHEVROLET BIG BLOCK V8

DART BIG-CHIEF

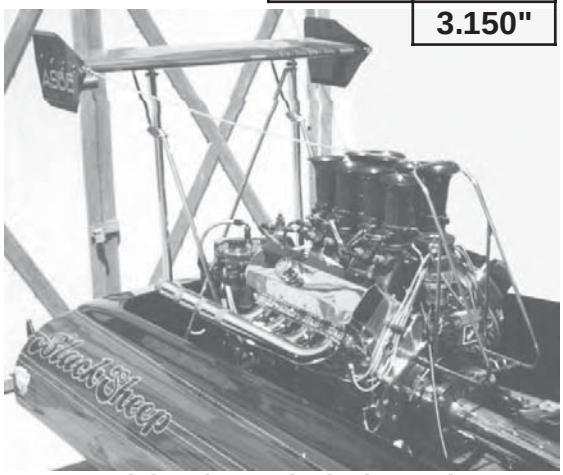
Standard Throttle Size	Optional Throttle Sizes
2.9"	3.0"
	3.150"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses for Constant Flow, EFI, or Lucas nozzles
- Also available for Dart's 14^0 Oldsmobile port profile
- Magnesium or aluminum



Constant flow metering



Dick Asbe's 'Black Sheep' drag boat with 557 CID big block Chevrolet. Dart Big-Chief cylinder heads and Kinsler manifold with constant flow metering

CHEVROLET SYMMETRICAL PORT OR OLDSMOBILE DRCE

Standard Throttle Size	Optional Throttle Sizes
2.9"	3.0"
	3.150"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Oldsmobile

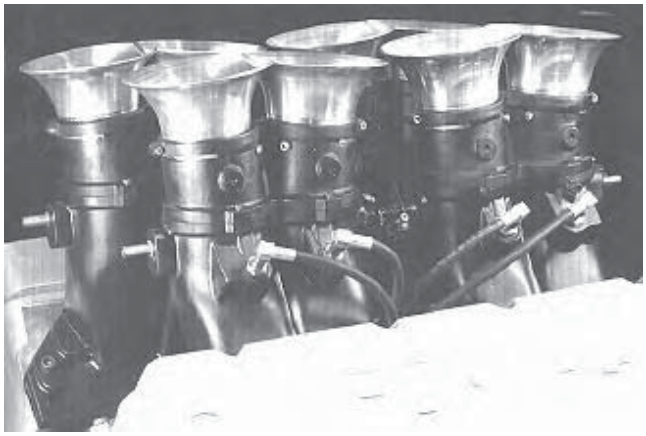
EFI injector bosses in the ramtube adapters

PONTIAC PRO-STOCK

Standard Throttle Size	Optional Throttle Sizes
2.9"	3.0"
	3.150"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum



Constant flow metering with 1/2-20 nozzles below throttle plates

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FORD BIG BLOCK V8

SUPER COBRA JET

Standard Throttle Size	Optional Throttle Sizes
2 3/8"	2 5/8"
2 1/2"	2 11/16"
	2 13/16"
	2.9"
	3.0"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

TFS / SVO

Standard Throttle Size	Optional Throttle Sizes
2.9"	3.0"
	3.150"

With constant flow metering

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

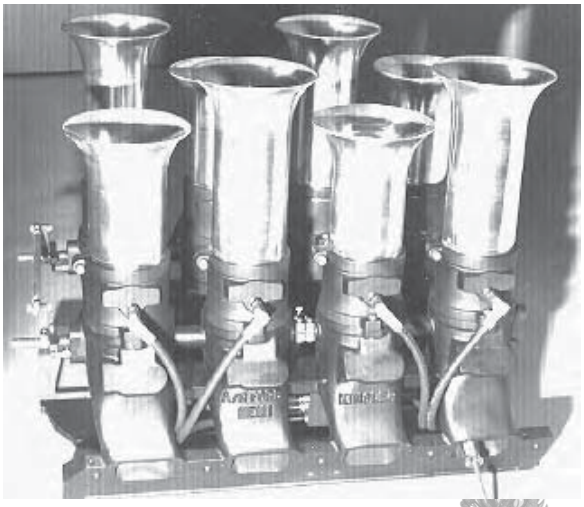
A/R HEMI HEADS

Standard Throttle Size	Optional Throttle Sizes
2.9"	3.0"
	3.150"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas
- Magnesium or aluminum

Dave Willoughby's 4-wheel drive pull truck, 700 CID Ford A/R Hemi with constant flow metering



With constant flow metering

MOPAR MANIFOLDS

ASCS DRAGON CLAW

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 5/8"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium
- Dual milled precision ground milled style one-piece hard-nickel plated throttle shafts
- Jackshaft linkage kit
- Set of Kinsler flowed and precision matched nozzles, 1/2-20 thread with 5 1/2" 'AS' style deflectors
- Billet aluminum valley plate

ASCS Mopar Dragon Claw manifold

MOPAR DRAGON CLAW

STANDARD FEATURES

Standard Throttle Size	Optional Throttle Sizes
2 5/8"	2 3/4"
2 11/16"	2.9"
2 13/16"	3.0"

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- For W7 or W9 cylinder heads only
- Inboard or Outboard nozzle location
- Not supplied with valley plate

Mopar Dragon Claw manifold

MOPAR MONSTER

STANDARD FEATURES

Standard Throttle Size	Optional Throttle Sizes
2 11/16"	2 3/4"
	2 13/16"
	2.9"
	3.0"

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- For W7 or W9 cylinder heads only
- Standard nozzle location with internal air bleeds
- Optional 'Lower' nozzle location available
- Not supplied with valley plate

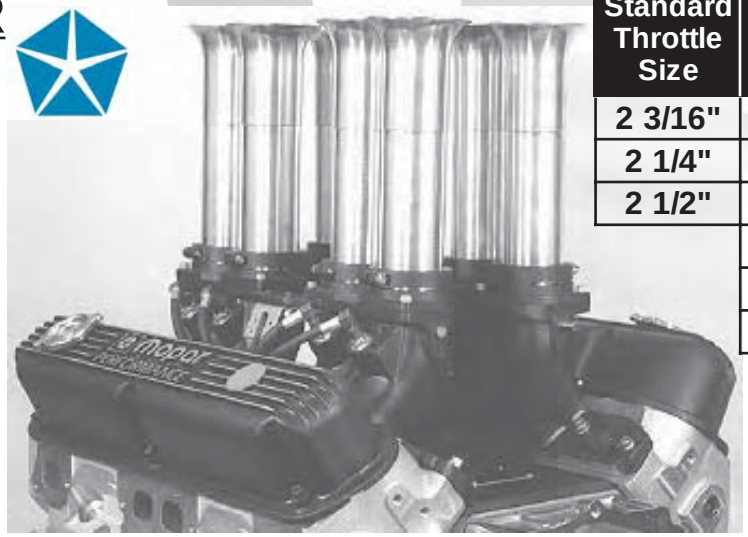
Mopar Monster manifold

MOPAR MANIFOLDS - CONTINUED -

SMALL BLOCK MOPAR

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum



Standard Throttle Size	Optional Throttle Sizes
2 3/16"	2"
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 9/16"
	2 5/8"
	2 11/16"

On W-7 cylinder head with constant flow

426 HEMI

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- Designed to use Kinsler Idle Air Control rail system

Standard Throttle Size	Optional Throttle Sizes
2 3/16"	2"
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 9/16"
	2 5/8"
	2 11/16"

4-CYLINDER HEMI

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Available exclusively through:

Gary Stanton Racing
100 Memorial Drive
Nicholasville, KY 40356
Tel: (859) 885-7354
Fax: (859) 887-2799

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/16"
2 1/2"	2 3/8"
	2 7/16"
	2 5/8"

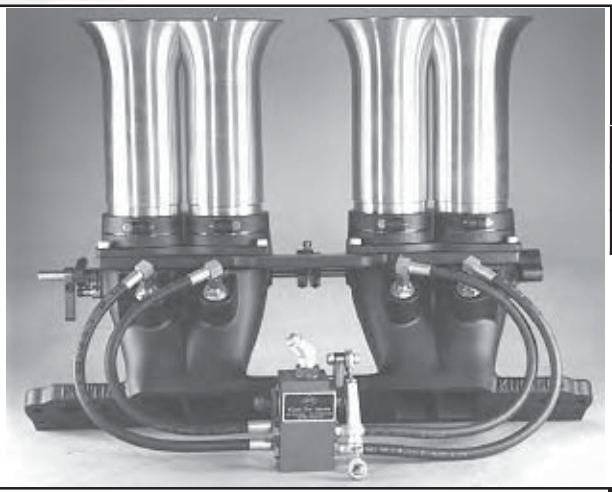
4-CYLINDER IN-LINE MANIFOLDS

WE CAN MAKE 4-CYLINDER MANIFOLDS TO FIT MOST ENGINES; GIVE US A CALL.

CHEVROLET

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Based on the 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum



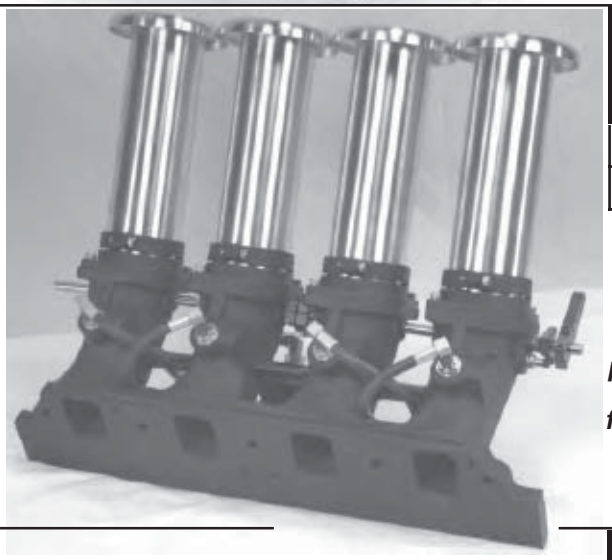
Standard Throttle Size	Optional Throttle Sizes
2 3/16"	2"
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 9/16"
	2 5/8"

Chevrolet with constant flow metering

FORD

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Based on the 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum



Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2"
2 1/2"	2 3/16"
	2 3/8"
	2 7/16"
	2 9/16"
	2 5/8"
	2 11/16"

Ford with Yates C3H high port profile and constant flow metering

TRD

Developed with Ed Pink Racing Engines (EPRE) for Toyota 4-cylinder midget program

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Based on the 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas
- O-ringed ports seal to head
- Magnesium standard, aluminum on special order

Constant flow metering with optional light weight barrel valve

Standard Throttle Size	Optional Throttle Sizes
2 5/8"	2 7/16"
	2 11/16"
	2 13/16"
	2 3/4"
	2.9"

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V6 MANIFOLDS

CHEVY 90° V6

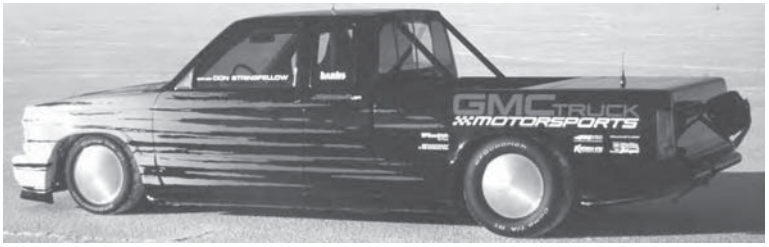
Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 9/16"
	2 5/8"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Constant flow metering

Trans-Am Champion: Chevrolet 90⁰ V6, engine built by Katech. Kinsler manifold with EFI



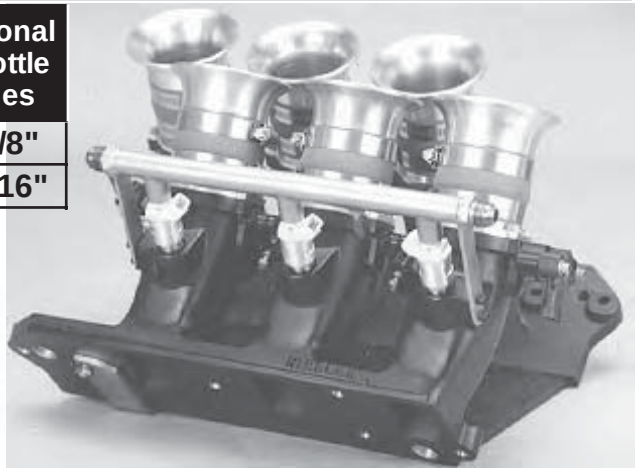
GMC Motorsport's S-15, the first truck to reach 200 MPH at Bonneville. Chevrolet 90⁰ V6, engine built by Katech

BUICK V6 STAGE II

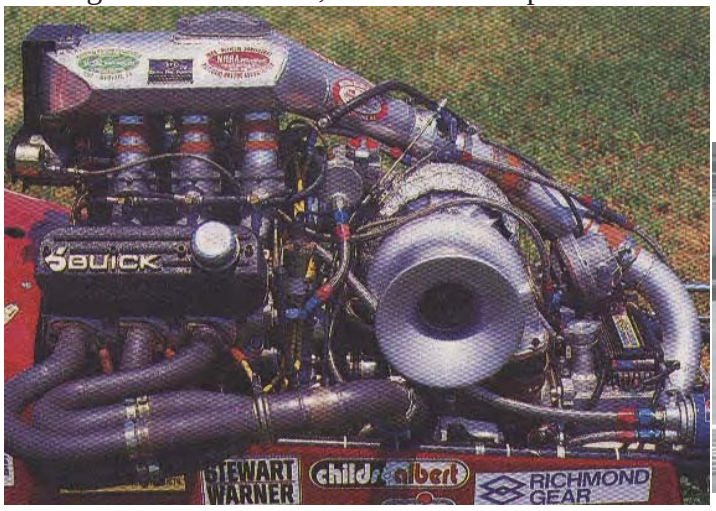
Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/8"
2 1/2"	2 7/16"

STANDARD FEATURES

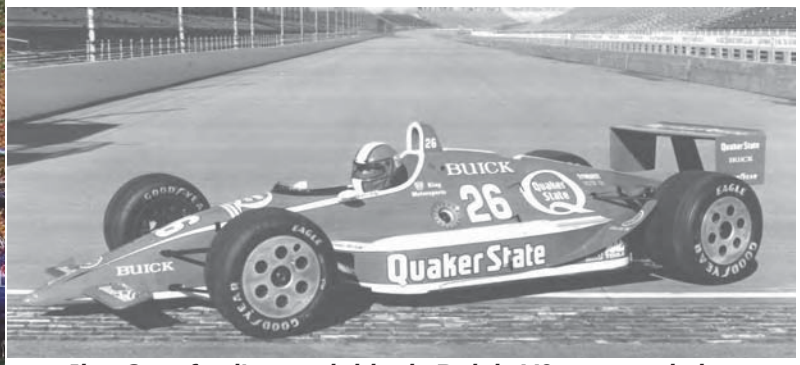
- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Vertical or lean-in models
- Magnesium standard, aluminum on special order



Lean-in model with EFI



Hill and William's turbocharged Buick V6 with constant flow metering



Jim Crawford's stock-block Buick V6 powered the Lola to a record of the fastest lap in unoffical testing, an impressive 224.2 MPH

PONTIAC MANIFOLDS

Standard Throttle Size	Optional Throttle Sizes
2 3/16"	2"
2 1/4"	2 3/8"
2 1/2"	2 7/16"
	2 5/8"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 2-piece design uses factory or aftermarket lifter valley cover.... we don't supply it
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Aluminum standard, magnesium on special order

Front view with Kinsler aluminum EFI fuel rails

PONTIAC SUPER DUTY

'437' cylinder head

Standard Throttle Size	Optional Throttle Sizes
2 1/4"	2 3/8"

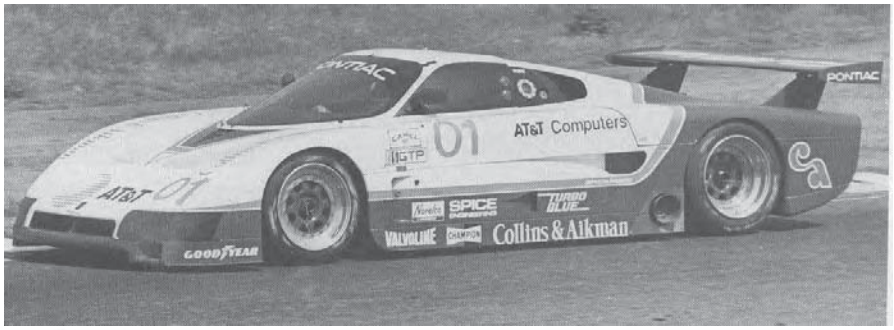
'801' cylinder head

Standard Throttle Size	Optional Throttle Sizes
2 1/2"	2 5/8"

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Aluminum standard, magnesium on special order

Many midget oval track sprint cars were powered by a Pontiac using Kinsler's constant flow metering



Pontiac's GTP-L Fiero used Kinsler constant flow metering. Pontiac dominated the IMSA classes then went on to win the 24-hours of Daytona

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SPORT - COMPACT MANIFOLDS

WE CAN MAKE 4-CYLINDER MANIFOLDS TO FIT MOST ENGINES; GIVE US A CALL.

CHEVROLET

Standard Throttle Size	Optional Throttle Sizes

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- Dual milled transverse throttle shafts
- Optional 'Upper' rail assembly available
- Billet linkage connector bar with ball bearings and snap rings

HONDA K SERIES

Standard Throttle Size	Optional Throttle Sizes
2.0"	2 1/2"
2 1/4"	2 5/8"
2 3/16"	
2 3/8"	
2 7/16"	

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- Optional 'Upper' rail assembly available
- Billet linkage connector bar with ball bearings and snap rings

HONDA F and H SERIES

Standard Throttle Size	Optional Throttle Sizes
2.0"	2 1/2"
2 1/4"	2 5/8"
2 3/16"	
2 3/8"	
2 7/16"	

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- Optional 'Upper' rail assembly available
- Billet linkage connector bar with ball bearings and snap rings

SPORT - COMPACT MANIFOLDS

HONDA D SERIES

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Billet aluminum base plate with cast throttle bodies
- Includes fuel rail, use of OEM pressure relief valve optional

Standard Throttle Size
1.810"
2.0"
2 3/16"
2 1/4"

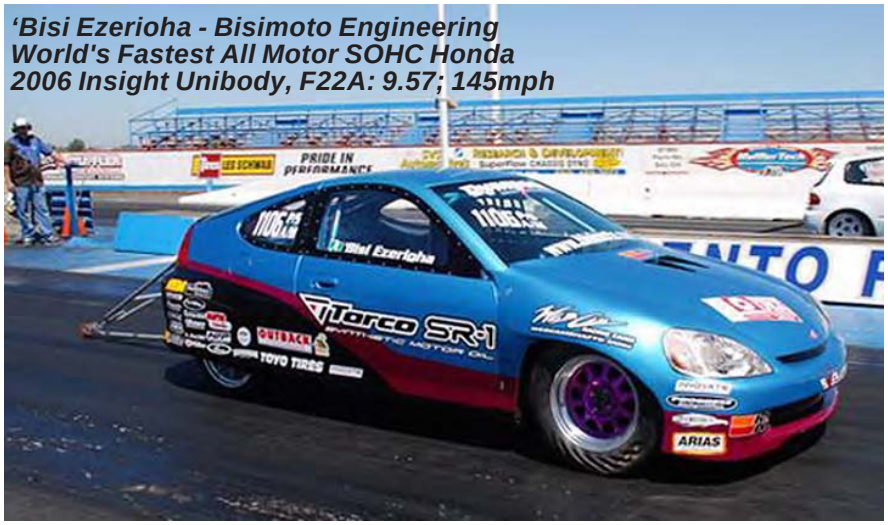
Looking for a B-series Honda ITB? We can do it!

Please call or e-mail us for details and options.

1.6L SOHC ZC

Honda F-series ITB, custom designed for Bisimoto Engineering

'Bisi Ezerioha - Bisimoto Engineering
World's Fastest All Motor SOHC Honda
2006 Insight Unibody, F22A: 9.57; 145mph



MITSUBISHI 4G63

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum
- Optional 'Upper' rail assembly available
- Billet linkage connector bar with ball bearings and snap rings

Standard Throttle Size	Optional Throttle Sizes
2.0"	2 1/2"
2 1/4"	2 5/8"
2 3/16"	
2 3/8"	
2 7/16"	

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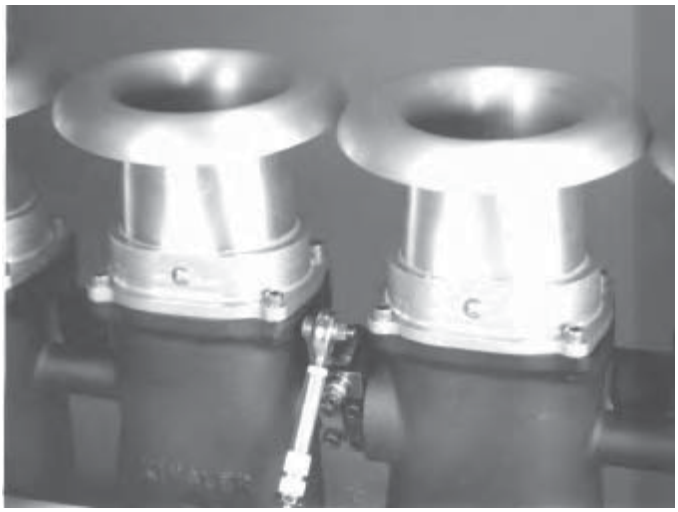
6-CYLINDER IN-LINE MANIFOLD

GM L-6

STANDARD FEATURES

- Standard throttle size: 2.680" x 1.860" oval
- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 2-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Incorporates cast-in fuel rail, machined for Delco side feed EFI injectors
- Uses hard-anodized fuel transfer tube between the two manifold castings
- Magnesium or aluminum

Manifold assembled from two three-cylinder castings



Adapters for ramtube mounting

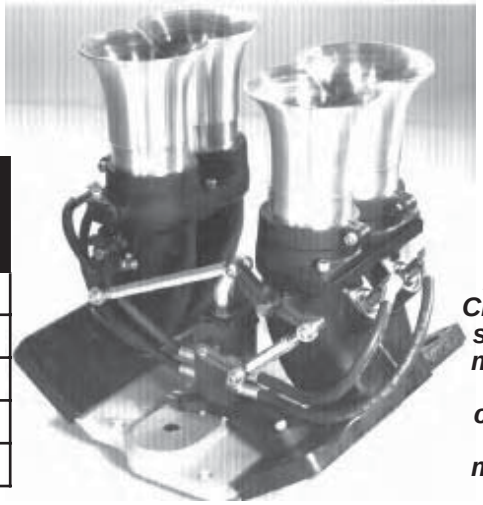
Chevrolet's Baja champion, running L6 in-line manifold

V4 INJECTION MANIFOLD

STANDARD FEATURES

- The port windows and their location to the bolt holes are precisely machined, then the runners are blended to the windows
- For standard or custom deck height block
- 3-piece design
- Universal nozzle bosses accept Constant Flow, EFI, or Lucas nozzles
- Magnesium or aluminum

Standard Throttle Size	Optional Throttle Sizes
2 3/16"	2 3/8"
2 1/4"	2 7/16"
2 1/2"	2 9/16"
	2 5/8"
	2 11/16"



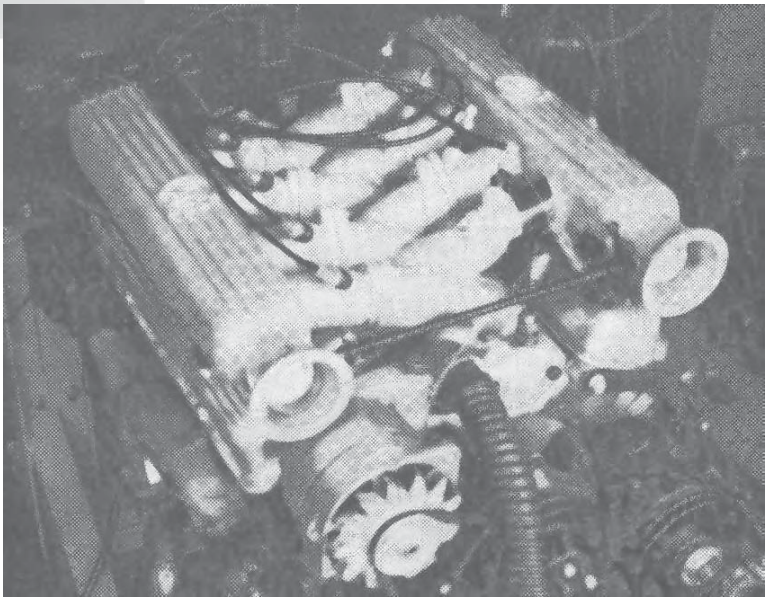
Kinsler Chevrolet-style V-4 manifold with constant flow metering

Dave Laney's off-road sand buggy with a Scat V4 engine with turbo-charger. Kinsler's constant flow fuel system

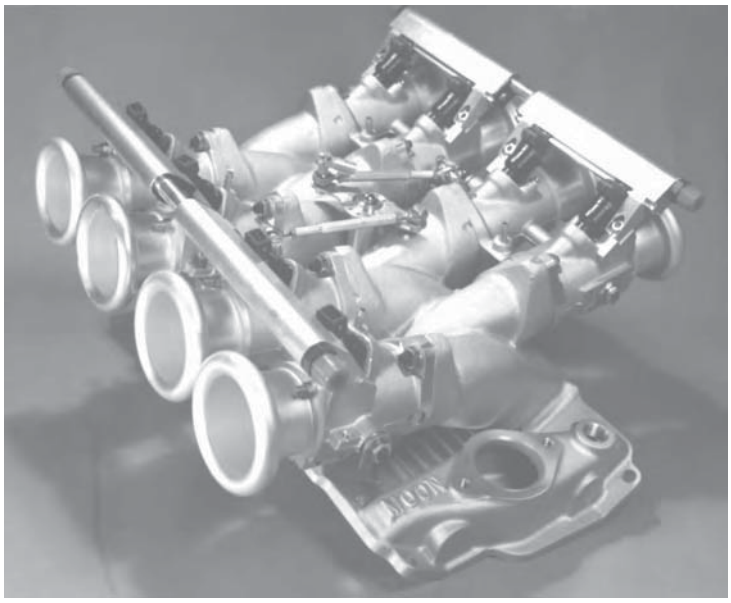
CROSSRAM MANIFOLDS

SMALL BLOCK CHEVROLET

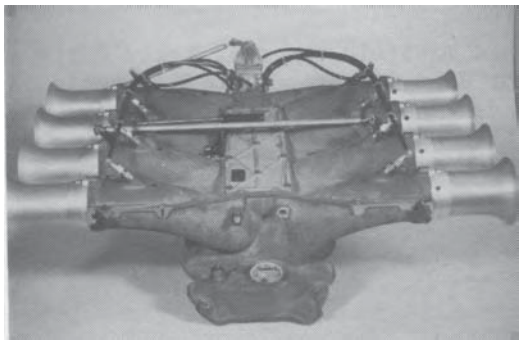
Designed with small runners to give maximum low end torque for street use. Fits standard small port cylinder head. Throttle body mounting flanges are for Weber IDA 45 mm. Cast aluminum only.



Each Kinsler log has a 2 1/4" throttle at the front with cross-connecting linkage; Lucas mechanical metering



Four EFI IDA style throttle bodies with aluminum fuel rails and connector linkage



CHAPARRAL BIG BLOCK CHEVROLET

Designed for Jim Hall's Chaparral 2J Can-Am car. Magnesium manifold with 2.9" throttles; Lucas metering. About fifteen were made.

The 2J car used a moveable Lexan skirt that ran 1/4" from the road all the way around the outside of the car. Two fans sucked the air out to make the car a rolling suction cup. SCCA banned the car after one season as being beyond the technical and financial capability of other racers.

Jim Kinsler was responsible for the manifold and suction fans in 1968-1969, while he was still in Research and Development at the Chevrolet Engineering Center, Warren, Michigan.

GREENWOOD BIG BLOCK CHEVROLET

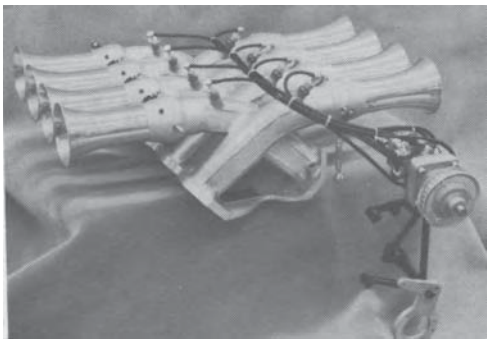
This manifold was originally designed for John Greenwood, to fit completely under the hood of his Corvette.

Available in magnesium or aluminum. Custom throttle sizes are available for good top end power combined with super low end characteristics.

Phosphorous bronze throttle shaft bushings and spring screw universal throttle shaft linkage eliminates any possible throttle bind; works smooth!

Available for EFI, Constant Flow, or Lucas metering.

Note: Crossram units cost about twice as much as vertical types, as it takes a lot of extra work to develop a runner that flows well, and the design and castings are also considerably more involved.



FABRICATED

Look closely.... this manifold was hand fabricated in 1977 at Kinsler's from sheet and bar aluminum for Charlie Kemp's Trans Am Mustang. A crossram was the only way to get the desired runner lengths while meeting the rule that the unit had to be completely under the hood. Used Lucas metering.

A good flowing runner was developed, then exactly duplicated by forming four strips of aluminum over a pattern. Had 2 7/16" throttles. The top road racing teams now have manifolds made of carbon fiber.

Kemp was quite successful.

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KINSLER 4-BARREL THROTTLE BODY

Standard series with polish and progressive linkage options

Machined from a solid billet of 6061-T6 aluminum. Bronze throttle shaft bushings, dual milled hard-nickel plated throttle shafts (stainless steel is available for marine use), throttle arms, throttle stops with safety return springs, connector link, and 8AN port plug for remote IAC port in base of throttle body.

Special Order - name area can be custom machined with your personalized logo.
Standard Finish - body is machined, linkage is blue anodized.
Custom finish - polishing and/or anodizing of throttle body housing and linkage.

High-flow series with polish and progressive linkage options

STANDARD SERIES

Has Holley 4150 bolt pattern. Has standard 5" diameter neck for 5 1/8" air filter base and hole tapped for 1/4-20 stud. Overall height is 3", bolt pattern c-c front to rear is 5.605", and c-c left to right is 5.155". Unit has provision for GM style idle air control motor. Order motor seperately, part #10660 (see below). Weighs approx. 5 3/4 pounds.

14105	Throttle size 1.525", approx. 750 CFM @ 1.5 Hg or 20.4" water
14107	Throttle size 1.700", approx. 1000 CFM @ 1.5 Hg or 20.4" water

HIGH-FLOW SERIES

Has Holley 4500 Dominator bolt pattern. Overall height is 3.5", bolt pattern c-c is 5.375" x 5.375". Has standard 7 5/16" diameter neck for air filter and hole tapped for 1/4-20 stud. Remote idle air control housing and motor available (see below). Weighs approx. 8 pounds.

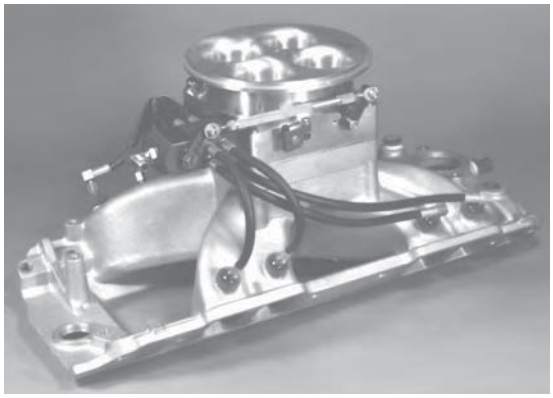
14118	Throttle size 1.875", approx. 1325 CFM @ 1.5 Hg or 20.4" water
14120	Throttle size 2.0", approx. 1600 CFM @ 1.5 Hg or 20.4" water

Progressive linkage option

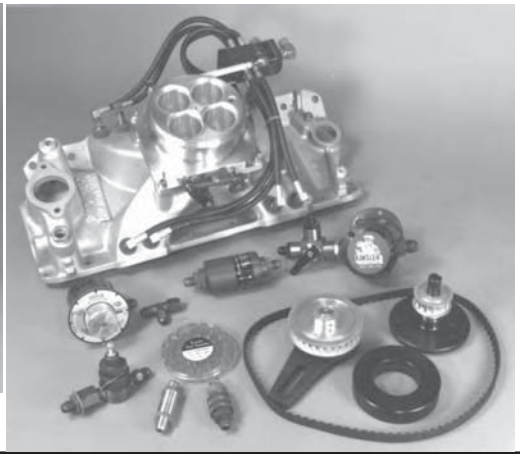
Standard series throttle body with idle air control motor (IAC)

OPTIONS - FOR STANDARD AND HIGH-FLOW THROTTLE BODIES

14110	Progressive linkage kit, installed. Front pair of throttle plates opens halfway before the rear throttle plates begin to open
14112	Installation of Kinsler bolt-on TPS boss with drive coupler. Common TPS's: Delco or CTS (lever style), Ford (D-shape), Ford or CTS (two drive dogs inside a .475" I.D. pocket), Rochester (cross style), and others available. See Pages #147-148 for throttle position sensors and bolt-on bosses with drive couplers
6199	Plug for idle air control (I.A.C.) motor, 20mm x 1.5, billet aluminum with o-ring seal. For Kinsler Standard series throttle body ONLY
10660	Idle air control (IAC) motor, GM style, 20mm x 1.5 thread
10662	Remote idle air control motor housing, high flow, for #10660 IAC motor, 3/8" NPT
10663	K&N air filter for #10662 remote idle air control motor housing
3535	Mounting bracket, constant flow barrel valve to Standard series throttle body
3536	Mounting bracket, constant flow barrel valve to High-Flow series throttle body



Constant flow on high flow throttle body



Constant flow on standard series throttle body

Ultra high flow twin blade throttle body, dominator flange, call us

KINSLER MODULAR THROTTLE BODIES

FOR CUSTOM APPLICATIONS:

1 to 16 CYLINDERS

IMPORT, VINTAGE, WEBER CARB, CONVERSIONS

MODEL MC-180

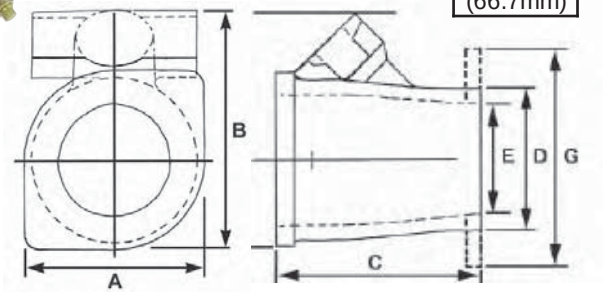
MODEL MC-215 and MC-225

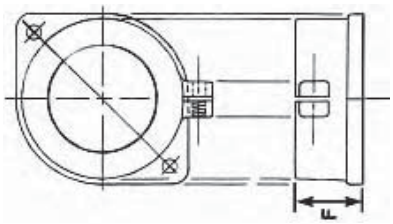
MODEL MC-250

Any boot or flange detail is available with any throttle size... allows installation of larger throttles without modifying your boot or cylinder head.

STANDARD THROTTLE SIZES

MC-180	MC-215	MC-225	MC-250
1.437" (36.5mm)	1.950" (49.5mm)	1.950" (49.5mm)	2.187" (55.5mm)
1.562" (39.7mm)	2.0" (50.8mm)	2.0" (50.8mm)	2.250" (57mm)
1.687" (42.8mm)	2.100" (53.3mm)	2.100" (53.3mm)	2.375" (60.3mm)
1.810" (46mm)	2.187" (55.5mm)	2.187" (55.5mm)	2.437" (61.9mm)
1.900" (48.2mm	2.250" (57mm)	2.250" (57mm)	2.500" (63.5mm)
			2.625" (66.7mm)





Machined for Kinsler universal nozzle bosses. Inserts can be installed for constant flow nozzles (1/2-20 or 1/8" NPT thread) or EFI injectors (Bosch, Lucas, Rochester, etc.) (see Pg. #139). All throttle bodies are machined for Kinsler's bolt-on TPS boss and fuel rail stanchions. Custom throttle sizes available. Aluminum or magnesium castings.

Each throttle assembly is port blended for smooth air flow and has bronze throttle shaft bushings, dual milled throttle shaft, billet aluminum throttle arm and billet aluminum throttle stop with safety return spring.

Multiple throttle bodies are mounted on a locator bar for a perfect fit and secure installation.... NO cutting, welding, broken boots due to improper alignment, or problems with linkage binding. When enough room is available, Kinsler Spring-Screw universal throttle shaft linkage is installed (see Pg. #64-65). You can change the port spacing by simply installing the throttle bodies on a new locator bar; throttle shafts may require modification or replacement.

BASIC DIMENSIONS

	MC-180	MC-215	MC-225
A	2.750"	3.200"	3.200"
B	3.350"	3.800"	3.800"
C	3.000"	3.000"	3.000"
D	1.900"	2.200"	2.500"
E	1.200"	1.500"	1.500"
F	0.950"	1.200"	1.200"
G	4.000"	4.000"	4.000"

Billet aluminum locator bar

EFI four-cylinder

BASIC DIMENSIONS

	MC-250 WITHOUT NOZZLE BOSS	MC-250 WITH NOZZLE BOSS	MC-250 WITH TRANSVERSE THROTTLE SHAFTS
A	2.700"	3.700"	3.800"
B	3.500"	4.500"	4.600"
C	3.900"	3.900"	3.900"
D	2.750"	2.750"	2.750"
E	1.500"	1.500"	1.500"
F	1.400"	1.400"	1.400"
G	5.000"	5.000"	5.000"

Unmachined MC-215

Machined MC-215 throttle body with Weber style detail

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THROTTLE BODIES

HD SERIES THROTTLE BODY

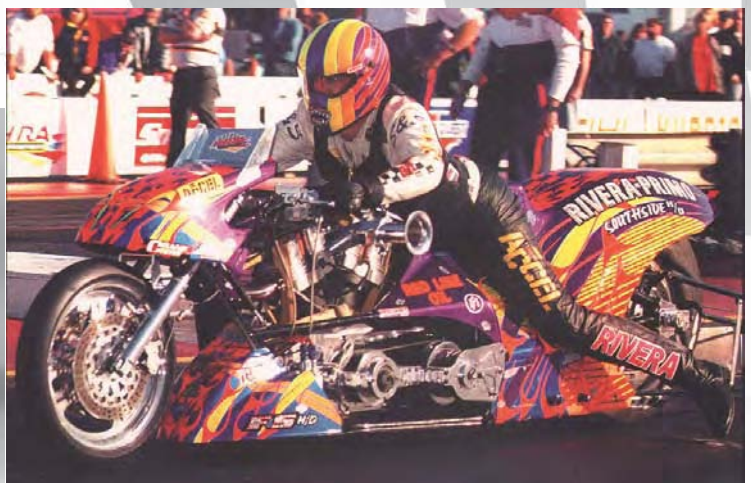
Offers great flexibility for many applications. Has a seperate ramtube adapter with aluminum ramtube.

Billet aluminum housing with bronze throttle shaft bushings, 3/8" dia. throttle shaft for strength, Kinsler billet throttle stop with safety return spring, and throttle arm. Kinsler spun aluminum ramtube can be cut to different lengths for tuning. Removable pinch clamp ramtube, allows using any size ramtube with any size throttle bore. Also available with o-ringed top and bottom flanges for centrifugal blower applications.

Available with barrel valve for constant flow metering, or throttle position sensor for EFI.

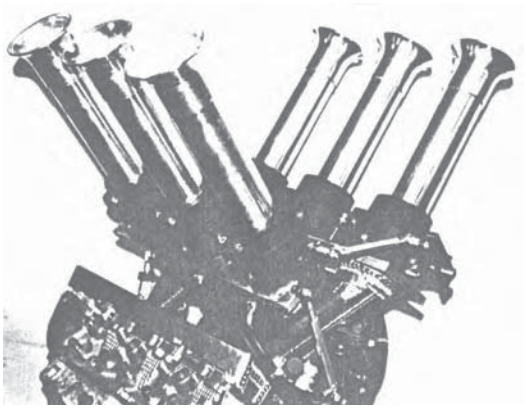
Throttle sizes: 2 3/16", 2 1/4", 2 3/8", 2 7/16", 2 1/2", 2 5/8", and 2 11/16".

HD throttle body with optional barrel valve, ramtube, and adapter



Jim McClure, owner of Master Performance riding his Top Fuel Harley-Davidson drag bike. Uses Kinsler fuel pump and fuel system components

HD throttle body with optional radius inlet plate and barrel valve



Six HD throttle bodies on sheet aluminum manifold. 60-degree Chev V6

ZX THROTTLE BODY

Designed primarily for use on a small displacement turbocharged engines. This compact throttle body (2.0" tall) allows options for many applications.

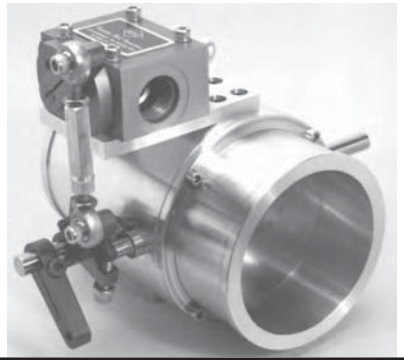
One piece billet aluminum construction. Includes bronze throttle shaft bushings, 3/8" dia. throttle shaft, Kinsler throttle stop with safety return spring. O-ringed 4-bolt base flange with 1.838" c-c and hose type inlet for 2 1/8" ID hose.

Available with barrel valve for constant flow metering or throttle position sensor for EFI.

Throttle sizes, standard 1.870" ; optional 1.900" and 1.950".

Made for and sold through:
Mr. Turbo
4014 Hopper Road
Houston, Texas 77093 USA
Tel: (281) 442-7113
Fax: (281) 442-4472

Hill climb motorcycle



Optional barrel valve mounting bracket

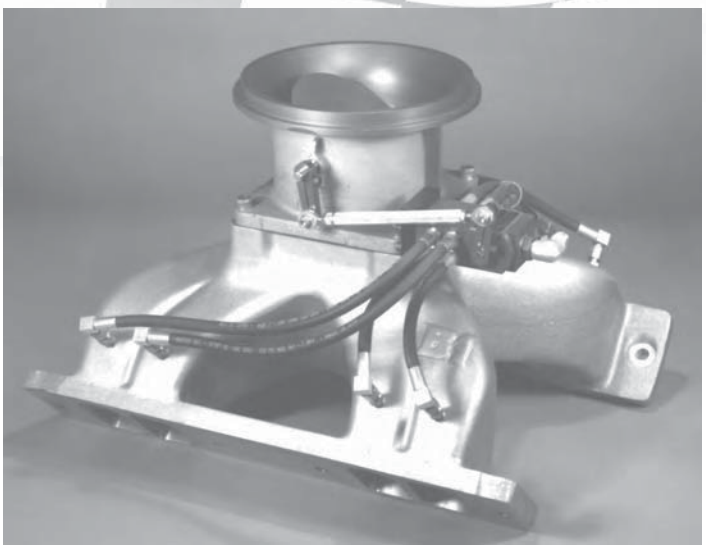
THROTTLE BODY

One piece billet aluminum body with bolt-on o-ringed turbo style hose flanges. Bronze throttle shaft bushings, 3/8" dia. throttle shaft, Kinsler throttle stop with safety return spring.

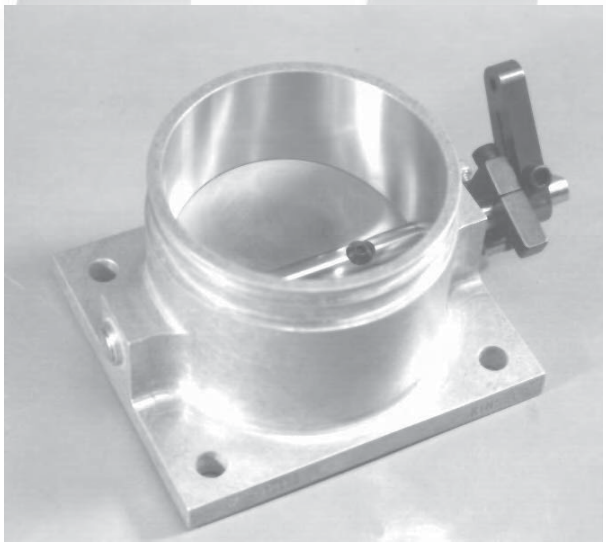
Available with aluminum or stainless steel throttle plate.

Throttle size: 2.9" ; other sizes can be special ordered.

THROTTLE BODIES

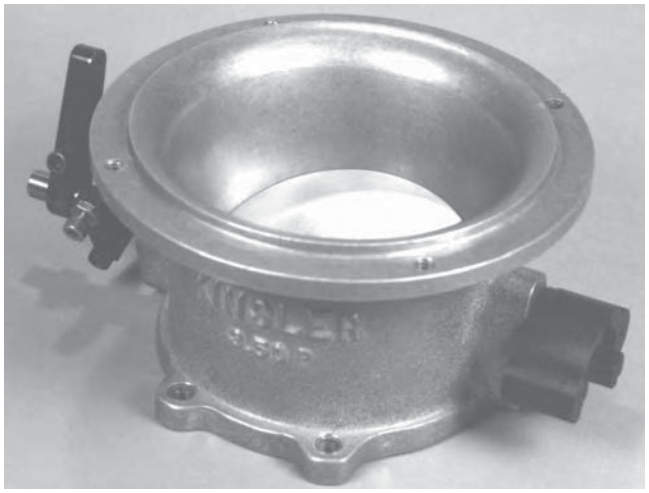


On single plenum 4-barrel intake manifold with constant flow metering



MONO VALVE THROTTLE BODY

Single throttle plate. 3.75", 4.0", 4.1" diameter available. Specify Holley 4150 or 4500 bolt pattern.



3.5P throttle body with TPS boss installed

THROTTLE BODY MODEL 3.5P

Cast aluminum housing with 3 1/2" throttle plate. Large radius entrance with 5" diameter flange (like a standard Holley carb), to attach an air filter base plate. Bronze throttle shaft bushings. Drilled and tapped on both sides for Kinsler throttle stop boss or bolt-on TPS boss, and has a 3.250" c-c square mounting pattern, four 1/4" bolts. O-ringed on bottom for sealing. Has flat pad on the rear for vacuum port or bracket attachment. Throttle plate is .125" thick aluminum. Precision ground hard-nickel plated throttle shaft is 1/2"dia. through throttle plate and bushing area, milled on both sides for increased air flow, turned to 3/8"dia. outside the body housing.

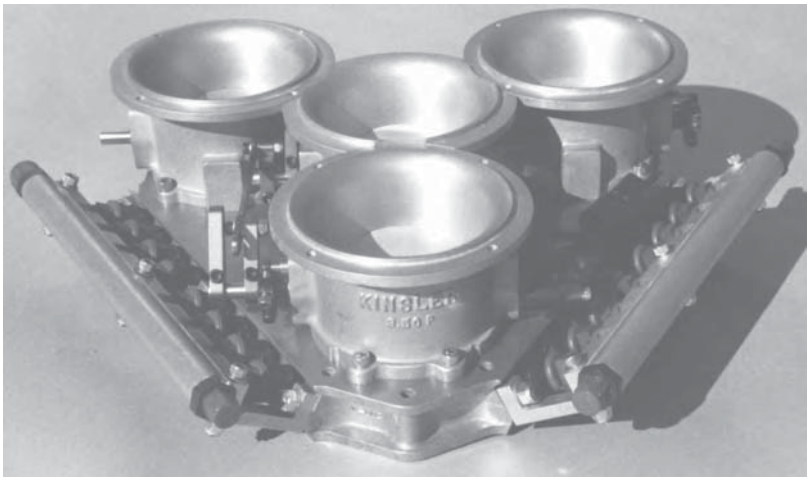
Use on turbo intake; one or two on tunnel ram, etc.

THROTTLE BODY MODEL V

Throttle sizes: 3.0" and 3.250"

2.75" tall with 3.0" x 3.5" bolt pattern. Includes bronze throttle shaft bushings, 3/8" OD throttle shaft with safety return spring. Billet aluminum. Available with aluminum or stainless steel throttle plate.

3.5P throttle body installed on 4150 Holley carb adapter plate



Kinsler PSI supercharger EFI adapter with four 3.5P throttle bodies; progressive linkage (see Page #51)

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THROTTLE BODIES

SB THROTTLE BODY

One piece billet aluminum body with 3-bolt flange. With bronze throttle shaft bushings, 3/8" OD throttle shaft, Kinsler throttle stop with safety return spring and stop boss. Accepts Kinsler bolt-on TPS boss.

Throttle size: 2 1/2", 2 5/8", and 2 11/16". Other sizes on special order.

Available with aluminum or stainless steel throttle plates.

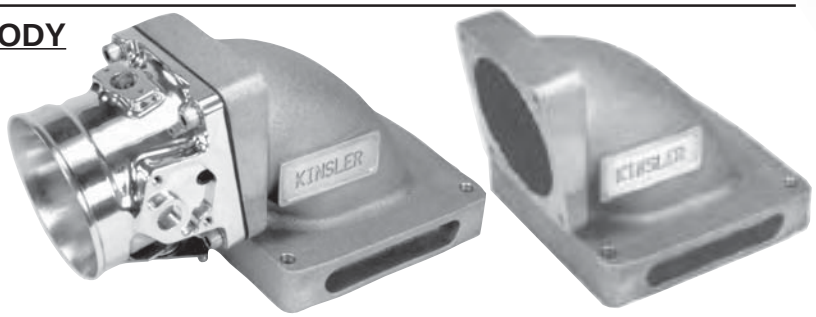
Overall height is 2.1". Bore c-c is 2.850". Overall length is 7.4" with full radius.

Ideal for tunnel-ram conversion

THROTTLE BODY

Billet aluminum throttle body, polished. Throttle bores: 2.362" to 3.543" (60-90mm). Accepts twin groove TPS and Ford IAC motor. Adapter available to use GM IAC motor.

Great bolt-on for high output 5.0 Mustangs

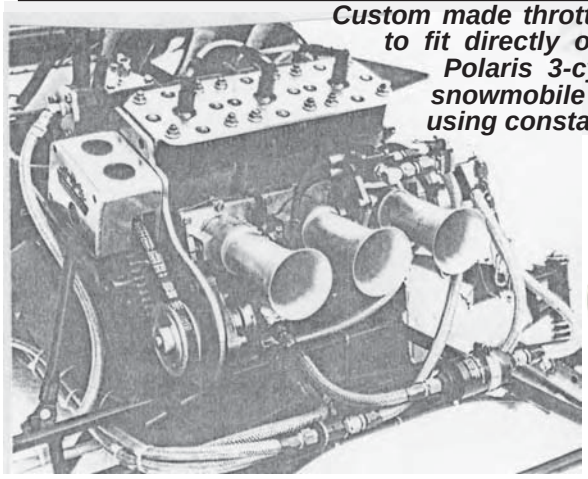


ELBOW ADAPTER FOR MANIFOLD

Often used on turbo and centrifugal superchargers.

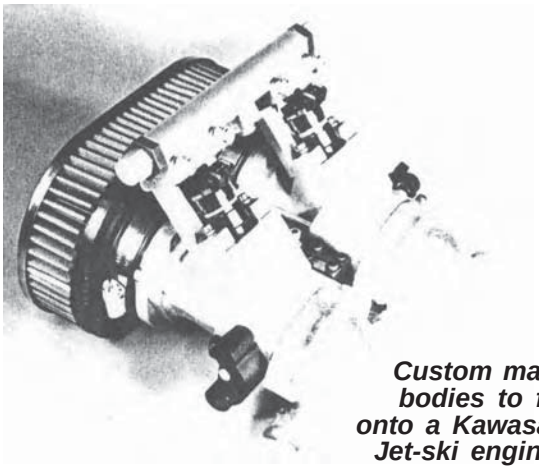
Adapts 4150 Holley flanged carburetor manifold to throtle body.

Has 3.54" (90mm) openning for throttle body. Cast aluminum.



Custom made throttle bodies to fit directly onto a Polaris 3-cylinder snowmobile engine, using constant flow

Custom made throttle body for naturally aspirated or supercharged application (with use of plenum) using EFI



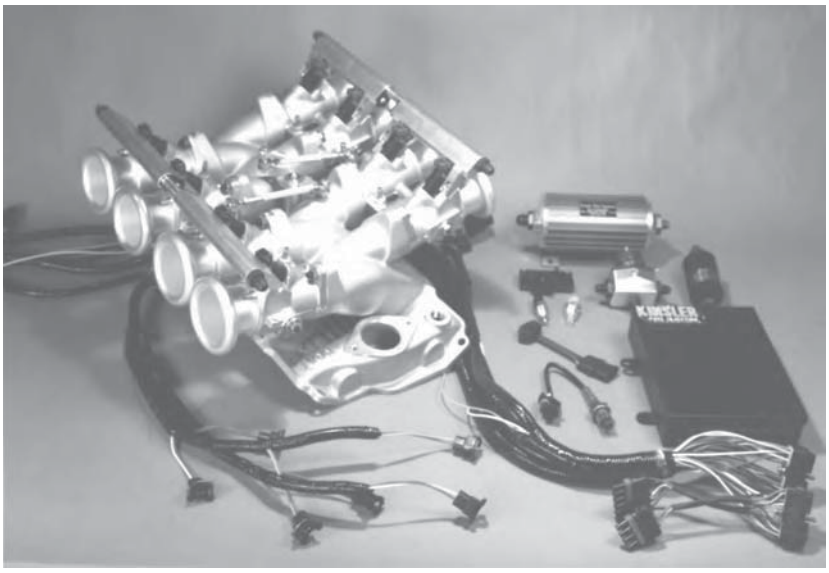
Custom made billet aluminum throttle bodies to bolt on as replacements for Weber IDA carburetors for Volkswagen Oval Track Midget. Constant flow

Custom made throttle bodies to fit directly onto a Kawasaki 2-cylinder Jet-ski engine using EFI

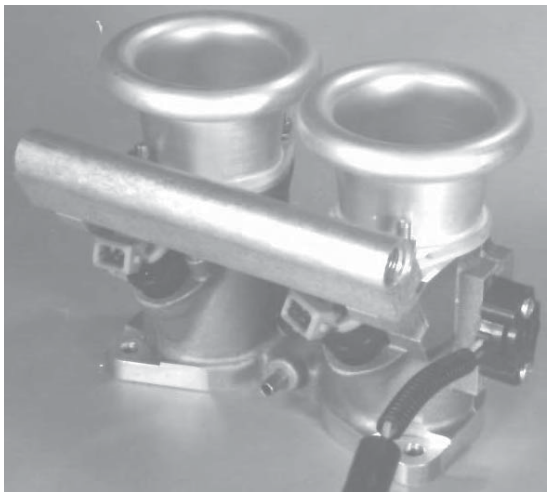
THROTTLE BODIES FOR WEBER CONVERSIONS

We have throttle bodies in stock that will often bolt right on in place of Weber carbs, or we can custom make throttle bodies to your specifications.

Jaguar V-12 Weber intake manifold with Kinsler flange style MC-215 modular throttle bodies. For EFI with Kinsler aluminum fuel rails



Small block Chev crossram with bolt-on throttle bodies, with complete EFI system



IDA throttle body with with fuel rail and TPS

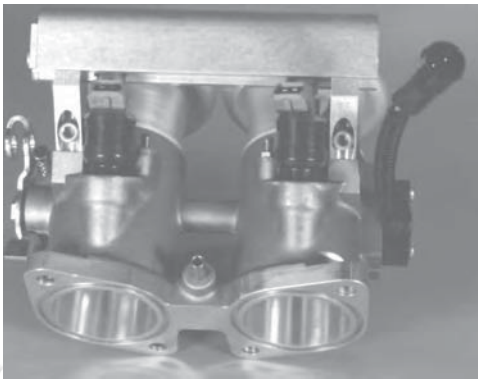
REPLACEMENT THROTTLE BODIES FOR WEBER CARBURETORS

Many configurations are available, most with single or dual injector bosses. Some applications require a right and left hand unit. Various ramtube styles and lengths are available, see Page #57.

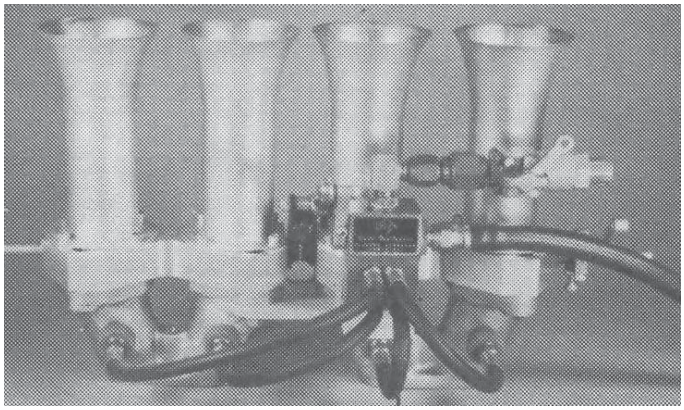
Type	Bore Center to Center	Throttle Size (mm)
DCOE	90mm	40, 42, 45, 48, 50, & 55*
IDF	90mm	40, 45, 48, & 50
IDA	120mm	48, & 50
IDA 3C		40, 44, 46, & 48
DCNF	48mm	40, 44, & 46

* special order

NOTE:
These throttle bodies are NOT a direct factory replacement. They have the correct bolt pattern but linkage location and overall height compared to a Weber carburetor may require the linkage and/or air filter/air box to be altered vs. the factory setup.



"Weber" throttle body with with fuel rail, and TPS



Custom made billet aluminum throttle bodies to bolt directly to a Datsun 4-cylinder engine, constant flow metering

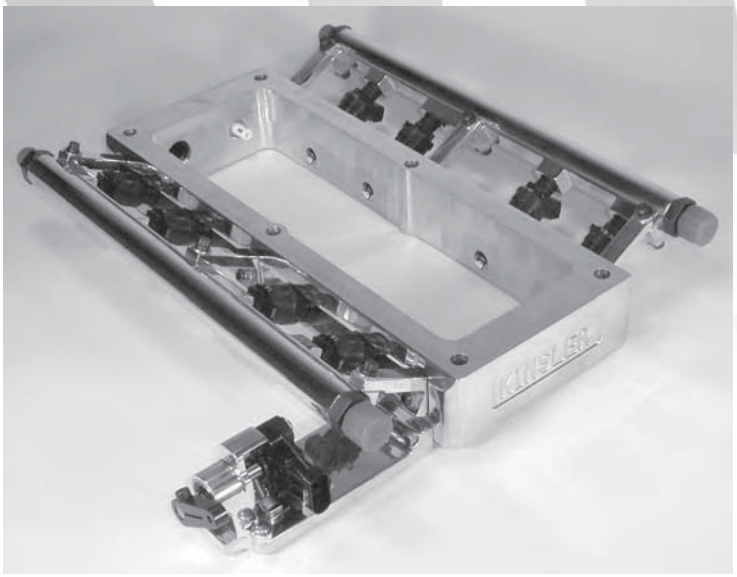
Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

EFI ADAPTER PLATES FOR GMC SUPERCHARGERS

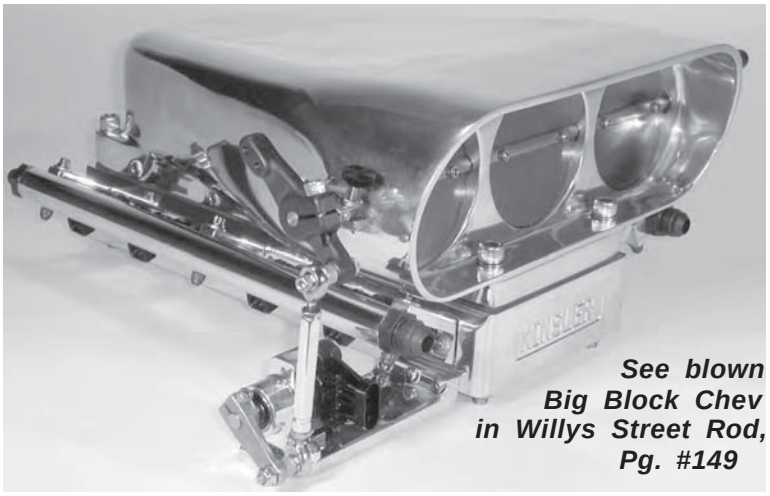
Designed to inject the fuel directly into the opening of the supercharger for best distribution. Fuel rails are utilized for high flow demands, to properly supply the injectors.... individual hoses would not be adequate.

Available in 8 or 16 injector models. Any brand of dual o-ring EFI injectors can be installed. When less injectors are used, Kinsler #10193 blank EFI injector bodies can be installed, see Page #140. Machined for Kinsler billet fuel stanchions, available with aluminum or stainless steel fuel rails. Enderle, Hilborn, or Crower blower hats will bolt directly to the 6-71 EFI adapter, or you can install a cast four barrel adapter.

Billet 6061 aluminum, "show-quality polished". Custom color anodizing available. Standard 6-71 GMC bolt pattern or 14-71 bolt pattern. Custom made units are available.

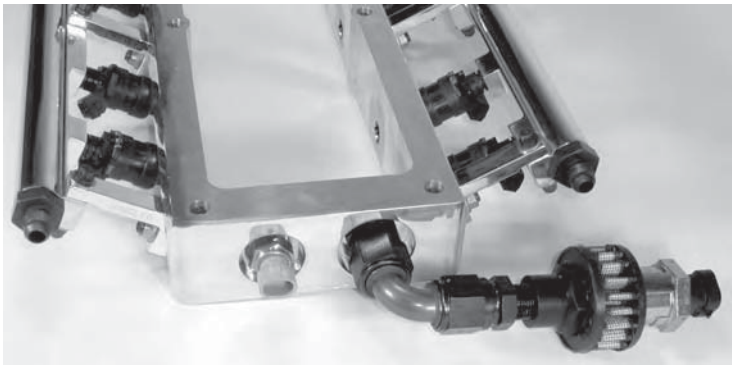


Open style adapter #16951, fuel rails, 8 injectors, remote TPS adapter



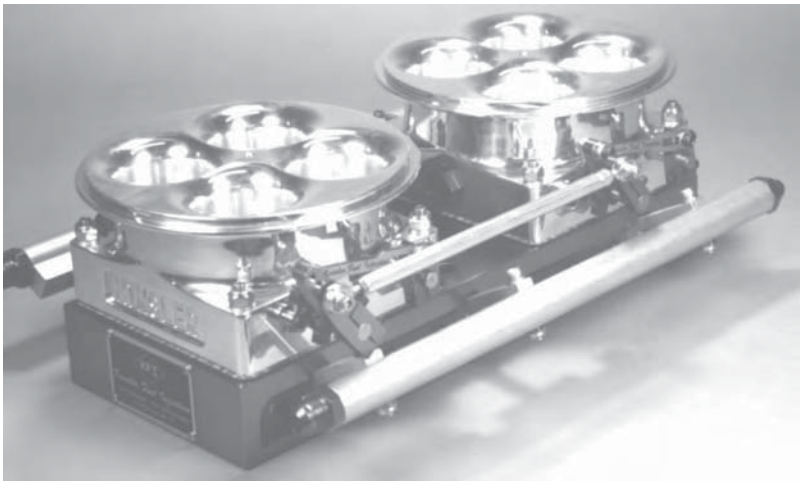
See blown Big Block Chev in Willys Street Rod, Pg. #149

Open style for 6-71 or 8-71, with Kinsler aluminum fuel rails, TPS mount with linkage, on Enderle Bugcatcher blower hat



Optional idle air control motor and remote housing #10662

16950	Open style, fits 6-71 & 8-71 supercharger, 16 injector
16951	Open style, fits 6-71 & 8-71 supercharger, 8 injector
16952	Dual 4-barrel style, fits 6-71 & 8-71 supercharger
16954	Open style, fits 14-71 supercharger
16956	Dual 4-barrel style, fits 14-71 supercharger
16960	Pair of EXTRUDED ALUMINUM fuel rail kit*, Fits 6-71 adapter #16950 and #16952, 16 injector
16961	Pair of EXTRUDED ALUMINUM fuel rail kit*, Fits 6-71 adapter #16951, 8 injector
16964	Pair of EXTRUDED ALUMINUM fuel rail kit*, Fits 14-71 adapter #16954 and #16956
16962	Pair of STAINLESS STEEL fuel rail kit*, Fits 6-71 adapter #16950 and #16952
16966	Pair of STAINLESS STEEL fuel rail kit*, Fits 14-71 adapter #16954 and #16956
7086	Billet aluminum remote TPS mount, ball bearing: For GM lever style sensor ONLY; TPS, throttle arm and hex link assembly sold seperately, see Page #149
7087	Billet aluminum mounting plate to attach #7086 remote TPS mount on any of the above EFI adapter plates

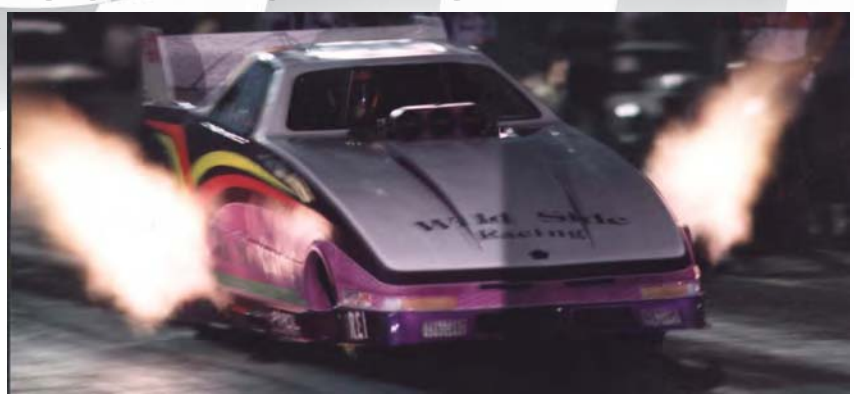


Dual four-barrel adapter #16952 with two Kinsler High-Flow 4-barrel throttle bodies (see Page #43) and extruded aluminum fuel rails

* Kits include mounting stanchions, hardware, and AN fittings

BLOWER HATS FOR SUPERCHARGED ENGINES

Complete service, parts and systems. We can help you upgrade your existing fuel system, or do a complete new one for you.



Flow Test and Calibration: We flow test new and used systems with single or multiple stage nozzle configurations, in or out of boost. We also flow test individual components, such as pumps, nozzles, and bypass valves.

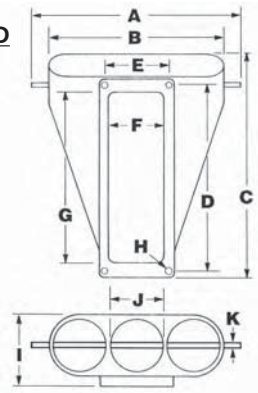
Type of System: The number of nozzles used will vary depending on the fuel, type of blower hat, and size of supercharger.

Hat Nozzles Only: Injects all the fuel into the top of the supercharger. This system is the easiest to understand and tune, but the limited ability to change the distribution makes this system inadequate for large superchargers and high boost levels.

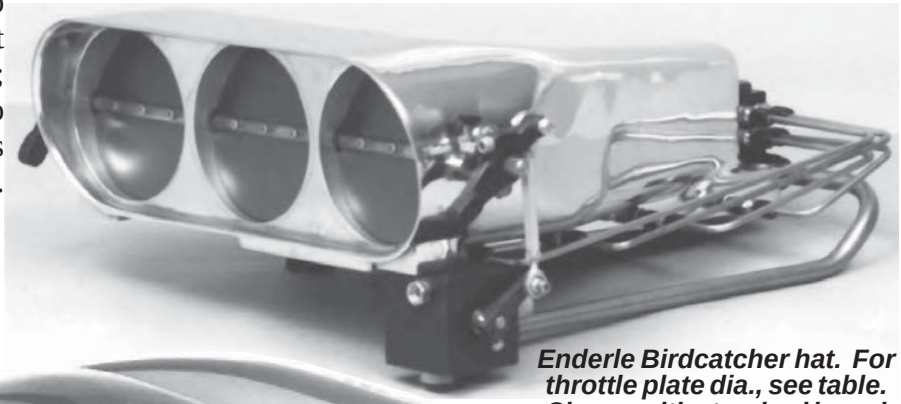
Hat and Port Nozzles: The engine will idle and run at small throttle angles on the hat nozzles only. As the RPM increases, fuel pressure rises, and the port check valve will open to allow fuel flow to the port nozzles. Normally has at least one port nozzle in each runner of the intake manifold; allows the fuel distribution to be adjusted to compensate for the air and fuel distribution errors caused by the supercharger and intake manifold.

SPECS FOR ENDERLE BLOWER HATS :

		BUG	BIRD	BUZZARD
A	Overall Width	14.68"	18.00"	20.50"
B	Casting Width	12.37"	14.60"	16.50"
C	Length	15.30"	17.25"	20.00"
D	Bolt Center Length	13.25"	13.25"	15.31"
E	Bolt Center Width	4.44"	4.44"	4.44"
F	Outlet Width	4.00"	4.00"	4.10"
G	Outlet Length	12.25"	12.25"	15.06"
H	Bolt Hole Diameter	.40"	.40"	.44"
I	Overall Height	5.20"	5.80"	6.44"
J	Throttle Plate Dia.	3.69"	4.38"	5.00"
K	Throttle Shaft Dia.	.31"	.44"	.44"
L	Throttle Area Sq. In.	32.07"	45.20"	58.90"

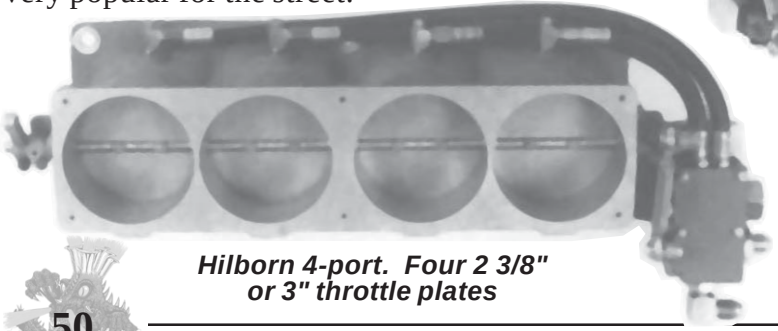


Blower Hats: Throttled air plenum used on the inlet of a supercharged engine. Make sure the hat is large enough to support the air requirement of the engine, but a hat that is too large will cause some loss of driveability at part throttle; for drag racing this is not usually a problem. For the racer who wants a big blower hat appearance but with good driveability, we internally block off part of the blower hat to reduce its air flow.... this is very popular for the street.

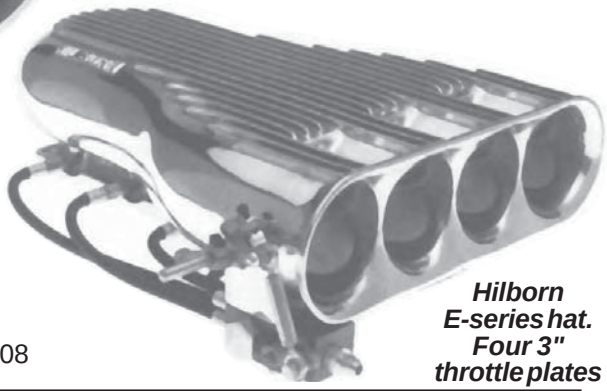


Enderle Birdcatcher hat. For throttle plate dia., see table. Shown with standard barrel valve...high flow is in stock

Hilborn H-series hat, sometimes called a Shot-Gun. Two 5 1/4" throttle plates



Hilborn 4-port. Four 2 3/8" or 3" throttle plates



Hilborn E-series hat. Four 3" throttle plates

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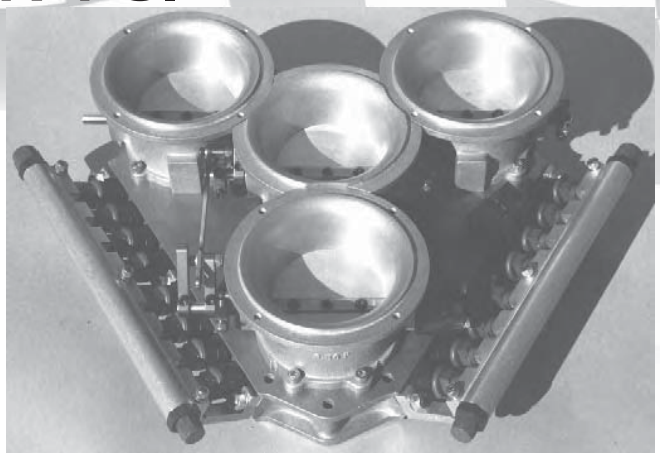
EFI ADAPTER PLATES FOR PSI® SUPERCHARGERS

Bolt directly to the top of Performance Systems Inc.'s screw type supercharger. The injector's spray is directed into the opening of the supercharger. Fuel rails properly supply the injectors at high flow rate.

Adapter accepts four Kinsler 3.50P throttle bodies. The open style is for placing the injectors under the blower. Both styles of adapters are machined from cast aluminum and are 1.5" finished height.

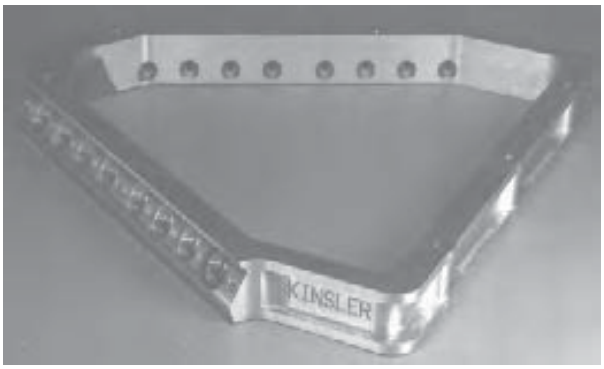
Up to 16 of any brand dual o-ring EFI injectors can be installed by selecting the proper Kinsler universal boss adapters. If you want to run less than16 injectors, either blank boss adapters or Kinsler #10193 EFI blank injector bodies can be installed. Machined for Kinsler billet fuel rail stanchions. Available with aluminum or stainless steel fuel rails.

Optional for both styles of adapters: up to ten additional EFI injectors across the front of the adapter plate.

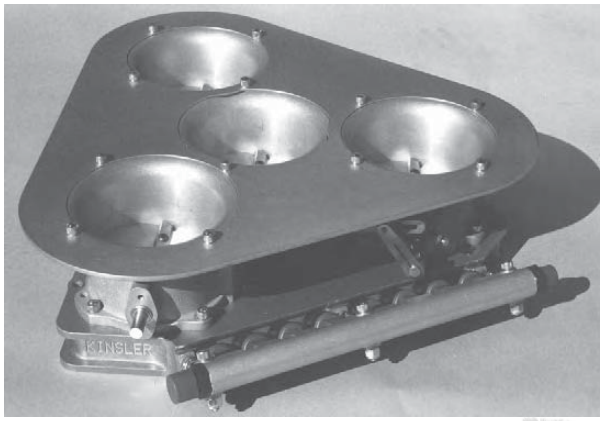


EFI adapter with four Kinsler 3.50P throttle bodies and extruded aluminum fuel rails

Throttle body adapter to go on top of PSI® supercharger



Open style EFI adapter to go under PSI® supercharger



Throttle bodies with air filter base installed

15100	Open style, includes Kinsler EFI injector boss adpaters
15104	Throttle body style, includes Kinsler EFI injector boss adpaters
15110	Upgrade on above #15100 and #15104 adapters for additional ten EFI injectors across front of adapter
15112	Pair of Kinsler EXTRUDED ALUMINUM fuel rails, includes mounting stanchions, hardware, and AN fittings. Fits #15100 and #15104 adapters
15114	Additional Kinsler EXTRUDED ALUMINUM fuel rail, for #15110. Optional ten injectors across front of adapter, includes mounting stanchions, hardware, and AN fittings
15116	Pair of Kinsler STAINLESS STEEL fuel rails, includes mounting stanchions, hardware, and AN fittings. Fits #15100 and #15104 adapter
15118	Additional Kinsler STAINLESS STEEL fuel rail, for #15110. Optional ten injectors across front of adapter, includes mounting stanchions, hardware and AN fittings
15090	Throttle bodies, set of four Kinsler 3.5P mono-valve throttle bodies with throttle shaft and throttle plate. Includes modification for installation on #15100 adapter plate
15092	Linkage package, for installation of #15090 throttle bodies to make the rear throttle body the primary opening unit. Consists of: (2) Kinsler billet spring-screw links to connect front two throttle bodies, (3) Kinsler throttle arms, (3) Kinsler throttle stops with safety return springs and stop bosses, (1) hex link assembly with rod ends, (1) Kinsler progressive link bar with arm, bolts, washers, and nuts
15093	Upgrade on #15092 linkage package to make front two throttle bodies the primary opening units
15108	Labor to assemble; mount #15090 throttle bodies, #15092 linkage package, fuel rails to adapter plate. Setup linkage and geometry.
15106	Kinsler air filter housing for four 3.50P throttle bodies on PSI adapter. Billet aluminum base and lid, machined groove to retian #5125 K&N air filter. Base machined to fit over throttle bodies and bolt to inlet flanges. Includes standoffs to support lid
5125	K&N air filter element specially made to fit #15106 air filter housing
7086	Kinsler billet aluminum remote TPS mount, bearing style. For GM lever sensor ONLY. TPS, throttle arm and hex link assembly - sold seperately. For remote TPS mount see THROTTLE POSITION SENSORS AND ACCESSORIES on Page #149

TURBOCHARGING

Turbocharging has tremendous potential, but very few have tapped it, as a proper installation is far more involved than that for a GMC roots type belt driven supercharger. The following hints will help....

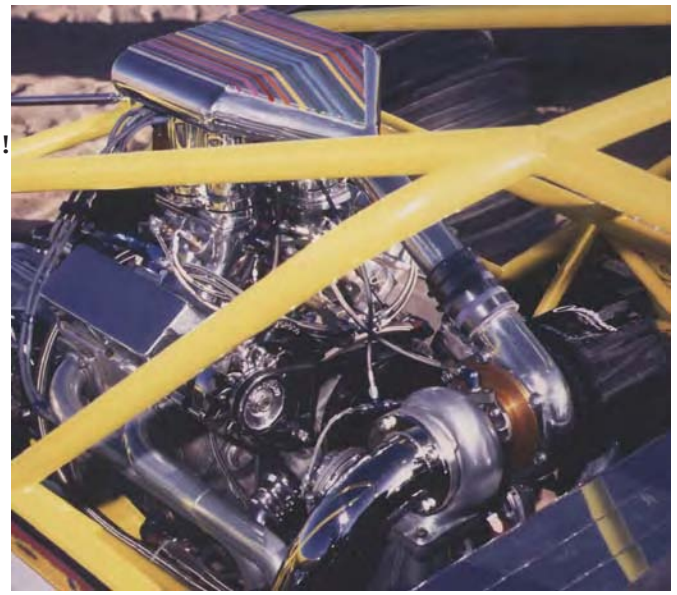
1) Electronic fuel injection is the ultimate for turbos. The constant flow system cannot compensate throughout the whole range for the boost pressure against the nozzle resisting fuel flow. The EFI system can be programmed to the peaks and valleys of the engine's torque and horsepower, giving the potential to extract the most power and best driveability. An EFI system with programmable ignition curves will provide further improvements as ignition timing is EXTREMELY important to a turbo engine. You want to run all the spark lead you can to burn the fuel before the exhaust valve opens, to reduce the exhaust temperature at the turbos, to keep from burning them up.

Twin turbo 4.6L 3-valve modular Ford Mustang with EFI

2) One of the worst misconceptions is that ram tuning is not important when using a turbo. On the contrary, it is extremely important for power, and the exhaust tuning sharply increases throttle response as well.

3) Use ported cylinder heads...allow the engine to breathe!!! You must get the air in and out for power.

4) "Turbo Lag" is actually mostly fuel lag. If the fuel is put into the air before it enters the turbo, the fuel cools the incoming air, which will cause it to pick up more heat from the hot turbo. Also, the turbo has to compress more mass. All of this decreases system efficiency. In addition, the fuel has a long way to get to the engine, causing lag. Not to mention one pop back into that whole inlet system full of fuel, and KABLOOM! Injection right at the inlet port sharply increases throttle response, efficiency, distribution, safety, and **power!!!**



Scat V4 with constant flow fuel injection with single turbo in a dune buggy

5) When running over about 8 PSI of boost with gasoline, a good air-to-air intercooler is a ***must***. Lowering the charge temperature will:
   - Increase density, giving 15-20% more power
   - Give less tendency to detonate
   - Lower exhaust temperature, since lowering inlet temperature a given amount lowers exhaust about the same amount.

   Theoretically, high exhaust temperature is desireable, but in reality, there is almost always too much...it burns up the turbos and pipes.

6) On large engines, two intercooler cores are used in series. This gives slightly more pressure drop than if in parallel, but lower charge temperature and better performance, due to higher velocity of the charge air scrubbing the walls of the intercooler.

7) In front engine cars, the intercooler is placed where the radiator would normally be, to get a good blast of the coldest air and short ducting. The radiator is placed to the side, behind, or in the fenders.

8) An exhaust system with divided turbine and exhaust collector will increase throttle response with the same top end horsepower. Great for sports cars.

9) The best system compresses air only, intercools it, then adds fuel at the ports. Look at the pictures carefully!

Purchase "Turbochargers" by HP books.

Two of Mark Stielow's projects: '69 Camaro, twin turbos into Kinsler 18° small block Chevrolet I.R. EFI manifold (left) and '69 Chevelle, twin turbos into plenum style EFI manifold (above)

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PLENUM LOGS

CHEVROLET BIG BLOCK

Fits: Dart Big Chief, Dart/Olds 14^{0}, Pontiac Pro-Stock, and EB 650/800 cylinder heads.
Fits one piece big block Chevrolet manifold (modification required).

Available with a throttle at the inlet or plain.

Two throttle sizes available:
2.5" throttle has 2.5" ID runner outlets.
2.9" throttle has 2.9" or 3.0" ID runner outlets.

Center to center of runner bores: 3.300", 6.350", 3.300"

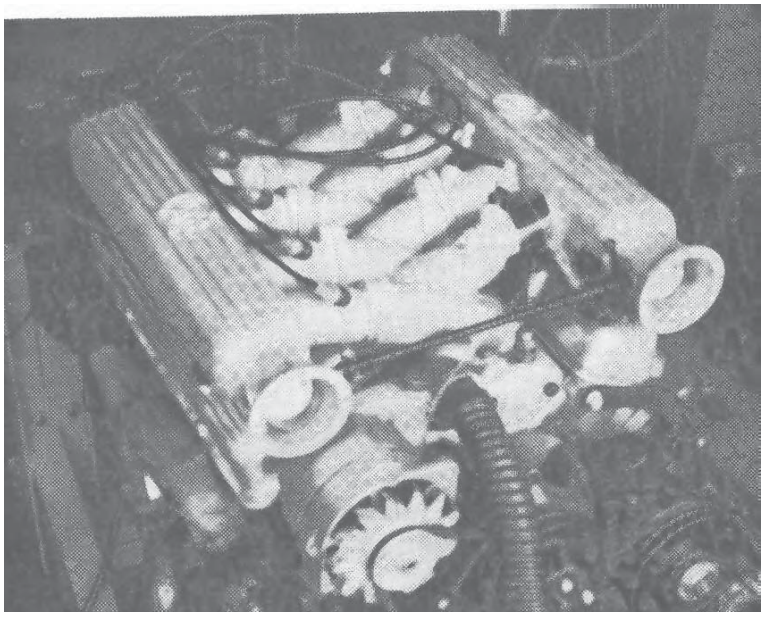
Each runner entrance has a generous radius cast into it. Logs have provision for balance tube between the pair.

'As cast' logs have a throttle body on each end at different lengths, so the throttle shafts of both throttles will line up with each other. For most applications only two throttle bodies are needed so the opposite end of the log is machined off, and an end cap is installed. Logs can be machined so there is a throttle body or hose attachment at both ends.

Logs with 2.5" throttle plates, on Kinsler 3-piece Pontiac Pro-Stock manifold with aluminum fuel rails

Log with no throttle plate. 2.9" ID hose connection and 3.0" runner outlets to manifold

Log with 2.5" throttle plate and 2.5" runner outlets to manifold



Small block Chev crossram with Lucas mechanical timed injection

CHEVROLET SMALL BLOCK

Fits Moon small block Chev cross-ram. Cast aluminum plenum logs are machined with the bolt pattern of a pair of IDA Weber throttle bodies. Center to center of runner bores: 3.470", 4.025", 3.470"

Each log has provision for a 2 1/4" throttle at the front with cross-connecting linkage, or they can be supplied without the throttles. Ideal for turbo-charging.

3-PIECE MANIFOLD INSTALLATION

BEFORE YOU BEGIN

1) Make sure all intake gasket surfaces are clean and flat (especially around bolt holes and any water ports). If the manifold has been used, inspect the condition of the entire assembly, including all linkage. Be sure to remove all the old silicone, and clean out the sealing grooves.
2) Check the fit of all the manifold pieces on the engine to be sure everything fits correctly before applying any new silicone.
3) The valley plate has holes at both ends along the block's register. Most racers find it much easier to install the plate if they drill and tap the block at each end to secure it. The holes in the valley plate may not be symmetrically located.... position the valley plate carefully, then use it as a drilling template.

Check surfaces for flatness

INSTALLATION

These instructions are for the typical Kinsler three piece injection manifold.

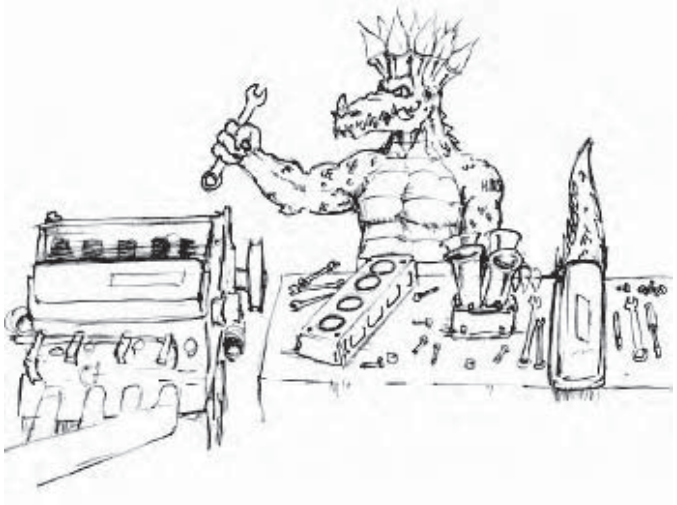
Try to do the installation within twenty minutes. The surface of the silicone bead can set up quickly, causing a poor seal.

A) It is very important to get silicone down into the bottom corners of both the manifold and valley plate grooves, just flush to the surface... push it in with your finger.

B) Put a bead of silicone along the surfaces on top of the grooves and mate the manifold to the valley plate. If the correct amount of silicone is used, about 1/16" - 1/8" will come out the top and bottom sides.

C) Install all the bolts and run them down just snug. Start torque sequence from the center bolts and work outward. Tighten the mounting bolts down a little bit at a time to obtain an even crush. Do not overtighten!

Push silicone into grooves



Eddie Abrams's Kinsler injected small block Chev U.S.D.B.A. flat bottom drag boat

Hooker Industries sponsored Vesco/Nish Streamliner, Kinsler small block Chev contant flow

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THROTTLE SHAFTS

WE MAKE THE STRONGEST THROTTLE SHAFTS IN THE INDUSTRY

We make out throttle shafts from special stress-proof steel, which makes them unusually strong and tough. We hard nickel coat them for excellent wear resistance, then bake them to eliminate any embrittlement.

We can make custom shafts to your print or sample.

THROTTLE SHAFT BASICS

Alternate Material 303 stainless steel for salt water marine use. These won't rust, but they are only 1/4 as strong as the stress proof steel, and wear much quicker. Don't use this material unless you really feel you need to.

STYLE

Milled	A flat is machined halfway through the shaft for the throttle plate.
Slit	A slit is cut through the middle of the shaft, leaving the shaft at it's full diameter.

We use 3/8" diameter milled type shafts because they make a better bearing than a 5/16" does and we get more strength than 5/16" with less air flow resistance! How?

A) 5/16" has so little cross-sectional area that it is usually slotted for anything larger than 2" throttle bores. The place where the the throttle plate screw goes is very weak, as the #8 screw hole removes most of the remaining material!

B) A milled 3/8" shaft has 24% more cross-section after the #8 screw hole is tapped into it than a 5/16" slotted shaft.

C) The 5/16" shaft presents a .312" wide restriction to the airflow. The milled 3/8" shaft is .188" wide after milling, plus .071" width of the throttle plate = .259" total, which is 17% less width than the 5/16" slotted shaft.

D) **BACK-CUT** The milled 3/8" shaft is strong enough that we can mill a flat on the backside of it .062" deep and still maintain good strength. This leaves .126" shaft width, plus the .071" plate width = .197" total, which is 37% less width than the 5/16" slotted shaft! This is optional on all our units and replacement shafts.

E) **STREAMLINED** The ultimate shaft for air flow is the back-cut shaft with it's leading and trailing edges machined with a radius from the OD of the shaft to the flat area of the back-cut. It is then blended and polished. This gives an improved aerodynamic shape. This is optional on all our units and replacement shafts.

MATERIAL FOR THROTTLE SHAFTS

	DIAMETER	MATERIAL
4760	5/16" (.312")	Stress proof steel
4761	3/8" (.375")	Stress proof steel
5452	5/16" (.312")	303 stainless steel
5453	3/8" (.375")	303 stainless steel

Shown Actual Size

Milled shaft

Slit shaft

Back-cut shaft

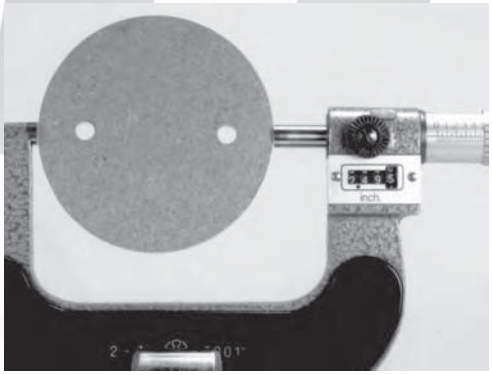
Streamlined shaft

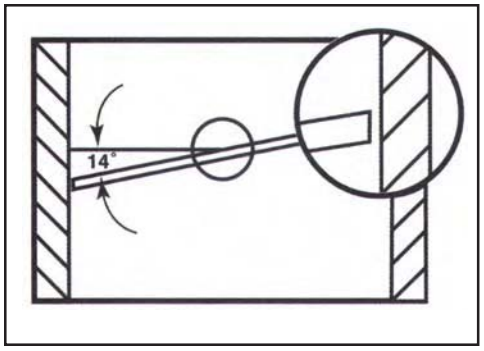
MACHINING Each end of our flat for the throttle plate has a .010" radius to prevent a stress riser. We also break the edge of the two outside corners at each end of the flat. On our shafts with multiple throttle plates we are careful to machine all the flats exactly at the same angle and plane. If the flats are not cut properly, the idle air distribution and part throttle operation will be poor.

Ray Price's Kinsler injected top fuel Harley Davidson drag bike

Jason Meyer's Kinsler injected WoO sprint car

THROTTLE PLATES





QUALITY MACHINING

EACH KINSLER THROTTLE PLATE IS TURNED IN A LATHE !!!

A stamped plate can be bowed from the press, have varying edge angles, etc. Turning gives a flat, crisp edge, at the precise angle.

REPLACEMENT THROTTLE PLATE

We STOCK and/or custom MAKE plates for all types of injection manifolds and throttle bodies:

HILBORN, CROWER, ENDERLE, ENGLER, JACKSON, ALGON, RON'S, EVM, GM, HOLLEY, ETC.

CUSTOM THROTTLE PLATES

We make plates for just about ANYTHING! Injection units, carbs, throttle bodies, etc. We have spinning fixtures for different angles and bolt hole spacings.

IMPORTANT FACTS

DIAMETER

Must be measured across the center of the bolt holes. It is smaller than the throttle bore to provide clearance for rotation, and material expansion of the plate from the engine heat during a hot soak. The clearance varies depending on the quantity of plates over a length of shaft.

Example : One-piece throttle shaft with four plates versus two shafts with two plates each, joined with a Kinsler billet Spring-Screw Link... the latter can run with less clearance. A single throttle plate can run with even less. See Pages #64-65.

SCREW HOLES

Throttle plate screw holes are larger than the screw diameter to allow the plate to be adjusted for alignment in the throttle bore.

MATERIAL

Our standard plate material is 2024 aluminum. This alloy has a very high bending strength. On special order we offer 304 stainless steel (.091" thick ONLY). We don't recommend brass (too soft) or cold rolled steel (too weak, rusts, and creates excessive wear on throttle bore).

THICKNESS

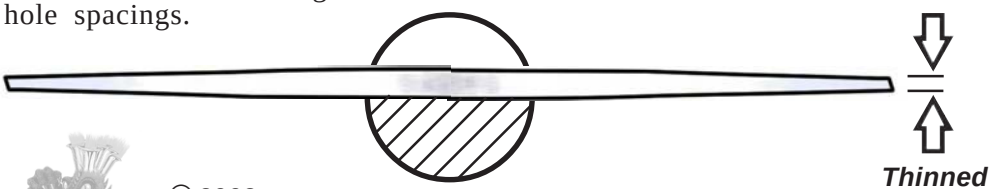
We use .062", .071", or .091" depending on the throttle bore size and the strength that is require for the plate. Do not use a plate that is thicker than needed, as that causes more air flow restriction.

ANGLE

Our standard angle is 14°, rotating 76° to wide open. This is good for sealing and non-sticking. Special angles available on request.

STREAMLINED

For an aerodynamic shape, the plate has the leading and trailing edge thinned to about one-half the original thickness, then tapered and blended to where the plate mounts on the throttle shaft. Least air flow resistance when used with streamlined throttle shafts, see Page #55. This design is as strong as the standard in bending, but is much more expensive to make.



STANDARD KINSLER ALUMINUM THROTTLE PLATES :

PART #	ACTUAL DIAMETER	NOMINAL THICKNESS	CENTER TO CENTER ON SCREW HOLES
20010	1.372"	.062"	1.0"
20012	1.523"	.062"	1.0"
20014	1.697"	.062"	1.0"
20016	1.763"	.062"	1.0"
20018	1.807"	.062"	1.0"
20020	1.872"	.062"	1.0"
20022	1.897"	.062"	1.0"
20024	1.997"	.062"	1.0"
20026	2.147"	.071"	1.0"
20028	2.179"	.071"	1.5"
20030	2.182"	.071"	1.5"
20032	2.242"	.071"	1.5"
20034	2.245"	.071"	1.5"
20036	2.247"	.071"	1.5"
20038	2.297"	.071"	1.5"
20040	2.362"	.071"	1.5"
20042	2.365"	.071"	1.5"
20044	2.367"	.071"	1.5"
20046	2.429"	.071"	1.5"
20048	2.432"	.071"	1.5"
20050	2.434"	.071"	1.5"
20052	2.492"	.071"	1.5"
20054	2.495"	.071"	1.5"
20056	2.497"	.071"	1.5"
20058	2.554"	.071"	1.5"
20060	2.557"	.071"	1.5"
20062	2.617"	.071"	1.5"
20064	2.620"	.071"	1.5"
20066	2.670"	.071"	1.5"
20068	2.672"	.071"	1.5"
20070	2.675"	.071"	1.5"
20072	2.682"	.071"	1.5"
20074	2.685"	.071"	1.5"
20077	2.804"	.071"	1.5"
20078	2.807"	.071"	1.5"
20080	2.892"	.071"	1.5"
20081	2.895"	.071"	1.5"
20082	2.897"	.071"	1.5"
20084	2.997"	.071"	1.5"
20086	2.997"	.091"	1.5"
20088	3.147"	.091"	1.5"
20090	3.495"	.125"	1.0" (3 SCREWS)

NOTE : Due to machining tolerances sizes may vary slightly !

Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

RAMTUBES

KINSLER 180 DEGREE BELL SPUN ALUMINUM RAMTUBES

Our 180 degree bell aluminum ramtubes are formed from 6061-0 alloy and have a nominal .070" thick wall. 180 degree bell ramtubes have consistent wall thickness and inside/outside diameters.

These ramtubes use our special180° tapered bell design for increased air flow.

Part #	Inside Diameter	Maximum Length	Machined Outside Diameter	Bell Diameter
7806	2.0"	7"	2.150"	3.900"
7808	2.177" (2 3/16")	9"	2.340"	4.110"
7813	2.250" (2 1/4")	9"	2.365"	4.175"
7815	2.370" (2 3/8")	9"	2.490"	4.280"
7817	2.437" (2 7/16")	9"	2.565"	4.350
7819	2.500" (2 1/2")	9"	2.645"	4.410"
7821	2.625" (2 5/8")	9"	2.765"	* 4.395"
7823	2.625" (2 5/8")	11"	2.765"	* 4.395"
7825	2.625" (2 5/8")	9"	2.765"	4.900"
7824	2.680" (2 11/16")	9"	2.785"	5.010"
7827	2.750" (2 3/4")	9"	2.872"	5.070"
7830	2.812" (2 13/16")	9"	2.938"	5.100"
7710	2.900"	9"	3.000"	5.230"
7833	3.0"	9"	3.100"	5.320"
7889	Machine 180 degree bell ramtube to length specified by customer			
7896	Machine ramtube bell, notch for clearance for use on siamese top adapter			

* Non-tapered, straight wall ramtube

KINSLER TRADITIONAL BELL SPUN ALUMINUM RAMTUBES

Our traditional bell spun aluminum ramtubes are made from 1100-0 alloy and have a nominal .080" thick wall. These ramtubes will have slight variations in wall thickness and inside/outside diameters.

Part #	Inside Diameter	Maximum Length	Nominal Outside Diameter	* Ideal Machined Outside Diameter	Bell Diameter
7804	1.810" (1 13/16")	6"	1.960"	1.930"	3.180"
7807	2.000"	10"	2.240"	2.150"	3.505"
7810	2.190" to 2.235" (2 3/16")	10"	2.390"	2.340"	3.830"
7812	2.175" to 2.190" (2 3/16")	10"	2.385"	2.340"	3.830"
7811	2.250" (2 1/4")	10"	2.450"	2.365"	3.830"
7814	2.375" (2 3/8")	10"	2.560"	2.490"	4.125"
7816	2.437" (2 7/16")	10"	2.610"	2.565"	4.240"
7818	2.500" (2 1/2")	10"	2.665"	2.645"	4.380"
7822	2.680" (2 11/16")	10"	2.850"	2.785"	4.500"
7707	2.900"	9"	3.045"	2.998"	5.080"
7708	2.900"	11"	3.025"	2.998"	5.080"

* Machined outside diameters may vary +/-.004"

Traditional bell ramtube machining and labor, see Page #54

How Do I Know What Size Ramtube I Need?

Kinsler identifies ramtube size by measuring the Inside Diameter of the base of the tube

Do not measure the ramtube Outside Diameter or Ramtube Adapter

Measuring ramtube length

Kinsler big block Chev with 180 degree tapered bell ramtubes

RAMTUBES

#7898

#7899

#7893/#7894/ #7895

OPTIONS

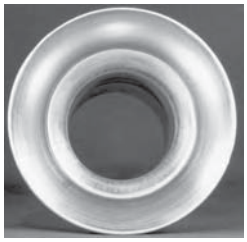
7890	Polish (8) aluminum ramtubes to 'Show-Quality' finish
7892	Polish, brite-dip and anodize (8) spun aluminum ramtubes, call for available colors
7893	Bosses, for 14mm Lucas nozzles
7894	Fairing - must use with #7893 nozzle boss, 6061 aluminum
7895	Material and labor - weld #7893 bosses and #7895 fairings on set of (8) aluminum ramtubes, includes bosses and fairings, ramtubes NOT included
7887	Material and labor - weld 1/8" pipe thread bosses and #7895 fairings on set of (8) aluminum ramtubes, includes bosses and fairings, ramtubes NOT included
7888	Material and labor - weld 1/2-20 thread bosses and #7895 fairings on set of (8) aluminum ramtubes, includes bosses and fairings, ramtubes NOT included
7898	Labor - turn outside diameter of ramtube base to fit ramtube top adapter and cut ramtube to height
7899	Labor - same as #7898 plus notch bell for siamese top adapters

Dog bone to go under clamping screws on oval bore

CARBON FIBER IRL STYLE RAMTUBES AND ACCESSORIES

Kinsler carbon fiber IRL style ramtubes have molded flange which is machined with bolt pattern 1.626" X 2.226", 180º radiused bell.

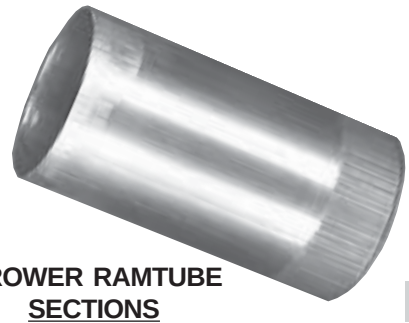
27516	2.270" tapered wall 2.150" tall
27519	2.270" tapered wall 3.150" tall
27523	2.470" tapered wall 2.150" tall
27527	2.470" straight wall 2.150" tall
27529	2.470" straight wall 2.500" tall
27551	2.270", 1/2" tall spacer
27553	2.270", 1" tall spacer
27559	2.470", 1/2" tall spacer
27561	2.470", 1" tall spacer
27502	Set of (16) 'dog-bones' for 2.270" ramtubes
27507	Set of (16) 'dog-bones' for 2.470" ramtubes



RESTRICTOR TUBES

Designed to meet rules that require at least a 3" length of restricted size. Inlet and outlet has a special radius and taper to provide a smooth transition of the pulse in the runner, going both up and down. Restrictors are made to fit into a host ramtube. They can be modified to fit into other inside diameter ramtubes. Made from thin wall aluminum.

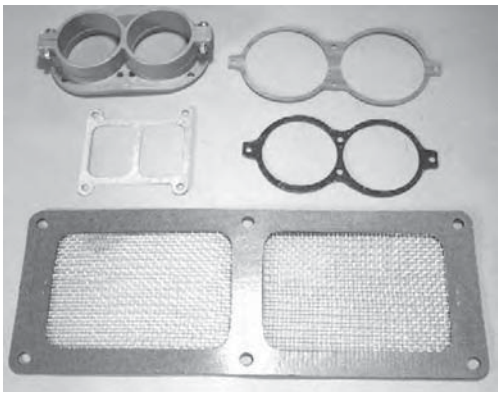
7791	2.100" inside diameter to fit host 2.500" (2 1/2") ramtube
7793	2.187" (2 3/16") inside diameter to fit host 2.500" (2 1/2") ramtube
7797	2.187" (2 3/16") inside diameter to fit host 2.625" (2 5/8") ramtube



CROWER RAMTUBE SECTIONS

7225	Straight section for Crower 2.9" big block Chevrolet injection manifold, 12" long

Note: Kinsler spun aluminum ramtubes can be machined to fit Crower big and small block Chevrolet injection manifolds.



GASKETS, O-RINGS, AND TOP ADAPTERS

7245	Blower screen gasket, 6-71/8-71, fits between blower hat and top of supercharger
7246	Gaskets, set of (4), ramtube adapter on 2.9" bore Crower big block Chevrolet manifold
7247	Gaskets, set of (4), ramtube adapter on 2.5" bore Crower small block Chevrolet manifold
7244	Gaskets, set of (4), Hilborn small block Chevrolet injection, siamese ports
7248	O-ring set, Kinsler big block Chevrolet manifold, ramtube adapters to manifold top
7249	O-ring set, Kinsler 3-piece small block Chevrolet manifold, ramtube adapters to manifold top
7500	Top adapters, converts 5 degree angle on Hilborn 2 3/16" small block Chevrolet to straight up ramtubes for use with K&N (Kinsler #5105) double air filters, set of (4)
7501	Top adapter, one ONLY, replacement for above set part #7500

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TOP ADAPTER - SPECIAL

RADIUSED DOUBLE INLET PLATES

Bolts to Kinsler 3-piece small block Chev, Mopar, and Pontiac manifolds, with 3-bolt pattern. Bore centers are 2.850" c-c. Billet aluminum, 1.550" overall height.

7855	Individual siamese radius plate for 2 1/2" throttle bore size
7857	Individual siamese radius plate for 2 5/8" throttle bore size
7858	Individual siamese radius plate for 2 11/16" throttle bore size
7862	Set of (4) siamese raduis plates, any of the above sizes - outright purchase
7864	Upgrade on purchase of NEW V8 manifold, replaces the cast ramtube adapters and aluminum ramtubes with radius plates

Radiused double inlet plate

RADUISED SINGLE BORE INLET PLATES

Bolts to manifold using the 2-bolt pattern (3.740" c-c) of the Kinsler 3-piece injection manifold for small block Ford, and small block Chev with cylinder heads: Dart/Buick, SB2, Brodix Canted Valve or BD-2000, Chev Symmetrical Port, and LS-1. Billet aluminum, 1.750" overall height.

7871	Individual single radius plate for 2 1/2" throttle bore size
7873	Individual single radius plate for 2 5/8" throttle bore size
7874	Individual single radius plate for 2 11/16" throttle bore size
7943	Spacer, for 2 1/2", 1/2" tall, billet aluminum
7982	Spacer, for 2 1/2", 1" tall, billet aluminum
7945	Spacer, for 2 5/8", 1/2" tall, billet aluminum
7984	Spacer, for 2 5/8", 1" tall, billet aluminum
7946	Spacer, for 2 11/16", 1/2" tall, billet aluminum
7985	Spacer, for 2 11/16", 1" tall, billet aluminum
7876	Set of (4) single radius plates, any of the above sizes - outright purchase
7877	Set of (8) single radius plates, any of the above sizes - outright purchase
7878	Upgrade on purchase of NEW 4-cylinder manifold, replaces the cast ramtube adapters and aluminum ramtubes with radius plates
7879	Upgrade on purchase of NEW V8 manifold, replaces the cast ramtube adapters and aluminum ramtubes with radius plates

'Monster' small block Chev with radiused inlet plates

Radius plates are available for Dragon Claw and Monster manifolds

#7873 Radiused single inlet plate *#7984 Spacer* *#7945 Spacer*

RADIUSED INLET PLATES FOR KINSLER BIG BLOCK MANIFOLDS

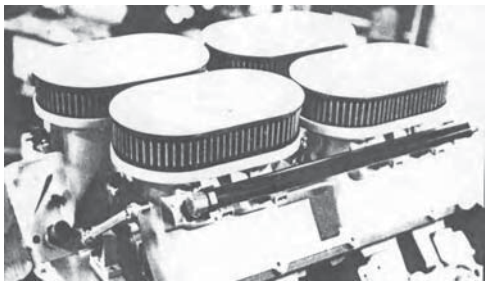
Fit all Kinsler big block Chev manifolds: Standard one-piece rectangular port, three piece Dart Big-Chief, Pontiac Pro-Stock, and EPD. Has the same 4-bolt pattern and bore centers as the Kinsler big block Chev manifold. Billet aluminum, .750" overall height.

Ultra short style, bolts through radii

7750	Individual 2.9" throttle bore size, 3.300" bore center to center
7751	Individual 3.0" throttle bore size, 3.300" bore c-c
7752	Individual 3.15" throttle bore size, 3.400" bore c-c
7754	Set of (4) radius plates, any of the above sizes - outright purchase
7755	Upgrade on purchase of NEW V8 manifold, replaces the cast ramtube adapters and aluminum ramtubes with radius plates

SINGLE - Fits all of Kinsler big block 4-runner injection manifolds: Ford, Chevrolet, and Olds.

7766	Individual 2.9" throttle bore size
7767	Individual 3.0" throttle bore size
7768	Individual 3.15" throttle bore size
7770	Upgrade on purchase of NEW V8 manifold, replaces the cast ramtube adapters and aluminum ramtubes with radius plates



Air cleaner adapters installed on Kinsler Pontiac Pro-Stock injection manifold with EFI for street use

RADIUS PLATES FOR AIR FILTERS ON KINSLER BIG BLOCK CHEVROLET INJECTION MANIFOLD

7756	Individual 2.9" throttle bore size, 3.300" bore center to center
7757	Individual 3.0" throttle bore size, 3.300" bore c-c
7758	Individual 3.15" throttle bore size, 3.400" bore c-c
7760	Set of (4) radius plates, any of the above sizes - outright purchase
7761	Upgrade on purchase of NEW V8 manifold, replaces the cast ramtube adapters and aluminum ramtubes with radius plates

THROTTLE SYNCHRONIZATION AT IDLE

DO THIS *ONLY* IF YOU CAN'T SYNCHRONIZE THE THROTTLES USING THE UNI-SYN.

See Pages #62-63 "HOW TO SETUP LINKAGE"

If the throttle plates are not synchronized at an idle, then some cylinders will be rich or lean compared to others... these will **NOT** develop maximum power as quickly as the other cylinders when the engine is brought to wide open throttle. Sometimes at W.O.T. the problem clears up quickly, sometimes NOT. A rich cylinder may take a fraction of a second to several seconds to burn off the excess fuel and raise combustion chamber temperature. A cylinder running lean at an idle is a prime candidate for serious engine damage. When the engine is brought to wide open throttle, the overheated spark plug may cause detonation.

SOLVING SYNCHRONIZATION PROBLEMS

Make sure the throttle plates are not installed upside down. They are machined at an angle! (see THROTTLE PLATES on Page #56). Check the intake manifold for gasket leaks; worn shaft bushings, shafts, plates, etc.

If no problems are found:

1) Disconnect the cross hex link bar and work on each side of the injection unit separately.
2) Back off the throttle stop idle screws all the way, so the throttle plates will contact the throttle bores.
3) Loosen or remove all the throttle plate screws. BE VERY CAREFUL NOT TO DROP THEM INTO THE ENGINE! Any New Kinsler manifold or manifolds serviced by Kinsler have Loctited ® plate screws. The screws may require heat to break the bond.
4) While holding the throttle shaft in closed position, tap the shaft back and forth lightly to allow plates to center themselves in the throttle bore and rotate plate in the throttle bore till gaps are equal on both sides of the plate at the location shown in Fig 1.
5) Install throttle plates and tighten screws using Loctite ® #271.
6) Do the same to the other side of the manifold.
7) Reconnect cross hex link bar. Adjust it so both sides maintain the closed position.
8) Turn idle screws "in" to raise plates just off the throttle bore. Depending on the engine displacement, throttle size, and idle speed you want, the throttle plates will need to be open about .002" to .008". A small block Chev will require about .003" - .004"
9) Check that both sides of the injection open at the same rate. See How To Set Up Linkage on Pages #62-63.

UNDERSTANDING THE IDLE

Idle Speed is a balance of throttle plate opening and fuel rate. The unit should idle near the desired RPM with the proper amount of fuel. Never richen up the fuel rate to reduce the idle RPM; back out the idle screw instead.

Mechanical fuel injection systems require a rich idle mixture for optimum throttle response since they do not have an accelerator pump. Any time the idle speed is adjusted, the fuel rate at idle may need to be readjusted for best throttle response... set it so you get the best response when you snap the throttles open with the vehicle out of gear. Engines equipped with an automatic transmission require richer mixtures "out of gear" to compensate for the load of the transmission when "in gear".

Loctite ® #271 must be applied to secure the throttle plate screws

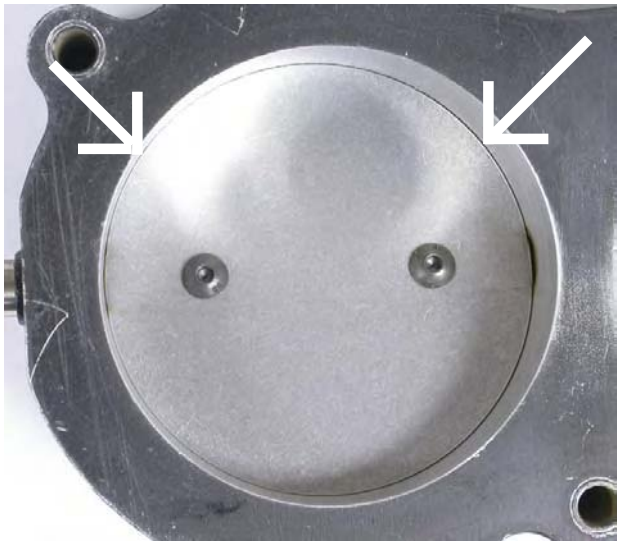
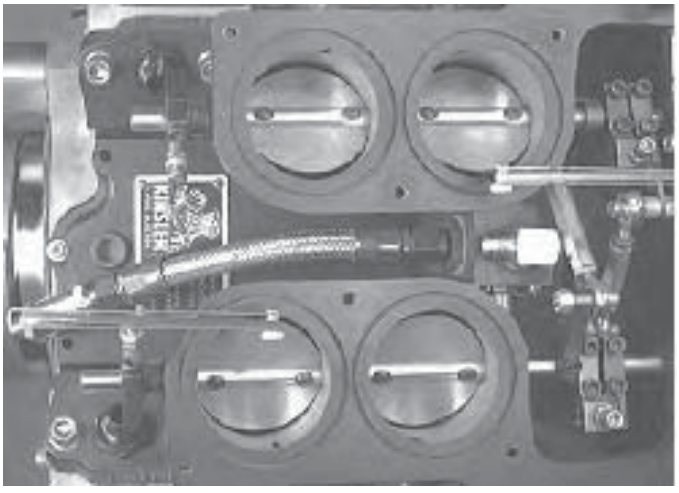


Fig. 1



Check synchronization side to side using feeler gauges

UNI-SYN® THROTTLE SYNCHRONIZER

TAKE THE GUESS WORK OUT OF SYNCHRONIZING YOUR THROTTLES OR CARBS AT AN IDLE !

#6002

WHY YOU NEED A UNI-SYN

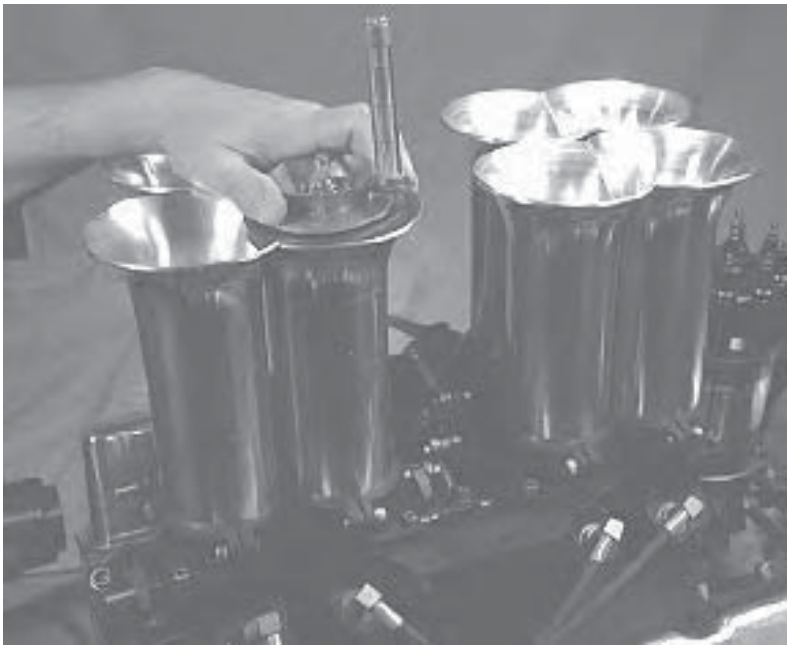
The Uni-Syn ® displays the relative air flow of one cylinder vs. another at an idle. If the throttle plates are not synchronized at an idle, they will not be synchronized at part throttle. This won't be as important to a drag racer who launches his vehicle from wide open throttle as it is for oval track, road, or off-road racing where this can mean the difference of who gets out of the corner first.

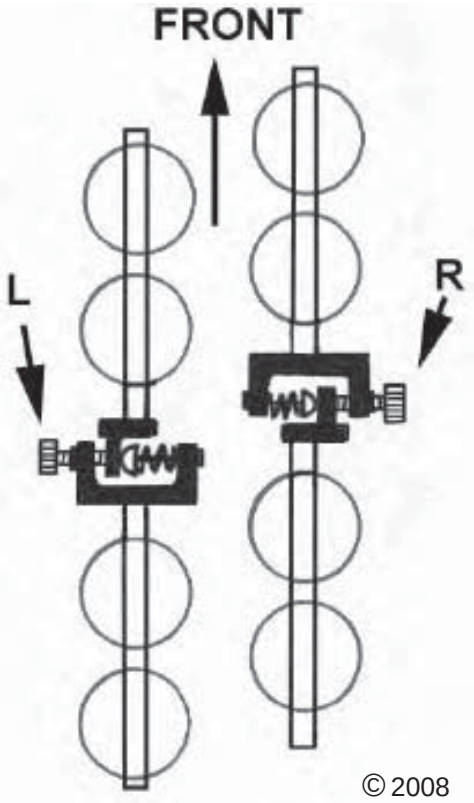
HOW THE UNIT WORKS

The Uni-Syn ® has a swiveling sight tube, so the unit can be used at any angle. The sight tube must be vertical. Air flowing between the flow control wheel and the housing creates a depression (vacuum), which pulls the float up the tapered sight tube. Rotating the wheel clockwise lowers it in the housing's tapered bore. This increases the vacuum signal, which raises the float in the sight tube.

Reasonable synchronization is if all the flow checks are within 3/4", the distance between any two lines on the sight tube.

6002	Uni-Syn® throttle synchronizer, 2 3/4" dia. foam lined base
5995	Adapter biscuit for #6002, foam disk with self-adhesive backing, 1/2" thick x 3 1/2" O.D. for larger ramtubes
6001	Adapter plate for #6002, aluminum plate with foam, fits ramtube bell up to 5 1/8" outside diameter





HOW TO USE THE UNI-SYN

Make sure there is good seal between the Uni-Syn and the ramtube.

On Manifolds WITHOUT Kinsler Spring-Screw Linkage:
With the engine idling, place the Uni-Syn over the top of one ramtube on the left side of the engine, while keeping the sight tube vertical. Adjust the flow control wheel in the center of Uni-Syn until the float is halfway up the sight tube. Check the rest of the cylinders on the left side of the engine to get an average reading. Now check the cylinders on the right side and adjust the cross hex link until the average readings are the same on both sides. If you are unable to achieve similar average readings, see section on MANIFOLD INSTALLATION AND SETUP on Page #54.

On Manifolds WITH Kinsler Spring-Screw Linkage:
Synchronize the front and rear throttles on the left side of the engine using screw "L". Now synchronize the front and rear throttles on the right by using screw "R". Now synchronize the left side to the right side by adjusting the cross hex link. Kinsler's spring-screw linkage can be installed on most injection manifolds, see section on KINSLER BILLET SPRING-SCREW UNIVERSAL THROTTLE SHAFT LINKS on Pages #64-65.

HOW TO SET UP LINKAGE

THROTTLE SHAFT TRAVEL

Since most throttle plates have a 14° seat angle, they only have to rotate 76° to be 90° to the throttle bore, which is wide open throttle.

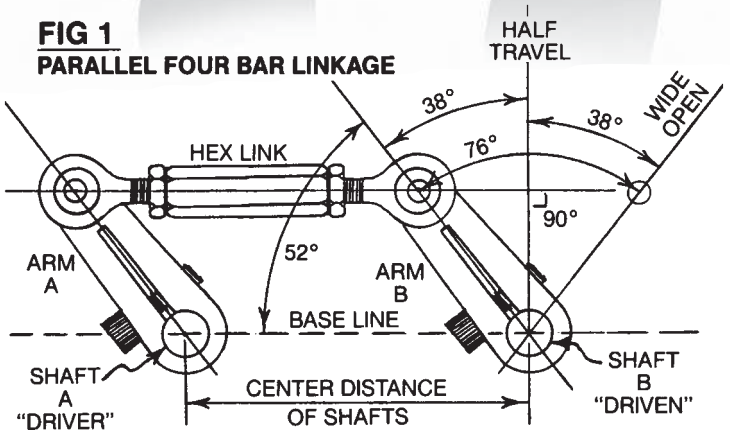
THE SAFEST LINKAGE

The safest linkage is one in which the driven arm makes a 90° angle to the hex link at half travel, so the total travel is split evenly to both sides of the 90° point... 38° to each side. This keeps well away from having the driven arm go to an over-center position... see "CAUTION" on "Uneven Four Bar Linkage", Page #63.

FOUR BAR LINKAGE

Four Bar Linkage is called "Four Bar", because it consists of four bars. Looking at Fig 1 : One bar is "Arm A", the second is "Arm B", the third is the "Hex Link". The fourth is whatever holds the two shafts in place; a manifold casting, a bracket, etc. All the bars may be different lengths.

FIG 1
PARALLEL FOUR BAR LINKAGE

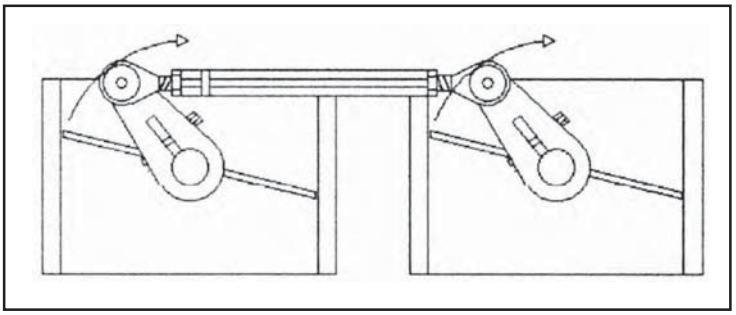


PARALLEL FOUR BAR LINKAGE

Parallel four bar linkage is when the hex link is made the same center-to-center (c-c) distance as the two shafts, and the c-c of "Arm A" is equal to "Arm B". As the arms rotate they will remain parallel to each other, and the Hex Link will remain parallel to the Base Line. The significance is that "Shaft A" will move the same number of degrees as "Shaft B" at every point, which is needed when linking the shafts on the left and right side of the manifold, see Fig 1.

PART THROTTLE AIR FLOW

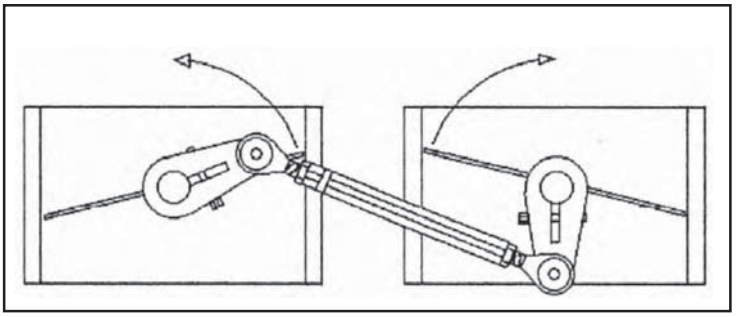
When using Parallel Linkage, the throttle shafts both rotate in the same direction, so the lower edges of all the throttle plates slope to the right or to the left. At part throttle this will direct the air differently to the ports on the right side of the engine versus the left. Some racers claim this gives rough part throttle operation. At wide open throttle the throttle plates are all straight open, so it won't affect full power.



Throttle plates that rotate the same direction, use parallel linkage

OVER-UNDER LINKAGE

Very difficult to set up properly. Over-Under linkage counter-rotates the throttle shafts allowing the throttle plates to be installed with the lower edge of each throttle plate out toward the valve cover. This will direct the air the same to every port as the throttles are opened. ***While the geometry can be set satisfactory, it is never exact*** (see table in Fig 2), and if the arms are loosened, it is difficult to get them back as they were... their initial angles are critical. Every shaft c-c distance and arm length combination requires different initial arm angles.



Throttle plates that are opposite rotation, often use over-under linkage

JACKSHAFT LINKAGE... BECOMING MUCH MORE POPULAR

This is much more desireable than the over-under linkage, as it is much easier to set up and gives each shaft the exact same rotation. See Page #63, 69.

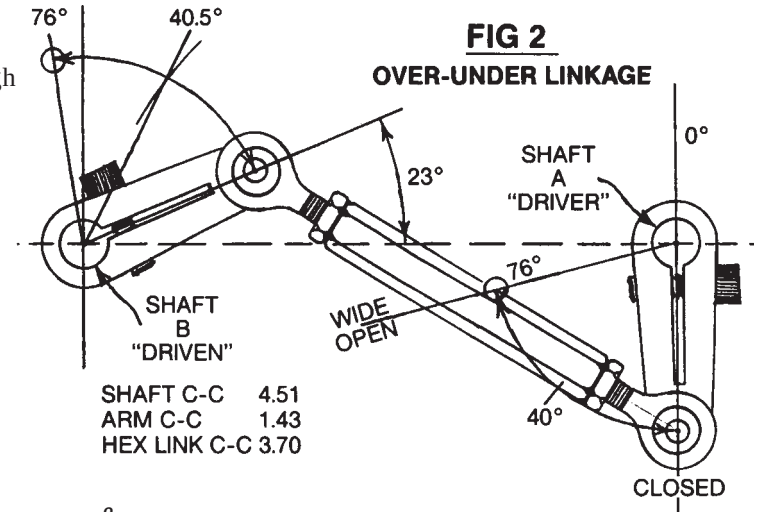
CENTER BELLCRANK LINKAGE

This also gives even shaft rotation, but there is not often enough room to fit it in. See Page #68.

DRAWING LINKAGE

Measure the c-c of the two shafts to be connected. Though one shaft may be higher than the other, for convenience draw the shafts as horizontal. Draw a dashed Base Line and put the shaft centers on it. Draw an arc with the c-c of Arm-A. Draw another with the c-c of Arm-B. Draw lines from the center of the shafts to represent the initial trial position of the arms. The distance between these two points on the arcs is the length of the Hex-Link. Set the compass at this distance. Mark off 10° increments along arc-A. Set the point of the compass on each of these and make a mark on arc-B for each. Example: see the 40° and 40.5° marks in Fig 2. Measuring the angles of the marks on arc-B allows a table to be made of the relative movements. If the numbers are not satisfactory, try other arm settings and/or Hex Link length.
See "Shaft Rotation Ratio" on Page #63.

FIG 2
OVER-UNDER LINKAGE



DRIVER°	0	10	20	30	40	50	60	70	76
DRIVEN°	0	10.3	20.5	30.3	40.5	50.8	61.0	70.8	76.0

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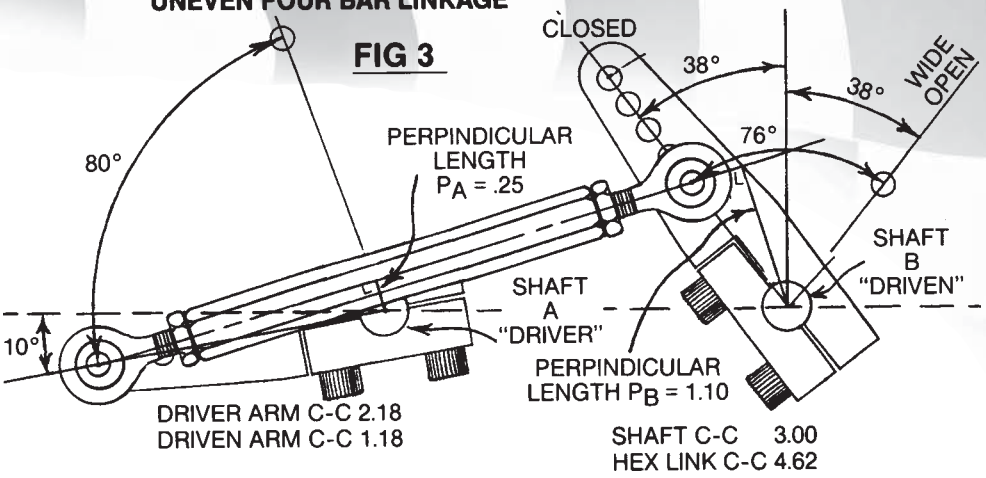
HOW TO SET UP LINKAGE

UNEVEN FOUR BAR LINKAGE

This linkage setup helps make a manifold or blower hat with very large throttles much more driveable for road racing or the street. Using the linkage in Fig 3, the first 30° of pedal travel only moves the plates 15°. The geometry reverses as it approaches wide open throttle, so at 80° of pedal travel the plates have rotated the required 76°. Caution - The throttle spring must be on the driver shaft. Shaft-A can't be the driven arm as it comes too close to over-center, the condition where the centerline of the hex link goes past the centerline of the driven arm... then the linkage can't be pulled back.

UNEVEN FOUR BAR LINKAGE

FIG 3



DRIVER°	10	20	30	40	50	60	70	80
DRIVEN°	3.2	7.7	15.0	24.0	35.0	47.0	60.0	76.0

SHAFT ROTATION RATIO

The shaft rotation ratio at any instant is determined by the ratio of the lengths of the perpendiculars to the Hex Link that pass through each shaft center. Example: In Fig 3, P_B (1.10") divided by P_A (.250") indicates 4.4° rotation of Shaft A to 1° for Shaft B in this position.

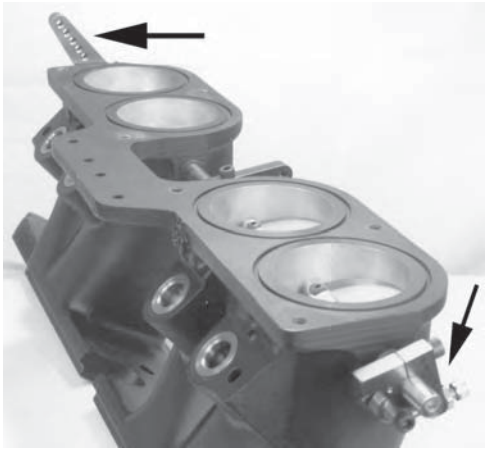
THROTTLE STOP

Fuel injection throttle stops, shafts, etc., are not made to take all the force that can be exerted with the driver's foot at full throttle. A pedal stop should be made, set at approximately 1/16" under the throttle pedal at lightly loaded full opening, to absorb excess force.

THROTTLE LINKAGE ATTACHMENT

The throttle linkage must be attached to the manifold at a point where it will pull directly against a throttle stop at full throttle. Avoid attaching the linkage where the full throttle force would go through a throttle shaft to get to the stop, as this could easily twist the shaft.

CORRECT
Pulling arm installed next to throttle stop



!!! INCORRECT !!!
Pulling arm on the oppisite end of the manifold from the throttle stop

For Safety...

TOE STRAP

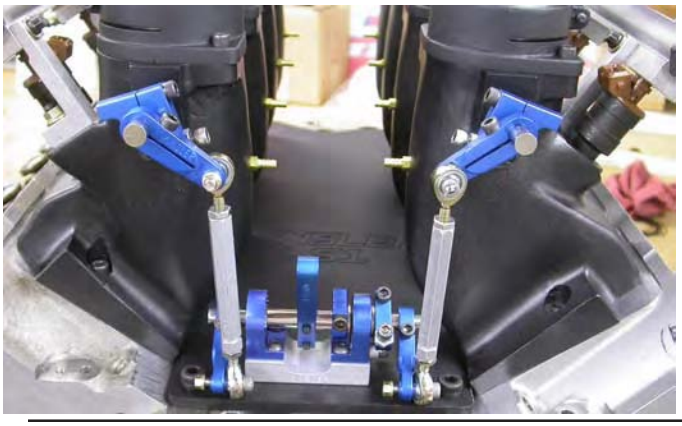
Make a sturdy strap for the throttle pedal that passes over the top of the driver's foot so if the linkage sticks, he can pull it back.

TOE KILL SWITCH

Mount a spring loaded push-in ignition kill switch where the toe strap will contact it if the driver's foot is pulled way back. Check it every time the vehicle is raced!

CLEARANCE FOR LINKAGE

No one ever got hurt because they had too much clearance! Consider the engine's shifted position due to severe torque and vibration. Also consider body panel flexing.



JACKSHAFT LINKAGE

Counter-rotates the throttle shafts allowing the throttle plates to be installed with the lower edge of each throttle plate out toward the valve cover. This will direct the air the same to every port as the throttles are opened.

Easy to set up and gives each shaft the exact same rotation.
See Page #62, 69.

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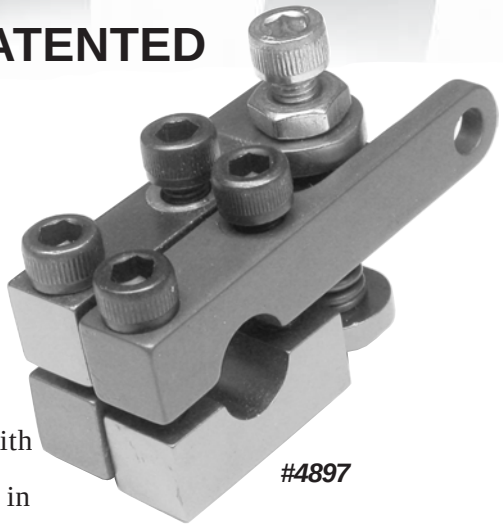
KINSLER SPRING-SCREW UNIVERSAL THROTTLE SHAFT LINKS

PATENTED

Available on most Kinsler manifolds. Can be installed on most other manufacturer's manifolds and special made units.

The Spring-Screw link with it's unique patented design ***acts as a combination slip and universal joint. It also has a screw for torsionally phasing the shafts and a spring to keep any looseness out of the joint.***

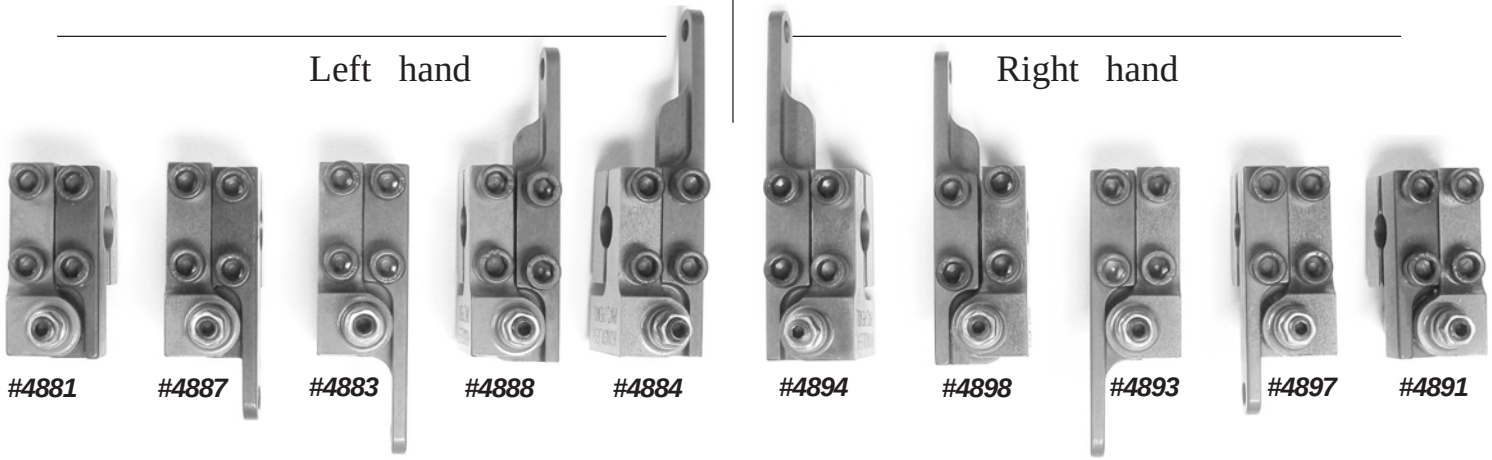


#4897

The bolt-on design allows ease of installation on an existing unit without having to disassemble the manifold. The adjusting screw allows synchronization of the front cylinders to the rear ones for smoother engine idling. 2024 aluminum, anodized blue; hard coated where the screw and rivet contact the tab for additional wear protection.

Made in "right" hand and "left" hand so that they can always be installed with the screw facing outwards for ease of adjustment, yet have the torque from the "driving" shaft pushing directly against the screw rather than the spring in the adjuster assembly.... this way the action is always positive. If pushed against the spring, a heavy load could compress it.

Left hand | Right hand



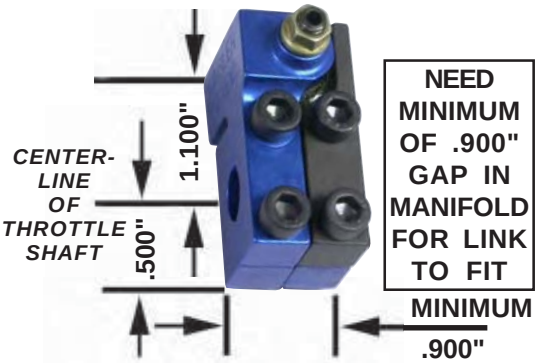
#4881 ***#4887*** ***#4883*** ***#4888*** ***#4884*** ***#4894*** ***#4898*** ***#4893*** ***#4897*** ***#4891***

4880	5/16", left hand, no arm	4890	5/16", right hand, no arm
4881	3/8", left hand, no arm	4891	3/8", right hand, no arm
4886	5/16", left hand, 1.430" C-C arm	4896	5/16", right hand, 1.430" C-C arm
4887	3/8", left hand, 1.430" C-C arm	4897	3/8", right hand, 1.430" C-C arm
4888	3/8", left hand, 1.430" C-C arm on opposite end	4898	3/8", right hand, 1.430" C-C arm on opposite end
4882	5/16", left hand, 1.750" C-C arm	4892	5/16", right hand, 1.750" C-C arm
4883	3/8", left hand, 1.750" C-C arm	4893	3/8", right hand, 1.750" C-C arm
4884	3/8", left hand, 1.750" C-C arm on opposite end	4894	3/8", right hand, 1.750" C-C arm on opposite end

Installation on Hilborn Chevrolet manifold

1. Cut the shaft without disassembling manifold

2. Bolt-on Kinsler spring-screw linkage



Determine style of link required and check for proper clearance

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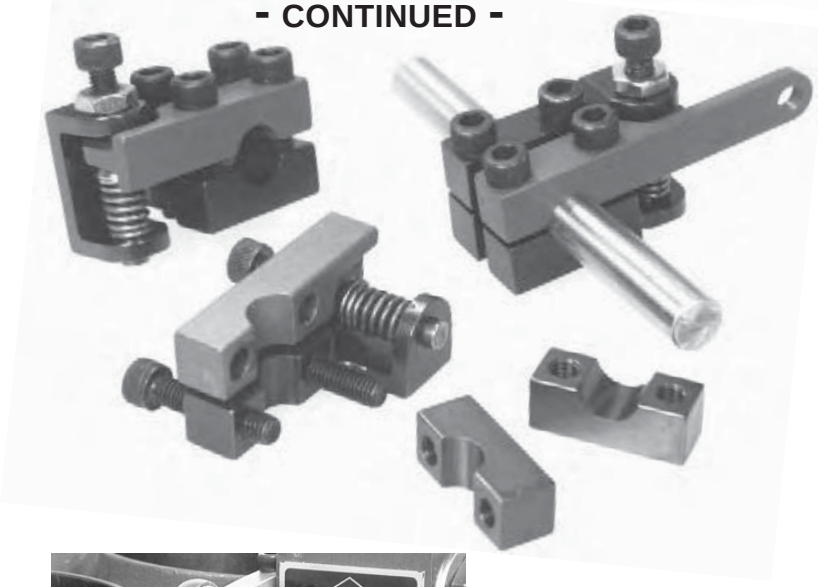
KINSLER SPRING-SCREW UNIVERSAL THROTTLE SHAFT LINKS

- CONTINUED -

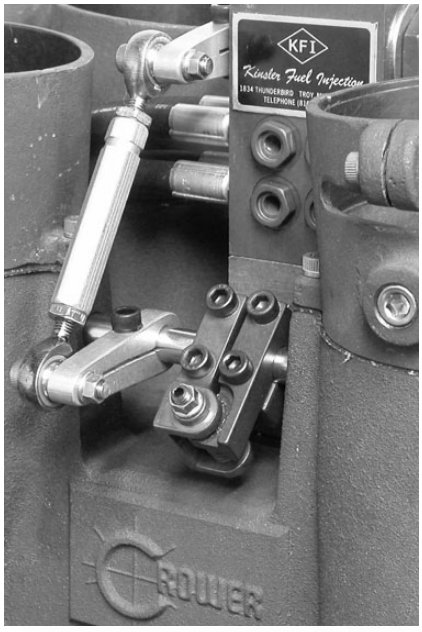


How these links can help YOU !

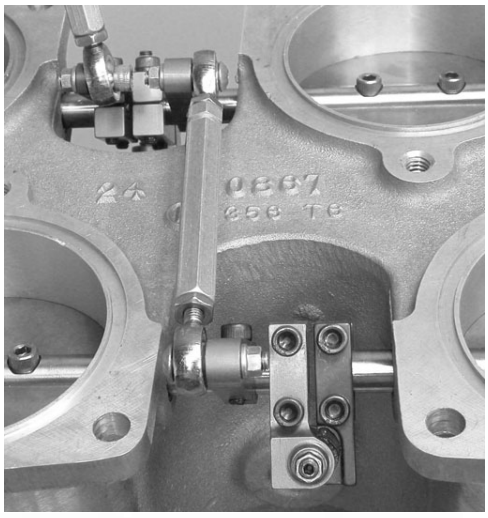
A manifold having a one piece throttle shaft going all the way through it can experience throttle sticking because :

1) Though a manifold may look quite rigid, it flexes when bolted down.
2) The throttle shaft is steel and the manifold is magnesium or aluminum. As the manifold heats or cools, it grows longer or shorter than the shaft, so the edges of the throttle plates are pushed into the sides of the throttle bores. This causes drag and greatly increases wear into the sides of the throttle bores.
3) Due to production tolerances, we find that in most brands of manifolds the throttle shaft bore in the front runners rarely lines up exactly with the one in the rear runners.... this puts the throttle shaft in a bind.
4) If the throttle shaft has a slight twist in it, the front throttle plates are open slightly more than the rear ones. Without the Spring-Screw link there is no way to correct it.

Our combination slip and universal spring-screw links fix all of these problems.

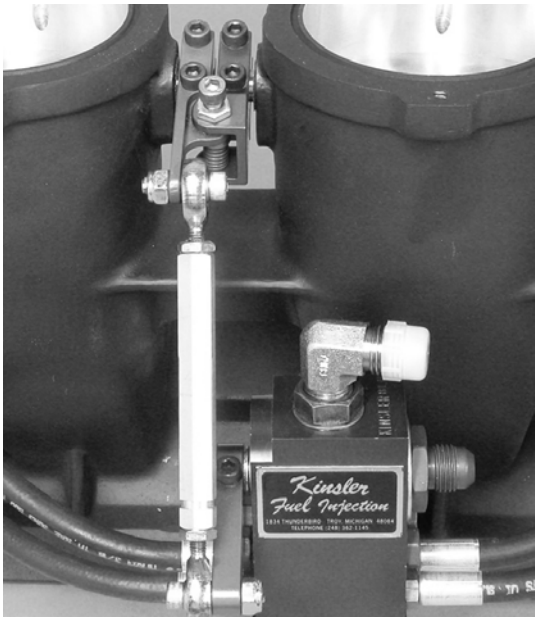


On Crower Chev manifold

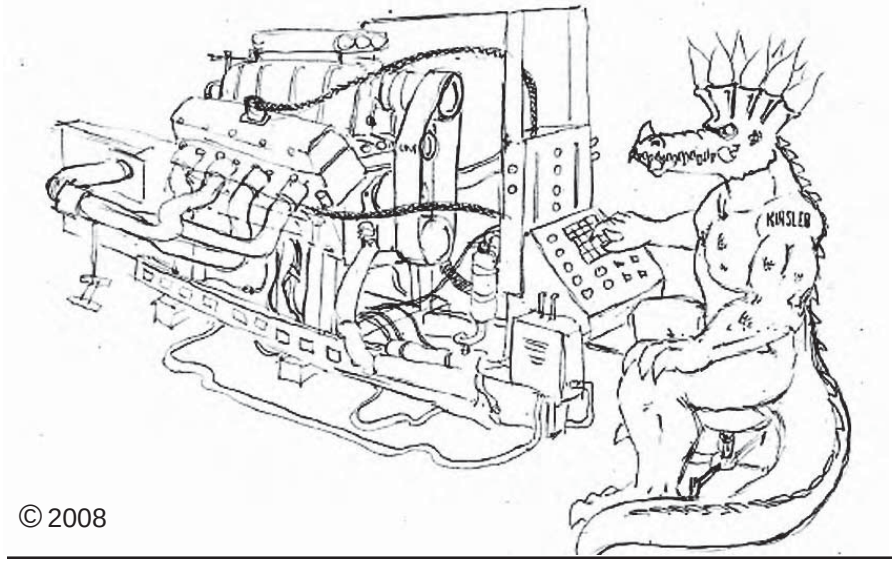


On Kiekhaefer Chev manifold

Installed on Kinsler Ford manifold



Installed on Kinsler Ford manifold



THROTTLE ARMS

Kinsler throttle arms are light weight, but super strong billet 2024-T4 aluminum. 10-32 Grade 8 socket head cap screws. Blue anodized. Custom color anodizing available; please call.

1 PIECE ARMS

#5493

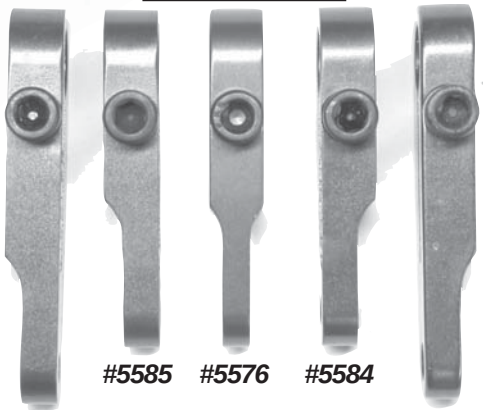
#5491

#5572

5490	5/16"	shaft, 1.430" C-C
5491	3/8"	shaft, 1.430" C-C
5492	5/16"	shaft, 1.750" C-C
5493	3/8"	shaft, 1.750" C-C
5570	5/16"	shaft, 1.0" C-C
5572	3/8"	shaft, 1.0" C-C

#5490 installed on barrel valve

SIDE CUT ARMS



#5585 #5576 #5584

#5589 #5588

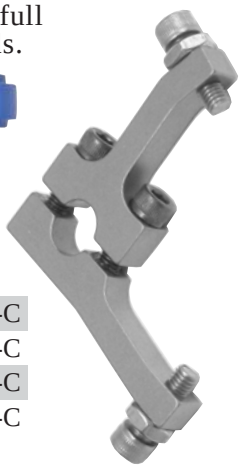
5576	3/8"	shaft, .163" thick center, 1.430" C-C
5582	5/16"	shaft, .200" thick right side, 1.430" C-C
5583	5/16"	shaft, .200" thick left side, 1.430" C-C
5584	3/8"	shaft, .200" thick right side, 1.430" C-C
5585	3/8"	shaft, .200" thick left side, 1.430" C-C
5586	5/16"	shaft, .200" thick right side, 1.750" C-C
5587	5/16"	shaft, .200" thick left side, 1.750" C-C
5588	3/8"	shaft, .200" thick right side, 1.750" C-C
5589	3/8"	shaft, .200" thick left side, 1.750" C-C

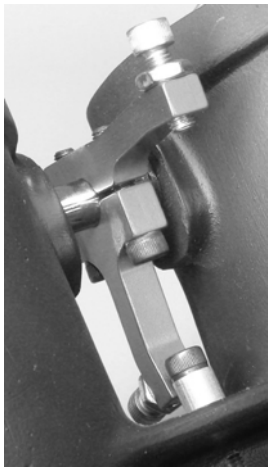
RELIEVED SURFACE

For additional rod end rotation while retaining full thickness for bolt threads.

5556	5/16"	shaft, 1.430" C-C
5557	3/8"	shaft, 1.430" C-C
5558	5/16"	shaft, 1.750" C-C
5559	3/8"	shaft, 1.430" C-C

IDLE/STOP ARM

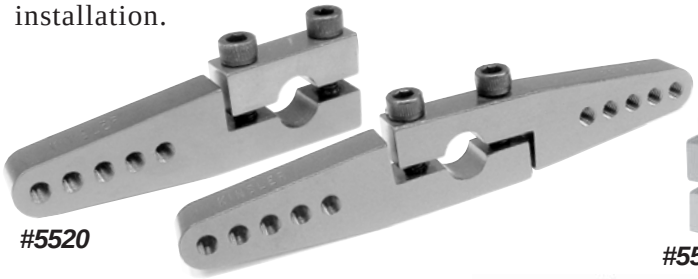




5555	2 pc., 3/8" shaft, includes stainless socket head adjusting screws with jam nuts

2 PIECE ARMS

Kinsler split style 2 piece arms are useful anywhere, especially when an arm or stop needs to be put in the center of a manifold. Throttle shafts do not have to be removed for installation.

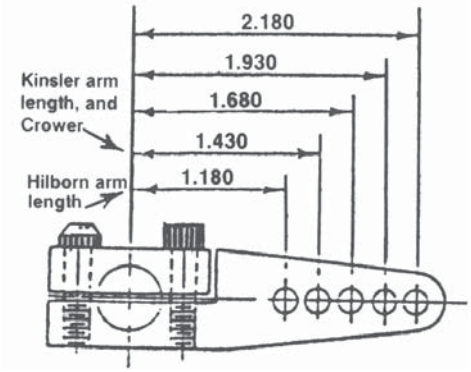


#5520

#5528

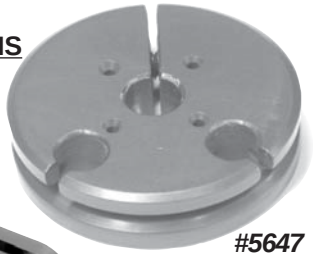
#5579

5520	5/16"	single, 1.180-2.180" C-C
5521	3/8"	single, 1.180"-2.180" C-C
5522	1/2"	single, 1.180"-2.180" C-C
5528	3/8"	single, .750" C-C
5579	5/16"	double, 1.180"-2.180" C-C
5580	3/8"	double, 1.180"-2.180" C-C
5581	1/2"	double, 1.180"-2.180" C-C

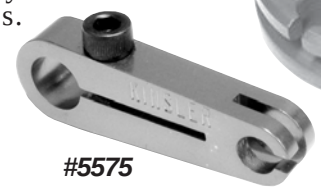


CABLE ACTIVATED ARMS

Machined to accept barrel type cable end. Mostly used on motor-cycles.



#5647



#5575

Close-up of cable end detial

5571	5/16"	shaft, 1.0" C-C
5573	3/8"	shaft, 1.0" C-C
5574	5/16"	shaft, 1.430" C-C
5575	3/8"	shaft, 1.430" C-C
5647	5/16"	shaft, dual cable wheel, .625" C-C, 1.600" O.D.
5648	3/8"	shaft, dual cable wheel, .625" C-C, 1.600" O.D.

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ARMS AND STOPS

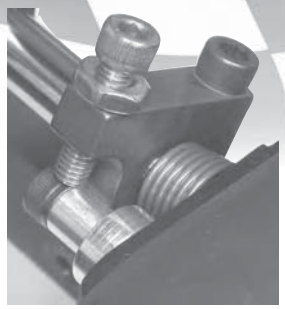
ONE-PIECE STOPS

Billet 2024-T351 aluminum, blue anodized, uses 10-32 grade 8 socket head cap screw for positive clamping and stainless steel adjusting screw with jam nut. Drilled for Kinsler safety return spring.


#5496

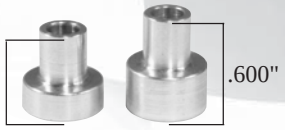

#5599

5496	5/16" shaft
5497	3/8" shaft
5599	3/8" shaft, ear type


#5497 stop with safety return spring and boss

STOP BOSSES

Billet 2024-T4 aluminum, uses 10-32 grade 8 socket head cap screw for mounting.



5507-S 5507-L

5507-S	Stop boss, short style
5507-L	Stop boss, long style

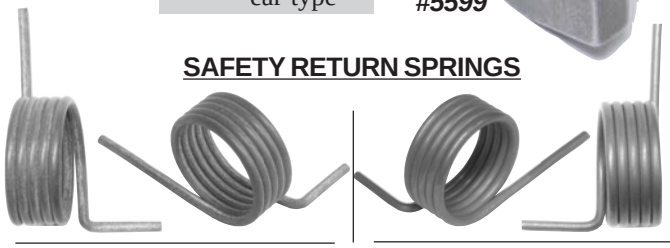
PROGRESSIVE LINKAGE BAR

#5567

#5566

5566	Stainless steel, for Kinsler standard series four barrel throttle body. For throttle shafts on 1.935" C-C with a 1.430" C-C driver arm and a .750 C-C driven arm
5567	Stainless steel, for Kinsler high flow series four barrel throttle body. For throttle shafts on 2.750" C-C with a 1.430" C-C driver arm and a .750" C-C driven arm

SAFETY RETURN SPRINGS

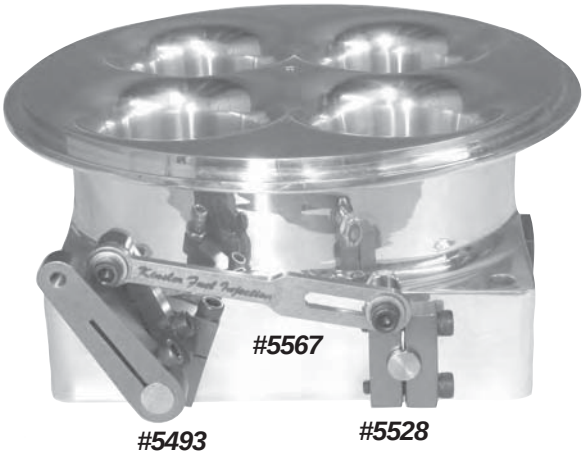

Left Hand Rotation Right Hand Rotation

7713-R	Standard tension, right hand rotation
7713-L	Standard tension, left hand rotation
7715-R	Light tension, right hand rotation
7715-L	Light tension, left hand rotation

SAFETY RETURN SPRING TENSIONER


#5598 #5598-E

5577	5/16" shaft, safety returrn spring tensioner
5598	3/8" shaft, safety return spring tensioner
5598-E	3/8" shaft, safety return spring tensioner with stop ear


#5567 #5493 #5528

H-TYPE LINKAGE


#5499


#5593

5592	5/16" shaft, 1.180" C-C
5593	3/8" shaft, 1.180" C-C
5498	5/16" shaft,
5499	3/8" shaft,

E-TYPE LINKAGE


#5504 #5518 #5508 #5529 #5495

5494	5/16" serrated shaft, 1.28" C-C
5508	3/8" serrated shaft, 1.28" C-C
5495	5/16" serrated shaft, 1.28" & 1.71" C-C
5517	5/16" serrated shaft, 1.30", 1.71" x 1.31" C-C
5518	3/8" serrated shaft, 1.30", 1.71" x 1.31" C-C
5519	7/16" serrated shaft, 1.30", 1.71" x 1.31" C-C
5500	5/16" serrated shaft, bronze
5504	3/8" serrated shaft, bronze
5505	7/16" serrated shaft, bronze
5529	Thumb adjusting screw, 10-32 thread

TWO-PIECE STOPS

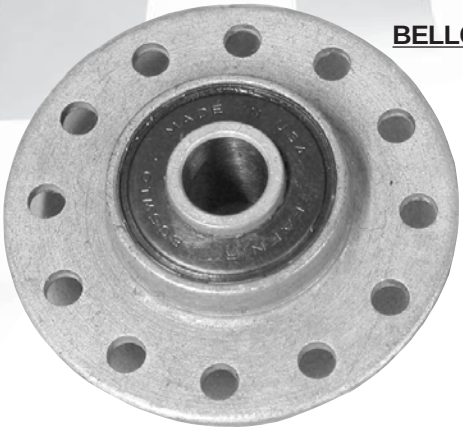
Billet 2024-T351 aluminum, blue anodized, uses 10-32 grade 8 socket head cap screw for positive clamping and stainless steel adjusting screw with jam nut.


#5524


#5527

5523	5/16" shaft
5524	3/8" shaft
5525	1/2" shaft
5526	Idle/stop arm, 5/16" shaft, adjustable Wide Open Throttle (W.O.T.) screw and thumb screw for idle setting
5527	Idle/stop arm, 3/8" shaft, adjustable W.O.T. screw and thumb screw for idle setting

BELLCRANK BEARINGS AND ARMS



BELLCRANK BEARING

Aircraft quality sealed ball bearing. Twelve #6 holes (.135" dia.) at 30° increments. Two center hole sizes, each with a different bolt circle diameter.

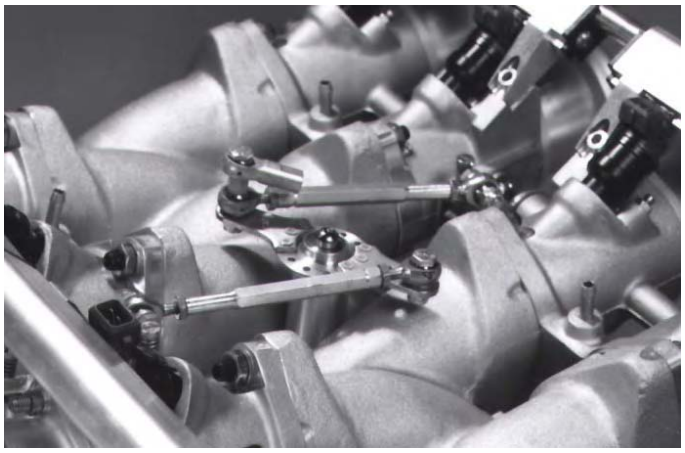
5469	1/4" I.D. shaft hole, 1.625" overall diameter with 1.315" bolt circle
5485	5/16" I.D. shaft hole, 1.690" overall diameter with 1.380" bolt circle

ARMS FOR BELLCRANK BEARING

#5486 #5443 #5444 #5442

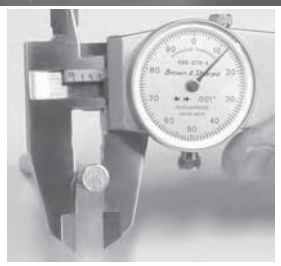
Center-To-Center using:		#5469 (1/4")	#5485 (5/16")
5486		1.395"	1.430"
5443		2.090"	2.125"
5444		2.265"	2.300"
5442		1.155"	1.185"
	Five	1.400"	1.430"
	Hole	1.650"	1.680"
	Arm	1.900"	1.930"
		2.130"	2.160"

Blue anodized 2024 aluminum. Includes mounting bolts and elastic locknuts. The center-to-center measurement is from the center of the bell crank bearing hole to the center of hole in arm.



Center bellcrank linkage on small block Chevrolet cross-ram manifold

On Kinsler small block Chev



SHAFT MATERIAL

Precision ground and polished. Sold per inch.

	DIAMETER	MATERIAL
4760	5/16" (.312")	Stress proof steel
4761	3/8" (.375")	Stress proof steel
5452	5/16" (.312")	303 stainless steel
5453	3/8" (.375")	303 stainless steel

90 DEGREE ANGLE LINKAGE DRIVE

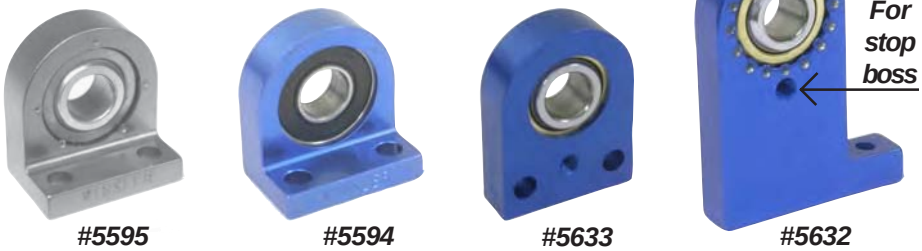
Arms and hex link assemblies sold seperately

#5487

5487	Aluminum housing, sealed ball bearings, 3/8" dia. counter-rotating shafts, 1:1 ratio

#5487

PILLOW BLOCKS Billet aluminum



#5595 #5594 #5633 #5632

5595	5/16"	I.D. spherical brg.	.650" base to brg. ctr.	.750" C-C	#10 mount holes 1.120" width
5596	3/8"	I.D. spherical brg.	.650" base to brg. ctr.	.750" C-C	#10 mount holes 1.120" width
5594	5/16"	I.D. ball brg.	.650" base to brg. ctr.	.750" C-C	#10 mount holes 1.120" width
5635	5/16"	I.D. spherical brg.	.650" base to brg. ctr.	.760" C-C	#10 mount holes 1.120" width
5633	3/8"	I.D. spherical brg.	.650" base to brg. ctr.	.760" C-C	#10 mount holes 1.120" width
5634	5/16"	I.D. spherical brg.	1.650" base to brg. ctr.	.880" and 1.200" C-C	#10 mount holes 1.650" width
5632	3/8"	I.D. spherical brg.	1.650" base to brg. ctr.	.880" and 1.200" C-C	#10 mount holes 1.650" width

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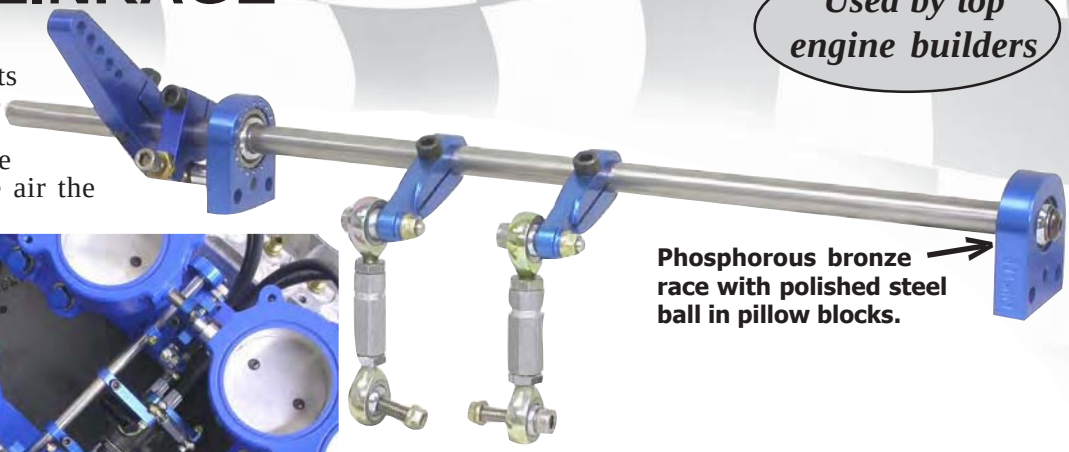
JACKSHAFT LINKAGE

Used by top engine builders

Counter-rotates the throttle shafts allowing the throttle plates to be installed with the lower edge of each throttle plate out toward the valve cover. This will direct the air the same to every port as the throttles are opened.

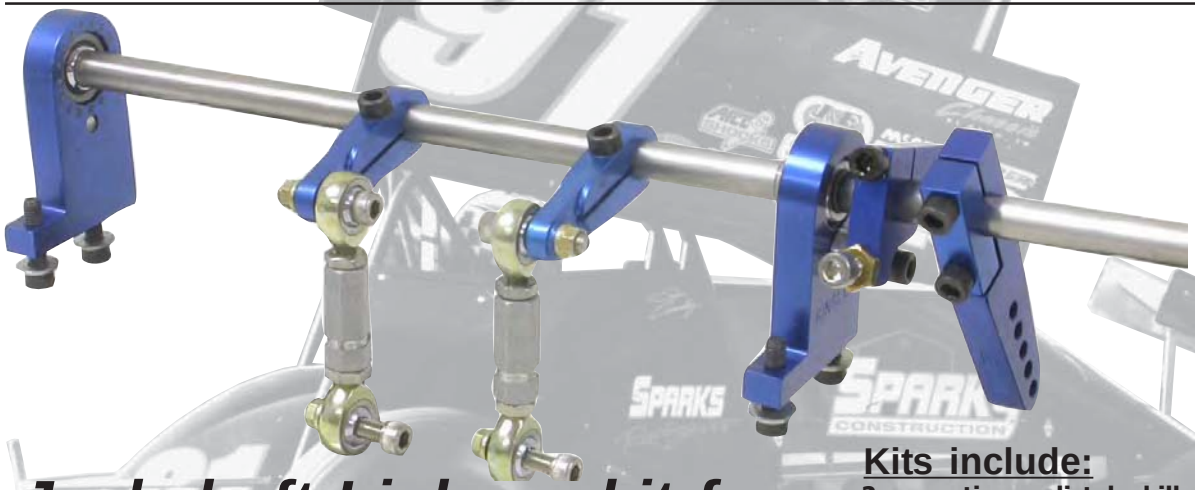
Easy to set up and gives each shaft the exact same rotation. See Page #62, 63.



Phosphorous bronze race with polished steel ball in pillow blocks.

Jackshaft linkage kit installed on Dragon Claw manifold

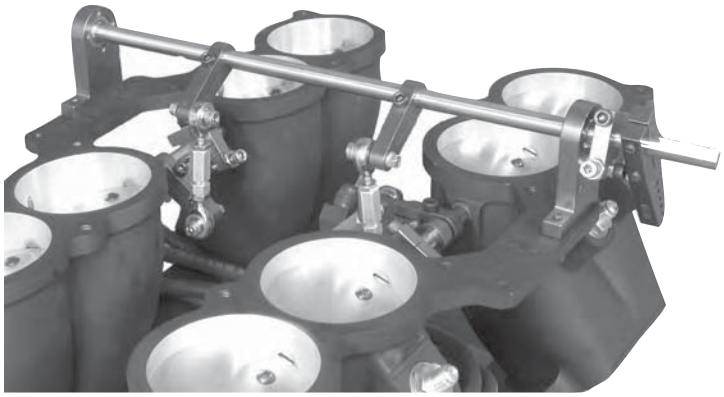
Jackshaft Linkage kit for Kinsler Dragon Claw Small Block Chev



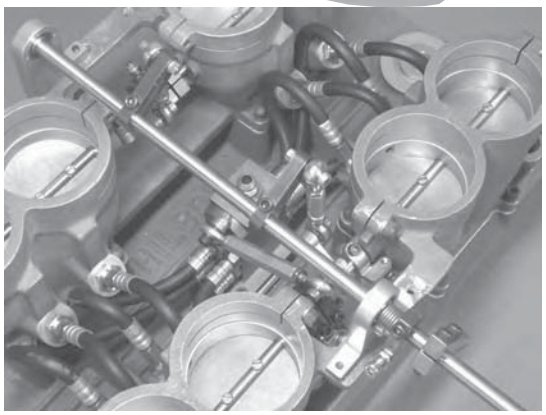
Jackshaft Linkage kit for Kinsler traditional and Hilborn Small Block Chevrolet and Mopar

Kits include:

- **2- mounting pedistals, billet aluminum with spherical ball bearings**
- **2- throttle arms, one piece**
- **2- hex link assemblies with rod ends and hardware**
- **1- throttle stop with stop boss**
- **1- throttle arm, two piece, multi-hole**
- **1- cross shaft, stainless steel, titanium is available**



Jackshaft installed on Kinsler traditional small block Chevrolet manifold

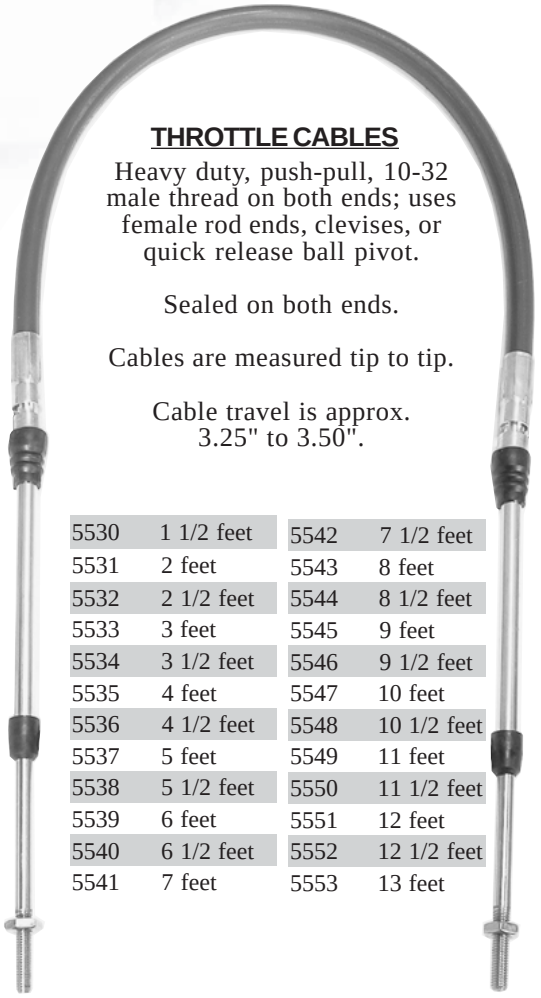


Jackshaft installed on Hilborn small block Chevrolet manifold

CABLES & ACCESSORIES

Excellent for actuating fuel injection manifolds or throttle bodies, carburetors, or shut off valves.

6" minimum bend radius
50 lb max. pull load
40 lb max. push load



THROTTLE CABLES

Heavy duty, push-pull, 10-32 male thread on both ends; uses female rod ends, clevises, or quick release ball pivot.

Sealed on both ends.

Cables are measured tip to tip.

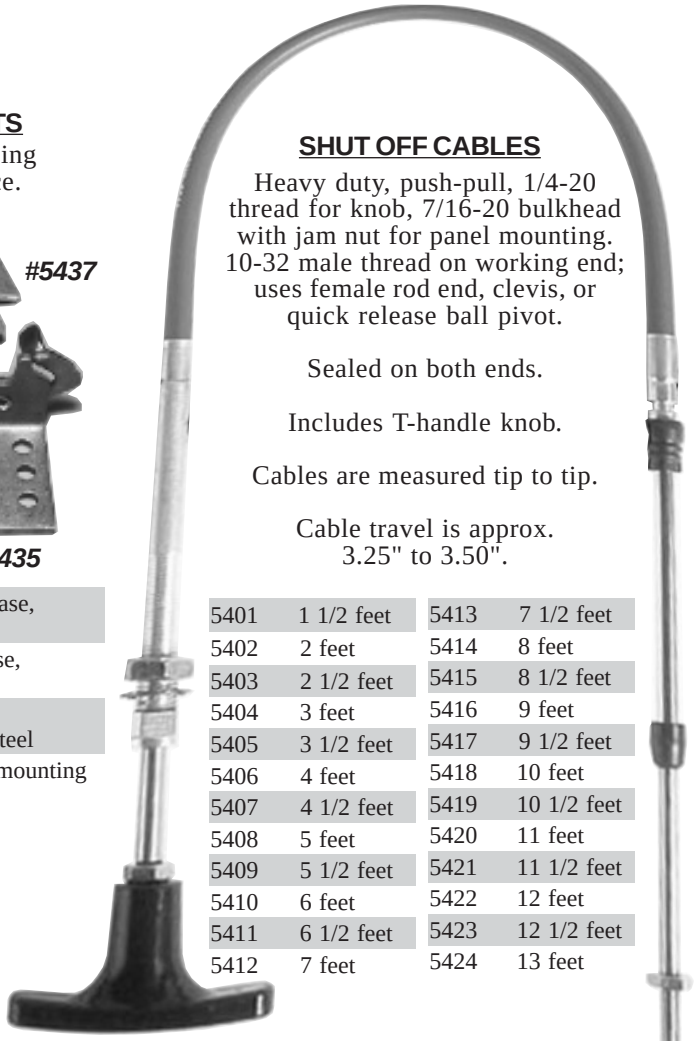
Cable travel is approx. 3.25" to 3.50".

5530	1 1/2 feet	5542	7 1/2 feet
5531	2 feet	5543	8 feet
5532	2 1/2 feet	5544	8 1/2 feet
5533	3 feet	5545	9 feet
5534	3 1/2 feet	5546	9 1/2 feet
5535	4 feet	5547	10 feet
5536	4 1/2 feet	5548	10 1/2 feet
5537	5 feet	5549	11 feet
5538	5 1/2 feet	5550	11 1/2 feet
5539	6 feet	5551	12 feet
5540	6 1/2 feet	5552	12 1/2 feet
5541	7 feet	5553	13 feet

CABLE BRACKETS

Easy cable mounting to any flat surface.

5435	Single, quick release, stainless steel
5428	Dual, quick release, stainless steel
5436	Bolt down type, cadmium plated steel
5437	U-type, multiple mounting holes, aluminum



SHUT OFF CABLES

Heavy duty, push-pull, 1/4-20 thread for knob, 7/16-20 bulkhead with jam nut for panel mounting. 10-32 male thread on working end; uses female rod end, clevis, or quick release ball pivot.

Sealed on both ends.

Includes T-handle knob.

Cables are measured tip to tip.

Cable travel is approx. 3.25" to 3.50".

5401	1 1/2 feet	5413	7 1/2 feet
5402	2 feet	5414	8 feet
5403	2 1/2 feet	5415	8 1/2 feet
5404	3 feet	5416	9 feet
5405	3 1/2 feet	5417	9 1/2 feet
5406	4 feet	5418	10 feet
5407	4 1/2 feet	5419	10 1/2 feet
5408	5 feet	5420	11 feet
5409	5 1/2 feet	5421	11 1/2 feet
5410	6 feet	5422	12 feet
5411	6 1/2 feet	5423	12 1/2 feet
5412	7 feet	5424	13 feet

CABLE HANDLES

Available for 1/4-28 and 10-32 thread, round or t-type.

#5429 #5439

5429	Round, 10-32 female thread, not printed
5439	T-type, 10-32 female thread, printed 'Shut-Off'
5440	T-type, 1/4-20 female thread, printed 'Shut-Off'
5441	Round, 1/4-20 female thread, not printed

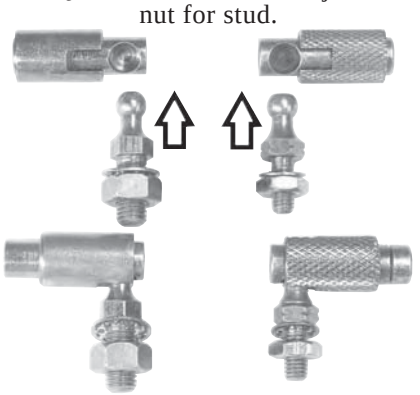
CLEVISES

#5445 #5446

5445	10-32 right hand female
5446	10-32 right hand male
5447	1/4-28 right hand female
5448	1/4-28 right hand male
5450	5/16-24 right hand female
5451	5/16-24 right hand male

BALL PIVOTS

Quick release, includes jam nut for stud.



5430	10-32 female x 10-32 male stud
5431	10-32 female x 1/4-28 male stud
5433	1/4-28 female x 1/4-28 male stud

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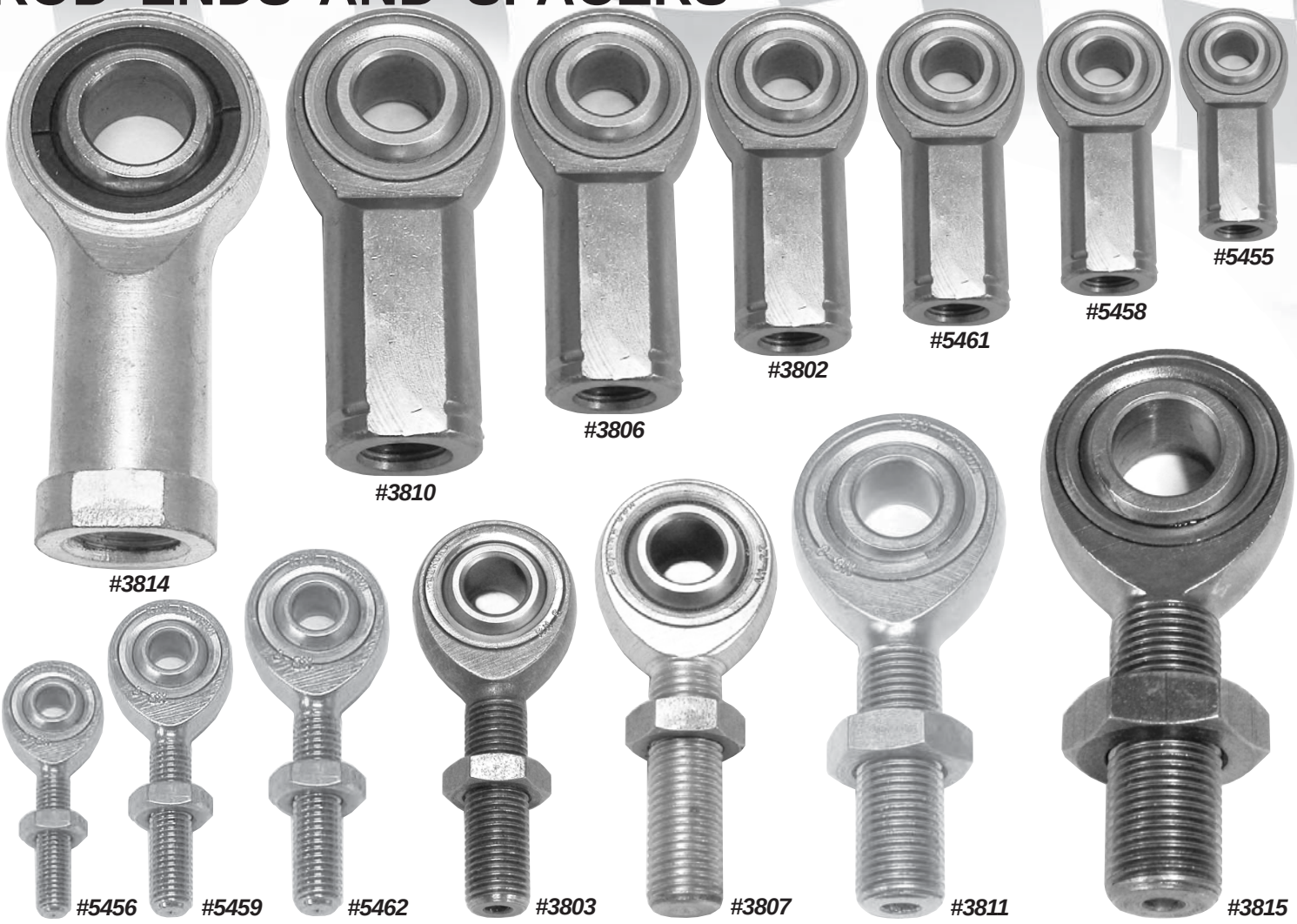
ROD ENDS AND SPACERS

Shown close to actual size

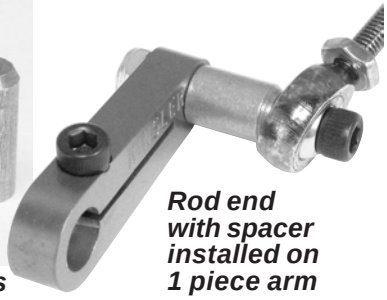


5455	10-32 right hand female
5456	10-32 right hand male
5456-S	10-32 right hand male, for use with hex bars shorter than 1 1/2"
5457	10-32 left hand male
5457-S	10-32 left hand male, for use with hex bars shorter than 1 1/2"
5458	1/4-28 right hand female
5459	1/4-28 right hand male
5460	1/4-28 left hand male
3800	1/4-28 left hand female
5461	5/16-24 right hand female
5462	5/16-24 right hand male
5463	5/16-24 left hand male
3801	5/16-24 left hand female

3802	3/8-24 right hand female
3803	3/8-24 right hand male
3804	3/8-24 left hand male
3805	3/8-24 left hand female
3806	7/16-20 right hand female
3807	7/16-20 right hand male
3808	7/16-20 left hand male
3809	7/16-20 left hand female
3810	1/2-20 right hand female
3811	1/2-20 right hand male
3812	1/2-20 left hand male
3813	1/2-20 left hand female
3814	5/8-18 right hand female
3815	5/8-18 right hand male

#5457-S for use with hex bars shorter than 1 1/2"

Rod end spacers



Rod end with spacer installed on 1 piece arm

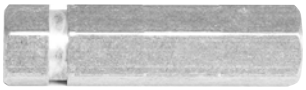
5465	Spacer, aluminum, #10 through hole, specify length .100" to .700"; available in .050" increments

3/8" hex with 10-32 right and left hand threads. Stocked in 1/4" increments from 1" to 12". 2011 aluminum. Also available unmachined; sold per inch.

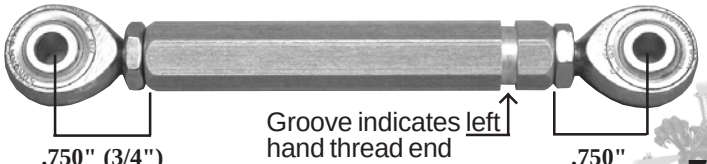
⇨ 10-32 rod ends add 1 1/2" total to the overall length.

⇨ Hex bars shorter than 1 1/2" require #5456-S and #5457-S rod ends.

HEX BARS



5454	3/8" hex material, not machined, sold per foot
5480	10-32 R & L hand female thread, 1" to 5" every 1/4"
5481	10-32 R & L hand female thread, 5 1/4" to 7" every 1/4"
5482	10-32 R & L hand female thread, 7 1/4" to 9" every 1/4"
5483	10-32 R & L hand female thread, 9 1/4" to 12" every 1/4"



A BRIEF HISTORY OF FUEL INJECTION

CARBS TO CONSTANT FLOW, TO LUCAS MECHANICAL, AND FINALLY ELECTRONIC

CARBS TO CONSTANT FLOW

Back in the fifties it was either carbs or constant flow fuel injection. The basic cost for an out of the box carb was quite cheap compared to injection. However, to get the mixture distribution right with the carb took a pretty smart person a lot of time, as both the air distribution and the fuel distribution were tough to get right, and they changed with engine RPM and load. A really good running set of carbs would wind up costing a lot more than the injection, and even then carbs did poorly with combinations of both straightaway acceleration and cornering as the floats and bowls hadn't been developed far enough. Even today's carbs don't handle boating through rough waters well, as it's impossible to meter the fuel if it's bouncing off the top of the float bowl. Don't get us wrong - we're not knocking carbs, as tens of millions of them have done an admirable job for many years when used on the application they were designed for.

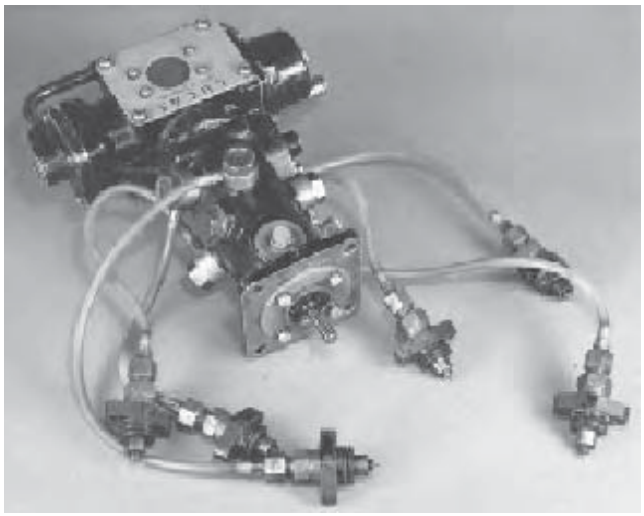
If you bought a good set of individual runner injection, the air distribution was just about perfect right out of the box, since all of the runners were cast the same and had a radiused bell at each entrance. If your unit had a properly matched set of nozzles the fuel distribution had to be good, since there was one nozzle in each runner. Other advantages of the injection was that you could change the fuel mixture quickly by just changing one jet (even from the dashboard while driving), and you could run alcohol and nitro. There were no carbs at the time that did a good job with these fuels.

Walt Kolodziej's 'Blue Meanie' small block Chev with Kinsler injection

Most of the early injection was of the constant flow design, which to this day is the most rugged and dependable system. The basic fuel metering is done by sensing throttle angle and engine speed. The throttle rotates a spool with a tapered ramp inside a metering block; it has a samll opening to the nozzles at an idle, which gets larger as the throttles are opened. Engine speed is sensed by using a positive displacement pump driven by the engine, so when the engine speed doubles, the output of the pump doubles. This system has always worked well for drag racing, where the fuel can easily be kept cool. In round track or road racing, the fuel gets hotter the longer you run, both from the track heat and the warm fuel returning to the tank. Because the light ends in gasoline boil at about room temperature, or even lower if you have any vacuum at the inlet of the pump caused by a restriction in the inlet line from the tank, the fuel pump doesn't draw in all the fuel it should, which causes a lean condition. The car will run just fine early in the race, but after a while it gets "lazy".... the power and reaponse fall off and you may even burn a piston. The solution is to pressurize the pump inlet line so the fuel can't boil. Our vapor separator tank is the heart of an excellent off-the-shelf system that can take care of this. A nice feature of the constant flow system is that you can tailor bumps and dips into the fuel curve using special metering pieces that we have available. While alcohol doesn't boil as easily as gasoline, it still requires a carefully plumbed inlet line to the pump to prevent lean-out.

LUCAS MECHANICAL

In the early sixties both Lucas and Bosch mechanical timed injection became popular because of several nice features because they use the stroke of a piston to precisely meter the fuel. The fact that they are timed allows you to inject the fuel at just the right instant to avoid letting any go through during valve overlap, thus giving better potential fuel economy. These systems also meter the fuel well during engine starting and idle which prevents washing off the upper cylinder lube. The nozzles are of a valve-and-seat design, so there is no dripping of the fuel into the engine on shutdown, even without a fuel shut-off valve. The throttle response is very crisp, as you get the new fuel rate within two revolutions of the engine after moving the throttle pedal. Finally, the output of the pump is not a basic part of the metering system, so if the pump were to cavitate say 10%, it would have no effect on the mixture at all. All of these features make this system very popular for road race cars.
A drawback of both the Lucas and Bosch is that to get more than a simple straight line fuel curve you have to make a complex three dimensional fuel cam. Even today, an engine with a Lucas or Bosch mechanical system with the simple straight line fuel curve runs quite well, because the internal combustion engine is so beautifully forgiving... it puts out almost full power from about three percent lean to about six percent rich.



1963 Maserati Mistral Lucas mechanical fuel metering system

ON TO ELECTRONIC

In the late sixties various auto companies started serious electronic fuel injection (EFI) programs for better economy, driveability, and emissions. What needed to be done was obvious, but the progress was slow because of the difficulty of developing good low cost injectors and electronic bits. The exciting thing about using electronics is that you can look at as many inputs as you want to for very little money. Why? With any mechanical device, either carbs or injection, it is quite cumbersome and expensive to sum more than a few inputs. With electronics it is easy and cheap to sum as many as you want. So while only throttle angle or intake vacuum combined with engine speed had been used in most mechanical systems, now you could sense air, water, oil, and fuel temperature, barometer, rate of throttle opening, etc. With computing ability, it became easy to have complex maps of fuel mixture vs. RPM for various throttle angles, acceleration enrichment, controlled enrichment from cold starting to hot running, etc. Bosch was the clear leader in the early EFI work, introducing the system on the 1967 Volkswagen.

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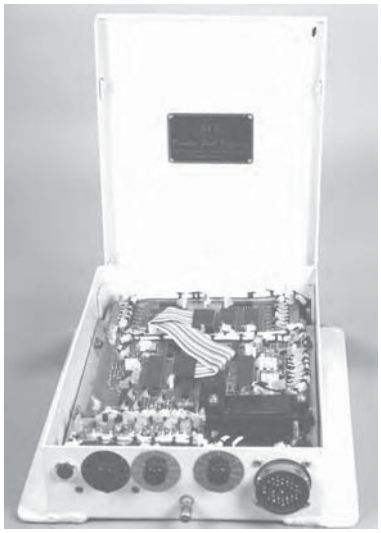
A BRIEF HISTORY OF FUEL INJECTION

In the early seventies, EFI became more popular on passenger cars. It was very expensive compared to carbs, as the carbs had been developed for many years to do a reasonable job while being mass produced using die castings. Just a couple of the EFI injectors cost as much as a carburetor. A V8 has as many as eight injectors, a complicated fuel rail, various sensors, and a complex wiring harness and electronic control unit (ECU). So why did they go to the EFI? It was a combination of political pressure due to fleet economy and emission requirements, image, startability, driveability, and the hopes that volume use and further research would lower the cost, which it certainly has.

In the early eighties the first race ECU's appeared in the speed industry. They were quite basic, expensive, and tedious to program. Various sports cars tinkered with the EFI, and a Formula Vee series ran exclusively with it. A lot of this equipment was initially supplied by Bosch, with advancements being made by other companies that produced racing-only boxes.



First Zytek 'white' ECU; 1984.

Used an EPROM chip that had to be 'burned' outside of the ECU with hexidecimal code, then installed in the unit. It did have the luxury of having trim knobs for some field adjusting.

Because of its ability to handle a very complex engine fuel map with ease, EFI was literally snatched up by the F-1 cars in the mid-eighties for their turbo motors. While the output of these engines at about 750 horsepower from 92 cubic inches on gasoline looked impressive to most of the world in 1983, the developers knew that they were making tremendous compromises to stay safe with the limitations of their mechanical systems. Within just a few years after introducing EFI, some F-1 engines were dynoing at nearly 1,250 horsepower or 13.5 horsepower per cube!! They ran about 1,000 horsepower on the track for qualifying and dropped back further for the actual race. Any skepticism about the ability of EFI to run with massive ignition interference, heat, or vibration was silenced.

By the end of the eighties there were more than a dozen companies making aftermarket and racing electronic control systems; several of them being quite reputable with good solid products. The popular use of the systems was on road race, Indy cars, offshore race boats and high performance street machines, all these having rather complex fuel requirements. Today, drag racing is seeing limited use of EFI, both because of rule restrictions, and the relatively simple fuel requirements (wide open throttle only) for most type of engines operating on the drag strip... constant flow metering still works quite well there.

The control boxes now available for racing range from basic ones at $1,500-$3,000 with programming software, to extremely complex systems that sense everything you can think of at $5,500-$15,000 with programming aids and software that are very user friendly and will run on laptop computers. Add to all this the cost of injectors at $40-100 each for common types, wiring harness at $300 for the street type to $1,500 for a good race harness, to $4,000 for super quality F-1 type harnesses. Fuel rails are $200 for the basic ones, $400 for high flow aluminum, to $800 for custom built stainless steel. Add a manifold, fuel pump, filter, pressure relief valve, etc. and you go from a complete system for high performance street use at about $4,500, serious on-track system at $7,000 to the most sophisticated at $11,000 to $21,000 including engineering time.

Indy 500 winner, Treadway Racing's car driven by Arie Luyendyk using Kinsler manifold, filters, p.r. valve

Electronics surround us everywhere we go, and they are in the automotive world to stay. EFI applied to the correct applications in racing can actually save money. A supercharged or turbocharged drag race engine costs from twenty to fifty thousand dollars. It can be destroyed in an instant if it isn't fueled properly. Most of the present mechanical fuel systems are a compromise on these engines. EFI allows complete mapping of the engine, suppling the correct amount of fuel at every possible condition. Programmed meticulously, reliability will be gained using EFI.

Racing has been an innovative and progressive sport. Considering that Buick was 100% EFI in the mid-80s, it only makes sense that there should be at least a couple of competition classes where the creative racer can dabble with the latest technology. There are a lot of systems and components available now and the cost has come down to an affordable range. EFI has arrived to stay !

So where does all this put us? Electronic fuel injection is becoming more advanced and sophisticated, so selecting the features needed for an application can be confusing. Kinsler Fuel Injection can help you work through the choices to find the right components for your project.

We decided not to make our own electronic control because there are excellent ones available. We carry most brands of E.C.U.s and components, and make complete systems for any application. We have technicians who are glad to advise you on what to use for your application. They are happy to assist you no matter what mix of brands you plan on using, or what you may already have. ***Give us a call!***

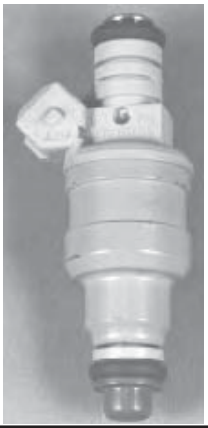
COMPARISON OF RACING FUEL INJECTION SYSTEMS

	Constant Flow	Lucas Mechanical	Electronic
Complete race metering system cost with pumps but without manifold	$1,500.00	$7,500.00	$2,500.00 - $15,000.00 plus cost of laptop computer to run it
Dependability	Excellent	Excellent	Very good with electronics properly selected for the intended application
Ability to calibrate to exact engine requirement	Fair to Good	Poor to fair	Very excellent + Programmed ignition
Time to calibrate on dynomometer	1 - 4 Hours	1 - 2 Hours	2 - 12 Hours, but varies dramatically according to features and user aids
Ability to run methanol and/or nitromethane fuels	Excellent	Poor or not able	Fair - requires constant maintenence High risk of long term component failure
Self adjusting to atmospheric conditions	No	On production car models	Yes
Does unit control metering during starting	Poor; little or no atomization during cranking	Very good	Excellent
Ease of starting	Fair	Very good	Excellent
Ability to set clean idle yet have good throttle response	Poor	Fair	Excellent
Function of nozzles/injectors	Meter by pressure drop across orifice	Atomization only; no metering function	Meter by pressure drop across 'orifice' plus electronically controlled duty cycle
Nozzle/injector atomization quality	Poor -- to -- Good (low RPM) to (high RPM)	Excellent	Excellent
Tendency for nozzles/injectors NOT to drip after shutting engine off	Poor; very poor if you don't use a shut-off valve	Very good	Excellent
Fuel economy	Poor	Fair	Excellent
Ease of cleaning nozzles/injectors	Good	Fair	Poor if you don't have special equipment
Ease of maintenance of overall system	Excellent	Good	Fair

CONSTANT FLOW NOZZLE

LUCAS MECHANICAL TIMED NOZZLE

ELECTRONIC INJECTOR



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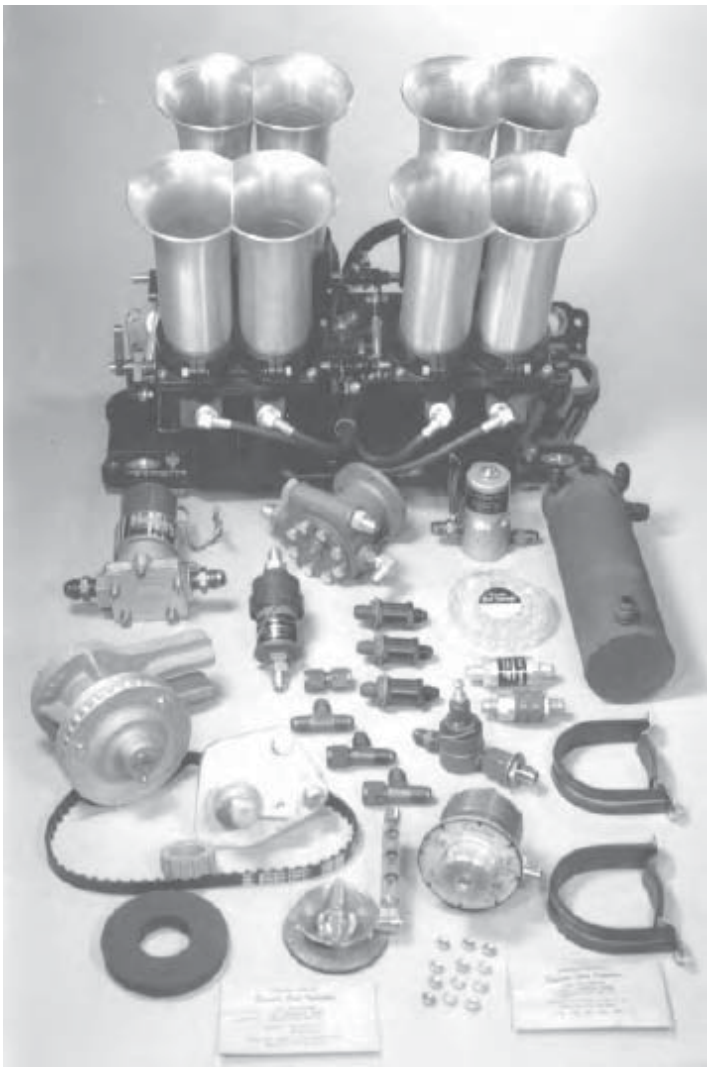
CONSTANT FLOW FUEL INJECTION METERING

Constant flow systems are very flexible and cost effective for many types of racing, engine configurations, and fuels. They are capable of suppling a very wide range of fuel requirements. The system can be easily configured and tuning is accomplished by increasing or decreasing the systems operating pressure.

A constant flow system uses a mechanical fuel pump to increase/decrease the supply flow to the injection unit directly related to engine RPM. This variable flow creates pressure against the fixed orifices of the main bypass jet and the nozzles. The idle and the part throttle fuel rate is controlled by utilizing a barrel valve assembly. Kinsler can supply additional bypasses and enrichment circuits to provide added flexibility.

Steve Kinser, 19-time, World of Outlaw Sprint Car Champion



Basic components of a constant flow fuel injection system :

A) Air control - individual runner (I.R.) manifold or throttle body.
B) Barrel valve assembly - barrel valve houses the spool. The spool controls fuel for idle and part throttle. There is a selection of spools for different engines and fuels.
C) Nozzles - fixed orifice in the runner or plenum of intake manifold. Sized for specific engine application and fuel being used.
D) Nozzle hoses - connects barrel valve or distribution block to nozzles.
E) Main bypass jet can - houses poppet and spring for basic idle fuel pressure, holds main bypass jet.
F) Main bypass jet - this orifice works in conjunction with pump and nozzles to set the overall fuel delivery of the system. It can be quickly changed to adjust the base fuel rate.
G) Fuel pump (mechanical) - positive displacement pump.
H) Fuel pump drive - typically drives fuel pump at 1/2 engine RPM. Can be mounted to camshaft or belt driven.
I) Fuel shut-off valve - stops fuel flow to barrel valve to allow the engine to be shut-off.
J) Fuel filter - filters the fuel to protect nozzles, bypass valves, and barrel valve.

Optional components :

K) Secondary bypass valve - allows tuning flexibility of part throttle.
L) High speed bypass valve - allows tuning flexibility of higher RPM fuel delivery.
M) Electric lean-out or enrichment valve - special function valve to allow tuning of a specific area or range of the fuel delivery.
N) Kinsler Jet Selector Valve - holds eight main bypass jets. Allows main jet to be adjusted while engine is running.
O) Kinsler Vapor Separator Tank (VST) system - typically used when the main fuel tank is mounted too far away from the mechanical pump and a transfer pump is required. This Kinsler specially designed system helps to prevent fuel boiling and pump inlet cavitation by maintaining pressure to the mechanical pump inlet. Return fuel from the injection system is routed back to this tank. See Pages #115-116 for details on Vapor Separator Tank plumbing.

KINSLER K-TYPE JETS

PRECISE ; ACCURATE ; CONSISTENT

THAT IS WHY YOU NEED K-JETS

A perfect fuel injection system is of little use to the owner unless he has a good set of jets to use with it. When using commercially made jets, it is not unusual when going .005" smaller in jet size (in an attempt to richen the unit), to actually find no fuel rate change, or perhaps go grossly rich, or even to go a bit leaner! This can make it impossible to "tune in" the engine for best power and consistency.

FEATURES OF THE K-TYPE JETS

EACH K-type jet is precisely machined and stamped with the "KINSLER" name to identify it. It has a reamed orifice controlled within .0002", a precise radius leading to the orifice, and a regulated finish.

Every K-type jet is tailored on the flow bench to within 1% of the flow rate of the master reference jet of its same size. Therefore, even though the increments between the K-type jets are very small (.002" available), the change in flow rate between each jet is controlled. Every jet of the same size flows the same, if one jet is lost, an exact duplicate can be shipped immediately.

Drop in style jets give several advantages:

No damage to the jet on installation or removal like some screw-in commercial jets, screwdriver nicks on the face of the inlet to any orifice can cause the flows to change.

The jet rests on an o-ring for a positive seal. No possible leakage which could alter the flow, affecting the tuning of the engine.

TYPICAL INCREMENTS VERSUS APPLICATION

The following are guidelines: .002" gasoline and small alcohol engines
.004" for typical alcohol V8
.004" to .008" for blown applications
.006" to .010" for high speed and secondary restrictor jets.

IMPORTANT NOTES

A) When installing a K-type jet that is replacing a commerical jet, start with a K-type jet that is about .008" smaller. This is due to the efficient design of the K-type jets.

B) Always install the jet so that the number is facing up as the jet is dropped in, then the fuel will flow into the radiused side of the jet. After the jet can has been assembled, the number will be facing toward the poppet.

C) Make sure the jet can end has an o-ring receiving groove and that an o-ring is in place for the jet to rest on. Note: the jet sealing o-ring should be replaced periodically to make sure that the compound has not "dried" out.

D) Any marks on the radius of a K-type jet were put there on purpose during the flow tailoring process.... leave them alone!

E) ***Never*** string the jets on a wire, as their entrance shapes will change as they move around on the wire!!! For storage use the Kinsler plastic jet holder case #3720.

ORDERING K-JETS

Kinsler K-type jet pricing is broken down into material and labor.
For proper pricing, the labor charge and the jet blank price must be added together.

3710	Labor to make SPECIAL K-type jets: .014" to .028" at .002"
3711	Labor to make SPECIAL K-type jets: .030" to .038" at .002"
3712	Labor to make SPECIAL K-type jets: .040" to .048" at .002"
3713	Labor to make ONE standard K-type jet; .050" to .186" at .002"
3714	Labor to make quantity set of 8 to 12 K-type jets, state sizes: .050" to .186" at .002" (you may request multiple quantites of the same jet size)
3715	K-type jet blank to make above matched jets

K-Jet installed in jet can

IMPORTANT - the labor charge to make a set of K-type jets is included in the basic labor charge of flow testing and calibration of any fuel injection system, new or used.

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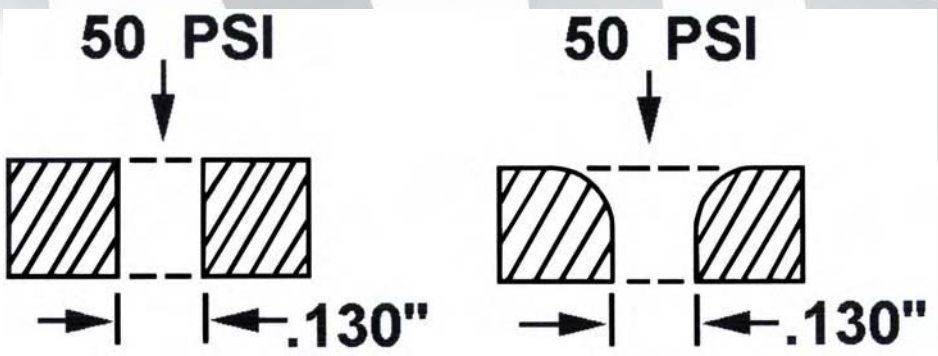
KINSLER K-TYPE JETS

REASONS FOR FLOW ERRORS



1) Variations in the orifice size... even the same drill doesn't make the same size orifice each time; reaming is the only way to insure exact orifice size.

2) Entrance conditions... these can make a considerable difference in flow, yet are often overlooked:

   Even though both of the jets in the picture have the same fuel pressure to them, and the same orifice size, the flow through the jet on the right will be about 20% greater than that of the jet on the left. This is due to the generously rounded entrance which makes it easier for the minute particles (molecules) of fuel to get into the orifice. See "ORIFICE THEORY" on Pages #202-203.

3) Most commercial jets have a square edge, with a simple chamfer. A K-type jet has a large radius that is precisely blended to the bore, giving better control of the entrance conditions and better protection of the orifice.

4) All of the problems mentioned above are eliminated by using the K-type jets, since each jet is precisely machined, then hand tailored to the flow of a master reference jet.

#3073

#3060

THE PROBLEM WITH COMMERCIAL JETS

Commercial jets① are not as precisely made as they should be, so there is often poor correlation of fuel mixture versus jet number. In fact, it is sometimes so bad that a jet change that should be richer is actually leaner, or vice versa (note jet .115" and .120" in the table to the right), or it may make no change at all (note .125" and .130"):

Jet size	Flow to nozzles, lb/hr gasoline
.110"	360
.115"	340
.120"	350
.125"	320
.130"	320
.135"	310

① The term "jets" is sometimes used to refer to the nozzles. This is incorrect and should be avoided.

If you have your engine running well, we can ***flow test*** your commercial jet to tell you which K-jet to start with.

3073	Enderle jet, screw-in type (7/16-20 thread), unmatched, state size: .020" to .200" at .005" increments
3054	Hilborn jet, drop-in for 6 AN jet can, unmatched, state size: .020" to .225" at .005" increments
3060	Hilborn jet, drop-in for 8 AN jet can, unmatched, state size: .020" to .405", sizes available may depend on available drills

NOTE : We **do not** attempt to match any other brands of jets other than our own; It is not cost effective.

KINSLER PLASTIC JET HOLDER CASE

Ideal for organizing and protecting your jets. Rotating top allows you to select and remove one jet at a time. Special fuel resistent polymer plastic.

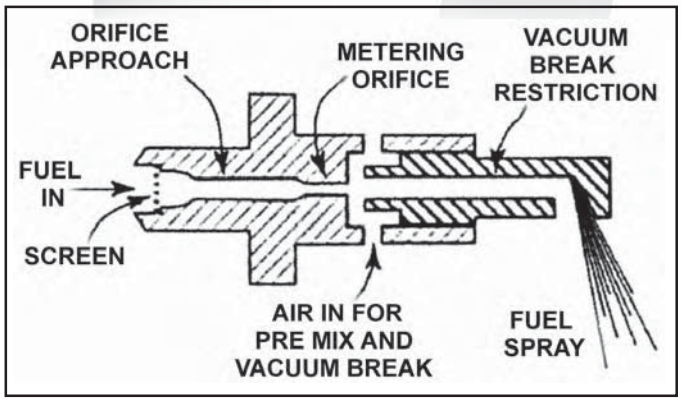
3720	Holds 28 Kinsler, Hilborn, Ron's, or Holley jets, or 16 Enderle plus 12 Kinsler or Hilborn jets.

NEVER string the jets on a wire, as their entrance shapes will change as they move around on the wire!!! For storage use the Kinsler plastic jet holder case #3720.

NOZZLES: CONSTANT FLOW

FUNCTION

1) The orifices in the nozzles meter the fuel to the engine in conjunction with the main bypass return jet and the fuel pump.
2) Control the distribution of fuel to each cylinder of the engine.
3) Atomize and direct the fuel being injected.



FLOWED AND MATCHED

Customers spend lots of money having their cylinder heads air flowed and ported to get even flow characteristics, but then use nozzles that have fuel distribution as bad as 10-15%. Commercial nozzles just aren't made well enough. Very tiny differences in the hole size and machining marks around the inlet or outlet of the fuel orifice makes significant changes in fuel flow.

Nozzles are affected by the same problems as the return jets.
Read "THE K-TYPE JETS" on Pages #76-77 and "ORIFICE THEORY" on Pages #202-203.

Kinsler nozzle sets are flowed and matched to within a 1% total spread in distribution. The orifices are radiused and polished to promote even flow. Each nozzle is individually flow tested through a range of pressures and hand matched to a master reference nozzle. Should a nozzle not work into the master flow curve, it is discarded or resized for use in a larger set.

KINSLER STANDARD NOZZLE IDENTIFICATION

We stamp our flowed nozzles with - the name "KINSLER"; a size reference; a flow code, and a deflector style-air orifice reference.

Example: S-710 AS-78 explanation :

The 'S' indicates a nominal .0338" orifice - orifice sizes may vary ± .0004" due to machining tolerances, so hand matching is still required.
The 710 is the flow code.
AS is the deflector style (see deflector types on next page).
78 refers to a .078" air orifice in the deflector, also referred to as the vacuum break restrictor.

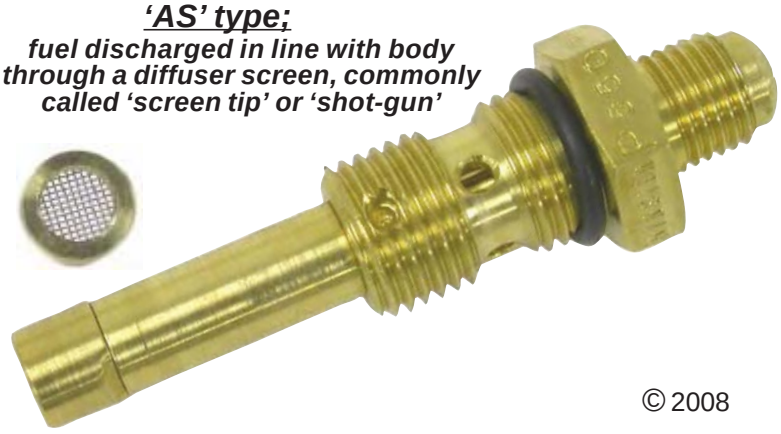
An 'X' indicates a nozzle with .039" or larger fuel orifice. Example: X-39 930 AS-89
The 'X' followed by 39 means a .039" fuel orifice; 930 is the flow code; 'AS' is deflector style; 89 refers to a .089" air orifice in the deflector.

The flow code is the pounds per hour (lbs/hr) of fuel flow at 30 PSI for one nozzle.
Example: S-710 is really 71.0 lbs/hr at 30 PSI.

You can calculate the flow of a nozzle at any fuel pressure - see "ORIFICE THEORY" on Pages #202-203.

'AS' type;

fuel discharged in line with body through a diffuser screen, commonly called 'screen tip' or 'shot-gun'



'A' type;

fuel discharged at 45° to body through notch cut in deflector, commonly called 'whistle' or notch

Kinsler nozzle Flow Code	lbs/hr flow per nozzle at 30 PSI gasoline .72 sp. gr. @ 60°F	Nominal orifice size	Approx. Hilborn size	*Crower & Enderle nozzle size
E-165	16.5	.016"	4	16
F-200	20.0	.017"	5	17
G-240	24.0	.020"	6	20
H-280	28.0	.0215"	7	21
J-320	32.0	.0225"	8	22
K-360	36.0	.0238"	9	24
L-390	39.0	.025"	---	25
M-410	41.0	.0259"	10	26
N-470	47.0	.0277"	---	28
P-510	51.0	.0289"	12	29
P-550	56.0	.0294"	14	31
R-620	62.0	.0318"	16	32
S-710	71.0	.0338"	18	33
T-740	74.0	.0349"	---	35
T-792	79.2	.0359"	20	---
U-800	80.0	.036"	---	36
V-840	84.0	.0373"	22	37
W-880	88.0	.038"	24	38
X-39 930	93.0	.039"	27	39

**** + or - approx. 8% from flows shown at left (they code their inserts by orifice diameter number)***

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NOZZLES : CONSTANT FLOW

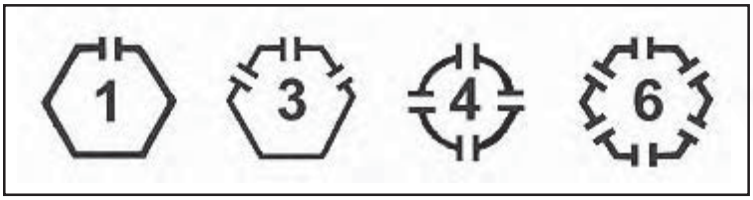
NOZZLE VENTING Vents allow air to pre-mix with fuel inside the nozzle for better atomization and eliminates engine vacuum from drawing fuel into the engine.

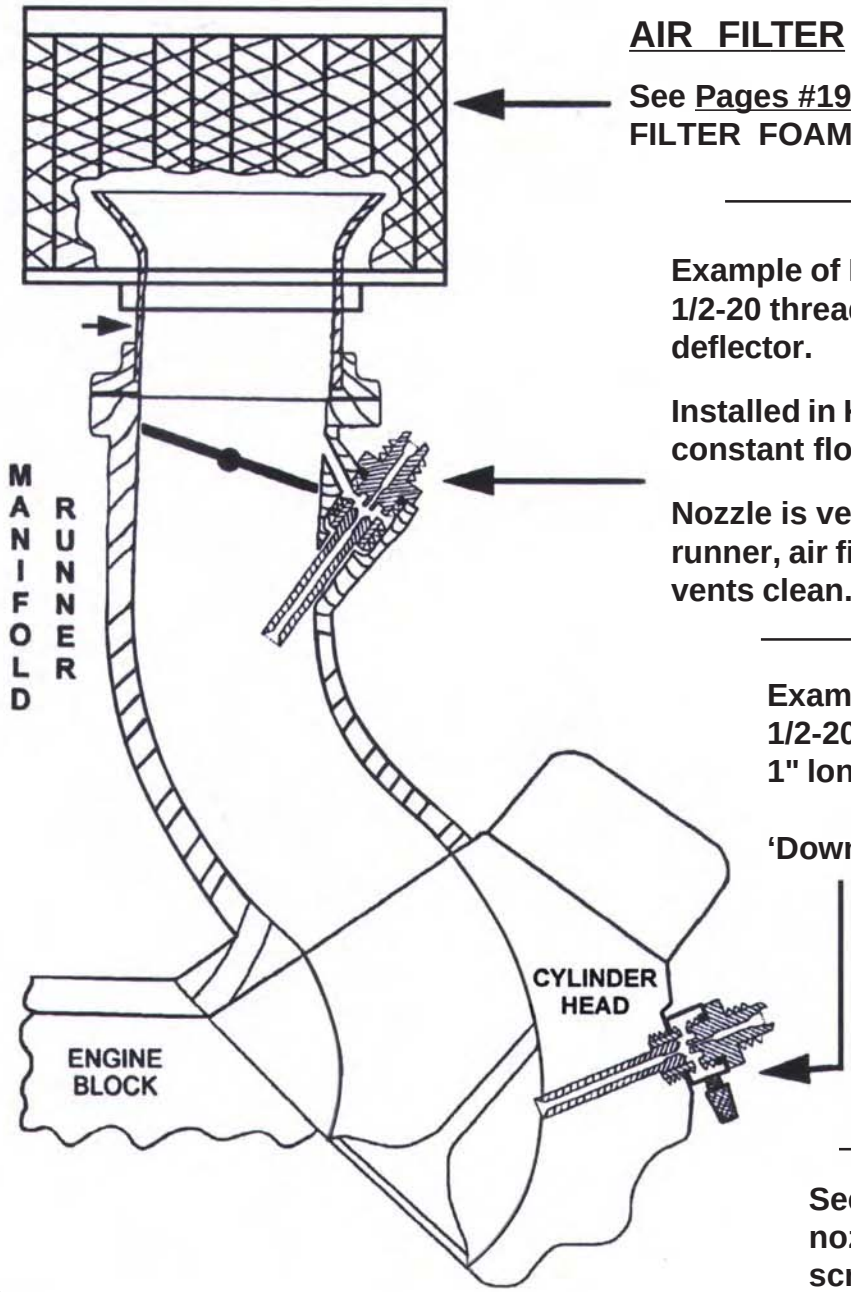
Externally vented - for normally aspirated engines (unblown) or supercharged engines with nozzles at blower inlet. Vented to the atmosphere; see AIR FILTRATION on Page #82.
Internally vented - for normally aspirated engines. Vents from inside the runner of the manifold.
Non-Vented and Z-type - for supercharged or turbocharged applications were the nozzle outlet is subject to manifold boost.

VENT LOCATION AND QUANTITY

One and three vent nozzles drip fuel into the engine on shut-down, may make motor hard to restart due to excess fuel in cylinders.

Four and six vent nozzles may drip fuel outside on shut-down, but reduces cylinder wash down.





AIR FILTER

See Pages #190-192 for FILTER FOAM ; K&N AIR FILTERS ; AIR BOXES

Example of Kinsler #2228 internally vented 1/2-20 thread nozzle with 1" long 'AS' style deflector.

Installed in Kinsler 3-piece manifold with constant flow universal nozzle boss adapters.

Nozzle is vented back into the manifold runner, air filter on the ramtube keeps the vents clean.

Example of Kinsler internally vented 1/2-20 thread nozzle with 1" long 'AS' style deflector.

'Down nozzle' installed in cylinder head

Nozzle is vented into #2393 Kinsler 1/2-20 aluminum banjo with sintered bronze air filter.

See Page #80 for 1/8" NPT thread nozzles and holders that accept screw-in insert nozzles.

NOZZLES : CONSTANT FLOW

THESE NOZZLES ARE PREMIUM RACE GRADE QUALITY ....
FLOW TESTED AND MATCHED AT FOUR DIFFERENT PRESSURES.
We can make variations of these nozzles for your special requirements - Just Call Us !!!

NO.	KINSLER PART #	DEFLECTOR TYPE	AIR VENT TYPE & NO.	BODY LENGTH	DEFLECTOR LENGTH	OVERALL LENGTH	BODY MATERIAL	TYPICAL USE	REPLACES HILBORN NO.
Kinsler 1/2-20 straight thread, 5/8" hex, seals with o-ring									
1	2201	AS	INT-4	1.360"	0.300"	1.660"	brass	Kinsler and Hilborn manifold	*708AS 1/4"
2	2211	AS	INT-4	1.360"	0.540"	1.900"	brass	Kinsler and Hilborn manifold	*708AS 1/2"
3	2231	AS	INT-4	1.360"	0.750"	2.110"	brass	Kinsler manifold; longer reach; 'Down nozzles'	*708AS 3/4"
4	2221	AS	INT-4	1.360"	1.000"	2.365"	brass	Kinsler manifold; longer reach; 'Down nozzles'	*708AS 1"
5	2431	AS	INT-4	1.360"	1.250"	2.615"	brass	Longer reach needed; 'Down nozzles'	---
6	2351	AS	INT-4	1.360"	1.500"	2.865"	brass	Longer reach needed; 'Down nozzles'	---
7	2361	AS	INT-4	1.360"	1.750"	3.115"	brass	Longer reach needed; 'Down nozzles'	---
8	2371	AS	INT-4	1.360"	2.000"	3.365"	brass	Longer reach needed; 'Down nozzles'	---
9	2281	AS	INT-4	1.360"	2.500"	3.865"	brass	Longer reach needed; 'Down nozzles'	---
10	2381	AS	INT-4	1.360"	3.500"	4.865"	brass	Longer reach needed; Hilborn ASCS manifold	*710-3 1/2" ASZ
11	2451	AS	INT-4	1.360"	5.500"	6.865"	brass	Longer reach needed; Dragon Claw, Hilborn	*710AS 5 1/2"
Kinsler 1/2-20 straight thread, T-type, 5/8" hex with jam nut and sealing o-ring									
12	2251	A	INT-4	1.835"	0.475"	2.310"	brass	Internally vented aimable; turbocharged	*709A
13	2261	A	INT-4	1.835"	0.750"	2.585"	brass	Internally vented aimable; turbocharged	---
14	2291	A	INT-4	1.835"	1.000"	2.835"	brass	Internally vented aimable; turbocharged	---
Kinsler drop-in nozzle insert and bodies									
15	2331	---	---	---	---	0.315"	brass	Adjustment of fuel distribution	---
16	2340	A	EXT-6	1.000"	0.470"	1.470"	brass	1/8" NPT, straight. Holds above insert	---
17	2344	AS	EXT-6	1.000"	0.500"	1.500"	brass	1/8" NPT, straight. Holds above insert	---
Kinsler 1/16" NPT, straight nozzle, 7/16" hex									
18	2090	N/A	none	1.095"	N/A	1.095"	brass	Nitrous injection or vacuum signal	---
Kinsler 1/8" NPT 90 degree, 7/16" body, hose connection 90 degrees to body									
19	2101	A (LH)	INT-4	1.185"	0.475"	1.875"	brass	Kinsler Big Block, Crower, Early Hilborn	*701A 1/4"
20	2101	A (DOWN)	INT-4	1.185"	0.475"	1.875"	brass	Kinsler Big Block, Crower, Above throttles	*701A 1/4"
21	2101	A (RH)	INT-4	1.185"	0.475"	1.875"	brass	Kinsler Big Block, Crower, Early Hilborn	*701A 1/4"
22	2161	A (DOWN)	INT-4	1.185"	1.000"	2.625"	brass	Kinsler Big Block, Crower, Early Hilborn	*701A 1"
Kinsler 1/8" NPT 90 degree, 7/16" body, hose connection 90 degrees to body									
23	2111	AS	INT-4	1.185"	0.300"	1.700"	brass	Early Hilborn small and big block	*701AS 1/4"
24	2121	AS	INT-4	1.185"	0.540"	1.950"	brass	Early Hilborn small and big block	*708AS 1/2"
25	2131	AS	INT-4	1.185"	0.750"	2.165"	brass	Longer reach needed	*701AS 3/4"
26	2141	AS	INT-4	1.185"	1.000"	2.400"	brass	Longer reach needed	*701AS 1"
27	2398	---	---	---	---	---	---	Inspection screw for 90 degree body	F3-3X3B
28	2399	---	---	---	---	---	---	Gasket for inspection screw	F33F
Kinsler 1/8" NPT, straight nozzles, 7/16" hex									
29	2011	A	EXT-3	1.095"	0.470"	1.565"	brass	Non-Drip - road cars, small & big blocks	---
30	2001	A	EXT-6	1.095"	0.470"	1.565"	brass	Kinsler, Hilborn, Enderle, Ron's, Jackson	*702A 1/4"
31	2191	A	EXT-6	1.360"	0.750"	2.615"	brass	Longer reach needed	---
32	2151	A	EXT-6	1.095"	1.000"	2.095"	brass	Longer reach needed	---
Kinsler 1/8" NPT, straight nozzles, Z-type, internally vented by air passage cut in upper end of deflector									
33	2021	A	Z-INT-ONE	1.095"	0.470"	1.565"	brass	Turbocharged port nozzle	---
34	2501	A	Z-INT-ONE	1.095"	1.000"	2.095"	brass	Turbocharged port nozzle	---
35	2031	AS	Z-INT-ONE	1.095"	0.300"	1.395"	brass	Turbocharged port nozzle	---
36	2041	AS	Z-INT-ONE	1.095"	1.000"	2.095"	brass	Turbocharged port nozzle	---
Kinsler 1/8" NPT, straight nozzles, 7/16" hex									
37	2051	AS	EXT-6	1.095"	0.300"	1.395"	brass	Early Hilborn; Some Jackson and EVM	*702AS 1/4"
38	2061	AS	EXT-6	1.095"	0.500"	1.595"	brass	Early Hilborn; Some Jackson and EVM	*702AS 1/2"
39	2071	AS	EXT-6	1.095"	0.750"	1.845"	brass	Longer reach needed	*702AS 3/4"
40	2081	AS	EXT-6	1.095"	1.000"	2.095"	brass	Longer reach needed	*702AS 1"
41	2171	AS	EXT-6	1.095"	3.500"	4.595"	brass	Longer reach needed	---
Kinsler screw-in nozzle insert and bodies (replaces Enderle type)									
42	2301	---	---	---	---	1.000"	brass	Adjustment of fuel distribution	---
43	2325	A	EXT-3	---	0.500"	1.500"	brass	Air orifice insert; tunnel rams	---
44	2322	A	none	---	0.500"	1.500"	brass	Ports of blown engine	---
45	2322A	A	none	---	1.000"	1.950"	aluminum	Ports of blown engine	---
46	2321	A	EXT-3	---	1.000"	1.950"	aluminum	Air orifice insert; Enderle blower hat	---
47	2323B	A	none	---	1.000"	1.950"	brass	Ports of blown engine	---
48	2323A	A	none	---	1.000"	1.950"	aluminum	Ports of blown engine	---
49	2324B	A	none	---	0.750"	2.650"	brass	Ports of blown engine	---
50	2324	A	none	---	0.750"	2.650"	aluminum	Ports of blown engine	---
51	2326	AS	EXT-3	---	0.300"	1.300"	brass	Air orifice insert; tunnel rams	---
52	2527	AS	EXT-3	---	0.500"	1.500"	brass	Air orifice insert, tunnel rams	---
53	2528	AS	EXT-3	---	0.750"	1.750"	brass	Air orifice insert; tunnel rams	---
54	2529	AS	EXT-3	---	1.000"	2.000"	brass	Air orifice insert; tunnel rams	---
55	2327	AS	EXT-3	---	0.300"	2.190"	brass	Dart/Buick 'down' nozzle holder	---
56	2318	A	INT-ONE	---	1.000"	2.000"	brass	Ports of blown engine	---
57	2313	AS	INT-ONE	---	1.000"	2.000"	brass	Ports of blown engine	---

NOTE: Above part numbers are for a singular nozzle. Change last digit of part number for number of nozzles in a set.

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www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

NOZZLES : CONSTANT FLOW

Kinsler Fuel Injection stocks a very wide range of nozzles

Kinsler also can supply special made nozzle(s) for your unique requirements

FILTRATION

AIR FILTRATION FOR NOZZLES

Nozzles are a vital part of the fuel system.
KEEPING THEM CLEAN IS A MUST !!!

NOZZLE VENT FILTER BISCUITS

These biscuits made from filter foam, slip over the outside of the 1/8" NPT nozzle body to give complete protection. Washable and reusable, 45 ppi.

#5021

5020	Set of (8) Kinsler nozzle vent filter biscuits
5021	Individual nozzle vent filter biscuit

#2396

2396	Kinsler nozzle inlet screen, 80 x 70 mesh stainless steel

#2390 *#2391* *#2392*

2390	Single 3/8" barb, plated 1/2-20 nozzle banjo
2391	Dual 3/8" barb, plated 1/2-20 nozzle banjo
2392	Tee, for 6 AN push-lock hose, plated

#2393

2393	Aluminum 1/2-20 nozzle banjowith 1/8" NPT female port; sintered bronze air filter with 1/8" NPT male thread
2394	Air filter ONLY, sintered bronze with 1/8" NPT thread
2379	Banjo body ONLY, aluminum, for 1/2-20 nozzle

Monster Mesh Series Filters

Excellent for oil, fuel, and transmission

Monster Mesh

Mega Monster Mesh

Ultra Monster Mesh

Monster Mesh series filters part numbers and descriptions, see Page #164

Ano-BRL *Alum-BRL*

INSTALLATION

Consult the plumbing schematic for the type of fuel system being used and MAKE SURE the correct type and style of fuel filter is being installed.

Fuel pump inlet: pumps are very sensitive to disturbance in the inlet hose. IT IS A MUST to have the correct filter or it will damage the pump and/or cause problems. ***NEVER*** have return fuel going back into the pump's inlet hose. As fuel leaves the pressurized side of the fuel system and enters a non-pressure area the fuel can flash vaporize, causing damage to the pump and erratic running conditions.

FOR CONSTANT FLOW SYSTEM

We recommend filtering all the fuel coming out of the pump so that all the bypass valves and the barrel valve receive filtered fuel. Do NOT use paper element filters on this type of system: bits of the paper element from the 'clean' side of the filter will clog the nozzles and/or glue on the element may dissolve in methanol causing the element to separate. Do NOT use paint strainers or other cloth filters to fill the tank, as lint from them may plug the nozzles. Use our #5610 filter funnel (see Page #182) or a similar metal element strainer.

Filter funnel with removeable element

Got surface area? #9031 Ano-BRL element vs. #8370 Monster Mesh element

#8370

#9031

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MAIN BYPASS VALVE

The main jet is the most basic adjustment of a constant flow metering system. A smaller main jet makes the engine richer, by allowing less fuel to flow back to the tank and forcing more fuel to go to the engine. A larger main jet makes the engine leaner, by allowing more fuel to flow back to the tank which means less fuel flows to the engine. Regarding jets: see section on "K-TYPE JETS" on Pages #76-77 and "ORIFICE THEORY"on Pages #202-203.

This valve also acts as a check valve to hold pressure for starting and idling. We highly recommend plumbing this valve after the fuel filter, since any dirt or sticking may cause the engine to idle poorly or possibly not start (see Kinsler's PREFERRED PLUMBING SCHEMATIC on Page #112). Note: It is important to carefully read the section on "HIGH-SPEED BYPASS" on Pages #90-94, so you will understand the relationship between the two bypass valves at wide open throttle.

#3112 'Ano-QD' quick disconnect valve

#3084 6 AN brass high-flow

#3006 6 AN standard hard-anodized aluminum

QUICK DISCONNECT VALVES AND COMPONENTS

3104	Red and gold anodized aluminum, 6 AN male flare, for gasoline
3112	Hard-anodized aluminum, model: Ano-QD, 6 AN male flare, for gasoline and methanol
3115	Same as #3112 but with o-rings for use with nitromethane
3101	End cap, for quick disconnect, hard-anodized, includes jet sealing o-ring
3036	Poppet, Kinsler hard-anodized, for Kinsler and Hilborn 6 AN jet can
3319	Spring, .019" wire diameter, standard spring for Kinsler main bypass valve
3116	O-ring, jet sealing, for end cap #3006, #3104, and #3112
3117	O-ring set, for quick disconnect, gasoline and methanol ONLY
3119	O-ring set, for quick disconnect, nitromethane ONLY

SCREW TOGETHER VALVES AND COMPONENTS

3006	Main bypass valve, 6 AN male flare, hard-anodized aluminum, model: Ano-K, for gasoline and methanol
3007	Same as #3006 , but with o-rings for nitromethane
3016	End cap ONLY, for model: Ano-K jet can
3010	Washer o-ring, for end cap to 6 AN jet can body, Kinsler or Hilborn
3036	Poppet, Kinsler hard-anodized, for Kinsler and Hilborn 6 AN jet can
3084	Main bypass valve, Kinsler 6 AN High-Flow brass jet can, for all fuels
3155	Main bypass valve, Kinsler 6 AN High-Flow hard-anodized aluminum, for all fuels
3087	Poppet, for #3084 and #3155, precision ground stainless steel
3074	O-ring set, for #3084 and #3155 end cap, gasoline and methanol

NOTE

There is no one o-ring compound that works well for gasoline, methanol, and nitromethane. We therefore use one o-ring compound in the gas/methanol jet cans, and a different compound in the methanol/nitro jet cans. Using a fuel or additive other than that specified may cause swelling of the main body o-ring, or leakage due to shrinkage of the o-rings. When the main body o-ring swells, it may be difficult to uncouple the valve. Contact us for the proper o-rings if a fuel other than the ones specified is being used.

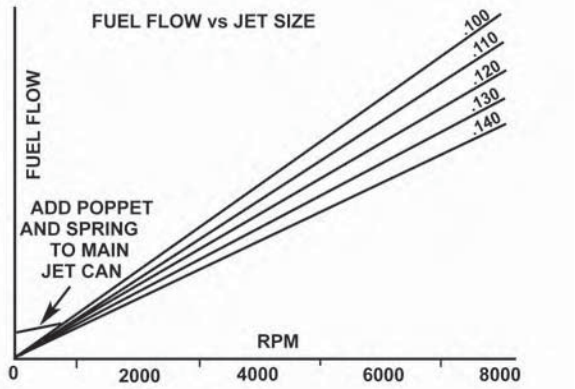
When you drop the jet into the end of the main jet can, make certain the number is facing you

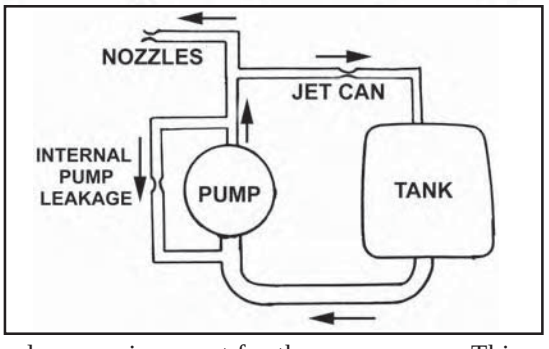
FUEL FLOW DELIVERY OF SIMPLEST SYSTEM

(pump, nozzles, and main jet can ONLY)

In the most basic fuel injection system, flow increases directly with RPM, resulting in a curve that is theoretically a straight line. In actual practice, internal leakage in the pump would alter the shape of the curve slightly (see schematic at right).

The output of the pump is split between the nozzles and the main jet. A larger main jet leans out the engine because it allows more fuel to return back to the tank.

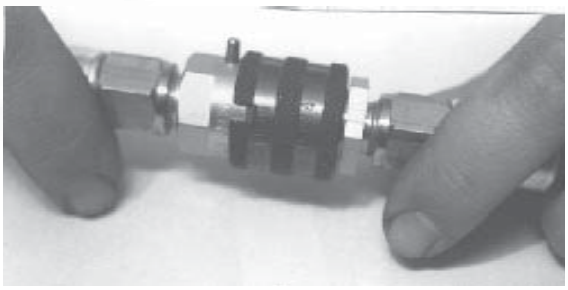




Running clearance is a must for the pump gears. This clearance causes some internal leakage back past the gears and has the same effect as a bypass from the pump outlet back to the inlet. While internal pump leakage must occur, we do NOT recommend plumbing any bypass valve's return flow back to the pump inlet.

KINSLER QUICK DISCONNECT BYPASS VALVE

FAST and EASY JET CHANGES



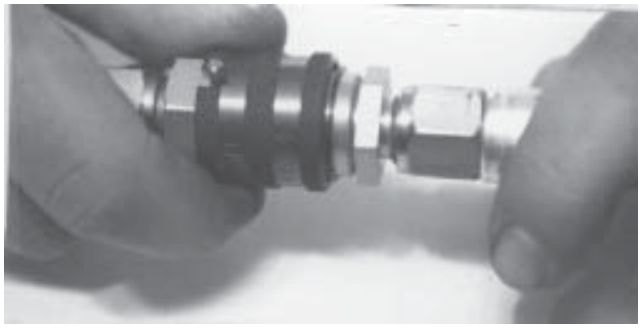
The quick disconnect bypass with hoses attached. Note: collar is rotated so that the notch is not aligned with the pin; prevents accidental opening of the valve

NO WRENCHES NEEDED !!!

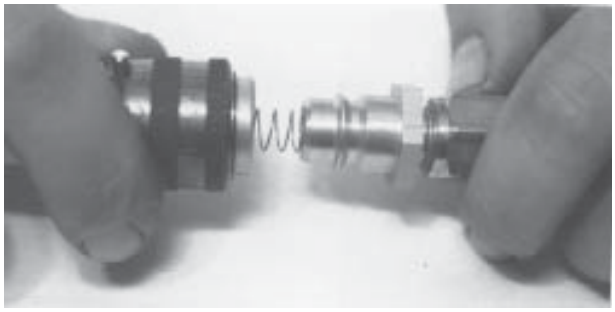
Simply slide back the outer collar, pull the main bodies apart, and change the jet

ACCEPTS Kinsler K-type or Hilborn jets. Valve has 6 AN male flare ends and has a fully machined, hard anodized, stick-free poppet.

CAN BE USED ON ANY MAKE OF INJECTION UNIT : Kinsler, Hilborn, Crower, Enderle, Ron's, Jackson, etc.



The collar being pulled back after the notch is aligned with the pin



Use a twisting motion while pulling the valve apart

The two parts of the assembly are separated, with the jet in the end cap on the right, the jet is merely dropped out and the new one is inserted

Valve can be used for other applications by using different spring and shim combinations.
(For springs and shims see Page #95 BYPASS VALVES)

3104	Red and gold anodized aluminum, 6 AN male flare, for gasoline
3112	Hard-anodized aluminum, model: Ano-QD, 6 AN male flare, for gasoline and methanol
3115	Same as #3112 but with o-rings for use with nitromethane
3101	End cap, for quick disconnect, hard-anodized, includes jet sealing o-ring
3036	Poppet, Kinsler hard-anodized, for Kinsler and Hilborn 6 AN jet can
3319	Spring, .019" wire diameter, standard spring for Kinsler main bypass valve
3116	O-ring, jet sealing, for end cap #3006, #3104, and #3112
3117	O-ring set, for quick disconnect, gasoline and methanol ONLY
3119	O-ring set, for quick disconnect, nitromethane ONLY

NOTE

There is no one o-ring compound that works well for gasoline, methanol, and nitromethane. We therefore use one o-ring compound in the gas and methanol jet cans, and a different compound in the alcohol/nitro jet cans. Using a fuel or additive other than that specified may cause swelling of the main body o-ring, or leakage due to shrinkage of the o-rings. When the main body o-ring swells, it may be difficult to uncouple the valve. Contact us for the proper o-rings if a fuel other than the ones specified is being used.

CAUTION Be sure to shut off the engine before pulling apart the jet can, or fuel spillage will occur.

When you drop the jet into the end cap, be sure the number is facing you

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KINSLER JET SELECTOR VALVE (JSV)

- **Allows driver to select EIGHT different main bypass jets *while the engine is running.***
- **All the jets in the valve can be changed in a few minutes by simply removing them and installing new ones.**
- **Uses Kinsler matched jets in increments of .002" or greater; can also use Hilborn jets.**

- **Hard anodized aluminum construction for long life and use with all fuels.**
  (Different seals may be needed for fuel compatibility.... we have these).
- **Can be dash or remote mounted.**

'Xtra-Light' Jet Selector Valve with fittings and trim plate 0.65 lbs.
#3404 'Xtra-Light' valve

DO NOT confuse the Kinsler Jet Selector Valve with Dial-A-Jet or others. Only the Kinsler valve allows you to work with matched K-type jets, and change all the jets.

Jets NOT included; must be ordered separately.
See K-TYPE JETS on Pages #76-77

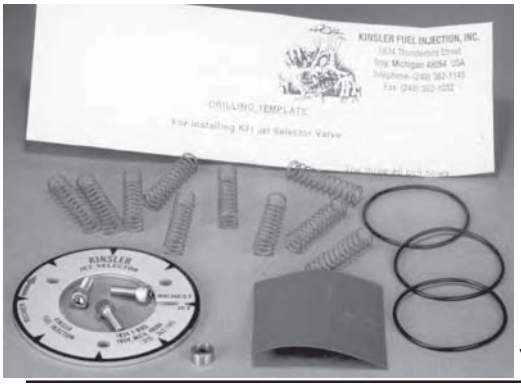
- **Valve can be used with ANY brand of injection system.**

USE FOR... Sprint and Oval Track
Road Racing
Boats : Pleasure or Racing
Street Driving
Pulling Trucks and Tractors
Land Speed
Off-Road
Dyno Tuning

3404	Kinsler 'Xtra-Light' Jet Selector Valve, complete with #3440 installation kit and Kinsler 6 AN hard anodized male flare fittings
3413	O-ring, to seal main body to cap, large diameter
3414	O-ring, to seal rotor shaft to main body, gasoline and methanol
3430	Trim plate, for #3404, includes mounting screws
3440	Installation kit for #3404, consists of: trim plate with screws, springs, shim, instructions, lapping paper, and three spare body o-rings
3461	Knob, for 'Xtra-Light' #3404 valve

Allows making jet changes while driving:

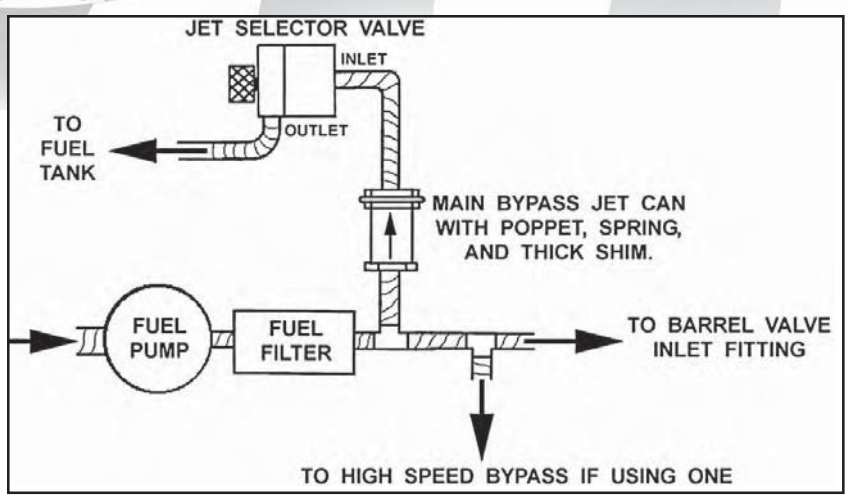
- Lean the engine during caution laps to save fuel and prevent loading up.
- Fastest top speed can be found by running at full speed and dialing in different jets. (Use caution if High speed bypass is installed in fuel system)
- Instant jet changes for extra fast adjustment in the vehicle.
- Adjust the fuel rate to suit any driving condition : from cruising to all-out performance.
- Adjust for changing track conditions or controlling engine temperature.



#3440 installation kit for Jet Selector Valve

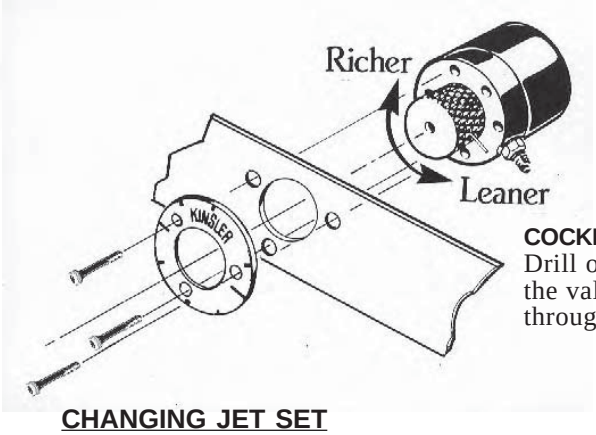
The coarsley knurled aluminum knob is easy to grip, even while wearing gloves!

KINSLER JET SELECTOR VALVE - CONTINUED -



INSTALLATION PROCEDURE

Plumb the Jet Selector Valve (JSV) on the outlet side of your main bypass jet can. Take the jet out of the main bypass and replace it with one thick shim, .183" thick, supplied in installation kit. The main bypass will now be utilized only to keep pressure in the system for starting and idle with no jet in it.



COCKPIT INSTALLATION

Drill one 1 5/8" hole and three 3/16" holes using the drilling template enclosed with the valve. Install the valve so that the outlet is to the right (3 o'clock). Insert knob through hole and attach trim plate to valve body with the three screws provided.

CAUTION:
Never loosen the four allen set screws in the knurled knob, the knob's detent pins are indexed for proper jet alignment to the outlet port of the JSV body.

CHANGING JET SET

Note :
Numbers of steps relate to schematic on right.

① Set pointer in line with outlet.

② Remove cover (6 bolts).

③ Remove springs (8).

④ Remove jets (8).

⑤ Before installing the new jets, place #600 grit sandpaper from the installation kit on a hard flat smooth surface and lightly lap the backside (opposite the number) of the jets to be sure they will seal properly in the valve. NOTE : excessive lapping may alter the jet flows.

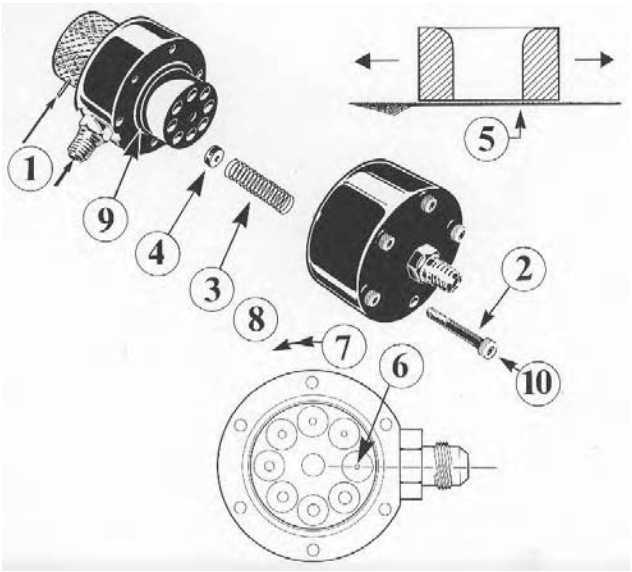
⑥ With the knob pointer still positioned in line with the outlet fitting, drop the richest (smallest) jet into the hole in the cylinder that is in line with the outlet (the position that is over the hole in the body). The num ber on the jet should be visible.

⑦ Drop the remaining jets into the cylinder, in order from the smallest to largest, going counterclockwise from the first jet.

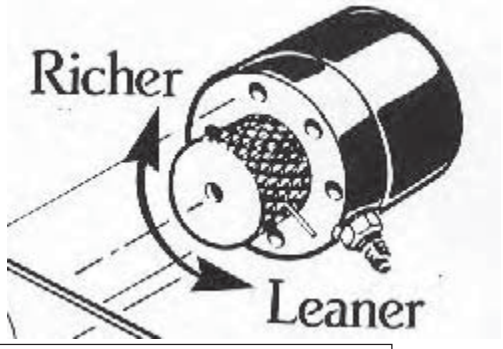
⑧ Replace the springs.

⑨ Replace the cover; be careful that the o-ring is in it's groove.

⑩ Replace the eight socket head cap screws.



If the jets are installed properly in the valve, the richest jet will be obtained when the knob pointer is straight to the right (aligned with the outlet; see step #1 above), and the next leanest jet will be obtained by rotating the knob counterclockwise one position.



IF YOU WOULD NEED TO RUN A .100" OR LARGER MAIN JET IN THE JSV, WE STRONGLY ENCOURAGE YOU TO USE THE RANGE JET VALVE SYSTEM (see PAGE #87). JETS LARGER THAN .100" INSIDE THE JSV WILL NOT FLOW EXACTLY AS THEY SHOULD.

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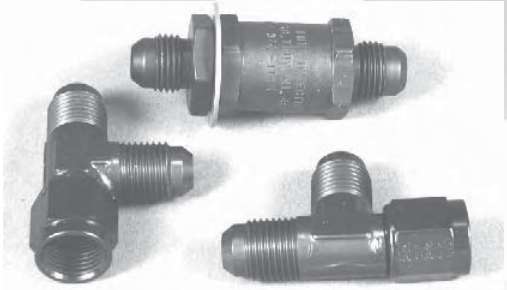
RANGE JET VALVE
FOR USE WITH KINSLER JET SELECTOR VALVE

WHEN DO YOU NEED IT ?

A Range Jet Valve is required when a Kinsler Jet Selector Valve is being installed and the main bypass jet exceeds .100" diameter. This is because very high flow through the Jet Selector causes enough turbulence to affect the stability of the flow through the jets in it. The accuracy of the valve is excellent when used with jets under .100".



#3020 Kinsler Range Jet Valve Kit, includes two 6 AN swivel tee fittings (does not include jets)

HOW IT WORKS

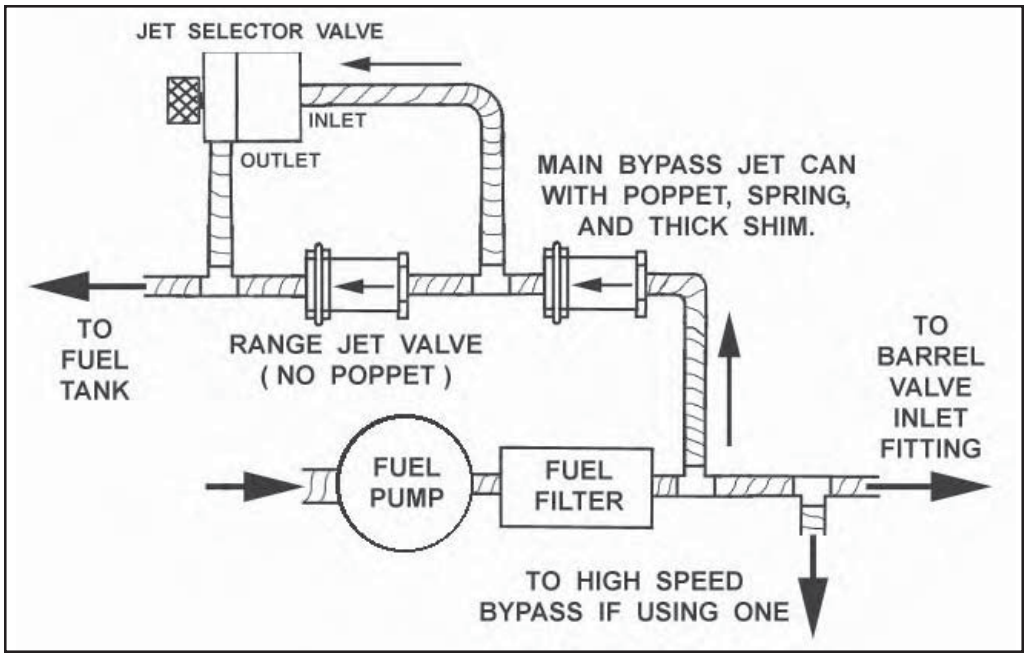
The Range Jet creates a constant bypass around the Jet Selector Valve, so the flow passing through the Jet Selector is reduced.

An added bonus of the Range Jet Valve is that the jets in the Jet Selector Valve don't have to be changed... if a richer or leaner set of jets is needed, merely change the jet in the Range Valve to a smaller or larger one... this changes the range of all eight jets in the Jet Selector Valve....
much easier, quicker, and cheaper!

PLUMBING

Arrange the two 'tee' fittings as shown, so the flow to and from the Range Jet Valve will be flowing through the "straight through" side of the tee.

Note : Use this schematic with our PREFERRED PLUMBING SCHEMATIC on Page #112. It is important to locate the fuel filter on the main pump outlet so all the fuel will be filtered going to the engine and the main bypass, Jet Selector, high speed, etc.



Selecting the Jets required for Jet Selector and the Range Jet Valve

These jet increments are about twice as coarse as we would recommend if there were no Range Jet Valve in the system.... since there is always flow bypassing through the Range Jet, the effect of changing from one jet size to another in the Jet Selector is reduced by about half. If the Range Jet Valve weren't in the system, we would normally use .004" increments for most alcohol applications and .002" for gasoline.

If using a Range Jet Valve,
the jets in the Jet Selector Valve should be :

For alcohol .050" .058" .066" .074" .082" .090" .098" .106"
(.008" increments)

For gasoline .062" .066" .070" .074" .078" .082" .086" .090"
(.004" increments)

WHAT RANGE JET SIZE TO START WITH ?

Set up the Jet Selector Valve with .074" in the center position. The following table shows what Range Jet size to use versus the jet size that you were using with only a main bypass jet can.

Main bypass jet can only jet size	Range Valve jet size (with Selector Valve on .074" jet)
.100"	.070"
.110"	.086"
.120"	.102"
.130"	.112"
.140"	.118
.150"	.130"
.160"	.146"
.170"	.156"
.180"	.174"

IMPORTANT NOTES

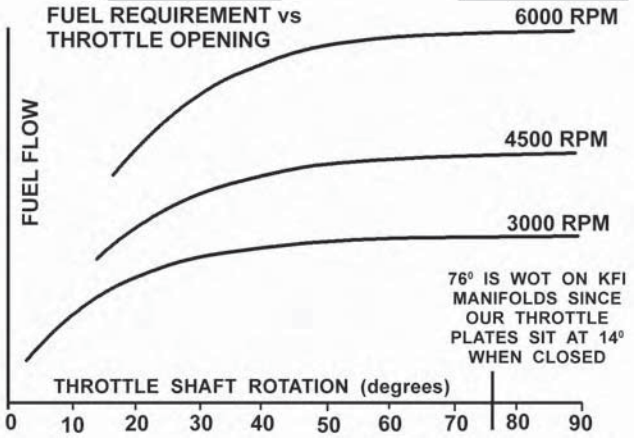
All of the data in this table is for K-type jets; the results will vary if commercially made jets are used. Be sure to read KINSLER K-TYPE JETS on Pages #76-77.

To figure out a jetting size combination, use the formula shown in ORIFICE THEORY on Pages #202-203.

SECONDARY BYPASS VALVE

Barrel Valve Spool Ramp

Since the engine makes less power at part throttle, it needs less fuel. The spool in the barrel valve is the main control for part throttle fuel delivery. At wide open throttle, the spool has a large notch cut into it's side to pass all the fuel to the nozzles unrestricted. As the throttles are closed, a tapered ramp ground into the side of the spool reduces the passage to restrict flow to the nozzles. When adjusting the hex-link to set the idle fuel rate, the spool is being re-positioned to make the passageway larger or smaller to the nozzles. If you remove the fitting from the top of the barrel valve, you can see this ramp. Because each engine's part throttle fuel requirement varies due to camshaft, manifold, and exhaust system selection, the fuel rate the ramp delivers at part throttle is seldom exactly what the engine needs, but the secondary can be used to tailor it.



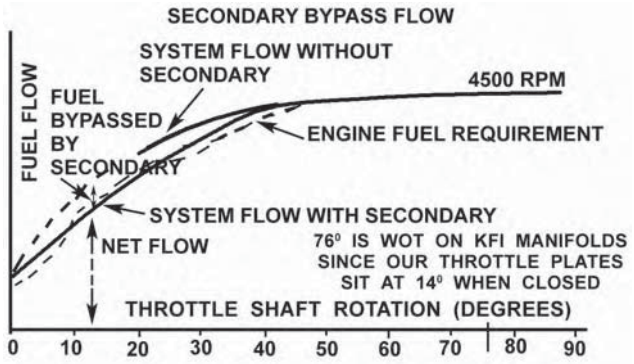
FUEL REQUIREMENT versus THROTTLE OPENING
Past 40 degrees of throttle opening, the 3000 RPM curve requires little more fuel flow, because at that speed the engine is already getting all the air it can use. At 6000 RPM, the curve doesn't flatten until 60 degree throttle opening. Actual results vary due to throttle area and engine volumetric efficiency.

How The Secondary Works

The flow to the secondary bypass is through a port in the top half of the barrel valve spool. The port is usually wide open to about 20 degrees of throttle opening, then it begins to close off. It is completely closed at approx. 40 degrees of throttle opening, or about half throttle, so it has no affect on wide open throttle metering. Depending on the exact spool positioning, the port may actually be slightly closed off at an idle. The secondary bypass normally has a higher pressure setting than the main bypass, so when the engine returns to idle speed, the secondary bypass poppet closes and allows the spring and poppet in the main jet can to regulate the idle fuel pressure.

Applications of the Valve

The valve will often improve the performance of the engine for any application: Drag Racing, Oval Track, Road Racing, Pulling Truck or Tractor, Street, Boat Racing, Hill-Climb, Mud or Sand Racing, etc.



SECONDARY BYPASS tailors part throttle fuel flow. Beyond a 40 degree throttle opening, the barrel valve spool shuts off the passage to the secondary bypass.

A) Staging : An engine at the starting line being held at high RPM has the throttle open only a few degrees, but the pump is putting out a lot of fuel. The fuel rate will often be too rich and tend to load up the engine... the secondary can be used to lean it out.

B) Over-Run : After going through the traps, or at the end of a straight-away, when the throttles are snapped closed, the pump is still at high RPM. The pressure in the system goes quite high, especially with a small main jet and a jet restricted high speed bypass (or NO high speed bypass). The secondary serves as a "dump-off" to reduce the high pressure, thus preventing an over-rich condition.

C) Idle : The secondary bypass pressure is usually set higher than the idle pressure, so the valve is normally NOT bypassing any fuel at an idle. In some special applications, like unblown nitro or highly supercharged engines, the secondary is adjusted to aid in controlling idle fuel pressure. In these systems the secondary bypass will be active at idle speeds and may also utilize a restrictor jet to limit or control the amount of flow that the circuit can bypass.

D) Cornering : If you run through the turns at part throttle and the engine loads up, or is sluggish coming out of them, install a lighter spring or reduce the shims in the secondary. If it lacks response or backfires out the intake when the throttle is depressed, install a heavier spring or more shims.

E) When used in conjunction with a Kinsler Vapor Separator Tank System : It may be necessary to reduce the pressure setting of the secondary bypass when installing a Vapor Separator Tank System. This is due to the down-stream pressure (Vapor Separator Tank pressure) acting against the secondary bypass outlet. Generally we find the secondary pressure will need to be reduced by 3 PSI; the typical pressure in the VST. We recommend installing a Kinsler "bubble tight" one way check valve on the outlet of the secondary bypass. This will ensure that engine flooding cannot occur by fuel backflowing through the secondary and out to the nozzles when the engine is not running.

Installation On a Kinsler, Hilborn, or Crower barrel valve, the secondary is plumbed to the barrel valve spool retaining fitting. Should the barrel valve fitting not have the provision for a secondary, it usually can be converted for it. On Enderle and Jackson units, the system MUST first be converted to an external bypass jet (see Kinsler section on Enderle barrel valve conversion, Page #114). Then the secondary bypass is connected to the "out" or "ret" fitting on the barrel valve.

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SECONDARY BYPASS VALVE - CONTINUED -

Adjustment

To vary the amount of pressure needed to unseal the poppet inside the valve: The wire diameter (stiffness) of the spring is the primary adjustment; a stiffer spring gives a higher opening pressure (RPM). Shims are utilized for fine tuning. If the secondary opens at the right RPM, but bypasses too much fuel, it's flow back to the tank can be restricted by putting a jet in it. Replacing a thick shim with an .080" jet is usually a good starting point. If installing a jet be sure there is a jet sealing o-ring.

Note: the jet sealing o-ring is equivalent to .060" of shim.

CAUTION - Using a spring that is too light, especially on a supercharged or turbocharged application may cause a backfire through the blower/turbo or into the plenum, causing damage.

The secondary bypass is used to tailor part throttle fuel rate **ONLY**; it has no affect on wide open throttle metering.

Troubleshooting

First follow all steps in "System Troubleshooting," Pages #110-111.

1) Check to be sure that the poppet seals in the body. A small amount of dirt can cause the poppet to stick. Thoroughly clean the valve and connecting hose assembly.
2) If adjusting the secondary valve doesn't seem to do anything, make sure the barrel valve spool has a bypass port (see Page #108) and that the secondary valve is installed correctly.
3) Adjustments to the secondary valve should not affect wide open fuel mixture; if they do:
   A) Check to make sure the spool is indexed correctly in the barrel valve.
   B) Check the fit of the spool to the barrel valve block. Approx. clearance is one-half of a thousandth of an inch. Too loose of a fit can cause fuel to leak out through the secondary port at wide open throttle. Test the fit with a leak down meter, 1% or less is preferred at WOT.

#3030 secondary bypass valve

#3076 high-flow 6 AN brass valve

SECONDARY BYPASS VALVES

3030	Standard 6 AN male flare hard anodized aluminum valve, complete assembly, includes: poppet, spring, and shims, for gasoline, methanol, and nitromethane (specify nitro. application when ordering)
3036	Poppet, fully machined, very smooth for stick-free operation, hard-anodized aluminum, for Kinsler and Hilborn 6 AN jet cans
3016	End cap ONLY, for #3030 valve
3010	Washer o-ring for #3016 end cap and #3030 valve
3076	High-Flow 6 AN male flare brass valve, complete assembly, includes: poppet, spring, and shims, for gasoline, methanol, and nitromethane
3085	End cap ONLY, for #3076 valve
3086	Body Only, for #3076 valve
3156	High-Flow 6 AN male flare hard-anodized valve, complete assembly, includes: poppet, spring, and shims, for gasoline, methanol, and nitromethane
3150	End cap ONLY, for #3156 valve
3151	Body ONLY, for #3156 valve
3087	Poppet, fully machined, stainless steel for #3076 and #3156 valves
3074	O-ring, fits end cap for #3085 or #3076 and #3150 or #3156 (specify nitro. application when ordering)
3088	Labor; flow test and set pressure of secondary bypass valve on flow bench
3166	O-ring, jet sealing, gasoline/methanol
3019	O-ring, jet sealing, methanol/nitromethane, E.P. compound
3024	O-ring, jet sealing, for extreme duty use (high pressure) , teflon
3535	Kinsler hard-anodized fitting, 6 AN male flare, Kinsler or Hilborn barrel valve
3521	Kinsler hard-anodized plug for Kinsler or Hilborn barrel valve
3010	Washer o-ring, for Kinsler secondary fitting or plug
3519	Spring to retain spool, .039" wire diameter, Kinsler or Hilborn barrel valve
3522	O-ring, Kinsler or Hilborn barrel valve spool shaft, gasoline/methanol
3043	Shim, brass, goes between spring and barrel valve spool, provides bearing surface

SPRINGS FOR 6 AN JET CANS

3303	Spring kit, for Kinsler and Hilborn 6 AN jet can, consists of: .016", .018", .019", .021", .024"
3304	Spring kit, for Kinsler and Hilborn 6 AN jet can, consists of: .028", .032", .036", .039", .042"
3316	Spring: .016" wire diameter
3317	Spring: .017" wire diameter
3318	Spring: .018" wire diameter
3319	Spring: .019" wire diameter
3321	Spring: .021" wire diameter
3324	Spring: .024" wire diameter
3328	Spring: .028" wire diameter
3332	Spring: .032" wire diameter
3336	Spring: .036" wire diameter
3339	Spring: .039" wire diameter
3342	Spring: .042" wire diameter

SHIMS FOR 6 AN JET CANS

3034	Shim kit, includes: 1- .183" thick shim and 6- .030" thick shims
3040	Shim, .183" thick, brass
3042	Shim, .020" thick, brass
3043	Shim, .030" thick, brass

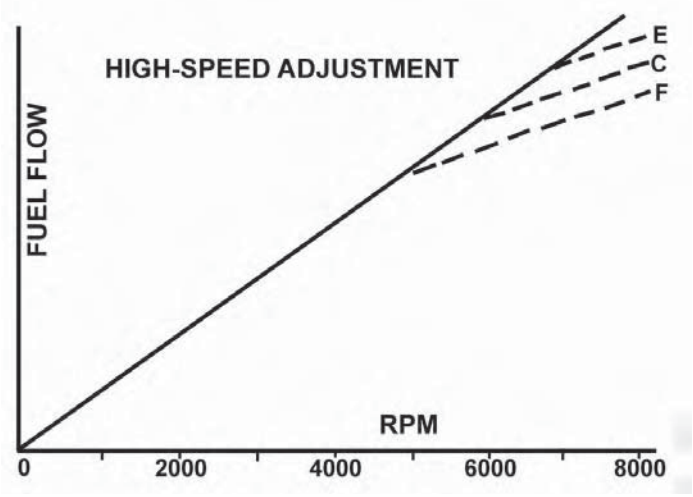
HIGH SPEED BYPASS VALVE

FIRST TIME INSTALLATION OR FUEL SYSTEM NOT CALIBRATED BY KINSLER

When installing a high speed bypass in the system for the first time, or on a system that presently has one but it is not tuned properly:

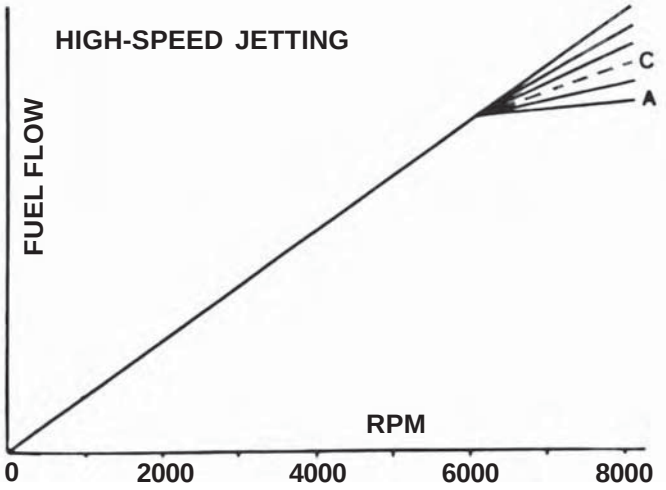
1) Block off the high speed by capping off the hose, DO NOT INSTALL VALVE BACKWARDS, the valve may leak fuel which will cause inaccuracy in the following test.
2) Using only the main jet bypass valve, find the main jet that produces the best performance up to approximately 500-1000 RPM beyond the peak torque of the engine.
3) Go .004" richer on the main jet (.002" to .008" is the range we see), and put the high speed bypass back in the system.
4) Adjust the high speed pressure higher (richer) and lower (leaner) to find the setting for best performance. If using a restrictor jet, try larger or smaller ones in increments of .004" to .010". As a larger restrictor jet is used, the pressure setting of the valve may have to be readjusted.
5) Try richer main jets.... adjust the high speed with each one to find the best overall performance.

We can pressure test and set your high speed bypass valve or provide you with a New Kinsler valve that is set for your system.



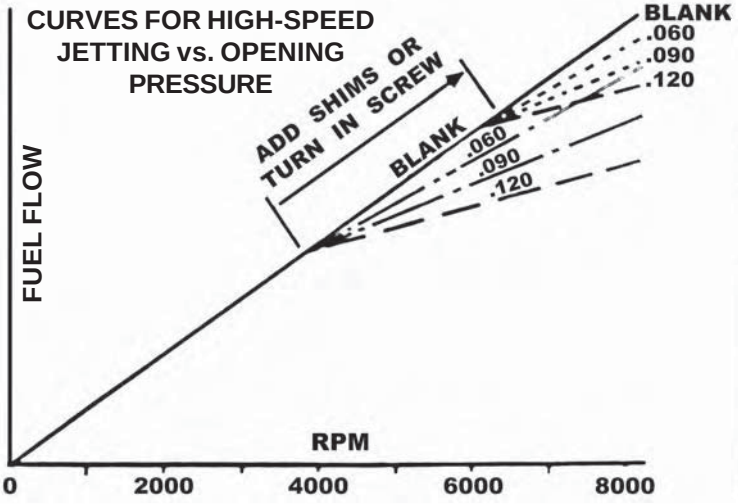
HIGH SPEED ADJUSTMENT

The RPM at which the high speed bypass opens is determined by the pressure setting of the valve. Curve "F" is the lowest setting; the valve opens at 5000 RPM. Raising the pressure will give curve "C", opening at 6000 RPM. Curve "E" opens at 7000 RPM. Raising the RPM at which the new curve starts doesn't change it's slope.



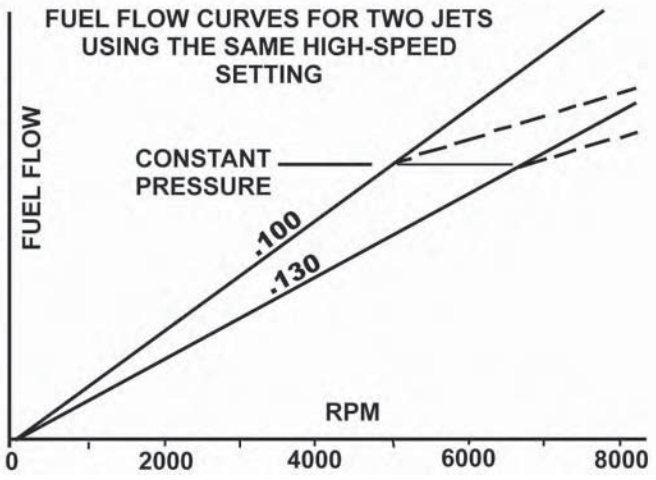
HIGH SPEED RESTRICTOR JETTING

With a blank jet (no orifice- not allowing the bypass to flow), the pressure and flow keep on going as though the high speed bypass wasn't there. Without any jet, the flow levels out as in curve "A", because the high speed lets a lot of fuel bypass back to the tank on the top end. Curve "C" ; adding a restrictor jet gives some intermediate fuel curve. The smaller the jet, the closer the curve comes to the original one. Even without a jet, the bypass offers some internal restriction, which makes curve "A" slope up slightly.



CURVES FOR HIGH SPEED JETTING VERSUS HIGH SPEED SHIMMING OR SCREW ADJUSTMENT

The RPM at which the high speed bypass opens can be raised by adding shims (jet can type). Then the top end can be leaned out further by using a larger restrictor jet in the valve.



CURVES FOR TWO DIFFERENT MAIN JETS USING THE SAME HIGH SPEED SETTING

Fuel pressure is what opens the high speed bypass. With a larger main jet, the opening pressure will not be reached until a higher RPM. To retain the same high speed opening RPM with a larger main jet, you must lower the pressure setting of the high speed valve.

HIGH SPEED BYPASS VALVE

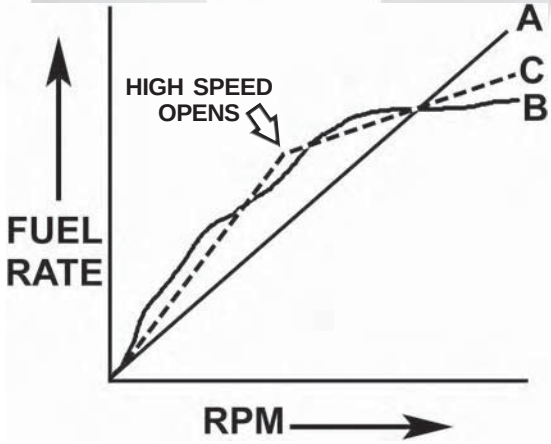
WHY YOU NEED A HIGH SPEED BYPASS

A high speed bypass is needed to obtain maximum horsepower because the engine will experience a loss of volumetric efficiency at RPM above the peak torque. At high RPM the inlet valves are open for such a small amount of time that the cylinders do not have enough time to completely fill with fresh mixture:

Fuel curve "A" shows the flow of a system with a main bypass jet only. An engine with the same volumetric efficiency at all speeds would have this fuel rate requirement.

Fuel curve "B" is the actual fuel requirement of a typical engine. Note that curve "A" is too rich at high engine speed, resulting in a loss of power.

Fuel curve "C" represents the flow rate attained by using a richer main jet to obtain a steeper initial curve, then a high speed to break it over to follow the engine requirement.... A very close compromise to curve “B”.



THE HIGH SPEED ALSO BENEFITS THE MID-RANGE PERFORMANCE

If an engine is jetted to obtain maximum horsepower at high RPM without a high speed bypass, it would be lean around the peak torque RPM (see fuel curve "A" compared to the engine fuel requirement, “B”). Unfortunately jetting rich enough for best mid-range power will cause the engine to run rich and lose power at high RPM. By installing a high speed bypass, separate control of the mid-range and high RPM fuel rates are possible. The main jet can be run richer for best mid-range performance, while using the high speed to lean the system for best power at high RPM.

TUNING TIPS AND BASIC ADJUSTMENTS

Turning the screw "in" on a diaphragm type high speed or changing to a heavier spring, and/or adding more shims in a jet can type, will raise the pressure (RPM) at which the valve opens, making the system richer on the top end. The high speed is usually adjusted to start opening about 500-1000 RPM above peak torque. If a high speed is installed on a fuel system when it is calibrated by Kinsler, the main jet and high speed bypass setting should be very close for best power. However, if the system does not seem to have the ideal fuel rate “as received”:

1) If the fuel curve seems too rich throughout the RPM range, go to a leaner main jet.
2) If just the top end seems rich; go lower on the high speed pressure setting until the high rpm mixture is correct.
   A) If the system has a restrictor jet, try going .004" - .010" larger per run. (Note: the calibrated pressure settings of the high speed should not require a major adjustment if the original main jet is being utilized.) Compare this with the results obtained by going lower on the valve pressure setting.
   B) If the system still seems rich after step "A" above, lower the opening pressure of the high speed by approximately 3 PSI. CAUTION: We recommend you reinstall the original restrictor jet before lowering the pressure setting.
   C) If the engine still seems rich with the lower pressure setting, repeat step "A". While this method may require several runs of the engine it has be found to be a safe way to tune the system while avoiding engine damage from going too lean.
3) If the system is adjusted to give a proper fuel curve, but the overall curve needs to be richened or leaned due to changes in the engine displacement, air density, weather, altitude, etc., adjust the high speed pressure for each main jet step you adjust.
4) Tune the engine for best performance, not just what appears to be good plug readings.

IMPORTANT NOTE: When properly adjusted, a high speed bypass's engagement should not be felt by the driver.
If the driver feels the high speed bypass engage because the engine's power increases dramatically, then either the main jet is adjusted too rich or the high speed is opening at too high a RPM. Either condition will cause the engine’s output to be lower than optimum. There should be no sudden burst of power, only a steady strong pull.

RESTRICTOR JETS

The pressure setting of the high speed is used to control the RPM at which the valve opens, while the restrictor jet is used to limit the flow through it after it opens. The smaller the jet, the less fuel that can flow through the high speed and back to the tank, thus richening the system at higher RPM levels.

In some Oval Track applications the use of a restrictor jet assures that the high speed does not dump off too much fuel at high RPM part throttle.... for example coming down a straight away and quickly closing the throttles causing a pressure spike. The high speed will open and start returning fuel. The restrictor jet will then restrict the amount of fuel bypassed during this overrun condition.

If you own a high speed bypass valve that doesn't have a provision for a restrictor jet. Simply use a jet can after the valve by removing the poppet and stretching the spring out to hold the jet in place. Make sure the jet can has a jet sealing o-ring.

For better understanding of the operation of the restrictor jet see the fuel curves on Page #83.

WHEN THE JET IS DROPPED INTO THE END OF THE VALVE MAKE SURE THE NUMBER IS FACING YOU

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HIGH SPEED BYPASS VALVE

ADVANTAGE OF KINSLER'S DIAPHRAGM HIGH SPEED BYPASS VALVE

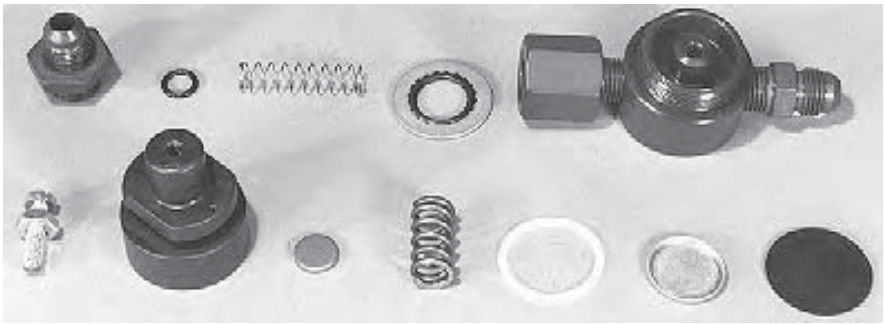
The advantage of this valve over the "jet can" type used in the past is that it has less internal friction on it's moving parts, and it has a much larger area for the pressure to act on for regulation, resulting in a valve that opens at the same RPM every time. Easily adjusted using a blade screwdriver and a 7/16" wrench; no parts to drop or lose, no dealing with leaking fuel when changing pressure settings.

#3903 Model: H

#3904 Model: HR

DIAPHRAGM VALVE AND COMPONENTS

3903	Kinsler diaphragm high speed bypass valve, neoprene diaphragm, gasoline and methanol, hard-anodized aluminum, includes 6 AN male flare fittings, model: H
3904	Kinsler diaphragm high speed bypass valve with restrictor jet provision, neoprene diaphragm, gasoline and methanol, hard-anodized aluminum, includes 6 AN male flare fittings, model: HR
3950	Kinsler diaphragm high speed bypass valve, teflon diaphragm, nitro. ONLY, hard-anodized aluminum, includes 6 AN male flare fittings, model: H
3951	Kinsler diaphragm high speed bypass valve with restrictor jet provision, teflon diaphragm, nitro. ONLY, hard anodized aluminum, includes 6 AN male flare fittings, model: HR
3926	Labor to flow test and set diaphragm valve pressure on flow bench



COMPONENTS

3929	Adjusting screw and lock nut; 12-24 thread, screws are ground to specific length then radiused on end for smooth operation
3932	Upper spring rest; goes between adjusting screw and spring
3933	Lower spring rest; goes between spring and diaphragm
3937	Spring; standard .084" wire diameter for high speed diaphragm valve
3941	Slip ring; teflon, goes between diaphragm and tower
3944	Diaphragm; neoprene, for gasoline and methanol ONLY
3947	Diaphragm; teflon, for nitromethane ONLY
3949	Restrictor jet pod assembly, 1/4" male NPT inlet x 6 AN male flare outlet, includes spring, washer o-ring, end cap, and jet sealing o-ring
3016	End cap for #3949; 6 AN male flare, hard-anodized aluminum
3010	Washer o-ring; for #3949 and #3016
3116	O-ring; jet sealing, for #3949 and #3016
6170	Fitting; Kinsler hard-anodized aluminum, 6 AN male flare x 1/4" male NPT

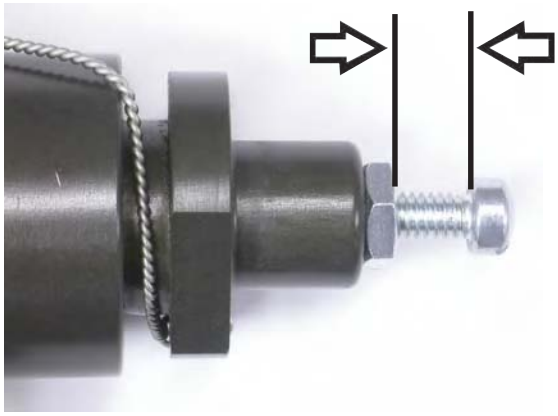
"E" DIMENSION

TURNS OF SCREW	CHANGE IN "E" DIMENSION	CHANGE IN OPENING PRESSURE
1/4	.010"	5.1 ± 1.3 PSI *

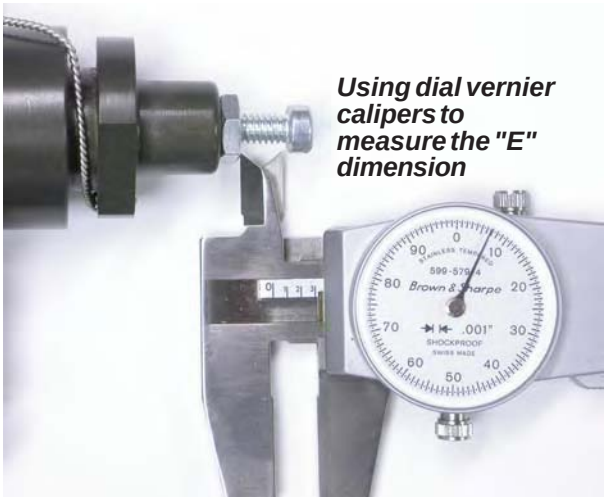
* The average pressure change was determined by testing (5) valves between 40 and 90 PSI.

MEASURING THE "E" DIMENSION

A vernier caliper is the most accurate method for measuring the "E" dimension, but a good steel scale will suffice if read carefully. On every unit calibrated by us, the 'as shipped' "E" dimension is recorded on the tech sheet titled "A Few Important Notes". About .002" inch change in the "E" dimension gives one PSI change in pressure.



The "E" dimension on the adjustment screw is the distance between the bottom of the screw head and the top face of the nut



Using dial vernier calipers to measure the "E" dimension

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HIGH SPEED BYPASS VALVE

KINSLER 6 AN HIGH FLOW JET CAN HIGH SPEEDS AND COMPONENTS

3081	Brass High-Flow 6 AN jet can high speed
3157	Hard-anodized aluminum High-Flow 6 AN jet can high speed
3085	End cap ONLY, brass
3150	End cap ONLY, hard-anodized aluminum
3086	Body ONLY, brass
3151	Body ONLY, hard-anodized aluminum
3087	Poppet, precision ground stainless steel
3089	Labor; pressure set valve on flow bench to pressure of customer's application/request
3074	O-ring set, includes body and jet sealing
3034	Shim kit, consists of: 1- .183" and 6- .030" thick shims
3040	Shim, .183" thick, brass
3042	Shim, .020" thick, brass
3043	Shim, .030" thick, brass
3303	Spring kit, consists of: .016", .018", .019", .021", .024"
3304	Spring kit, consists of: .028", .032", .036", .039, .042"

#3081 high-flow 6 AN brass jet can

Springs may be purchased separately. Last two digits of part number is wire diameter.

example: Part #3339 = .039" wire diameter spring

KINSLER 12-VOLT ELECTRIC LEAN-OUT OR ENRICHMENT VALVES

6060	Valve only, includes electrical connector, NO fittings, 1/4" female NPT ports, normally closed
6061	Valve only, includes electrical connector, NO fittings, 1/4" female NPT ports, normally open
6062	Same as #6060 with 6 AN male flare inlet fitting and restrictor jet provision which holds Kinsler or Hilborn jets
6063	Same as #6061 with 6 AN male flare inlet fitting and restrictor jet provision which holds Kinsler or Hilborn jets

For more technical information on this valve see Page #171

#6062

NOTE: Maximum operating pressure: 150 PSI
Normally closed- no power applied valve is CLOSED, valve opens when power is applied.
Normally open- no power applied valve is OPEN, valve closes when power is applied.

Ken Regenthal's 'Carolina Hooker' Kinsler modified Crower injection system on a big block Chev making a 4.88 second ; 147+, 1/8 mile pass

Hank Scott Racing (HSR) 1100cc oil cooled Suzuki engined Mini-Sprint Oval Track Car. Kinsler modular motorcycle injection assembly (see Page #44) with constant flow metering

HIGH SPEED BYPASS VALVE

K-140

THE ULTIMATE HIGH SPEED

#3989 ***#3161***

KINSLER K-140 VALVES

This valve has the highest flow capacity with the lowest pressure rise of any valve on the market. For most applications the rise is under 1-PSI, since the total bypass flow for most systems is 600 lbs/hr or less.

Extremely smooth operation. The closing flow curve is within 0.3 (3/10) PSI at any flow point on the opening curve. This is achieved by hardcoating, then microlapping all of the moving parts. This means the pressure in the fuel system will stay close to the set point on both rising and falling engine RPM.

Many valves can go into a "buzz" (hydraulic vibration); this valve is more stable as it is the only valve on the market with a unique spring arrangement designed to control buzz.

The diaphragm has a swiveling "live" center pintle that closes down on the seat for very smooth operation. Both the pintle and the seat are lapped for bubble tight close-off.

Hard anodized aluminum housing components and a very compact design makes this piece lighter and easier to install in the vehicle. Components are compatible with **gasoline** and **methanol**.

Seven different spring combinations are available for a total adjustable range of 17 - 230 PSI. There is also CUSTOM BUILDUP SERVICE available.

Accepts Kinsler or Hilborn jets... has jet sealing o-ring for restrictor jet.

Valve is **LIGHT**, weighs 0.45 lbs.

The K-140 High Speed comes complete with :
1- 6 AN male flare inlet fitting, 8 AN port plug for unused inlet port
3 AN port plug for pressure gauge port
#3989 vent breather filter
#3161 restrictor jet holder

3967	Complete assembly, 17-37 PSI
3968	Complete assembly, 26-51 PSI
3969	Complete assembly, 34-80 PSI
3970	Complete assembly, 49-106 PSI
3971	Complete assembly, 57-123 PSI
3972	Complete assembly, 72-152 PSI
3973	Complete assembly, 88-230 PSI, requires special spring package, call for details
3161	Restrictor jet holder, has jet sealing o-ring, 6 AN female inlet x 6 AN male flare outlet, screws directly onto K-140 inlet or outlet fitting and seals with o-ring
3988	Adjusting screw with lock nut, 10-32 thread
3989	Vent filter breather, sintered stainless steel, 10-32 male thread
12090	Diaphragm assembly, 'D' style, includes: lower spring rest, pintle, and diaphragms (2)
12091	Diaphragm replacement material ONLY (two pieces)
12087	Spring, 'Inner'
12088	Spring, 'Middle'
12089	Spring, 'Outer'
12085	K-140 mounting bracket, billet aluminum, black anodized, four mounting holes at 1.90" centers
12086	Set of four Vibration Isolation Mounts, for #12085, 5/8" diameter x 1/2" tall, rubber, 8-32 x .490" thread

Exploded view of K-140

Close up of live-action pintle

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BYPASS VALVES

KINSLER HIGH FLOW 6 AN JET CANS

Body has a micro finished bore for stick free poppet travel and a precision ground stainless steel poppet for long life. Accepts Kinsler or Hilborn jets... has jet sealing o-ring for accurate orifice metering.

Can be used for main, secondary, high speed, or port check. Unit has high flow rate versus opening pressure which makes this valve ideal for jet can type high speed bypass when a large quantity of fuel must be bypassed. Uses Kinsler's standard springs and shims.

Available in brass or hard anodized aluminum.
Aluminum valve is **67% LIGHTER** than the brass valve.

BRASS

3084	Main bypass valve, complete assembly
3076	Secondary bypass valve, complete assembly
3081	High speed bypass valve, complete assembly
3085	End cap ONLY, for brass valve, includes o-rings
3086	Body ONLY, brass
3170	Safety pressure valve, used on IRL systems, complete assembly 150-155 PSI
3172	Pump safety valve, typically used on supercharged fuel systems, complete assembly 190-200 PSI

HARD ANODIZED ALUMINUM

3155	Main bypass valve, complete assembly
3156	Secondary bypass valve, complete assembly
3157	High speed bypass valve, complete assembly
3150	End cap ONLY, for hard-anodized valve, includes o-rings
3151	Body ONLY, hard-anodized aluminum
3175	Safety pressure valve, used on IRL systems, complete assembly 150-155 PSI
3177	Pump safety valve, typically used on supercharged fuel systems, complete assembly 190-200 PSI

PARTS FOR BRASS AND ALUMINUM VALVES

3074	O-ring set, for end cap, body, and jet sealing, gasoline and methanol
3079	O-ring set, for end cap, body, and jet sealing, nitromethane
3087	Poppet ONLY, precision ground hardened stainless steel

LABOR

3088	Flow test and set secondary #3076 and #3156 on flow bench
3089	Flow test and set high speed #3081 and #3157 on flow bench

For pressure charts on spring and shim combinations for Kinsler high flow 6 AN jet cans, see PRESSURE CHARTS on Page #96

SPRINGS FOR 6 AN JET CANS

3303	Spring kit, for Kinsler and Hilborn 6 AN jet can, consists of: .016", .018", .019", .021", .024"
3304	Spring kit, for Kinsler and Hilborn 6 AN jet can, consists of: .028", .032", .036", .039", .042"
3316	Spring: .016" wire diameter
3317	Spring: .017" wire diameter
3318	Spring: .018" wire diameter
3319	Spring: .019" wire diameter
3321	Spring: .021" wire diameter
3324	Spring: .024" wire diameter
3328	Spring: .028" wire diameter
3332	Spring: .032" wire diameter
3336	Spring: .036" wire diameter
3339	Spring: .039" wire diameter
3942	Spring: .042" wire diameter

SHIMS FOR 6 AN JET CANS

3034	Shim kit, includes: 1- .183" thick shim and 6- .030" thick shims
3040	Shim, .183" thick, brass
3042	Shim, .020" thick, brass
3043	Shim, .030" thick, brass

8 AN HIGH FLOW JET CAN

3061	Brass jet can, 8 AN, precision ground stainless steel poppet and spring
3050	Aluminum jet can, 8 AN, precision ground stainless steel poppet and spring
3062	Poppet, for #3061 and #3050 jet can

SPRINGS

3064	Available springs for #3061 and #3050 8 AN jet cans ONLY, (wire diameter x length) .028" x 1.500"; .035" x 1.525"; .050" x 1.425"; .061" x 1.475"; .075" x 1.500"; .080" x 2.050" Specify size when ordering
3078	Spring kit, for 8 AN jet can, includes 1 each of the above eight springs
3130	Spring kit, for 8 AN jet can, 'Light' four spring assortment, 3-40 PSI
3131	Spring kit, for 8 AN jet can, 'Heavy' four spring assortment, 38-300 PSI

SHIMS FOR 8 AN JET CANS

3059	Shim kit for 8 AN jet can: (4)- .020" shims, (2)- .060" shims, (1)- .185" shim
3065	Shim for 8 AN jet can: .020" nominal thickness, brass
3066	Shim for 8 AN jet can: .060" nominal thickness, brass
3067	Shim for 8 AN jet can: .185" nominal thickness, brass

8 AN H-TYPE JET CAN

3055	H-type jet can, 8 AN, hard anodized aluminum with poppet and spring
3057	Poppet, for #3055 ONLY, hard anodized aluminum

SPRINGS:

3058	For #3055 8 AN jet can ONLY: .024" or .047 wire diameter

BYPASS VALVE PRESSURE CHARTS

THESE CHARTS APPLY TO KINSLER VALVES USING
KINSLER SPRINGS AND A JET SEALING O-RING*.

PRESSURES MAY VARY SLIGHTLY.

HARD-ANODIZED 6 AN ALUMINUM (ANO-K TYPE VALVE)
MAIN #3006 AND SECONDARY #3030

SHIMS	.015"	.016"	.017"	.018"	.019"	.021"	.024"	.028"	.032"	.036"	.039"	.042"
NONE	0.5	0.5	1.2	1.5	2.0	2.1	2.3	3.4	5.9	12.3	14.4	35.4
1-THICK	1.0	1.0	2.0	2.5	3.2	3.5	4.6	8.9	13.7	26.0	35.9	63.0
2-THICK	1.4	1.6	2.8	3.5	4.4	5.0	7.1	13.8	21.5	39.4	54.8	90.4

HIGH FLOW BRASS AND
HARD-ANODIZED 6 AN ALUMINUM
MAIN #3084 AND #3155 ;
SECONDARY #3076 AND #3156 ;
HIGH SPEED #3081 AND #3157

SHIMS	.015"	.016"	.017"	.018"	.019"	.021"	.024"	.028"	.032"	.036"	.039"	.042"
NONE	0.7	0.8	1.7	2.2	2.9	3.3	4.0	7.4	13.4	26.7	34.3	68.8
1-THICK	1.2	1.4	2.6	3.5	4.5	5.2	6.9	14.2	23.2	41.6	60.9	104.6
2-THICK	1.8	2.1	3.5	4.7	6.1	7.0	9.9	20.3	33.4	61.8	86.3	138.4

6 AN QUICK DISCONNECT TYPE VALVE ;
#3104 AND #3112

SHIMS	.015"	.016"	.017"	.018"	.019"	.021"	.024"	.028"	.032"	.036"	.039"	.042"
NONE	0.3	0.3	0.7	0.9	1.3	1.3	1.1	0.9	2.4	5.5	5.4	18.5
1-THICK	0.7	0.8	1.5	1.9	2.4	2.6	3.2	5.4	9.0	17.0	21.5	43.0
2-THICK	1.1	1.2	2.1	2.8	3.4	3.8	5.2	9.3	15.8	28.5	39.6	66.8

***NOTE:** A jet sealing o-ring in the jet can is equivalent to .060" worth of shims.
Kinsler and Hilborn jets are equivalent to approximately .180" of shims.

PRESSURE TESTER

See Our Barrel Valve Leakage Tester Pg. #107

Tony 'The Tiger' Lang's Top Fuel drag bike, supercharged injected nitro. Kawaski

5990 Single gauge pressure tester, includes: 0-100 PSI gauge with 2 PSI increments, 6 AN female swivel coupler

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BARREL VALVES

Our valves feature 3 AN female nozzle hose ports that are spaced apart for good wrench clearance. All feature a High-Flow distribution cavity with a removable o-ring plug. Can be installed on most Hilborn, Engler, Crower, and Ron's manifolds either as a direct bolt-on or using a Kinsler mounting adapter. These barrel valves are made from 6061-T6 billet aluminum, then hard anodized for protection from corrosion by methanol.

Part # of Complete Assembly	Part # of Block Only	Model	Description
3501	3590	ALH	8-port, high flow, nozzle ports exit out of the sides, left hand spool rotation, bottom mount
3502	3591	ARH	8-port, high flow, nozzle ports exit out of the sides, right hand spool rotation, bottom mount (this is the standard unit on Kinsler small block Chevrolet manifolds)
3561	3571	ARH-XL	Same as #3502, Xtra-Light is .25 lb less than ARH
3510	3599	ARH-P	Same as #3502 with two 6 AN female ports on front and rear of distribution cavity, bottom mount
3511	3574	ALH-P	Same as #3501 with two 6 AN female ports on front and rear of distribution cavity, bottom mount
3503	3592	BLH	8-port, high flow, nozzle ports exit front and rear, left hand spool rotation, bottom mount
3562	3572	BLH-XL	Same as #3503, Xtra-Light is .25 lb. less than BLH
3566	3586	BLH-T	Same as #3503, with two 1/4" mounting holes through side of block, side and/or bottom mount
3504	3593	BRH	8-port, high flow, nozzle ports exit front and rear, right hand spool rotation, bottom mount
3563	3573	BRH-XL	Same as #3504, Xtra-Light is .25 lb. less than BRH
3508	3597	CLH	16-port, high flow, four nozzle ports exit each side, left hand spool rotation, bottom mount
3509	3598	CRH	16-port, high flow, four nozzle ports exit each side, right hand spool rotation, bottom mount
3564	3575	CRH-XL	Same as #3509, Xtra-Light is .3 lb. less than CRH
3505	3594	PLH	4-port, high flow, two nozzle ports exit front and rear, left hand spool rotation, side mount
3506	3595	PRH	4-port, high flow, two nozzle ports exit front and rear, right hand spool rotation, side mount
3507	3596	D	Mono-port, 6 AN female inlet and outlet ports, side mount

NOTE : When ordering a barrel valve, specify make and style of manifold, barrel valve spool shaft rotation*, fuel being used, and type of racing.
Our barrel valve assembly comes with a standard Kinsler spool, secondary outlet fitting, and mounting bolts.
The throttle arm and inlet fitting are ordered separately.
Optional spools are ordered as an Upgrade.

* Rotation:

Right hand - looking at the end of the spool shaft (the screw driver slot end), it rotates clockwise from idle to wide open throttle.
Left hand - looking at the end of the spool shaft (the screw driver slot end), it rotates counterclockwise from idle to wide open throttle.

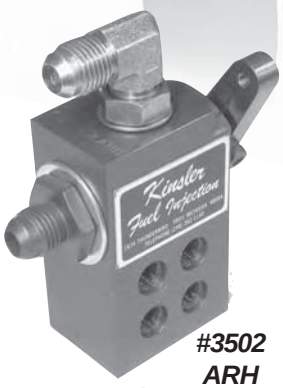
TERMINOLOGY

Mounting Orientation: Barrel valves are usually mounted on individual runner manifolds so that the secondary outlet fitting points toward the front of the engine, so the spool shaft protrudes toward the rear. Kinsler bottom mount barrel valves have 10-32 threaded mounting holes in their base. Side mount has .170" clearance holes for #8 attaching bolts, except BLH-T/BRH-T which have .250" clearance holes.

Nozzle Line Ports: Side exit refers to ports pointing towards valve covers of V8 engine. Front and rear exit refers to ports pointing towards the front and rear of a V8 engine.

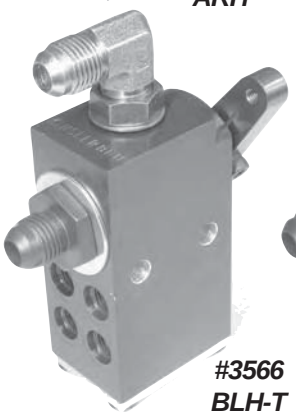
BARREL VALVE ASSEMBLIES

Arms and inlet fittings sold seperately

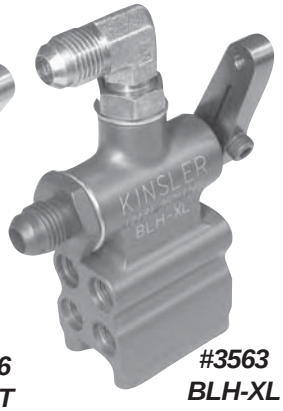


#3502 ARH

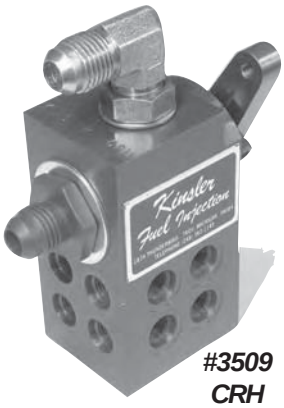
#3561 ARH-XL



#3566 BLH-T



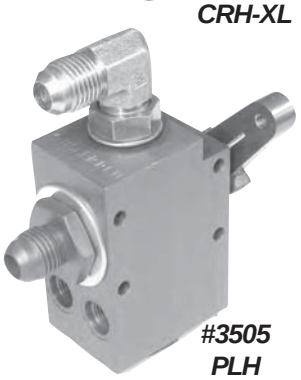
#3563 BLH-XL



#3509 CRH

#3564 CRH-XL

#3510 ARH-P



#3505 PLH

#3507 D

BARREL VALVE SPOOLS AND DUAL RATE IDLE SYSTEM

These spools also fit Hilborn barrel valves with .575" diameter spool bore

UNDERSTANDING THE SPOOL

We make a variety of ramp widths and depths, with various rates of ramp depth taper. What works well for a drag racer may not be correct for a road racer. The correct spool for an application is the one that delivers the proper amount of fuel at all the part throttle opening angles. The correct spool for an engine equipped with a 2 1/16" injection manifold is probably not the right one for a similar engine with a 2 1/2" injection manifold. The air flow increase per degree of throttle rotation using the larger throttle will be greater than that of the smaller one, therefore requiring more fuel per degree of spool rotation. Most of our competitors spools work well at idle and wide open throttle, but do not provide the proper amount of fuel at part throttle. Since the ramp is fixed, the only way to achieve the fuel required at part throttle with one of those spools is by richening the idle, which advances the entire ramp. Unfortunately, the idle is now too rich. Plug fouling and engine stumbling may occur.

KINSLER BARREL VALVE SPOOLS

3552	H/K, .100" wide - part throttle fuel ramp x .200" wide - full throttle fuel ramp
3553	54/K, .200" wide fuel ramp
3551	26/K, .200" wide fuel ramp, increased flow at part throttle over 54/K
3556	23/K, .200" wide - part throttle fuel ramp x .300" wide - full throttle fuel ramp
3555	56/N, .300" wide fuel ramp
3557	59/K, .250" wide fuel ramp, based on 54/K
3558	64/K, .350" wide fuel ramp, based on 54/K
3559	22/K, .200" wide - part throttle fuel ramp x .250" wide - full throttle fuel ramp
3560	24/K, .200" wide - part throttle fuel ramp x .350" wide - full throttle fuel ramp
1401	Labor to degree New Kinsler barrel valve spool and modify fuel curve to Kinsler 'Race-Grade' specification

HILBORN BARREL VALVE SPOOLS

3614	#54, .200" wide fuel ramp
3616	#56, .300" wide fuel ramp
3617	#57, .100" wide fuel ramp
3618	#61, .300" wide fuel ramp
3619	#68, .200" wide fuel ramp
3620	#71, .050" wide fuel ramp
3621	#77, .100" x .200" wide fuel ramp

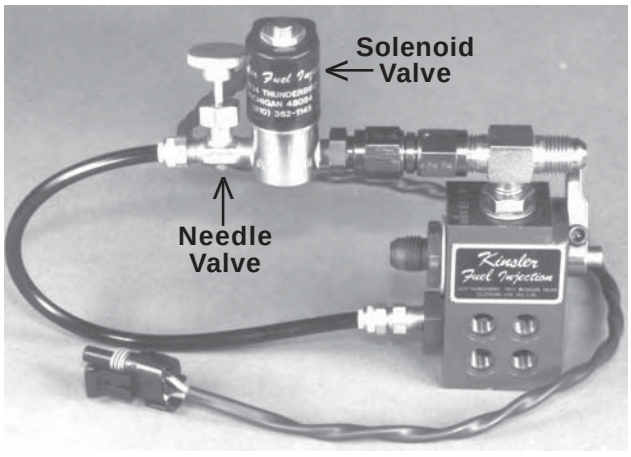
#3523 next to barrel valve model: BLH-T #3566

SERVICE PARTS AND ACCESSORIES

3010	Washer o-ring, for #3515 and #3521
3515	Fitting, secondary outlet on barrel valve, 6 AN male flare
3521	Plug, secondary outlet on barrel valve
3512	Plug, for bottom of high-flow barrel valve, includes o-ring, for barrel valves with .750" I.D. cavity
6167	Port plug, 3 AN male + o-ring, hard anodized alumiinum
6153	Fitting, 3 AN male flare x 3 AN male + o-ring, brass
3519	Spring, retains spool against block, .039" wire diameter
3522	O-ring, seal spool shaft to block
3043	Thin shim, brass, goes between spring and spool
3523	Retainer plate, holds bottom plug in place when barrel valve is not bolted down to a bracket

DUAL RATE IDLE SYSTEM

Adjust the barrel valve spool for a "nice clean idle", with the solenoid valve off. The rich idle is set for best throttle response (see pg. #106) by adjusting the needle valve to bypass fuel around the spool after the 12-volt solenoid valve has been activated. This is great for the street... use the lean idle at a traffic light to eliminate excess exhaust fumes, then switch to rich to accelerate away. Great for race cars too.



3625	Kit, consists of: electric soleniod, needle valve, fittings, and hose


#3551


#3553


#6167


#3521


#3515


#3512


#3010


#3519


#3043


#3522

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www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

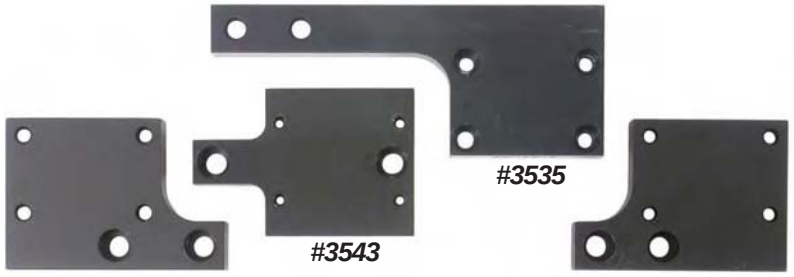
BARREL VALVE MOUNTING BRACKETS AND DISTRIBUTION BLOCKS

We also CUSTOM make mounting brackets.

3530	Adapts Kinsler bottom mount barrel valve to Crower manifold
3531	Adapts Kinsler model: D barrel valve (#3507) to Enderle blower hat
3532	Adapts Kinsler bottom mount barrel valve to Kinsler big block Chevrolet cross-ram manifold
3548	Modular 2-piece universal billet aluminum bracket, typically used to mount barrel valve to tunnel ram base
7020	Adapts Kinsler bottom mount barrel valve to Kinsler 3-piece small block Chevrolet manifold, offset to right hand side
7022	Adapts Kinsler bottom mount barrel valve to Kinsler 3-piece small block Chevrolet manifold, offset to left hand side
3533	Adapts Kinsler bottom mount barrel valve to Ron's 'Flying Toilet', specific bolt centers
3534	Same as #3533, but moves the barrel valve an additional 2.120"
3543	Adapts models: D, PLH, or PRH barrel valve onto Kinsler MC-180 locator bar bolt holes, 2.1" c-c
3535	Adapts Kinsler bottom mount barrel valve to Kinsler standard series 4-barrel throttle body
3536	Adapts Kinsler bottom mount barrel valve to Kinsler High-Flow series 4-barrel throttle body


#7020 #7022

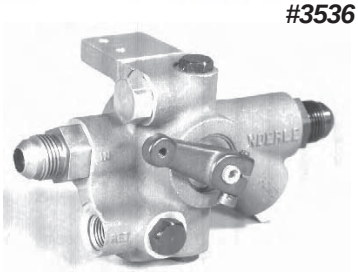

#3530 #3548 #3532


#3535 #3543 #3533 #3536

ENDERLE BLOWER HAT BARREL VALVES - COMPLETE

16170	Blown gasoline ONLY; Bug or Birdcatcher
16171	Injected methanol; Bug, Bird, Buzzardcatcher
16172	Blown methanol ONLY; Bug or Birdcatcher
16174	Blown High-Flow methanol or nitromethane; Bug or Birdcatcher
16176	Blown High-Flow nitromethane; Bug, Bird, or Buzzardcatcher

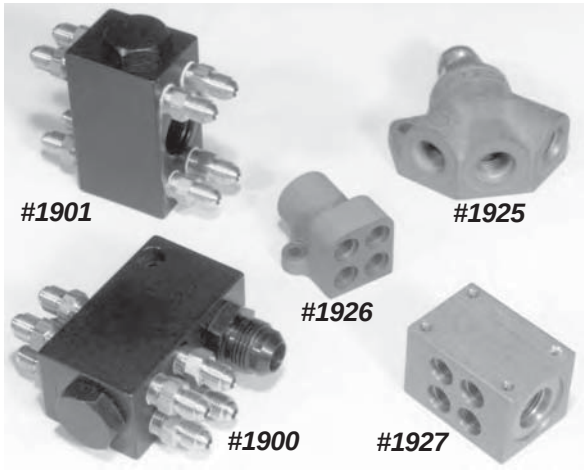

#16172


#16174

DISTRIBUTION BLOCKS

Often called junction blocks (J-block), these pieces offer flexibility on plumbing your fuel, nitrous, and/or vacuum/pressure reference system.

1900	(8) 3 AN male fittings, specify 6 or 8 AN inlet, typically used on tunnel-ram or Enderle blower hat
1901	(8) 3 AN male fittings, 8 AN female inlet port (in center), typically used for port nozzles on supercharged application
1925	(3) 6 AN female ports x (1) 8 AN female port
1926	(4) 3 AN female ports x (1) 6 AN female port
1927	(8) 3 AN female ports x (2) 6 AN female ports
6167	Port plug, 3 AN male + o-ring, hard-anodized aluminum
6153	Fitting, 3 AN male flare x 3 AN male + o-ring, brass
6125	Fitting, 3 AN male flare x 1/8" NPT male thread, brass


#1901 #1925 #1926 #1900 #1927

Plumb your High-speed bypass from the barrel valve
Run a second high-speed bypass
Data aquisition port
Run 2 or 3 sets of nozzles

KINSLER 6 AN BARREL VALVE ADAPTER BLOCK

3528	Two 6 AN female distribution ports exit front and rear, bolts to bottom of Kinsler High-Flow barrel valves, hard-anodized aluminum, includes o-ring

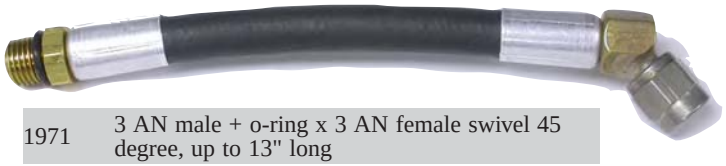

#3528

NOZZLE HOSES - CUSTOM MADE DAILY TO THE LENGTHS AND FITTINGS YOU ORDER

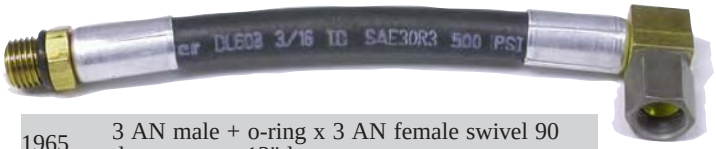
NOZZLE LINES - BLACK NITRILE

Hose is 3/16" I.D., 500 psi maximum working pressure. Brass hose ends for corrosion resistance, barbed for secure engagement into hose and have outer aluminum collar crimped into place. Hose length is measured from the ends of the aluminum collars that contact the hose ends.

1961	3 AN male + o-ring x 3 AN female swivel straight, up to 13" long
1962	Same style as #1961, 13 1/4" to 28" long

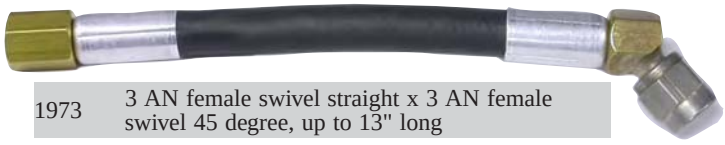


1971	3 AN male + o-ring x 3 AN female swivel 45 degree, up to 13" long
1972	Same style as #1971, 13 1/4" to 28" long

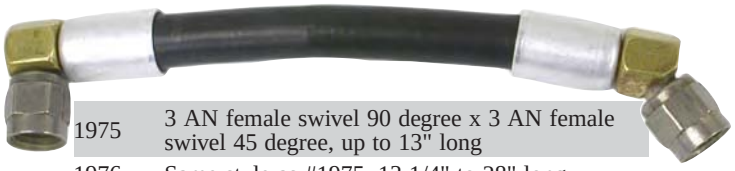


1965	3 AN male + o-ring x 3 AN female swivel 90 degree, up to 13" long
1966	Same style as #1965, 13 1/4" to 28" long

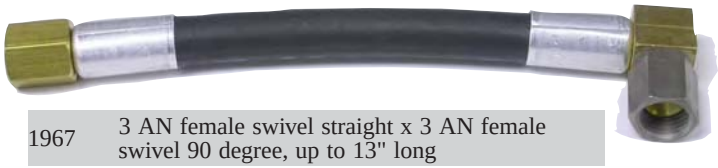
1963	3 AN female swivel straight x 3 AN female swivel straight, up to 13" long
1964	Same style as #1963, 13 1/4" to 28" long



1973	3 AN female swivel straight x 3 AN female swivel 45 degree, up to 13" long
1974	Same style as #1973, 13 1/4" to 28" long



1975	3 AN female swivel 90 degree x 3 AN female swivel 45 degree, up to 13" long
1976	Same style as #1975, 13 1/4" to 28" long



1967	3 AN female swivel straight x 3 AN female swivel 90 degree, up to 13" long
1968	Same style as #1967, 13 1/4" to 28" long

1969	3 AN female swivel 90 degree x 3 AN female swivel 90 degree, up to 13" long
1970	Same style as #1969, 13 1/4" to 28" long

OPTIONS

1988	1/8" male NPT hose end, in place of hose end on above hoses
1989	6 AN female swivel straight hose end, in place of hose end on above hoses
6167	Port plug, 3 AN male + o-ring, hard anodized aluminum, to plug nozzle-line-outlet-port in barrel valve
6153	Fitting, 3 AN male flare x 3 AN male + o-ring, brass
6125	Fitting, 3 AN male flare x 1/8" NPT male thread, brass

45 degree hose end on 'down' nozzle

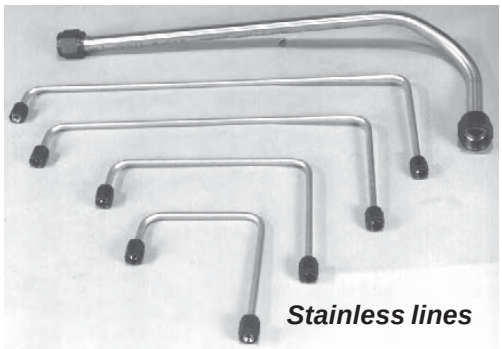
HOSE ENDS

1979	Hose end, 3 AN male + o-ring x 3/16" barb
1956	Hose end, 3 AN female swivel straight x 3/16" barb
1957	Hose end, 3 AN female swivel 90 degree x 3/16" barb
1983	Hose end, 3 AN female swivel 45 degree x 3/16" barb
1958	Aluminum collar, for above hose ends MUST be proper crimped onto hose
1959	Nozzle hose, priced per foot

STAINLESS STEEL 3 AN NOZZLE TUBES

We can supply individual components or fabricate custom tubing for fuel injection manifolds, nitrous oxide systems, or vacuum system.

1986	Sleeve and nut, 3 AN, for #1987 tubing
1987	Tube for nozzle, stainless steel, 3/16" O.D. x .155" I.D.
1982	Nozzle tube set of (8) , Enderle Bug/Birdcatcher
16167	Tube, 8 AN, Enderle Bugcatcher barrel valve (#16170) without high speed to #1900 distribution block
16168	Tube, 8 AN, Enderle Birdcatcher barrel valve (#16172) without high speed to #1900 distribution block
16169	Tube, 8 AN, Enderle Birdcatcher barrel valve (#16172) with high speed to #1900 distribution block
6153	Fitting, 3 AN male flare x 3 AN male + o-ring, brass
6125	Fitting, 3 AN male flare x 1/8" NPT male thread, brass



Stainless lines

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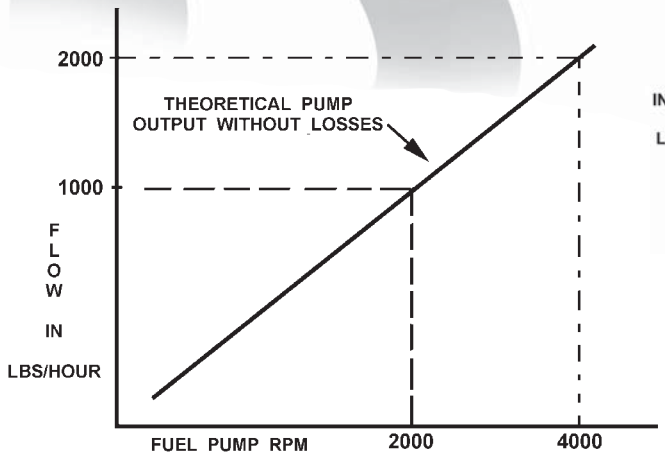
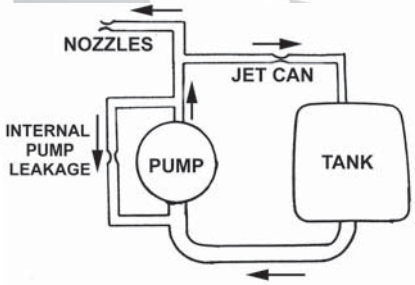
MECHANICAL FUEL PUMPS

PUMP OUTPUT

In theory, a mechanical pump's output is linear to the RPM at which it is driven. Rotate the pump shaft twice as fast and the flow will double. However, even a good pump is affected by the physical clearances of the gears and the pressure load against the outlet. Typically the flows at very low RPM and very high RPM will be below the linear graph of the pump's output due to internal leakage, pumping friction losses, and clearance in the components.





Running clearance is a must for the pump gears. This clearance causes some internal leakage back past the gears and has the same effect as a bypass from the pump outlet back to the inlet.

GENERAL SIZING AND SERVICE

Engine displacement, volumetric efficiency, and the fuel being used will dictate the required pump displacement size. If you have a doubt about the size of your pump, note the number stamped on it and give us a call. Several pumps are assembled using the same size housing, so the casting number located on the housing does not indicate the exact pump displacement. Most pumps are identified by the serial number stamped on it.

Most pumps experience wear over a period of time. To maintain engine performance on a fuel system where the pump is losing flow output, the main jet has to be continually richened. If the main jet is not richened, the top end performance will drop off. If a problem is not found after thoroughly checking other engine components (especially valve springs, cam lobes, and ignition), the pump should be sent in for testing.

We can test and rebuild many types of pumps. To have a pump tested, send it in with all of the fittings still in it. Include a day and evening time telephone number with the area code..... a technician will call if there is a problem.

PUMP SIZE

FLOWS ARE AVERAGE OUTPUT - ACTUAL OUTPUT MAY VARY SLIGHTLY

PUMP RPM	PSI	KW-200	-00	KW-300	-0	KW-400	KW-450	KW-500	0-1/2	-1	KW-700	KW-1300	-2	-4
2000	0	335	380	505	685	670	770	835	960	1190	1170	2160	2325	2930
2000	50	305	295	475	590	655	760	815	865	1095	1130	2125	2140	2765
3500	50	570	570	845	1070	1150	1330	1450	1515	1950	2000	3670	3710	4760

Flows in this chart are in pounds per hour (lbs/hr) of .720 specific gravity test fluid at 60°F.

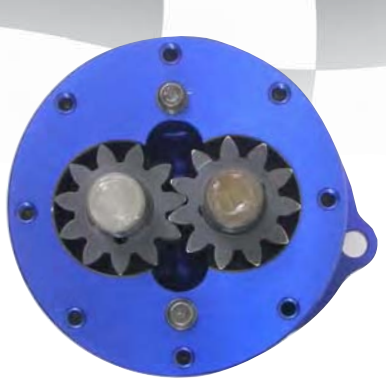
TYPICAL APPLICATIONS VERSUS PUMP SIZE

These recommendations are based on the pump running at 1/2 crank speed.
Variations will occur with RPM of engine and pump drive speed.

KW	Hilborn	Typical Use
N/A	BL-235	Very small displacement engines fueled by gasoline and/or alcohol (typically one to four cylinders)
200	-00	Small displacement four cylinder engine (typically) fueled by gasoline and/or alcohol
300	N/A	Large displacement four cylinder engine (typically) fueled by gasoline and/or alcohol
400	-0	Gasoline and alcohol (typically 6-cylinder and under 400 cubic inch V8)
450	N/A	Alcohol (over 400 cubic inch V8)
500	-1/2	Gasoline and alcohol (typically unblown under 430 cubic inch V8)
700	-1	Unblown and blown gasoline; unblown alcohol up to 700 cubic inch displacement; small displacement blown alcohol low boost or low % nitro
1300	-2	Small displacement unblown high % nitro ; average blown alcohol
LB750	-4	Large displacement unblown high % nitro; large displacement high boost blown alcohol; small displacement low boost blown nitro
LB1500	-5	Very large displacement high boost blown alcohol; large displacement high boost high % nitro

ALL FLOWS , SIZES , AND RECOMMENDATIONS FOR FUEL PUMPS ARE FOR GENERAL REFERENCE. CONSULT A KINSLER TECHNICIAN FOR YOUR SPECIFIC APPLICATION !!!

MECHANICAL PUMPS



CHANGING PUMP ROTATION:

Gear-rotor style pumps are reversed by removing the cover and re-indexing it 180°. Pumps tend to change their flow when taken apart and reassembled. Disassembling the pump in the field is discouraged. It is recommended that the pump be sent to us, if the rotation needs to be changed. We will flow test the pump before and after changing it's rotation to be sure it is performing properly.

Gear to Gear style pumps are reversed by removing the inlet and outlet fittings. Simply turn the body 180° and install inlet and outlet fittings in the opposite end of the pump from the original configuration. (Note: the original inlet port of the pump will now be the outlet port)

GEAR TO GEAR DESIGN

TYPICAL KW, WATERMAN, OR DSR.

LOOKING AT PUMP COVER

REGULAR ROTATION

REVERSE ROTATION

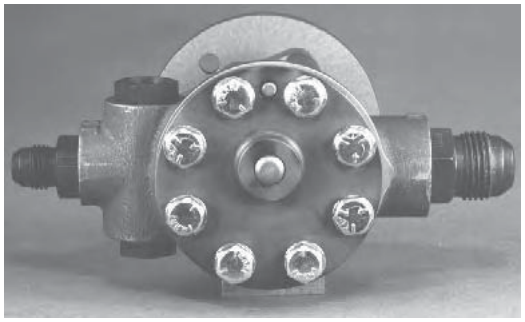
Gear to gear (above) and gear-rotor (below) style pumps with front covers removed

The required pump rotation can be determined by looking at the rotation of ***female drive hex*** at the mounting surface. A clockwise rotation female drive requires a regular rotation pump, counterclockwise requires a reverse rotation pump.

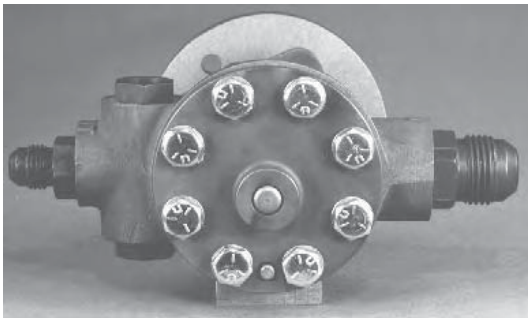
GEAR-ROTOR DESIGN

TYPICAL HILBORN OR ENDERLE

LOOKING AT BOLT-ON PUMP COVER



REGULAR ROTATION



REVERSE ROTATION

A pin or notch at the twelve o'clock position with the inlet fitting at the three o'clock position is regular rotation. A reverse rotation pump will have the pin or notch at six o'clock with the inlet fitting at the three o'clock position.

MINIMUM PLUMBING FOR INLET SUPPLY HOSE SPECIFICATIONS :

KW or Waterman 200-300 / Hilborn or DSR -00 pump	-8AN hose with 7/16" I.D.*
KW or Waterman 400 / Hilborn or DSR -0 pump / Enderle 80A-0	-8AN hose with 7/16" I.D.*
KW or Waterman 450 or 500 / Hilborn or DSR -1/2	-10AN hose with 9/16"I.D.*
KW or Waterman 600 or 700 / Hilborn or DSR -1 / Enderle 80A	-12AN hose with 11/16" I.D*
KW or Waterman 900 or 1300 / Hilborn -2 / Enderle 110	-12AN hose with 11/16" I.D.*
Hilborn -4 / Enderle 110-990 or 110-1100	-16AN hose with 7/8" I.D.*

*- I.D. of stainless steel braided hose

LARGER HOSE SIZES ARE REQUIRED AT PUMP SPEEDS OVER 4000 RPM (8000 engine RPM)

ALL FLOWS , SIZES , AND RECOMMENDATIONS FOR FUEL PUMPS ARE FOR GENERAL REFERENCE. CONSULT A KINSLER TECHNICIAN FOR YOUR SPECIFIC APPLICATION !!!

Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

MECHANICAL FUEL PUMPS

KW FUEL PUMPS

a) Side-by-side gear construction allows this pump to withstand higher fuel pressure loads than other designs, with minimal flow losses. The gears and plates are coated with Polydyn ™ dry film lubricant to reduce wear. The billet aluminum housing is hard anodized on the inside to reduce corrosion.
b) Pumps are available in sizes :
KW/LW : 200, 300, 400, 450, 500 , 600, 700
Large KW : 900, 1000, 1100, 1200, and 1300
c) Uses 3/8" male hex drive. Swivel base flange for ease of installation, allows indexing of inlet and outlet ports for clearance of inlet and outlet hoses.
d) Kinsler offers a complete line of AN hard anodized aluminum fittings. These fittings are light, resistant to methanol corrosion, give smooth flow, and good sealing.
e) All parts are available to customer. Allows for "emergency" field service.
f) Interchangeable gears and spacers lets you quickly change the displacement size of the fuel pump, bigger or smaller (within housing limits).
g) Pump can be driven either clockwise or counterclockwise without modification. Internal design allows either port to be inlet or outlet depending on rotation. Simply switch the inlet and outlet fittings.

KW 500 pump and parts

KW 200 - 700 FUEL PUMPS

Housing configuration consists of 3-inlet ports (1-8 AN and 2-6 AN female) and 3-outlet ports (1-8 AN female and 2-6 AN female). Pump without fittings weighs approx. 1.95 lbs

2904	KW-200 regular rotation
2905	KW-200 reverse rotation
2908	KW-300 regular rotation
2909	KW-300 reverse rotation
2912	KW-400 regular rotation
2913	KW-400 reverse rotation
2954	KW-450 regular rotation
2955	KW-450 reverse rotation
2916	KW-500 regular rotation
2917	KW-500 reverse rotation
2980	KW-550 regular rotation
2981	KW-550 reverse rotation
2920	KW-600 regular rotation
2921	KW-600 reverse rotation
2924	KW-700 regular rotation
2925	KW-700 reverse rotation

LW 'Lite-Weight' series pump

Service parts are available for in-the-field repairs

PUMP FLOW TESTING SERVICE

2900	Labor to run in and flow test New KW/LW fuel pump, 900 series or smaller
2901	Labor to run in and flow test New KW fuel pump, 1000 series and larger

900-1300 series pumps have a larger housing, 12 AN female inlet port and 8 AN female outlet port

2932	KW-900 regular rotation
2933	KW-900 reverse rotation
2936	KW-1000 regular rotation
2937	KW-1000 reverse rotation
2940	KW-1100 regular rotation
2941	KW-1100 reverse rotation
2944	KW-1200 regular rotation
2945	KW-1200 reverse rotation
2947	Upgrade on KW-900, KW-1000, KW-1100, KW-1200, build pump with capability to accept up to size 1300 gear set, uses 1300 front cover and additional spacer (900 only), different size spacers are used for other size pumps
2948	KW-1300 regular rotation
2949	KW-1300 reverse rotation

NEW

'Lite-Weight' fuel pump ! When every bit of weight counts !

LW "Lite-Weight" FUEL PUMPS

Housing configuration consists of 1-inlet port (8 AN female) and 3-outlet ports (1-8 AN female and 2-6 AN female in cover). Pump without fittings weighs approx. 1.45 lbs

2914	LW-400 regular rotation
2915	LW-400 reverse rotation
2956	LW-450 regular rotation
2957	LW-450 reverse rotation
2918	LW-500 regular rotation
2919	LW-500 reverse rotation
2982	LW-550 regular rotation
2983	LW-550 reverse rotation

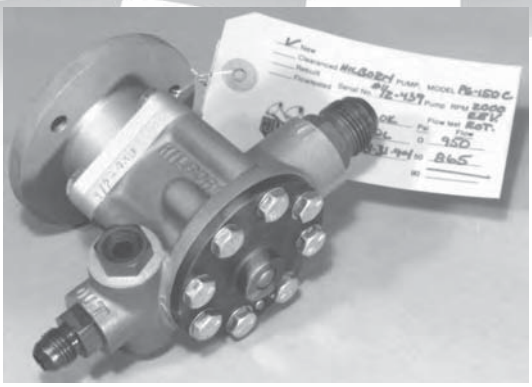
FITTINGS - KINSLER HARD-ANODIZED ALUMINUM

6166	6 AN port plug with o-ring
6156	6 AN male flare x 6 AN male + o-ring
6044	6 AN male flare x 8 AN male + o-ring
6043	8 AN male flare x 8 AN male + o-ring
6103	Reducer bushing, 6 AN female x 8 AN male + o-ring
6177	10 AN male flare x 8 AN male + o-ring
6178	12 AN male flare x 8 AN male + o-ring
6179	12 AN male flare x 12 AN male + o-ring
6100	16 AN male flare x 12 AN male + o-ring

KW 900 pump

MECHANICAL FUEL PUMPS

HILBORN FUEL PUMPS



PG-150C-1/2

We are an AUTHORIZED SALES and SERVICE CENTER for Hilborn fuel pumps.

a) Pumps are available in sizes : PG150C : -00 ; -0 ; Super -0 ; -1/2 ; -1
PG175B : -2 ; -4
PG250 : -5.

b) 3/8" male hex drive.

c) New fuel pumps are supplied with Kinsler AN hard anodized aluminum fittings, also available for replacement.

d) To change pump rotation, the front cover plate must be removed and re-indexed 180°. We strongly advise the customer not to do this once we have set up the pump, since the tolerances and output of the pump are sensitive to disassembly and reassembly.

e) We cannot sell parts for Hilborn fuel pumps directly to the customer for user repair.

The PG150C is the current series fuel pump. It was preceded by PG150, the PG150A, and the PG150B. These numbers are on the casting, the actual pump displacement is designated by the first number of the serial number (which is stamped into the pump casting). Exceptions, if the pump was resized since new, the new size is designated by a -# at the end of the original serial number, example: originally 0-9632 which was a size -0, resized to a -1, the number will be 0-9632-1

NOTE - ALL Hilborn fuel pumps sold by Kinsler are clearanced, run-in, and flow tested !!

PG-175B-2

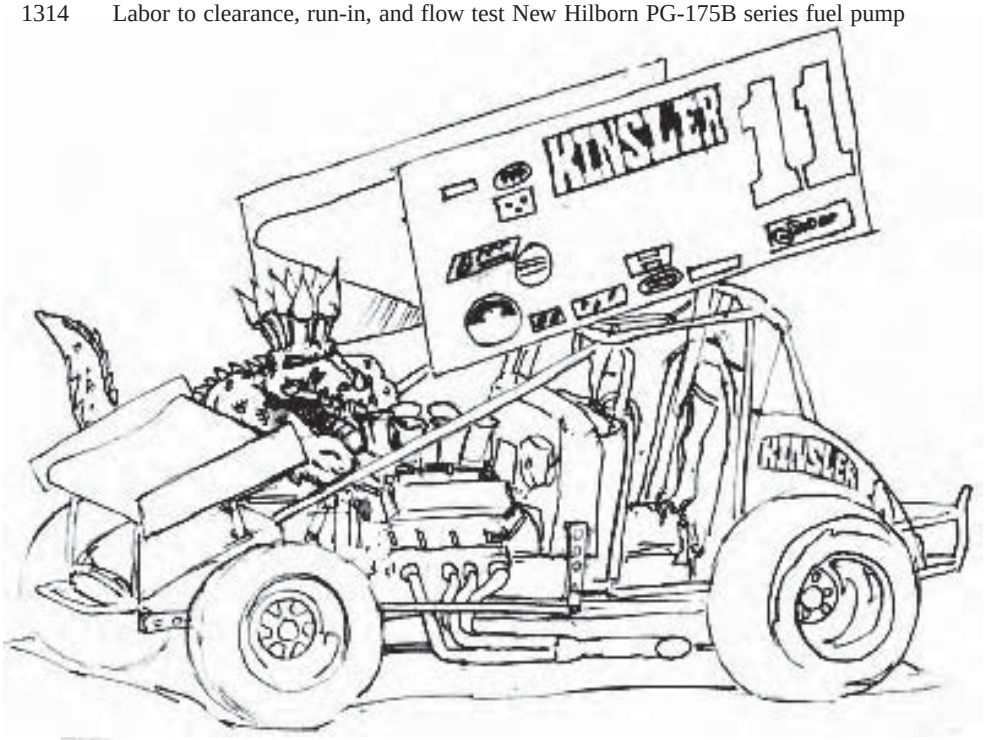
PG-150 series pumps:

2810	-00	reg. rot.
2811	-00	rev. rot.
2800	-0	reg. rot.
2801	-0	rev. rot.
2820	Super -0	reg. rot.
2821	Super -0	rev. rot.
2818	-1/2	reg. rot.
2819	-1/2	rev. rot.
2802	-1	reg. rot.
2803	-1	rev. rot.

All **PG-175** series pumps have coated gears :

2804	-2 reg. rot.
2805	-2 rev. rot.
2806	-4 reg. rot.
2807	-4 rev. rot.

1312	Labor to clearance, run-in, and flow test New Hilborn PG-150C series fuel pump
1314	Labor to clearance, run-in, and flow test New Hilborn PG-175B series fuel pump



PHENOLIC INSULATOR PLATE

5276	.140" thick, insulates drive heat from mechanical fuel pump

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CUSTOMERS IN ACTION

Saleen S7R testing at Willow Springs racetrack, Calif. We supply independently - throttled - runner manifolds for all of the factory sponsored Saleen racecars.

Terry McCarl at Knoxville World of Outlaws

November 4, 2005
T-MAC Motorsports, Inc.

Kinsler Fuel Injection

Dear Mr. Kinsler

I would like to personally thank you for your support in 2005. We had a great year finishing 9th in the World of Outlaw point standings. As a manufacturer you will be happy to know that we also lead the World of Outlaws with 12 fast times (3 track records) and 12 second fast times. This alone is an impressive statistic; however we also raced the entire 100 race World of Outlaw schedule with NO engine failures. We feel this is an amazing accomplishment and one we could not have acheived without your involvement.

Again, I appreciate all you do for my race team and I am looking forward to even more success in 2006.

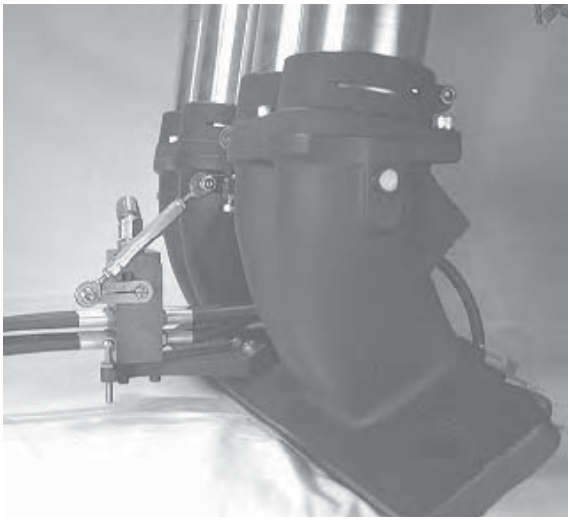
Sincerely yours,
Terry McCarl

John MacKichan's Speedway Motors Bonneville Streamliner
C/BGS 328.928 MPH E/FS 275.717 MPH

Louie Carufel, 2005 Sprints On Dirt
Rookie of the Year, 6th place overall

Aaron Polaski's Willys:
7.71 @ 181 with 100 H.P. hit of nitrous. System is street driven; Aaron says it runs nice and smooth.

BASIC ADJUSTMENTS FOR CONSTANT FLOW METERING



IDLE SPEED

Controlled by throttling the amount of air entering the engine, not by the amount of fuel. Set the idle speed by adjusting the throttle stops. If a slow or a smooth idle cannot be obtained, some of the throttle plates may not be closing properly... see UNI-SYN on Page #61 and THROTTLE SYNCHRONIZATION AT IDLE on Page #60.

THROTTLE RESPONSE

Governed by the idle fuel rate. Mechanical fuel injection doesn't have an accelerator pump, so it's necessary to put in a continuous "pump shot" by running a rich idle mixture. Smoke, spark plug fouling, and diluted oil due to prolonged periods of idling may occur with the barrel valve set for best response, so minimize idle time. The injection can be adjusted for a "nice clean idle", but it will not have the best throttle response. (We offer a DUAL RATE IDLE SYSTEM, see Page #98).

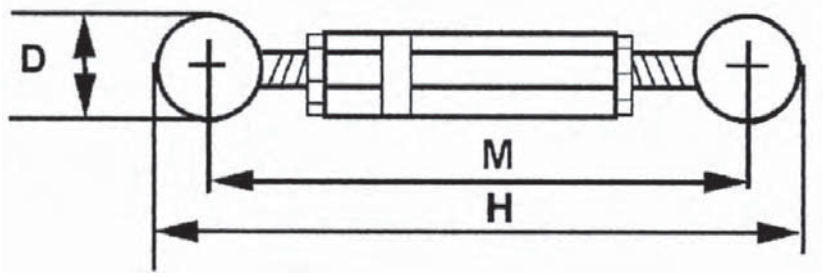
Rotating the hex link so that it moves the arm on the barrel valve in the same direction that it moves when the throttles are opened makes the idle richer.
Note : Idle fuel rate has no affect on wide open throttle mixture.

To adjust the "idle" fuel rate, mark one of the flats on the hex link to the barrel valve, then also measure the hex link's center to center distance ("M" measurement). Keep a record of how many flats it takes to richen or lean the idle so the hex link can be brought back to the "As Shipped" setting. If you lose track, the "As Shipped" setting can be reset by using the "M" measurement and the mark on the flat. **Never** loosen the arm on the throttle shaft or barrel valve.

M = H – D

D = diameter of one rod end

H = overall length of hex link with rod ends



With the vehicle warmed up and out of gear, set the "idle" fuel rate for the best throttle response, not a "nice clean idle". Rapping the throttle open quickly should give a sharp response. So you don't run a richer idle than necessary, lean the idle until you don't have good response, then richen it up just enough to get good response again. If you are running an automatic transmission or a boat, adjust the hex link one or two more flats richer to compensate for when the vehicle is put in gear, thus loading the engine.

Jim Lape's Top Alcohol funny car

Jim Nader's 5-time National Champion Pro Stock flat bottom drag boat. 500 CID big block alky burning Chev by Mickey Marollo Racing Engines. Kinsler constant flow fuel injection system.

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SETTING THE LEAKAGE OF A BARREL VALVE SPOOL

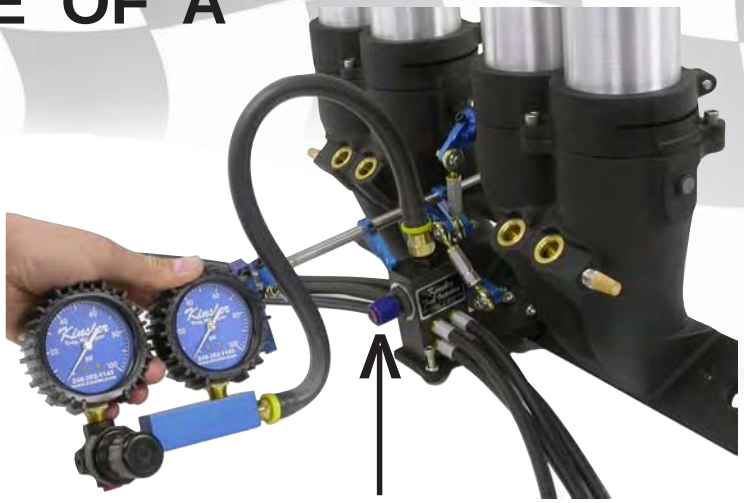


Fig. 1 cap off secondary outlet fitting

LEAKAGE SETTING BARREL VALVE

A leakage test is done to determine how far the idle passage ramp is open in the spool. The setting that works best for one engine combination may not work for another because variables such as fuel pressure, throttle size, idle speed, and ignition timing all affect the proper barrel valve "idle" opening. The idle setting, or spool indexing, affects the part throttle fuel delivery. See sections on KINSLER BARREL VALVE SPOOLS, Pg. 98 and SETTING THE "IDLE" FUEL RATE FOR BEST THROTTLE RESPONSE, Pg. 106

DIFFERENT STYLES OF LEAKAGE METERS

1) **Direct Percent Readout Style** - displays the percent of leakage on the gauge. Sun leak testers were like this.... no longer made.

2) **Pressure Differential Style** - usually has two pressure gauges, pressure in and pressure out. The leakage is a function of the differential value between the gauge readings.

   Examples: 100-PSI in and 70-PSI out, results in a leakage of 30-PSI, 30-PSI is 30% of 100-PSI.
   80-PSI in and 70-PSI out, results in a leakage of 10-PSI, 10-PSI is 12.5% of the 80-PSI inlet pressure.

   REMEMBER YOU WANT A PERCENTAGE!

To calculate this: $\frac{\text{Inlet PSI - Outlet PSI}}{\text{Inlet PSI}}$ = % Leakdown

#5980 Kinsler leakage tester

5980	Dual gauge leakdown metering; 0-100 PSI / 0-100 PSI gauges with 6 AN female swivel hose assembly

TESTING PROCEDURE

NOTES: A) PLEASE read the instructions for the leakage tester before using it.
B) Be consistent in the test method. Perform the test the same every time, this will help avoid errors.
C) The secondary bypass fitting MUST be capped off, see upper photo.
D) Always use the same inlet pressure for repeatability.

1) Attach the leakage meter outlet hose to the barrel valve inlet fitting.
2) Open the barrel valve to wide open throttle, turn the air pressure to the meter on and off to make sure that the gauges zero.

Note: The manufacturer of the leakage meter you are using may specify a different zeroing method. Use that one.

3) With the air pressure on, close the throttles to the idle position and observe the gauge reading(s).
4) Most Leakage Meters Do Not Read the Same; but all Kinsler meters are calibrated to a master so each of them reads the same. Test your barrel valve leakage after receiving your unit from our calibration department. Record the reading before making ANY adjustments. Your leakage tester may show a value different than the unit we used. Leakage testers that are working properly read within about 2% of one another.

CONDITIONS THAT INFLUENCE THE REQUIRED LEAKAGE

Fuel system pressure, engine idle speed, and the load against the engine all affect the required leakage setting of the barrel valve spool.

1) Fuel Pressure at Idle ; Given two identical engines: if engine 'A''s fuel pressure is higher than engine 'B''s, because of a heavier spring behind the poppet in the main bypass, the barrel valve spool on Engine 'A' will need to be closed further to maintain the same fuel idle flow.
2) Engine Idle Speed ; Is proportional to the idle air flow, which will affect the amount of fuel required. The more air, the more fuel needed to maintain the same air/fuel ratio.
3) Engine Load ; A Sprint Car which is push started "in gear" will have a significant load against the engine right from the start. A drag car engine will start and idle "out of gear" with very little load, mainly the reciprocating friction of the engine and accessories. The Sprint Car engine will require more fuel due to the heavier load (increased load means additional horsepower requirement) to maintain a given RPM.

INDEXING A BARREL VALVE

LINKAGE GEOMETRY TO BARREL VALVE

The linkage geometry to the barrel valve affects the part throttle fuel rate. The geometry MUST be set correctly before the spool is indexed. The center-to-center (c-c) of arms 'A' and 'B' must be equal. The barrel valve hex link must have the same c-c distance ('M') as the barrel valve spool shaft to the throttle shaft ('D'). As the two arms rotate, they will remain parallel to each other, and the barrel valve hex link will remain parallel to the baseline. Setting up the linkage geometry this way will cause the barrel valve spool to rotate exactly the same as the throttle shaft.

See "HOW TO SET UP LINKAGE" on Pages #62-63.

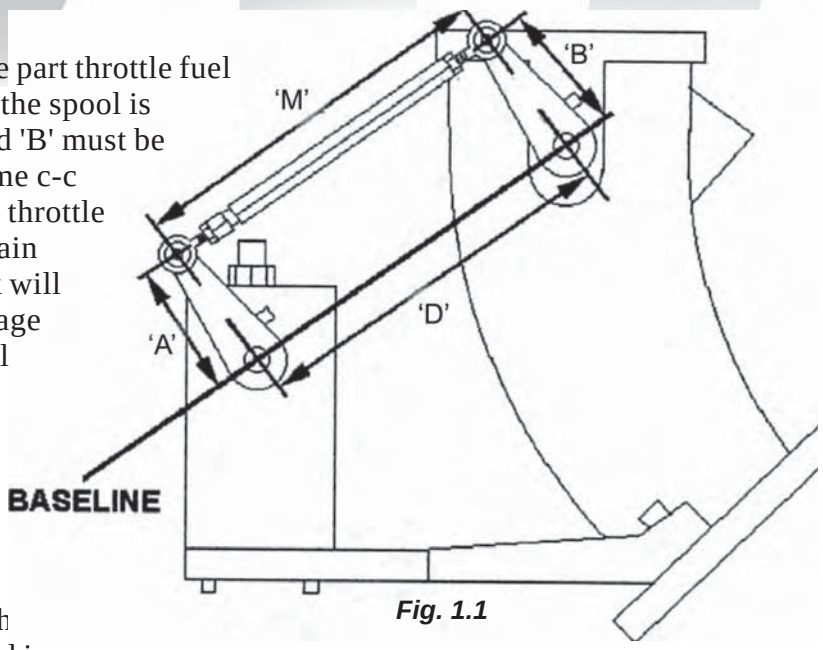


Fig. 1.1

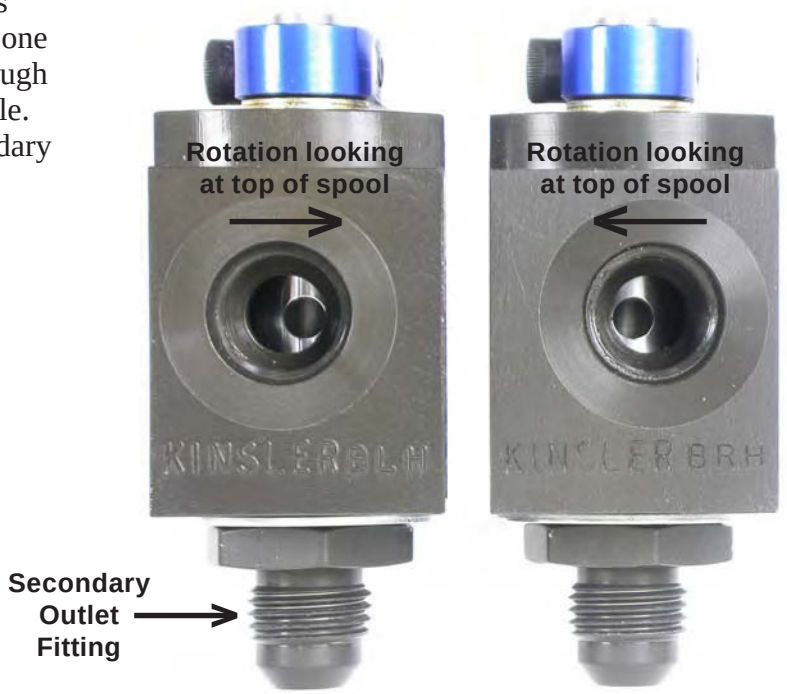
INDEXING AND ROTATION

Kinsler barrel valves are available in clockwise (Right hand) and counterclockwise (Left hand) rotation. The spool is centered in the block, with the inlet fitting port offset to one side of the spool bore. This gives more direct flow through the notch cut in the side of the spool at wide open throttle. See "Barrel Valve Spool Ramp" and "How The Secondary Works", top of pg #88.

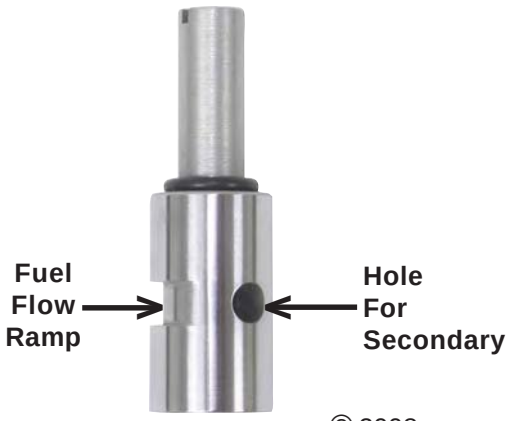
A properly fit spool will have approximately 0.0005" clearance to the barrel valve block bore. A spool with a looser fit will allow fuel to seep around the spool, requiring reindexing to compensate for the increased flow of fuel. If seepage is excessive, the spool will have to be reindexed too much causing the secondary port to be closed off prematurely during the opening of the throttles. Also, the fuel flow notch may be reindexed enough to close it off some at wide open throttle and inadequate fuel delivery near wide open throttle.

When a spool has a secondary bypass port, at an idle the port in the spool should be exposed to the inlet port of the barrel valve block, fully or partially.

Note: Crower barrel valves have the spool bore machined offset from the center of the block instead of inlet port being offset machined.



Counterclockwise (left hand) *Clockwise (right hand)*



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BASIC ADJUSTMENTS FOR CONSTANT FLOW METERING

MAIN FUEL MIXTURE

An engine that "pops and crackles" out of the intake manifold under full power is probably lean. An engine that seems lazy is probably rich. An engine running on methanol can be difficult to tune; as it will run cool and cause you to think it is rich but actually it can be lean enough not to build power (generate heat), having the symptons of running rich. If you are uncertain if the engine is running rich or lean, it is generally safer to richen the engine and try it. If it is lean and you lean it more, you may damage the engine.

SPARK PLUG READINGS: While plug color should not be used as the only indication of proper fuel mixture, cracked porcelain, melted cement, and melted electrodes are all indications of extreme heat or detonation from lean fuel mixture, improper timing, bad fuel, etc. If the plugs show any of these signs, find the cause and correct it before further damage results!

Drag Racing - Do not put too much emphasis on spark plug readings, as they can be misleading. Time slips give the best indication of proper mixture. Go richer and leaner and then use the jet that runs the best. Note: for top end mixture, see: HIGH SPEED BYPASS VALVE on Pages #90-91.

A) Engine runs strong off the line but bogs 1/3 of the way down the strip. The unit is usually rich when running gasoline and may be rich or lean when running methanol. Install a larger (leaner) main bypass jet when running gasoline and install a smaller (richer-safer) jet when running methanol.
B) Engine crackles at the top of each gear, either the main jet is too lean (too large), or the high speed bypass is set too lean (see HIGH SPEED BYPASS Pages #90-91.
C) Engine is sluggish and seems rich at the start but cleans out and runs good 1/2 way down. The idle is set too rich; lean out the idle only, not the main jet. Note : If you reset the idle too lean, the engine will lose throttle response.

Oval Track and Road Racing - There are too many variables involved to use lap times to determine jetting. It is a must to watch the spark plugs carefully as the primary indication of fuel mixture. Also look at the tops of the pistons and the inside of the exhaust ports.

A) Car (or boat) runs strong off the corner but bogs 1/3 of the way down the straight-away. The unit is usually rich when running gasoline and may be rich or lean when running methanol. Install a larger (leaner) main bypass jet for gasoline; install a smaller (richer-safer) jet for running methanol and try it.

B) Engine crackles at the end of the straightaway. Either the main jet is too lean (too large), or the high speed bypass is set too lean (see HIGH SPEED BYPASS Pages #90-91).

C) Vehicle is sluggish and seems rich off the corner but cleans out and runs good 1/2 way down the straight away, the idle or secondary is set too rich. Lean out the idle or secondary only, not the main jet. If you reset the idle too lean, the engine will lose throttle response.

Eddie Shea's Super Modified uses a Kinsler cross-ram manifold with constant flow system on a big block Chev

ENGINE OVER-RUN

The engine is in an over-run condition when you back out of the throttles at high RPM, such as at the end of a burnout or end of a run in drag racing, or when going into a turn in oval track and road racing. See section on SECONDARY BYPASS VALVE on Pages #88-89.

Chris Cherry's 'Pro-Street' Thames panel van. Kinsler modified Hilborn 4-port blower hat on a 6-71 supercharged small block Chev on gas. Uses a Kinsler Jet Selector Valve and Vapor Separator Tank.

TROUBLE SHOOTING CHART
CONSTANT FLOW SYSTEM
FOR WIDE OPEN THROTTLE

ENGINE RUNS LEAN	Fuel Tank	Tank vent too small. Fuel level low in tank, or tank too small. Tank poorly designed; return fuel blasts bubbles down into outlet. Tank in bad location (hot, too low, or too far away). Poor quality fuel or old fuel. Hot fuel temperature or high vapor pressure gasoline (winter grade).
	Plumbing	Inlet hose to pump: kinked, clogged, too small. Angled or restrictive fittings. Loose fitting or pinhole in hose; allows pump to suck air. Separating or torn inner liner; allows flap of hose material inside to pop up when fuel flows through hose, may look OK unless carefully inspected. See FUEL PUMPS on Page #98 for minimum hose size and inside diameter for the inlet hose and fittings. Restrictive or clogged fuel filter or screen. Shut-off valve not fully open, too small, or vibrating closed. Debris under top fitting (above spool) in barrel valve.
	Fuel Pump	Pump too small or wrong pump-to-engine drive ratio. Drive hex so worn that it slips, or slipping drive belt. Worn or damaged fuel pump; pump hex bottomed in drive. Faulty in-pump relief valve (early Hilborn pumps only). Pump shaft seal faulty causing pump to suck air.
	Metering	Main bypass jet too large. Damaged or No jet sealing o-ring in main bypass or any valve that uses a jet. Dirty nozzles; check screens for dirt or lint. Nozzles too small. High speed bypass set too lean (if used) or not sealing properly. Barrel valve spool indexed incorrectly or fit too loose causing secondary to bypass at wide open throttle.
ENGINE RUNS RICH	Fuel Tank	Tank vent too small (see reference #1 at bottom of page).
	Plumbing	Restrictive fittings (small inside diameter) in bypass hoses or in tank. Restrictive bypass lines (kinked or clogged). Main bypass return hose teed with other bypass hoses.
	Fuel Pump	Main bypass jet too small. Stuck poppet in main bypass jet can Main or high speed bypass installed backward in hose. Teflon poppet , restrictive outside diameter. Nozzles too large.
POOR DISTRIBUTION	Metering	Nozzles not matched properly or different size nozzles. Dirty nozzles; check screens for dirt or lint. Restrictive nozzle hose (plugged, kinked, or damaged). Barrel valve not adequate for fuel rate required.

REFERENCE

#1- Primarily on gasoline burning engines. Gasoline generates considerable vapor pressure when it is contained in a closed tank. The return fuel blasting back into the tank creates more volume of vapor than the volume of gasoline used, so the pressure in the tank increases and causes the unit to go richer. Alcohol and nitro units go lean if the vent is too small, as they can't draw the fuel out of the tank quick enough. See FUEL TANK CONSTRUCTION and LOCATION on Page #180 for proper vent sizes.

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TROUBLE SHOOTING CHART CONSTANT FLOW SYSTEM

FOR STARTING, IDLE, AND PART THROTTLE

WILL NOT START

Fuel level in tank below pump (see reference #2 at bottom of page).
Main or secondary poppet stuck open, or spring missing.
Main bypass installed backwards or in wrong hose - see reference #2.
Loose or damaged pump inlet hose.
Idle mixture set incorrectly.
Worn pump; pump set for wrong rotation; broken drive.
Fouled spark plugs or weak ignition.
Camshaft improperly timed.

WILL NOT IDLE OR POOR IDLE DISTRIBUTION

Main or secondary poppet stuck open, or spring missing.
Restricted main bypass hose.
Plugged or dirty nozzles, nozzle screens, or nozzle hose.
Loose or damaged pump inlet hose.
Vent in fuel tank too small - see reference #2.
Throttle stops not adjusted properly - see reference #3.
Throttle plates not synchronized or cross-link not adjusted - see reference #3.
Twisted throttle shaft or worn throttle shaft bores - see reference #3.
Throttle plates installed backwards or bent - see reference #3.
Spring in main bypass too weak - see reference #4.
Idle mixture too lean or air leak at manifold gasket - see reference #5.
Fouled spark plugs or weak ignition.

IDLES RICH

Main bypass poppet stuck closed or spring too stiff.
Main bypass installed backwards or restricted bypass hose - see reference #2.
Vent in fuel tank too small - see reference #2.
Idle mixture set too rich - see reference #5.
Nozzle vents restricted or plugged (nozzles located below throttle plates).
Barrel valve spool worn excessively.

BACK FIRES WHEN THROTTLES OPEN, OR POOR RESPONSE

Idle mixture set too lean or air leak at manifold gasket - see reference #5.
Main or secondary poppet stuck open or spring missing.
Improper barrel valve spool or linkage geometry.
Ignition too far advanced.
Bent or leaking intake valve.
Camshaft not properly timed.
Fouled spark plugs or weak ignition.

STICKING THROTTLE

Throttle plates not synchronized or cross-link not adjusted - see reference #3.
Twisted throttle shaft or worn throttle shaft bores - see reference #3.
Throttle plates installed backwards or bent - see reference #3.
Dirty or bent rod end bearing.
Manifold not evenly tightened down.
Manifold damaged, bushings loose, linkage geometry incorrect.
Bolt securing one of the rod ends overtightened (deformed ball).

FUEL DRIPS CONTINUALLY INTO ENGINE WHEN NOT RUNNING

No shut-off valve or internally leaking shut-off valve.
Fuel level in tank above nozzles without shut-off valve.
Bad pump seal; leaks into engine (Not on belt drive pumps).
Hose between shut-off valve and barrel valve picking up heat; fuel in hose boils, thus expanding into engine.

REFERENCE

#2- See "Preferred Plumbing Schematic on Pg. #112
#3- See "Uni-Syn" on Pg. #61. Note: Even through throttle synchronization only affects distribution at idle, it is very important, since the difference in idling cylinder temperatures that it causes will heat some spark plugs more than others. The warmer plugs tend to overheat during the run and cause detonation, especially in fueler units. The overheated plugs will at least give false readings even after a full throttle run.
#4- See "Bypass valves" on Pg. #95 #5- See "Basic Adjustments for Constant Flow Metering" on Pg. #106

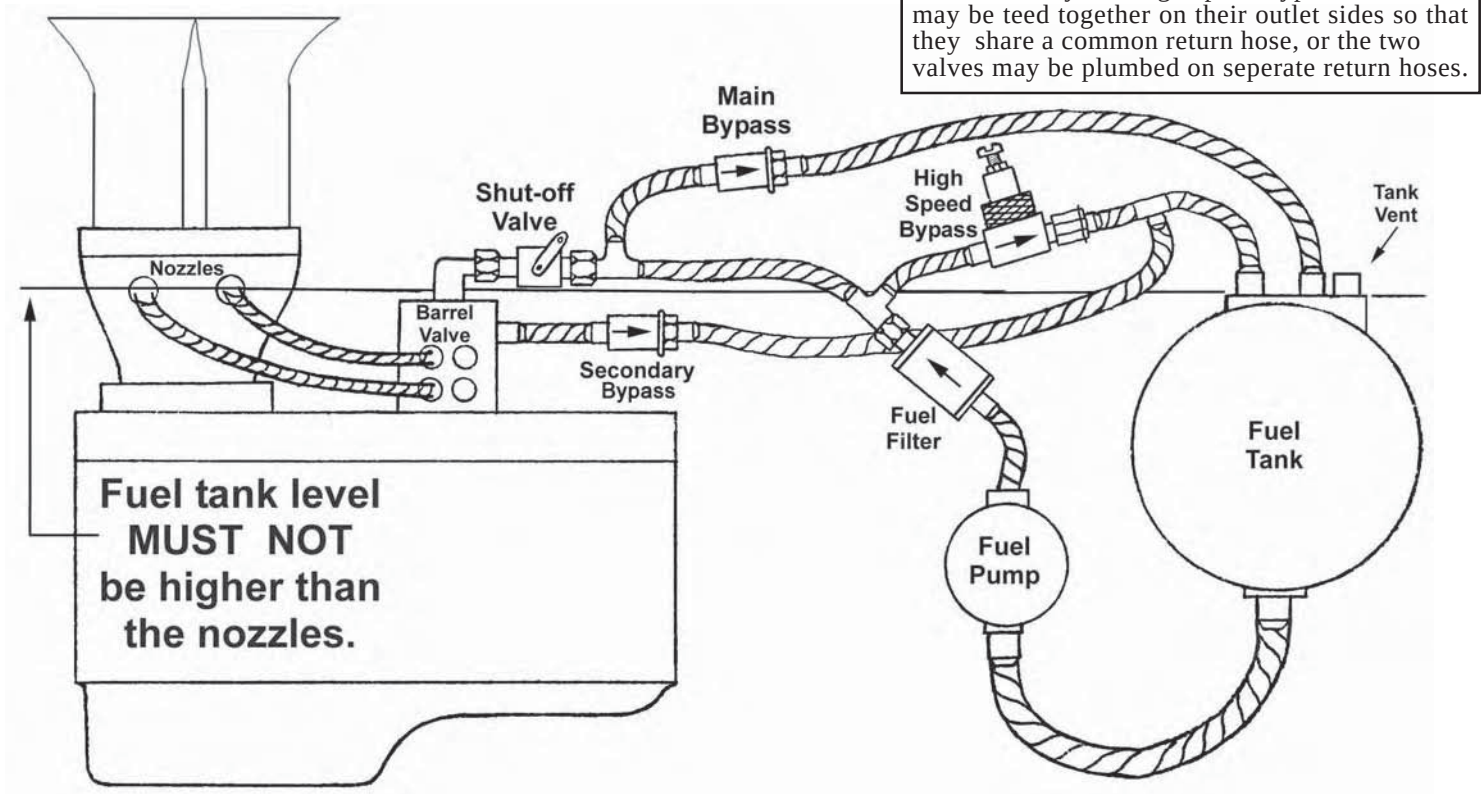
PREFERRED PLUMBING SCHEMATIC FOR CONSTANT FLOW

This **Preferred Plumbing Schematic** will give the same results as the "Old" style plumbing schematic we recommended in the past, but this Preferred Schematic will supply **FILTERED** fuel to main, secondary, and high speed bypass. Unfiltered fuel may stick the poppets in the main and secondary, and it clogs up the high speed bypass.

Placing the fuel shutoff valve at the barrel valve has an advantage. When the engine is shut off, the fuel in the filter and hoses picks up heat and expands. By having the shutoff at the barrel valve, this expanding fuel is forced back toward the fuel tank rather than into the engine.

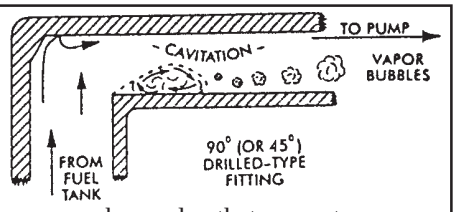
Never plumb any of the bypass valves back to the fuel pump inlet. When they blow off, they make some vapor, which we don't want going back through the system.

The secondary and high speed bypass valves may be teed together on their outlet sides so that they share a common return hose, or the two valves may be plumbed on seperate return hoses.



To obtain good fuel supply to the pump, locate it as low as possible, and the fuel tank as high as possible, but don't locate the top of the tank above the level of the nozzles. See FUEL TANK CONSTRUCTION AND LOCATION on Page #179.

NEVER use a "drilled block of metal" type angle fitting on ANY pump inlet... where the drilled holes intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses. If you have a really tight place, use a bent tube type hose end fitting.



- For pump inlet hose size, see MECHANICAL PUMPS on Page #102.
- The proper coarse screen filter maybe added on the fuel pump inlet hose to protect the pump, see FUEL FILTERS on Pages #164 and #166.
- To protect the fuel pump, strain all the fuel as the fuel tank is filled, use a filter funnel, see FITTINGS AND BUNGS on Page #182.
- Do not use paint strainer or rags to strain the fuel as they give off lint, which plugs the nozzles.
- If you place a shutoff valve in the pump inlet line, you must not shut it off above an idle or you may damage the pump... the fuel flow lubricates the gears. We strongly prefer the fuel shutoff at the barrel valve.
- For tank vent size see FUEL TANK CONSTRUCTION AND LOCATION on Page #180.

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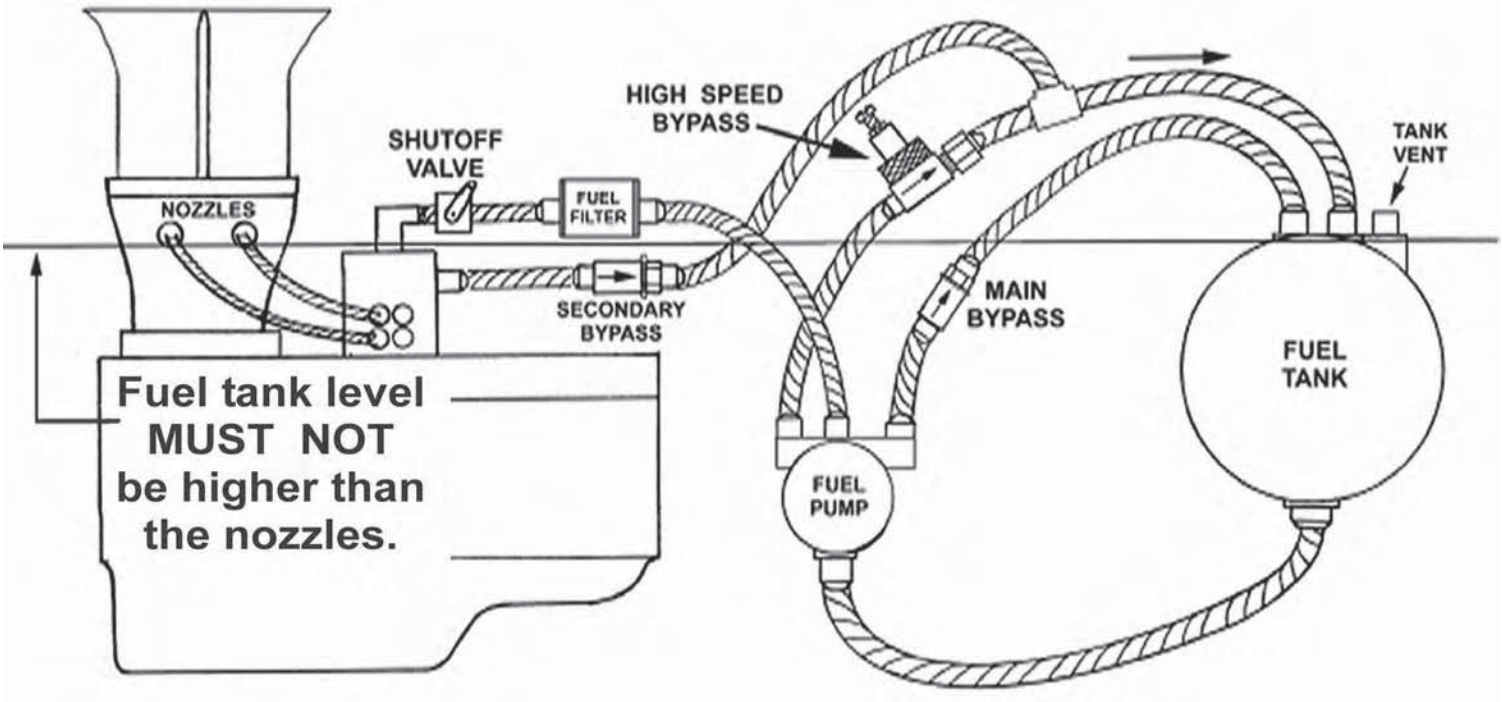
"OLD" PLUMBING SCHEMATIC FOR CONSTANT FLOW

This is the schematic recommended by most fuel injection manufacturers, and by us in the past. We now **urge** you to use the ***"Preferred Schematic"*** shown on the previous page, as it will supply filtered fuel to the main, secondary, and high speed bypass. Unfiltered fuel may stick the poppets in the main and secondary, and it clogs the high speed bypass.

Placing the fuel shutoff valve at the barrel valve has an advantage. When the engine is shut off, the fuel in the filter and hoses picks up heat and expands. By having the shutoff at the barrel valve, this expanding fuel is forced back toward the fuel tank rather than into the engine.

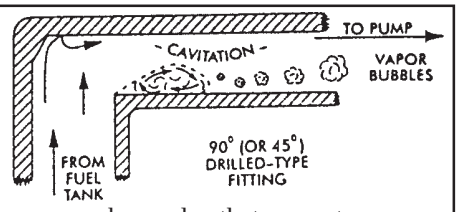
Never plumb any of the bypass valves back to the fuel pump inlet. When they blow off, they make some vapor, which we don't want going back through the system.

The secondary and high speed bypass valves may be teed together on their outlet sides so that they share a common return hose, or the two valves may be plumbed on seperate return hoses.



To obtain good fuel supply to the pump, locate it as low as possible, and the fuel tank as high as possible, but don't locate the top of the tank above the level of the nozzles. See FUEL TANK CONSTRUCTION AND LOCATION on Page #179.

NEVER use a "drilled block of metal" type angle fitting on ANY pump inlet... where the drilled holes intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses. If you have a really tight place, use a bent tube type hose end fitting.

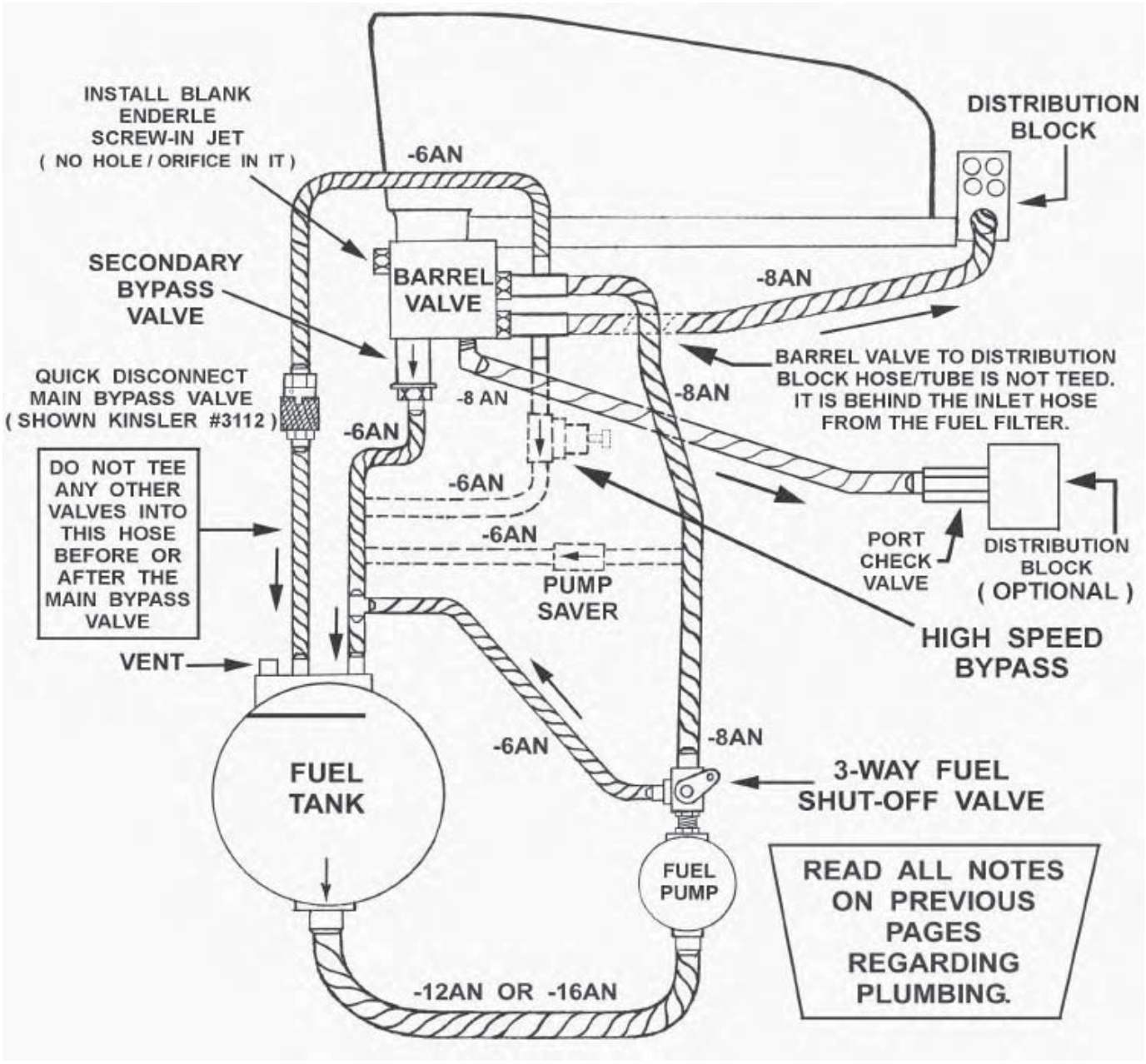


- For pump inlet hose size, see MECHANICAL PUMPS on Page #102.
- The proper coarse screen filter maybe added on the fuel pump inlet hose to protect the pump, see FUEL FILTERS on Pages #164 and #166.
- To protect the fuel pump, strain all the fuel as the fuel tank is filled, use a filter funnel, see FITTINGS AND BUNGS on Page #182.
- Do not use paint strainer or rags to strain the fuel as they give off lint, which plugs the nozzles.
- If you place a shutoff valve in the pump inlet line, you must not shut it off above an idle or you may damage the pump... the fuel flow lubricates the gears. We strongly prefer the fuel shutoff at the barrel valve.
- For tank vent size see FUEL TANK CONSTRUCTION AND LOCATION on Page #180.

PLUMBING SCHEMATIC FOR ENDERLE BLOWER HAT AND BARREL VALVE ASSEMBLY WITH PORT NOZZLES

KINSLER'S CONVERSION FROM ENDERLE'S JET-IN-THE-BARREL-VALVE TO KINSLER EXTERNAL BYPASS SYSTEM.

Kinsler is pleased with the quality of Enderle's blower hats, but we prefer not to use their jets or nozzles for two reasons: They are sharp edged and the jets have a screw driver slot. As mentioned in "A Note About Jets", square edged jets are easily damaged... the use of the screw driver in the slot further aggravates the problem. Changing to the Kinsler external bypass system and using the K-type jets eliminated the problem. Many of the racers also prefer the external bypass system for it's greater flexibility in tuning and ease of operation.



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KINSLER VAPOR SEPARATOR TANK (VST) SYSTEM

Also know as a *pressurized pump inlet system*.

THE PROBLEM

For a constant flow fuel injection system to meter the fuel repeatably, the mechanical pump must deliver a precise amount of fuel at any given RPM. In many installations, however, the pump delivers varying amounts of fuel, sometimes very erratically, due to plumbing of the vehicle, or operation at high altitude and/or hot conditions.

THE CAUSE

The main problem is caused by pump inlet cavitation, a form of "vapor lock". Because gasoline almost boils at room temperature, if the temperature of the fuel is raised, or a vacuum is pulled on it, it will start to boil. This is what causes the pump delivery problem...as the pump tries to draw the fuel into it's inlet, it pulls a slight vacuum on the fuel. The higher the pump speed, the higher the vacuum. This vacuum, combined with hot temperatures found in most race cars, causes at least some of the fuel in the inlet hose to flash to vapor (boil). Thus the pump draws in a mixture of liquid and vapor and therefore delivers less fuel per revolution. This causes an erratic lean condition and sometimes premature pump failure due to a lack of pump lubrication.

Conditions that aggravate pump inlet cavitation :

HEAT Hot weather; hot fuel in the fuel tank; vehicle parked on hot black pavement on a sunny summer day (which heats up the whole car); exhaust pipes near fuel hoses, pump, tank, etc.; radiator heat coming back across fuel pump, hoses, tank, etc.; fuel pump not isolated from engine block heat (use phenolic isolator see MECHANICAL FUEL PUMPS on Page #104 and #176)

VACUUM Pump inlet hose too long, such as in vehicles that have a fuel tank in the rear; pump inlet hose too small in diameter; fittings in pump inlet hose with too small of an inside diameter; angle drilled fittings, (see Pg. #112); low mounted fuel tank; high mounted fuel pump

THE CURE

In our VST system, more fuel than the engine will consume is pumped from the main tank by an electric fuel pump to the VST. The excess fuel flows back to the main tank through the Backpressure Valve, which holds 2-6 PSI in the VST, thus pressurizing the mechanical pump inlet with about that same pressure. This helps prevent the fuel from boiling at the inlet of the pump.

4" diameter by 12" tall tank

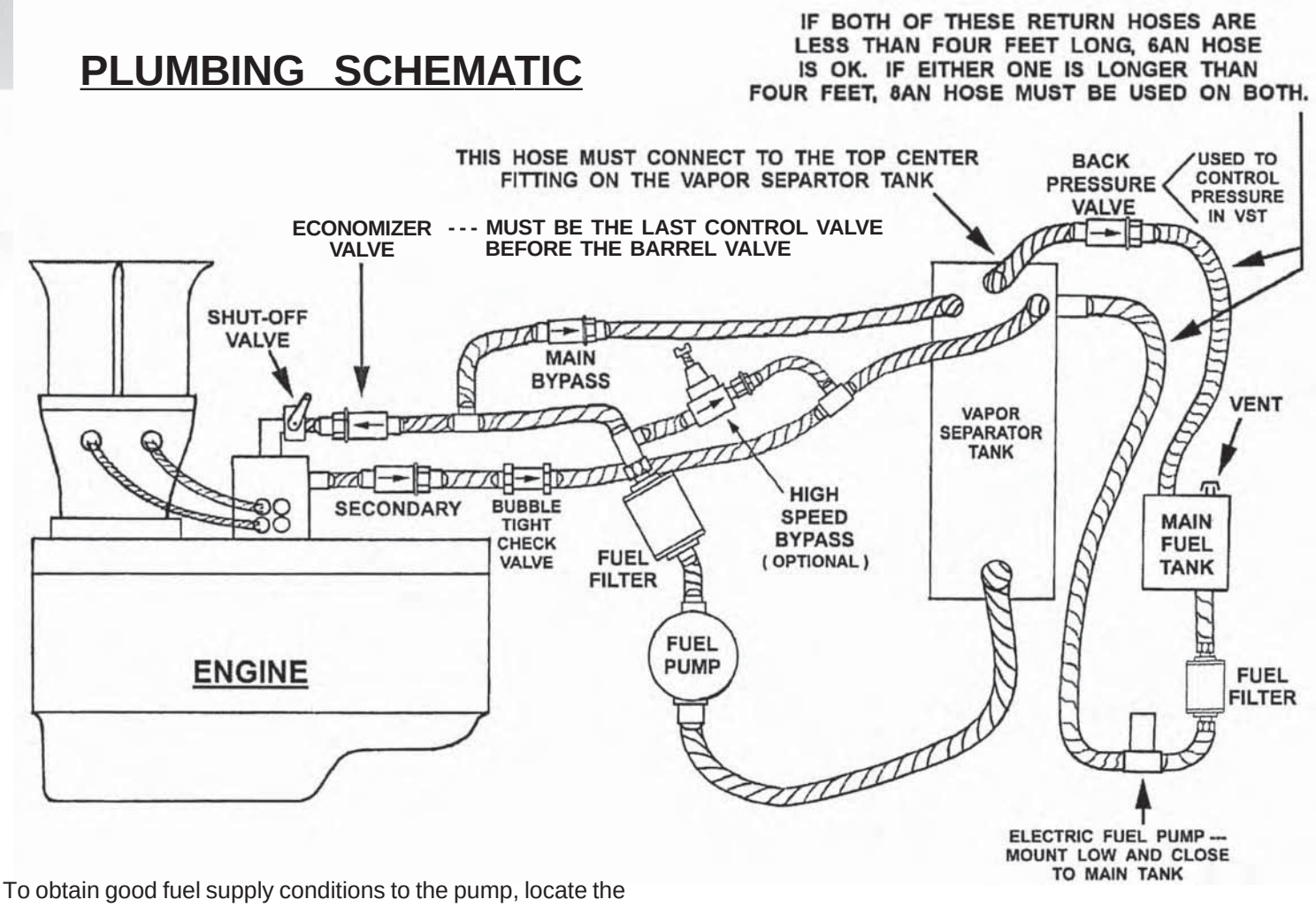
The VST is specially built to act as a low pressure reservoir and as a vapor separator. The fuel coming from the electric fuel pump, main bypass, secondary bypass, and high speed bypass has vapor in it. The tank is SPECIALLY BAFFLED to separate the vapor and feed it to the top center fitting on the tank, then back to the main tank, where it can escape out of the main tank vent. The pressure in the tank is very dependant on the flow through the Backpressure Valve, so this flow curve is an important part of the system's calibrations. Since the electric fuel pump provides the flow through the valve, it is important to use only the specified model electric fuel pump; a pump that flows more or less would alter the calibration. The poppet in this valve is designed not to seal perfectly, so any residual pressure can be bled back to the main tank when the system is shut off. It is best to install a pressure gauge in the hose between the VST and the Backpressure Valve. If the system does not have about 3 PSI when the electric pump is switched on, the engine should not be started. Check to see that the electric pump is working and the Backpressure Valve is functioning properly. Under racing conditions, a pressure reading below 1 PSI could cause a lean condition. Any deviation from the required 2.5-4 PSI should be closely monitored.

Mounting clamp

The Economizer Valve (Econ) is used to reduce the pump output pressure back closer to what it would have been if the pump were not pressurized at it's inlet. The system would be quite rich at an idle and low speeds if this valve was not used. The poppet in this valve has an orifice, sized to flow the proper amount of fuel for cranking and idling. Above idle, the poppet moves off it's seat and maintains a pressure drop of about 3 PSI across it to counterbalance the pressure being applied to the inlet side of the fuel pump. It should be installed after the filter to protect it from dirt.

KINSLER VAPOR SEPARATOR TANK (VST) SYSTEM - CONTINUED -

PLUMBING SCHEMATIC



To obtain good fuel supply conditions to the pump, locate the VST as high as possible, but don't locate the top of the tank above the level of the nozzles unless you have a bubble tight shutoff just before the barrel valve that you use every time you shut off the engine. See FUEL TANK CONSTRUCTION AND LOCATION Pg. #179.

Locate the mechanical fuel pump as low as possible to obtain best fuel supply conditions.

To protect the fuel pump, strain all the fuel as you fill the tank; use a filter funnel. See FITTINGS AND BUNGS Pg. #182.

Do not use a paint strainer or rags to strain the fuel as they give off lint, which plugs the nozzles.

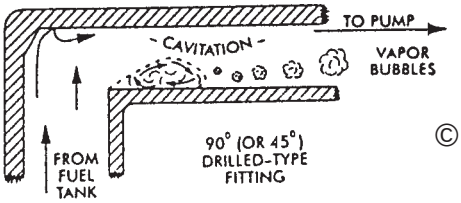
For pump inlet hose size, see MECHANICAL PUMPS Page #102.

A proper coarse screen filter may be added on the mechanical fuel pump inlet hose to protect the pump, see FUEL FILTERS Pg. #163 and #166.

NEVER put a fuel shutoff valve in the fuel pump inlet hose --- put it in the hose going from the pump to the barrel valve. See SHUT-OFF VALVES Pg. #167 - #171

For tank vent size see FUEL TANK CONSTRUCTION AND LOCATION Pg. #180.

NEVER use a "drilled block of metal" type angle fitting on ANY pump inlet hose... where the drilled holes intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses. If you have a really tight place, use a bent tube type hose end fitting.



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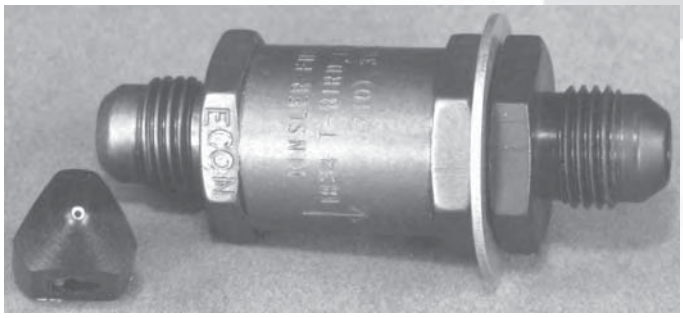
KINSLER VAPOR SEPARATOR TANK (VST) SYSTEM - CONTINUED -

APPLICATIONS

The VST system is often used on road race cars, marine applications, off-road cars and trucks, street cars, and sometimes on drag cars with rear mounted fuel tank, both for constant flow and EFI systems. Used by top race teams all over the world including Daytona, Sebring, and LeMans. It is usually used with gasoline, however it can be used with alky, which requires special maintenance and/or hardware. Call a Kinsler technician for details.



Economizer Valve has a small metering orifice drilled in the center of the poppet make certain is stays clean

ADVANTAGES OF THE VST SYSTEM

NO squirt bottle, NO open fuel containers, one person operation, easy to install

Automatic priming of the fuel injection system from the drivers seat. The pressure in the Vapor Separator Tank purges out all the vapor. This pushes the fuel through the mechanical injection pump. When the main fuel shut-off is opened, the fuel flows directly into the engine. When the engine starts it will stay running because all the fuel system hoses are purged out. Gone are the problems of having to try and start the engine three or four times, this is hard on the starter, battery, and sometimes a persons ego (nothing hardly worse then being at a race or show and having the engine start, pop, bang, and die several times).

The VST system is less expensive than other "fixes" on the market. It takes up less room, and is not affected by G-forces.

COMPONENTS:

5708	Vapor seperator tank, 8" tall x 3" diameter, blue anodized aluminum
5710	Vapor seperator tank, 10" tall x 3" diameter, blue anodized aluminum
5712	Vapor seperator tank, 12" tall x 3" diameter, blue anodized aluminum
5713	Mounting bracket for 3" diameter tank, stainless steel with rubber liner, two required
5716	Vapor seperator tank, 12" tall x 4" diameter, blue anodized aluminum
5717	Mounting bracket for 4" diameter tank, stainless steel with rubber liner, two required

Stainless steel Vapor Separator Tanks are available on SPECIAL ORDER.

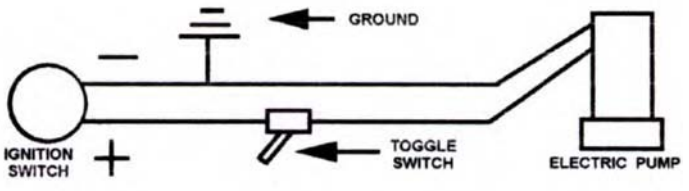
NOTE : Specify 8 AN, 10 AN, or 12 AN outlet to mechanical injection pump when ordering. Tanks are available with 8 AN or 10 AN male flare inlet (supply from electric pump) and 6 AN or 8 AN male flare for return to Back Pressure valve - other sizes can be special ordered.

Each valve is stamped on the end to identify it as seen on this Back Pressure Valve... stamped "BP"

3096	Bubble tight check valve, for use between secondary bypass and VST, 6 AN male flare inlet and outlet
5732	Back Pressure valve, 6 AN brass high flow jet can, controls pressure in VST
5735	Economizer (Econ) valve, special metered orifice poppet for use with VST system
5737	Back Pressure valve, 8 AN brass jet can, controls pressure in VST (requires 8 AN fitting on VST)
5742	Labor; flow test and set spring, shim, and orifice size on #5735, #5732, and #5737

INSTALLATION

Use the plumbing schematic entitled "KINSLER VAPOR SEPARATOR TANK SYSTEM" see Page #116. Follow the schematic carefully; read all the small notes. It would be a good idea to install a 15-PSI gauge to monitor the VST pressure. Install it between the VST and the Back Pressure valve. The pressure at an idle should be 3-4 PSI. This pressure should not drop below 1-PSI at maximum RPM wide open throttle operation.



Electric fuel pump wiring: wire the electric fuel pump into the ignition switch, so that the pump cannot run when the ignition is shut "off". PLUS install a separate pump switch in the circuit so even when the ignition is "on", the pump can be shut off. It is important NOT to run the pump when the engine is shut "off", fuel could drip from the nozzles and eventually flood the engine.

KINSLER VAPOR SEPARATOR TANK (VST) SYSTEM - CONTINUED -

MAIN JET should be about the same size as before the installation of the VST system.

TO AVOID SPARK PLUG FOULING AND POTENTIAL CYLINDER FLOODING:

START-UP

1) Turn ignition switch "on", turn electric fuel pump switch "on", ---- DO NOT CRANK ENGINE.
2) Wait a few seconds to purge vapor from the VST and pressurize it.
3) Open the fuel shut-off valve, wait a few seconds for fuel to flow to the nozzles. This will prime the engine. Experience will help determine how long to leave the shut-off open.
4) Close the fuel shut-off valve or the engine may become flooded.
5) Crank engine, when it fires, open fuel shut-off valve.
6) IF engine DOES NOT start immediately:
   A) Engine may need more fuel for priming, repeat step #3.
   B) Make sure - VST has pressure, shut-off is opening and closing, barrel valve is set correctly for idle.
   C) If the engine floods - leave shut-off closed, throttles closed, crank engine with ignition "on".
   D) IF severe flooding occurs: remove the spark plugs, disable ignition, close fuel shut-off valve, then crank the engine. Once excess fuel has been purged, reinstall spark plugs (new plugs maybe required) and go back to 1.

SHUT DOWN

1) Bring engine to idle.
2) Turn electric pump switch off so the VST pressure will drop.
3) Close fuel shut-off valve. Allow engine to continue running to burn off any excess fuel. The engine may pick up RPM when the shut-off is closed, as it leans out.
4) Turn off ignition switch.
5) The shut-off MUST be left in the closed position until the engine is ready to be restarted.

CAUTION

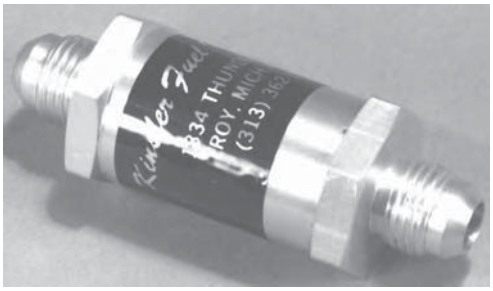
A) This system is designed to operate at 2-6 PSI. Never use the vapor separator tank in an application where it would be subject to pressures over 15 PSI or it might rupture and spill fuel.
B) Never attempt to add another fitting to the tank, or modify it in any way; the internal baffling could be damaged.

BUBBLE TIGHT ONE-WAY CHECK VALVE

Installed to stop fuel flowing from the pressurized VST back through the secondary bypass valve, into the barrel valve, and out to the nozzles when the engine is not running. This could cause the engine to hydraulically lock up.

This valve is installed between the outlet of the secondary bypass valve and the vapor separator tank. The 'arrow' on this valve must point toward the vapor separator tank. See VST Plumbing Schematic, Page #116.

3096	Bubble tight one-way check valve, 6 AN male flare inlet and outlet



Al Mullin's Pro-Street 468 CID big block Chev El Camino. 6-71 supercharger on gas using Kinsler constant flow system

Kinsler SS-12 Electric Fuel Shut-off valve mounted near the barrel valve on the blower hat

Kinsler Vapor Seperator Tank and Jet Selector Valve mounted in lower right corner of the photo

TURBOCHARGED CONSTANT FLOW INJECTION SYSTEM

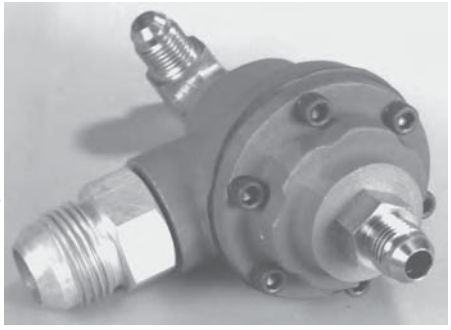
Unlike positive-displacement blowers (GMC roots blowers), the boost a turbocharged engine is not directly proportional to engine speed. Since the boost level is not directly tied to RPM and throttle position, a conventional mechanical fuel injection system, with a barrel valve and mechanical pump, cannot respond correctly to the engine's fuel requirements. The system requires two stages of fuel delivery. One stage fuels the engine under the naturally aspirated conditions while the second stage takes over when the engine goes into boost. The second stage is activated via the use of an air valve and a boost sensor valve (See schematic below).

Duane Schroeder's triple turbocharged alcohol John Deere® super stock pulling tractor

TYPICAL VALVES AND FUNCTIONS

Main bypass : Set for nominal 2-3 PSI and has changeable metering jet. Controls fuel pressure for starting and low speed off-boost operation. The jet in this valve controls fuel rates at part throttle and off boost conditions. (Also see Economizer valve)

Secondary bypass : this valve is typically set for 8-25 PSI blow off (depending on exact application). The function of this bypass is to control fuel pressure at part throttle operation where high engine RPM is experienced. This valve is mechanically shut off at about 50% of throttle opening. (See INDEXING A BARREL VALVE on Page #108)



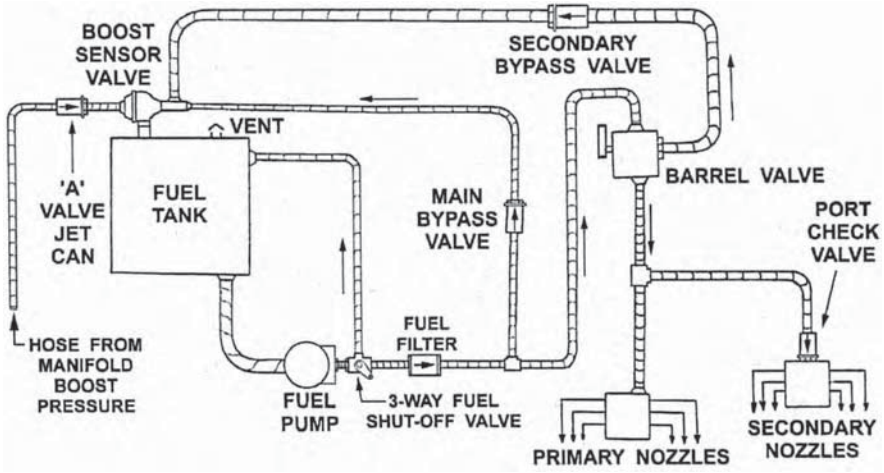
Boost sensor valve

Air valve : commonly called the "A" valve. This valve holds an orifice which reduces the amount of boost signal that is sensed at the boost sensor. The larger the jet in the air valve, the more boost the sensor will see, therefore making the injection unit go richer. This valve aids in controlling fuel under boost conditions ONLY !!!

Boost sensor valve : this valve controls fuel enrichment on a boosted engine by restricting the fuel flow back to the fuel tank. A piloted valve suspended on a diaphragm slides into the return port seat. When boost signal is applied to the dry side of the diaphragm, the air pressure pushes the valve toward the seat and restricting the return flow which richens the engine. When no boost signal exists on the diaphragm, the return flow pushes the valve and diaphragm away from the seat, opening sufficient area for fuel return.

Economizer valve : this valve is used to restrict the amount of fuel flow and pressure to the barrel valve and nozzles on injection systems with a single set of nozzles that are sized for high flow conditions. Nozzles that are sized for high flow conditions (boosted engines), are too rich for part throttle operation. The system would be very difficult to tune as a small change in pressure will cause a significant flow change. Adjustment of economizer valve; remove shims from this valve to increase fuel flow at part throttle, especially as boost is just starting to come on.

#5 valve : (not shown in plumbing schematic) is used to bypass fuel directly into the fuel tank to decrease the return volume passing through the boost sensor valve. When the valve diverts fuel into the tank, the boost sensor enrichment rate will be reduced. Changing this valve's spring rate will mostly effect the point of opening while changing the restrictor jet will effect the tapering of enrichment from the boost sensor. The larger the bypass jet the slower the enrichment will be, (more gradual enrichment). This valve is similar to a high speed bypass on a normally aspirated engine.



Signal pressure at 30 PSI boost with various KINSLER 'A'-valve jets.

"A" Valve Jet	Signal to Sensor (PSI)
.034"	18.50
.036"	20.00
.038"	21.50
.040"	22.75
.042"	23.50
.044"	24.25
.046"	25.50
.048"	25.75
.050"	26.25
.054"	27.25
.058"	27.75
.062"	28.25
.066"	28.75
.070"	29.00

The signal pressures in this chart are relative due to the flow variations of the orifice in the boost sensor valve body.

ELECTRONIC FUEL INJECTION BASICS

Electronic fuel injection metering, when properly designed and programmed, is today's most accurate way to introduce fuel to an internal combustion engine. With it's many sensors and input signals it can be tuned to meet the demands of an engine operating over an extremely broad range of conditions.

The most commonly sensed inputs are:

1) Engine RPM
2) Throttle position and rate of opening/closing
3) Barometric pressure and/or manifold absolute pressure (M.A.P.)
4) Air temperature
5) Water and/or oil temperature, and sometimes fuel temperature

Accel DFI Gen. VII system

There are two basic types of multi-port EFI : 1) Group Fired
2) Sequential Fired

GROUP FIRED

This injection system generally triggers a group of the injectors simultaneously. The ignition system or crank trigger provides the signal to the electronic control unit (ECU) for speed input and thus injector triggering. Since a V8 ignition fires four cylinders per revolution, this gives four injections per revolution on a basic group fired system... eight injections per engine cycle. Most ECU's can be programmed to fire the injectors based on the number of ignition/trigger inputs received. Example: a typical V8 engine will be programmed to pulse 4 or 8 injectors every fourth input pulse from the ECU trigger device.

The good thing about the group fired system is it's low cost. The problem is that while some injectors will be close to properly timed, others will not. If an injector is triggered at the wrong crank angle, fuel may collect in areas of the intake port or cling to the runner walls. When the intake valve opens, only a portion of the fuel injected will be in suspension with the air entering the cylinder, while the remainder may be running down the port wall as liquid. This can cause erratic mixture conditions to exist in that cylinder, especially during low speed engine operation, due to the small amount of air movement in the intake runner.

Many engines have at least some liquid fuel coming past the intake valve at various conditions. One saving grace is that the pressure drop and turbulence across the intake valve causes much of the liquid fuel to become atomized at that point.

Since EFI injectors turn on and off, the interrupted flow causes pressure waves to bounce around in the fuel rails, especially at wide open throttle where the flows are the highest. In a group fired system you often trigger two or more injectors at a time in a given fuel rail. The simultaneous pulses can reinforce each other at some RPM to give unusually high pressure pulses, sometimes causing poor fuel distribution. It often helps to run a larger diameter fuel rail. Our extruded aluminum fuel rails are .680 inch inside diameter as this smooths out the pulses quite well when compared to smaller sizes. Running higher overall system pressure also helps. We often run about 72 PSI instead of the more common 36 to 45. The amplitude of the pressure spikes will remain about the same, but will be relatively smaller based on the percent change in injector flow. We also like the better atomization achieved with the higher pressure and it sometimes gives better power and economy. Be careful about running too high of fuel pressure, as some ECUs don't have enough current to lift the disc or pintle in the injector consistently off the seat against this added pressure, resulting in poor fuel distribution. Also be sure your fuel pump is capable of supplying the engine with the volume required at this higher fuel pressure.

SEQUENTIAL FIRED

These systems trigger each injector at a precise crank angle on every cylinder, usually near top dead center overlap (intake valve opening). This improves idle quality, low speed engine smoothness, and fuel economy. Some systems can even be programmed for different injection phasing for each speed site in the fuel map.

Triggering a sequential system is more complicated than a group fired system, as it requires a separate triggering signal to reference the start of the injector firing sequence. This signal is typically generated once every two crankshaft revolutions on a 4 cycle engine and is most commonly referred to as the "CAM" or "SYNC" signal. The sequential system also requires a "Crank" signal, generated at a specific crankshaft angle on each cylinder. This signal is used to calculate engine RPM and crank angle position for injector firing and ignition triggering from the ECU. "Crank" and "CAM" signal requirements will vary with each manufacturers ECU. Most manufacturers require either a sine wave signal, typically generated by a magnetic sensor, or a square wave signal, typically generated by a Hall effect sensor.

The magnetic pickup is a simple magnetic material core wrapped with fine wire. When a piece of steel is passed by it, a electric pulse is generated. This pickup may not give as nice a signal as the Hall effect, but it can operate in a much hotter environment and it is more rugged.

The Hall effect square wave signal is generally very stable at all RPM and produces a very clean sharp signal wave. A problem with the Hall effect is that it has a solid state computer "chip" inside of it, so it cannot be surrounded by air that is hotter than 300°F, or the chip may fail.

We offer a complete line of both group and sequential fired systems, priced from approximately $1,500.00 for the base grouped fired unit to $18,000.00 for the most sophisticated sequential system for the professional racer.

Kinsler Fuel Injection, Inc.
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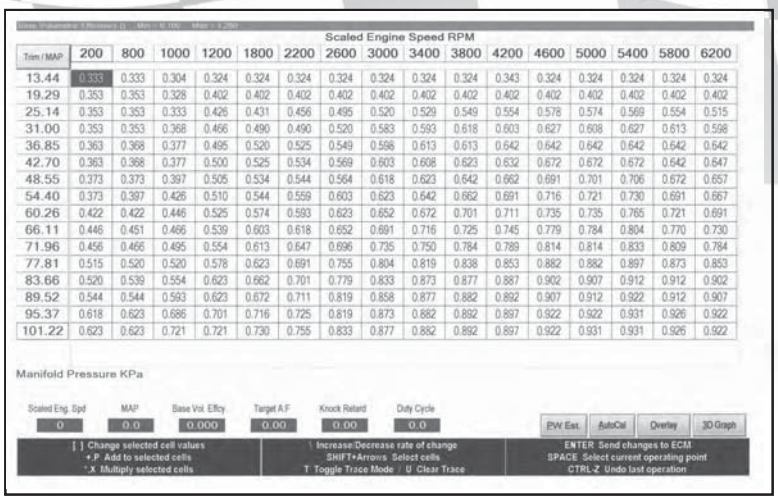
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

ELECTRONIC FUEL INJECTION BASICS

All of the systems are programmed via a serial link from an IBM compatible computer and allow the inputs from the sensors on the engine to be monitored on the screen. Some systems use graphics for ease in programming. Programming software ranges from $300.00 thru $2,000.00 depending on the number of controllable features.



The Basic Fueling in any EFI system is controlled by engine RPM and the amount of time each injector is kept open. It is the "open" or "on" time that is varied by all the programming. This is called the "pulse width" and is measured in milliseconds. When the user wants to richen the engine, he places a larger value in the RPM and load sites to increase the pulse width. The entire group of all the numbers is called the "table" or "map" for each of the ECU's programmable functions.

Most users are at least a bit intimidated by all the new things to know when first learning to program an EFI system, especially if not familiar with using a computer, but it all falls into place after a bit of practice.

SOME GOOD TIPS

Accel DFI Gen. VII ECU

1) Use premium quality race type suppression ignition wire. The type we use has what looks like a tiny coil spring for a conductor. This "spring" design reduces the magnetic flux field surrounding the wire and therefore reduces the amount of electro-magnetic interference (E.M.I.).

2) You can never be too careful with the wiring effort. Through all the years, electrical wire failures have been a prime cause of cars not finishing races, even with just basic electrical systems. Ty-wrap® the wires often so they don't vibrate and keep them away from the distributor cap and spark plug wires. Use silicone sealer to strain-relief the wires.

3) The ECU must not be subjected to severe vibration or jarring. It is best to mount it on rubber vibration mounts, which we can supply. Some engines shake way too much for the ECU, especially a four cylinder. It's always safest not to mount the ECU on the engine.

4) The ECU is made up of microprocessor computer circuits that operate on very tiny electric inputs from the sensors on the engine. You can't be too careful with the wiring in the vehicle :

   A) The chassis is not an acceptable ground for these systems! Using it as the ground for the ECU has caused many problems with all the brands and types of ECUs. The problem is that any vehicle has points along its electrical system with varying voltages, varying resistances, and current surges. By far the safest way to hook up the power supply to any ECU is to run the positive and negative lead all the way from the terminals on the battery. Put a relay in the circuit, energized by the ignition switch so that the ECU will be automatically turned off when you shut off the vehicle. This wiring isolates the ECU from the current surges that pass through the ignition switch.

   B) Alternators, electric fuel pumps, and other electric devices that seemed just fine before installing the ECU may actually cause electric "noise" to be transmitted through the air or through the wires thus disturbing the functioning of the ECU. Loose or marginal connections in totally unrelated electrical items in the car can cause electrical surges that may affect the ECU. Make all the connections as secure as you can.

5) The **ECU DOES NOT LIKE HEAT !!!** Since it is a computer circuit that is subject to failure from heat, and it is generating it's own internal heat from it's circuits, it must be mounted in as cool a spot as you can find. The driver compartment is usually the best location. The better units need to be surrounded by air not exceeding 140°F while some units are limited to 110-120°F.

6) Nearly all sensors being used on racing EFI systems are from passenger car systems... they don't have the vibration or temperature ratings that would be ideal for race vehicles. A few things to do :

   A) Mount the air temperature sensor in the air intake duct and isolate if from any heat that could be conducted to it from the engine.

   B) On engines that shake a lot (just about all four cylinders), replace the sensors often that are mounted on the engine, especially the throttle position sensor... vibration seems to wear its rotating circuit wiper rapidly.

   C) If the sensor shorts or goes open circuit, the output will be at it's minimum or maximum value... program these points in the ECU with a "nominal" value so you can keep racing, or at least limp home.

   D) When using a hall effect sensor for triggering the ECU, be sure to locate it in an area that will not exceed 300° Fahrenheit, or it will fail.

   E) Mount all temperature sensors in active areas. Examples: mount the air temperature sensor where air will pass over the sensor tip; mount coolant sensor where there is good coolant flow so you don't 'read' a hot spot.

TYPES OF ENGINE MANAGEMENT

We carry several popular EFI management systems, and provide full programming and tuning for each of them.

ACCEL DFI
ENGINE MANAGEMENT SYSTEMS

www.fuelairspark.com
FAST™
FUEL AIR SPARK TECHNOLOGY

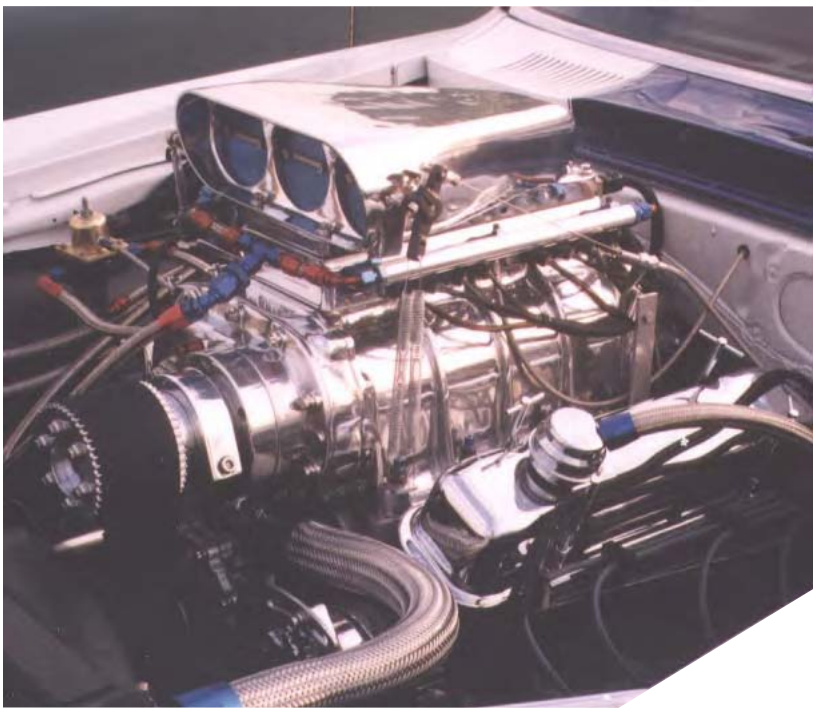
MoTeC

Systems for pro racing, sportsman, and street. Basic systems start with group fired injection only. Advanced systems have sequential injection, spark curve mapping, wide band oxygen sensing, data logging, etc.

Our broad experience provides you with the selection guidance you need. If you have an existing system and require calibration help, give us a call.

We can deliver a complete ready to run EFI system with pump(s), filters, regulator(s), management system, manifold, fuel rails, injectors.

AEM



Ernie Pickler's blown injected 69' Firebird

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Kinsler 'Monster Mesh' series filters

Protect your investment with the Ultimate in Filtration

Hard anodized - methanol compatable

Blue anodized housing for use with gasoline, oil, transmission, differential

Paper and stainless steel mesh

For a complete list of Monster Mesh part numbers and descriptions, see Pages #163-164

Element is o-ring sealed to endcap

Quick release t-bolt type stainless steel mounting bracket

Available with internal one-way check valve and safety relief valve, call for details

Paper-BRL filter

with 10 micron disposable paper element

#8170

Are you using the right protection?

Monster Mesh inlet and outlet filters, Weldon pump, K-140 pressure relief valve - a bullet-proof combination

ELECTRIC FUEL PUMPS

AT KFI YOU GET THE FACTS, NOT SALES HYPE !!!

The actual flow of your pump could be as much as 50% lower than the pump's advertised flow, as the aftermarket industry does not have a standard for testing. Flow output may be advertised with no backpressure on the pump, while it may see substantial backpressure in actual use. Incorrect information could cost you expensive engine parts and down time.

WELDON BOSCH AEROMOTIVE WALBRO AIRTEX MALLORY HOLLEY

KINSLER SUPPLIES THE ANSWERS!

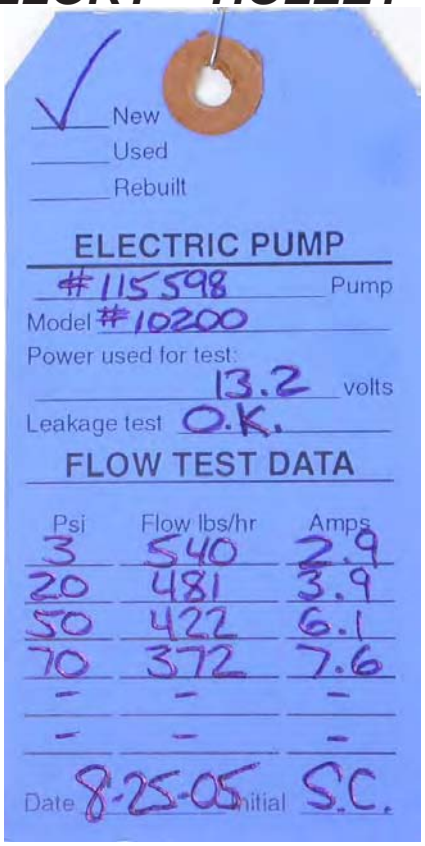
A) Electric pumps tested by Kinsler are first run-in on a schedule of varying pressure and voltage, then flow tested to insure that you receive a good pump and accurate test info.

B) All flows are in pounds per hour (lbs/hr) of .72 specific gravity gasoline. Divide the flow by 6.0 to obtain approximate gallons per hour.

C) Tests are run with 13.2 volts at the pump terminals. This is on the low end of what should be available in any vehicle running an alternator, so the flows shown are conservative. To calculate the flows at slightly different voltages, (+ or - 4 volts), ratio the flow by the change in the voltage.

For Example: $\frac{15.2 \text{ volts}}{13.2 \text{ volts}}$ x flow at 13.2 volts = approx. flow at 15.2 volts

D) We offer flow testing of any **new fuel pumps** we sell. We also can **flow test your existing fuel pump** and supply you with the test results.



Selecting the proper electric fuel pump for gasoline on a naturally aspirated engine

Select a pump from the table that will give you the flow and pressure you need. Flow in lb/hr is about 1/2 of the horsepower number of your engine (700 HP would need about 350 lb/hr). Oversizing the pump about 10% is safer. Oversizing the pump too much may cause a higher than desireable current draw. Sometimes two smaller pumps are less expensive and draw less current than one larger pump.

Wiring:

You must use the correct wire gauge to assure good voltage to the pump. It is important to fuse the circuit for protection from excessive current (amp) draw or a possible short. Most ECU's that offer electric fuel pump control require a relay to carry the amps needed to run the pump. The ECU's delicate transistor circuit may only be capable of 500 milliamps (1/2 AMP).

CAUTION: some ECU's will ground the relay coil for activiation, while others will supply power to the coil. Be sure you understand the system you are using before you connect the circuit. See EFI CONNECTORS, RELAYS, AND ACCESSORIES ON Pages #152-153.

FILTRATION

We offer many different fuel filters for the inlets of electric fuel pumps, see FUEL FILTERS on Pages #162-166. Depending on the design of the electric pump, some are very susceptible to the smallest amount of dirt. We suggest a 45 micron filtration for Weldon vane style fuel pumps, while Bosch in-line fuel pumps require 25 micron filtration.

FUSE SELECTION CHART	
Pump Part #	Recommended
5792, 10214, 10250, 10255, 10279, 10284, 10287-O, 10287-G	10 AMP
10208, 10209, 10210, 10270, 10285, 10293, 10293C	15 AMP
10211, 10265, 10286, 10288	20 AMP
10292, 10295, 10296, 10297	25 AMP

FLOW TESTING :

Consists of recording flow data and amperage draw.

5793	Labor to run-in and flow test New electric fuel pump
5795	Labor to run-in and flow test customer's electric fuel pump

Steve Quinn's 95' Camaro Z28 Naturally Aspirated LT1
60' ET: 1.320
1/8 mile ET: 6.277
1/8 mile MPH: 108.3
1/4 mile ET: 9.900
1/4 mile MPH: 135.16

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ELECTRIC FUEL PUMPS




Kinsler Part #	10299				10298				10296		10262		10297	
Inlet	16 AN female				12 AN female				12 AN female		12 AN female		12 AN female	
Outlet	12 AN female				10 AN female				10 AN female		12 AN female		10 AN female	
Weight (lbs)	12.75				6.0				5.50		5.65		5.45 lbs	
Diameter	5.830"				2.970"				3.400"		3.420"		3.020"	
Length	6.600"				8.100"				7.660"		7.350"		7.430"	
Pressure (PSI)	13.2v LB/HR	13.2v AMPS	16.0v LB/HR	16.0v AMPS	13.2v LB/HR	13.2v AMPS	16.0v LB/HR	16.0v AMPS	LB/HR	AMPS	LB/HR	AMPS	LB/HR	AMPS
0	2675	25.3	3330	33.0	1520	7.9	1815	9.7	1,250	11.7	1225	12.2	1,150	9.6
20	2600	26.9	3300	38.9	1460	8.9	1750	10.2	1,090	13.0	1175	14.1	1,020	11.0
50	2450	36.6	3100	42.3	1270	13.4	1575	14.2	1,030	16.0	975	19.6	965	13.3
70	2375	43.9	2950	48.2	1145	17.1	1460	17.2	975	19.0	775	23.3	914	15.7
100	2160	52.6	2805	53.1	955	22.5	1285	22.2	855	23.0			782	20.7
120	Not Recommended				Not Recommended				Intermittent Duty				Not Recommended	

Pump relays and wiring accessories, see Pages #152-153



Kinsler Part #	10288		10261		10295		10265		10290	
Inlet	8 AN female		12 AN female		8 AN female		10 AN female		8 AN female	
Outlet	8 AN female		10 AN female		8 AN female		10 AN female		8 AN female	
Weight (lbs)	5.15		5.65		5.35		5.65		5.15	
Diameter	3.020"		3.420"		2.970"		3.420"		3.020"	
Length	7.560"		7.350"		7.600"		7.350"		7.560"	
Pressure (PSI)	LB/HR	AMPS	LB/HR	AMPS	LB/HR	AMPS	LB/HR	AMPS	LB/HR	AMPS
0	1035	8.3	1100	8.6	685	8.6	795	8.4	610	4.6
20	1000	9.6	990	10.2	660	9.4	714	10.3	585	5.3
50	935	12.4	725	15.3	615	10.8	557	14.8	525	6.8
70	857	14.7	535	19.4	585	11.9	426	18.0	410	8.2
100	Full Relief at 105 PSI				540	14.0			Full Relief at 75 PSI	
120					500	15.6				
140					475	17.0				
160					450	18.5				

SCALE: 1" = Approx. 4.25" Actual

ADAPTER FITTINGS, SEE PAGES #182-188

ELECTRIC FUEL PUMPS

Pump relays and wiring accessories, see Pages #152-153

Walbro pump installation kits and accessories, see Page #128

Kinsler Part #	10285		10293		10256		10211		22002	
Inlet	8 AN female		8 AN female		8 AN female		18mm x 1.5 female		10mm x 1.5 female	
Outlet	8 AN female		8 AN female		8 AN female		12mm x 1.5 female		10mm x 1.5 female	
Weight (lbs)	5.15		4.18 lbs		6.0		2.18		1.0	
Diameter	3.020"		2.530"		2.975"		2.440"		1.690"	
Length	7.560"		6.690"		8.125"		6.280"		6.300"	
Pressure (PSI)	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**
0	576	7.1	600	8.6	781	4.3	490	8.9	507	4.0
20	546	8.8	550	9.4	699	6.4	445	10.0	470	5.4
50	480	9.2	475	10.8	468	13.1	420	12.2	397	8.3
70	450	10.2	440	11.9	311	18.3	390	13.5	347	10.6
100	**Full Relief at 70 PSI**		**Not Recommended**		78	26.8	350	16.0	265	15.0
120					**Not Recommended**		315	17.4	**Not Recommended**	

SCALE: 1" = Approx. 4.25" Actual

ADAPTER FITTINGS, SEE PAGES #182-188

Weldon mounting clamp

5713	Stainless steel, cushion mount, two .200" mounting holes, for Weldon pumps with 3" diameter motors

#10297-K

Weldon Fuel Injection 'Street & Strip' combo kit includes: #10297 pump, #10747 pressure relief valve, and #12340 'Dial-A-Flow'

#10295-K

Weldon Fuel Injection 'Road & Track' combo kit includes: #10295 pump, #10747 pressure relief valve, and #12340 'Dial-A-Flow'

#10280

Weldon Fuel Injection 'Street-Combo' kit includes: #10293 pump and #10747 pressure relief valve

#10281

Weldon Carburetion 'Street-Combo' kit includes: #10293 pump and #10749 pressure regulator

ELECTRIC FUEL PUMPS

Walbro pump installation kits and accessories, see Page #128





Includes (2) mounting clamps

Kinsler Part #	10273		10271		10272		10200		10274		10210	
Inlet	#12415 install. kit		#12411 inlet strainer		#12413 inlet strainer		8 AN female		#12416 install. kit		14mm x 1.5 female	
Outlet	.320" male nipple		.320" male nipple		.320" male nipple		6 AN female		.320" male nipple		12mm x 1.5 female	
Weight (lbs)	.8		.8		.8		5.15		.8		2.15	
Diameter	1.545"		1.545"		1.545"		2.750"		1.545"		2.440"	
Length	4.850"		4.935"		4.935"		8.500"		4.935"		6.585"	
Pressure (PSI)	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**
0	523	4.1	508	4.2	509	3.9	565	2.0	501	3.8	400	5.5
20	471	5.4	462	5.7	453	5.3	480	3.2	447	5.4	370	6.9
50	389	8.4	380	9.0	371	8.1	395	5.5	360	8.4	325	8.7
70	318	11.0	320	12.0	311	10.4	330	7.1	300	11.1	300	10.0
100	113	16.6	148	18.8	126	14.5	240	9.5	110	16.8	260	11.7
120	**Not Recommeded**		**Not Recommeded**		**Not Recommeded**		**Not Recommeded**		**Not Recommeded**		200	13.0

Pump relays and wiring accessories, see Pages #152-153



Kinsler Part #	10208		10209		10205		22003		10214		10212	
Inlet	.475" male nipple		screen		.475" male nipple		10mm x 1.5 female		.475" male nipple		.595" male nipple	
Outlet	12mm x 1.5 female		12mm x 1.5 female		12mm x 1.5 female		10mm x 1.5 female		.312" male nipple		12mm x 1.5 female	
Weight (lbs)	2.15		2.05		2.10		1.0		1.40		2.15	
Diameter	2.445"		2.520"		2.450"		1.690"		2.120"		2.450"	
Length	7.025"		5.400"		6.320"		6.300"		7.065"		6.775"	
Pressure (PSI)	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**	**LB/HR**	**AMPS**
0	400	5.5	400	5.5	348	3.2	340	1.9	310	2.3	275	3.4
20	370	6.9	370	6.9	319	4.5	302	3.2	275	3.0	250	4.6
50	325	8.7	325	8.7	275	6.4	242	5.9	220	4.6	200	6.1
70	300	10.0	300	10.0	244	7.7	193	8.3	185	5.8	170	7.4
100	260	11.7	260	11.7	191	9.9	103	12.7	99	7.5	75	9.4
120	200	13.0	200	13.0	150	11.3	**Not Recommended**		**Not Recommended**		**Not Recommended**	

SCALE: 1" = Approx. 4.25" Actual

ADAPTER FITTINGS, SEE PAGES #125 AND #182-188

ELECTRIC FUEL PUMP INSTALLATION ACCESSORIES

Pump relays and wiring accesories, see Pages #152-153

For pump #10271

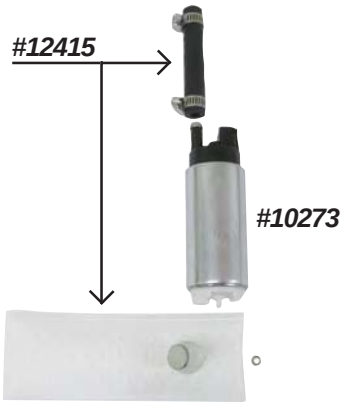
12411	Filter, inlet strainer
12412	Wire harness

For pump #10272

12413	Filter, inlet strainer with clip
12414	Wire harness

For pump #10273

12415	Installation kit with inlet strainer, clip, and adapter hose, for Honda Civic



For pump #10274

12416	Installation kit, with inlet strainer, clips, hose adapter, wire harness, and seals, for select 1985-97 Ford Mustang

For pumps #22002 & 22003

22008	Mount kit, includes: isolation tubing sleeve and (2) plastic coated steel band clamps
22009	Fitting, 6 AN male flare x 10mm 1.0 M, blue anodized (requires #22011)
22010	Fitting, 8 AN male flare x 10mm 1.0 M, blue anodized (requires #22011)
22011	Crush wahser seal, for 10mm threads
22012	Fitting, 10.5mm barb x 10mm 1.0 M, (fits 3/8" push-lock hose, requires #22011)

#22002 pump with #22009 fittings and #22011 crush washers installed

#22002 pump with #22012 fittings and #22011 crush washers installed

#22008 mount kit

#22002 pump with #22008 mount kit installed

For Bosch pumps

8300	Mounting clamp, quick release t-bolt, stainless steel, two 1/4" mounting holes (does not fit Bosch pump #10214)
10232	Mounting bracket, saddle type, with two clamps, cushion mount (does not fit Bosch pump #10214)

Metric adapter fittings *

6181	6 AN male flare x 12mm 1.5 male, hard anodized
6183	6 AN male flare x 14mm 1.5 male, hard anodized
6182	8 AN male flare x 12mm 1.5 male, steel
6184	8 AN male flare x 14mm 1.5 male, hard anodized
6192	8 AN male flare x 18mm 1.5 male, steel
6193	10 AN male flare x 18mm 1.5 male, steel

**** Washer o-ring required to seal fitting to Bosch pump***

Washer o-rings

6130	For 12mm threads
6131	For 14mm threads
6133	For 18mm threads

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ELECTRIC FUEL PUMPS

For Low Pressure or Carburetted applications

Pump relays and wiring accessories, see Pages #152-153

Kinsler Part #	#10255	
Inlet	8 AN female	
Outlet	8 AN female	
Weight (lbs)	6.80	
Diameter	3.030"	
Length	9.100"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	1660	6.0
5	1625	6.5
10	1240	7.2

Kinsler Part #	#10286	
Inlet	8 AN female	
Outlet	8 AN female	
Weight (lbs)	5.15	
Diameter	3.020"	
Length	7.560"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	1120	10.5
5	1075	10.9
10	1055	10.9
15	1000	11.0
20	780	11.1

Kinsler Part #	#5780	
Inlet	3/8" NPT female	
Outlet	3/8" NPT female	
Weight (lbs)	3.70	
Diameter	2.485"	
Length	6.300"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	845	3.5
5	822	3.8
10	675	4.2
12	560	4.4

Kinsler Part #	#10284	
Inlet	8 AN female	
Outlet	8 AN female	
Weight (lbs)	5.15	
Diameter	3.020"	
Length	7.560"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	653	6.0
5	650	6.1
10	631	6.3
15	512	6.4
20	265	6.8

Kinsler Part #	#5792	
Inlet	3/8" NPT female	
Outlet	3/8" NPT female	
Weight (lbs)	3.15	
Diameter	2.100"	
Length	5.400"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	650	2.8
5	610	3.1
10	560	3.6

Kinsler Part #	#10279	
Inlet	6 AN female	
Outlet	6 AN female	
Weight (lbs)	2.45	
Diameter	2.500"	
Length	5.970"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	360	3.0
10	347	3.2
20	337	3.6
30	290	4.1
40	157	4.5
50	157	4.7

Kinsler Part #	#10283	
Inlet	6 AN female	
Outlet	6 AN female	
Weight (lbs)	2.45	
Diameter	2.500"	
Length	5.970"	
Pressure (PSI)	**LB/HR**	**AMPS**
0	181	3.1
10	165	3.3
20	152	3.6
30	75	3.7

OIL TRANSFER PUMP

Kinsler Part #	#10287
Inlet	6 AN female
Outlet	6 AN female
Weight (lbs)	3.0
Diameter	2.500"
Length	5.400"
Manufacturer's Specifications	
31 Gallons Per Hour with 90W gear lube at 200°F	
55 PSI max. pressure	
motor: 10 amps max.	

ADAPTER FITTINGS, SEE PAGES #182-188

SCALE: 1" = Approx. 4.25" Actual

ELECTRIC FUEL PUMPS

WELDON "DIAL-A-FLOW"

The Weldon Dial-A-Flow voltage regulator, with pulse width modulation is a superb fuel pump controller. It allows the user to slow down their fuel pump, reducing the amperage draw, quieting the pump, and reducing the potential heat build up in the fuel system, when the pump's full fuel flow is not required. It is designed to regulate the speed of a pump motor under changing flow rates while maintaining constant pressure.

12340	Dial-A-Flow kit; includes controller, six foot cable with a potentiometer installed at one end, a switch, five terminals, and a knob for the potentiometer

Example : Kinsler #10211 Bosch fuel pump with voltage supply held at 13.2 volts.

"DIAL-A-FLOW" - OFF:		
PSI	lbs/hr	AMPERAGE
0	480	7.7
50	425	10.5
70	405	11.7
100	365	13.6

"DIAL-A-FLOW" - ON, SET AT FULL:		
PSI	lbs/hr	AMPERAGE
0	370	3.7
50	325	6.7
70	305	8.3
100	280	10.4

Example : Kinsler #10295 Weldon fuel with voltage supply held at 13.2 volts.

"DIAL-A-FLOW" - OFF:		
PSI	lbs/hr	AMPERAGE
0	685	7.9
50	615	10.1
70	590	11.4
100	540	13.4
120	500	14.7

"DIAL-A-FLOW" - ON, SET AT FULL:		
PSI	lbs/hr	AMPERAGE
0	495	5.0
50	450	6.8
70	415	8.3
100	390	10.5
120	360	11.9

SEE PUMP PAGES #124 - 129

#10237

BOOST-A-PUMP ENHANCER SYSTEM

Raises voltage to electric fuel pump for increased flow output.

Note: Requires additional amperage (40 amp max.) from electrical system on vehicle.

Kit consists of: enhancer box, wiring harness, remote mounted control knob with cable.

Unit can be activated either by a toggle switch, pressure switch, or vacuum switch. The voltage to the pump can be adjusted using the remote mounted control knob to obtain the required flow, see example below.

10237	Kit for supercharged/turbocharged applications
10238	Kit for normally aspirated (unblown) applications

Example : Kinsler #10211 fuel pump with head pressure held at 40 PSI and the voltage supply held at 13.2 volts.

BOOST-A-PUMP PERCENTAGE	SUPPLY AMPERAGE	PUMP VOLTAGE	PUMP AMPERAGE	PUMP OUTPUT lbs/hr
OFF	10.1	12.1	10.1	410
0	16.7	15.2	12.8	515
10	17.7	15.7	13.2	530
20	19.9	16.6	13.7	550
30	23.0	17.6	15.0	600
40	26.4	18.7	16.1	625
50	29.2	19.6	16.8	650

Example : Kinsler #10297 fuel pump with head pressure held at 70 PSI and the voltage supply held at 13.2 volts.

BOOST-A-PUMP PERCENTAGE	SUPPLY AMPERAGE	PUMP VOLTAGE	PUMP AMPERAGE	PUMP OUTPUT lbs/hr
OFF	16.4	11.9	16.3	825
0	23.2	15.2	17.7	1110
10	24.2	15.7	17.7	1150
20	26.4	16.7	18.3	1220
30	29.0	17.8	18.6	1320
40	29.1	18.9	17.6	1405
50	30.2	19.8	17.4	1445

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MECHANICAL FUEL PUMPS FOR EFI

Mechanical fuel pumps are ideal for Electronic Fuel Injection for several reasons:

1. Flow output directly related to engine RPM - decreases demand on Pressure Relief valves throughout the rev range, especially at idle
2. No electric draw - decreases demand on electrical system
3. Fuel compatibility - coated internal pump parts resistant to methanol corrosion; many electric pumps aren't
4. Fuel pressure - some mechanical pumps are capable of 300+ P.S.I.
5. Weight

FLOWS ARE TYPICAL OUTPUT - ACTUAL OUTPUT WILL VARY SLIGHTLY

PUMP OUTPUT

A mechanical pump's output is close to linear with the RPM at which it is driven. Rotate the pump shaft twice as fast and the flow will double. However, even a good pump is affected by the clearances of the gears and the pressure at the outlet. The flows at very low RPM and very high RPM will be below the linear graph of the pump's output due to internal leakage, caused by the side clearance required for the gears. This clearance leakage back past the gears has the same effect as a small bypass from the pump outlet back to the inlet.

REQUIRED PUMP SIZE

The horsepower and the fuel being used will dictate the required pump size.

KINSLER PUMP SIZES

PUMP RPM	PSI	K-200	K-300	K-400	K-450	K-500	K-700	K-1300
2000	0	335	505	670	770	835	1170	2160
2000	50	305	475	655	760	815	1130	2125
3500	50	570	845	1150	1330	1450	2000	3670

pounds per hour (lbs/hr) of .720 specific gravity test fluid at 60°F.

Pump Model	Maximum pump shaft speed (RPM)	Minimum inlet fititng size
#200-#250	7,000	8 AN
#300	6,000	8 AN
#400 through #500	6,000	10 AN to 12 AN
#550	6,000	12 AN
#600-#700	5,000	12 AN
#900 through #1300	5,000	16 AN

We test and rebuild many types of pumps. To have your pump tested, send it in with all the fittings still in it. Include a day and evening phone number with the area code.....so we can call if we need info.

ALL SIZES, FLOWS , AND RECOMMENDATIONS FOR FUEL PUMPS ARE FOR GENERAL REFERENCE. CALL US FOR YOUR SPECIFIC APPLICATION !!!

For more mechanical fuel pump info., see Pg. #101-104, for Pump drives, see Pg. #174-176

Christian Kuhn's 68' Mustang powered by a 4.6 liter small block Ford with EFI

MECHANICAL FUEL PUMPS

KINSLER FUEL PUMPS

a) Side-by-side gear construction allows this pump to withstand higher fuel pressure loads than other designs, with minimal flow losses. The gears and plates are coated with Polydyn ™ dry film lubricant to reduce wear. The billet aluminum housing is hard anodized on the inside to reduce corrosion.

b) Pumps are available in sizes :
KW/LW : 200, 300, 400, 450, 500 , 600, 700
Large KW : 900, 1000, 1100, 1200, and 1300

c) Uses 3/8" male hex drive. Swivel base flange for ease of installation, allows indexing of inlet and outlet ports for clearance of inlet and outlet hoses.

d) Kinsler offers a complete line of AN hard anodized aluminum fittings. These fittings are light, resistant to methanol corrosion, give smooth flow, and good sealing.

e) All parts are available to customer. Allows for "emergency" field service.

f) Interchangeable gears and spacers lets you quickly change the displacement size of the fuel pump, bigger or smaller (within housing limits).

g) Pump can be driven either clockwise or counterclockwise without modification. Internal design allows either port to be inlet or outlet depending on rotation. Simply switch the inlet and outlet fittings.

KW 400 pump and parts

NEW

'Lite-Weight' fuel pump ! When every bit of weight counts !

KW 200 - 700 FUEL PUMPS

Housing configuration consists of 3-inlet ports (1-8 AN and 2-6 AN female) and 3-outlet ports (1-8 AN female and 2-6 AN female). Pump without fittings weighs approx. 1.95 lbs

2904	KW-200 regular rotation
2905	KW-200 reverse rotation
2908	KW-300 regular rotation
2909	KW-300 reverse rotation
2912	KW-400 regular rotation
2913	KW-400 reverse rotation
2954	KW-450 regular rotation
2955	KW-450 reverse rotation
2916	KW-500 regular rotation
2917	KW-500 reverse rotation
2980	KW-550 regular rotation
2981	KW-550 reverse rotation
2920	KW-600 regular rotation
2921	KW-600 reverse rotation
2924	KW-700 regular rotation
2925	KW-700 reverse rotation

LW 'Lite-Weight' series pump

LW "Lite-Weight" FUEL PUMPS

Housing configuration consists of 1-inlet port (8 AN female) and 3-outlet ports (1-8 AN female and 2-6 AN female in cover). Pump without fittings weighs approx. 1.45 lbs

2914	LW-400 regular rotation
2915	LW-400 reverse rotation
2956	LW-450 regular rotation
2957	LW-450 reverse rotation
2918	LW-500 regular rotation
2919	LW-500 reverse rotation
2982	LW-550 regular rotation
2983	LW-550 reverse rotation

Service parts are available for in-the-field repairs

PUMP FLOW TESTING SERVICE

2900	Labor to run in and flow test New KW/LW fuel pump, 900 series or smaller
2901	Labor to run in and flow test New KW fuel pump, 1000 series and larger

KINSLER MANIFOLD OUTLET FUEL PUMPS

2913-M3P	KW-400 reverse rotation, 3-port
2913-M4P	KW-400 reverse rotation, 4-port
2955-M3P	KW-450 reverse rotation, 3-port
2955-M4P	KW-450 reverse rotation, 4-port
2917-M3P	KW-500 reverse rotation, 3-port
2917-M4P	KW-500 reverse rotation, 4-port

900 - 1300 series pumps have a larger housing, 12 AN female inlet port and 8 AN female outlet port

2932	KW-900 regular rotation
2933	KW-900 reverse rotation
2936	KW-1000 regular rotation
2937	KW-1000 reverse rotation
2940	KW-1100 regular rotation
2941	KW-1100 reverse rotation
2944	KW-1200 regular rotation
2945	KW-1200 reverse rotation
2947	Upgrade on KW-900, KW-1000, KW-1100, KW-1200, build pump with capability to accept up to size 1300 gear set, uses 1300 front cover and additional spacer (900 only), different size spacers are used for other size pumps
2948	KW-1300 regular rotation
2949	KW-1300 reverse rotation

FITTINGS- KINSLER HARD-ANODIZED ALUMINUM

6166	6 AN port plug with o-ring
6156	6 AN male flare x 6 AN male + o-ring
6044	6 AN male flare x 8 AN male + o-ring
6043	8 AN male flare x 8 AN male + o-ring
6103	Reducer bushing, 6 AN female x 8 AN male + o-ring
6177	10 AN male flare x 8 AN male + o-ring
6178	12 AN male flare x 8 AN male + o-ring
6179	12 AN male flare x 12 AN male + o-ring
6100	16 AN male flare x 12 AN male + o-ring

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KINSLER PRESSURE RELIEF VALVE

K-140

#12104

HIGH FLOW CAPACITY

ACCURATE PRESSURE CONTROL

FANTASTIC PRESSURE REPEATABILITY

METHANOL AND GASOLINE COMPATIBLE

COMPACT DESIGN

SERVICEABLE IN-THE-FIELD

Model K-140 pressure relief valve has many unique (patent pending) features

Our unit has the highest flow capacity with the lowest pressure rise of any valve on the market. At 1000 lbs/hr (2.8 GPM) of bypass flow, it only has a 2.5 PSI pressure rise. This is less than 1/7th to 1/4 the drop of the most popular valves we have tested. For most applications the rise is under 1-PSI, since the total bypass flow for most systems is 600 lbs/hr or less.

Extremely smooth operation. The closing flow curve is within 0.3 (3/10) PSI at any flow point on the opening curve. This is achieved by hardcoating, then microlapping all of the moving parts. This means the pressure in the fuel rails will stay close to the set point on both rising and falling engine RPM.

Many valves can go into a "buzz" (hydraulic vibration); ours is more stable as it is the only valve on the market with an available damping option. A unique spring arrangement is also available to further control buzz.

The diaphragm has a swiveling "live" center pintle that closes down on the seat for very smooth operation. Both the pintle and the seat are lapped for bubble tight close-off. Valves that use a fixed pintle or a ball tend not to shut off smoothly, nor to seal completely.

A nice design feature is a replaceable seat. Should the seat get damaged or worn it can be removed and a new one installed.

Two 8 AN female inlets, with full flow-through capability to help balance fuel rail pressure fluctuations and a 3 AN pressure gauge port. We can adapt the valves inlets to most AN sizes.

Hard anodized aluminum housing components and a very compact design makes this piece lighter and easier to install in the vehicle. Components are compatible with **gasoline** and **methanol**.

Seven different spring combinations are available for a total adjustable range of 17 - 230 PSI. There is also CUSTOM BUILDUP SERVICE available.

EFI PRESSURE RELIEF VALVES

12100 Series... Extremely Precise Fuel Pressure Control

- > Light-weight
- > Compact
- > Adjustable
- > Vacuum/Boost Reference
- > Methanol Compatible
- > The Most Accurate Valve on the Market

#12100

#10747

Weldon

#10715

Aeromotive

#10745

KINSLER #	PSI	BAR	ADJ. SCREW	VAC. REF.	HOUSING MATERIAL	WEIGHT (LBS)	INLET DETAILS	OUTLET DETAILS
10700	36 - 44	2.5 - 3.0	Yes	No	Steel Gold Iridite	0.31	1 - 5/16" Nipple	1 - 12mm 1.5 Male and 5/16" Nipple
10712	65 - 174	4.5 - 12.0	Yes	Yes	Steel Gold Iridite	0.56	2 - 14mm 1.5 Male Inverted Flare	1 - 12mm 1.5 Male and 5/16" Nipple
10714	44 - 87	3.0 - 6.0	Yes	Yes	Steel Gold Iridite	0.55	2 - 14mm 1.5 Male Inverted Flare	1 - 16mm 1.5 Male and 5/16" Nipple
10742	58 - 174	4.0 - 12.0	Yes	No	Steel Gold Iridite	0.57	2 - 14mm 1.5 Male Inverted Flare	1 - 16mm 1.5 Male and 5/16" Nipple
12100	17 - 37	1.2 - 2.5	Yes	Yes	Aluminum Hard Anodized	0.42	2 - 8 AN Female	1 - 6 AN Male Flare
12102	26 - 51	1.8 - 3.5						
12104	34 - 80	2.4 - 5.5						
12106	49 - 106	3.4 - 7.3						
12108	57 - 123	4.0 - 8.4						
12110	72 - 152	5.0 - 10.4						
12116	88 - 230	6.1 - 16.0						
10745	35 - 87	2.5 - 6.0	Yes	Yes	Aluminum Black/Red	0.88	2 - 10 AN Female	1 - 6 AN Female
10747	30 - 120*	2.1 - 8.3	Yes	Yes	Aluminum Gold/Black	1.10	2 - 10 AN Female	1 - 6 AN Female
10715	30 - 120*	2.1 - 8.3	Yes	Yes	Aluminum Gold/Black	1.22	2 - 12 AN Female	1 - 12 AN Female
10701	36	2.5	No	Yes	Steel Black Coated	0.40	1 - 14mm 1.5 Male Inverted Flare	1 - 16mm 1.5 Male and 5/16" Nipple
10702	44	3.0	No	Yes	Steel Black Coated	0.34	1 - O-ring	14mm 1.5 Female
10703	44	3.0	No	Yes	Steel Black Coated	0.34	1 - O-ring	1 - 5/16" Nipple
10710	55	3.8	No	Yes	Steel Black Coated	0.38	1 - O-ring	14mm 1.5 Female
10711	72	5.0	No	Yes	Steel Gold Iridite	0.44	1 - 14mm 1.5 Male Inverted Flare	1 - 16mm 1.5 Male and 5/16" Nipple

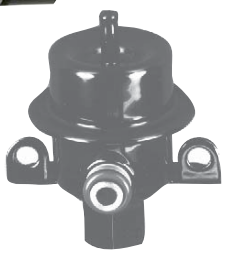
*** Optional springs available for 7-200 PSI**

KINSLER K-140 PRESSURE RELIEF VALVE INSTALLATION KITS

12096	Two 6 AN male flare inlet fittings, 3 AN gauge port plug, vacuum/boost reference barb
12098	Two 8 AN male flare inlet fittings, 3 AN gauge port plug, vacuum/boost reference barb

Bosch

#10710


#10702


#10700

EFI PRESSURE RELIEF VALVES AND ACCESSORIES

DUAL PRESSURE RELIEF VALVE ADAPTER

This assembly uses two stock type low cost relief valves for higher flow capacity.

Dual pressure relief valve adapter shown with polished finish

10750	Dual pressure relief mounting rail, extruded aluminum, 8 AN female inlet & outlet ports, fits valves #10701, #10702, #10703, #10710, and #10711
10761	Labor to polish #10750 dual pressure relief mounting rail
6043	Fitting, 8 AN male flare x 8 AN male + o-ring, hard anodized
6044	Fitting, 6 AN male flare x 8 AN male + o-ring, hard anodized
6047	Bulkhead, 8 AN male + o-ring x 8 AN male + nut & o-ring, plated steel
6048	Bulkhead, 8 AN male + o-ring x 6 AN male + nut & o-ring, plated steel

SADDLE ADAPTER

10751	Saddle adapts o-ring style inlet pressure relief valve to AN fittings, billet aluminum, blue anodized, 6 AN female port, fits valves #10702, #10703, and #10710
6156	Fitting, 6 AN male flare x 6 AN male + o-ring, hard anodized
6157	Fitting, 8 AN male flare x 6 AN male + o-ring, .390" I.D., plated steel
6048	Bulkhead, 8 AN male + o-ring x 6 AN male + nut & o-ring, plated steel

K-140 MOUNTING BRACKET

Black anodized billet aluminum, available with rubber vibration isolation mounts

12085	Mounting bracket, billet aluminum, black anodized
12086	Set of four rubber vibration isolation mounts

QUICK RELEASE VACUUM/BOOST REFERENCE KIT

10917	Vacuum signal junction block assembly, with barbed outlet fitting, (8) #10912 90 degree quick release inlet fittings, (8) #10911 straight quick release fittings, and 10' of black nylon tubing
10918	Tee fitting, quick release, 1/8" x 1/8" x 1/4"
10911	Quick release fitting, straight, 1/8" female collet x 10-32 male + o-ring
10912	Quick release fitting, 90 degree, 1/8" female collet x 10-32 male + o-ring
10915	Tubing, 10', black nylon, .070" I.D. x .125" O.D., fits fittings #10911 and #10912
10913	Quick release fitting, straight, 1/4" female collet x 1/8" male pipe thread
10914	Quick release fitting, 90 degree, 1/4" female collet x 1/8" male pipe thread
10916	Tubing, 10', black nylon, .150" I.D. x .250" O.D., fits fittings #10913 and #10914

VACUUM/BOOST REFERENCE KIT

10900	Vacuum signal junction block assembly, blue anodized billet aluminum with (8) #10902 - 1/8" barbed inlet fittings and one 3/16" barbed outlet fitting
10901	Vacuum signal block ONLY, blue anodized billet aluminum, with (8) 10-32 female ports and (2) 1/8" NPT female ports
10902	Barbed fitting, 10-32 male thread with gasket x 1/8" barb
10904	Hose, black flourosilicone, for #10902 fitting, temp. range -80 to 450°F, 1/8" I.D., 10'
10905	Signal damper, for MAP signal, reduces signal pulsing

#10913

#10914

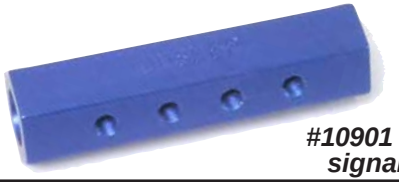
#10918

ADJUSTABLE PRESSURE RELIEF VALVE TOWER

Converts GM L-98 T.P.I. pressure relief valve for adjustable operation.

10752	Adjustable pressure relief valve tower, blue anodized billet aluminum, includes adjustor screw, vacuum nipple fitting, and spring support tab

#10752



#10901 Vacuum signal block

EFI PRESSURE RELIEF VALVES AND ACCESSORIES

PRESSURE RELIEF VALVE BASICS

Fuel rail pressure is controlled on an EFI system by a pressure relief valve which returns excess volume back to the tank thereby maintaining pressure at the injector's inlet.

If the pressure relief valve does not do it's job properly the system fuel pressure may rise or fall which will cause the fuel flow to do the same. Should the valve allow the fuel pressure to flutter, then the fuel delivery will flutter. These conditions could cause difficulty in starting the engine, inconsistency in the engine's performance, difficulty in programming, or engine damage.

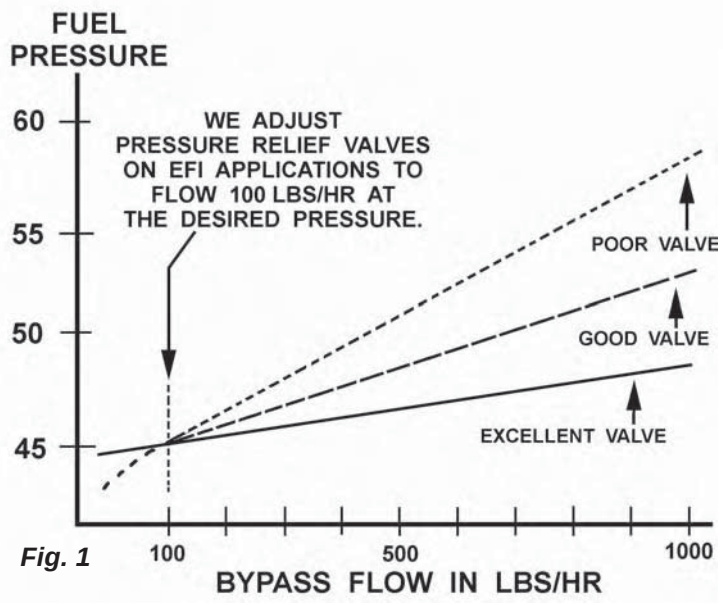


Fig. 1

Pressure relief valves used with EFI systems have a diaphragm assembly with a pintle or ball that sets on a seat. A spring(s) above the diaphragm assembly will force it to set on the seat at a desired pressure. Fuel pressure from the pump will exert force on the diaphragm and lift the sealing device off the seat allowing fuel to pass through the valve. In order for the valve to open and allow fuel to flow, the spring must be compressed. Compressing the spring, causes a rise in pressure. When larger volumes of fuel must be bypassed, the spring will need to be compressed even further to allow the flow through the valve. The best designed valve will pass the desired amount of volume with very little pressure rise. See Fig. 1

To clear up a bit of confusion: a pressure regulator limits the pressure going into a system, such as a regulator feeding fuel to a carburetor... any vapor bubbles in the fuel are vented out through the float bowl. All EFI systems use a pressure relief valve to control the fuel pressure. Most bypass fuel after the fuel rails which purges the vapor out of the system. If a pressure relief valve is used on the inlet of the fuel rails there would be no way to purge the vapor out of the rails. This is very important, since after a hot soak any vapor trapped in the rails would flow out to one or two cylinders, causing those cylinders to be lean at start up.

VACUUM/BOOST REFERENCE

Some pressure relief valve models have a port (fitting or barb) to connect a manifold absolute pressure (M.A.P.) hose to the top side of the diaphragm in the valve. At idle or partial throttle the vacuum pulls up on the diaphragm, lowering the fuel pressure. Under boost, the fuel pressure will be raised. This feature broadens the usable range of the injectors. Ideally the valve should raise or lower the fuel pressure at a 1:1 ratio. See Fig. 2.

It is desirable to maintain a constant pressure differential across the injectors for consistent fuel mapping (see ORIFICE THEORY on Pages #202-203). When the injector outlet is installed where it would be subjected to vacuum (under the throttle plate) or boost (on the pressure side of blower/turbo), the flow of the injector will increase or decrease as the resulting outlet pressure changes. The vacuum and/or boost in a manifold runner is called manifold absolute pressure (M.A.P. see SENSORS FOR EFI SYSTEMS on Page #146). Referencing the manifold absolute pressure to the pressure relief valve causes the fuel pressure in the rail system to be adjusted by the change in the manifold absolute pressure. This reference will maintain a constant pressure differential across the injector and consistent flow.

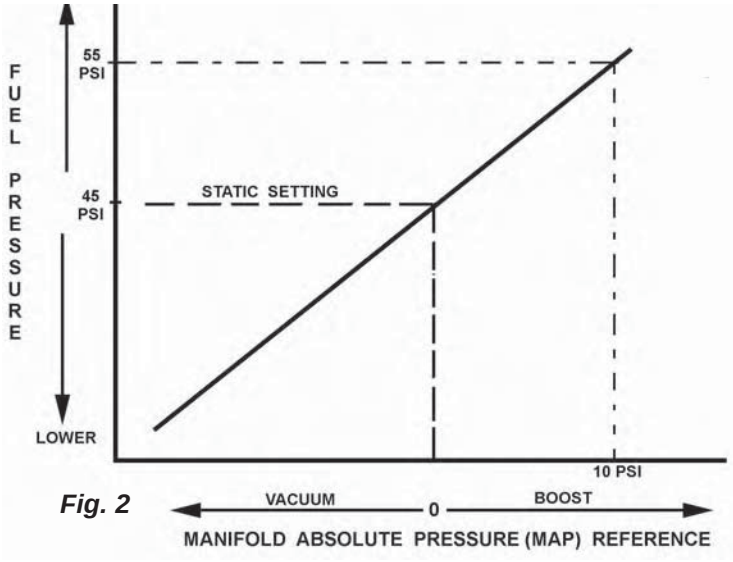


Fig. 2

ADJUSTABLE PRESSURE

Some pressure relief valves are available with an adjustment screw to allow the fuel pressure setting to be raised or lowered. Adjustment of the pressure relief valve allows the fuel pressure to be increased or decreased to change the injector's flow (see ORIFICE THEORY on Pages #202-203), thus allowing the user to add more or less fuel without changing injectors or the fueling program in the ECU.

PRESSURE RELIEF VALVE PLUMBING

See EFI PLUMBING on Page #154 regarding the physical placement of the valve in relationship to the fuel rails. All hose sizes must have large enough inside diameter so that they will not cause any restriction, which could cause the system's fuel pressure to vary with the change in flow.

FILTRATION: It is very important the pressure relief valve has filtered fuel. The mechanical seat of the valve is very sensitive to dirt. A proper fuel filter is vital to maintain the operational integrity of the EFI system components. We recommend the Kinsler fuel filter assembly #8170, which has a 10-micron replaceable paper filter element #9031 - see FUEL FILTERS on Pages #162-166.

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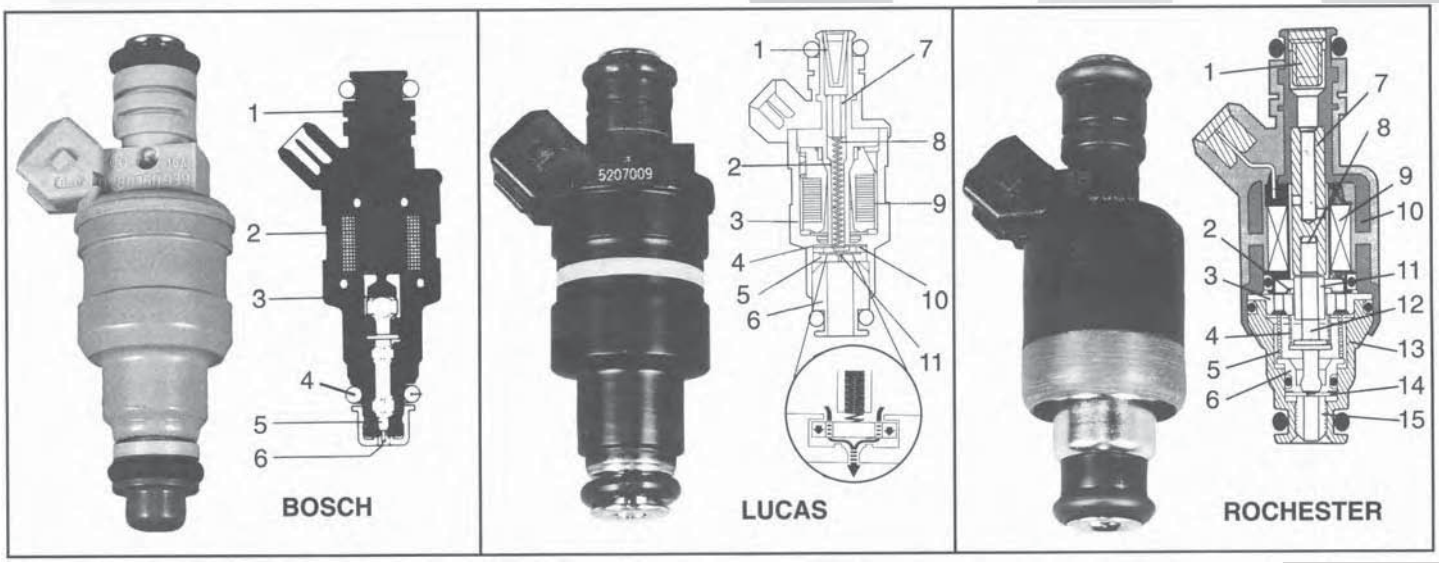
EFI INJECTORS

THERE ARE THREE TYPES OF DESIGN FOR EFI INJECTORS - PINTLE, DISC, and BALL :



PINTLE TYPE

Controls fuel flow by moving a pintle in and out of the fuel orifice. The pintle also atomizes the fuel by dispersing the fuel in a cone shaped pattern. These spray patterns will generally vary from 15 to 30 degrees of included angle dependent upon the injector selected. Fuel atomization is very good with these injectors.

1 - Filter
2 - Magnetic winding
3 - Solenoid
4 - O-ring
5 - Needle valve pintle
6 - Spray tip

DISC TYPE

Controls fuel flow by lifting a disc off of its seat. The disc has as many as six holes around its circumference. When the injector is activated,the disc is raised and fuel flows through the holes and exits out the orifice. The disc in this injector may actually rotate while the injector is operating. The spray pattern of this type of injector will generally vary for 10 to 20 degrees. These narrower spray patterns can aid in targeting the fuel. Fuel atomization is typically not as fine as the pintle type injector.

1 - Filter
2 - Core
3 - Body
4 - Shim
5 - Valve seat
6 - Nozzle
7 - Calibration slide
8 - Spring
9 - Coil assembly
10 - Spacer
11 - Disc

BALL TYPE

Controls fuel flow by raising a ball off its seat. This allows fuel to flow through the seat orifice and then out through a fixed director plate with several holes. The director plate serves to direct the fuel spray pattern. This type of injector has a 10 to 15 degree included angle spray pattern. The fuel atomization of this type of injector is similar to the disc type injector. Disc and ball type injectors by design are less susceptible to clogging. We have not experienced any clogging problems provided that the fuel is filtered. (See Kinsler Fuel Filters on Pages #162-166).

1 - Filter
2 - Guide ring
3 - Spacer
4 - Core spring
5 - Seat spring
6 - Seat
7 - Pole piece
8 - Stop
9 - Solenoid coil
10 - Solenoid body
11 - Core ring
12 - Core
13 - Spray tip housing
14 - Director
15 - Spray tip

SIEMENS DEKA

THE BASICS OF AN EFI INJECTOR

An EFI injector is a electronically controlled solenoid that controls fuel flow through an orifice. When the solenoid is activated, the orifice is exposed allowing fuel to flow. EFI injectors are available with various flow capacities. The injectors are electronically pulsed, typically measured in milliseconds (thousandths of a second), to control the amount of fuel delivered to the engine.

The percentage of time that the injector is pulsed is called the duty cycle. 100% duty cycle or Static Flow means the injector is open all the time. Static flows for injectors are specified at a certain pressure level. The test pressure rating may be in PSI, BAR, KPA, or KG/CM^2. Manufactures rate their injectors at different pressures. For accurate comparison of flow rates, be sure you are comparing flows at the same pressure levels, (see Fuel Flow versus Fuel Pressure - Page #138).

When properly sized for a specific application the injector will normally operate at 80-90% duty cycle. Injectors that are too large will not accurately deliver small amounts of fuel for good idle quality. Injectors that are too small may cause severe engine damage because of lean mixtures at large throttle openings and/or high engine RPM.

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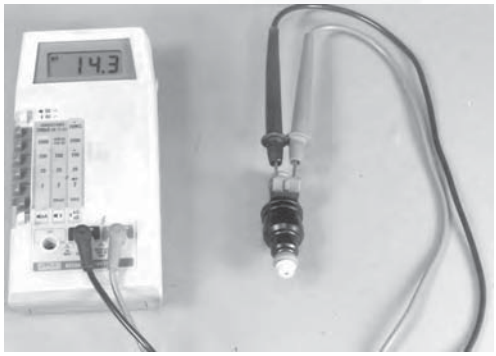
EFI INJECTORS

ELECTRICAL DIFFERENCES

The solenoid inside an injector can be classified into one of two basic groups: low resistance or high resistance. The resistance of an injector coil can be measured with an ohm meter by attaching the meter leads to the two terminals on the injectors.



Injector measures 14.3 ohm on voltiohm meter

Low resistance injectors

Also referred to as *peak* and *hold*, measure between 2 and 5 ohms resistance. The drive circuit for these injectors are called current sensing or current limiting. A *peak* current is used to quickly open the injector, then a much lower *hold* current is used to maintain the open condition while reducing overall current draw.

High resistance injectors

Also referred to as saturation injectors, measure 12-16 ohms. The injector drivers for these injectors are called saturation drivers. These drivers simply turn the supply voltage on and off to pulse the injector. High resistance injectors typically respond slower than low resistance injectors. High resistance injectors may sometimes be controlled by a peak and hold driver. The drive circuit may not reach the peak current value and therefore not switch to the hold current. This may cause some drivers to overheat due to sustained high current. ECU manufacturers utilize various injector drivers. You must consult Kinsler Fuel Injection or the manufacturer regarding specific driver/injector compatibility.

FUEL FLOW versus FUEL PRESSURE

Injector flow capacity varies with changes in supply pressure. Increasing fuel pressure to the injector will result in additional flow and a potential improvement in atomization. When the pressure level is increased, the load against the injector solenoid will also increase. Some injectors solenoids will not handle the increased load. Please consult your Kinsler technical representative about specific injector operation. The load against the fuel supply system will also increase and fuel pump output will decrease. Please be sure that the fuel pump(s) will handle the increased load. (See Electric Fuel Pumps on Pages #124-130).

EXAMPLE OF SYSTEM WITH INCREASING FUEL PRESSURE

Formula:	Supply	-	Engine Usage	=	Bypass
System Pressure	**1- #10208 Fuel Pump (tested at 13.2 volts)**		**8- #10057 Injectors (static flow)**		**Bypass Flow**
45	330 lbs/hr	-	156.0 lbs/hr	=	174 lbs/hr - OK
70	300 lbs/hr	-	196.0 lbs/hr	=	104 lbs/hr - OK
100	260 lbs/hr	-	284.7 lbs/hr	=	-24.7 lbs/hr **< Danger**

Pressure rises as the square of the flow through an orifice, so to double the flow through an injector takes four times the pressure :

$$\text{New Press} = \text{Old Press} \times \left(\frac{\text{New Flow}}{\text{Old Flow}}\right)^2$$

If we know the flow of an injector at some pressure, we can figure the flow at a new pressure :

$$\text{New Flow} = \text{Old Flow} \times \sqrt{\frac{\text{New Press}}{\text{Old Press}}}$$

CALCULATION FOR INJECTOR SIZE SELECTION

Maximum Engine output (H.P.) times Brake Specific Fuel Consumption (B.S.F.C.) at Peak Power times 1.175 (Conversion factor from 85% duty cycle to static flow) divided by number of injectors equals Static Flow required per injector. If actual B.S.F.C. value is not available, use 0.5 for normally aspirated engines operating on gasoline. Use 1.1 - 1.2 B.S.F.C. for normally aspirated methanol burning engines.

Example : 1) Small block Chevrolet V8 on gasoline. [500 (h.p.) X 0.5 (B.S.F.C.)] X 1.175 / 8 = 36.7 lbs/hr

2) Big block Chevrolet V8 on methanol. [1100 (h.p.) X 1.1 (B.S.F.C.)] X 1.175 / 8 = 177.7 lbs/hr

Look for an injector that has flow close to flow rate at the operating pressure and the correct resistance for your electronics.

METHANOL WITH EFI

Most EFI injectors are compatible with methanol based fuels. The problems are from the chemical affects of the methanol. Methanol attracts water which can cause rusting of internal components. When methanol comes into contact with aluminum it corrodes the aluminum and when it drys it turns to a 'sand-like' residue which can easily clog up injectors, filters, pressure relief valve, and fuel pump. The only 100% way not to have a problem is to totally flush the entire fuel system after each use with cleaning solvent or gasoline. Methanol is extremely corrosive to aluminum components, fuel rails, fittings, etc. This aluminum oxidation also will put contamination in the fuel system, possibly causing problems. It is highly recommended that stainless steel fuel rail be used.

FLOWING AND GROUPING

EFI injectors are not perfect out of the box. We have measured as much as 12% variation in flow rates of the same part number injector. To obtain the best possible fuel distribution, it is advisable to have the injectors flow tested. Kinsler flows new or used injectors and can provide the test results.

We group similar flowing injectors to minimize the spread in distribution.

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EFI INJECTORS

Manufacturers rate injectors at different pressures. For accurate flow comparison, be sure to compare flows at the same pressure. To calculate the flow at different pressures see "ORIFICE THEORY" on Pages #202-203.

STYLE 1

Type: disc (D) or pintle (P)
Top: o-ring Bottom: o-ring
Center to center on o-rings: 2.550"

High Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr	Type
10125	15.0	18.7	P
10119	17.9	22.3	P
10123	26.1	32.5	P
10090	26.2	33.2	P
10148	25.7	33.3	P
10121	31.1	38.8	P
10186	32.7	40.6	D
10177	32.2	40.1	P
10150	32.5	41.1	P
10142	43.8	54.7	D
10083	55.7	69.5	P

Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr	Type
10109	20.2	25.8	P
10113	20.6	26.6	P
10117	32.2	40.8	P
10132	32.8	41.3	P
10160	40.7	49.1	P
10082	56.9	70.6	D
10188	57.7	73.0	P
10165	65.0	81.1	P
10080	73.8	92.7	D
10081	84.8	105.9	D
10092	158.0	197.0	P

STYLE 2

Type: disc
Top: o-ring Bottom: o-ring
Center to center on o-rings: 2.500"

High Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10051	14.5	19.5
10052	31.7	40.2
10058	38.6	48.0
10059	44.1	55.0

Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10057	19.5	24.5
10060	51.7	64.6

STYLE 3

Type: ball
Top: o-ring Bottom: o-ring
Center to center on o-rings: 2.600"

High Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10067	24.3	30.6
10068	40.7	50.3
10069	50.2	60.3

Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10070	73.2	Call for Details
10071	94.5	

STYLE 4

Type: disc
Top: o-ring
Bottom: smooth open face end

Kinsler #10086;
modification to bottom captive o-ring detail.

Very Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10129	63.8	79.0
Ohms : 0.85		

STYLE 5

Type: pintle
Top: hose Bottom: bung

Kinsler #10192; injector adapter for captive o-ring inlet detail.
Kinsler #10087; modification of injector for #10192 adapter

Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10105	18.1	22.6
10107	20.3	26.2
10100	36.3	44.9
10102	43.6	52.7
10103	51.0	64.3

STYLE 6

Type: pintle
Top: shank
Bottom: smooth open face end

Kinsler #10085; modification to top and bottom captive o-ring detail.

Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10136	38.5	46.6
10134	48.7	60.4
10137	53.0	64.0

STYLE 7
'EV6 long body'

Type: disc
Top: o-ring Bottom: o-ring
Center to center on o-rings: 2.550"

Low Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10154	36.7	45.8
10155	36.7	45.8

#10154 has dual stream spray pattern designed for 4-valve engines

STYLE 8

Type: disc
Top: o-ring
Bottom: o-ring
Center to center on o-rings: 1.500"

High Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10061	21.4	26.7
10062	30.5	38.0
10063	44.0	54.9

STYLE 9
'EV6 standard'

Type: disc
Top: o-ring Bottom: o-ring
Center to center on o-rings: 2.075"

High Resistance

Part #	45 PSI lbs/hr	70 PSI lbs/hr
10075	25.7	32.1

TO CONVERT lbs/hr to cc/min

$$\frac{\text{lbs/hr}}{5.7} \times 60 = \text{cc/min}$$

TO CONVERT cc/min to lbs/hr

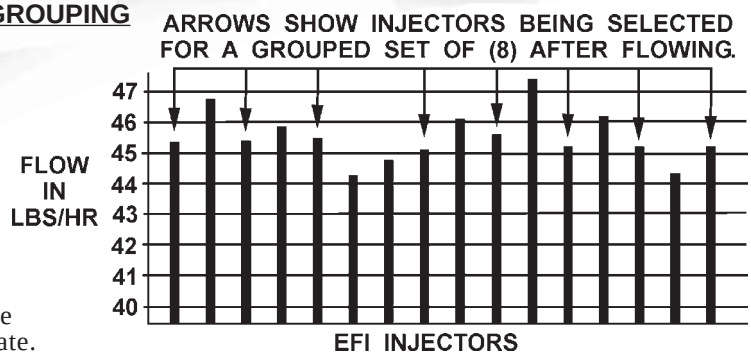
$$\frac{\text{cc/min} \times 5.7}{60} = \text{lbs/hr}$$

EFI INJECTORS : PARTS AND MODIFICATIONS

FLOW AND GROUPING

We offer this service on new injectors and customer's injectors.

EFI injectors of the same rated size do not necessarily have the same flow rate.



FOR ULTIMATE RESULTS - THIS IS A MUST !!!

'DUMMY' INJECTOR

10193	Kinsler billet aluminum 'dummy' injector, o-ring top and bottom, black anodized for stock appearance, ideal for blocking fuel rail and manifold ports that are not in use

#10193

LABOR TO MODIFY EFI INJECTORS

BEFORE

AFTER

10085	Modify injectors #10134, #10136, #10137 to dual o-ring

BEFORE

AFTER

10087	Modify injectors #10100, #10102, #10103, #10105, #10107 for conversion to o-ring inlet, machine inlet to a shank with .308" O.D., inlcudes Kinsler #10192 adapter

#10190 ***#10191*** ***#11190*** ***#10195***

#10197 ***#10196*** ***#10194***

EFI INJECTOR PARTS

10190	Inlet screen, O.E. replacement, fits Bosch top feed EFI injectors
10191	Inlet screen, fits most top feed EFI injectors
10194	Bung seal, GM type, outlet of injector, .350" I.D. x .540" O.D.
10195	Retainer clip, Bosch style
10196	Bung seal, Bosch injector, .305" I.D. x .540" O.D.
10197	O-ring, for Bosch injector, top or bottom
11190	Pintle cap, specially made for Kinsler, cone tip design shields pintle, large molded locking ring securely retains cap on injector, fits several Bosch injectors

#10192

#10198

#10199

INJECTOR ADAPTERS

10192	Adapter, billet aluminum, has internal and external o-ring, fits an injector that has been modified to have inlet shank of .307" O.D. (see #10087 injector modification), Measurement does not include o-rings, .310" I.D. x .525" O.D.
10198	Inlet adapter, Delron, fits #10134, #10136, and #10137, .300" I.D. x .505" O.D.
10199	Outlet washer, Delron, fits #10129, #10134, #10136, and #10137, .310" I.D. x .527" O.D.

#10396

INDIVIDUAL INJECTOR FUEL CONNECTORS

10396	Single injector cup, 6 AN male flare, stainless steel, with Bosch type clip groove
10397	Single injector cup, 8 AN male flare, stainless steel, with Bosch type clip groove

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EFI FUEL RAILS - NEW .970" I.D. RAIL!

We can supply a completed fuel rail for our manifold or yours, or we can machine a rail to your print or supply a partially machined rail for you to finish. Individual components available!

Our 8 AN fuel rails with .685" ID are more than adequate for most applications. Our 12 AN fuel rails with .970" ID have twice the cross-sectional area of the 8 AN rails... we recommend these for very high horsepower gas engines, most methanol engines, systems with very large injectors, or two injectors .... call our technicians for advice.

The problem: When a very large EFI injector is pulsed (opened), it takes a very quick "gulp" of fuel out of the rail, causing a large instantaneous pressure drop. These pressure drops can reinforce each other in a random ram tuning within the rail and attached fuel hoses that cause chaotic pressure pulsing; we have seen plus and minus 30 psi on a 130 psi supply (100 - 160 psi range). As the pressure waves travel through the fuel rail, some injectors are likely to open when there is a high or low local pressure... this causes very significant cycle to cycle rich and lean conditions to the cylinders, as once the injector opens, it's simply a function of the pressure acting on it's outlet orifice(s). A pressure gauge will not respond accurately to these pulses as they are too fast; we use very fast responce piezoelectric pressure transducers to analyze these systems.

Why the larger rails help: All fuel has some air in it, especially after the system has run a little, because the return fuel absorbs more air as it falls back into the tank. This makes the fuel a bit compressible, thus the larger rail assists the ability to take a "gulp" with less pressure drop. We have seen 45 horsepower picked up by just switching from our 8 AN to our 12 AN rails.

Avoid using individual supply hoses to the injectors; they cause huge pressure drops because of the pulsing flows. If you must use them, make them all the same length, and as large an ID as possible... 3/16" ID is too small; 3/8" would be much better

ALUMINUM FUEL RAILS

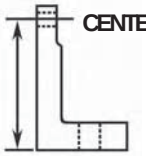
Extruded aluminum fuel rail material in bulk form, cut to desired length, partially machined, or machined to fit. Billet aluminum mounting stanchions are available in varying heights to aid in the installation of EFI injectors with different overall body lengths. We offer a complete line of mounting hardware and adapter fittings. Our extrusion design allows for the drilling and tapping of 8 AN female o-ring end ports (NO pipe thread which can crack the tube, or sealer compound to get in your fuel system).

10300	Extruded aluminum fuel rail tubing, 6061-T6 alloy, .680" I.D., .110" wall, .900" wide x 1.3" tall, priced per foot
10301	Extruded aluminum fuel rail tubing, 6061-T6 alloy, .970" I.D., .140" wall, 1.250" wide x 1.730" tall, priced per foot
10365	Labor, machine one end of extruded aluminum fuel rail for 8 AN female o-ringed thread
10366	Labor, machine both ends of one rail to square off raw cut piece
10303	Stanchion, 2.000" tall, L-type, billet aluminum
10305	Stanchion, 2.050" tall, L-type, billet aluminum
10308	Stanchion, 2.100" tall, L-type, billet aluminum, used on Kinsler manifolds with Bosch or Rochester EFI injectors
10310	Stanchion, 2.150" tall, L-type, billet aluminum
10312	Stanchion, 2.200" tall, L-type, billet aluminum
10313	Stanchion, 2.000" tall, L-type, billet aluminum, Special L-type, pad for installation of #10314 bell crank bracket
10314	Bracket, bolts to stanchion #10313 to mount Kinsler #5485 bell crank bearing, used on Buick V6 'Indy Light' cars
10317	Stanchion, 2.250" tall, L-type, billet aluminum
10319	Stanchion, 2.300" tall, L-type, billet aluminum

U-Type Stanchions are for severe vibration applications

10329	Stanchion, 2.100" tall, U-type, billet aluminum
10330	Stanchion, 2.220" tall, U-type, billet aluminum
10331	Stanchion, 1.960" tall, U-type, billet aluminum

10355	Injector cup extension, 1.135" long, 6 AN male + o-ring, billet aluminum
10357	Injector cup extension, 1.355" long, 6 AN male + o-ring, billet aluminum
10359	Injector cup extension, 2.0" long, 6 AN male + o-ring, billet aluminum, not machined for injector detail



Stanchion height is measured from bottom of stanchion to the centerline of the fuel rail mounting hole.

10348	Stud kit, set of (4) 5/16-18 x 1 1/4" studs with recess hex, washers, and jet nuts
10349	Bolt kit, set for mounting (4) U-type stanchions, 5/16-18 x 1 1/4" cap screws, (4) special washers, (4) small hex nuts for studs, cross bolts, washers, and nuts
10350	Bolt kit, set of (4) for mounting fuel rail to stanchion, 1/4-20 x 1" long small head 12-pt. bolts with washers and jet nuts

EFI FUEL RAILS

LS1 EXTRUDED ALUMINUM FUEL RAIL KIT

Fits GM factory LS1 intake manifold. Kit includes two machined rails, four billet aluminum mounting stanchions, studs with locking flange nuts, nuts and bolts.

12755 LS1 extruded aluminum fuel rail kit

LS1 factory manifold

HONDA K-SERIES EXTRUDED ALUMINUM FUEL RAIL KIT

Fits Honda factory K-series intake manifolds. Kit includes machined rail, AN inlet & outlet fittings (or plug for returnless system), two billet aluminum mounting stanchions, nuts and bolts.

12765 Honda K-series extruded aluminum fuel rail kit

MITSUBISHI EVO EXTRUDED ALUMINUM FUEL RAIL KIT

Fits Mitsubishi factory EVO intake manifolds. Kit includes machined rail, AN inlet & outlet fittings, two billet aluminum mounting stanchions, nuts and bolts.

12767 Mitsubishi EVO extruded aluminum fuel rail kit

OEM STYLE PRESSURE RELIEF VALVE ADAPTER

For installation of OEM style pressure relief valves on extruded aluminum fuel rails. Includes 8 AN or 12 AN bulkhead fitting for 360 deg. indexing. Billet aluminum.

12768 OEM style pressure relief valve adapter, specify 8 AN or 12 AN

SUBARU WRX EXTRUDED ALUMINUM FUEL RAIL KIT

Fits 2002-2004 Subaru WRX factory intake manifold. Kit includes two rails, two billet aluminum mount bases, bolts, and 6 AN or 8 AN male flare inlet and outlet fittings... specify AN size.

12780 WRX extruded aluminum fuel rail kit

NOTE: Will not fit STi models, requires remote pressure relief valve mount or aftermarket pressure relief valve (call for details).

Kinsler WRX fuel rail kit and Vapor Seperator Tank system

These were on every Indy 500 race winner from 1996-2003.

Retainer plates

MODULAR FUEL RAIL COMPONENTS

Originally designed by Kinsler for the Indy Racing League (IRL) Olds Aurora engine; later used by the Chevrolet-Indy engines.

The injector housing holds a high-flow, side-feed Delco injector solenoid valve with separate stainless steel swirl and orifice plates, held in place by a hollow threaded retainer. The injector solenoid is secured by a retainer plate which bolts to the top the housing. The outboard housing accepts an o-ring style fitting; straight or 90^0 8 AN, secured by an aluminum retainer plate. The other side has a female socket to accept a fuel transfer tube. The inboard housing has a female socket on both sides.

These housings, tubes, and fittings are 6061 billet aluminum, hard-anodized for corrosion protection from methanol.

The retainer plates are black anodized aluminum.

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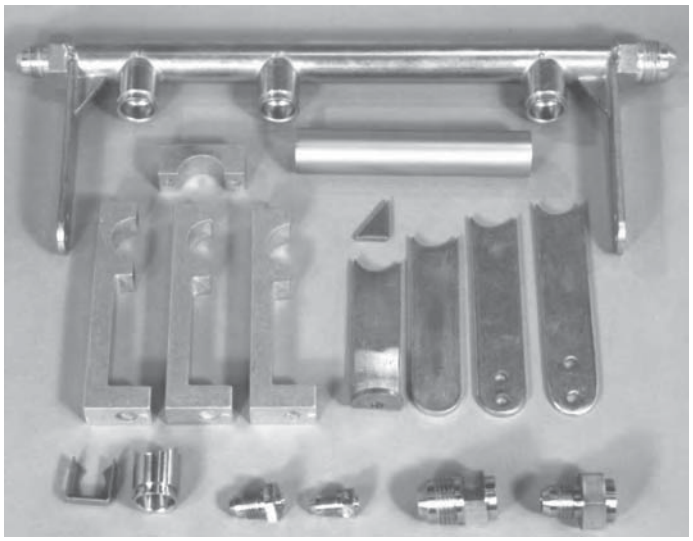
EFI FUEL RAILS

We can supply a complete rail for our manifolds or yours. We can machine a rail to your print, or supply a partially machined rail so you can finish it. Individual components available !



STAINLESS STEEL FUEL RAILS

We offer complete stainless steel fuel rails. Tubing is available in bulk form, cut to length, or various stages of machining and assembly. Rails that we assemble are vacuum nickel brazed or silver brazed then pressure tested for leaks. Stainless rails are mounted using brazed-on straps, or our billet aluminum 2-piece mounting stanchions, available in various lengths for installation of EFI injectors with different overall body lengths. (See EFI INJECTORS on Page #139 for length details).

10370	Kinsler stainless steel tubing, 304 alloy, .650" I.D., .750" O.D., .050" wall, sold per foot
10333	Stanchion, 2-piece, billet aluminum, 2.900" height
10338	Stanchion, 2-piece, billet aluminum, 3.000" height
10343	Stanchion, 2-piece, billet aluminum, 3.050" height
10350	Stanchion mounting bolt kit, set of (4), 5/16-18 x 1 1/4" studs with recess hex, washers, and jet nuts
10371	Gusset, stainless steel, .120" thick for support of fuel rail strap
10372	Strap material, stainless steel, .120" thick x .750" wide, sold per foot
10373	Strap, stainless steel, blank, 2.850" long
10374	Strap, stainless steel, 3.550" long, (2) .190" bolt holes on .600" C-C
10375	Strap, stainless steel, 3.550" long, (2) .190" bolt holes on .600" C-C
10376	Strap, stainless steel with 90 degree bend, 2.5" height with (1) .190" hole
10195	Injector retainer clip, Bosch style
10380	Injector cup, 304 stainless steel, contoured for side of rail tube, machined for injector retaining clip, radiused I.D. for smooth flow
10390	P.S.I. tap, stainless steel, 3 AN male flare, shouldered to insert into tube wall
10391	P.S.I. tap, stainless steel, 4 AN male flare, shouldered to insert into tube wall
10386	Rail end fitting, 6 AN male flare, 304 stainless steel, shouldered to insert into end of fuel rail tubing, radiused I.D. for smooth flow
10387	Rail end fitting, 8 AN male flare, 304 stainless steel, shouldered to insert into end of fuel rail tubing, radiused I.D. for smooth flow
10388	Side mount fitting, 6 AN male flare, contoured to attach on side of tubing, stainless steel
10389	Side mount fitting, 8 AN male flare, contoured to attach on side of tubing, stainless steel
10392	Plug, to cover end of #10370 tubing, stainless steel

EFI INJECTOR ADAPTORS

Fits top feed injectors using .575" O.D. o-ring. 6 AN female inlet port. Two .190" mounting holes, 1.5" C-C. Standard finishes are glossy blue anodized or flat black anodized. Custom finishes available, please call.

10382	EFI injector adapter, please specify blue or black anodized

Blue anodized with optional 6 AN male flare fitting

Black anodized with optional 4 AN male flare fitting and injector

PRESSURE DAMPENING COMPONENTS

The opening and closing of EFI injectors causes fuel pressure fluctuations, affecting the fuel delivery to individual cylinders. Dampening the pressure pulses in the fuel rail can improve the fuel distribution. Group-Fire systems fire more than one injector at a time cause the highest pressure pulsing due to a large instantaneous demand for fuel. Sequentially timed systems, opening one injector at a time, creates a smaller instantaneous demand, thus lower pressure fluctuations.

10755	Pressure damper, 18mm x 1.5 female thread, Bosch
10756	Banjo fitting, plated steel, .595" I.D. nominal pocket
10757	Banjo bolt, stainless steel, 18mm x 1.5 male thread, .750" nominal female pocket
10758	8 AN male flare banjo bolt, stainless steel, 18mm x 1.5 male
10759	Banjo bolt, cadmium plated steel, 18mm x 1.5 male thread, 24mm hex head
10678	Crush washer, 18mm, copper

TOOLING TO MACHINE FUEL RAILS AND INJECTOR POCKET MACHINING

Machining tools (purchase or rental) so you can machine your manifold and/or fuel rails. Fast and effective way to cut the complete detail in one operation.

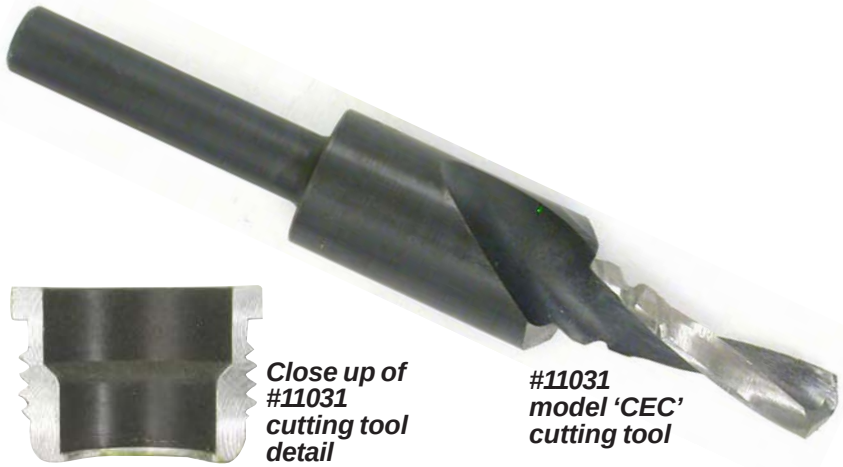
EFI INJECTOR DETAIL

11030	Model CEU. For EFI injector with captive o-ring on tip of outlet, boss inside diameter is straight-through design, to be used ONLY with fuel rails that have injector retaining clips or other suitable injector retention
11031	Model CEC. For EFI injector with captive o-ring on tip of outlet, inside diameter of boss will have an o-ring seat to stop injector body from contacting boss or manifold, select this tool when using extruded aluminum fuel rails without injector retainer clips
11032	Model CEB. For EFI injector using "bung" style seal for injectors with or without rail retainer clips
11033	Model CEP. For 'Pico' style EFI injector with captive o-ring on tip of outlet, inside diameter of boss will have an o-ring seat to stop injector body from contacting boss or manifold, select this tool when using extruded aluminum fuel rails without injector retainer clip
11045	Model CEV6. For 'EV6' style EFI injector with captive o-ring on tip of outlet, inside diameter of boss will have an o-ring seat to stop injector body from contacting boss or manifold, select this tool when using extruded aluminum fuel rails without injector retainer clip

INJECTOR DETAIL IN ALUMINUM RAIL

11001	One-step machining of o-ring style EFI injector detail into extruded aluminum fuel rail, for most Bosch, Rochester, Siemens, Lucas, and Nippondenso top feed injectors with .575" O.D. o-ring
11046	One-step machining of o-ring style EFI injector detail into extruded aluminum fuel rail, for most Keihin and Denso injectors with .432" O.D. o-ring

#11001



Close up of #11031 cutting tool detail

#11031 model 'CEC' cutting tool

Closeup of 8 AN + o-ring thread detail

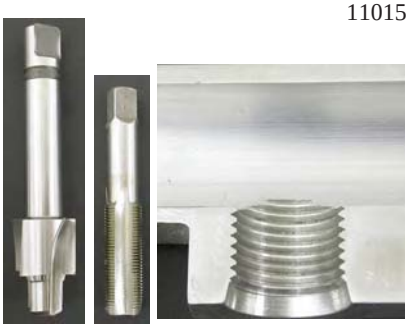
THREAD END OF ALUMINUM RAIL

11005	Counter bore cutter, machines 8 AN o-ring pocket, inlet/outlet of extruded aluminum fuel rail tube
11010	Tap, 8 AN (3/4-16 thread), inlet/outlet of extruded aluminum fuel rail tube
11003	Counter bore cutter, machines 12 AN o-ring pocket, inlet/outlet of extruded aluminum fuel rail tube
11015	Tap, 12 AN (1 1/16-12 thread), inlet/outlet of extruded aluminum fuel rail tube

RENTAL

Rental of special machining tools:
We send the tool(s) via UPS, Prepaid Credit Card or COD for the full purchase price. You may use the tool for 30 days maximum, at which time you may keep it or return it to us (in good shape); we will subtract the rental fee and refund or credit the difference. This only covers our handling costs and eventual resharpening; we are not really charging a rental fee. We appreciate your business and are glad to help you with your project.

11050	Rental of one machine tap: #11010, #11011, #11012, #11013, #11014
11051	Rental of special detail cutter: #11001, #11005, #11006, #11020, #11030, #11031, #11032, #11033, #11045, #11046



6 AN DETAIL IN ALUMINUM FUEL RAIL

Allows a 6 AN male + o-ring fitting or Kinsler #10355, #10357, or #10359 fuel cup extensions (see Page #141) to be screwed into fuel rail.

11006	Counter bore cutter, machines 6 AN o-ring pocket for injector extensions
11011	Tap, 6 AN (9/16-18 thread), thread pocket for injector extension for 6 AN fitting

PRESSURE TAP IN ALUMINUM RAIL

11012	Tap, 4 AN, (7/16-20 thread)
11013	Tap, 3 AN, (3/8-24 thread), thread pocket for PSI tap in extruded aluminum fuel rail tube

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SENSORS FOR EFI SYSTEMS

All sensors are not created equal! There are different types, styles, and quality. Similar models may have different resistance values or response times. Most ECU's must use specific sensors. A few select ECUs offer the ability to be programmed for operation with various sensors.

AIR TEMPERATURE SENSOR

An air temperature sensor is a thermistor which monitors air temperature via a change in resistance. This sensor should be mounted where the incoming air will pass across the sensor tip. This sensor, when installed in the intake manifold, may be referred to as a M.A.T. (Manifold Air Temperature) sensor.

10652	Air temperature sensor, GM style, 3/8" NPT, specially potted by Kinsler, .585" probe length, compatible with Accel/DFI, F.A.S.T./Speed-Pro, Haltech, Motec, and EFI Technology electronic systems
10653	Air temperature sensor, Lucas, 10mm x 1.25 with crush washer, specially potted by Kinsler, .400" probe length, compatible with Zytek, Motec, and EFI Technology electronic systems

Special potting consists of injecting a silicone specially designed for electronic applications around the wire leads of the thermistor for protection against vibration

#10652

#10653

COOLANT AND OIL TEMPERATURE SENSOR

A coolant or oil temperature sensor is a thermistor which monitors coolant or oil temperature via a change in resistance. This sensor should be installed in the cooling system where the coolant will pass across the sensor tip. Thermostat housing areas on water cooled engines usually provides a good location. Be sure to install the sensor on the engine side of the thermostat, so it will sense the temperature as the engine is warming up... since the ECU needs accurate readings to properly meter the fuel during warm up.

10650	Coolant temperature sensor, Bosch, 12mm x 1.5 with crush washer, .600" probe length, compatible with Zytek, Motec, and EFI Technology electronic systems
10651	Coolant or oil temperature sensor, GM style, 3/8" NPT, .500" probe length, compatible with Accel/DFI, F.A.S.T./Speed-Pro, Haltech, Motec, and EFI Technology electronic systems
10640	Coolant temperature sensor, GM style, 1/2-20 thread, .600" probe length, compatible with Accel/DFI, also used for Manifold Surface Temperature sensing with #10641 mount
10641	Housing, for Manifold Surface Temperature sensor #10640, blue anodized billet aluminum

#10651

#10650

#10641 with #10640 sensor installed

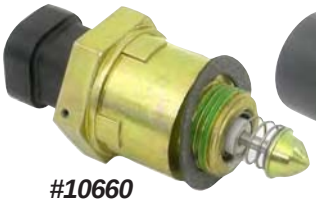
IDLE AIR CONTROL (I.A.C.) MOTOR

A computer controlled motor, of either step or screw design. The idle air motor bypasses air around the throttles to control engine idle RPM during warm-up or when the engine is under a load near idle, as when in gear with a torque converter. When the ECU senses that engine RPM is too low, the I.A.C. motor opens the bypass port allowing additional air flow to the engine.

10660	Idle Air Control (I.A.C.) Motor, GM style, 20mm x 1.5 thread, step design, uses square four pin connector #10407
10662	Remote I.A.C. housing, high flow design, 3/8" NPT inlet, accepts air filter #10663
10663	Air filter for #10662 remote I.A.C. high flow houisng, K&N
5198	Pre-filter for protection of #10663 filter, blue
10664	Sealed remote I.A.C. housing, (2) 8 AN female inlet ports and (1) 8 AN female outlet port, 1 1/2" hex size housing with (2) 1/4-20 threaded mounting holes, this remote I.A.C. housing was specially designed for use on engines equipped with centrifugal blowers or turbochargers where the controlled air passage must be sealed in the air stream at the throttle inlet to prevent boost leakage

#10663

#5198

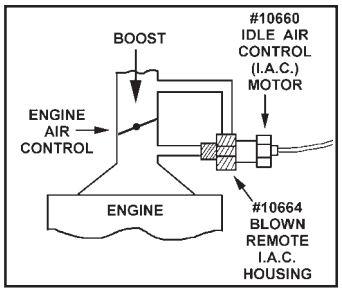


#10660

#10662

KNOCK SENSOR

Works like an electronic microphone, listening for sound (vibration) that represents spark knock or pre-ignition. The sensor produces an AC signal that increases with the intensity of detected knock. This allows the ECU to retard timing This sensor is NOT used on most racing and high performance engines because the engines generally produce too much mechanical noise knock sensor control circuits can be adjusted to ignore the engines mechanical sounds, however this reduces it's ability to accurately detect knock



#10664 with #10660

SENSORS FOR EFI SYSTEMS

MANIFOLD ABSOLUTE PRESSURE (M.A.P.) SENSOR

May be used either as a barometric sensor, (compensates for atmospheric pressure change), or a Manifold Absolute Pressure sensor, depending on how the engine management system is configured. This sensor may be remote mounted and connected to the wiring harness or it may be mounted inside the ECU and may require external plumbing. The ECU powers the MAP sensor via a fixed 5-volt supply, and the sensor sends a variable 0-5 volt signal back proportional to the absolute pressure. When used for manifold pressure/vacuum the unit is sensing relative engine load. A high vacuum (low absolute pressure reading) indicates to the ECU that the engine is experiencing less load, therefore requiring less fuel. As the absolute pressure reading increases, the ECU would increase the pulse time to the injectors, therefore suppling more fuel.

10654	MAP sensor, 1 Bar, GM, EFI Technology
10655	MAP sensor, 2 Bar, GM
10656	MAP sensor, 3 Bar, GM
10657	MAP sensor, 1 Bar, GM, Accel/DFI, F.A.S.T.
10658	MAP sensor, 5 Bar, F.A.S.T.

#10901 with quick release fittings installed

#10901 with barbed fittings installed

VACUUM SIGNAL JUNCTION BLOCK AND COMPONENTS

Vacuum signal junction block for collecting vacuum/boost signal on individual throttled runner manifolds. This junction block system is constructed with fittings and tubing to provide a good signal response while also minimizing excess air bleed which causes idle RPM control problems. See Page #135 for vacuum/boost reference kits and components.

SIGNAL DAMPER

The strong intake pulses on a tuned I.R. manifold along with a high performance or racing camshaft will create fluctuations in the signal sensed by the MAP sensor. The Kinsler signal damper will smooth out the signal pulsing. This is accomplished by flowing the signal across an orifice and into the accumulated volume within the damper.
Note: transient signal amplitude may be slightly reduced.

10905	Signal damper, 1.900" diameter x 4.250" long (NOT including fittings)

Note : 3/16” barbed fittings may be changed to 3AN male flare fittings.

#10905 - Signal Damper with 3/16" barbed fittings

Brandon Switzer’s NMRA PRO 5.0 Mustang, Fastest N_2O/EFI car

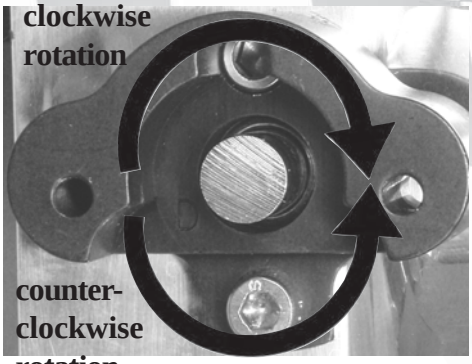
7.54 @ 189 MPH

Uses Kinsler High-flow 4-barrel throttle body and EFI system components

THROTTLE POSITION SENSORS (TPS) AND ACCESORIES

The TPS is a potentiometer actuated by a throttle shaft. The ECU supplies a constant 5 volts to the TPS which sends a 0-5 volt signal back, proportional to throttle opening. The ECU uses this signal to find the proper fuel rate in it's basic fuel map table, and/or for accel/decel fueling.

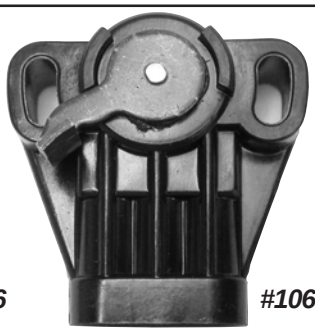
TPS rotation is determined while looking at the end of the throttle shaft



All Kinsler bolt-on TPS adapter bosses are .500" C-C upper mount hole to throttle shaft and .587" C-C lower mount hole to throttle shaft. All of our manifold ends are drilled and tapped with these two bolt holes.

GM STYLE SENSORS


#10686


#10685

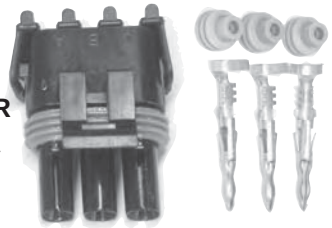

#7095


#7090

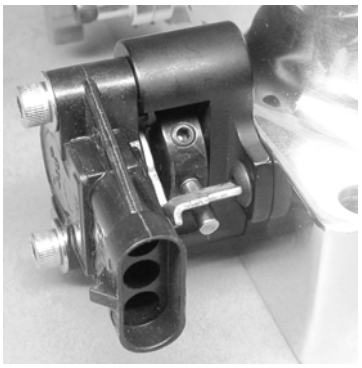

#7095 with #7090

10685	TPS, GM style, model 'D', adjustable, clockwise rotation
10686	TPS, GM style, model 'D', adjustable, counter-clockwise rotation
7095	Bolt-on TPS adapter boss, for GM style TPS
7090	Drive dog; for GM style TPS

CONNECTOR ASSEMBLY



10403	3 pin, flat, Weather Pack, to fit GM TPS


GM style TPS, adapter boss and drive dog installed on Kinsler four barrel throttle body


Example of LS1 style TPS


#7071


#7072


#7071 with #7072

7071	Bolt-on TPS adapter boss, for LS1 style TPS
7072	Drive dog, for LS1 style TPS

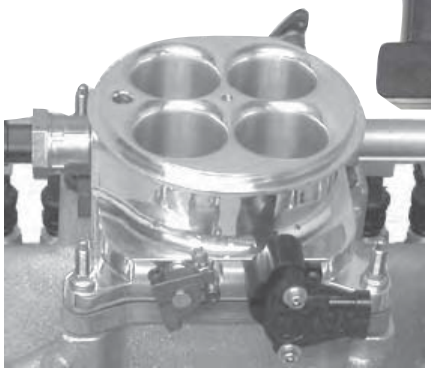
All Kinsler drive dogs are made for a 3/8" diameter shaft


#10689


#7097


#7077


#7097 with #7077


Kinsler 4-barrel throttle body with bolt-on TPS adapter and TPS


Kinsler Dragon Claw with bolt-on TPS adapter and TPS

10689	TPS, GM/CTS twin groove/tang style, counter-clockwise rotation
7097	Bolt-on TPS adapter boss, for #10689 TPS
7077	Drive dog, for #10689 TPS

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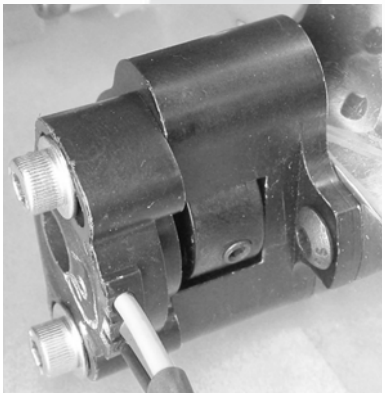
THROTTLE POSITION SENSORS (TPS) AND ACCESORIES - CONTINUED -

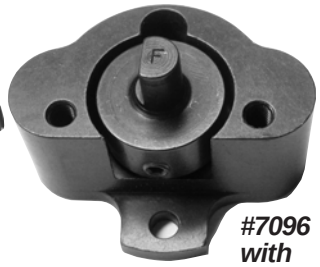


FORD STYLE SENSORS

#10684

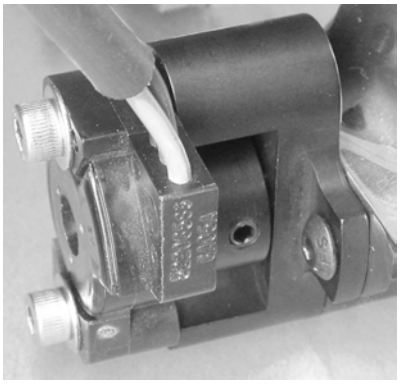
#7096

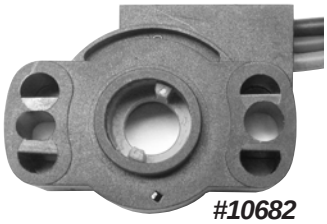
#7091



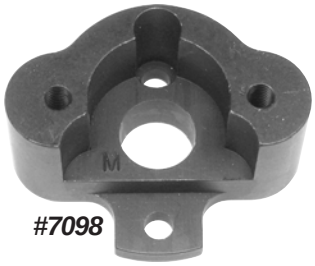
#7096 with #7091

10684	TPS; Ford style, model 'F', counter-clockwise rotation
7096	Bolt-on TPS adapter boss; for #10684 TPS
7091	Drive dog; for #10684 TPS



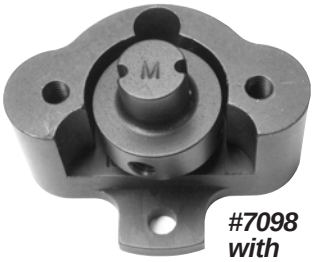


#10682



#7098

#7093



#7098 with #7093

10682	TPS; Ford style, model 'M', clockwise rotation
10683	TPS; Ford style, model 'M', counter-clockwise rotation
7098	Bolt-on TPS adapter boss; for #10682 & #10683 TPS
7093	Drive dog; for #10682 & #10683 TPS

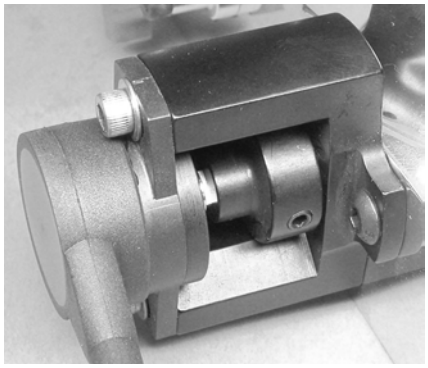
FORD 3-VALVE STYLE BOSS AND DRIVE

#7078

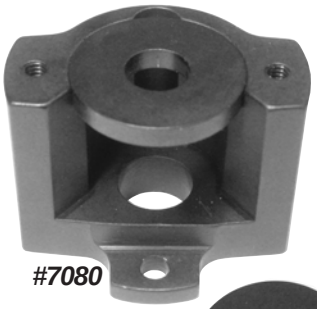
#7079

#7078 with #7079

7078	Bolt-on TPS adapter boss, for Ford 3-valve style TPS
7079	Drive dog, for Ford 3-valve style TPS



#7080 with #7081



#7080

#7081

NOVOTECHNIK SENSOR

Will run CW and CCW

#10690

10690	TPS; Novotechnik
7080	Bolt-on TPS adapter boss; for Novotechnik TPS
7081	Drive dog; for Novotechnik TPS

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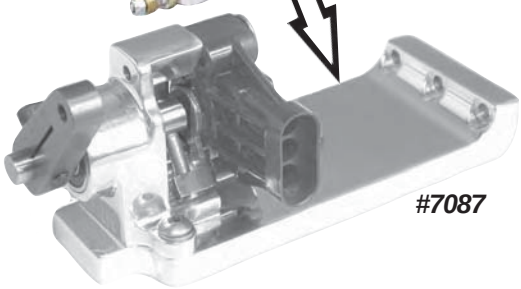
THROTTLE POSITION SENSORS AND ACCESORIES - CONTINUED -

Bugcatcher

Birdcatcher



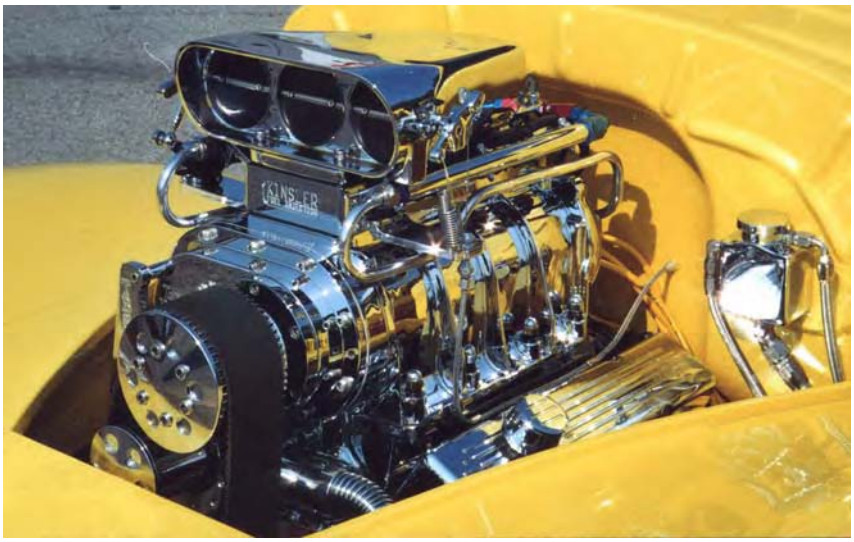
#7087

#7086

Remote TPS Mount

For Delco/CTS lever style TPS only. Excellent for adapting TPS when a shaft end is not accessible, or you want to drive the TPS at a different rate (by using different length throttle arms). 1.925" tall, two #10 mount holes (1.570" C-C). Billet aluminum housing with dual bearings for smooth operation. Weighs 0.3 lbs. Can be used to link T. P. S. to data acquisition system for use with EFI.

7086	For GM style T.P.S., with drive dog, shaft and ball bearings, polished or blue anodized (specify)
7087	For use with #7086 TPS, polished aluminum



Frank Yarasezski's blown EFI Willy's

Al Maynard's 1967 Camaro

Alf Stellan's blown EFI GTO

SENSORS FOR EFI SYSTEMS

EXHAUST GAS OXYGEN (EGO)

Installed in the exhaust system, this generates a low voltage signal (usually 0-5 volts) relative to the oxygen in the exhaust, which is proportional to the engine's instantaneous air-fuel ratio. This allows the ECU to adjust the fuel to maintain a proper air-fuel ratio.

#10673

#10435

HOW IT WORKS :

The inside and outside of the ceramic body of the sensor is coated with a thin layer of zirconium/ platinum which serve as electrodes. The inside surface is exposed to ambient air while the outside surface is exposed to exhaust gas. The difference in oxygen concentration between the exhaust gas and the ambient air results in a voltage differential between the two surfaces. This voltage serves as a measure of oxygen in the exhaust. The ceramic body of the sensor becomes conductive for oxygen ions starting at or above 572° Fahrenheit (300° Celsius). Sensor response time below this temperature is measured in seconds, while response time at the ideal temperature of 1112° Fahrenheit (600° C) is less than 50 milliseconds (ms). Some sensors have heater circuits to aid in quickly raising the sensor temperature to operating levels. Most production sensors operate only in a narrow band close to stoichiometric (14.7:1 air-fuel ratio). These sensors are used for fueling corrections when the engine is at light load.

Some special sensors, like part #10672, operate through a wide band of air-fuel ratios. Wide band sensors may respond much quicker, allowing fuel corrections to be safely performed on an engine operating at wide open throttle. Most aftermarket ECU's that can use this type of sensor will read air-fuel ratios from 10:1 through 17:1. Very special units can monitor air-fuel ratios from 6:1 through 60:1 either with a custom configured ECU or laboratory test equipment.

10671	Heated oxygen sensor, used on #11070/11065 Air/Fuel Ratio Meter, wired with 3-pin circular connector that plugs directly into Air/Fuel Ratio Meter harness
10672	Heated wide band oxygen sensor, Bosch LSM, 18mm x 1.5 thread, 4-wire, compatible with Haltech, Motec, late-model EFI Technology ECU's, and D.T.S. dynamometers
10673	Heated wide band oxygen sesnor, Bosch LSU, 18mm x 1.5 thread, 5-wire, 13" wire leads, UNLEADED FUEL ONLY
10435	Connector assembly, for #10673, male, with housing, pins, and cable seals

#10672

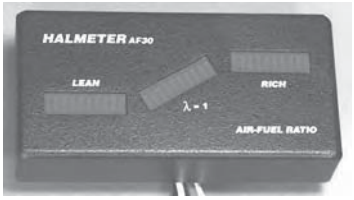
10675	Oxygen sensor bung, plug, and crush washer assembly, 304 stainless steel
10676	Bung, 18mm x 1.5 female thread, for oxygen sensor, 304 stainless steel
10677	Plug, 18mm x 1.5 male thread, 5/16" female hex, 304 stainless steel
10678	Crush washer, 18mm, copper

#10676 Bung has pilot for positioning in the exhaust tubing for welding

AIR FUEL RATIO METER

11070	Meter ONLY, Halmeter, 30 LED air/fuel ratio indicator, 3.920" length x 1.970" width x .830" depth
11065	Meter ONLY, BZ, 16 LED air/fuel ratio indicator, 4.025" length x 2.4" width x 1.0" depth
11071	Air Fuel Ratio kit, includes #11070 meter, #10671 oxygen sensor, weld-in bung, wiring harness, and instructions
11072	Air Fuel Ratio kit, includes #11070 meter, (2) #10671 oxygen sensors, (2) weld-in bungs, dual sensor wiring harness, and instructions
11073	Air Fuel Ratio kit, includes #11065 meter, #10671 oxygen sensor, weld-in bung, wiring harness, and instructions
11074	Air Fuel Ratio kit, Accel, includes NTK wide band oxygen sensor for leaded or unleaded fuel, 2 1/16" illuminated display gauge with harness, 10:1 to 20:1 air/fuel ratio range
11066	Wiring harness, for #11070 meter, single oxygen sensor
11068	Wiring harness, for #11070 meter, dual oxygen sensors

#11074 Accel/DFI wide band oxygen sensor kit with 2 1/16" illuminated display gauge and harness. NTK oxygen sensor for leaded or unleaded fuel with 10:1 to 20:1 air/fuel ratios



#11070

#11065

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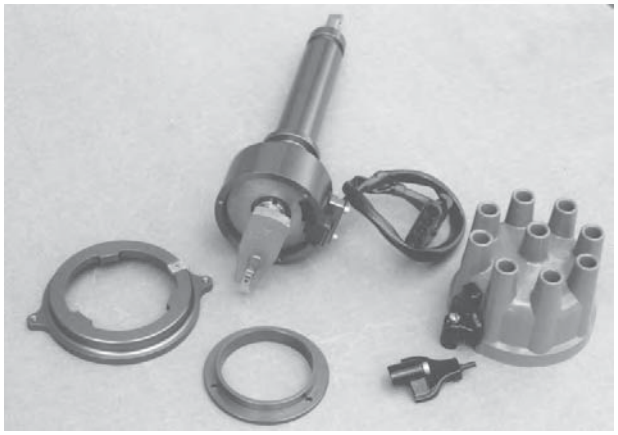
EFI SPEED AND SYNCHRONIZATION SIGNAL GENERATORS



FOR SMALL BLOCK FORD

FOR STANDARD CHEVROLET

T-TYPE SPEED/SYNC DISTRIBUTOR

Fits 10.2" tall deck Chev, billet aluminum Spacer required for standard deck height. Blue anodized; custom anodizing available. Has Kinsler speed/sync trigger wheel and dual Hall effect sensor #10630. Separate mounting plate for distributor cap allows the cap to be rotated for rotor phasing. Cap secured with Marine style hold-down clamps. We can build CUSTOM distributors for different makes of engines.

10636	Complete speed-sync distributor with spacer for standard deck Chev

ACCEL DUAL-SYNC DISTRIBUTORS

One distributor generates two signals: cam and crank for sequential fired fuel injected engines. All popular applications available. LED readout allows you to synchronize cyl. #1 with the hall effect pick-up in the distributor without expensive equipment. Large or small diameter cap with HEI type male tower design with screw-on wire retainer. Billet housing.

DUAL HALL EFFECT SENSOR

Detects the air gap in the rotating speed/sync wheel to supply triggering data to the ECU for reference of engine RPM and cam timing.

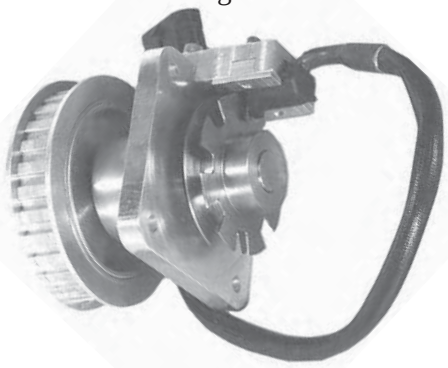
10630	Dual sensor, GM, with leads and 4-pin W-P connector

#10600

Front *Rear*

KINSLER'S SPEED/SYNC TRIGGER WHEELS

10600	Zytek V8 speed/sync for T-type distributor
10601	K-type V8 speed/sync, 5/8" bore
10602	EFI Technology V8 speed/sync for T-type distributor
10603	EFI Technology SPECIAL V12 speed/sync, .630 shaft bore



KINSLER'S UNIVERSAL BELT DRIVE SPEED/SYNC TRIGGER ASSEMBLY

10615	5/8" diameter shaft on dual sealed bearings. Uses trigger wheel #10601 and dual Hall sensor #10630. Billet aluminum assembly, weighs 2 1/4 lbs

HALL EFFECT SENSORS

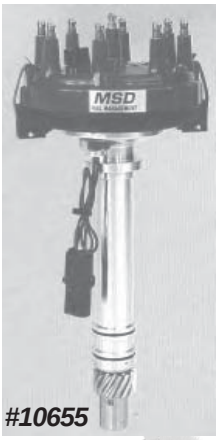
Detects the passing of a ferromagnetic material such as a gear tooth or bolt head near the sensing tip. Sensing is accomplished by the interruption of a magnetic field, providing non-contact speed sensing capability down close to zero-speed. Units have stainless steel housing with 3/8-24 thread. Maximum sink current: 25mA and 10,000 Hz frequency response.

10631	Colletor version with 4.7K pull up
10632	Open collector version (ECU must have internal pull up circut)

LOW PROFILE MSD™ BILLET ALUMINUM EFI DISTRIBUTORS FOR CHEV V8 ENGINES

For magnetic triggered EFI systems ONLY !!!

10655	Injection sync. signal ONLY!!! Must use crankshaft or flywheel trigger system. Fits standard deck height



#10655

™ a division of Autotronic Controls Corporation

EFI CONNECTORS, RELAYS, AND ACCESSORIES

#10401 #10402 #10403 #10404 #10406

#10407 #10405 #10408 #10409

CONNECTORS

Weather Pack (W-P) assemblies include male tower, female shroud, mating terminal pins, and seals.

10401	1-Pin Weather Pack connector assembly
10402	2-Pin Weather Pack connector assembly, tower/shroud are black
10467	2-Pin flat Weather Pack connector, tower/shroud are grey, fits F.A.S.T. and Accel Gen. VII trigger leads
10403	3-Pin flat Weather Pack connector assembly
10404	4-Pin flat Weather Pack connector assembly
10405	5-Pin round Weather Pack connector assembly
10406	6-Pin flat Weather Pack connector assembly
10407	4-Pin square Weather Pack connector assembly, fits GM idle air control motor #10660
10438	4-Pin flat Metri-Pack connector assembly, fits LT1 GM idle air control motors
10439	3-Pin round Metri-Pack connector assembly, fits LT1 GM throttle position sensors
10408	GM coolant temperature sensor connector assembly
10409	GM air temperature sensor connector assembly, grey
10410	GM M.A.P. sensor connector assembly, blue, fits sensor #10654
10411	GM M.A.P. sensor connector assembly, orange, fits most 2 and 3 Bar M.A.P. sensors
10412	GM M.A.P. sensor connector assembly, green, fits sensor #10657, Accel/DFI
10413	1-Pin male tower assembly, for GM knock sensor

#10473 #10438 #10415 #10439 #10468

#10434 #10459

METRI-PACK CONNECTORS

10415	Metri-Pack fuse holder, with sealed connector assembly
10434	10-Pin connector assembly, fits F.A.S.T. or Accel Gen VII+ injector harness, includes: tower and shroud, male and female terminals, cable seals
10438	4-Pin connector assembly, fits GM model LT1 idle air control motor
10439	3-Pin connector, fits GM model LT1 throttle position sensor
10459	8-Pin connector assembly, fits Accel Gen VII+ ignition adapter harness, includes: tower and shroud with backshell lock, male and female terminals, cable seals
10468	4-Pin connector assembly, fits GM model LS1 coils
10473	3-Pin connector assembly, fits F.A.S.T. communication cable

#10414 #10420 #10421 #10460 #10464 #10469

EFI INJECTOR CONNECTORS

10414	Injector connector assembly, quick release type, includes: housing, female terminals, and boot
10420	Injector connector assembly, quick release type, includes: houisng, female terminals, and boot (#10462)
10421	Injector connector assembly, push-on type, includes: housing, female terminals, and boot (#10462)
10460	90 degree injector connector assembly, snaps onto 'Style 5' injectors in catalog, includes: housing and female terminals
10462	Rubber backshell boot, fits #10420 and #10421 connectors
10464	Injector connector assembly; Delphi OEM type, includes: female terminals and cable seals
10469	Injector connector assembly, Bosch late model, includes: housing, female terminals and cable seals

#10436

#10431 #10432

10431	Mil-Spec 3-pin female connector, gold plated pins and molded backshell boot, commonly used on EFI-Technology wiring harness, flange for panel or bulkhead mounting
10432	Mil-Spec 3-pin male connector, gold plated pins and molded backshell boot, commonly used on EFI-Technology wiring harness
10434	Connector assembly, 10-pin, as used on FP/Speed Pro injector harness, includes tower, shroud, pins and cable seals
10436	30-pin connector housing, ECU connector for F.A.S.T. or Accel Gen. VII , two pcs. required, specify A-K or L-Y pin designations
10437	Terminal pins, for #10436 connector, pack of 30
10475	12-pin connector assembly, for Ford EDIS module, terminal pins included

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EFI CONNECTORS, RELAYS, AND ACCESSORIES


#10423


#10427


#10425

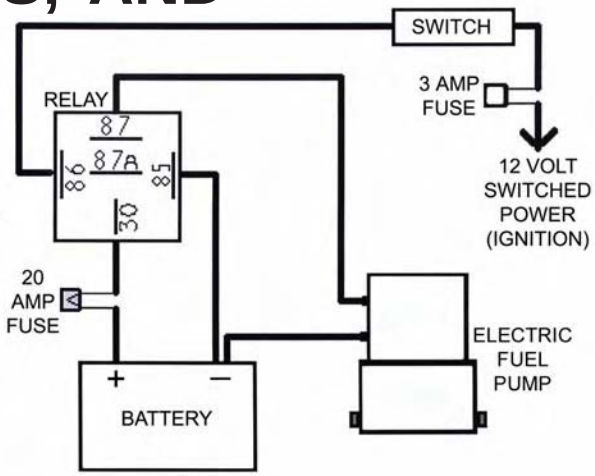

#10424


#10428


#10426 socket


#10429

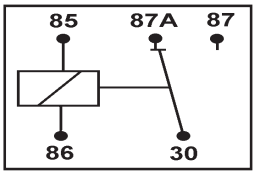
(87A TERMINAL NOT USED)



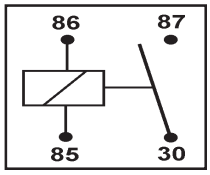
Preferred relay wiring diagram

RELAYS

10423	Relay, 30 amp, plug in type, current re-route (Single Pole Double Throw) use #10427 socket
10424	Relay, 20 amp, plug in type, current re-route (SPDT)
10425	Relay, 30 amp, plug in type, metal housing, current connect (SPDT) use #10427 socket
10426	Relay, 30 amp, with Weather Pack connector assembly, current re-route
10427	Socket assembly, for relays #10423 and #10425, locking feature
10428	Socket assembly, for relay #10424, add-on locking feature
10429	Mounting tab, for #10426 relay



CURRENT REROUTE



CURRENT CONNECT

#10430

BALLAST RESISTOR

10430	Lucas model '2PR', current control for using (8) low impedance (2-3.5 ohm) injectors on ECU equipped with saturation drivers or limited drive stages, with mating connector and pins


#10418


#10419

TOOLS AND ACCESSORIES

10400	Extraction tool, Weather Pack connectors, yellow handle, female tube
10465	Extraction tool, Micro-Pack connectors, red handle, .042" x .071" blade
10466	Extraction tool, Metri-Pack connectors, green handle, spring steel tapered blade
10417	Pin extraction tool, Blue Point, green
10416	Crimping tool, Weather Pack connectors, crimps wire to terminal, 14-20 AWG terminals
10530	Crimping tool, Sealed Weather Pack pin and sleeve, core and insulation, 14-20 AWG
10531	Crimping tool, Unsealed Micro-Pack 100, female only, core and insulation, 14-22 AWG
10532	Crimping tool, Sealed Metri-Pack 150 & 280, core and insulation, 14-20 AWG
10418	Tweek Contact Enhancer, brush-on applicator, 7 ml bottle
10419	Corrosion preventitive grease, for electrical contacts


#10530


#10466


#10400

WIRE

Temperature range of -76^{0}F to +392^{0}F, 600 volts.


#10440


#10441

10440	Shielded wire, one 18 AWG lead inside of braided shield, white teflon jacket, sold per foot
10441	Shielded wire, two 18 AWG lead inside of braided shield, white teflon jacket, sold per foot

HEAT SHRINK TUBING

Heat Shrink Tubing is in 4-foot long sections and black. Select appropriate diameter tubing for wire gauge, cut tubing to length desired, slide over wire before terminating, position over connection, use radiant heat gun to shrink tubing tight to wire. Do not use open flame to heat tubing.

10442	Heat shrink tubing, 1/8" inside diameter
10443	Heat shrink tubing, 3/16" inside diameter
10444	Heat shrink tubing, 1/4" inside diameter
10445	Heat shrink tubing, 3/8" inside diameter
10446	Heat shrink tubing, 1/2" inside diameter
10447	Heat shrink tubing, 3/4" inside diameter
10448	Heat shrink tubing, 1" inside diameter
10449	Heat shrink tubing, 1 1/2" inside diameter

EXPANDABLE SLEEVE AND TY-RAP CABLE TIES

10450	Expandable sleeve, 1/8" to 7/16" range size, polyester, 10 foot length
10451	Expandable sleeve, 1/4" to 3/4" range size, polyester, 10 foot length
10452	Expandable sleeve, 1/2" to 1 1/4" range size, polyester, 10 foot length
10453	Ty-Rap cable ties, 3 5/8" long, 3/4" max. bundle dia., translucent, 100 pcs.
10454	Ty-Rap cable ties, 5 1/2" long, 1 1/4" max. bundle dia., translucent, 100 pcs.

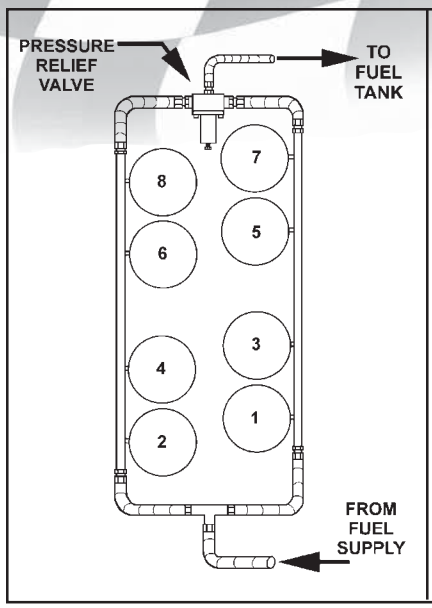
EFI PLUMBING

FUEL RAIL BASICS

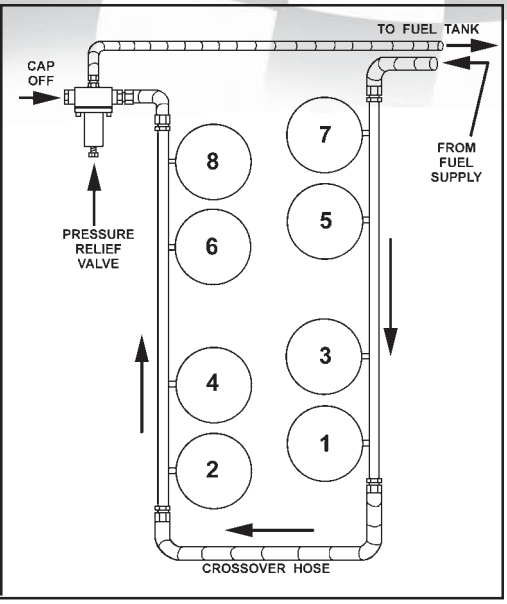
We recommend that EFI injectors be plumbed using fuel rails, rather than individual hoses. The instantaneous opening and closing of the injectors causes large pressure pulses in the system. This pulsing can be dampened by common fuel plenums (rails), a high quality pressure relief valve, and/or a specially designed damper (see Page #143). Pressure spikes can cause poor fuel distribution and in severe cases lean conditions which can damage the engine.

Two types of fuel rail material :
1) Aluminum - low cost and easy to machine.
2) Stainless steel - for use with alcohol and nitro.

See EFI FUEL RAILS on Pages #141-143 and TOOLING TO MACHINE FUEL RAILS AND INJECTOR MOUNTING on Page #144.



PARALLEL PLUMBING
Fig. 1



SERIES PLUMBING
Fig. 2

TYPES OF FUEL RAIL PLUMBING

PARALLEL :

Parallel plumbing is done by teeing the feed hose from the pump into both fuel rails, then connecting the two outlets to the pressure relief valve, see Fig 1. This gives twice the flow capacity of series plumbing. It also reduces the fuel velocity in the rail when compared to series plumbing. If the fuel velocity is too high it may cause flow disturbance in the fuel rails. A parallel configuration is recommended to achieve the best cylinder to cylinder distribution.

SERIES :

Series plumbing is done by feeding fuel into one rail, then out to the other rail, then to the pressure relief valve, see Fig. 2. This configuration has inherent fuel supply problems for the last cylinders in the series. This is most apparent on a Group Fire type of EFI system since the injectors are fired in groups of 4 or 8 (on a V8 engine) causing a high demand in an instantaneous period of time. This plumbing method is *NOT recommended on high horsepower engines*.

SYSTEM PRESSURE

We prefer to operate our EFI systems at about 70 PSI rather than the typical 45 PSI, as we find slightly better power and economy and less sensitivity to pressure fluctuations. A 1 PSI fluctuation affects a 45 PSI system more than a 70 PSI system: see ORIFICE THEORY on Pages #202-203. Sometimes system cost prohibts running the higher pressures.

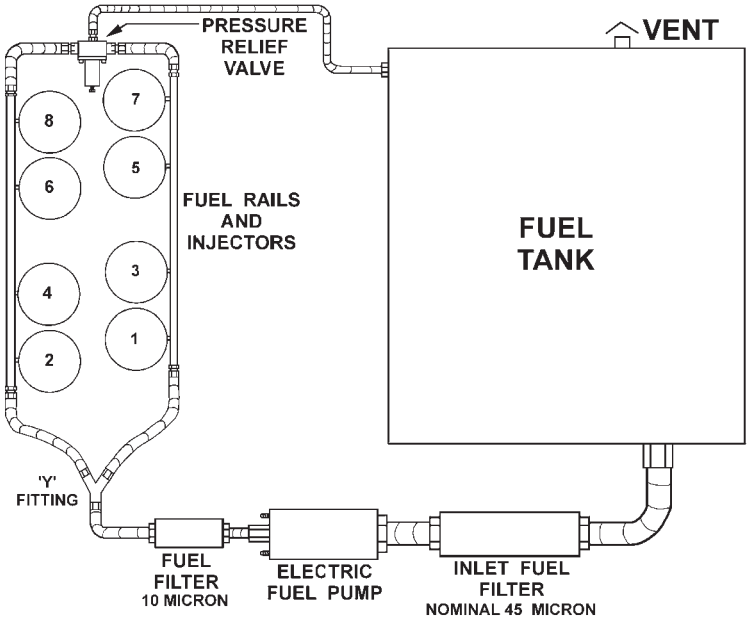
Fuel pressure reading should be taken as close as possible to the center of the fuel rail. This provides an average pressure reading. If the pressure gauge is installed before filters, tees, etc., the pressure gauge will read higher pressure than there really is in the rails, due to the pressure drop across these components.

FILTRATION

Pleated 10-micron paper filter elements (see FUEL FILTERS on Pages #162-166) in this system are very fine, so they do an excellent job of cleaning the fuel, but this means they plug up quickly. Replace them after about every twenty hours of racing when operating on gasoline or every race event when using methanol. It is an excellent idea to use one of our large 45 micron filters to filter the fuel when filling the main tank. This will greatly extend the life of the elements in the system. Be extremely careful to keep water out of the tank as it swells the paper elements shut.

VACUUM/BOOST REFERENCE

The pressure relief valve should be referenced to vacuum and/or boost. This will help offset the manifold absolute pressure on the outlet of the injector to maintain a constant injector flow rate (see EFI PRESSURE RELIEF VALVES AND ACCESSORIES on Pages #134-135, Fig. 2).



PLUMBING OF EFI SYSTEM WITH ELECTRIC FUEL PUMP ONLY

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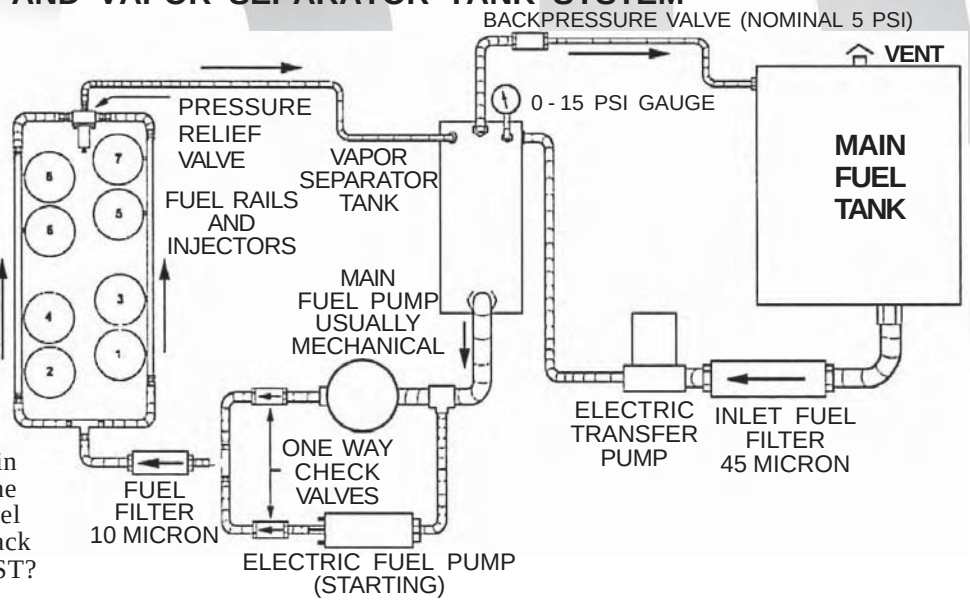
EFI PLUMBING - CONTINUED -

WITH MECHANICAL FUEL PUMP AND VAPOR SEPARATOR TANK SYSTEM

This schematic is **FOR EFI ONLY,** for constant flow see Page #116.

It is important to read the notes on the constant flow plumbing schematic no matter what type of fuel system is being used.

See Page #154 for FUEL RAIL and PRESSURE RELIEF VALVE PLUMBING.



NOTES :

The plumbing schematic would be simpler if we eliminated the Vapor Separator Tank (VST) by drawing out of the bottom of the main tank through the 45 micron filter directly to the inlet of the electric starting and mechanical fuel pumps, then plumb the pressure relief valve back to the top of the main tank. So why use the VST?

VAPOR SEPARATOR TANKS; PAGES #115-118

1) Gasoline is a mixture of many types of hydrocarbons, some of which boil off at just above room temperature. It is common for some boiling to occur inside a warm fuel tank and fuel lines. The vapor bubbles produced won't become liquid again when the main pump pressurizes the fuel... they will become smaller, but they will still be there. When these reach the injectors they cause an erratic lean condition.

The VST has a special baffle system to separate out the vapor coming into it from both the main tank and the pressure relief valve. This vapor is collected in a chamber that is connected to the top center fitting on the tank, where it passes out to the main tank via the backpressure valve. This insures that the final supply pump(s) will receive vapor free fuel.

Vapor Separator Tank MAXIMUM PRESSURE IS 15 PSI

2) This system has two "flow loops" :

A - The fuel from the main tank flows through the 45 micron filter into the transfer pump, which pushes it into the VST If the engine isn't running, all of this fuel passes out through the top center fitting and back to the top of the main tank via the "backpressure" valve. This valve is set at about five PSI on EFI systems to keep the VST pressurized, both to prevent boiling in the VST and cavitation of the main fuel pump, which would produce vapor.

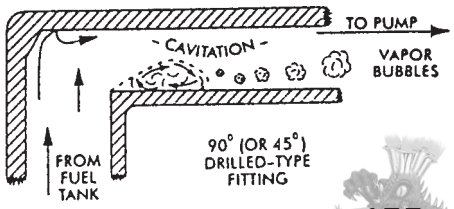
B - To start the engine, turn "on" the electric transfer pump. Leave the transfer pump "on" whenever the engine is running. After the fuel pressure in the VST comes up to about 5 PSI, turn "on" the electric starting pump. Fuel will flow to the 10 micron filter, while the check valve on the outlet of the mechanical fuel pump prevents fuel from passing back through the clearances of the pump gears. All of the fuel is routed through the fuel rail, to purge out any vapor bubble that formed in it and the hoses during the “hot soak” since the last time the engine was shut off.

Once the engine is running, the mechanical pump is adequate to run the engine. Turn “off” the electric start-up pump. The check valve on it’s outlet prevents the high pressure fuel from back flowing through it.

3) An excellent feature of the VST is that it allows you to use all the fuel from the main tank with no lean conditions. As the main tank runs low, the fuel will slosh away from the pickup, letting air go through the transfer pump and into the VST where it is separated out. The 15 PSI gauge will drop close to zero under this condition, but you can still run for the pits at wide open throttle. As soon as the main system pressure drops you must stop running at wide open throttle or engine damage will occur.

4) A mechanical pump is preferred to do the main system pressure work as it is more reliable than any electric pump and reduces the overall system’s current draw. Current draw on an average electric pump can range from about 8-10 amps for a small block naturally aspirated V8 gasoline system, up to 60 amps for a large turbocharged system. When engine RPM increases, the demand for fuel volume increases. When the engine RPM decreases, the fuel demand decreases. The mechanical pump output increases/decreases with RPM, thus following the engine requirement. An electric fuel pump provides a constant volume of fuel, even if there are changes in engine RPM, throttle angle, and load. This volume is not needed at idle and light load conditions, causing the pressure relief valve to work harder to maintain the proper fuel pressure (see PRESSURE RELIEF VALVES on Pages #133-136). On an EFI system, the mechanical pump isn’t used to sense engine speed, as it is on a constant flow system.

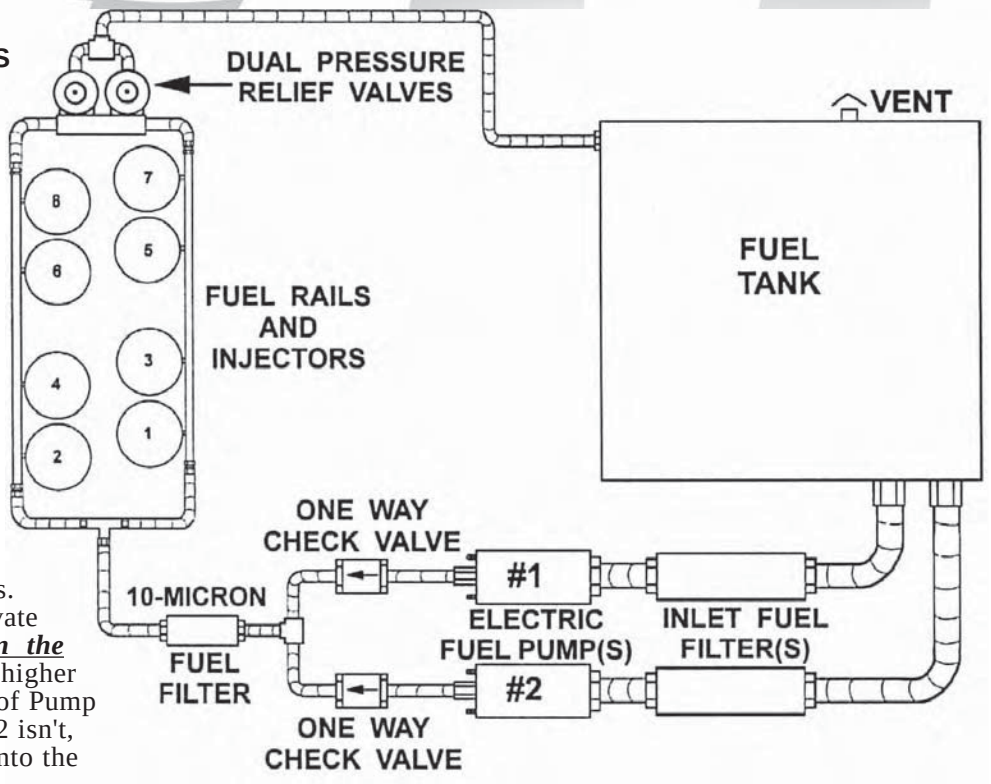
5) Never use a "cross drilled block of metal" type angle fitting on any pump inlet hose... where the drills intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses, as in the above schematic. If there is a really tight place, use a bent tube type fitting.



EFI PLUMBING - CONTINUED -

WITH TWO ELECTRIC FUEL PUMPS AND TWO PRESSURE RELIEF VALVES

> ***NOTE:***
> ***Check out your electrical system to be sure it will support the ampere draw of two pumps, EFI management system, ignition, radio, cooling fan(s), etc.***



PLUMBING TWO ELECTRIC PUMPS

Should the fuel demand require two pumps, it is best to plumb them using this schematic. Pump #1 will start and run the engine under light load conditions. You can wire in a separate switch to activate each pump -- ***But Don't Forget to Turn the Second Pump 'ON'*** when operating at higher demands. The check valve on the outlet of Pump #2 is so when Pump #1 is running and #2 isn't, fuel will not flow back through #2 and into the fuel tank.

BACKUP PUMP: If you are installing a second fuel pump as an auxiliary, you will need to install a check valve on the outlet of both fuel pumps, so no matter which pump is 'ON' it will not backflow through the other.

PUMP INTERNAL CHECK VALVES : some pumps have an internal check valve/ball. We have experienced some internal check valve "sticking" on systems operating in excess of 50 PSI. It may be necessary to remove the internal check valve and install an external valve that can handle the pressure loads without sticking. See CHECK VALVES on Page #189.

PLUMBING TWO PRESSURE RELIEF VALVES

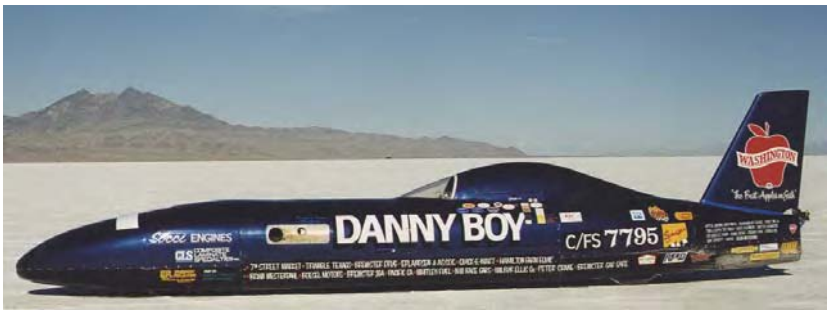
We recommend installing two pressure relief valves on any system utilizing an electric pump(s) where the pump output exceeds approximately 1000 lbs/hr. Using two pressure relief valves allows additional volume to be dumped off, to maintain good pressure regulation. If only one pressure relief valve were installed, there would be excessive pressure rise in the system at low fuel demand conditions.

MECHANICAL INJECTION PUMP WITH ELECTRIC "STARTING" FUEL PUMP SYSTEM

This provides a large volume at high rail pressure for higher horsepower applications and alternate fuels, such as methanol, ethanol, and nitro combinations. It eliminates the high current draw associated with large or multiple electric pump installations. A mechanical pump replaces electric pump #2 in the above schematic. The electric pump is used to start the engine. Once the engine is at sufficient RPM, the mechanical pump will supply all the fuel and the electric pump can be shut off.

Danny Boy's Records

C.I.D			
371	FIA	Flying Mile	340.394 MPH
371	FIA	Flying K	547.250 KPH
371	C/FS	Flying Mile	332.921 MPH
292	D/BGS	Flying Mile	315.489 MPH
256	E/BGS	Flying Mile	290.007 MPH
371	Bonneville	Flying Mile	340.394 MPH



Danny Boy Land Speed Streamliner owned by Richard Thomason and Ed Tradup. Powered by a small block Chevrolet V8 with Kinsler 3-piece Dart/Buick manifold equipped with F.A.S.T. EFI system

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EFI SYSTEMS

WE CAN SUPPLY A MANIFOLD WITH EFI OR MODIFY YOUR MANIFOLD FOR EFI INJECTORS. DO-IT-YOURSELF COMPONENTS AND TOOLING AVAILABLE.

KINSLER CHEVROLET SMALL BLOCK V8

Kinsler 3-piece intake manifold with extruded aluminum fuel rails, F.A.S.T. XFI sequential ECU, sensors (air and water temp., TPS, MAP, and wide band O2). Kinsler #8312-045 pump inlet filter with 45-micron stainless steel mesh element. Kinsler #8310-010 fuel filter with 10-micron replaceable paper element. Weldon electric fuel pump. Kinsler #12104 adjustable pressure relief valve model K-140, and Bosch injectors.

NOTE : We offer individual runner intake manifolds for most engine brands and models.... call us.

KINSLER FOUR BARREL THROTTLE BODY

Kinsler High-Flow series (4500 style) billet aluminum four barrel throttle body (2.0" throttle size, 1600 CFM, with progressive throttle linkage) installed on a Kinsler modified Dart Big block Chev manifold, with Kinsler fuel rails. [*Can also be installed on a tunnel-ram manifold with one or two throttle bodies*]. Accel/DFI Gen. VII sequential ECU, OEM style injector harness, sensors (air, water, and manifold surface temp., TPS, MAP, and wide band O2). Kinsler #8312-045 pump inlet filter with 45-micron stainless steel mesh element. Kinsler #8170 fuel filter with replaceable 10 micron paper element, #10211 fuel pump, Weldon #10747 adjustable pressure relief valve, and Lucas disc style injectors.

NOTE : We also offer Standard series four barrel (4150 style) throttle bodies, see Page #43.

KINSLER MODULAR THROTTLE BODIES

Modular throttle bodies configured for a Suzuki GSXR-1100 air cooled in-line 4-cylinder engine with fuel rail, AEM EMS sequential ECU, sensors (air and water temp., TPS, MAP, and wide band O2). Kinsler #8309-025 pump inlet filter with 25-micron stainless steel mesh element. Kinsler #8170 fuel filter with replaceable 10 micron paper element, Walbro #22022 fuel pump, Kinsler #12104 adjustable pressure relief valve model K-140, and Bosch pintle style injectors.

NOTE : Our modular throttle bodies can be configured for any number of cylinders and different bore centers. Offered in many throttle sizes and base details for boot or flange style mounting. These bodies allow great design flexibility. (See Page #48)

SERVICE AND MODIFICATION OF OTHER BRANDS

-- FOR NEW OR USED CUSTOMER INJECTION SYSTEMS --

We began as a company that serviced, repaired, and upgraded other brands of injection systems and components. As time passed we started to manufacture more and more manifolds and components, but we still service and sell all the other brands. This continues to give us a unique understanding of the different types of injection systems and their limitations, so that we can do an excellent job of upgrading them.

You don't have to own a Kinsler unit to get HELP from us!

Please <u>call</u> us rather than writing... we get a much better exchange of information by phone.

CONSTANT FLOW FUEL METERING

- ♦ - flow test and rebuild fuel pump
- ♦ - qualify and test barrel valve and spool for part throttle distribution and fueling
- ♦ - custom grind barrel valve spool for customer's application
- ♦ - correct linkage geometry
- ♦ - flowcheck nozzles for distribution and size
- ♦ - flowtest and calibrate complete injection system
- ♦ - flow and pressure check bypass valves for pressure setting
- ♦ - install additional bypass valves for more precise fuel system tuning
- ♦ - service and repair of bypass valves

MANIFOLDS AND THROTTLE BODIES

- ♦ - replace worn linkage hardware
- ♦ - install new throttle plates
- ♦ - replace worn throttle shafts
- ♦ - install bronze throttle shaft bushings
- ♦ - remove and replace broken bolts
- ♦ - rebore throttle area
- ♦ - install bosses for nozzles or EFI injectors
- ♦ - install TPS boss with drive coupler
- ♦ - install vacuum reference system
- ♦ - machine manifold for cylinder head port profile and blend runners
- ♦ - 'show-quality' polish manifold (aluminum only)
- ♦ - polish and anodize ramtubes (aluminum only)
- ♦ - machine throttle shaft(s) for increased air flow

ELECTRONIC FUEL INJECTION (EFI)

- ♦ - flow test electric fuel pump(s)
- ♦ - flow and check customer injectors for proper distribution and flow capacity
- ♦ - backflush injectors and clean
- ♦ - flow and check fuel rail for distribution problems
- ♦ - run complete management system on flow bench to check and evaluate fuel system maps
- ♦ - check wiring harness for proper function
- ♦ - check sensors for proper operation and resistance
- ♦ - flow and test pressure relief valve for desired pressure setting and operation.

LUCAS MECHANICAL TIMED METERING

- ♦ - flowtest and rebuild electric and mechanical fuel pumps
- ♦ - flow and check customer's nozzles for proper spray pattern and operation pressure
- ♦ - rebuild nozzles
- ♦ - flowtest and calibrate complete injection system
- ♦ - grind metering unit shuttles to improve fuel distribution
- ♦ - flow test and rebuild pressure relief valve
- ♦ - replace worn or damaged nozzle hoses
- ♦ - replate banjo bolts and hose ends
- ♦ - machine metering unit tower for clearance for fuel cam
- ♦ - custom make fuel cam
- ♦ - install Kinsler solid roller lifter
- ♦ - replace banjo bolt o-rings and bung seals
- ♦ - complete rebuild of rotor and sleeve assembly

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CONVERSION OF CARBURETOR MANIFOLDS INTO FUEL INJECTION

WE CAN CONVERT YOUR EXISTING MANIFOLD OR A NEW ONE INTO A FUEL INJECTION UNIT.

Converting a carburetor manifold for port fuel injection can be accomplished several different ways. Manifold availability, desired results, and the cost effectiveness will help determine the approach to the project.

Fuel injection is the combination of an air control device and a fuel control system. These two controls need to be thought of as two separate things, joined together to perform a task:

Fuel Control - is done by constant flow metering, electronic engine management (EFI), or Lucas mechanical metering. Any of these types of fuel control can be combined with any type of air control, it is just a matter of which is best for the application.

Air Control - is achieved by some configuration of a throttle plate style unit(s). It can be a Enderle Birdcatcher blower hat, one or two Kinsler 4-barrel throttle bodies, a large single throttle plate unit, an old carburetor body, or any other suitable air control device.

Constant flow metering with Enderle Bugcatcher blower hat installed on tunnel ram manifold

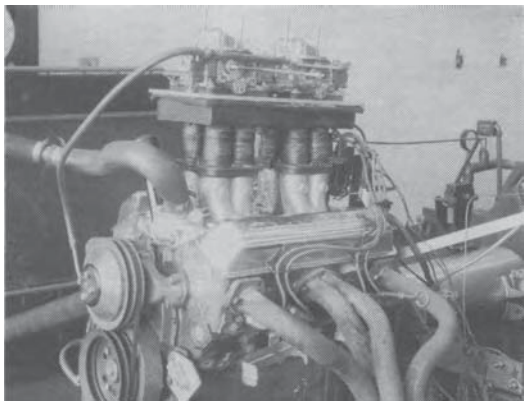
INSTALLATION OF A BLOWER HAT ONTO A TUNNEL RAM MANIFOLD

Certain tunnel ram manifolds (listed below), feature a top which will allow a blower hat with the 6-71 bolt pattern/opening to bolt direct onto the manifold. Most fabricated sheet aluminum tunnel rams are made to accept a bolt-on flat plate. We can machine an adapter plate to accept a blower hat. Some cast manifold conversions require welding in between the two carburetor pads then machining the top of the adapter to accept the blower hat.

16910	Adapter to mount 6-71 bolt pattern hat to Edelbrock big block Chevrolet Victor-Ram tunnel ram manifold #7075, includes bolts
16920	Adapter to mount 6-71 bolt pattern hat to Edelbrock small block Chevrolet Victor-Ram tunnel ram manifold #7070, includes bolts
16930	Adapter to mount 6-71 bolt pattern hat to Weiand Super Pro Hi-Ram for Chevrolet big block #5996 or Ford big block #5999
16932	Adapter to mount 6-71 bolt pattern hat to Dart cast aluminum tunnel ram

Two Kinsler billet High-Flow series 4-barrel throttle bodies on sheet aluminum tunnel ram manifold with constant flow

WHERE DID THOSE TUNNEL RAM MANIFOLDS START OUT IN THE FIRST PLACE ?



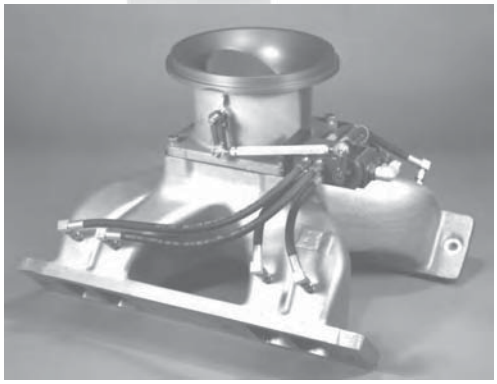
This was one of the forerunners. This dyno development setup consisted of a Kinsler small block Chevrolet fuel injection manifold with steel runner extensions and plenum, with two Holley four barrel carburetors.

The year... 1966. The data was very good; it went right out to one of the major carburetor manifold manufacturers.

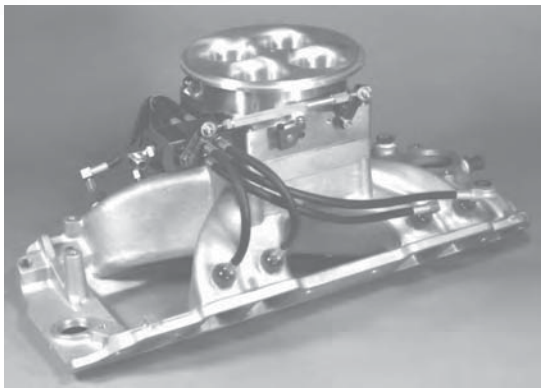
CONVERSION OF CARBURETOR MANIFOLDS INTO FUEL INJECTION

INSTALLATION OF CONSTANT FLOW FUEL INJECTION

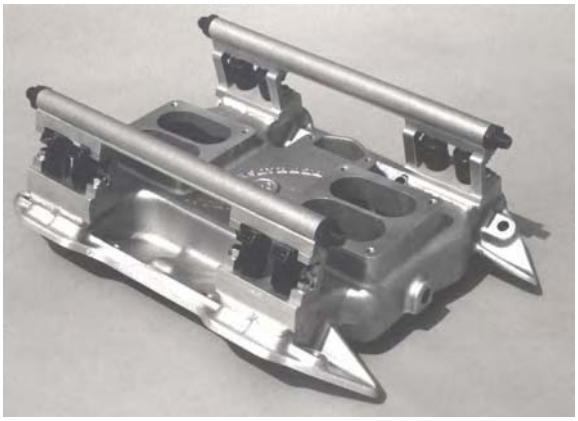
Constant flow fuel metering - typically the nozzle has a 1/8" NPT thread. Most cast aluminum manifolds have runner walls thick enough that they can just be drilled and tapped for this size. However, most fabricated sheet aluminum manifold have runner walls too thin to be drilled and tapped. Provided there is no epoxy in the runners, a boss can be welded into place, then drilled and tapped.



Mono valve throttle body with constant flow fuel metering



Kinsler High-Flow series 4-barrel throttle body with constant fuel fuel metering



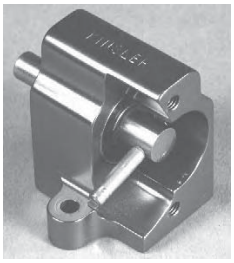
EFI injectors and fuel rails installed on dual 4-barrel manifold for big block Mopar

INSTALLATION OF EFI INJECTORS BOSSES ONTO A MANIFOLD

Most manifolds do not have runner walls thick enough for injector mounting. A boss must be "welded" or "bolted on" and then machined for the injectors. Should you wish to do this yourself, we offer all the components and even the tooling (see Page #144 - TOOLING TO MACHINE FUEL RAILS AND INJECTOR MOUNTING).

VINTAGE HILBORN HEMI MANIFOLD CONVERTED FOR EFI

Converts Hilborn 2 7/16" manifold (model: 426-C-8A) to electronic fuel injection. Billet aluminum plates bolt to existing ramtube 2-bolt pattern, accepts our combination billet aluminum EFI injector holder and ramtube adapter. The holders can be installed with the injector towards the center of the engine or out by the valve covers. Holders accept our extruded aluminum or stainless steel fuel rails. Allows the use of 2 3/8" inside diameter aluminum ramtubes which have a nominal outside diameter of 2.490".



Throttle position sensor is mounted on the previous barrel valve mounting pad in the center of the manifold using #7086 remote TPS mount (see Page #149). The remote TPS mount will be connected to the throttle shaft using a hex link bar.

Ron Martin's '65 Hemi Cornett with with EFI conversion and F.A.S.T electronics, seen in an issue of Mopar Collector's Guide

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KINSLER INJECTOR/NOZZLE BOSSES

#4804 #4806 #4808 #4812 #4815 #4822

Closeup of #4806

KINSLER UNIVERSAL BOSS INSERTS

Most of Kinsler manifolds are tapped 13/16-16 to use these boss adapter inserts. To change the type of injector/nozzle, remove the boss insert and install another.

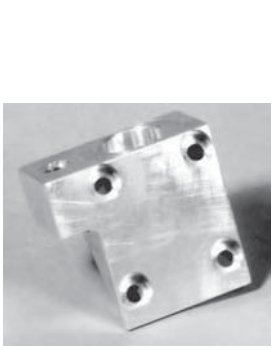
4804	Blank, not drilled all the way through, tapped 5/16-18 for use as a bolting boss, can be drilled and tapped for 1/8" NPT or for use as vacuum ports
4806	1/2-20 thread, anodized aluminum with side vents, typically used for gasoline constant flow nozzles
4808	1/2-20 thread, brass, typically used for constant flow nozzles using methanol
4812	For most Bosch and GM 'bung seal' type EFI injectors, model CEB
4815	For most Bosch EFI injectors that have captive o-ring on outlet and extruded aluminum fuel rail, model CEC, .530" inside diameter for injector o-ring
4816	For most EFI injectors that have captive o-ring on outlet and fuel rails with injector retaining clip, model CEU, .530" inside diameter for injector o-ring
4817	For Rochester Special Products EFI injector that has o-ring on outlet and fuel rail with injector retaining clip, model CEE, .545" inside diameter for injector o-ring
4818	For Rochester injector '7119-BAVR' that have captive o-ring on outlet and extruded aluminum fuel rail, model CED, .565" inside diameter for injedtor o-ring, .050" shallower than #4815
4819	For Siemens or Rochester injectors installed without a retaining clip, model CES, boss has .015" smaller inside diameter than #4818 for additional o-ring crush
4820	For 'EV6' style EFI injectors that have captive o-ring on outlet and extruded aluminum fuel rail, model 'CEV6'
4821	For 'Pico' EFI injectors that have captive o-ring on outlet and extruded aluminum fuel rail, model 'CEP'
4822	14mm x 1.25, typically used for Lucas mechanical nozzle
11025	Installation tool for Kinsler EFI injector boss inserts

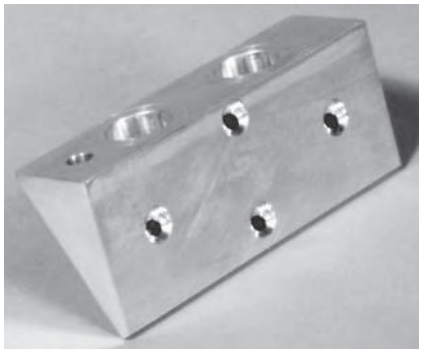
#4842 *#4843*

WELD-IN / EPOXY-IN EFI INJECTOR BOSSES

Bosses are machined from billet 6061 aluminum.

4842	Individual weld-in EFI injector boss for 'CEC' style captive o-ring type injector, 1.560" overall length
4843	Individual weld-in EFI injector boss for 'CEC' style captive o-ring type injector, 2.560" overall length





KINSLER BOLT-ON EFI INJECTOR BOSSES

Shown are two samples of bolt-on injector bosses. Used where welding is not practical but a solid mounting surface is required. Our bosses typically have injector pocket machined into boss and fuel rail mounting stanchion bolt hole.

Closeup of universal boss detail in Kinsler MC-180 throttle body

TOOLING FOR MACHINING FOR UNIVERSAL BOSS INSERTS

11020	Cutter, machine boss in manifold for thread-in injector inserts
11014	Tap, 13/16-16 thread, bottoming style tap for thread-in boss inserts

FUEL FILTERS

WHY DO YOU NEED ONE ?

An injection system that has been properly cleaned, flow tested, and calibrated, should be good for several years of trouble free service. There is ONE gremlin that can cut this to one day, even one minute, perhaps even a few seconds.... DIRT. Dirt is the biggest problem with ***ANY*** type of fuel injection system.

In years past many of the racers ran without any filter, because the ones on the market were of such poor design that they caused more problems than they solved. The same racers experienced many plugged nozzles, ruined or damaged engines, and many failed to finish a race. Since Kinsler's introduction of properly designed high capacity filters, it's not worth the risk to run without one...

THE PROPER FILTER IS THE BEST INSURANCE AGAINST DIRT RELATED PROBLEMS IN YOUR FUEL INJECTION SYSTEM !

Paper-BRL element

#9031 10-micron paper element, it has 35 square inches of surface area

Monster Mesh element

#8320 10-micron paper element, it has 74 square inches of surface area - 211% more surface area than #9031

DESIGN

An element with pleats allows a very large amount of surface area to fit into a compact housing, allowing the assembly to have a very low pressure drop for top system performance!
DO NOT USE stone type elements: typically they are too restrictive and clog up very easily.

For your reference 25.4 micron is approximately 0.001" .
A Kinsler 10-micron paper pleated element will trap particles larger than 0.0004"

INSTALLATION

Consult the plumbing schematic for the type of fuel system being used and MAKE SURE the correct type and style of fuel filter is being installed.

Fuel pump inlet: pumps are very sensitive to disturbance in the inlet hose. IT IS A MUST to have the correct filter or it will damage the pump and/or cause problems. ***NEVER*** have return fuel going back into the pump's inlet hose. As fuel leaves the pressurized side of the fuel system and enters a non-pressure area the fuel can flash vaporize, causing damage to the pump and erratic running conditions.

FOR CONSTANT FLOW SYSTEM

We recommend filtering all the fuel coming out of the pump so that all the bypass valves and the barrel valve receive filtered fuel. Do NOT use paper element filters on this type of system: bits of the paper element from the 'clean' side of the filter will clog the nozzles and/or glue on the element may dissolve in methanol causing the element to separate. Do NOT use paint strainers or other cloth filters to fill the tank, as lint from them may plug the nozzles. Use our #5610 filter funnel (see Page #182) or a similar metal element strainer.

FOR EFI SYSTEM

The electric fuel pumps used on EFI systems are susceptible to dirt. Carefully read all information on fuel filters for pump inlets. Pressure relief valves are also very susceptible to small dirt particles. Using the proper filter and keeping it clean is very important. EFI injectors have inlet filters with very little surface area, which means they can not handle large amounts of dirt/debris. Proper fuel filtration should begin at the fuel tank to protect the pump and the fuel system components. We offer many different fuel filters for the fuel supply system, disposable lower cost filter assemblies, or billet housings with replaceable filter elements. We recommend, whenever possible, to filter the fuel before it enters the tank. Road vehicles with electric fuel pumps should have a filter to protect the fuel pump.

45 micron Mega Monster Mesh inlet filter, Weldon pump, 10 micron Monster Mesh outlet filter on 4-barrel throttle body system

FOR LUCAS MECHANICAL SYSTEM

Due to the extremely tight tolerance in the Lucas equipment there are several filters throughout the system. Mechanical pump inlet, main hose from the pump to metering unit, metering unit inlet fitting, and on each injector. A Lucas system MUST be kept 100% clean. The smallest dirt particle can mean disaster.

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FUEL FILTERS

Monster Mesh series filters

Used for:

- *Injected or carburetted fuel systems*
- *Engine oil*
- *Rear end*
- *Transmission*

Used by:

- *Indy Racing League*
  Toyota, Honda, and Chevrolet
- *Drag*
- *Sprint*
- *Midget*
- *Street*
- *Off-road*
- *Road race*
- *Monster truck*
- *Pull truck & tractors*

Element is o-ring sealed to endcap

Quick release t-bolt type stainless steel mounting bracket

Filter Name	Housing Length (not incl. fittings)	Housing Diameter	Media Square Inches	Microns in paper	Microns in stainless steel mesh	Filter Assembly Weight (Ounces) paper	Filter Assembly Weight (Ounces) stainless steel mesh	Fuel Compatibility	Housing Finish	Application	Available Ports
Laser Welded Filter #8194 Laser Welded Filter #8197	3.100"	2.160"	92	10	-	4.32	-	gasoline	stainless steel	EFI pump outlet	3/8" male barb 16mm x 1.5 female
Injector Protector #8170	2.910"	1.900"	45	10	-	5.92	-	gasoline	black anodized	EFI pump outlet	8 AN female*
Ano-BRL #4156	2.910"	1.900"	19	-	140	-	6.56	methanol	hard anodized (olive-grey color)	mechanical pump outlet	8 AN female*
Alum-BRL #4148	2.910"	1.900"	19	-	140	-	6.56	gasoline	red anodized	mechanical pump outlet	8 AN female*
Monster Mesh 8300 Series	4.035"	2.460"	MESH 74 PAPER 108	10, 20, 40	25, 45, 70, 100, 218	9.12	10.88	gasoline methanol nitromethane	blue anodized and hard anodized	EFI pump inlet & outlet, mechanical pump inlet & outlet, oil	8 AN female 8 AN male flare 10 AN male flare 12 AN male flare
Mega Monster Mesh 8400 Series	5.240"	2.460"	MESH 111 PAPER 162	10, 20, 40	25, 45, 70, 100, 218	10.56	12.96	gasoline methanol nitromethane	blue anodized and hard anodized	EFI pump inlet & outlet, mechanical pump inlet & outlet, oil	8 AN female 8 AN male flare 10 AN male flare 12 AN male flare
Ultra Monster Mesh 8500 Series	6.460"	2.460"	MESH 148 PAPER 216	10, 20, 40	25, 45, 70, 100, 218	11.68	14.88	gasoline methanol nitromethane	blue anodized and hard anodized	EFI pump inlet & outlet, mechanical pump inlet & outlet, oil	8 AN female 8 AN male flare 10 AN male flare 12 AN male flare

FUEL FILTERS



Monster Mesh Assembly

8 AN female ports without fittings 4.77" overall
with 6 AN fittings 6.50" overall
with 8 AN fittings 6.70" overall
8 AN male flare ends 6.02" overall
10 AN male flare ends 6.89" overall
12 AN male flare ends 7.25" overall

Series-micron	End caps	Anodized
8308-xxx*	8AN female	Blue
8350-xxx	8AN female	Hard
8309-xxx	8AN male flare	Blue
8352-xxx	8AN male flare	Hard
8310-xxx	10AN male flare	Blue
8354-xxx	10AN male flare	Hard
8312-xxx	12AN male flare	Blue
8356-xxx	12AN male flare	Hard

Mega Monster Mesh Assembly

8 AN female ports without fittings 5.98" overall
with 6 AN fittings 7.71" overall
with 8 AN fittings 7.91" overall
8 AN male flare ends 7.22" overall
10 AN male flare ends 8.10" overall
12 AN male flare ends 8.46" overall

Series-micron	End caps	Anodized
8408-xxx*	8AN female	Blue
8450-xxx	8AN female	Hard
8409-xxx	8AN male flare	Blue
8452-xxx	8AN male flare	Hard
8410-xxx	10AN male flare	Blue
8454-xxx	10AN male flare	Hard
8412-xxx	12AN male flare	Blue
8456-xxx	12AN male flare	Hard

Ultra Monster Mesh Assembly

8 AN female ports without fittings 7.19" overall
with 6 AN fittings 8.92" overall
with 8 AN fittings 9.12" overall
8 AN male flare ends 8.46" overall
10 AN male flare ends 9.31" overall
12 AN male flare ends 9.67" overall

Series-micron	End caps	Anodized
8508-xxx*	8AN female	Blue
8550-xxx	8AN female	Hard
8509-xxx	8AN male flare	Blue
8552-xxx	8AN male flare	Hard
8510-xxx	10AN male flare	Blue
8554-xxx	10AN male flare	Hard
8512-xxx	12AN male flare	Blue
8556-xxx	12AN male flare	Hard

xxx*---Specifiy 3-digits for micron
Examples: 8308-010 specifies 10-micron Paper element 8556-218 specifies 218-micron Stainless Steel element

MONSTER MESH ELEMENTS

Paper elements, pleated, 108 square inches
Stainless steel mesh, pleated, 74 square inches

8320	10 micron paper
8330	20 micron paper
8340	40 micron paper
8325	25 micron stainless steel
8345	45 micron stainless steel
8370	70 micron stainless steel
8380	100 micron stainless steel
8388	218 micron stainless steel

MEGA MONSTER MESH ELEMENTS

Paper elements, pleated, 162 square inches
Stainless steel mesh, pleated, 111 square inches

8420	10 micron paper
8430	20 micron paper
8440	40 micron paper
8425	25 micron stainless steel
8445	45 micron stainless steel
8470	70 micron stainless steel
8480	100 micron stainless steel
8488	218 micron stainless steel

ULTRA MONSTER MESH ELEMENTS

Paper elements, pleated, 216 square inches
Stainless steel mesh, pleated, 148 square inches

8520	10 micron paper
8530	20 micron paper
8540	40 micron paper
8525	25 micron stainless steel
8545	45 micron stainless steel
8570	70 micron stainless steel
8580	100 micron stainless steel
8588	218 micron stainless steel

MONSTER MESH SERIES PARTS

8300	Mounting clamp, stainless steel band with quick release t-bolt, two 1/4" mounting holes
8303	Housing, Monster Mesh, 3.855" long, blue anodized
8304	Housing, Monster Mesh, 3.855" long, hard anodized
8403	Housing, Mega Monster Mesh, 5.065" long, blue anodized
8404	Housing, Mega Monster Mesh, 5.065" long, hard anodized
8503	Housing, Ultra Monster Mesh, 6.275" long, blue anodized
8504	Housing, Ultra Monster Mesh, 6.275" long, hard anodized
8314	End cap, 8 AN female o-ring boss, inlet, blue anodized
8315	End cap, 8 AN female o-ring boss, outlet, blue anodized
8316	End cap, 8 AN female o-ring boss, inlet, hard anodized
8317	End cap, 8 AN female o-ring boss, outlet, hard anodized
8614	End cap, 8 AN male flare, inlet, blue anodized
8615	End cap, 8 AN male flare, outlet, blue anodized
8616	End cap, 8 AN male flare, inlet, hard anodized
8617	End cap, 8 AN male flare, outlet, hard anodized
8618	End cap, 8 AN male flare, outlet, with 6 AN female o-ring tee for pressure relief valve and internal 6 AN female o-ring boss for internal check valve installation, hard anodized
8414	End cap, 10 AN male flare, inlet, blue anodized
8415	End cap, 10 AN male flare, outlet, blue anodized
8416	End cap, 10 AN male flare, inlet, hard anodized
8417	End cap, 10 AN male flare, outlet, hard anodized
8514	End cap, 12 AN male flare, inlet, blue anodized
8515	End cap, 12 AN male flare, outlet, blue anodized
8516	End cap, 12 AN male flare, inlet, hard anodized
8517	End cap, 12 AN male flare, outlet, hard anodized
8600	Spring, element retaining, fits all 'Monster Mesh' series filters
8601	O-ring, end cap to housing sealing, two required
8602	O-ring, element to outlet end cap sealing

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FUEL FILTERS

MECHANICAL PUMP OUTLET - METHANOL AND NITRO

HARD ANODIZED aluminum housing, 8 AN female ports inlet and outlet, housing has threaded end caps that seal with o-rings. Element sealed to end cap by o-ring. Dimensions at largest points: 1.9" diameter x 3.650" long (without fittings), weighs 0.4 lbs (without fittings).
Filtration: one element, 1.1" diameter x 1.950" long, 22 square inches, pleated cleanable stainless steel element, 140-micron.

4156	Filter assembly, complete, methanol, gasoline, and nitromethane, stainless steel element, hard anodized housing and end caps, model 'Ano-BRL'
4105	Element, stainless steel, 22 square inches, 140 micron
4104	Spring, retains element in place
8172	O-ring, end cap to body, for #4156, #4148, and #8170
8173	O-ring, end cap to filter element
4135	End cap, hard anodized
4137	End cap, hard anodized, with o-ring detail
4103	Mounting clamp for #4156, #4148, and #8170, stainless steel band with rubber cushion liner and ear for mounting

#4156 with #6044 fittings and #4103 mounting clamp

#4105 stainless steel element

MECHANICAL PUMP OUTLET - GASOLINE - HIGH FLOW

Anodized aluminum housing, 8 AN female ports inlet and outlet, housing has threaded end caps that seal with o-rings. Element sealed to end cap by o-ring. Dimensions at largest points: 1.9" diameter x 3.650" long (without fittings), weighs 0.4 lbs (without fittings).
Filtration: one element, 1.1" diameter x 1.950" long, 22 square inches, pleated cleanable stainless steel element, 140-micron.

4148	Filter assembly, complete, gasoline ONLY, stainless steel element, red anodized housing with black anodized end caps, model 'Alum-BRL'
4105	Element, stainless steel, 22 square inches, 140 micron
4104	Spring, retains element in place
8172	O-ring, end cap to body, for #4156, #4148, and #8170
8173	O-ring, end cap to filter element
4134	End cap, black anodized
4136	End cap, black anodized, with o-ring detail
4103	Mounting clamp for #4156, #4148, and #8170, stainless steel band with rubber cushion liner and ear for mounting

#4148 with #6044 fittings installed

EFI, CARBURETORS, AND LUCAS

Anodized aluminum housing, 8 AN female ports inlet and outlet, housing has threaded end caps that seal with o-rings. Dimensions at largest points: 1.9" diameter x 3.650" long (without fittings), weighs 0.4 lbs (without fittings).
Filtration: one element, 1.250" diameter x 1.950" long, pleated, disposable paper element, 10-micron.

#8170 with #6043 fittings installed

8170	Filter assembly, complete, gasoline ONLY, 10 micron paper element, black anodized housing and end caps, model 'Paper-BRL'
9023	Element, 10 micron paper, 22 square inches, installed in early filter housing #9020, can be installed in #8170
9031	Element, 10 micron paper, 35 square inches, 60% more surface area than #9023
4104	Spring, retains element in place
8172	O-ring, for #8170, #4148, and #4156
4103	Mounting clamp for #8170, stainless steel band with rubber cushion liner and ear for mounting

Outlet end

#9031 element

Disassembled #8170 'Paper-BRL'

FUEL FILTERS

FOR EFI

In-line disposable filter assembly. Stainless steel, laser welded, 66 square inches of pleated 10-micron paper element.

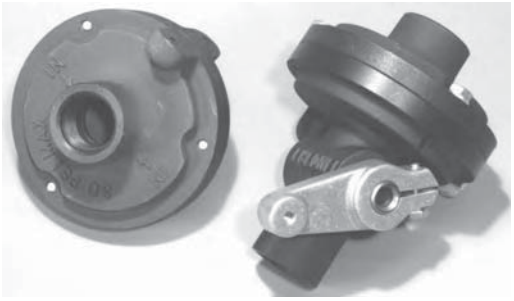
8194	Filter, 3/8" male barbs
8197	Filter, 16mm x 1.5 female + o-ring ports
6185	Fitting, 6 AN male flare x 16mm 1.5 with o-ring, blue anodized aluminum
6186	Fitting, 8 AN male flare x 16mm 1.5 with o-ring, blue anodized aluminum

Small block Chevrolet C5R manifold with wet nitrous system installed

MECHANICAL PUMP INLET - "H" TYPE

Anodized aluminum housing, 12 AN female ports inlet and outlet, housing end secured to body with V-style stainless steel band clamp. Dimensions at largest points: 3.9" diameter x 4.75" long (without fittings), weighs 2.3 lbs (without fittings). Housing has four 5/16-18 threaded holes for mounting on outlet end plate. Holes located on 2.120" spacing with the outlet boss in the center.
Filtration: up to ten 2.75" diameter double sided wafered, stainless steel, cleanable, disks on slit mandrel, available in two micron ratings.

4900	Filter assembly, 200 micron, complete
4916	Filter assembly, 25 micron, complete
4901	Element, disk type, 40 x 200 mesh, 200 micron, filter requires (10)
4917	Element, disk type, 25 micron, filter requires (10)
4904	O-ring, for #4900 and #4916 filter housing, one required



MECHANICAL PUMP INLET PANCAKE STYLE - "E"-TYPE

4905	Filter assembly, complete, dimensions at largest point: 4.320" diameter x 3.450" long (without fittings), weighs 1.55 lbs (without fittings)
4906	Filter assembly with shut-off valve, complete, dimensions at largest point: 4.320" diameter x 5.60" long (without fittings), weighs 2.25 lbs (without fittings)
4907	Element, 40 mesh, stainless steel, coarse, one required
4908	Element, 40 mesh, stainless steel, fine, one required
4909	O-ring for #4905 and #4906

Anodized aluminum housing, 12 AN female ports inlet and outlet, housing held together with three 7/16" hex bolts. Housing has two 1/4-20 threaded holes for mounting on pad at edge of diameter.
Filtration: one 3.1" diameter, cleanable, stainless steel screen, element is available in two micron ratings.

Al Marani's 1968 Shelby Mustang with a 500 CID Ford Boss Hemi using a 6-71 GMC supercharger with a complete Kinsler modified Accel/DFI electronic fuel injection

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SHUT-OFF VALVES

USAGES

Typically used to shut off an engine with constant flow fuel metering. On this type of system it is not wise to shut off the ignition to stop the engine. After killing the ignition system, the engine "winds down", and the mechanical fuel pump which is still turning pumps fuel into the engine. A shut-off valve allows the operator to shut off the engine cleanly; prolonging engine component life, ease in restarting, and reduces oil dilution. It also aids in obtaining reliable spark plug readings.

DO NOT USE a shut-off to stop fuel flow to a pump that is rotating. The fuel lubricates the pump, shutting off the fuel could cause damage to the pump. A shut-off can be used to allow the servicing of a pump inlet filter, removing a pump, or removal of a fuel tank.

DO NOT INSTALL a shut-off that will "dead head" the pump. Always be sure that an adequate flow path back to the tank is available.

SHUT-OFF MOUNTING

When mounting a shut-off valve be sure that the valve itself and the linkage\cable\etc. has plenty of room for operation.
Always take into consideration the movement of parts under torque stress, or vibration, such as body panels, hood, suspension, etc.

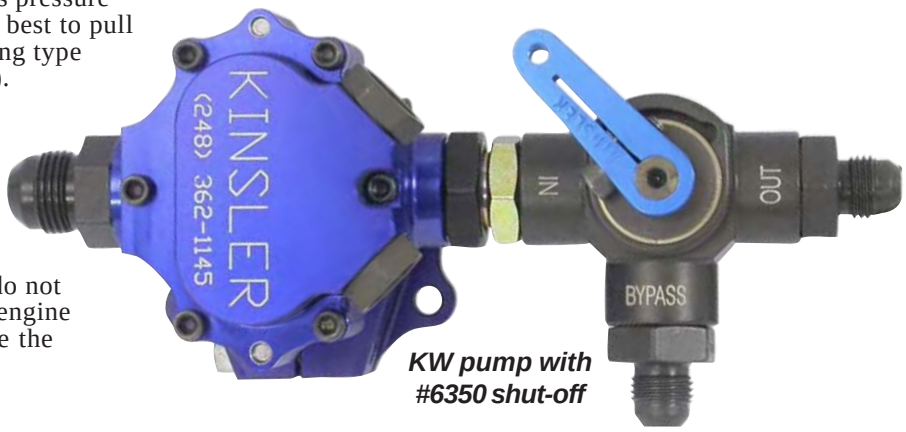
On a constant flow injection it is always best to mount the shut-off valve at the inlet of the barrel valve (see "Preferred Plumbing Schematic" on Page #112), because:

A) If the shut-off is pulled at high engine speed, the fuel will be able to bypass back to the tank through the main bypass and the high speed bypass, thus avoiding excessive fuel pump pressure. Since excess pressure can ruin a fuel pump instantly, it is always best to pull the shut-off at low RPM or install a relieving type shut-off, (normally called a 3-way shut-off).

B) When the engine is shut off, the fuel in the hoses and filter absorbs heat and expands. Mounting the shut-off at the barrel valve will force the expanding fuel back toward the tank rather than into the engine.

If the shut-off is mounted with a threaded fitting, do not screw any other item to the valve.... under typical engine vibration the additional weight may tend to fatigue the fitting that mounts the valve and cause it to break.

DO NOT mount any two way shut-off valve directly on the pump outlet, since the fuel has no place to go when the shut-off is pulled.... this could easily ruin the pump or rupture a hose.



KW pump with #6350 shut-off

TYPES OF SHUT-OFF VALVES

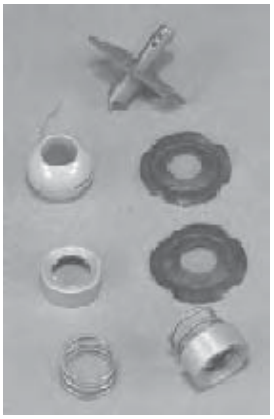
Mechanical valve - spool type and seal assisted ball.

Spool Type

Acceptable for internal sealing when in good condition. The spool rotates inside a housing without the aid of any seals to prevent leakage around the spool. Typically smaller in size than the seal assisted ball type valve. The fit of the spool to the housing is critical, a worn spool or housing will allow excessive amount of leakage through the valve assembly. This may allow the engine to continue to run, or fuel to leak past the valve when the engine is not running.

Ball Type - Seal Assisted

Excellent for internal sealing. The ball rotates on a large sealing surface stopping the flow of liquid on the inlet and outlet. A spring loaded seal on both sides of the ball prevents leakage around the ball. While this style is more difficult and costly to manufacture it is the valve of choice due to it's positive shut off.



Ball and components

Spool

SHUT-OFF VALVES

HFV SHUT-OFF VALVES

Hard anodized aluminum housing with 8 AN male flare and 8 AN female ends, will flow in either direction. Overall length is 2.6" without adapter fittings. Ball type valve with spring loaded end seals and o-ring on actuation shaft. Arm rotates 360° on standard series valve assembly and 90° on safety series valve. Standard series valve has built-in detents every 90 degrees, this gives the valve a positive on/off position and it can be actuated by cable, linkage, or by hand. A large selection of adapter fittings makes this a very adaptable and flexible valve. Arm has a 3/16" clearance hole and 1.250" center to center for a 90° travel of 1.768". Unit can be disassembled and new seals installed in the field.

#6036 HFV shut-off valve with #6043 8 AN adapter fitting installed

STANDARD SERIES

6036	Model 'HFV', neoprene seals, for gasoline and methanol ONLY
6038	Model 'HFV', teflon seals, for methanol and nitromethane

SAFETY SERIES

Ideal for boats and motorcycles, if driver is thrown from vehicle, cord attached to driver pulls pin, allowing spring loaded valve to snap shut. Billet aluminum mounting bracket is blue anodized and features a stainless steel pull pin.

***** IMPORTANT***** ***DO NOT*** attach a cable or rod to valve arm when using it as a safety shut-off.

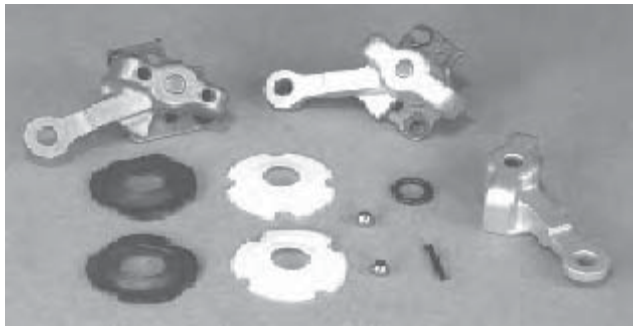
6037	Safety shut-off valve, same as #6036, with safety pull pin and mounting bracket, for gasoline and methanol ONLY
6039	Safety shut-off valve, same as #6038, with safety pull pin and mounting bracket, for methanol and nitromethane

Pin installed, valve is open

Pin removed, valve snaps closed

PARTS FOR HFV SHUT-OFF VALVES

6055	Seal kit for #6036 and #6037, for gasoline and methanol ONLY, includes two end seals, one shaft seal, and one arm roll pin
6056	Seal kit for #6038 and #6039, for methanol and nitromethane, includes two end seals, one shaft seal, and one arm roll pin
6051	Top plate assembly, for #6036 and #6038 valve, with arm and shaft
6052	Top plate assembly, for #6037 and #6039 valve, with arm and shaft
6053	Ball only, for #6036, #6037, #6038, #6039 shut-off valve
6059	O-ring, for shaft seal on #6036 to #6039 shut-off valve, specify fuel



MOUNTING BRACKETS FOR HFV SHUT-OFF VALVES

6049	Bracket, for #6036 and #6038, panel mount, billet aluminum, two retaining screws for shut-off valve, two 10-32 mounting screws with washers, blue anodized
6050	Mounting plate, for use with #6049 bracket to mount 'HFV' shut-off valves on Kinsler 1-pc. big block Chevrolet injection manifold, billet aluminum, black anodized (polished finish optional)

#6049

#6050

ADAPTER FITTINGS - COMMONLY USED ON HFV SHUT-OFF VALVE

6040	6 AN male flare x 8 AN female swivel, plated steel
6041	6 AN female swivel x 8 AN female swivel, aluminum
6042	8 AN female swivel x 8 AN male + o-ring, hard-anodized aluminum
6043	8 AN male flare x 8 AN male + o-ring, hard-anodized aluminum
6044	6 AN male flare x 8 AN male + o-ring, hard anodized aluminum
6047	8 AN male + o-ring x 8 AN male bulkhead + nut & o-ring, plated steel
6048	8 AN male + o-ring x 6 AN male bulkhead + nut & o-ring, plated steel

SHUT-OFF VALVES

KINSLER 3-WAY SHUT-OFF VALVES

Hard-anodized aluminum body, precision ground and lapped stainless steel spool with internal detent pin, 1.430” C-C arm, housing has 8 AN female ports, rotates 90º closed to wide open. Side port can be used for bypass, this port will close off when valve is in "ON" position. Includes AN adapter fittings (other fittings are available).

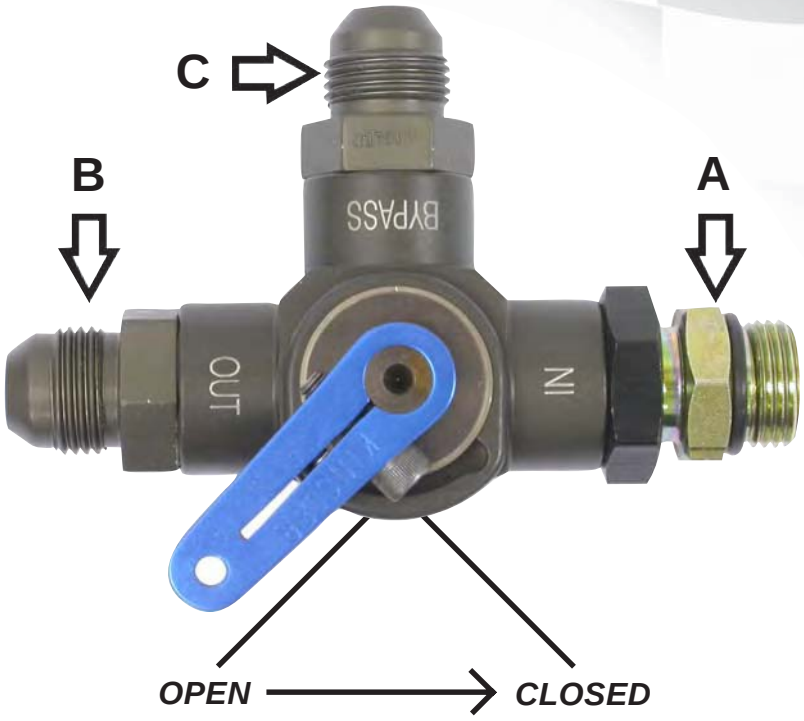
We recommend mounting a shut-off at the barrel valve inlet (see section on SHUT-OFF MOUNTING, Page #167).

However, if a customer desires to mount a shut-off valve on the fuel pump, this is the model to use!

OPERATION

Inlet port "A" is always open to the distribution cavity in the center of the valve. When the handle is in the 'open' position, the inlet is open to the engine port "B". Port "C" is blocked off. When the handle is in the closed position, the inlet is open to the bypass back to the fuel tank, port "C", while the engine port "B" is blocked off.

6350	Kinsler 3-way shut-off valve, curved body style, 6 AN male flare inlet and bypass fittings, 6 AN bulkhead inlet fitting
6354	Kinsler 3-way shut-off valve, curved body style, 8 AN male flare inlet and bypass fittings, 8 AN bulkhead inlet fitting

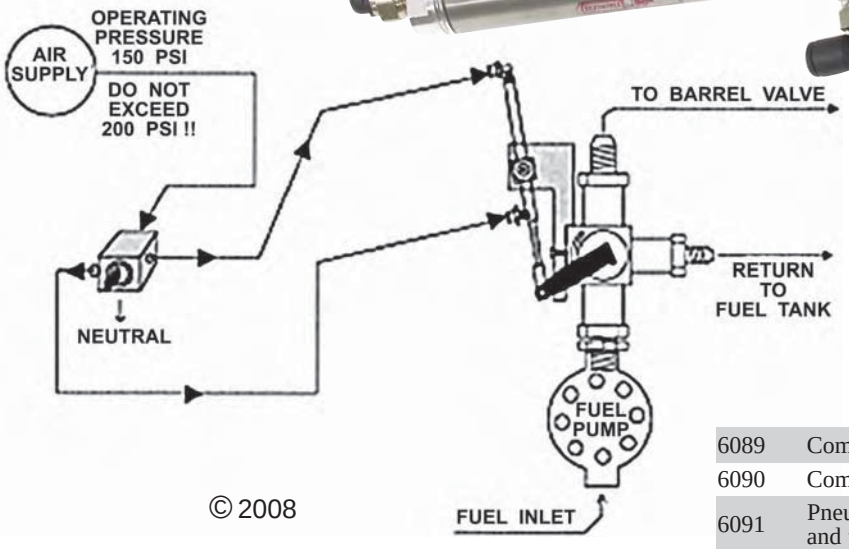


HIGH FLOW 3-WAY SHUT-OFF VALVES

Same as above 3-way valves but with larger ports.

6087	10 AN
6088	12 AN

#6089



PNEUMATIC 3-WAY SHUT-OFF VALVE KIT

Kits consists of: 3-way shut-off with AN fittings, pneumatic cylinder with mounting brackets, switch, connector fittings, and tubing. Customer is responsible for air supply, 100-300 PSI operating.

6089	Complete kit with #6350 shut-off valve, 6 AN fittings
6090	Complete kit with #6354 shut-off valve, 8 AN fittings
6091	Pneumatic switch, cylinder, mounting bracket, fittings and tubing, NO SHUT-OFF VALVE

SHUT-OFF VALVES

#6034 *#6031*

SPRINT SHUT-OFF

Anodized aluminum, spool type (stainless steel), arm has stop pin to keep valve from over rotating, rotates 90° closed to wide open, 2.121" total travel. Side port can be used for bypass valve, this port **DOES NOT SHUT OFF**. Includes arm and port plug.

6034	Inlet: 6 AN male plus nut & o-ring, outlet: 6 AN male flare, side port: 6 AN female with port plug. Overall length: 2.075", height with plug installed: .775", weight: 0.15 lb
6031	Inlet and outlet: 6 AN male flare, side port: 6 AN female with port plug. Overall length: 2.075", height with plug installed: 2.050", weight: 0.20 lb

DSR SHUT-OFF

Anodized aluminum, spool type (stainless steel), arm has stop pin to keep valve from over rotating, rotates 90° closed to wide open, 1.810" total travel.

6098	Inlet: 6 AN male plus nut & o-ring, outlet: 6 AN male flare Overall length: 2.250", weight: 0.15 lb
6099	Inlet and outlet: 6 AN male flare Overall length: 2.450", weight: 0.15 lb

#6098 *#6099*

#6095

12 AN AND 16 AN SHUT-OFF VALVE

6095	12 AN male flare bulkhead x 12 AN male flare, gasoline and methanol ONLY. Seal assisted ball type shut-off, arm rotates 90 degrees closed to wide open, .600" I.D. straight through, overall length: 4.250", width: 1.5", height: 2.550", weight: 0.55 lb
6033	16 AN male flare x 16 AN male flare, stainless steel, gasoline and methanol ONLY. Seal assisted ball type shut-off, arm rotates 90 degrees closed to wide open, .685" I.D. through ball, end cap is tapered from .850" at flare tip to.685" at ball, overall length: 3.400", width: 1.5", height: 2.600", weight: 1.35 lb

The arm is spring loaded and equipped with detents to secure the valve in the open position. When rotated from the full open position the valve will snap closed.

SHUT-OFF WITH FILTER - PANCAKE STYLE

Anodized aluminum housing, 12 AN female ports inlet and outlet, housing held together with three 7/16" hex bolts. 90° travel, 2.882" total travel. Housing has two 1/4-20 threaded holes for mounting on pad at edge of largest diameter. Mounting holes on 2.0" center to center. Filtration: one 3.1" diameter, cleanable, stainless steel screen. Element available in two micron ratings (see below).

4906	Filter assembly with shut off valve complete. Dimensions are at largest points: 4.320" diameter x 5.60" long (without fittings), weight: 2.25 lb (without fittings)
4907	Element, stainless steel, 40-mesh, one required
4908	Element, stainless steel, 40-micron, one required
4912	O-ring, for #4905 and #4906 filter housing, one required

FITTINGS - We offer a complete line of adapter fittings, see Pages #180-183.

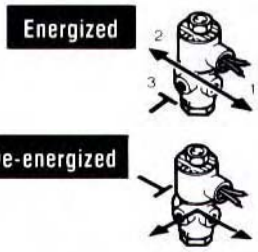
SHUT-OFF VALVES

SOLENOID SHUT-OFF VALVE, 12-VOLT DC

Consult us for proper use and application of this unit.

A) Can be utilized for shut-off of complete gasoline system.
B) Manual Lean-Out or enrichment system, can be activated by driver.
C) Can be wired for vehicles with automatic transmission and a transbrake or with a MSD two-step RPM control.
D) Excellent for fuel system which requires two different main jet selections, good launch and good mid-range.

6060	Valve assembly, normally closed (opens when power is applied), buna seals, model: SS-12
6061	Valve assembly, normally open (closes when power is applied), buna seals, model: SS-12
6062	Valve assembly #6060, normally closed (opens when power is applied), with restrictor jet holder installed in outlet and 6 AN male flare inlet fitting
6063	Valve assembly #6061, normally open (closes when power is applied), with restrictor jet holder installed in outlet and 6 AN male flare inlet fitting
6064	Valve assembly, normally closed (opens when power is applied), model: SS-13. Teflon seals, stainless steel body, includes 6 AN male flare fittings
6064-R	Valve assembly, normally closed (opens when power is applied), model: SS-13. Teflon seals, stainless steel body, includes 6 AN male flare fittings inlet and restrictor jet holder installed in outlet
6067	3-way flow divertor valve, 12-volt DC, 1/4" NPT female ports, 11 PSI max., 180°F max. fluid temperature



Buna seals, brass body.
Weighs approx. 1.3 lbs and includes male/female Weather-Pack two pin sealed connector assembly.
Seat orifice is 11/64" I.D.
Has 1/4"NPT female ports.
Maximum operating pressure: 11 PSI.
Maximum fluid temperature: 180°F.

Recommend:
For **gasoline and methanol** - buna seals
For **methanol / nitro** - teflon seals
Note: teflon seals may not produce a dripless seal.

#6060 with two #6160 6 AN male flare adapter fittings

MODEL: SS-12
Buna seals, stainless steel body.
Weighs approx. 1.9 lbs and includes male/female Weather-Pack two pin sealed connector assembly.
Seat orifice is 3/8" I.D.
Two 10-32 threaded mounting holes located in base. Has 1/4"NPT female inlet and outlet port.
Maximum operating pressure: 150 PSI.
Maximum fluid temperature: 230°F.

MODEL: SS-13 (Not Shown)
Teflon seals, stainless steel body.
Weighs approx. 1.3 lbs and includes male/female Weather-Pack two pin sealed connector assembly.
Seat orifice is 1/4" I.D.
Two 10-32 threaded mounting holes located in base. Has 1/4"NPT female inlet and outlet port.
Maximum operating pressure: 100 PSI.
Maximum fluid temperature: 180°F.

SERVICE KITS
Consists of : piston, spring, plunger, retainers, and seal.

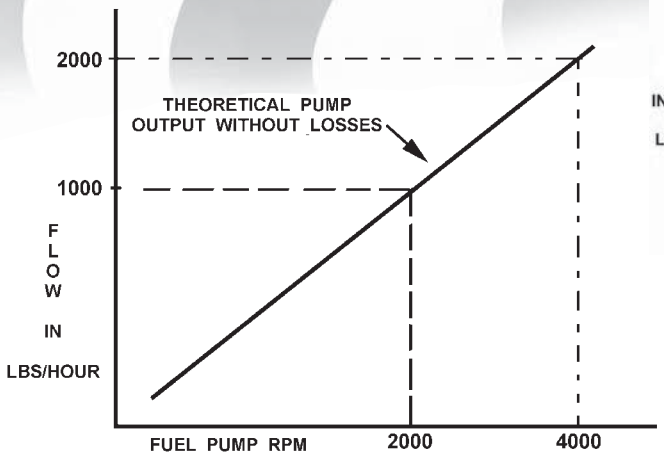
6068-B	Buna nitrile seal, for #6060 and #6062 SS-12 normally closed
6068-T	Teflon seal, for #6060 and #6062 SS-12 normally closed
6069-B	Buna seal, for #6061 / #6063 SS-12 normally open

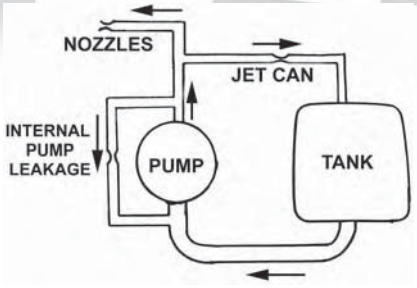
Phil Sonner's 55' Chevy with a Kinsler EFI system on a 454 big block

MECHANICAL FUEL PUMP

PUMP OUTPUT

In theory, a mechanical pump's output is linear to the RPM at which it is driven. Rotate the pump shaft twice as fast and the flow will double. However, even a good pump is affected by the physical clearances of the gears and the pressure load against the outlet. Typically the flows at very low RPM and very high RPM will be below the linear graph of the pump's output due to internal leakage, pumping friction losses, and clearance in the components.





Running clearance is a must for the pump gears. This clearance causes some internal leakage back past the gears and has the same effect as a bypass from the pump outlet back to the inlet.

GENERAL SIZING AND SERVICE

Engine displacement, volumetric efficiency, and the fuel being used will dictate the required pump displacement size. If you have a doubt about the size of your pump, note the number stamped on it and give us a call. Several pumps are assembled using the same size housing, so the casting number located on the housing does not indicate the exact pump displacement. Most pumps are identified by the serial number stamped on it.

Most pumps experience wear over a period of time. To maintain engine performance on a fuel system where the pump is losing flow output, the main jet has to be continually richened. If the main jet is not richened, the top end performance will drop off. If a problem is not found after thoroughtly checking other engine components (especially valve springs, cam lobes, and ignition), the pump should be sent in for testing.

We can test and rebuild many types of pumps. To have a pump tested, send it in with all of the fittings still in it. Include a day and evening time telephone number with the area code..... a technician will call if there is a problem.

PUMP SIZE

FLOWS ARE AVERAGE OUTPUT - ACTUAL OUTPUT MAY VARY SLIGHTLY

PUMP RPM	PSI	KW-200	-00	KW-300	-0	KW-400	KW-450	KW-500	0-1/2	-1	KW-700	KW-1300	-2	-4
2000	0	335	380	505	685	670	770	835	960	1190	1170	2160	2325	2930
2000	50	305	295	475	590	655	760	815	865	1095	1130	2125	2140	2765
3500	50	570	570	845	1070	1150	1330	1450	1515	1950	2000	3670	3710	4760

Flows in this chart are in pounds per hour (lbs/hr) of .720 specific gravity test fluid at 60°F.

TYPICAL APPLICATIONS VERSUS PUMP SIZE

These recommendations are based on the pump running at 1/2 crank speed.
Variations will occure with RPM of engine and pump drive speed.

KW	Hilborn	Typical Use
N/A	BL-234	Very small displacement engines fueled by gasoline and/or alcohol (typically one to four cylinders)
200	-00	Small displacement four cylinder engine (typically) fueled by gasoline and/or alcohol
300	N/A	Large displacement four cylinder engine (typically) fueled by gasoline and/or alchol
400	-0	Gasoline and alcohol (typically 6-cylinder and under 400 cubic inch V8)
450	N/A	Alcohol (over 400 cubic inch V8)
500	-1/2	Gasoline and alcohol (typically unblown under 430 cubic inch V8)
700	-1	Unblown and blown gasoline; unblown alcohol up to 700 cubic inch displacement; small displacement blown alcohol low boost or low % nitro
1300	-2	Small displacement unblown high % nitro ; average blown alcohol
LB750	-4	Large displacement unblown high % nitro; large displacement high boost blown alcohol; small displacement low boost blown nitro
LB1500	-5	Very large displacement high boost blown alcohol; large displacement high boost high % nitro

ALL FLOWS , SIZES , AND RECOMMENDATIONS FOR FUEL PUMPS ARE FOR GENERAL REFERENCE. CONSULT A KINSLER TECHNICIAN FOR YOUR SPECIFIC APPLICATION !!!

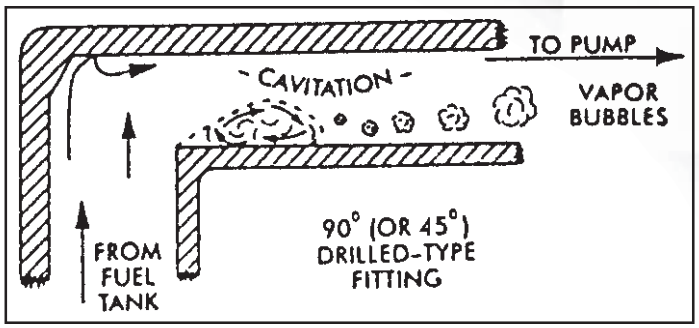
Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

MECHANICAL PUMP INSTALLATION

Constant flow injection systems sense two engine conditions to meter the fuel. The first is engine speed, which is achieved by using fuel pump speed... the faster the engine runs, the more fuel the pump delivers. The second is throttle angle, which is achieved by the barrel valve... as the throttles are opened, the linkage to the barrel valve rotates the spool toward full open from the partially closed off position that it had at an idle.

Because the fuel pump is an integral part of the metering system, it must be kept in good condition.
The pump requires careful installation and maintenance to prevent premature deterioration and/or failure.

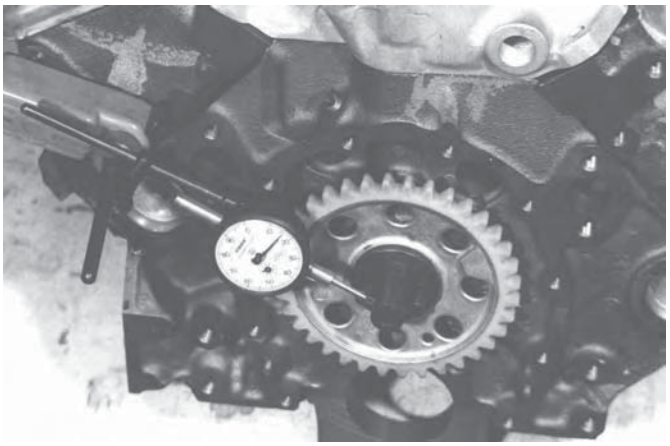
IMPORTANT FUEL PUMP NOTES



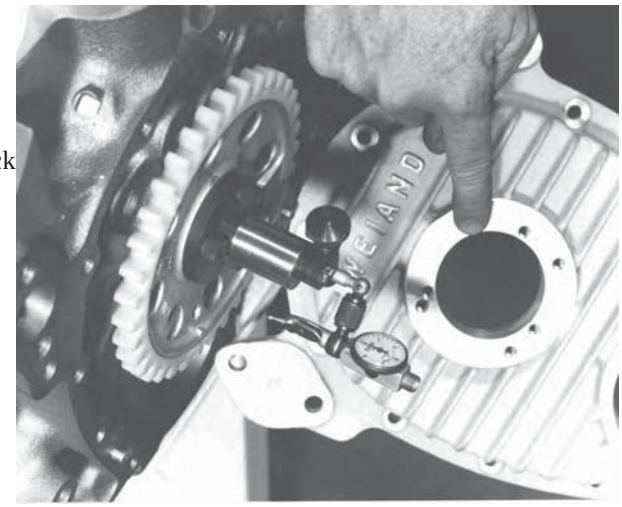
1) The pump must be primed before rotating the engine over, as the fuel lubricates the pump. If the pump is not going to be operated for an extended period of time, squirt some oil into it and turn it several revolutions.
2) The fuel pump moves a large volume of fuel. Any restriction in the pump inlet hose may cause cavitation.

To prevent pump inlet cavitation:

A) Mount the pump as low as possible, this allows for easier pump priming and better fuel supply conditions.
B) Mount the tank as high and close to the pump as possible. The far-forward tank location often used in early rear engine dragsters is NOT ideal; it would be better to locate the tank just in front of the engine, which will reduce the required inlet hose length.
C) Do not use a filter on the pump inlet. Strain the fuel as the tank is filled, to protect the pump from large pieces of dirt. If a filter is going to be used on the pump inlet, it must have a large surface area to prevent any restriction.
D) Keep the fuel in the tank cool... a good way is to wrap a wet towel (white, to reflect heat) around the tank and keep it wet. The evaporating water will keep the fuel cooler than the surrounding temperature.
E) Keep heat away from the fuel pump (exhaust pipes, hot air from the radiator, coolant system hoses, etc.). For oval track and road racing, duct cool air over the pump.
F) Be sure that the tank is properly constructed and vented.... See FUEL TANK on Pages #179-180.
G) Be sure that the pump inlet hose and fittings meet the minimum sizes in the table on Page #102.



3) Index the pump so that an angled inlet fitting is NOT required (angled fittings on the pump outlet are permissible). It is OK to drill new holes in the pump flange or the mounting surface to re-index the pump. our model KW fuel pumps have a swivel flange for easy indexing.
4) For front cover drives, check the hex drive spud (attached to the front of the cam) for radial run-out: .015" maximum allowed. On belt drive units, mount the drive bracket in a vise, lathe, or vertical mill to check for radial run-out.
5) Check the radial alignment of the pump to the hex drive spud. Due to manufacturing tolerances, many front covers do not locate the pump in exact alignment. If not, file the holes for the bolts that secure the cover to the engine to align the pump with the spud.



Two ways to check alignment :

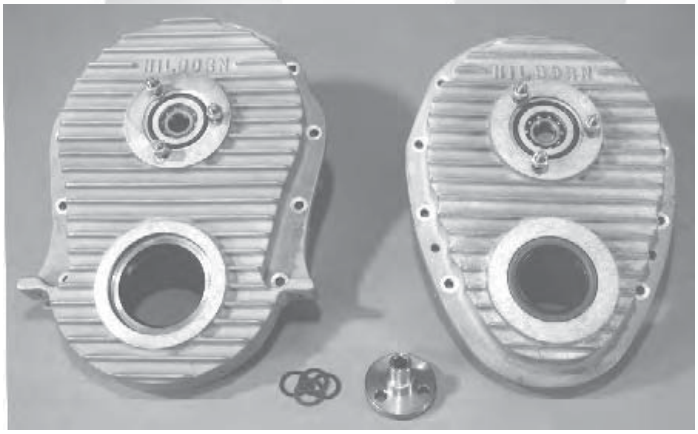
A) Attach a dial indicator to the spud with the cover in place and check the run-out to the pump pilot hole in the cover.
B) Make an alignment tool: machine a 3/4" thick round piece with an OD the same as the ID of the front cover, and with a concentric ID .015" larger than the drive spud O.D. It should easily slip into the front cover with the cover and spud in place on the engine.

6) Check hex engagement, male to female. It should be 3/8" minimum, but be sure that the pump hex doesn't bottom out in the spud, as this will quickly ruin the pump. A minimum of .100" clearance is recommended from the end of the male hex to the bottom of the female.
7) Any time the pump is removed, inspect the drive spud and replace it if worn. Grease the pump hex when installing it.
8) Most belt drive kits mount the fuel pump at about the water pump height. It is ideal to modify the kit to mount the pump as low as possible... we stock belts with various lengths, check available sizes (see Page #177) as you setup your pump drive. The pump should be setup to run one-half of engine speed. NOTE : Use the same above procedures to check the run out on the belt drive spud.

DRIVES FOR MECHANICAL PUMP

#5200

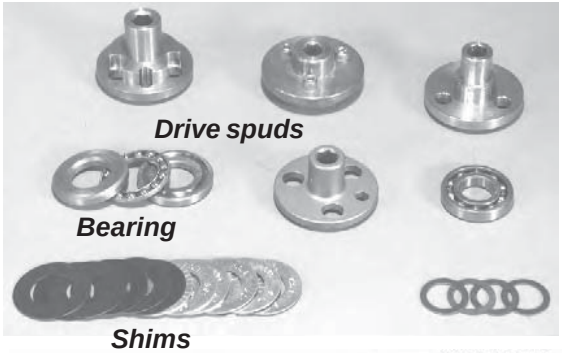
#5201



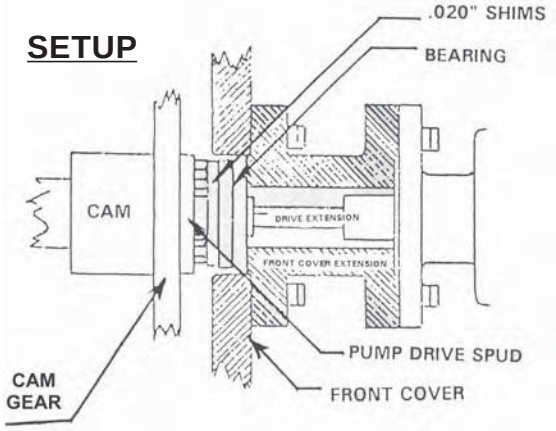
#5204 #5203

FRONT COVER FUEL PUMP DRIVE - KITS AND PARTS

5200	Chevrolet small block V-8, aluminum cover with spud, bearing, and shims
5201	Chevrolet big block V-8, aluminum cover with spud, bearing, and shims
5202	Ford 289 small block V-8, aluminum cover with spud, bearing, and shims
5205	Front cover ONLY, Chevrolet small block V-8, cast aluminum
5206	Front cover ONLY, Chevrolet big block V-8, cast aluminum
5210	Drive spud, Chevrolet V-8 camshaft, 3/8" female hex drive, 3-bolt
5211	Drive spud, Chrysler Hemi V-8 camshaft, 3/8" female hex drive, 3-bolt
5212	Shim kit, for drive spuds #5210 and #5211
5213	Thrust bearing, for drive spuds #5210 and #5211
5214	Drive spud, Ford 289 small block V-8, 3/8" female hex drive
5203	Hilborn: Chevrolet small block V-8, complete with cover, spud, bearing, and shims
5204	Hilborn: Chevrolet big block V-8, complete with cover, spud, bearing, and shims
5226	Hilborn drive spud, Chevrolet V-8 camshaft, 3-bolt
5227	Hilborn shim kit for #5226
5228	Bearing for #5226



SETUP



Install shims so that the cam end clearance is .010" to .020". The smaller clearance is preferred to minimize spark scatter.

Big block Chevrolet

Small block Chevrolet

KINSLER FRONT COVER FUEL PUMP DRIVE KIT
FOR USE WITH JESEL CAM DRIVE

Available for small and big block Chevrolet, standard and raised cam (see below). Allows mechanical fuel pump or shorty ignition distributor (see Pg. 219) to be run off the front of the cam. Clearance holes in mounting plate allow adjustment of cam timing without removing plate. Unit attachs to water outlet ports on block. Our spacers are hollow. Block off plates can be drilled and tapped for access to water. Kits are complete with all hardware and gaskets. Components are available separately.

5280	Small block Chevrolet, standard deck, complete kit
5282	Small block Chevrolet, raised cam +.391", complete kit
5283	Big block Chevrolet, standard deck, complete kit
5285	Big block Chevrolet, raised cam +.400", complete kit
5286	Drive spud, left hand thread, 3/8" female hex

Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
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DRIVES FOR MECHANICAL PUMP

BELT DRIVES ARE IDEAL FOR :

Mounting the pump low to allow proper gravity feed from the fuel tank
Keeping fuel pump away from direct contact with hot engine
Freeing up space directly in front of engine, or to run stock water pump

BELT TYPE FUEL PUMP DRIVES: E-TYPE

#5260 E-Type kit installed on small block Chevrolet V8

#5261 Kit for small block Chevrolet V8

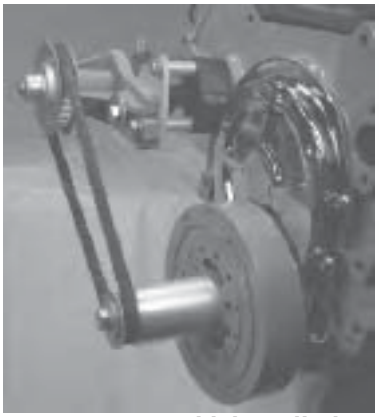
COMPLETE KIT CONSISTS OF:
Drive unit, crank hub, pulleys, bracket,belt, and hardware.

5260	Small block Chevrolet V-8
5261	Big block Chevrolet V-8
5262	Chrysler 426 Hemi V-8
5263	Ford big block V-8: 429/460 style

COMPONENTS

5264	Pulley, 32-tooth, 1/2" wide, 5/8" bore, 3/16" wide keyway, aluminum with guides
5265	Pulley, 28-tooth, 1/2" wide, 5/8" bore, 3/16" wide keyway, aluminum with guides
5266	Pulley, 14-tooth, 1/2" wide, 5/8" bore, 3/16" wide keyway, aluminum with guides
5277	Pulley, 16-tooth, 1/2" wide, 5/8" bore, 3/16" wide keyway, aluminum with guides
5267	Crank hub, small block Chevrolet V8, with 16-tooth pulley
5268	Crank hub, big block Chevrolet V8, with 16-tooth pulley
5269	Drive bracket kit, small block Chevrolet V8, with 32-tooth pulley and bracket
5270	Drive bracket kit, big block Chevrolet V8, with 32-tooth pulley and bracket
5279	Casting with shaft, bearing, and 32-tooth pulley
5271	Shaft: for #5260, #5261, #5262, and #5263 belt drives
5272	Bearing for shaft #5271, one required
5273	Mounting plate ONLY, for small block Chevrolet V8
5274	Mounting plate ONLY, for big block Chevrolet V8

BELT TYPE FUEL PUMP DRIVE: H-TYPE



#5241 H-Type kit installed on big block Chevrolet V8

#5240 H-type kit for small block Chevrolet V8

COMPLETE KIT CONSISTS OF:
Drive unit, crank hub, pulleys, bracket,belt, and hardware.

5240	Small block Chevrolet V-8
5241	Big block Chevrolet V-8
5242	Chrysler 426 Hemi V-8
5243	Ford small block V-8: 289/302/351
5244	Chrysler small block V-8

COMPONENTS

5245	Pulley, 32-tooth, 1/2" wide, 5/8" bore, 3/16" wide keyway, aluminum, 5/8" offset, bell shaped with guides
5246	Pulley, 16-tooth, 1/2" wide, 1 1/4" bore, 1/8" side keyway, aluminum, with guide on one side
5247	Crank hub adapter, small block Chevrolet V8, includes 16-tooth pulley
5248	Crank hub adapter, big block Chevrolet V8, includes 16-tooth pulley
5229	Crank hub adapter, fits inside 6-71 blower pulley, includes 16-tooth pulley
5249	Drive bracket kit, small block Chevrolet V8, with 32-tooth pulley and bracket
5250	Drive bracket kit, big block Chevrolet V8, with 32-tooth pulley and bracket
5251	Shaft, for #5240, #5241, #5242, and #5243
5252	Bearing, for shaft #5251, two required
5253	Mounting plate ONLY, for small block Chevrolet V8
5254	Mounting plate ONLY for big block Chevrolet V8
5255	Casting with shaft, bearings, and 32-tooth pulley

BELT TYPE FUEL PUMP DRIVE: W-TYPE

COMPLETE KIT CONSISTS OF:
Billet aluminum drive unit, crank hub, **radius tooth** pulleys, metric belt, bracket and hardware.

5294-D	Small block Chevrolet V8, pump installed on Driver side
5294-P	Small block Chevrolet V8, pump installed on Passenger side
5295-D	Big block Chevrolet V8, pump installed on Driver side
5295-P	Big block Chevrolet V8, pump installed on Passenger side

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DRIVES FOR MECHANICAL PUMP

KINSLER HEAVY-DUTY
RIGHT ANGLE DISTRIBUTOR DRIVE

For Chevrolet small and big block, passenger (9.8" deck) and truck block (10.2" deck), engines. Can be adapted for many uses. Used on Lucas mechanical system to drive the ignition and fuel metering unit. The horizontal drive shaft has a 3/8 female hex; can drive a mechanical constant flow fuel pump or our "Shortie" distributor (see Pg #222). The top receiver is machined for a tang drive or can be sealed off; we have Vertex magnetos to fit this, or the hex drive. The gear driven drive assembly requires lubrication from the engine oil system. We offer a special filtered Z-20 lubrication nozzle for this purpose. Optional mechanical tachometer drive.

EXTENSIONS - FUEL PUMP

5215	Complete Kinsler 2 1/4" extension
5216	Housing only, Kinsler 2 1/4", billet aluminum
5217	Shaft with coupler for Kinsler 2 1/4" extension
5220	Complete Kinsler 4 1/2" extension
5221	Housing ONLY, Kinsler 4 1/2" extension
5222	Shaft with coupler for Kinsler 4 1/2" extension
5224	Complete Weiand 6" extension
5225	Shaft with coupler for Weiand 6" extension
5230	Complete Hilborn 6" extension
5231	Shaft with coupler, for Hilborn 6" extension
5232	Bearing only, for #5230, sealed, two required

OVERDRIVE

Billet aluminum housing with 3/8" male hex input and 3/8" female hex overdriven output. Unit is gear to gear, NO belt. The output shaft turns the same direction as the input shaft.


Spur gear


#5235 overdrive assembly

DISCONTINUED

5235	Overdrive assembly, complete, 1-set of gears included - specify ratio of 10, 14, 18, or 22% overdrive
5236	Spur gears, 10% overdrive ratio, spare/replacement
5237	Spur gears, 14% overdrive ratio, spare/replacement
5238	Spur gears, 18% overdrive ratio, spare/replacement
5239	Spur gears, 22% overdrive ratio, spare/replacement

3/8" COUPLER AND SHAFT

5233	Coupler only, 3/8" hex female, cold roll steel
5234	Shaft material only, 3/8" hex, cold roll steel, sold per inch

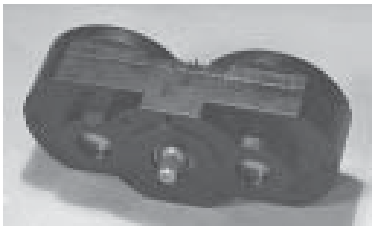
PHENOLIC INSULATOR

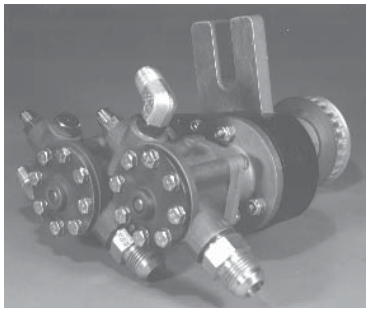
Helps isolate the fuel pump from heat transfer at it's mounting surface.

Note: Always be certain that the pump hex shaft has sufficent engagement when adding this insulator.


#5276

5276	.140" thick, insulates drive heat from mechanical fuel pump


#5275


#5275 with two Hilborn fuel pumps installed, on belt drive unit

DUAL PUMP DRIVE

Billet aluminum housing with 3/8" male hex input and two 3/8" female hex driven outputs. Gear to gear design does not require a belt. Output shafts turn the opposite rotation as input, 1:1 ratio.

5275	Dual pump drive assembly, complete

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COG BELTS AND PULLEYS

COG BELTS - XL037 SERIES

3/8" wide, 1/5 pitch

5300	110-XL037; 11" circumference
5301	120-XL037; 12" circumference
5302	130-XL037; 13" circumference
5303	140-XL037; 14" circumference
5304	150-XL037; 15" circumference
5305	160-XL037; 16" circumference
5306	170-XL037; 17" circumference
5307	180-XL037; 18" circumference
5308	190-XL037; 19" circumference
5309	200-XL037; 20" circumference
5310	210-XL037; 21" circumference
5311	220-XL037; 22" circumference
5312	230-XL037; 23" circumference
5313	240-XL037; 24" circumference
5314	250-XL037; 25" circumference
5315	260-XL037; 26" circumference
5316	280-XL037; 28" circumference
5317	290-XL037; 29" circumference
5318	300-XL037; 30" circumference
5319	320-XL037; 32" circumference
5360	330-XL037; 33" circumference

COG BELTS - L050 SERIES

1/2" wide, 3/8 pitch

5320	210-L050; 21" circumference
5321	225-L050; 22 1/2" circumference
5322	240-L050; 24" circumference
5323	255-L050; 25 1/2" circumference
5324	270-L050; 27" circumference
5325	285-L050; 28 1/2" circumference
5326	300-L050; 30" circumference
5327	322-L050; 32 1/4" circumference
5328	345-L050; 34 1/2" circumference
5329	367-L050; 36 3/4" circumference
5330	390-L050; 39" circumference
5331	420-L050; 42" circumference
5332	450-L050; 45" circumference

COG BELTS - L075 SERIES

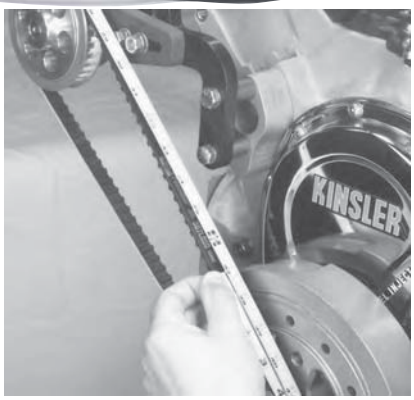
3/4" wide, 3/8 pitch

5340	210-075; 21" circumference
5341	225-075; 22 1/2" circumference
5342	240-075; 24" circumference
5343	255-075; 25 1/2" circumference
5344	270-075; 27" circumference
5345	285-075; 28 1/2" circumference
5346	300-075; 30" circumference
5347	322-075; 32 1/4" circumference
5348	345-075; 34 1/2" circumference
5349	367-075; 36 3/4" circumference

COG BELTS - L100 SERIES

1" wide, 3/8 pitch

5350	210-100; 21" circumference
5351	225-100; 22 1/2" circumference
5352	240-100; 24" circumference
5353	255-100; 25 1/2" circumference
5354	270-100; 27" circumference
5355	285-100; 28 1/2" circumference
5356	300-100; 30" circumference
5357	322-100; 32 1/4" circumference
5358	345-100; 34 1/2" circumference
5359	367-100; 36 3/4" circumference



Belts are measured in circumference

COG PULLEYS XL037 SERIES

Steel WITH flanges

5650	12 tooth, 3/16" plain bore
5653	14 tooth, 1/4" plain bore
5656	16 tooth, 1/4" plain bore
5659	18 tooth, 1/4" plain bore
5660	20 tooth, 1/4" plain bore
5663	22 tooth, 1/4" plain bore
5675	30 tooth, 5/16" plain bore

Aluminum WITH flanges

5661	20 tooth, 1/4" plain bore
5664	22 tooth, 1/4" plain bore
5667	24 tooth, 1/4" plain bore
5670	26 tooth, 1/4" plain bore
5673	28 tooth, 1/4" plain bore
5676	30 tooth, 3/8" plain bore
5685	36 tooth, 3/8" plain bore
5687	36 tooth, 3/8" plain bore, SPECIAL bolt-on flanges

Aluminum WITHOUT flanges

5662	20 tooth, 1/4" plain bore
5665	22 tooth, 1/4" plain bore
5668	24 tooth, 1/4" plain bore
5671	26 tooth, 1/4" plain bore
5674	28 tooth, 1/4" plain bore
5677	30 tooth, 3/8" plain bore
5690	40 tooth, 5/16" plain bore
5696	44 tooth, 5/16" plain bore
5699	72 tooth, 3/8" plain bore

COG PULLEYS L050 SERIES

MACHINED SHAFT BORE

Aluminum with two belt guide flanges

5245	32 tooth, 5/8" bore with 3/16" keyway
5246	16 tooth, 1 1/4" bore, 1/8" keyway, ONLY 1 flange
5264	32 tooth, 5/8" bore, 3/16" keyway
5265	28 tooth, 5/8" bore, 3/16" keyway
5277	16 tooth, 7/8" bore, 3/16" keyway
5266	14 tooth, 5/8" bore, 3/16" keyway
5382	18 tooth, 1/2" bore, 1/8" keyway, backside of pulley machined out to fit Lucas/Cosworth mechanical pump drive
5383	20 tooth, 1/2" bore, 1/8" keyway, backside of pulley machined out to fit Lucas/Cosworth mechanical pump drive
5384	22 tooth, 1/2" bore, 1/8" keyway, backside of pulley machined out to fit Lucas/Cosworth mechanical pump drive

UN-MACHINED SHAFT BORE

Aluminum with two belt guide flanges

5370	12 tooth, 1/2" plain bore
5371	13 tooth, 1/2" plain bore
5372	14 tooth, 1/2" plain bore
5373	15 tooth, 1/2" plain bore
5374	16 tooth, 1/2" plain bore
5375	17 tooth, 1/2" plain bore
5376	18 tooth, 1/2" plain bore
5377	19 tooth, 1/2" plain bore
5378	20 tooth, 1/2" plain bore
5379	21 tooth, 1/2" plain bore
5380	22 tooth, 1/2" plain bore
5381	24 tooth, 1/2" plain bore
5387	27 tooth, 1/2" plain bore

LABOR - MACHINE SHAFT BORE AND BROACH

5397	Bore 1/2" plain bore pulley to 5/8" inside diameter
5398	Broach 3/16" keyway in 5/8" I.D. pulley bore
5399	Broach 1/4" keyway in 5/8" I.D. pulley bore
5392	Bushing, adapts 1/2" bore 1/8" keyway pulley onto a 7/16" diameter 1/8" keyway shaft

PRIMER SYSTEM

#6065 Primer System

#6066 Primer System

KIT #6066 IS THE SAME AS #6065 EXCEPT FOR FUEL PUMP (#10211) WHICH HAS 'AN' MALE FLARE FITTINGS ON BOTH ENDS

Excellent for Constant Flow Injection systems, to assist in starting the engine.

Driver can prime engine from drivers seat. Ideal for the racer who is traveling alone.

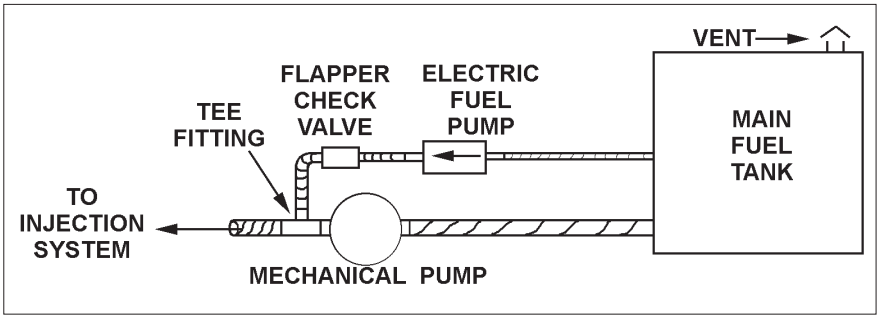
Safer - NO squirt bottle.

PRIMER SYSTEM

Kits consist of necessary components to properly install the primer pump. Hose and hose ends are NOT supplied in kit, since plumbing is unique to each installation, available separately, see Page #187.

This system reduces the cranking required by purging the air out of the fuel plumbing, especially on initial "fire up" for the day's racing. Great for mechanical pump lubrication during initial cranking and starting. This system can be plumbed with gasoline from an auxiliary tank on those applications where methanol is used and hard starting is experienced, especially in cold weather.

6065	Consists of: #22003 electric 12V fuel pump, #3091 6 AN flapper check valve, #6151 swivel t-fitting, momentary switch and panel mount housing, wire terminals (female spade),fuse holder with 10 amp fuse, and 20 feet of 18-AWG type SXL wire
6066	Consists of: #10210 electric 12V fuel pump, #3091 6 AN flapper check valve, #6151 swivel t-fitting, momentary switch and panel mount housing, wire terminals (female spade),fuse holder with 10 amp fuse, and 20 feet of 18-AWG type SXL wire



PREFERRED PLUMBING SCHEMATIC FOR PRIMING SYSTEM

Ambrose/Argenta/Huettman/Varsity Ford's NHRA Competition Eliminator I/A record holders for E.T. (7.92 - 9/99) and M.P.H. (163.65 - 8/99) using a Kinsler fuel system on 300 cubic inch 6-cylinder in-line Ford

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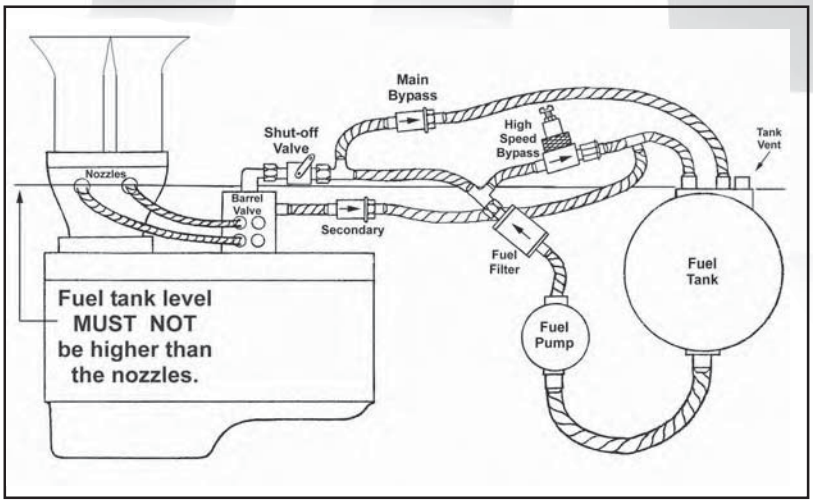
FUEL TANK CONSTRUCTION AND LOCATION

LOCATION

When mounting the fuel tank for a mechanical fuel injection system, DO NOT locate the maximum fuel level in the tank above the nozzles. This is to prevent the fuel from draining into the engine if the fuel shut-off valve is left open.... this is not a problem in an EFI system as the injectors shut off tight when the engine is not running.



FILTER BETWEEN TANK AND PUMP

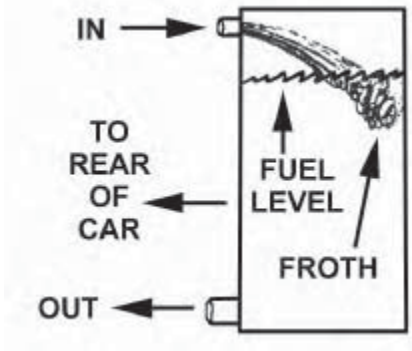
We strongly encourage ***CAUTION*** when using any filter on the inlet side of any pump. A filter can restrict the flow if the pump has to suck the fuel through the filter, the vacuum it has to pull to do it lowers the fuel's boiling point and may cause inlet cavitation. It is always best to strain the fuel when putting it into the tank and use a Kinsler filter between the pump and the barrel valve. If you want to use a filter before the pump, have a Kinsler technician spec a proper Kinsler Monster Mesh filter.

SHUT-OFF VALVE

NEVER shut off the flow to the pump above idle speed; it may cause damage, since the fuel lubricates the pump. If a shut-off is installed to give access to a pump inlet filter, make sure the inside diameter of the shut-off valve and any adapter fittings have the proper inside diameter. See Page #102 for minimum inlet hose sizes.

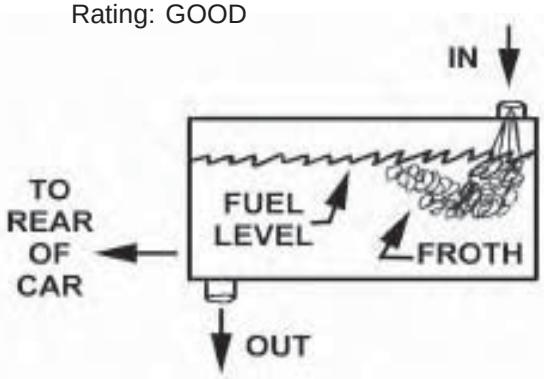
FUEL TANK CONSTRUCTION:

DESIGN #1
Rating: EXCELLENT



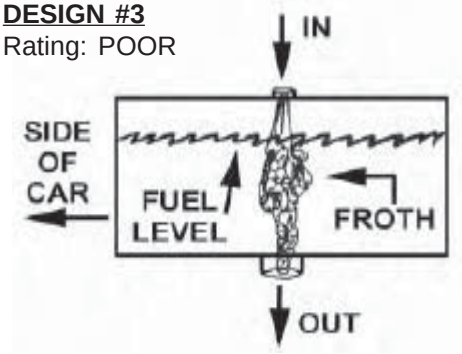
The return fuel shoots across the tank, causing minimum frothing. Deep construction minimizes slosh due to car movement; insures clear fuel at the outlet. Outlet to the rear is best; to the side is OK.

DESIGN #2
Rating: GOOD



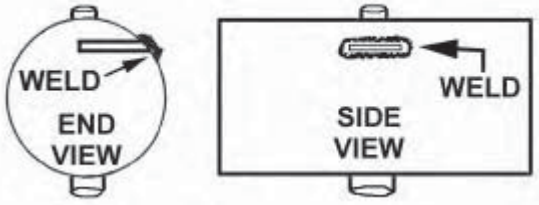
This design shoots the return fuel directly down into the tank, but the froth comes back to the surface before reaching the outlet. It is preferred to place the outlet toward the rear of the car; can be sideways.

DESIGN #3
Rating: POOR



It is preferred to install this type of tank sideways in the vehicle. This design is poor since the return fuel shoots directly into the fuel, froths up, and the froth is easily sucked out the outlet directly below. Early Moon tanks were constructed like this.

FIX FOR DESIGN #3; MAKES #2 BETTER



Make a slit in the side of the tank. Slide a .050" to .125" thick plate into the slit so it extends 1" below and 1" to all sides of the fitting. Weld in place. The incoming force of the fuel will be dissipated against the plate.

FUEL CELLS AND/OR BLADDERS

Due to the design of these types of fuel tanks, it may not be possible to install any baffles. The best thing to do is to fill the tank with a fuel compatible foam baffle material.

CAUTION - The foam MUST be compatible with the fuel and additives that may be used. If the foam breaks down, it will clog the fuel system. Even if the manufacturer states that the foam is compatible, put a piece of it in a sample of the *FUEL BEING USED* and *TEST IT !!!*

FUEL TANK CONSTRUCTION AND LOCATION

VENT SIZES

The tank MUST have a vent. Large amounts of fuel volume are being removed from the tank. This volume must be replaced or a vacuum may be formed inside the tank, causing the fuel to be 'locked' inside. Scenario - a straw in a drinking glass: put a finger on the end of the straw and lift it out of the liquid; the straw retains the liquid until the finger is removed and allows air in.

NOTICE : Fuel tank and cell manufacturers may *NOT* offer a tank that is properly configured for your application.

Too large of a vent will not hurt anything, too small may cause the pump to cavitate, resulting in an inconsistent fuel supply or damaged engine parts. Remember when altering a vent by adding length (hose), installing a roll-over valve, or a filter, the vent may require a larger inside diameter (see ORIFICE THEORY on Pages #202-203).

MINIMUM ALLOWABLE TANK VENT SIZES:
For pump sizes of -00 up to -1 3/8" (.375") inside diameter or bigger
For pump sizes of -2 up to -4 1/2" (.500") inside diameter or bigger.
For pump sizes of -5 or bigger 3/4" (.750") inside diameter or bigger.

Please consult your rule book/sanctioning body for additional requirements.

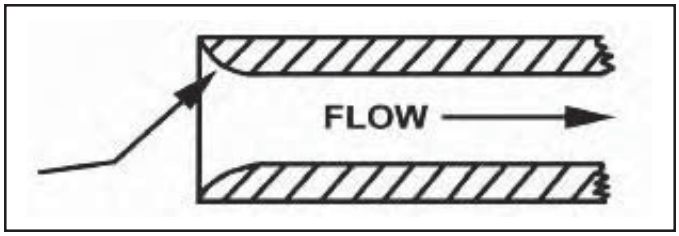
NOTE: When running multiple pump systems multiply the area of the above vent sizes by the quantity of fuel pumps.

OUTLET OF THE TANK

The outlet of the tank or cell should be at the lowest point on the tank/cell. It is best if the main feed hose to the fuel pump runs down from the tank to the pump, NOT UP. Fuel pumps are not designed to draw fuel, they are meant to be gravity fed. Pumps will pull fuel because of the fuel siphon due to displacement.

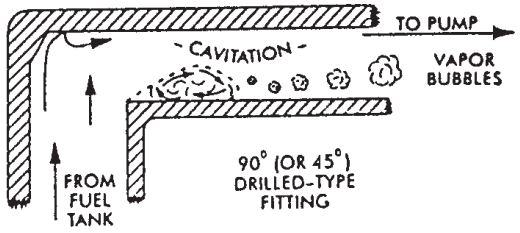
FITTING FOR OUTLET OF THE TANK

Bore the inside diameter (I.D.) of the tank outlet and pump inlet fittings as large as possible without unduly weakening the fitting. Chamfer the fitting on the tank outlet as shown at the right.



Kinsler hard-anodized fittings are designed like this, see FITTINGS on Page #183.

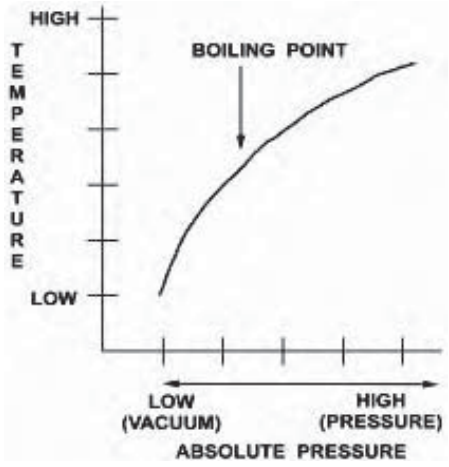
NEVER use a "drilled block of metal" type angle fitting on ANY pump inlet hose... where the drills intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses. However, if there is a really tight place, use a bent tube type hose end fitting.



LIQUID BOILING VERSUS BAROMETER AND TEMPERATURE

This subject is very complex, we are only going to discuss it in very general terms. There are many chemistry books, scientific papers, and web sites that can help further the understanding of this topic.

The boiling point of a liquid is affected by temperature and absolute pressure. Absolute pressure takes into consideration altitude. The temperature at which the vapor pressure of the liquid exceeds the pressure around the liquid is the boiling point. At temperatures below the boiling point, evaporation takes place only from the surface of the liquid; during boiling, vapor forms within the body of the liquid. As the vapor bubbles rise through the liquid, they cause the turbulence and the conditions that are associated with boiling. When the pressure against a liquid is increased, the boiling point goes up. When the pressure on a liquid is reduced, the boiling point goes down.



The lowest boiling point is that of helium, -452^{0}F (-268.9^{0}C). The highest is probably that of tungsten, about 10,650^{0}F (5900^{0}C).
Water is generally 212^{0}F at one standard atmosphere pressure (29.92" Hg).

See also KINSLER VAPOR SEPARATOR TANK SYSTEM / PRESSURIZED PUMP INLET SYSTEM on Pages #115-118.

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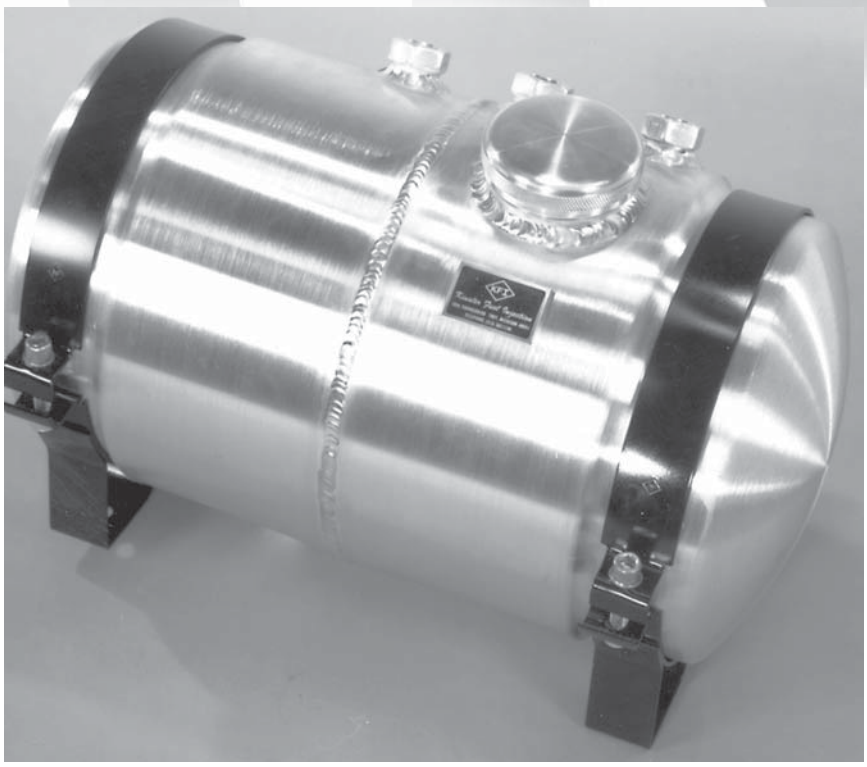
ALUMINUM TANKS AND COMPONENTS



BUILDING YOUR OWN TANK...
WE WILL BE GLAD TO SUPPLY ANY COMBINATION OF PIECES !!!

Release compound required with aluminum screw-on cap to prevent galling and seizing

CAPS WITH WELD-IN BUNGS

5831	Cap and aluminum weld bung, 2 1/8" I.D. with screw-on cap
5837	Cap only, same as included with #5831
5832	Cap and steel weld bung, 2 1/8" I.D., bayonet/twist-lock cap

KINSLER ALUMINUM TANKS

Our tanks are in stock and pressure tested for immediate shipment. Brushed spun aluminum, approx. .080" thick wall. All tanks have three bungs (3/8" female NPT) located near the top, one outlet (3/4" female NPT), one drain (1/8" NPT), and screw on filler cap (2 1/4" ID).

Custom built tanks are available.

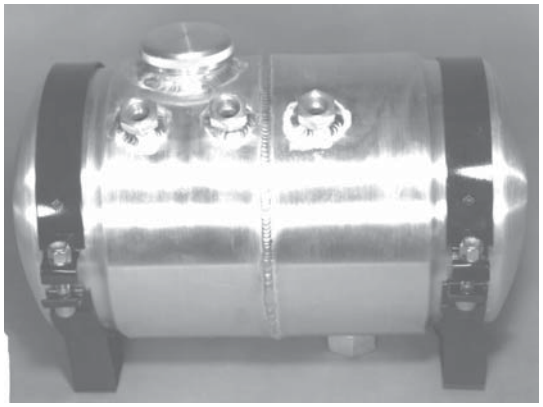
Individual components can be purchased.

5800	2-gallon, horizontal, 10" long x 8 1/2" diameter
5801	3 1/2-gallon, horizontal, 15" long x 8 1/2" diameter
5802	5-gallon, horizontal, 20" long x 8 1/2" diameter
5806	6-gallon, horizontal, 27" long x 8 1/2" diameter

BODY HALVES FOR ALUMINUM TANK

One solid piece, brushed spun aluminum, approx. .080" thick wall.

5816	Tank half, 1-gallon, 5" long x 8 1/2" diameter
5817	Tank half, 1 3/4-gallon, 7 1/2" long x 8 1/2" diameter
5818	Tank half, 2 1/2-gallon, 10" long x 8 1/2" diameter



MOUNTING BRACKETS FOR ALUMINUM TANKS

5810	Pair, for 8 1/2" diameter tank only, formed steel strap design, black epoxy painted

Custom-made spun aluminum fuel tank

FITTINGS AND BUNGS

WELD-IN AN MALE FLARE BUNGS

Machined from 6061 aluminum.

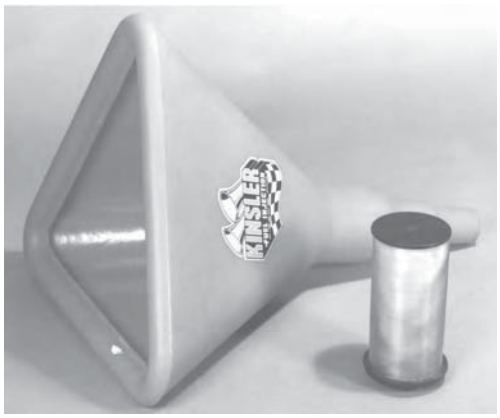
6164	6 AN male flare, straight, 17/32" male pilot
6165	6 AN male flare, 45 deg., 17/32" male pilot
6162	8 AN male flare, straight, 5/8" male pilot
6253	6 AN male flare, straight, 1/2" male pilot, 3/4" hex
6254	8 AN male flare, straight, 5/8" male pilot, 7/8" hex
6255	10 AN male flare, straight, 3/4" male pilot, 15/16" hex
6256	12 AN male flare, straight, 3/4" male pilot, 1 1/8" hex

WELD-IN FEMALE BUNGS - NATIONAL PIPE TAP (NPT) and AN

Machined from 6061 aluminum.

5845	1/8" NPT female, 3/4" hex
5846	1/4" NPT female, 7/8" hex
5847	3/8" NPT female, 1" hex
5848	1/2" NPT female, 1 1/4" hex
5849	3/4" NPT female, 1 1/2" hex
5850	1" NPT female, 1 1/2" hex

6221	4 AN female with o-ring pocket
6222	6 AN female with o-ring pocket
6223	8 AN female with o-ring pocket
6224	10 AN female with o-ring pocket
6225	12 AN female with o-ring pocket



FUNNEL - FILTER

5610	Funnel, plastic molded with cleanable/reusable stainless steel filter insert, 9" triangular opening with anti-slosh lip, tapered and two stepped outlet to fit 1.450" to 2.050" I.D. filler neck
5621	Filter insert, cleanable/reusable stainless steel element, 35.6 square inches of 60 micron filter media

Filter funnel in spun aluminum tank

CLASSIC STYLE WITH HIGH TECHNOLOGY

Bill Duff's AC Cobra (ERA replica) powered by a Dale Hall built 567 cubic inch big block Ford with TFS Pro-Stock aluminum cylinder heads. Kinsler injection manifold with special modifications made per customer's request : relocate EFI injectors to inside of runners, with white PPG Deltron® paint, and Kinsler billet aluminum radius inlet plates.

Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

FITTINGS

We have a large selection of adapter fittings, hose ends, and hose.
These pages barely show the beginning of our inventory.
If you aren't sure what you need, give us a call and we'll be glad to help. Most fittings are available in aluminum, some in steel. We also have a HUGE supply of speciality fittings.

Light Weight Fittings Specailly Designed for use with Alcohol!

#6043

#6178

Radius close-up of #6120

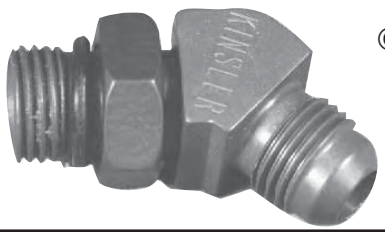
#6120

KINSLER HARD ANODIZED AN FITTINGS

Hard-anodized aluminum. Radius on o-ring end for smooth flow entering or exiting the fitting. The below fittings that adapt two different AN sizes have a tapered bore between the two inside diameters.

6156	6 AN male flare x 6 AN male + o-ring
6300	6 AN male flare x 6 AN male + nut and o-ring, 45 degree
6044	6 AN male flare x 8 AN male + o-ring
6043	8 AN male flare x 8 AN male + o-ring
6108	8 AN male flare x 10 AN male + o-ring
6120	8 AN male flare x 12 AN male + o-ring
6109	10 AN male flare x 10 AN male + o-ring
6177	10 AN male flare x 8 AN male + o-ring
6121	10 AN male flare x 12 AN male + o-ring
6179	12 AN male flare x 12 AN male + o-ring
6178	12 AN male flare x 8 AN male + o-ring
6101	16 AN male flare x 8 AN male + o-ring
6100	16 AN male flare x 12 AN male + o-ring

#6300



#6906 *#6905* *#6910*

PUSH-LOCK HOSE ENDS

Made for use with the Push-Lock hose. This is the most economical way to plumb for gasoline, alcohol, oil, water, air, etc. Simply cut the hose to length, apply lubricant, and push on the hose end.

6906	6 AN straight
6908	8 AN straight
6905	6 AN 45-degree bent tube
6909	8 AN 45-degree bent tube
3907	6 AN 90-degree bent tube
6910	8 AN 90-degree bent tube
6912	12 AN straight

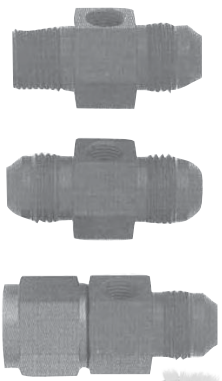
PUSH-LOCK HOSE

Neoprene hose with internal braid reinforcement is available in 6 AN, 8 AN, and 12 AN with push on hose end fittings. This is the most economical way to plumb for gasoline, alcohol, oil, water, air, etc. Simply cut the hose to length and push on the hose end.
Operating pressure: 250 PSI ; burst: 1,000 PSI.
Temperature rating : -40^{0}F to +212^{0}F

6926	3/8" inside diameter
6928	1/2" inside diameter
6932	3/4" inside diameter

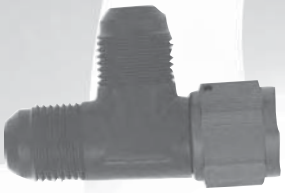
FITTINGS FOR PRESSURE GAUGE ADAPTING

All the aluminum fittings below have a 1/8" female NPT port.



35616	6 AN x 1/4" male NPT
35617	6 AN x 3/8" male NPT
35618	8 AN x 1/4" male NPT
35619	8 AN x 3/8" male NPT
35620	6 AN male flare x 6 AN male flare
35621	8 AN male flare x 8 AN male flare
35622	10 AN male flare x 10 AN male flare
35623	6 AN male flare x 6 AN female swivel
35624	8 AN male flare x 8 AN female swivel
35625	10 AN male flare x 10 AN female swivel

FITTINGS

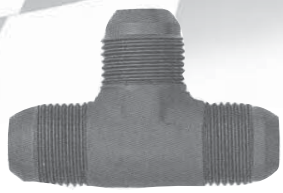


TEE
Aluminum with female swivel on run

35300	3 AN
35301	4 AN
6152	6 AN
6117	8 AN
35304	10 AN
35305	12 AN

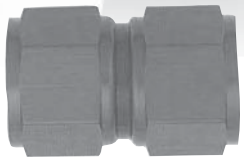
TEE
Aluminum with female swivel on side

35309	3 AN
35310	4 AN
6151	6 AN
6116	8 AN
35313	10 AN
35314	12 AN



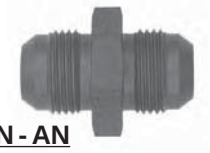
TEE
Aluminum with male flare on all sides

35331	3 AN
35332	4 AN
35333	6 AN
35334	8 AN
35335	10 AN
35336	12 AN



UNION
Aluminum with female swivel on both ends

35423	4 AN
6150	6 AN
6041	6 AN by 8 AN
6042	8 AN
35427	10 AN
35428	12 AN



UNION - AN
Aluminum with male flare on both ends

35380	3 AN
35381	4 AN
35382	6 AN
35383	8 AN
35384	10 AN
35385	12 AN

TEE - AN
Aluminum with female on all sides

35460	3 AN
35461	4 AN
35462	6 AN
35463	8 AN
35464	10 AN
35465	12 AN

CAP - AN
Aluminum

35553	3 AN
35554	4 AN
35556	6 AN
35558	8 AN
35560	10 AN
35562	12 AN

UNION-45 DEGREE
Aluminum with male flare by female swivel

35441	4 AN
6112	6 AN
6114	8 AN
35444	10 AN
35445	12 AN

UNION-90 DEGREE
Aluminum with male flare by female swivel

35451	4 AN
6113	6 AN
6115	8 AN
35454	10 AN
35455	12 AN

UNION - ADAPTER
Aluminum with male flare on both ends

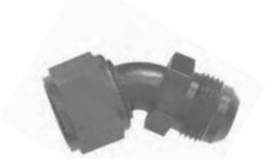
35389	3 AN by 4 AN
35390	3 AN by 6 AN
35391	4 AN by 6 AN
35394	6 AN by 8 AN
35396	6 AN by 10 AN
35397	8 AN by 10 AN
35399	6 AN by 12 AN
35400	8 AN by 12 AN
35401	10 AN by 12 AN
35402	10 AN by 16 AN
35403	12 AN by 16 AN

NUT - AN
Aluminum

35603	3 AN
35604	4 AN
35606	6 AN
6292	6 AN Hard-Anodized
35608	8 AN
35610	10 AN
35612	12 AN

PLUG - MALE FLARE
Aluminum

35545	3 AN
35546	4 AN
35547	6 AN
35548	8 AN
35549	10 AN
35550	12 AN



UNION-45 DEGREE
Aluminum with male flare by female swivel

35407	4 AN
35408	6 AN
35409	8 AN
35410	10 AN
35411	12 AN

UNION-90 DEGREE
Aluminum with male flare by female swivel

35415	4 AN
35416	6 AN
35417	8 AN
35418	10 AN
35419	12 AN

BULKHEAD-STRAIGHT
Aluminum with male flare on both ends

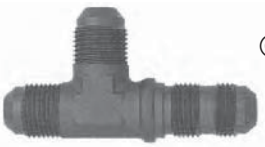
35340	3 AN
35341	4 AN
35342	6 AN
35343	8 AN
35344	10 AN
35345	12 AN

BULKHEAD-45 DEGREE
Aluminum with male flare on both ends

35350	3 AN
35351	4 AN
35352	6 AN
35353	8 AN
35354	10 AN
35355	12 AN

BULKHEAD-90 DEGREE
Aluminum with male flare on both ends

35360	3 AN
35361	4 AN
35362	6 AN
35363	8 AN
35364	10 AN
35365	12 AN



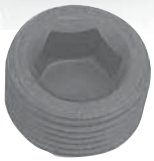
BULKHEAD TEE
Aluminum with male flare on all ends, bulkhead on run

35316	3 AN
35317	4 AN
35318	6 AN
35319	8 AN
35320	10 AN
35321	12 AN

BULKHEAD TEE
Aluminum with male flare on all ends, bulkhead on run

35316	3 AN
35317	4 AN
35318	6 AN
35319	8 AN
35320	10 AN
35321	12 AN

FITTINGS



PLUG - MALE NPT

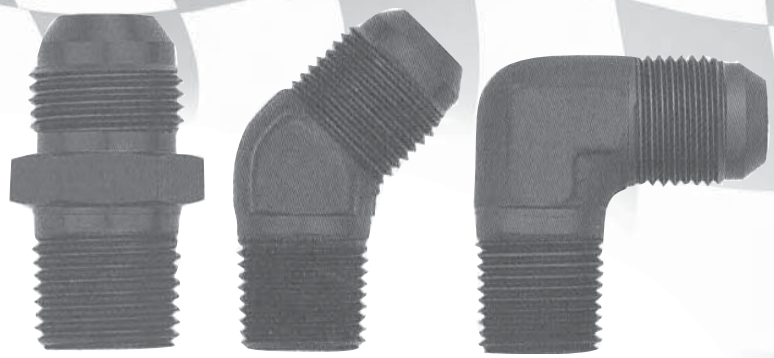
Recess hex

35535	1/16" aluminum
6160	1/8" stainless steel
35537	1/8" aluminum
35538	1/4" aluminum
35539	3/8" aluminum
35540	1/2" aluminum
35541	3/4" aluminum
35542	1" aluminum

REDUCER - NPT

Aluminum with female NPT by male NPT

35520	1/8" female x 1/4" male
35521	1/8" female x 3/8" male
35522	1/4" female x 3/8" male
35523	1/8" female x 1/2" male
35524	1/4" female x 1/2" male
35525	3/8" female x 1/2" male
35526	1/4" female x 3/4" male
35527	3/8" female x 3/4" male
35528	1/2" female x 3/4" male
35529	3/8" female x 1" male
35530	1/2" female x 1" male
35531	3/4" female x 1" male



FITTING - AN MALE FLARE X MALE NPT

Aluminum with male flare by male NPT

AN	NPT	STRAIGHT	45-DEGREE	90-DEGREE
3	1/8	35565	35665	35765
3	1/4	35566	35666	35766
4	1/8	35567	35667	35767
4	1/4	35568	35668	35768
6	1/8	35569	35669	35769
6	1/4	35570	35670	35770
6	3/8	35571	35671	35771
6	1/2	35572	35672	35772
8	1/4	35573	35673	35773
8	3/8	35574	35674	35774
8	1/2	35575	35675	35775
8	3/4	35576	35676	35776
10	3/8	35577	35677	35777
10	1/2	35578	35678	35778
10	3/4	35579	35679	35779
12	1/2	35580	35680	35780
12	3/4	35581	35681	35781
12	1	35582	35682	35782
16	3/4	35583	35683	35783
16	1	35584	35684	35784

TEE - NPT ON RUN

Aluminum with two AN male flares and NPT male on run

35500	3 AN x 1/8" NPT
35501	4 AN x 1/8" NPT
35502	6 AN x 1/4" NPT
35503	8 AN x 3/8" NPT
35504	10 AN x 1/2" NPT
35505	12 AN x 3/4" NPT

TEE - NPT ON SIDE

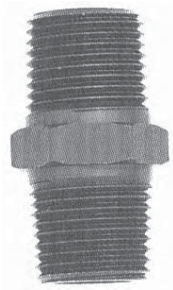
Aluminum with two AN male flares and NPT male on side

35510	3 AN x 1/8" NPT
35511	4 AN x 1/8" NPT
35512	6 AN x 1/4" NPT
35513	8 AN x 3/8" NPT
35514	10 AN x 1/2" NPT
35515	12 AN x 3/4" NPT

FITTING - AN X SWIVEL NPT MALE ADAPTER

Aluminum with swivel by male NPT

AN	NPT	STRAIGHT	FEMALE SWIVEL 90-DEGREE	MALE FLARE 90-DEGREE
3	1/8	35587	35717	35787
4	1/8	35588	35718	35788
4	1/4	35589	35719	35789
6	1/8	35590	35720	35790
6	1/4	35591	35721	35791
6	3/8	35592	35722	35792
8	1/4	35593	35723	35793
8	3/8	35594	35724	35794
8	1/2	35595	35725	35795
10	3/8	35596	35726	35796
10	1/2	35597	35727	35797
12	1/2	35598	35728	35798
12	3/4	35599	35729	35799



UNION - MALE NPT

Aluminum with male NPT on both ends

35478	1/8"
35479	1/4"
35480	3/8"
35481	1/2"
35482	3/4"
35483	1"

UNION - FEMALE NPT

Aluminum with female NPT on both ends

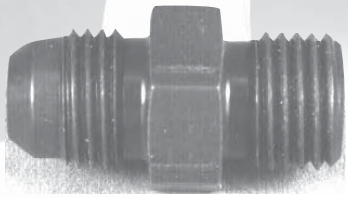
35488	1/8"
35489	1/4"
35490	3/8"
35491	1/2"
35492	3/4"
35493	1"

TEE - NPT

Aluminum with female NPT on all sides

35470	1/8"
35471	1/4"
35472	3/8"
35473	1/2"
35474	3/4"
35475	1"

FITTINGS



FITTING - AN MALE FLARE X METRIC

Hard-anodized aluminum, compatible with alcohol.

6181	6 AN male flare x 12mm 1.5 male
6183	6 AN male flare x 14mm 1.5 male
6182	8 AN male flare x 12mm 1.5 male
6186	8 AN male flare x 14mm 1.5 male

PLUG FOR 1/2-20 NOZZLE BOSS

Ideal for blocking off nozzle boss in injection manifold if 'down' nozzles are being used.

6160	Alumminum, blue anodized, includes o-ring

BULKHEAD

Ideal for mounting shut-off onto fuel pump, etc. Anywhere that two parts need to be closely mounted. Radius on both ends for good flow. Steel fitting for strength and aluminum nut, includes o-rings.

35337	6 AN male + o-ring x 6 AN bulkhead with nut + o-ring
35338	6 AN male + o-ring x 8 AN bulkhead with nut + o-ring
6048	8 AN male + o-ring x 6 AN bulkhead with nut + o-ring
6047	8 AN male + o-ring x 8 AN bulkhead with nut + o-ring
35346	10 AN male + o-ring x 8 AN bulkhead with nut + o-ring
35347	10 AN male + o-ring x 10 AN bulkhead with nut + o-ring
35339	12 AN male + o-ring x 8 AN bulkhead with nut + o-ring
35348	12 AN male + o-ring x 10 AN bulkhead with nut + o-ring
35349	12 AN male + o-ring x 12 AN bulkhead with nut + o-ring

AN ADAPTER BUSHING

6102	3 AN female with o-ring pocket x 8 AN male + o-ring, aluminum
6103	6 AN female with o-ring pocket x 8 AN male + o-ring, aluminum

PLUG FOR 14MM NOZZLE BOSS

Ideal for blocking off nozzle boss in injection manifold were Lucas mechanical nozzle was located. Sealing spark plug holes for engine storage shipment. 14mm x 1.25.

6161	Alumminum, blue anodized, includes o-ring

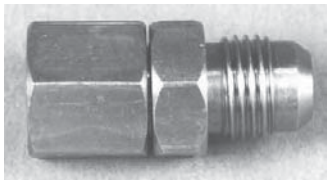
#6123

Y FITTINGS

6122	6 AN male flare x two 6 AN male flare branches
6123	8 AN male flare x two 6 AN male flare branches
6124	8 AN male flare x two 8 AN male flare branches
6126	10 AN male flare x two 8 AN male flare branches
6127	10 AN male flare x two 10 AN male flare branches
6128	12 AN male flare x two 10 AN male flare branches

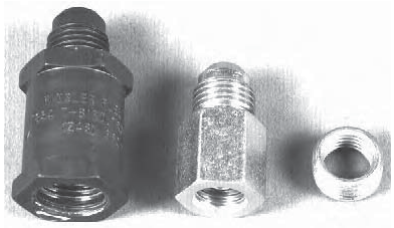
FITTING - AN X BSP

8281	6 AN male flare x 1/4" BSP, straight, chrome plated steel
8282	6 AN male flare x 1/4" BSP, straight, blue anodized aluminum
8277	6 AN male flare x 3/8" BSP, straight, plated steel
8279	8 AN male flare x 1/4" BSP, straight, plated steel
8280	8 AN male flare x 1/4" BSP, straight, blue anodized aluminum



FITTING - AN MALE FLARE X INVERTED FLARE METRIC

6189	6 AN male flare x 12mm 1.5 female, steel
6188	6 AN male flare x 14mm 1.5 female swivel, stainless steel



#6187 #6190 #6270

MISC. FITTING

6187	6 AN male flare x 16mm 1.5 female, 1 1/4" long, hard anodized aluminum, requires Loctite
6190	6 AN male flare x 12mm 1.5 female, internal flare seat, steel
6270	Reducer bushing, 12mm female x 16mm male, steel

PORT PLUGS

6169	3 AN + o-ring, hard-anodized aluminum
6166	6 AN + o-ring, hard-anodized aluminum
6168	8 AN + o-ring, hard-anodized aluminum
6197	10 AN + o-ring, aluminum

PLUG FOR GM IDLE AIR SPEED MOTOR PORT

Ideal for sealing the Idle Air Control (I.A.C.) motor port in Kinsler standard series four barrel throttle body when I.A.C. is not being used, 20mm x 1.5.

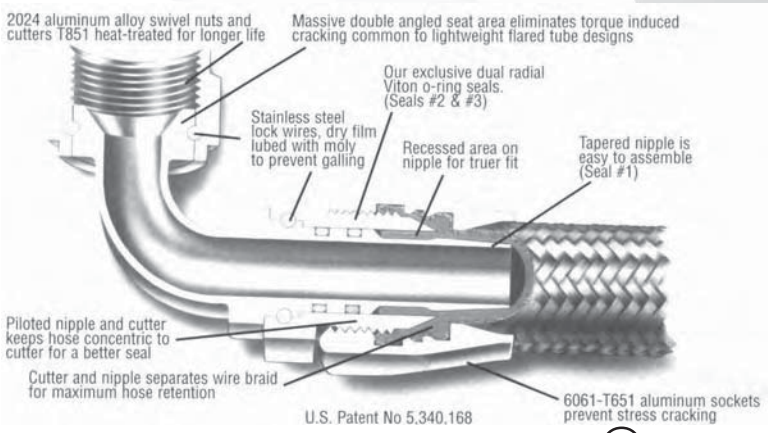
6169	Alumminum, blue anodized

FITTING - AN MALE FLARE X MALE METRIC + O-RING

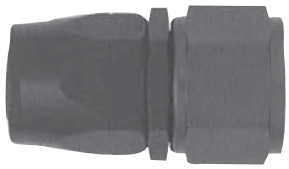
6185	6 AN male flare x 16mm 1.5 male, blue anodized aluminum
6186	8 AN male flare x 16mm 1.5 male, blue anodized aluminum

HOSE AND HOSE ENDS : STAINLESS STEEL BRAID

DOUBLE SWIVEL HOSE ENDS ARE TRIPLE SEALED AND ALLOW FULL ANGULAR POSITIONING AFTER ASSEMBLY !

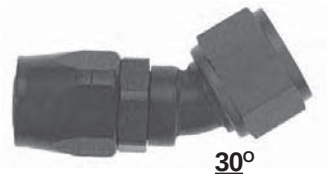


®of XRP, Inc.



STRAIGHT

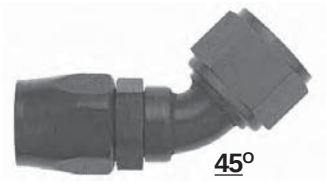
35104	4 AN
35106	6 AN
35108	8 AN
35110	10 AN
35112	12 AN
35116	16 AN
35120	20 AN



30°

30° BENT TUBE

35136	6 AN
35138	8 AN
35140	10 AN
35142	12 AN
35143	16 AN
35144	20 AN



45°

45° BENT TUBE

35146	6 AN
35148	8 AN
35150	10 AN
35152	12 AN
35156	16 AN
35160	20 AN

60°

60° BENT TUBE

35166	6 AN
35168	8 AN
35170	10 AN
35172	12 AN
35176	16 AN
35180	20 AN

STAINLESS STEEL BRAIDED HOSE

This braided hose provides durability and heat resistance. The inner liner of chlorinated polyethylene (CPE) provides excellent fluid transfer with temperature range from -40°F to +300°F.

Part #	Size	Hose I.D.	Max. Operating Pressure*
35004	4 AN	7/32"	1000
35006	6 AN	11/32"	1000
35008	8 AN	7/16"	1000
35010	10 AN	9/16"	1000
35012	12 AN	11/16"	1000
35016	16 AN	7/8"	750
35018	20 AN	1 1/8"	500
35020	28 AN	1 1/2"	250
35022	32 AN	1 13/16"	200

SOLD PER FOOT

*- When used with above hose ends. This hose is not for power steering or hydraulic applications. Due to the limitation of the hose end collar to retain the hose.

90°

90° BENT TUBE

35196	6 AN
35198	8 AN
35200	10 AN
35212	12 AN
35216	16 AN
35220	20 AN

120°

120° BENT TUBE

35226	6 AN
35228	8 AN
35230	10 AN
35232	12 AN
35236	16 AN
35240	20 AN

150°

150° BENT TUBE

35246	6 AN
35248	8 AN
35250	10 AN
35252	12 AN
35256	16 AN
35260	20 AN

180°

180° BENT TUBE

35266	6 AN
35268	8 AN
35270	10 AN
35272	12 AN
35276	16 AN
35280	20 AN

FITTINGS SIZES

AN

"AN" (**A**rmy-**N**avy) sizes were established by the Aerospace industry years ago. This was done to standardize the industry. Any 10 AN hose end will thread onto any 10 AN fitting. HOWEVER, this does not mean that all the inside diameters (I.D.) have been standardized. Check the I.D. of any hose and/or fittings that is going to be used. For example: a 6 AN teflon hose has a much smaller I.D. than a common 6 AN stainless steel braided hose. This is true on hydraulic fittings, hose, and hose ends; they are designed to handle much higher pressures and have thicker side walls which reduces the inside diameter. AN fittings seal by the 37° flare or by using an o-ring or washer o-ring.

AN Number	Thread Size	Nominal Thread O.D.
3	3/8 - 24	.372"
4	7/16 - 20	.431"
6	9/16 - 18	.560"
8	3/4 - 16	.745"
10	7/8 -14	.870"
12	1 1/16 - 12	1.055"
16	1 5/16 - 12	1.308"
20	1 5/8 - 12	1.620"
24	1 7/8 - 12	1.870"
32	2 1/2 - 12	2.495"

NPT

National **P**ipe **T**hread: is based on the inside diameter of the heavy wall pipe that plumbers originally used which received the male thread. The tapered male and female thread makes measurement difficult. This taper creates an interfere between the male and female pieces creating the seal. A sealant/ lubricant should be applied before installation to assure sealing and future removal.

Pipe Thread Size	Threads per Inch
1/16"	27
1/8"	27
1/4"	18
3/8"	18
1/2"	14
3/4"	14
1 1/4"	11 1/2
1 1/2"	11 1/2
2"	11 1/2

METRIC

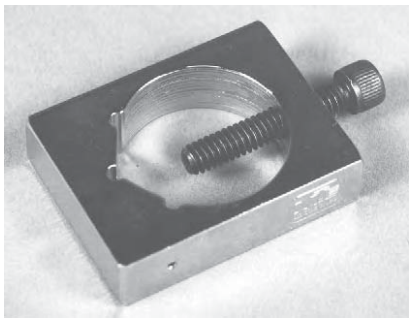
Fittings are measured by the diameter across the crowns of the male thread or the valleys of the female thread and the second number is the distance between the crowns of the threads or the valleys. Metric thread is straight. The fittings typically seal with an o-ring or more commonly with a washer o-ring.

Metric	Diameter x Thread/Inch
10mm x 1.5	.394" x .059"
12mm x 1.5	.472" x .059"
14mm x 1.5	.551" x .059"
16mm x 1.5	.630" x .059"
18mm x 1.5	.709" x .059"
20mm x 1.5	.787" x .059"

BSP

British **S**tandard **P**ipe is a straight thread. BSP uses a washer o-ring or a crush washer for sealing. Lucas mechanical fuel injection equipment generally require these fittings.

BSP	Nomial O.D. x Threand/Inch
1/16”	.304” x 28
1/8"	.383” x 28
1/4"	.518” x 19
3/8"	.656” x 19
1/2”	.825” x 14



SAFETY WIRE DRILL FIXTURE

1909	Drill fixture, to drill safety wire hole in hex fastners

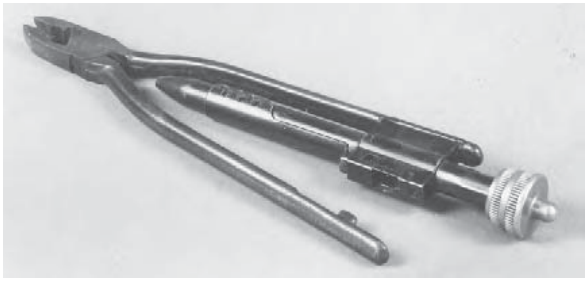
SAFETY WIRE

Safety wire is commonly used to provide additional security so that a bolt or nut can't back off. It has many other uses: holding something up, holding something out of the way, holding two things together, anywhere wire can be used.

HOW TO USE SAFETY WIRE

To secure a nut or bolt so it doesn't come loose, drill a diagonal hole through a point of the nut or bolt. Install wire through hole. Bring wire together, measure wire to an item being used as an anchor point, wire must be cut longer than this distance, when twisted length will shorten up. Anchor point must be in the OPPOSITE direct of the rotation of the nut or bolt, otherwise the bolt/nut may rotate half to a full turn before the safety wire tightens up.

The anchor point for the other end of the safety wire must be further ahead, in direction of tightening rotation, of the nut or bolt head. We recommend that the anchor point is located about 90° or more ahead of the item being secured.



SAFETY WIRE PLIERS

Fast and easy way to twist safety wire. These pliers are actually three tools in one - pliers, wire twisters, and cutters.

1905	Safety wire pliers

STAINLESS STEEL SAFETY WIRE

Available in a one pound spool with a choice of three wire diameter sizes. The wire is coiled inside the can and pulls from the center to provide easy access.

1906	Safety wire spool, .025" diameter wire
1907	Safety wire spool, .032" diameter wire
1908	Safety wire spool, .041" diameter wire

CHECK VALVES

CHECK VALVES - FLAPPER

Aircraft grade hinged-flap "toilet seat" check valve makes this a choice for roll-over valves, multiple tank fuel systems, or anti-back flow valve. Hinged-flap has captive o-ring for excellent seal when closed.

3090	4 AN male flare inlet & outlet
3091	6 AN male flare inlet & outlet
3092	8 AN male flare inlet & outlet
3097	10 AN male flare inlet & outlet
3098	12 AN male flare inlet & outlet
3093	3/4" NPT male inlet x 3/4" NPT female outlet
3094	16 AN male flare inlet & outlet
3095	20 AN male flare inlet & outlet

REPLACEMENT FLAPPER ASSEMBLY

3140	4 AN
3141	6 AN
3142	8 AN
3143	10 AN
3144	12 AN

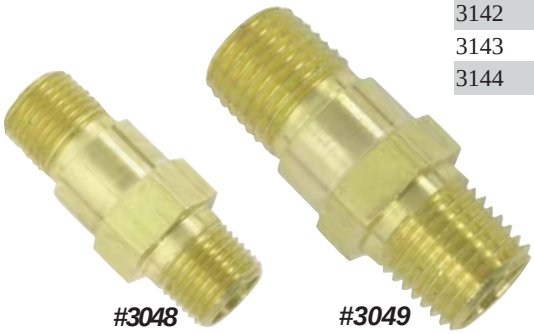
Includes: flapper plate with seal, spring, and pin only, does not include fitting.

3-WAY CHECK VALVE

Unit allows for two separate inlets to feed one outlet. A check valve on each inlet allows either supply to be utilized, while restricting back flow through the supply not in use. Billet aluminum housing, blue anodized, 8 AN female ports, mounting ear with clearance hole for a 1/4" bolt. This type of valve assembly is run on many Lucas Mechanical injection systems (see Pages #205-213). Those systems feature an electric starting pump and a mechanical engine driven pump. This assembly can also be installed when using two eletric pumps.

8102	Valve assembly with 6 AN male outlet and two 6 AN male flare check inlets
8101	Valve assembly with 8 AN male outlet and two 8 AN male flare check inlets
8100	Body ONLY, can be used as 8 AN female tee

Check inlet fitting



#3048 ***#3049***

ONE WAY CHECK VALVE

Ideal for pressure capturing equipment or low volume one-way flow to a nozzle, primer system, etc.

3048	1/8" NPT male inlet and outlet, brass, 1-PSI nominal opening pressure, gasoline and methanol only, 1.3" overall length
3049	1/4" NPT male inlet and outlet, brass, 1-PSI nominal opening pressure, gasoline and methanol only, 1.59" overall length

BUBBLE TIGHT CHECK VALVE

This 6 AN valve has an o-ringed poppet for positive sealing. Flows 1000 lbs/hr with a 2 PSI pressure drop for a very low restriction. Valve has 0.5 PSI nominal opening pressure.

3096	Bubble tight one-way check valve, 6 AN male flare inlet and outlet

BOOST PRESSURE CAPTURING ASSEMBLY

For monitoring maximum manifold pressure (boost) without watching the gauge. Assembly is setup with one-way check valve, glycerin filled pressure gauge,and push button pressure release.

5931	Boost pressure gauge assembly; uses #3048 check valve, 1/8" NPT, specify 0-30 or 0-60 PSI gauge
5932	Boost pressure gauge assembly; uses #3049 check valve, 1/4" NPT, specify 0-30 or 0-60 PSI gauge

AIR FILTRATION - FILTER FOAM

Excellent for protecting racing and high performance engines from dirt in the air. This open cell polyurethane material is easily cleaned for reuse. Sold in bulk, allowing you to construct the most suitable filter for your application, while it is less expensive than other filter systems.

5010	Green, 65 pores per inch. For air with very fine dirt. Roll: 12" wide x 4' 10" long x 1/2" thick
5015	Grey, 45 pores per inch. For air with medium dirt. Roll: 12" wide x 6' 8" long x 1/2" thick
5020	Set of (8) Nozzle Vent Filter Bisciuts (NVFB), to protect the air orifice on constant flow nozzles from dirt, 45 PPI
5021	Individual Nozzle Vent Filter Biscuit, EACH

#5021

#5015

ADVANTAGES OVER INDIVIDUAL AIR CLEANERS

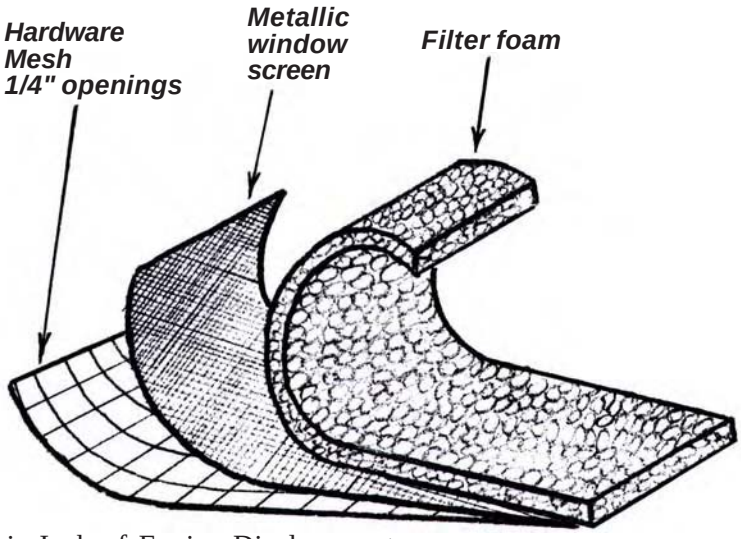
Using an individual air cleaner on each ramtube, can seriously lower power output. This is because each cylinder is drawing in air only about 30% of the time, and when it does, it takes a very fast "gulp". This instantaneous flow rate is very high, and individual air cleaners have a small area, so they can be restrictive. A small amount of dirt can cause an even greater loss in air flow.

We recommend the use of an air box type filter that covers all the ramtubes. When each ramtube takes it's "gulp" of air, it will have the entire area of foam to draw air through. The foam would have to be extremely dirty before any appreciable restriction would occur.

The air box system does not require removing the ramtube bells, like some individual air cleaners do. The bells should **NOT** be removed, as this causes appreciable power loss at high engine speeds.

FILTER SYSTEM CONSTRUCTION

Use a large area of foam to insure maximum air flow through the filter, while increasing its capacity to hold dirt without becoming restrictive.



SIZE FORMULA :
Gives approximate minimum filter surface area needed.

$$\frac{\text{CID X RPM}}{25{,}500} = \text{A}$$

CID = Cubic Inch of Engine Displacement
RPM = RPM of engine at max. power
A = Effective area in square inches of filter

EXAMPLE :

$$\frac{427 \text{ X } 7500}{25{,}500} = 126$$ Square Inches of Filter Area ***minimum***.

Reference :
A 11 1/4" X 11 1/4" square is 126.5 square inches.
A 9" X 13 1/4" is 121.5 square inches.
A 12" X 12" is 144.0 square inches (one square foot).

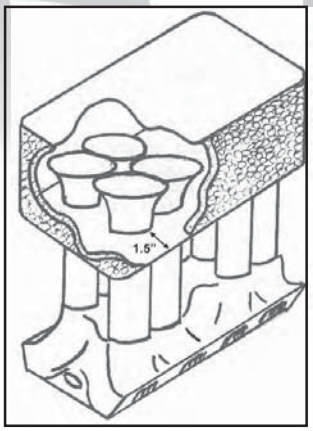
A filter that has adequate filtering area when it is new (clean) may not once it traps a fair amount of dirt. It is smart to make the filter a minimum of **20% larger** to compensate for this... the bigger the better.

The finished element consists of three layers. The hardware mesh gives structural strength. The metallic window screen is sandwiched between the mesh and the foam to serve as a flame arrestor, TO PROTECT THE FOAM IN CASE OF A BACKFIRE! The filter foam sits on the outside of the screen.

Filter foam butt seams can be made by applying five minute epoxy to the edges, then holding them until the glue sets. Make the foam element slightly smaller than the mesh support, so it will fit over with a stretch fit.

Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

AIR FILTRATION - CONTINUED -



When building an air box filter, the top plate should be mounted a minimum of .7 x ramtube inside diamter above the top of the ramtubes. Example: .7 x 2.5" diameter = 1.75". The base plate should be sealed to the ramtubes. Leave enough room below it to adjust the barrel valve and throttle stops. Maintain a minimum of 1 1/2" from the straight part of the ramtubes to the sides of the filter element.

For dirt track racing we recommend that you construct a sheet metal shield that mounts about 1 1/2" from the outside of the element, like an upside-down box. This will deflect dirt thrown by the tires.

In cases where it is not practical to use filter-element-sides for your air box, you can construct the air box using sheet metal sides and duct filtered air from a remote filter via large diameter flexible tubing.

Oiling the foam will increase it's effectiveness in trapping fine dirt. Use K&N oil (Kinsler #5043) or about 1 tablespoon of 10W oil per square foot of foam. Put the oil on the foam and then wring the element until the oil is evenly distributed. DO NOT OVER OIL !!!

To clean the filter foam, use a non-flamable water based cleaning solution that cuts oil: water with dish soap, Kinsler #5042 K&N air filter cleaner, etc. Thoroughly dry the foam before reinstalling, then re-oil it.

CARBURETORS

Our filter foam is excellent for use with carbs. It can be used to construct a replacement for your original element, or you can use it to build a custom air filter system.

CLEANER AND OIL FOR K&N® AIR FILTERS

5042	Cleaner, 32 fluid ounce spray bottle
5043	Oil, 12 fluid ounce aerosol can

OUTERWEARS® PRE-FILTERS FOR K&N AIR FILTERS

Helps keep dirt and mud from being packed into the pleats of your K&N filters, to save time and effort in cleaning. Pre-Filters can be washed and reused. Available for all Kinsler small block Chev, Mopar, Ford, Buick injection units. Custom made units are available.

5190	Fits Kinsler with K&N siamese air filter, each
5191	Fits Kinsler with K&N single air filter #5120 and #5121, each
5192	Fits Hilborn with K&N siamese air filter, each
5193	Fits Hilborn with K&N single air filter, each
5194	Fits aluminum air box panel filter #5122
5195	Fits carbon fiber air box #5151 for 8 cylinder
5196	Fits carbon fiber air box #5152 for 4 cylinder
5197	Fits #5123 K&N air filter for valve cover breather
5198	Fits #10663 K&N idle air control housing air filter, for Kinsler remote mount I.A.C.

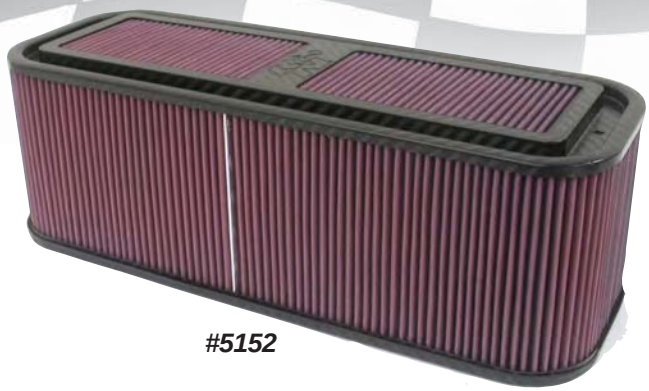
K & N® AIR FILTERS

If you don't see the filter you need, call us. Other filter sizes and custom filters are available.

5100	Hilborn 2 1/16" single ramtube, no angle, set of 8
5101	Hilborn 2 1/16" single ramtube, 5°, set of 8
5102	Hilborn 2 1/16" small block Chevrolet V8, siamese, set of 4
5103	Hilborn 2 3/16" single ramtube, no angle, set of 8
5104	Hilborn 2 3/16", single ramtube, 5°, set of 8
5105	Hilborn 2 3/16" small block Chevrolet V8, siamese, set of 4
5106	Hilborn 2 7/16", single ramtube, no angle, set of 8
5107	Hilborn 2 7/16", single ramtube, 5°, set of 8
5108	Hilborn 2 7/16" small block Chevrolet V8, siamese, set of 4
5109	Hilborn 2 7/8" big block Chevrolet V8, siamese, set of 4
5111	Kinsler and Crower 2.9" big block Chevrolet V8, 5°, requires removal of ramtube bell, set of 8
5112	Kinsler 2 3/16" and 2 1/4" small block Chev. V8, siamese, set of 4
5113	Kinsler 2 3/8" and 2 7/16" small block Chev. V8, siamese, set of 4
5114	Kinsler 2 1/2", 2 5/8", 2 11/16" small block Chev. V8, siamese, set of 4
5115	Kinsler and Engler 2 11/16", small block Chev. V8, siamese, set of 4
5119	Kinsler Pontiac 4-cylinder Super-Duty, 2 1/4" and 2 1/2"
5120	Kinsler small block Ford V8, all sizes (may require turning O.D. of ramtube bell), set of 8
5121	Kinsler small block Chevrolet with Dart/Buick cylinder heads, all sizes (may require turning O.D. of ramtube bell), set of 8
5123	Valve cover breather, 1"I.D. neck, 3"O.D., 2 3/8" tall
5124	Oval element, inside 22.75" long x 4.25" wide x 2.43" tall
5125	Kinsler PSI T-body air box, triangle shape, 6 1/2" tall
5126	Oval element, inside 7.37" long x 3.75" wide x 2" tall
5127	Lid, for siamese ramtube K&N filter, aluminum
5128	Clamp, for base of siamese ramtube K&N filter, stainless steel

AIR FILTRATION - CONTINUED -

#5151



#5152

CARBON-FIBER AIR BOXES

Complete air box consists of carbon-fiber formed base with solid rubber panels for ramtubes (customer responsible to cut holes for the ramtubes to go through). Upper part of box is molded with filtering material on the top and sides. Standoffs with bolts to attach the upper part to the base are included.

5151	Complete V8 style air box, weighs 3.6 lbs., 7" tall x 14" wide x 19" long
5152	Complete in-line 4 cylinder air box, weighs 2.4 lbs., 7" tall x 7" wide x 19" long
5153	Complete dual-cylinder air box, weighs 1.3 lbs., 7" tall x 7" wide x 9" long

RAMTUBE BOOTIES

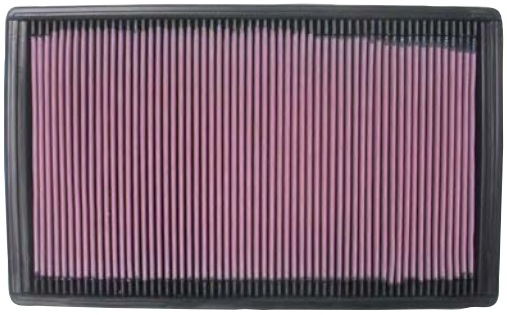
Reinforced sides with water repellant 25 micron nylon mesh media. Can be made for any single ramtube or pairs of siamesed ramtubes, please call to discuss your project.

K&N PANEL FILTER ELEMENT

For 'do-it-yourself' air box construction.

5122	Air filter replacement for V8 air box, 10" wide x 16" long
5194	Pre-filter replacement for V8 air box

#5122



BLOWER HAT AIR FILTER

Consists of aluminum adapter to inlet of blower hat, K&N air filter, billet aluminum front plate, and installation hardware.

5140	Kit for Enderle Bugcatcher, 6" deep, 5" tall, 13.5" wide
5142	Kit for Enderle Birdcatcher, 11" deep, 6" tall, 17" wide

AIR BOX FOR KINSLER MOTORCYCLE UNIT

Avaialble with fiberglass or carbon fiber base, wire mesh screen dome with foam filter media, call for details

CUSTOM AIR FILTERS

Kinsler can custom fabricate an air filter system for your specific requirements

Custom air filters made for 460 big block Ford street application

AIR DENSITY GAUGE

☆ WORKS EQUALLY WELL WITH FUEL INJECTION OR CARBS

☆ GIVES READINGS TO COMPENSATE FOR CHANGES IN ALTITUDE AND WEATHER

6016	Air density gauge, Kinsler brand, 60% to 110% scale
6017	Labor to qualify and calibrate new gauge. **Critically important**...no other brand on the market is calibrated
6018	Labor to qualify and SPECIAL calibrate new gauge for COLD WEATHER USE ONLY, for snowmobiles
6019	Labor to qualify and re-calibrate customer's gauge (does NOT include extensive rebuilding)
6028	Labor to qualify and re-calibrate customer's gauge for COLD WEATHER (does NOT include extensive rebuilding)
6029	Replacement bezel and lens, for #6016 air density gauge

WHY YOU NEED TO MEASURE AIR DENSITY

The power output of an engine is directly related to the density of the air that it consumes. Air density is mainly affected by barometric pressure and air temperature.

Each time a piston goes down in your engine, it draws in the same volume of air, but the weight of that volume will vary from day to day. If the atmospheric pressure increases (higher barometer), the air becomes compressed slightly... denser. If the temperature cools, the air shrinks slightly, which also makes it denser. The denser air makes the same volume weigh more, so more power will be produced.

The challenge is to measure the density change so the correct adjustment to the fuel rate can be made to keep a proper air-fuel mixture... best power is obtained with just the right mixture... richer or leaner gives less power. For gasoline this ratio is about twelve pounds of air to one pound of fuel, or 12:1.

Since neither mechanical injection nor carbs automatically change the fuel rate when the air density changes, the fuel system needs to be re-jetted to keep the mixture correct.

If density increases but the fuel is not increased, the mixture will be lean. This will cause a power loss and could damage the engine. Adding fuel to get the proper mixture will give us a power increase.

Lower air density can hurt power output in two ways. Example : the car was running good; the air density was 96% and the vehicle was jetted just right. Now the air density has dropped to 87%, a loss of 9%. See "UNDERSTANDING PERCENTAGE" on Page #194.

1) Since there is 9% less air to burn, there has to be a 9% loss of power... there is no way of correcting anything to get that back. Of course, if the engine is supercharged or turbocharged, adjusting the overdrive or wastegate is a way to compensate.

2) Even though there was a loss of 9% of air density, the constant flow metering system doesn't sense it, so it puts in the same amount of fuel as it did before. This makes the mixture too rich, which costs about another 5% of the power, making the total loss 14% (9% + 5%)!!! If the fuel system is leaned out to the proper air/fuel ratio, the 5% will be recovered, so there is only the 9% basic loss.

Everyone at the track will be affected the same way. It's just a matter of who can properly adjust for it.

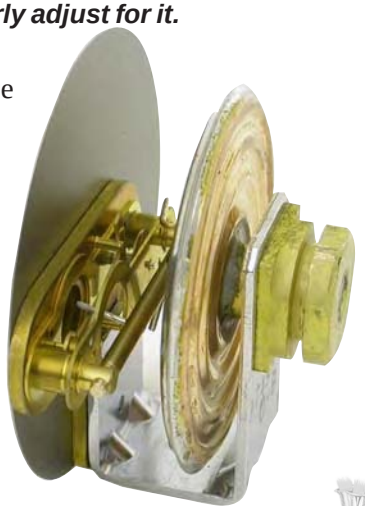
HOW DOES THE AIR DENSITY GAUGE WORK

The gauge has a metal bellows with air sealed inside. Higher atmospheric pressure compresses the bellows and moves the needle higher. Cooler temperature shrinks the air in the bellows, which pulls the bellows together and also moves the needle higher. Thus the gauge will give one needle reading to show the affect of atmospheric pressure and temperature change on the air density.

CALIBRATION IS OPTIONAL

The gauges we calibrate are done to read 100% at 59°F and 29.92 inches of mercury pressure (by international agreement, these are the conditions for one standard atmosphere, STP). Some brands of gauges are calibrated differently, and some gauges get abused, so they will read differently than yours. ***Use only your gauge to take readings!***

It doesn't matter if two gauges don't read exactly the same, since the readings are relative.... as long as you use the same gauge you should get good results. If you have a problem with your gauge we can test and possibly repair it.



Internal workings of an air density gauge

AIR DENSITY GAUGE - CONTINUED -

CAUTION

All weather broadcasts and weather maps give barometer readings corrected to sea level (zero altitude), so that high and low pressure weather fronts across the country can be compared regardless of the altitude of the weather station. Example: Denver, Colorado reads 24.00" on their barometer, but they are 5,000 feet above sea level, which causes a 5.02" lower pressure, so they broadcast a 29.02" reading (24.00 + 5.02).

To do proper calculations you must use the actual reading of the location you are at. The best way to do this is to have your own air density gauge. If you don't have a gauge, you could obtain a barometer reading from a nearby airport (which will always be corrected to seal level), then corrrect it back to your altitude by subtracting 1.0" for each thousand feet

The vents on the sides of the gauge must be exposed for a proper reading. See 1) above.

AIR DENSITY GAUGE READING PROCEDURE

1) The gauge must be pulled up out of the foam of the carrying case and placed in a shaded area. Do NOT hold the gauge in your hand, or place it inside the vehicle, or let sunlight fall directly on it, as all of these will artificially warm the gauge. Let the gauge sit for several minutes to stabilize before taking a reading.

2) Find the best jet for the day. Record the air density and jet size.

3) The next race day, observe the readings of the air density gauge. If it reads higher than before, go to a richer jet... this would be a smaller jet for a fuel injection unit, or a larger jet for a carburetor.

4) After just a few days of racing you will have established a chart for the jetting requirements versus the air density. Any time after that, merely observe the reading of the air density gauge, refer to the chart, and select the jet for the prevailing conditions. You should always try one richer and one leaner jet.

NOTE : Humidity has a very small affect... it can be neglected on an average day. If the humidity is very high (80-90%) go about 2% leaner, if it is very low (10-20%) go about 2% richer.

ALTERNATE PROCEDURE

This procedure will give the same results as the one above, but will take only one racing day to determine a baseline for making future jet changes:

1) and 2) Same as above.

3) The next race, observe the air density. Calculate the percent change in the air density.

Example On the first day, air density was observed to be 94%
On the second day, air density was observed to be 86%

PERCENT CHANGE : $\left[\frac{\text{NEW A.D. - OLD A.D.}}{\text{OLD A.D.}}\right] \times 100 = \text{percent (\%) change}$

$\left[\frac{86 - 94}{94}\right] \times 100 = \left[\frac{-8}{94}\right] \times 100 = -.085 \times 100 = -8.5\%$

Note that the sign is (-) because the air density has decreased; go to a leaner main jet. If the sign is (+) the air density has increased and go to a richer main jet. A high reading on the gauge means that there is an increase in density.

4) Go to the table on the next page and find your application. Go across in the table until coming to the percent change that is closest to what has been calculated. Change the main jet by the amount shown in the column heading.

Example - Running an unblown gas engine, 427 cubic inches, -1 fuel pump. Under the "Unblown Gas" heading, use the "402-520" line, -1 pump. Go across to the percentage that is closest to the one calculated above: 8.5%. The 9.0% figure is closest, so go .010" leaner (larger on fuel injection) on the main jet.

UNDERSTANDING PERCENTAGE

One whole item of anything is 100% of it. 9% of an apple is 9/100 or .09 of it. Rather than saying 9/100 or .09 of the apple, it is much easier to say 9%. To make any fraction into a %, move the decimal point two places to the right, thus .09 becomes 9%.

Example: 1/2 of something is .50 of it or 50% 1/8 of something is .125 or 12.5%

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AIR DENSITY GAUGE - CONTINUED -

PERCENT CHANGE IN FUEL DELIVERY TO ENGINE VERSUS JET CHANGE

The systems operating pressure will affect the percent change of fuel flow when changing the main jet.
This table is based on a typical system pressure of between 45 to 70 PSI.

APPLICATION	CUBIC INCHES	PUMP SIZE KINSLER	PUMP SIZE HILBORN	K-TYPE JETS .002"	.004"	.006"	.008"	.010"	COMMERCIAL JETS .005"	.010"
UNBLOWN GAS	302-402	400	-0	3.0	6.0	9.0	12.0	15.0	7.5	15.0
	402-520	700	-1	1.8	3.6	5.4	7.2	9.0	4.5	9.0
	520+	700	-1	2.1	4.2	6.3	8.4	10.5	5.2	10.4
BLOWN GAS	302-520	700	-1	1.8	3.6	5.4	7.2	9.0	4.5	9.0
UNBLOWN ALKY	70-200	300	-00	3.0	6.0	9.0	12.0	15.0	7.5	15.0
	300-400	400	-0	2.0	4.0	6.0	8.0	10.0	5.0	10.0
	400-500	700	-1	1.8	3.5	5.3	7.0	8.8	4.4	8.8
	500+	700	-1	1.6	3.2	4.8	6.4	8.0	4.0	8.0
BLOWN ALKY	300-500	700	-1	1.1	2.1	3.2	4.2	5.3	2.7	5.3
	300-500	1300	-2	1.0	1.9	2.9	3.8	4.8	2.4	4.8
UNBLOWN NITRO	300-500	700	-1	1.1	2.1	3.2	4.2	5.3	2.7	5.3
	300-500	1300	-2	1.2	2.4	3.6	4.8	6.0	3.0	6.0
BLOWN NITRO	300-500	LB750	-4	0.4	0.8	1.2	1.6	2.0	1.0	2.0

#6020

#6021

#6013

CASES

Nicely finished polished hardwood, piano type hinge, sturdy front latch, and foam liner.

6020	Case, to hold air density gauge ONLY, 4.7" x 4.7" x 3.0"
6021	Case, to hold air density gauge and 40 spark plugs, 12.7" x 5.6" x 4.5", has carrying strap.
6013	Case, to hold air density gauge and fuel analyzer kit, 11.2" x 6.3" x 4.5", has carrying strap
6027	Foam insert, replacement in #6013 fuel anaylzer case

Computech Systems

Race Air Competition Weather Analyzer

All-in-one digital weather station. Features: automatic air sampling and an internal fan control to provide highly accurate results. Provides weather data and calculated values to assist in E.T. prediction and tuning.

11052	Race Air Competition Weather Analyzer

John Anderika of East Coast Auto Electric. Big block Chev using Kinsler constant flow metering and mono-valve throttle body

FUEL ANALYZER KIT FOR SPECIFIC GRAVITY

- ***FOR FUEL INJECTION OR CARBS***
- ***LAB GRADE HYDROMETERS***
- ***FOR GAS, ALKY, NIITRO***

#6015 Complete kit plus air density gauge. Has easy procedure sheet

UNDERSTANDING SPECIFIC GRAVITY (sp gr)

The sp gr of any substance is its weight compared to an equal volume of water. Since water is used as the reference, it was given a sp gr of 1.0 At 68 deg F (20 deg C) water weighs 8.330 pounds per gallon; 62.32 pounds per cubic foot.

Examples:

1. Gasoline with a sp gr of .740 is 74% of the density of water.
2. What is the weight of a gallon of gasoline with .740 sp gr at 68 deg F? .740 x 8.330 = 6.16 pounds
3. What is the weight of a gallon of methanol with .792 sp gr at 68 deg F? .792 x 8.330 = 6.60 pounds

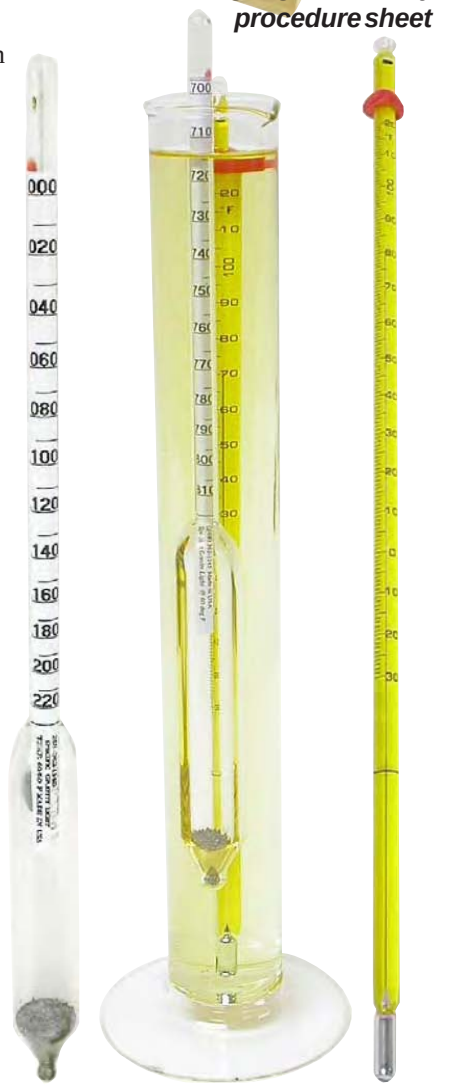
The second and third example above are valid at about room temperature, but keep in mind that as any substance is heated it expands, so the specific gravity of any liquid decreases (weighs less per gallon) as its temperature increases. Because of this, sp gr must always be referenced to some standard temperature. Each of our hydrometer kits contains a temperature correction table so you can read the sp gr of your fuel at any temperature, then correct it to any standard temperature you want to use; we like 70 deg F. If you are measuring sp gr at about room temperature, using that reading will usually be close enough, but if it is ten or twenty degrees hotter or cooler, you might want to use the correction tables.

WHY CHECK THE FUEL

Engines perform best in a narrow band of air-fuel ratios, determined by the weight of the air and fuel. Since all fuel injection systems and carburetors meter fuel by volume, a jet change must be made if the sp gr of the fuel changes significantly. This change is to adjust the volume to keep the weight of the fuel going to the engine the same. Example: if the sp gr of the fuel increases 4%, then the volume injected must be decreased 4% to keep the weight going to the engine the same.

Many race tracks and sanctioning bodies use our Fuel Analyzer Kit to spot-check the sp gr of the racers' fuel, to see if it is consistent with the fuel that is legal at that track.

6014	COMPLETE FUEL ANALYZER KIT, consists of: Two hydrometers (two of the same or two different...) specify which: #6003, #6004, #6005, #6006, #6007 One #6010 glass cylinder One #6011 thermometer One #6013 polished wood carrying case with foam liner, two plastic vials, and instructions
6015	COMPLETE FUEL ANALYZER KIT WITH KINSLER AIR DENSITY GAUGE: Same as #6014, plus #6016 Kinsler air density gauge and #6017 qualification and calibration of gauge (see pg #190)
6003	Hydrometer, lightest gas (aviation gasoline), .640-.710 (sp gr), 12" overall length, 5" scale at 0.0005 sp gr divisions
6004	Hydrometer, most pump gas and straight methanol (alcohol), .700-.810 (sp gr), 12" overall length, 5" scale at 0.001 sp gr divisions
6005	Hydrometer, 0-60% nitromethane, .650-1.000 (sp gr), 12" overall length, 4" scale at 0.005 sp gr divisions
6006	Hydrometer, 60-100% nitromethane, 1.000-1.220 (sp gr), 12" overall length, 5 1/2" scale at 0.002 sp gr divisions
6007	Hydrometer, 15-60% nitromethane, .840-1.00 (sp gr), 12" overall length, 5" scale at 0.001 sp gr divisions
6010	Cylinder, glass, 250cc, for use with hydrometer and thermometer
6011	Thermometer, -30 degrees F to 120 degrees F, laboratory grade, 12" overall length, 7" scale at 1 degree F divisions
6013	Case only, for fuel analyzer kit, polished wood with foam insert
6027	Foam insert, replacement in #6013 fuel anaylzer case



#6006 Hydrometer ***#6010 Glass Cylinder*** ***#6011 Thermometer***

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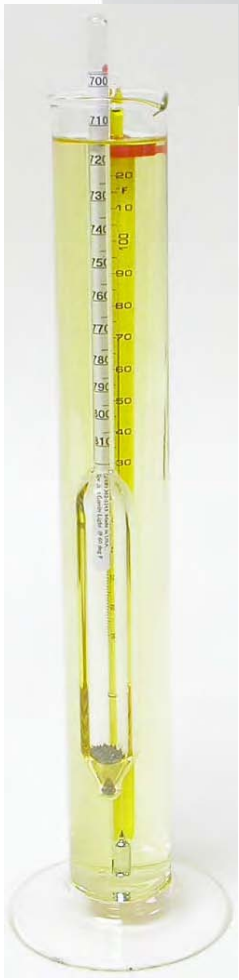
UNDERSTANDING FUELS

HOW TO CHECK THE FUEL

See detailed instructions on Pages #198-200 and supplied with fuel analyzer kit. Put enough of the liquid to be tested in the glass cylinder to allow the hydrometer to float. Hold the thermometer in the liquid so the bulb is submerged but not touching any part of the glass cylinder. Carefully sight across the bottom of the meniscus and read the hydrometer. The hydrometer MUST be floating freely, not in contact with the glass cylinder or your fingers.



OCTANE

Octane is a unit of measurement used to rate a fuels ability to resist detonation. Detonation (spark knock, ping) is the tendency of the fuel to explode violently in the engine rather than burning smoothly. If the fuel detonates, the pressure in the combustion chamber rises so fast and high that it is like beating on the top of the piston with a hammer... this is a primary cause of piston, rod, and bearing failures. The higher the octane rating the higher the resistance of the fuel to detonation. Racing gasoline is blended to provide additional octane rating, not more energy. In fact, all grades of gasoline have about the same amount of energy per pound. Increasing the octane, can get more power, since more compression or spark advance can be used. Note: too much octane can slow the burn rate of the fuel causing a loss in power.

GASOLINE

There is a big difference in specific gravity between various brands and grades of gasoline, often even between two batches of the same brand. The typical range of premium automotive pump gasoline is .730 to .760., aviation gasoline is .680 to .720, some unleaded racing gasolines are as heavy as .790. Many blends of pump gas now contain as much as 10% ethanol. These blends generally fall into the heavier specific gravity range.

For Example : Unocal 76 ® unleaded racing gasoline .788 @ 59^{0}F (15^{0}C).
Unocal 76 ® leaded racing gasoline .728 @ 59^{o}F (15^{0}C).

METHANOL (ALCOHOL)

The specific gravity of pure methanol is .792 @ 68^{o}F (20^{0}C). Methanol, methyl alcohol or wood alcohol (CH_3OH), is usually made from natural gas. It was first discovered in 1823 by condensing hot gases from the burning of wood. It has been the fuel for Indianapolis 500 race cars since 1965. Methanol has the ability to absorb water, even right out of the air. Keeping your fuel sealed will help prevent contamination. Adding water to alcohol will increase the specific gravity. High levels of water contamination will cause the alcohol to normally get cloudy. Loss of engine performance will typically occur before the contamination reaches these high levels. Fuel should be checked with a hydrometer before using it, maybe even before you leave your supplier, just to be sure to avoid any problems. Methanol is extremely corrosive to aluminum and magnesium, great care should be taken to keep this reaction to a minimum. The fuel system components should be of materials that do not react with methanol (stainless steel, brass, etc.) or should have a protective coating. Methanol crystallizes when it drys, this dried methanol does not readily dissolve. The fuel system will need constant attention. When not in use, the fuel should be drained out of the system. Flushing, or “pickling” with gasoline is a common practice.

ETHANOL

The specific gravity of ethanol is .815 @ 68^{o}F (20^{0}C). Ethanol, ethyl alcohol or grain alcohol (CH_3CH_2OH), is a liquid derived from corn or other grain, other agricultural products or waste. Because ethanol is corrosive (due to oxidation), the same modifications must be made to the fuel system as methanol to protect the fuel system components.

In the 1880s, Henry Ford built one of his first automobiles - the quadricycle - and fueled it with ethanol. Early Ford Model T's had a carburetor adjustment that could allow the vehicle to run ethanol fuel that was produced by America's farmers. Ford's vision was reportedly to "build a vehicle affordable to the working family and powered by a fuel that would boost the rural farm economy". However, in the past due to whatever reasons any alternative fuels other than gasoline were suppressed. Today, we are seeing the return of alternative fuel vehicles.

NITROMETHANE

The specific gravity of pure nitromethane is 1.139 @ 60-70^o F. Nicknamed 'nitro' is chemically CH_3NO_2. Pure alcohol (.792 @ 68^o F) is considerably different than nitromethane, it is easy to determine the percentage of nitromethane in alcohol by measuring the specific gravity of the mixture. Adding nitro to alcohol will increase its specific gravity. A table can be set up to show the percentage of nitromethane versus specific gravity (We supply this when a hydrometer or fuel analyzer kit is purchased).

The procedure is only slightly complicated by the fact that temperature affects the specific gravity, since any fluid expands as it is warmed, and therefore has a lower specific gravity. For example, a 60% mixture of nitro and alcohol and heat it, we know that it is still a 60% mixture, yet its specific gravity is lower.

Some brands of nitro hydrometer kits are sold without correction tables. Errors of 5% are common if no temperature correction is used. For best engine performance the nitro percent mixture should be kept within one or two percent of what the engine was tuned for.

NOTE: Mixing nitromethane creates a mild endothermic reaction, which absorbs heat from the mixture, thus cooling it (this is the opposite of most reactions, which give off heat). The maximum affect is with about a 50% mixture, which cools approximately 15^{o}F.

SPECIFIC GRAVITY

PROCEDURE FOR OBTAINING OBSERVED SPECIFIC GRAVITY

1) Holding the glass cylinder almost horizontal, place the hydrometer and thermometer into it. Slowly bring the cylinder to an upright position while jiggling them gently to the bottom.

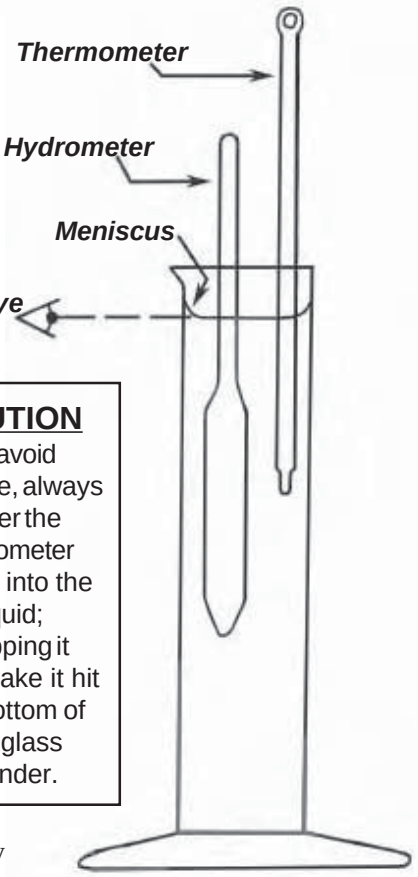
2) Fill the cylinder to within an inch of the top with a sample of the gasoline. This will cause the hydrometer to project out of the top for easy positioning with your fingers.

3) Place the cylinder in the shade.
Wait a few minutes for the temperature to stabilize.

4) Carefully sight across the bottom of the meniscus and read the hydrometer. It must be floating freely when you read it; not in contact with the cylinder or your fingers.

5) Hold the thermometer up so that it's bulb is about at the the middle of the hydrometer's bulb.
Read the temperature.

6) Note that you now have the observed specific gravity. To find the true specific gravity you must go to the correction chart, go down the column that has the heading temperature that is closest to the one you observed, until you come to the specific gravity you observed, then go across to the 60^0F column and read true specific gravity.



CAUTION
To avoid damage, always lower the hydrometer slowly into the liquid; dropping it may make it hit the bottom of the glass cylinder.

PROCEDURE FOR DETERMINING JET CHANGES FOR A CHANGE IN SPECIFIC GRAVITY

Since the specific gravity of a liquid decreases with a rise in it's temperature, specific gravity must always be referenced to a particular temperature. The accepted standard is 60^0F.

However, since it is not convenient to have to measure the liquid at 60^0F in the field, a chart has been made up to allow the specific gravity to be measured at any temperature, and then corrected to 60^0F.

Example : at 90^0F, the specific gravity of a gasoline sample is found to be .747. Go to the chart and go down the column labeled 90^0F until you find .747 . Now read the true specific gravity in the 60^0F column as .760.

In the procedure below, any time we refer to specific gravity, we mean corrected specific gravity... the specific gravity at 60^0F.

Procedure - To go from one type or batch of gasoline to a new one :
1) Measure the specific gravity of the "old" fuel, and note the jet size that worked best.
2) Measure the specific gravity of the "new" fuel.
3) Calculate the percent difference between the old fuel and the new one:

$$\frac{\text{New fuel specific gravity - Old fuel specific gravity}}{\text{Old fuel specific gravity}}$$

EXAMPLE : A new fuel is checked as .712, old fuel is .736 $\quad \frac{.712 - .736}{.736} = \frac{-.024}{.736} = -.0326 = -3.26\%$

4) To make jetting correction :
   a) For fuel injectors... Using the table below, go up or down on jet size to get the same total % change as determined in step #3 above. Since the example was "-", go to a richer (smaller) main jet. If it had been "+", go to a leaner (larger) main jet.

Percent change in fuel delivery to engine versus jet change for popular type fuel injection units, gasoline only :

Engine Displacement	Pump Size	K-type Jet .002"	K-type jet .004"	Commercial Jet .005"
302 - 402 cid	-0	3.0	6.0	7.5
402 - 520 cid	-1	1.8	3.6	4.5
All size blown	-1	1.8	3.6	4.5

   b) For carburetors... Calculate the area of the old main jets and increase or decrease them by the same percentage found in step #3 above. Going larger on carburetor jets is richer.

[Old jet area = (old jet area X % from step #3)] = new jet area

Sign (+ or -) is the ***opposite*** of the sign found for the % in step #3.

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SPECIFIC GRAVITY

The **0** in this chart refers to straight pure methanol (.792 sp. gr. @ 68°F) and the numbers refer to the percentage of nitromethane in methanol. Typically the grade of methanol used for racing is not pure in the true sense. Most is really classified as anywhere from 96 to 97% pure. There is 100% pure methanol but it is far more costly.

If your base number is different than .792 for pure methanol then you will need to adjust all the numbers of the chart to compensate for the difference.

STRAIGHT METHANOL (ALKY) TO 50% NITRO

Observed Sp. Gr.	50°F	60°F	70°F	80°F	90°F	100°F
.778	---	---	---	---	0	0
.785	---	---	---	0	2	3
.792	---	0	0	2	4	5
.799	0	2	3	4	6	7
.806	2	4	5	6	8	9
.813	4	6	7	8	10	11
.820	6	8	9	10	12	13
.827	8	10	11	12	14	15
.834	10	12	13	14	16	17
.841	12	14	15	16	18	19
.847	14	16	17	18	20	21
.854	16	18	19	20	22	23
.861	18	20	21	22	24	26
.868	20	22	23	24	26	28
.875	22	24	25	26	28	30
.882	24	26	27	28	30	32
.889	26	28	29	30	32	34
.896	28	30	31	32	34	36
.903	30	32	33	34	36	38
.910	32	34	35	36	38	40
.917	34	36	37	38	40	42
.924	36	38	39	40	42	44
.931	38	40	41	42	44	46
.938	40	42	43	44	46	48
.945	42	44	45	46	48	50
.952	44	46	47	48	50	52
.959	46	48	49	50	52	54

50% NITRO TO 100% NITRO

Observed Sp. Gr.	50°F	60°F	70°F	80°F	90°F	100°F
.966	48	50	51	52	54	56
.973	50	52	53	54	56	58
.980	52	54	55	56	58	60
.987	54	56	57	58	60	62
.994	56	58	59	61	62	64
1.001	58	60	61	63	64	66
1.008	60	62	63	65	66	68
1.015	62	64	65	67	69	71
1.022	64	66	67	69	71	73
1.029	66	68	70	72	73	75
1.036	68	70	72	74	75	77
1.043	70	72	74	76	77	79
1.049	72	74	76	78	79	81
1.056	74	76	78	80	82	84
1.063	76	78	80	82	84	86
1.070	78	80	82	84	86	88
1.077	80	82	84	86	88	90
1.084	82	84	86	88	90	92
1.090	84	86	86	88	90	92
1.097	86	88	90	92	94	96
1.104	88	90	92	94	96	98
1.111	90	92	94	96	98	100
1.118	92	94	96	98	100	---
1.124	94	96	98	100	---	---
1.131	96	98	100	---	---	---
1.138	98	100	---	---	---	---
1.145	100	---	---	---	---	---

SPECIFIC GRAVITY

OBSERVED SPECIFIC GRAVITY VERSUS TRUE SPECIFIC GRAVITY AT 60°F FOR AUTOMOTIVE GASOLINE.

This table corrects for both the change in volume of the glass hydrometer and the change in volume (specific gravity) of the liquid when using Kinsler's soft glass hydrometer.

50°F	55°F	60°F	65°F	70°F	75°F	80°F	85°F	90°F	95°F	100°F
.774	.772	.770	.768	.766	.764	.761	.759	.757	.755	.753
.772	.770	.768	.766	.764	.762	.759	.757	.755	.753	.751
.770	.768	.766	.764	.762	.760	.757	.755	.753	.751	.749
.768	.766	.765	.762	.760	.758	.755	.753	.751	.749	.747
.766	.764	.762	.760	.758	.756	.753	.751	.749	.747	.745
.764	.762	.760	.758	.756	.754	.751	.749	.747	.745	.743
.762	.760	.758	.756	.754	.752	.749	.747	.745	.743	.741
.760	.758	.756	.754	.752	.750	.747	.745	.743	.741	.739
.758	.756	.754	.752	.750	.748	.745	.743	.741	.739	.737
.756	.754	.752	.750	.748	.746	.743	.741	.739	.737	.735
.754	.752	.750	.748	.746	.744	.741	.739	.737	.735	.733
.752	.750	.748	.746	.744	.742	.739	.737	.735	.733	.731
.750	.748	.746	.744	.742	.740	.737	.735	.733	.731	.729
.748	.746	.744	.742	.740	.738	.735	.733	.731	.729	.727
.746	.744	.742	.740	.738	.736	.733	.731	.729	.727	.725
.744	.742	.740	.738	.736	.734	.731	.729	.727	.725	.723
.742	.740	.738	.736	.734	.732	.729	.727	.725	.723	.721
.740	.738	.736	.734	.732	.730	.727	.725	.723	.721	.719
.738	.736	.734	.732	.730	.728	.725	.723	.721	.719	.717
.736	.734	.732	.730	.728	.726	.723	.721	.719	.717	.715
.734	.732	.730	.728	.726	.724	.721	.719	.717	.715	.713
.732	.730	.728	.726	.724	.722	.719	.717	.715	.713	.711
.730	.728	.726	.724	.722	.720	.717	.715	.713	.711	.709
.728	.726	.724	.722	.720	.718	.715	.713	.711	.709	.707
.726	.724	.722	.720	.718	.716	.713	.711	.709	.707	.705
.724	.722	.720	.718	.716	.714	.711	.709	.707	.705	.703
.722	.720	.718	.716	.714	.712	.709	.707	.705	.703	.701
.720	.718	.716	.714	.712	.710	.707	.705	.703	.701	.699
.718	.716	.714	.712	.710	.708	.705	.703	.701	.699	.697
.716	.714	.712	.710	.708	.706	.703	.701	.699	.697	.695
.714	.712	.710	.708	.706	.704	.701	.699	.697	.695	.693
.712	.710	.708	.706	.704	.702	.699	.697	.695	.693	.691
.710	.708	.706	.704	.702	.700	.697	.695	.693	.691	.689
.708	.706	.704	.702	.700	.698	.695	.693	.691	.689	.687
.706	.704	.702	.700	.698	.696	.693	.691	.689	.687	.685
.704	.702	.700	.698	.696	.694	.691	.689	.687	.685	.683
.702	.700	.698	.696	.694	.692	.689	.687	.685	.683	.681
.700	.698	.696	.694	.692	.690	.687	.685	.683	.681	.679
.698	.696	.694	.692	.690	.688	.685	.683	.681	.679	.677
.696	.694	.692	.690	.688	.686	.683	.681	.679	.677	.675
.694	.692	.690	.688	.686	.684	.681	.679	.677	.675	.673
.692	.690	.688	.686	.684	.682	.679	.677	.675	.673	.671
.690	.688	.686	.684	.682	.680	.677	.675	.673	.671	.669
.688	.686	.684	.682	.680	.678	.675	.673	.671	.669	.667
.686	.684	.682	.680	.678	.676	.673	.671	.669	.667	.665

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FUEL DATA

	Density sp. gr. at 60°F	Weight lb/gal at 60°F	Heating Value Btu/lb - **	Air/Fuel Ratio for complete combustion	Latent heat of evaporation Btu/lb - **	Mixture temp. drop due to latent heat, °F - **
Gasoline	.690 aviation .751 most pump [avg of (6) major brands] .690 - .740 typical race	6.17 for .740 sp. gr.	20,000	14.7	148	35
Methanol	.792 with no water present (anhydrous)	6.60	8,600	6.5	500	250
Nitromethane (100%)	1.139	9.50	4,500	1.6	135	?

** - These are approximate values, especially the latent heat and mixture temperature drop.

Note : water is 8.3 pounds per gallon.

Example of use : A popularly accepted rule of thumb is that of the total heating value of gasoline, only about 1/3 goes down the drive shaft as work, as about 1/3 goes out of the radiator as heat and about 1/3 goes out of the exhaust pipes as heat and blow-down pressure.

Lets look at a 331 cubic inch small block professional road race engine: 648 hp @ 7800 rpm with .46 BSFC (Brake Specific Fuel Consumption)
470 ft-lb @ 6750 rpm with .42 BSFC

Looking at our conversion chart, we know that one horsepower = 42.44 Btu

Torque From the conversion chart, $hp = \frac{\text{torque (ft-lb)} \times \text{rpm}}{5252} = \frac{470 \times 6750}{5252} = 604$ hp

604 hp x 42.44 Btu/min per hp = 25,634 Btu/min work done by the engine

From the conversion chart, $BSFC = \frac{\text{lb/hr fuel}}{\text{observed hp}}$ so lb/hr = BSFC x obs hp = .42 x 604 = 254 lb/hr

254 lb/hr = 4.233 lb/min gasoline 4.233 lb/min gas x 18,400 Btu/lb gas = 77,887 Btu/min heat value in the gasoline burned

Efficiency = $\frac{25,634}{77,887} = 33\%$

Horsepower 648 hp x .46 BSFC = 298 lb/hr gas = 4.968 lb/min 4.968 lb/min x 18,400 Btu/lb = 91,411 Btu/min heat value
648 hp x .4244 Btu/min per hp = 27,501 Btu/min work done by engine

Efficiency = $\frac{27,501}{91,411} = 30\%$

NOTE It makes sense that the engine is less efficient at the horsepower peak than the torque peak, as the air pumping losses throughthe intake ports are higher at the horsepower peak.

Earl Wooden's Land Speed "1947 Crosley", set several land speed records when equipped with a Kinsler small block Chevrolet, and now powered by a big block G.M./D.R.C.E.2 engine at the World Finals at Bonneville set the world record for a flying mile with a average of 292.288 M.P.H.

Jerry Helwig's Land Speed 1940 Ford Coupe powered by Kinsler injected flat head Ford, runs in XF/VGC on gasoline and XF/VFC with alcohol/nitromethance mixture

ORIFICE THEORY

An orifice is "any hole that a fluid flows through"….both gasses and liquids. It can be any shape instead of round, with a totally rough interior.

All fuel systems, carbs, constant flow injection, and EFI, use orifices for metering the liquid flow, so they should have very stable flow for consistent metering. We achieve this by making them with a precise diameter and entrance radius that are very smooth, with a long length vs the hole diameter. Even though we machine our nozzles and jets with extreme care, they don't all flow just right because of microscopic flaws. We flow virtually every piece we make at 30, 55, and 100 psi, *note the errors in flow vs the master for that diameter, then use scrapers and polishing tools to bring the flow within 1% of the master. We work on the entrance and/or the exit. Even after this special effort, about one out of twelve pieces doesn't conform to the master flow curve, so we discard it. We use brass because it is one of the better metals for achieving close tolerances and a smooth finish. While this extreme attention to detail costs more, we don't believe you can find this quality anywhere else.

The pressure increases as the square of the flow; see the graph below: to flow 200 lb/hr takes 20 psi; to flow 400 lb/hr takes 80 psi, so to get twice the flow takes four times the pressure. Why? If we want to flow twice as much through a fixed hole size, we will have to push twice as many fuel particles through it at twice the velocity, so we will have to do 2 x 2 or 4 times the work. We use the pressure to do this work.

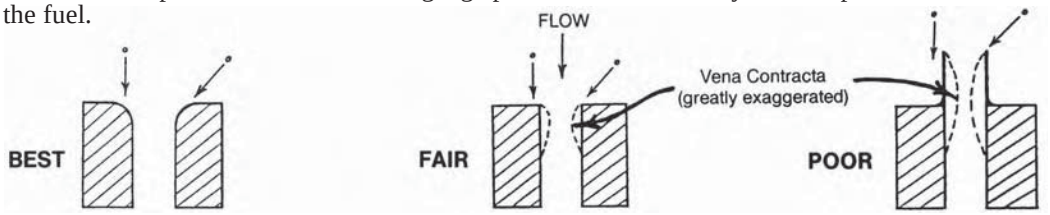
If you want to flow more through an orifice, but keep the pressure the same, then you must use a larger orifice. The flow increases as the area of the orifice increases. Since the area is Pi x diameter squared / 4, the area increases as the square of the diameter, so twice the diameter is four times the area. See the area and flow vs orifice size on the next page. (Pi is 3.1416).

* We use these test pressures because 55 psi gives about 1.35 the flow as 30 psi, and 100 psi gives about 1.35 the flow as 55 psi…. we like having the flow ratios about the same. See the very bottom of this page for the formula that we use to calculate these ratios.

THREE ORIFICE EXAMPLES BELOW

A sharp edge at the orifice entrance (middle example) causes the flow stream to converge, forming a vena contracta, which is a narrowing-in of the flow path of the particles. The diameter of the vena contracta becomes the effective flow diameter of the hole, thus the flow is reduced. At very low flows there is no vena contracta, while at very high flows there is a large vena contracta causing as much as a 20% flow loss, so it varies with flow and is unstable. It is always ideal to use the "BEST" design, which we use in all of our metering pieces.

CHOKED FLOW Example: Injecting fuel into a supercharged manifold. If your nozzle pressure is 70 psi and your boost is 10 psi, you might expect the flow to be what the nozzle is rated to flow at 60 psi. It will actually flow at a 70 psi rate, because the downstream pressure has no affect on flow until its absolute value (gauge reading + 14.7 psi atmospheric pressure) is about ½ of the upstream absolute pressure. To find the downstream pressure that will just start to reduce the flow when there is 70 psi upstream: 70 + 14.7 = 84.7 ½ x 84.7 = 42.3 absolute psi, – 14.7 = about 27.6 gauge psi. This is affected by fuel temperature, actual atmospheric pressure, and properties of the fuel.



The particle of fuel coming straight down a bit off to the left or in at an angle at the right both find their way into the orifice.

This design is the least sensitive to machine marks, but the blend of the radius to the main diameter is very important. Not easily damaged, as nicks from handling tend to be on the top surface.

The particle a bit off to the left hits the top surface; may bounce off to the left, or into the orifice. The particle coming in from the right will go into the orifice.

This design is quite difficult to make properly as the sharp edge must be the same on all the orifices, with no nicks. It is easily damaged by nicking the edge.

The particle a bit off to the left will not enter the orifice. The particle coming in from the right may not enter the orifice.

This design would never really be seen in a jet, but it is exactly like a ramtube without a bell. The top edge is easily damaged.

FLOW THROUGH AN ORIFICE

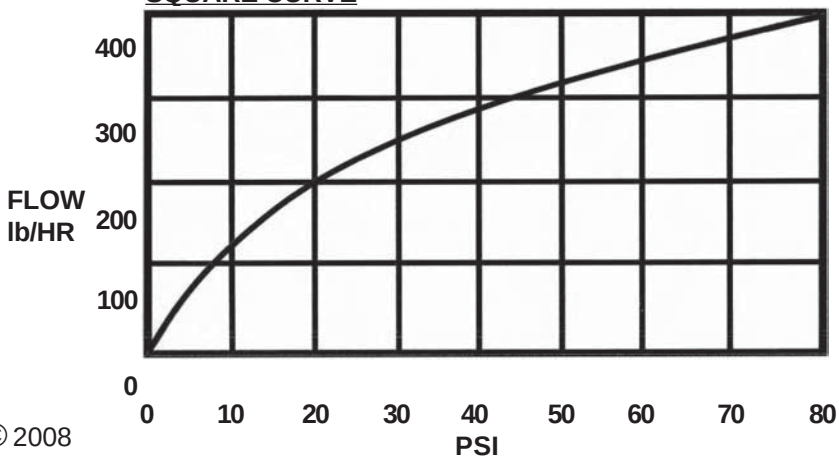
Pressure rises as the square of the flow through an orifice, so to double the flow through a jet or nozzle takes four times the pressure :

$$\text{New Press} = \text{Old Press} \times \left(\frac{\text{New Flow}}{\text{Old Flow}}\right)^2$$

Knowing the flow of a jet or nozzle at some pressure, the flow at a new pressure can be calculated:

$$\text{New Flow} = \text{Old Flow} \times \sqrt{\frac{\text{New Press}}{\text{Old Press}}}$$

SQUARE CURVE



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ORIFICE THEORY

UNDERSTANDING AN ORIFICE - DIAMETER VERSUS AREA

The flow of an orifice CAN NOT be interpolated by the ratio of the diameter, an .080" diameter orifice does not flow twice that of a .040" (see FLOW THROUGH AN ORIFICE on Page #199).

However flow can be interpolated by the ratio of the area in square inches of an orifice.
The diameter can be converted by the formula:

(radius x radius) x 3.14159 (Pi) = area

The area of .040" is .001257 in^2 and .080" is .00527 in^2 (see below quick reference chart).

$$\frac{.005027\ in^2\ (.080"\ dia.)}{.001257\ in^2\ (.040"\ dia.)} = 3.999\ ratio$$

So an .080" diameter orifice flows 3.999 times more than a .040" diameter orifice.

This fomula can be used for Kinsler's electric enrichment or lean-out valve (see Pages #89 and #168 about this valve).

Example for lean-out valve; If a .116" main jet is good for the basic mid-range and .124" is best when on transbrake, two-step, etc. You can calculate the K-jet for the lean-out by the following:

.012076 in^2 (area of .124") - .010568 in^2 (area of .116") = .001508 in^2 (the difference in area of the two jets).
Go to the chart and find area close to .001508 in^2 which is approximately .044".
This is the jet to install in the lean-out valve.

Dia.	Area	Dia.	Area	Dia.	Area	Dia.	Area	Dia.	Area
.005"	.000020	.041"	.001320	.077"	.004657	.113"	.010029	.150"	.017672
.006"	.000028	.042"	.001385	.078"	.004778	.114"	.010207	.151"	.017908
.007"	.000038	.043"	.001452	.079"	.004902	.115"	.010387	.152"	.018146
.008"	.000050	.044"	.001521	.080"	.005027	.116"	.010568	.153"	.018385
.009"	.000064	.045"	.001590	.081"	.005153	.117"	.010751	.154"	.018627
.010"	.000079	.046"	.001662	.082"	.005281	.118"	.010936	.155"	.018869
.011"	.000095	.047"	.001735	.083"	.005411	.119"	.011122	.156"	.019113
.012"	.000113	.048"	.001810	.084"	.005542	.120"	.011310	.157"	.019359
.013"	.000133	.049"	.001886	.085"	.005675	.121"	.011499	.158"	.019607
.014"	.000154	.050"	.001964	.086"	.005809	.122"	.011690	.159"	.019856
.015"	.000177	.051"	.002043	.087"	.005945	.123"	.011882	.160"	.020106
.016"	.000201	.052"	.002124	.088"	.006082	.124"	.012076	.161"	.020358
.017"	.000227	.053"	.002206	.089"	.006221	.125"	.012272	.162"	.020612
.018"	.000254	.054"	.002290	.090"	.006362	.126"	.012469	.163"	.020867
.019"	.000284	.055"	.002376	.091"	.006504	.127"	.012668	.164"	.021124
.020"	.000314	.056"	.002463	.092"	.006648	.128"	.012868	.165"	.021383
.021"	.000346	.057"	.002552	.093"	.006793	.129"	.013070	.166"	.021642
.022"	.000380	.058"	.002642	.094"	.006940	.130"	.013273	.167"	.021904
.023"	.000415	.059"	.002734	.095"	.007088	.131"	.013478	.168"	.022167
.024"	.000452	.060"	.002827	.096"	.007238	.132"	.013685	.169"	.022432
.025"	.000491	.061"	.002922	.097"	.007390	.133"	.013893	.170"	.022698
.026"	.000531	.062"	.003019	.098"	.007543	.134"	.014103	.171"	.022966
.027"	.000573	.063"	.003117	.099"	.007698	.135"	.014314	.172"	.023235
.028"	.000616	.064"	.003217	.100"	.007854	.136"	.014527	.173"	.023506
.029"	.000661	.065"	.003318	.101"	.008012	.137"	.014741	.174"	.023779
.030"	.000707	.066"	.003421	.102"	.008171	.138"	.014957	.175"	.024053
.031"	.000755	.067"	.003526	.103"	.008332	.139"	.015175	.176"	.024329
.032"	.000804	.068"	.003632	.104"	.008495	.140"	.015394	.177"	.024606
.033"	.000855	.069"	.003739	.105"	.008659	.141"	.015615	.178"	.024885
.034"	.000908	.070"	.003848	.106"	.008825	.142"	.015837	.179"	.025165
.035"	.000962	.071"	.003959	.107"	.008992	.143"	.016061	.180"	.025447
.036"	.001018	.072"	.004072	.108"	.009161	.144"	.016277	.181"	.025730
.037"	.001075	.073"	.004185	.109"	.009331	.145"	.016513	.182"	.026015
.038"	.001134	.074"	.004301	.110"	.009503	.146"	.016742	.183"	.026302
.039"	.001195	.075"	.004418	.111"	.009677	.147"	.016972	.184"	.026590
.040"	.001257	.076"	.004536	.112"	.009852	.148"	.017203	.185"	.026880
						.149"	.017437	.186"	.027172

IMPORTANT FACTS

FORMULAS

Area in square inches of a circle : **3.14159 (pi) x (radius x radius)** Area in square inches of a square : **height x length**

Convert inches to millimeters : **inches x 25.4 = millimeters (mm)** millimeters to inches : **millimeters / 25.4 = inches**

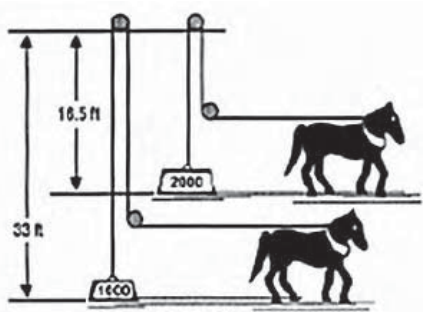
Engine size is measured by piston displacement: **CID = bore x bore x stroke x number of cylinders X .7854**

One standard horsepower is the work required to move 33,000 pounds a distance of 1-foot in one minute or:

$$\text{HP} = \frac{\text{ft-lbs per minute}}{33{,}000}$$

$$\text{Brake horsepower} = \frac{\text{torque x RPM}}{5252}$$

Brake horsepower is measured on a dynamometer.
If you know how much torque an engine is producing at a given RPM.



Volumetric Efficiency (VE) is the measure of an engine's ability to fill the cylinder with a fresh intake charge. The volumetric efficiency is measured per engine cycle and will vary throughout the engines operating range. It is the ratio between what is actually pumped into the engine and 100% of the actual cylinder volume.

Miles Per Hour: $$\text{MPH} = \frac{\text{overall tire dynamic diameter x achieved engine RPM}}{\text{differential ratio x achieved top gear ratio x 336}}$$ *

* - (1:1 No transmission or clutch slipage)

SOME AIR FACTS ... ALL ARE FOR DRY AIR

----- Related subject: see "AIR DENSITY" on Pages #190-192

$$\text{VE} = \frac{\text{Total Volume of intake charge}}{\text{Actual Cylinder Volume}}$$

One standard atmosphere (stp) is 59ºF and 29.92" Hg (14.694 PSI) ; this is 100% air density.
At stp, one pound of air = 13.07 ft^3, or .07651 pound/ft^3

Air density in lb/ft^3 at other temperature and pressure $= \frac{\text{1.327 x "Hg}}{\text{Temp. ºR}}$ **(Note : ºR = ºF + 460)**

Percent air density (like reading on air density gauge) $= \frac{\text{1734.7 x "Hg}}{\text{Temp. ºR}}$

Example : It is 82ºF, barometer is 27.84"Hg **Density** $= \frac{1734.7 \times 27.84}{82 + 460} = 89\%$

Example : A 6-71 blown engine has an intake manifold pressure of 22 PSI at 258ºF
Many racers would figure : $\frac{22 + 14.7}{14.7} = 250\%$ **air density at the intake ports.**

Now lets see what it really is : $1734.7 \times \frac{(22 + 14.7) \times 2.037\text{"Hg/PSI}}{258 + 460} = 181\%$

Composition of air by weight : 75.8% nitrogen , 23.22% oxygen , 0.98% other gases.
It takes .240 Btu/lb of air to change the temp. 1ºF, while holding the pressure constant.
It takes .172 Btu/lb of air to change the temp. 1ºF, while holding the volume constant.

The air drag on a car goes up as the square of the car speed.
The horsepower to push the car through the air goes up as the cube of the car speed.
Example : Your car was going 80 MPH, now it is going 130 MPH... the drag increases $(130/80)^2 = (1.625)^2 = 2.6$
The horsepower increases $(130/80)^3 = (1.625)^3 = 4.29$
This is why it is easy to go 100 MPH, but very difficult to go 200 MPH; the car has four times the drag, and it takes eight times the power to push it through the air.

HORSEPOWER

The invention of the steam engine made it necessary to establish a unit of measurement that could be used to compare work done by competing engines. The unit chosen was related to the standard power source of the time - "horsepower".

After some creative testing, it was found that the average horse works at a rate of 33,000 ft-lb per minute. This is equivalent to lifting 1 ton (2,000 lb) a distance of 16.5 ft in one minute.

Horsepower is now the standard (in the Western Hemisphere) for measuring the rate at which motors and drives produce work. A 1-hp motor, for example, can produce 33,000 ft-lb of work in one minute.

Torque 'T' and horsepower 'HP' are related through speed 'S'.
HP = T x S/C where 'C' is a constant that depends on the units used for torque. If torque is given in lb-ft, then the value of 'C' is 5,252.

*- used with gracious permission from PT Design, July 1999

PRESSURE VERSUS VELOCITY CHART .... for drag force on car bodies or pressure in air scoops.

Speed in MPH	40	60	80	100	120	140	160	180	200	250	300	400
PSI	.029	.064	.114	.178	.256	.348	.455	.577	.713	1.11	1.60	2.85

For other than stp conditions, multiply these values by the percent air density.
Air drag on a car body = frontal area x value in chart x % density x drag coefficient (Cd).
Cd is approximately: .65 - .75 for a tractor trailer truck, .60 - .70 for a convertible with top down, .55 - .70 for open wheel Indy Racing League car (this may appear like a high value, but it is due to down force from the front and rear wings for high MPH handling), .38 - .45 for an average sedan, .33 for a C5 Corvette, .15 - .20 for a streamliner.

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MANIFOLD MAINTENANCE AND HINTS

METHANOL (ALCOHOL) IN THE FUEL SYSTEM AFTER RACING

Do not leave methanol in the system for more than two days, as it can be VERY CORROSIVE to aluminum parts, especially when it has some moisture in it. We offer many adapter fittings and components that are hard-anodized then impregnated with a sealer to resist corrosion by methanol. Color anodizing (usually red and blue) provides only very slight protection. Methanol becomes a gel in it's early stage of drying out, then becomes a white powdery residue when it dries completely. Both of these forms of dried alcohol will clog nozzles and fuel filters.

TWO methods for Short Term Storage:

1) Drain Method: Totally drain the fuel tank and blow out the plumbing lines, barrel valve, nozzle lines, bypasses, fuel pump, etc. Oil the pump lightly.
2) Gasoline Method: Drain the methanol out of the fuel tank. Put in a couple of gallons of gasoline. Start and run engine (Note: engine will run poorly and very rich), changing to a much larger main bypass jet will help reduce this problem. The gasoline will mix with and flush most of the methanol out of the system. Depending on bypass valve pressure settings the gasoline may not blow through all of them. Leave gasoline in system till ready to use again. Drain out gas, put in methanol, most likely install fresh spark plugs (fouled by gasoline), and go.

Magnesium manifold runners heavily corroded by liquid methanol left in for one week. The engine broke an inlet valve rocker arm.... since the inlet valve didn't open, the alky accumulated

MAGNESIUM MANIFOLD AND PARTS

Water and methanol (alky) are ***VERY CORROSIVE*** to magnesium. Take great care not to let a magnesium manifold or parts be exposed to water or liquid methanol.

Examples: Where manifold intake flange contacts the water ports of the head. Letting methanol fill up in the intake runner. Setting a manifold on a concrete floor (the moisture on the concrete will react where the part contacts the concrete). Washing parts with water or steam cleaner and allowing the water to stay on the parts.

PROPER LONG TERM STORAGE OF AN INJECTION SYSTEM

Totally disassemble the fuel system, blow out all hoses, lines, tank, and manifold.

PUMP: Drain all the fuel. Using motor oil, fill the inlet, rotate pump over several times, then cap.
BARREL VALVE: Blow out fuel at idle and wide open throttle, then cap secondary port. Using motor oil fill the inlet, rotate spool back and forth several times, add more oil, cap off inlet.
BYPASS VALVES AND FILTER: disassemble and clean.
NOZZLES: remove from manifold, then blow out.

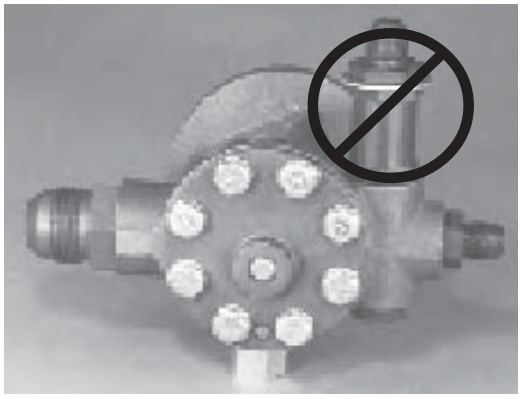
Note: light spray oils may evaporate that is why we recommend motor oil.

NOZZLE INSTALLATION

Any time the nozzles are removed from the manifold, put some anti-seize compound (Kinsler #1920) or heavy grease on the threads before reinstalling them. This will help prevent the nozzles from becoming seized into the casting. This is especially important on manifolds using methanol or nitromethane, since these fuels setup a corrosive action between the brass or aluminum nozzle body and the magnesium or aluminum casting. Do not overtighten the nozzles: NPT thread nozzles only have to be tight enough to maintain their position and o-ring nozzles only have to be tight enough to seat the hex and crush the o-ring.

BYPASS VALVE INSTALLATION

Do NOT screw jet cans directly into the fuel pump. Engine vibration can be severe enough that the poppet or jet may bounce off of it's seat, causing the engine to run lean or erratic, especially in four cylinder engines. Installing the jet can by a hose on each end eliminates this problem; the hoses dampen the shock.



Do not screw jet cans directly into the fuel pump.

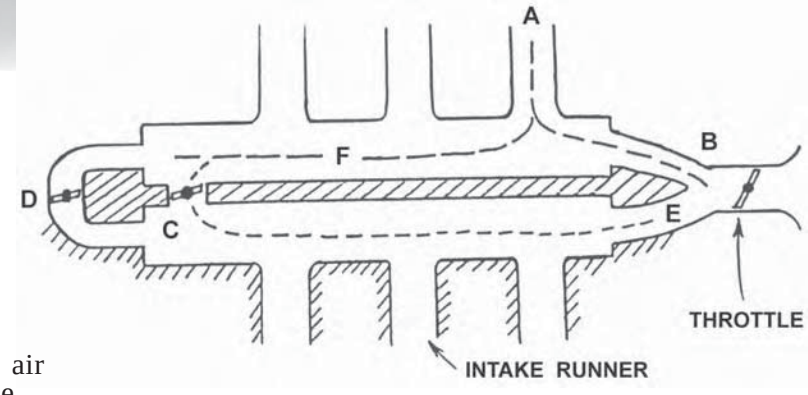
MANIFOLD AND LINKAGE LUBRICATION

A little oil applied to the shafts and rod ends helps keep them from sticking. Apply oil on the throttle shaft at both sides of the casting/bushing; rotate the throttle to allow the oil to penetrate. Oil the ball section of the rod ends (heim joints). Wipe off any excess.

MANIFOLD DESIGN

VARIABLE RESONANCE INDUCTION SYSTEM

Typical of some advanced design passenger car manifolds in the 1990s.

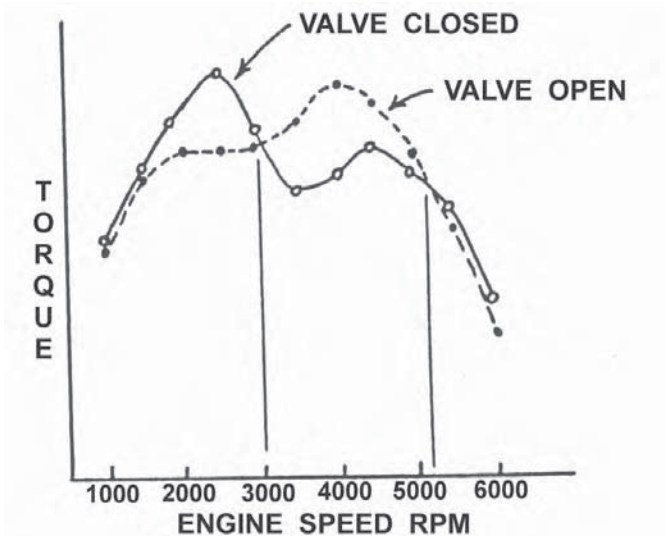


THEORY

The length of the resonance tube F can be changed by opening either valve C or D.... only one would be used .... D giving a longer length then C.

When a cylinder takes a gulp of air and the intake valve closes, the inertia in the air column makes the air try to keep flowing... it compresses down against the valve, then springs back, setting up a resonant pulsing, which can enhance or hurt the intake pressure available to the next cylinder gulping air.

Mazda obtained a positive effect through most of the RPM range by using the engine electronic control unit (ECU) to close a valve like C or D up to 3000 rpm, where it opens until 5200 RPM, where it closes again.



REFERENCE SAE Technical Paper #871977
Mazda six cylinder engine development

NOTES

1) Six cylinder engines resonate stronger than eight cylinder engines as they have three pulses that are evenly spaced, compared to four that are unevenly spaced.

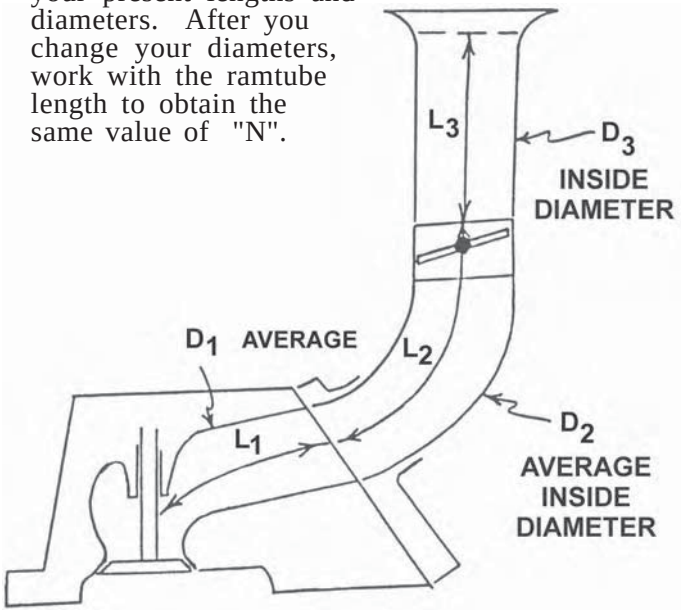
2) Tuning effects end where the intake becomes common, at E.

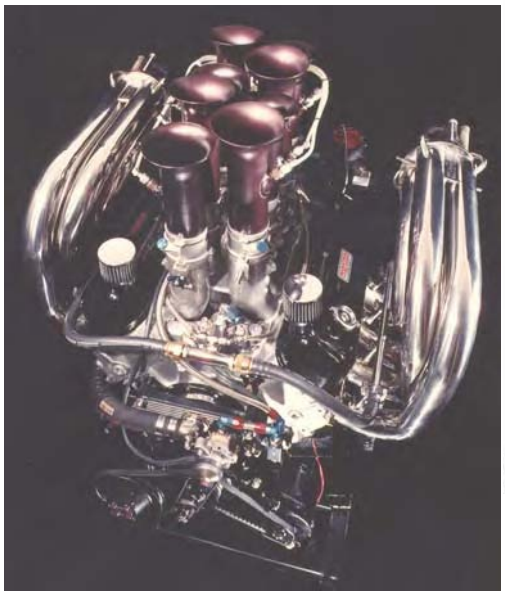
RUNNER FORMULA

How to calculate new length if you change the runner diameter but want to keep the engine ram tuned at the same RPM.

$$\frac{L_1}{D_1^2} + \frac{L_2}{D_2^2} + \frac{L_3}{D_3^2} = N$$

Calculate "N" using your present lengths and diameters. After you change your diameters, work with the ramtube length to obtain the same value of "N".





Offshore Power Boat big block Chev with Kinsler 1-piece manifold. Lucas mechanical metering and staggered ramtubes.

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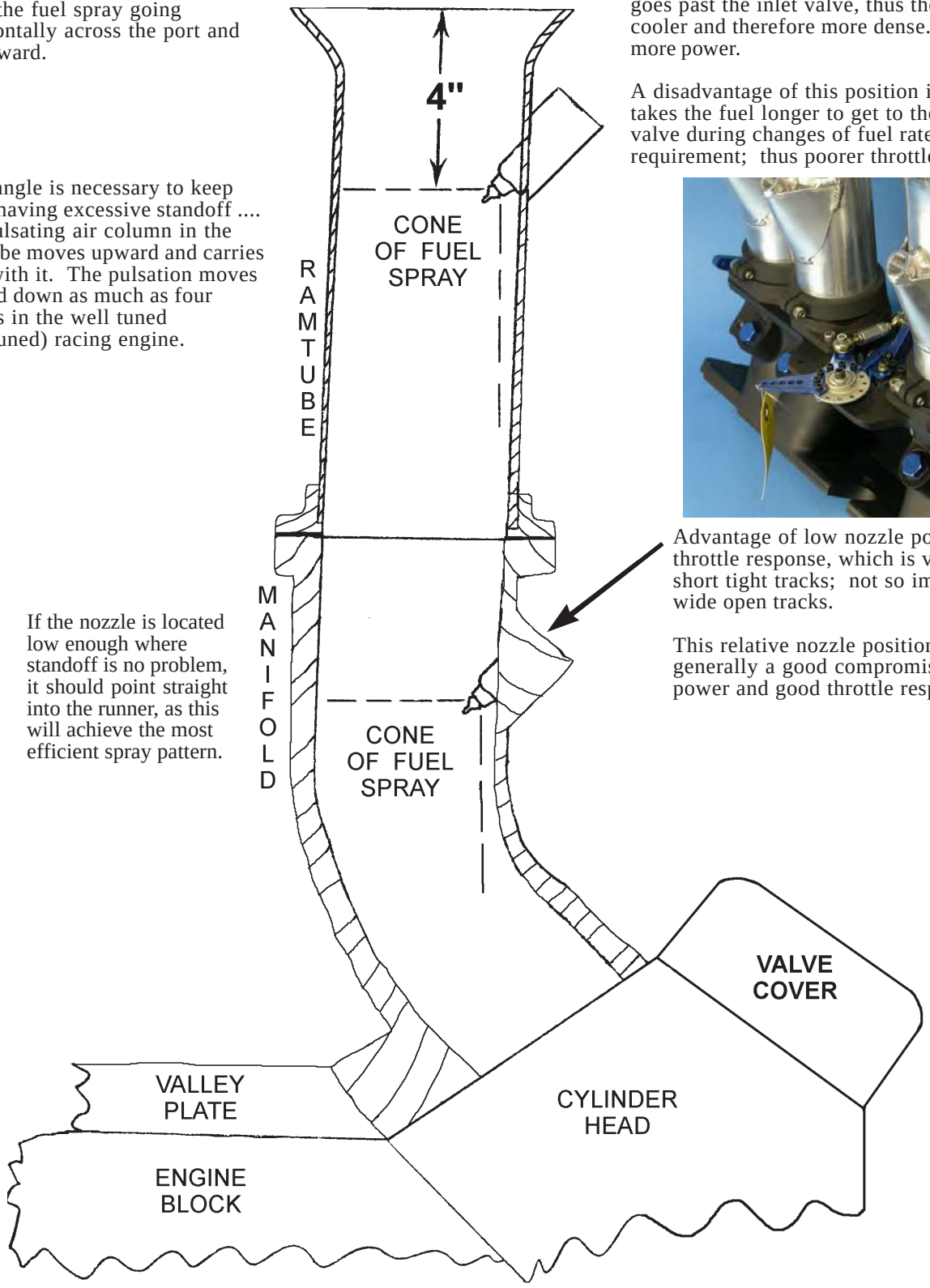
LUCAS NOZZLE PLACEMENT

Note - when the nozzles are located high in the ramtube, that the nozzle must be installed at a 45° downward angle. This will keep the fuel spray going horizontally across the port and downward.

This angle is necessary to keep from having excessive standoff .... the pulsating air column in the ramtube moves upward and carries fuel with it. The pulsation moves up and down as much as four inches in the well tuned (ramtuned) racing engine.

If the nozzle is located low enough where standoff is no problem, it should point straight into the runner, as this will achieve the most efficient spray pattern.



Advantage of high nozzle location, there is more time for the fuel to evaporate before it goes past the inlet valve, thus the charge is cooler and therefore more dense. This gives more power.

A disadvantage of this position is that it takes the fuel longer to get to the inlet valve during changes of fuel rate requirement; thus poorer throttle response.

Advantage of low nozzle position is very good throttle response, which is very important on short tight tracks; not so important on long wide open tracks.

This relative nozzle position shown here is generally a good compromise between good power and good throttle response.

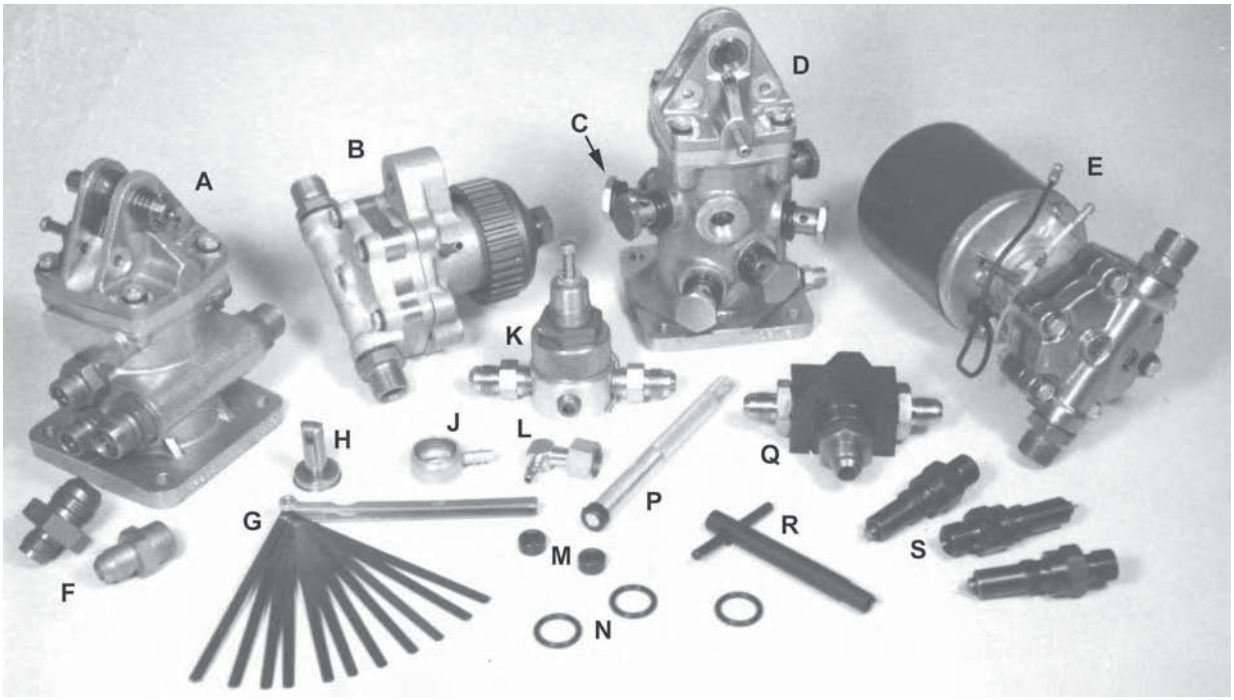
LUCAS METERING

Lucas fuel metering equipment was used on all F-1 cars from the mid 50's to mid 70's, and most top sports cars, including all of the Can-Am cars of the 60's and 70's. Jim Kinsler started KFI in 1967... built the Lucas systems for most of the Can-Am cars, including the factory McLaren cars made famous by the always-winning Bruce McLaren and Denny Hulme. It is still very good for racing, as it has very precise fuel distribution at any RPM or throttle angle, and excellent vapor handling. Lucas only made metering pieces, not complete injection systems. To make a complete system you need a manifold, metering unit, pump, drive, fuel cam, filter, linkage, calibration, etc.

We were the North American distributor for Lucas in the 70's and 80's. We still have much new old stock and used equipment for 4, 6, 8, and 12 cylinder engines.

We offer a premium line of modified Lucas equipment. The parts for every metering unit, pump, and nozzle are qualified, then assembled, and flowtested. The quality of these "Premium Race Grade" pieces is unsurpassed.

We service Lucas equipment for any application, including Ferrari, Maserati, Can-Am cars, F-1 cars, Triumph, offshore boats, etc. We rebuild worn and seized metering units, pumps, nozzles, etc. to new specs.



A. Metering unit for four cylinder (Units are available for 4,6,8,12 cylinders).
B. Mechanical fuel pump mounted on drive. Various pulley sizes and pitches are available. Standard pump has .250" thick (center) pump segment. High flow option is .370" thick.
C. Banjo bolt, carries fuel out to nozzle line. Standard finish on all Lucas pieces is cad plated. Triple chrome satin plate optional; a must for marine use.
D. Metering unit for eight cylinder engine.
E. Electric fuel pump, high pressure (approx. 100 psi), used only to start Lucas system.
F. Fittings made by Kinsler to adapt the BSP thread in the Lucas pieces to standard 6 AN (also 8 AN).
G. Feeler gauges, special narrow made by Kinsler, for checking the metering unit shuttle stroke.
H. Fuel cam follower by Kinsler for Lucas metering unit has precision ground solid-roller to eliminate the friction of the standard flat lifter. Don't use the ball bearing type; they crack!
J. Banjo fittings, to fit unit like "D". Triple chrome plated and stainless steel available.
K. Pressure relief valve by Kinsler, diaphragm type, with 1/4"NPT ports, available with 6 AN fittings. Smooth and reliable. Use this to replace the Lucas and Cosworth valves.
L. 90^0 fitting, nozzle-line-to-nozzle. Available triple chrome plated.
M. Bung seals, to seal the banjo bolt fitting nose to the metering unit sleeve.
N. O-rings, special oversize by Kinsler for better leakproof seal of banjo fitting to housing.
P. Bung seal installation tool.
Q. Three-way check valve by Kinsler. 6 AN fittings on left and right are one-way check flaps from mechanical and electric fuel pumps. 6 AN bottom fitting is outlet to fuel filter.
R. Spanner wrench for removing diaphragm retainer plate securing nuts.
S. Lucas nozzles, they only atomize the fuel. They have little to do with metering, which is done by the metering unit. One size fits all. Available triple chrome plated.
T. Filter (not shown), a must. Model: NPE, 10-micron, for inlet to Lucas metering unit, 6 AN fittings.
U. Nozzle line (not shown), nylon, 1/4"OD, in black or translucent white.

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LUCAS NOZZLES AND LINES

LUCAS NOZZLES

The Lucas nozzles do an excellent job of atomizing, but no fuel metering function. The metering unit controls the volume of the fuel being injected. All the nozzles should be set at the same opening pressure, usually 56 PSI.

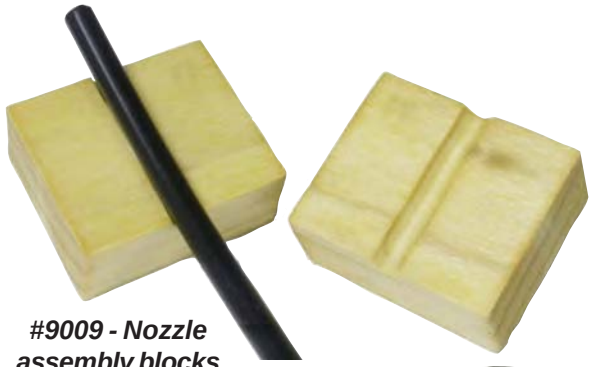
We set each nozzle pressure, then thoroughly flow test it, then epoxy the adjuster shut. The nozzle body has a 14 x 1.25 mm thread. The thread at the top for the fuel line fitting is 1/4 BSP.

Denny Hulme at speed in McLaren MK 8A on back straight at Elkhart Lake, Wisconsin

NOZZLE LINE ASSEMBLY

..... read completely before beginning.

1. Use Kinsler hardwood nozzle line gripping blocks (#9009) to hold the tubing during installation, so that the outside will not be marred. Use of the steel blocks that come in copper tube flaring kits will put rings around the outside of the tubing, creating a stress point, which may cause the tubing to fail.
2. Use only tubing from Kinsler for this application; available in black and translucent. Other tubing may not have the strength, I.D., proper elasticity or the resistance to gasoline required.
3. Push an amount of tubing up through the block that is .200" longer than the total length of the barb that you wish to install.
4. Clamp the block in a vise to grip the line.... a “C” clamp can be used in the field.
5. Put a drop of oil inside the end of the tubing, and a drop on the end of the fitting barb.
6. Start the end of the barb down into the tube by pushing and twisting it in by hand. If this is difficult, it can be made easier by driving a tapered punch into the end of the tubing just enough to make starting the barb easier. **DO NOT** “wallow” out the end of the tube with a nail or such, as this will damage the inside of the tube.
7. Tap the fitting into the tube with a small hammer until the line completely covers the barb assembly. If the tube beneath the fitting tends to kink as you tap the fitting in, there is too much line above the block. Sometimes it is necessary to start with only a small amount of line above the block, and then push more line up several times as you tap the fitting in.
8. Be careful that the tube does not slip down through the block as you tap in the fitting. If the end of the barb assembly (down inside the tubing) passes below the top of the block, it will damage the tubing.
9. Route the lines so that they have no sharp bends, since sharp bends tend to kink when the tubing gets hot. Keep the tubing away from moving parts, such as throttle linkage. Tywrap the lines together to prevent them from vibrating when the engine is running... vibration can fatigue the lines.



#9009 - Nozzle assembly blocks

90⁰ nozzle line fitting, banjo fitting, banjo bolt, KBB banjo bolt o-rings, bung seal, translucent and black Lucas nozzle line

LUCAS FUEL REQUIREMENT CURVE

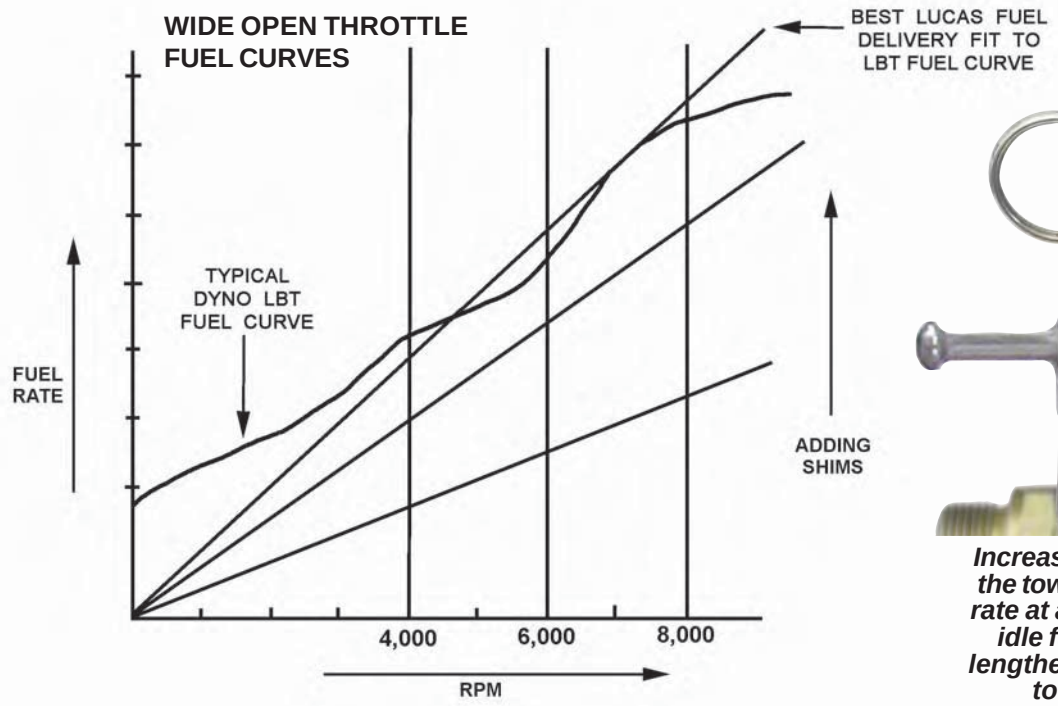
The very best way to determine the proper fuel curve for any engine is to run the engine on a dyno. At each RPM, find the ideal fuel rate to get the best torque. This is called LBT; Least fuel for Best Torque. Plot a curve of the results (see curved line below). Now fit the best straight line curve that the Lucas gives.

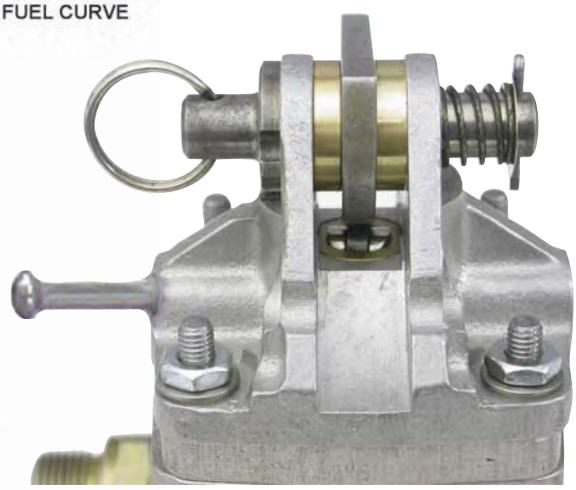
To run LBT with the Lucas : Hook the fuel cam to a separate dyno "throttle" lever, rather than directly to the arm on the throttle shaft as it normally is. Note where to put the fuel cam lever to have the cam open about like it would be if it were hooked to the throttle shaft.

Put about .010" of extra shims in the metering unit, so the unit can be made to go rich.

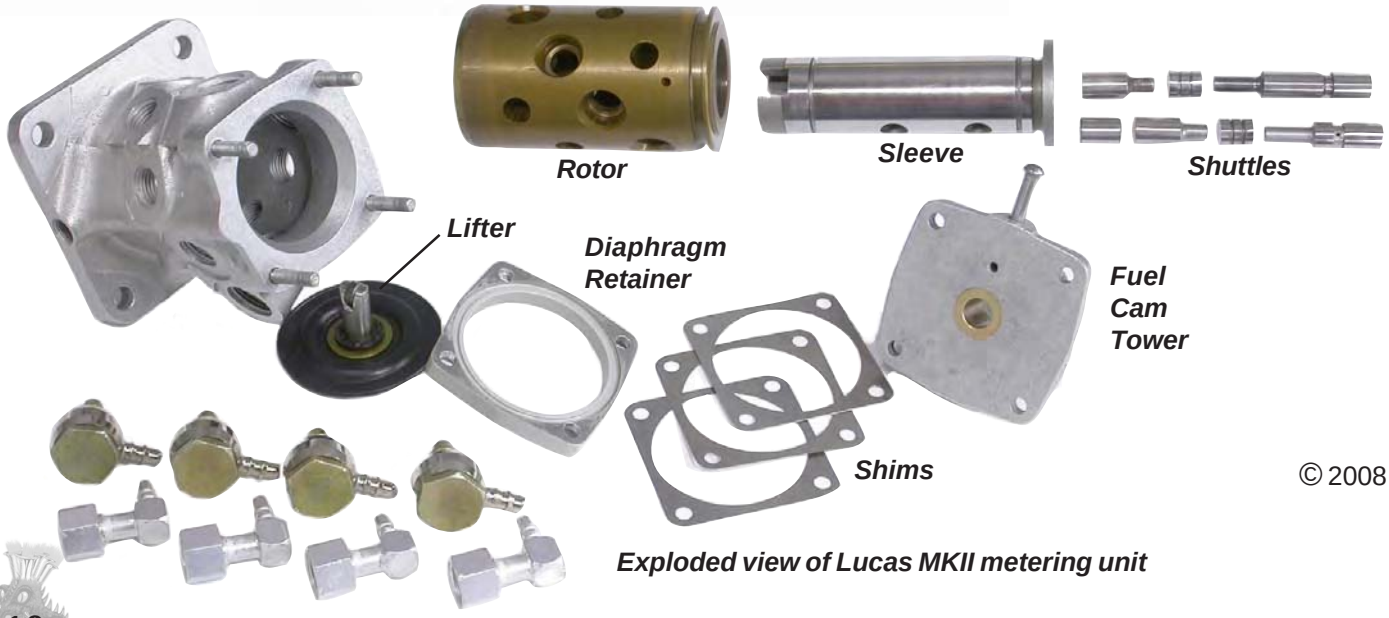
To run the test : Start the engine and take it to a steady RPM at part throttle, with the fuel cam open to a reasonable fuel rate, to warm it up. Go to wide open throttle while moving the fuel cam richer. Move the lever to richen and lean the engine. Record the RPM, torque, and fuel rate where the engine makes the best torque. It doesn't matter where the fuel cam is indexed... it is just being used to run the LBT test. The RPM increments are usually every 400 RPM, from the lowest to highest RPM that the engine will be run at wide open throttle while racing.

For an 8mm 8 cylinder metering unit, divide the fuel rate at 7,000 RPM by 3.5 for the shuttle stroke that is needed in thousandths of an inch. Check the unit with feeler gauges and add or delete shims to get the required shuttle stroke at wide open throttle, see Page #211.





Increasing the amount of shims under the tower assembly increases the fuel rate at all throttle angles. The original idle fuel rate may be preserved by lengthening or shortening the hex link to the fuel cam to reindex it.



Exploded view of Lucas MKII metering unit

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ADJUSTING THE METERING UNIT

TIMING THE METERING UNIT

Proper fuel timing gives best low RPM engine torque and throttle response; it has very little affect on high RPM horsepower.

For most engines, the best fuel timing is about 40 crankshaft degrees before top dead center, coming up to start the intake stroke. This timing usually works well, but another setting may be better for a given application. No harm will result from trying other timings.

If the engine builder specifies a certain timing, start with that, but you might try others.....

To time the engine at 40 degrees before top dead center coming up to start the intake stroke:

1. Rotate the crankshaft until it is 40 degrees before top dead center, coming up to start the intake stroke.
2. Remove the #1 nozzle line banjo bolt from the metering unit (be very careful when reinstalling it as it cross threads easily).
3. With the right angle drive unit removed from the engine, rotate the drive gear on the bottom in the running direction until the ports in the rotor and the bronze sleeve of the metering unit full line up.
4. When reinstalling the drive unit in the engine, try to mesh the drive gear to the cam so that it will keep this fuel timing. It is not critical to be exact.

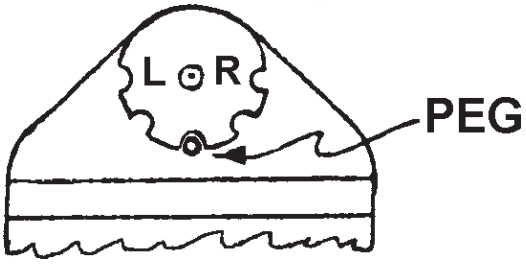
TO MAKE SMALL MIXTURE CHANGES

The fuel cam on the top of the metering unit pivots on an eccentric marked “R” and “L” .

The idea of this design was that by pushing the shaft out against the spring and rotating it so that the “R” moves toward the peg, the unit runs richer. One notch is supposed to equal .001” shim change.

NOTE -- DO NOT USE THIS .....

We have found that these pieces are often not indexed properly as Lucas made them... it may cause an improper adjustment. ***Use only the shims to make any mixture adjustment*** unless you carefully check the functionality of this piece.



Eccentric pin, spring, cotter pin, spring rest washers, and fuel cam bushings

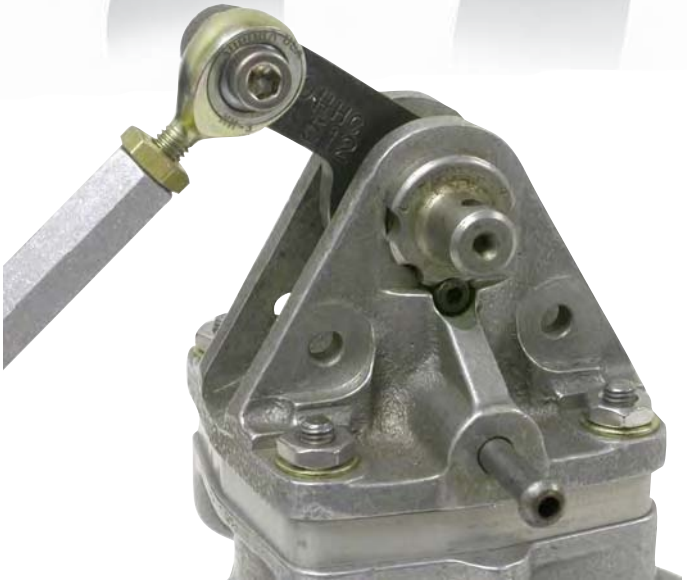
GENERAL METERING UNIT SETTINGS

These are average settings for Amercian V8 2-valve gasoline engines using a Lucas 8-cylinder metering unit with 8mm shuttles. If your engine is more powerful than the average race engine, it will need more shuttle stroke (fuel rate).

AT WIDE OPEN THROTTLE (WOT)

CUBIC INCHES	LITERS	IDLE SHUTTLE STROKE	WIDE OPEN THROTTLE SHUTTLE STROKE
302	5.0	.017"	.072"
331	5.5	.018"	.076"
350	5.8	.020"	.082"
410	6.8	.022"	.095"
427	7.0	.024"	.098"
454	7.5	.025"	.105"
480	8.0	.026"	.110"
500	8.3	.028"	.117"
540	9.2	.030"	.125"
572	9.4	.032"	.134"

ADJUSTING THE METERING UNIT



TO MAKE LARGE MIXTURE CHANGES

Remove the four nuts securing the top of the metering unit and remove it. Adding shims makes the unit richer (moves fuel cam farther from lifter). A .002" shim change will usually take care of a large change in atmospheric conditions.

SETTING IDLE FUEL RATE

Note : The "idle" fuel rate should be set for best throttle response as you quickly open the throttles; not for a smooth nonsmoking idle. The Lucas unit does not have an "accelerator pump shot", so the idle must be rich to compensate for this.

1. Start the engine and synchronize the throttle blades by using a Uni-syn air flow meter.
2. To richen the idle fuel rate, adjust the hex link to the cam to move it in the direction it moves as you open the throttles.

TURNBUCKLE VERSUS SHIM AND ECCENTRIC FUEL RATE CHANGES

If a wide open throttle fuel rate change is made by changing shims or using the eccentric pin, it will affect the idle fuel rate since the shuttle travel at the idle position will also be changed by the same amount. Reset the idle fuel rate for best throttle response.

Changing the "idle" fuel rate by using the hex link to reindex the fuel cam does not affect the wide open throttle (wot) fuel rate when using a KINSLER cam as it has no lift cut into it from 65° to 90° past it's nominal idle position. This is not only convenient, but proper, as a throttle plate does no throttling after about 65° of opening, so the engine is at wot air flow from that point on, and needs no additional fuel.

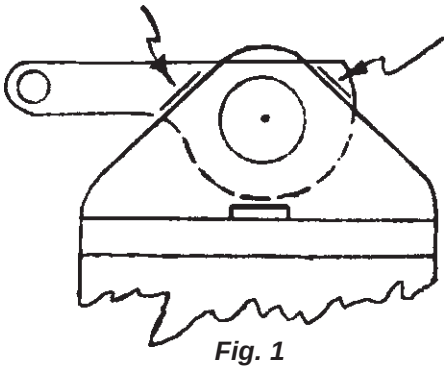


Fig. 1

ANGLES

The throttle plates are cut at a 14° angle so they won't stick in the throttle bore. Idle is about 1°, or 15° total, so the throttle shaft only rotates about 75° to wide open throttle (90°) from an idle.

The fuel cam is connected to the throttle shaft with a parallel four bar linkage (see Page #62) so it also rotates about 75° to go from idle to wot. Since it has no lift from 65° of travel to 90°, it can be reindexed to set idle fuel rate without affecting the wot fuel rate at all. It is rare to reindex the fuel cam more than 5° from the as shipped position to change the idle fuel rate significantly.

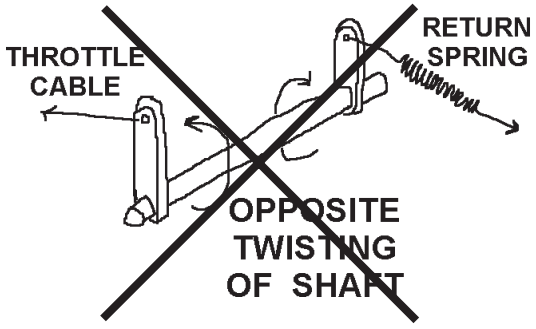
Some fuel cams have reference lines placed on them for checking the nominal, or "as shipped" cam position. The marks should be aligned as shown in Fig. 1 when the throttles are wide open on small block Chevrolets. On big block Chevrolet units, the throttle would be closed.

HOOKING UP THROTTLE LINKAGE

On units not having a rollerized fuel cam follower, the ideal place to attach the throttle linkage is on the throttle shaft, close to the arm that activates the fuel cam. This will prevent putting the torque required to move the fuel cam through the weakened section of the throttle shaft where it is milled to accept the throttle blade.

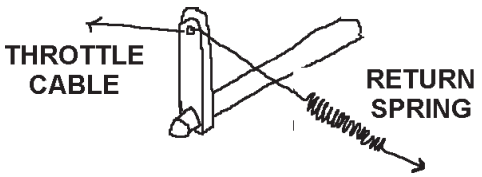
On units that have a rollerized lifter (which takes very little force to move), it is acceptable to attach the throttle linkage to one of the spring-screw links at the center of the manifold as long as the torque is pulling against the screw in the spring-screw link, not against the rivit - spring.

Always attach the throttle return springs so that they pull at the same point where the linkage is attached, so that they do not put torque through a throttle shaft. This will eliminate the possibility of putting the shaft under a cyclic strain, which could eventually result in a fatigue failure.



NOT CORRECT !!

The arrangement above puts torque through the throttle shaft while the setup below does the same job without putting any torque on the shaft.



CORRECT !!

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LUCAS MECHANICAL FUEL PUMP

Each Lucas mechanical pump supplied by Kinsler will have a red flow test tag wired to it. This assures that the pump has been put through a run-in schedule of varying pump speeds and pressures for at least 1.2 hours. The pump is flow tested at the start and end of the run-in, and if there is more than a very small difference in flow between the start and end flow tests the pump is rejected as unsatisfactory.

PRESSURE

The pressure relief (PR) valve is set to maintain system pressure at about 150 PSI on a Can-Am car with a 500 cubic inch engine, putting out about 700 HP.... this requires about .117" shuttle stroke. Since the nozzles crack at 56 PSI, this leaves 94 PSI (150 - 56) to move the two shuttles inside the metering unit.

CAUSES OF PUMP FAILURE

DIRT

It can't be stressed too much that cleanliness is of supreme importance to any fuel system. It only takes one small grain of dirt to start a scoring between the pump gears and the housing.

Making fuel lines: When you cut steel braided hose, small fragments from the braid get inside... it must be flushed **very** thoroughly to get all of these out... some always lodge at the end of the barb of the hose fitting.

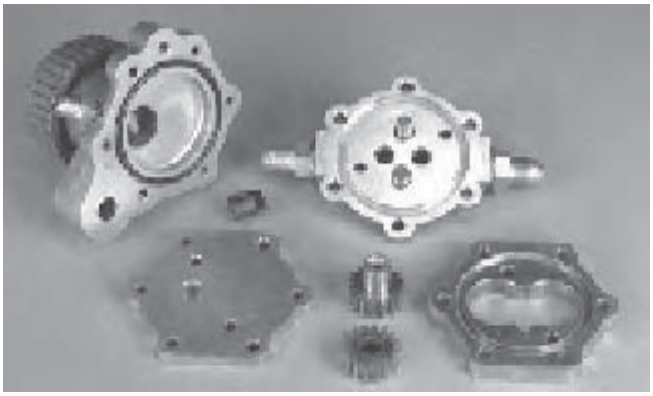
It is excellent to run a Kinsler 25 micron Monster stainless mesh pump inlet filter, part #8309-025 (see Page #164). It is ideal to place this in the fuel line immediately before the pump so it will catch any dirt left inside the line during fabrication. It measures just 2.5" in diameter by 4" long and comes with 8 AN male flare ends (can also be supplied with 6 AN male flare fittings).

LACK OF PUMP PRIMING

It is important that the pump is primed with fuel before the engine is cranked over at all, since the fuel is the only lubrication for the pump. It is smart to put a few drops of oil inside the pump each time you reinstall it on the engine, for initial startup lubrication.

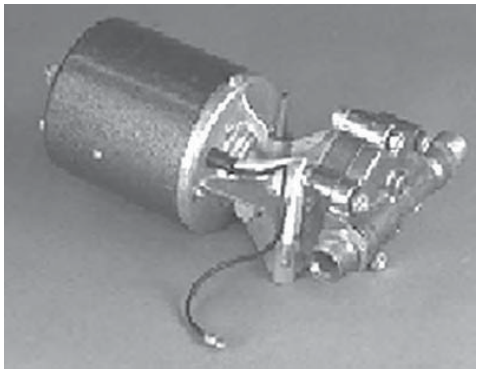
Turning on the high pressure electric starting pump doesn't necessarily push any fuel into the mechanical fuel pump. This is because there is a check valve at the outlet of each pump, to prevent fuel from going back through one pump when the other one is pumping.

Lucas wide gear mechanical pump segment mounted belt drive unit with AN adapter fittings



Disassembled Lucas mechanical pump segment

Early Lucas electric fuel pump - filter combination used on production Maserati in the 60's, and some racing Ferraris, such as the P4. Called "The Black Bomb"



Later Lucas electric fuel pump without filter. Used on production Triumph fuel injected cars and as starter pump on Can-Am cars in the 60's and 70's

#8226 ***#8228***

LUCAS PUMP DRIVE SEALS

Kinsler design and manufactured replacment lip seals for Lucas mechanical and electric fuel pump drives. Special compound provides excellent seal and resistance to detoration by the fuel.

8226	Lucas mechanical pump drive shaft seal
8228	Lucas electric pump drive shaft seal

LUCAS NOTES

A) The greatest enemy of <u>any</u> kind of fuel injection system is dirt. KEEP IT CLEAN. If disconnecting any lines, protect them from dirt.

B) There is a nylon filter in the adapter fitting on the inlet to the metering unit. Check this occasionally to be sure it is clean. Dirt may be removed from this and the nozzle inlet screens by using a Q-tip or similar cotton tipped swab.

C) An 8-cylinder metering unit that has 8mm diameter shuttles will flow 3.5 lbs/hr per .001" stroke at 7000 rpm.

D) Do not use any MK II metering units or nozzles that have not been flow tested. During certain dates of manufacture faulty pieces were assembled at the plant in England.

#9246 MK-II design

8201	Lucas nozzle line, translucent, per foot
8202	Lucas nozzle line, black, per foot
8203	Nozzle tube end fitting, 90 degree, MK II
8283	Washer o-ring, 1/4" BSP
8284	Washer o-ring, 3/8" BSP
9005	Narrow feeler gauges for use with Lucas MK I and MK II
9007	Bung seal installation tool
9008	Spanner wrench for removing diaphragm retainer nuts
9009	Set of hardwood nozzle line fabrication blocks
9211	Banjo bolt, MK II
9213	Banjo fitting, MK II
9215	KBB banjo bolt o-ring
9216	Bung seal
9231	Lifter, Kinsler precision ground solid rollerized, MK I
9235	Lifter, Kinsler precision ground solid rollerized, MK II
9236	Diaphragm, for lifter follower
9238	Washer, brass, retains #9236 diaphragm to lifter
9240	Clip, locks #9238 washer down on diaphragm (2 required)
9244	Spanner nut, secures diaphragm retainer plate, metering unit requires four
9246	Shim, metering unit tower, .002", MK II design
9248	Shim, metering unit tower, .003", MK II design
9250	Shim, metering unit tower, .004", MK II design
9252	Shim, metering unit tower, .008", MK II design
9254	Shim, metering unit tower, .015", MK II design
9290	Metering unit drive spud, Delron, made by Kinsler

Top and bottom of #9290 Drive spud

#9235 Lifter

#9236 Diaphragm

#9238 Washer

#9240 Diaphragm retainer clips

#9008 Spanner wrench removing #9244 spanner nut to remove diaphragm retainer plate

#3908 Pressure relief valve, model: NC

#3948 NC valve diaphragm

#12106 Pressure relief valve, model: K-140

Kinsler developed the K-140 valve in 1995 for the Indy Racing League. While is is quite excellent, the model NC valve is still totally adequate for the Lucas system. The model NC valve is the original one that Kinsler used on the Lucas systems from 1967 to 1995, so it is the correct piece for a vintage restoration.

3908	Kinsler pressure relief valve, model 'NC', includes flowing and pressure setting to 125 PSI or 150 PSI (please specify when ordering), 6 AN male flare adapter fittings, and stainless steel 1/8" NPT port plugs installed in the pressure gauge ports
3929	Adjuster screw with jam nut
3948	Diaphragm for NC valve
5995	Adapter biscuit, for #6002 to fit ramtube bells up to 3 1/2" O.D.
6002	Uni-Syn throttle synchronizer, 2 3/4" base
6016	Kinsler air density gauge
6017	Labor to qualify and calibrate #6016 air density gauge
8102	Kinsler 3-way check valve, 6 AN

9012	**Lucas Spares Kit, consists of:**
	20 - feet of Lucas nozzle line (specify translucant or black)
	1 - #9009 line fabrication block
	5 - shims for metering unit tower (1 each: .002", .003", .004", .008", .015")
	1 - #9005 set of narrow feeler gauges
	16 - #9215 KBB banjo bolt o-rings
	8 - #9216 bung seals
	1 - #9007 bung installation tool
	1 - #9008 spanner wrench
	1 - #9236-K diaphragm kit; includes diaphragm, hat washer and spring clip
	6 - #9023 NPE filter elements or #9031 BRL filter elements

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NOTES - PLUMBING MULTIPLE FUEL TANKS

SEE PLUMBING SCHEMATIC ON PAGE #216 FOR MULTIPLE FUEL SUPPLY TANKS ON A LUCAS SYSTEM.

READ THIS!!

This schematic greatly simplifies the plumbing and operation of the Lucas system when using multiple fuel tanks. It eliminates the need for multiple valves to select the desired fuel tank to run on. It also eliminates the need for selector valves running back to each tank.

Simply install one toggle switch on the instrument panel for each supply pump... these should all be wired through the ignition switch, (including the Lucas high pressure fuel pump) so no pump can be left running by mistake. Note: check amperage capacity of each switch. Select the tank that you want to use by using the corresponding fuel pump. This will deliver fuel through a one way check valve, then to the vapor separator tank. The check valves keep the fuel from backflowing into the other tank(s).

To switch to another tank: Leave the first pump running and flip on the switch for the next tank. After allowing about twenty seconds for the new pump to purge out the trapped vapor, flip off the switch to the first pump.

A critical item for this system is the Kinsler Vapor Separator Tank (VST). It must be constructed with a proper internal vapor separator chamber, or the tank will fill up with vapor. The Kinsler VST tanks have a proper chamber design:

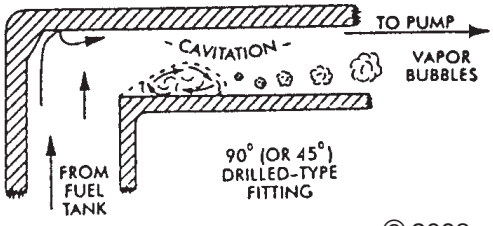
5708	Vapor seperator tank, 3" diameter x 8" tall, blue anodized aluminum
5710	Vapor seperator tank, 3" diameter x 10" tall, blue anodized aluminum
5712	Vapor seperator tank, 3" diameter x 12" tall, blue anodized aluminum
5713	Mounting bracket for 3" diameter tank, stainless steel with rubber liner, two required
5716	Vapor seperator tank, 4" diameter x 12" tall, blue anodized aluminum
5717	Mounting bracket for 4" diameter tank, stainless steel with rubber liner, two required

#5717

#5716

Stainless steel Vapor Separator Tanks are available on SPECIAL ORDER.

NOTE : Specify 8 AN, 10 AN, or 12 AN outlet to mechanical injection pump when ordering. Tanks are available with 8 AN or 10 AN male flare inlet (supply from electric pump) and 6 AN or 8 AN male flare for return to Back Pressure valve - other sizes can be special ordered.



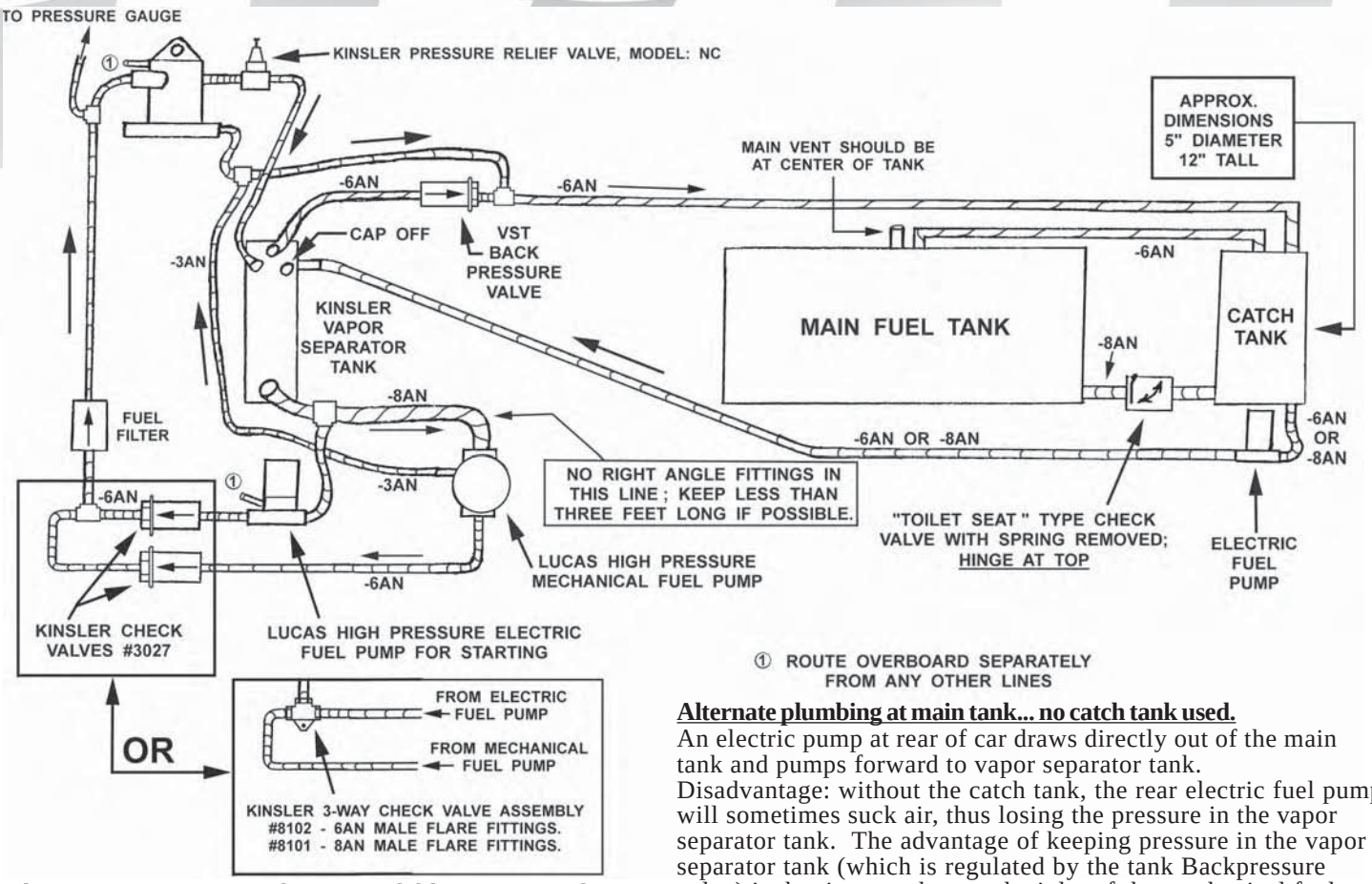
When mounting any pump.....

1. Mount it as low as possible, for good gravity feed from the tank. At least keep it below the lowest fuel level the tank will have.
2. Have no angled fittings in the inlet hose to the pump from the tank; make any bends with a sweeping bend of the hose. If forced to use an angled fitting, it must be a bent tube type fitting... this gives the fuel a reasonably smooth flow path, which will greatly reduce the tendency of the pump to cavitate at its inlet.

Marsh Motorsports, New Zealand, road racing RX-8, Kinsler small block Chev manifold with Lucas mechanical timed injection

Kinsler cross-ram big block Chevrolet manifold on Greenwood IMSA Corvette using Lucas mechanical timed injection

LUCAS PLUMBING

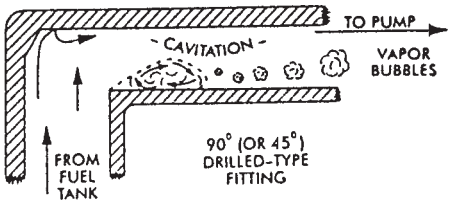


Kinsler vapor separator tanks are available 8", 10", and 12" tall; in 3" and 4" diameter. Use the tallest tank you can fit into the car. It is important that the tank have a proper internal vapor separator chamber, or the tank will fill up with vapor... this is built into our tanks.

NOTE :

The electric fuel pump MUST be on before cranking the engine to lubricate the metering unit.

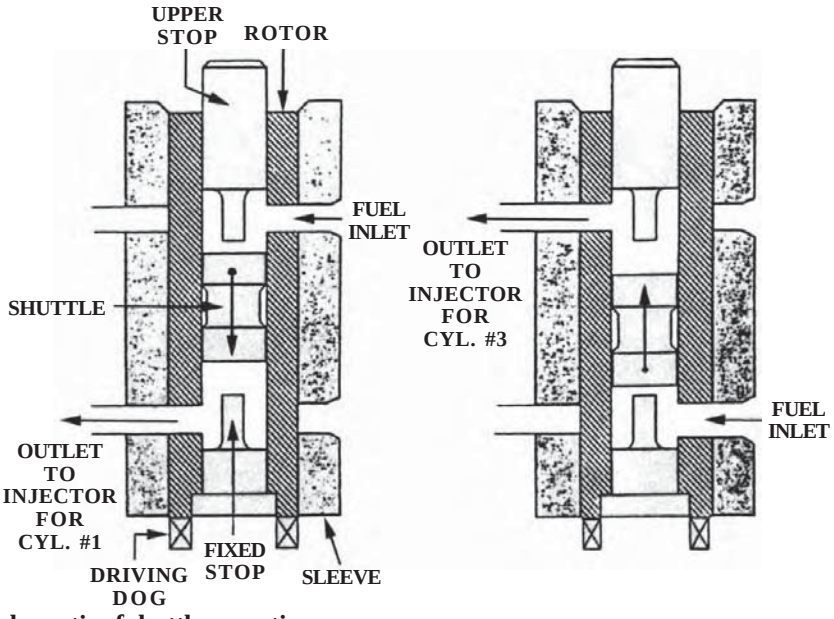
Use the Lucas high pressure electric fuel pump for starting ONLY. Shut it off after starting the engine. In the case of a mechanical pump failure, the Lucas electric pump can be used to run back to port or the pits at <u>low</u> engine speeds, part throttle <u>only</u>.



NEVER use a "drilled block of metal" type angle fitting on ANY pump inlet hose... where the drills intersect there is a razor sharp edge that promotes pump inlet cavitation. The best solution is to make gentle bends with the hoses. If you have a really tight place, use a bent tube type hose end fitting.

<u>Alternate plumbing at main tank... no catch tank used.</u>

An electric pump at rear of car draws directly out of the main tank and pumps forward to vapor separator tank. Disadvantage: without the catch tank, the rear electric fuel pump will sometimes suck air, thus losing the pressure in the vapor separator tank. The advantage of keeping pressure in the vapor separator tank (which is regulated by the tank Backpressure valve) is that it supercharges the inlet of the mechanical fuel pump, thus preventing any cavitation... ideal for very hot and/or high altitude operating conditions. If you do not use a catch tank, then draw out of the rear of the main tank with the electric pump, to get good fuel supply under acceleration conditions.



<u>Schematic of shuttle operation.</u>

On racing metering units, the shuttle stroke is controlled by a cam linked directly to the throttles. The principal of shuttle metering, illustrated above, shows shuttle movement is reversed as the rotor turns. On a V8 metering unit, there are two shuttle assemblies and each assembly controls the fuel to 4-cylinders.

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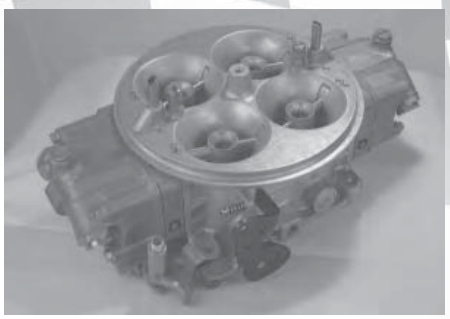
CARBURETOR FUEL SUPPLY



ANY PRESSURE AND VOLUME YOU NEED

MECHANICAL PUMP ELIMINATES THE NEED FOR A BATTERY AND CHARGING SYSTEM

EXTREMELY DEPENDABLE !

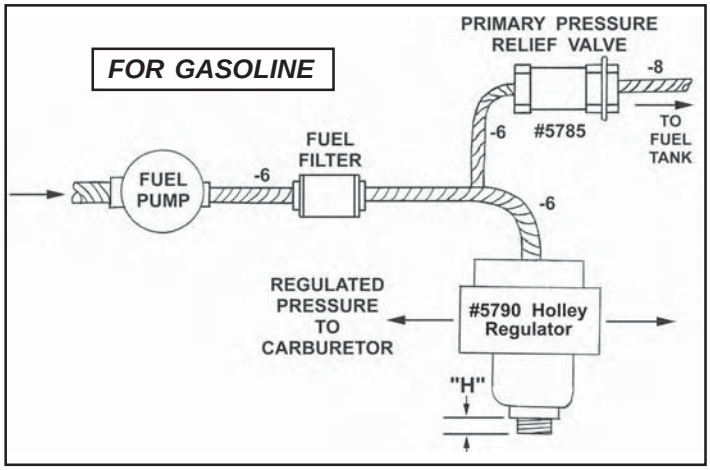
HOW IT WORKS

Mechanical injection pumps are positive displacement type, so the system must bypass the fuel that the carb doesn't need back to the tank. The primary pressure relief valve does this, and also regulates the pressure at about 15 PSI* to the inlet of the regulator valve. It is necessary to keep the inlet supply pressure to the carburetor regulator valve at least 1 PSI above the maximum desired regulated pressure, but not more than 20 PSI total to prevent damage to the regulator.

NOTE : the fuel filter is placed before the valves so that it will protect both the relief and regulator valves.

The table gives the final regulated pressure for this system on a small block Chev. If extremely fine pressure regulation is desired, two regulators can be installed in parallel, see table at right. Connect the two inlets together and connect the two outlets together. This should not be needed except on larger gasoline big block engines, or engines that run methanol. There are many regulators; call us; we will recommend the best setup for you.

Kinsler can supply a proper fuel supply system for a carburetor, using a mechanical or electric fuel pump (for information on ELECTRIC FUEL PUMPS see Pages #124-130). Pump drives, fuel filters, and bypass valves are also available.



Engine RPM	Regulated Pressure One Holley Regulator	Regulated Pressure Two Holley Regulators
1000	8.0	8.0
2000	7.8	7.9
3000	7.7	7.9
5000	7.6	7.8
7000	7.3	7.7
8000	7.2	7.6

Nominal Regulated Pressure	Holley Valve "H" Adjustment
2.0	.310"
3.0	.270"
4.0	.220"
5.0	.170"
6.0	.130"
7.0	.080"
8.0	.040"
9.0	-.010"
10.0	-.050"

5790	Holley pressure regulator, 3/8" NPT female inlet x two 3/8" NPT female outlets
5750	MagnaFuel pressure regulator, 4-12 PSI, 10 AN female inlet x two 6 AN female outlets, 1/8" NPT female pressure gauge port
5751	MagnaFuel pressure regulator, 4-12 PSI, 10 AN female inlet x 6 AN female outlets, 1/8" NPT female pressure gauge port and boost/vacuum reference barb
5752	MagnaFuel pressure regulator, 4-12 PSI, 10 AN female inlet x two 8 AN female outlets, 1/8" NPT female pressure gauge port
5753	MagnaFuel pressure regulator, 4-12 PSI, 10 AN female inlet x two 8 AN female outlets, 1/8" NPT female pressure gauge port and boost/vacuum refernece barb
5754	MagnaFuel pressure regulator, 4-12 PSI, 10 AN female inlet x four 6 AN female outlets, 1/8" NPT female pressure gauge port
5755	MagnaFuel pressure regulator, 4-12 PSI, 10 AN female inlet x four 6 AN female outlets, 1/8" NPT female pressure gauge port and boost/vacuum reference barb
10748	Weldon pressure regulator, 0-30 PSI, two 10 AN female inlets x 6 AN female return, 1/8" NPT female pressure gauge and boost/vacuum ports

Adjustable Pressure Regulators


#5790


#5750


#5751

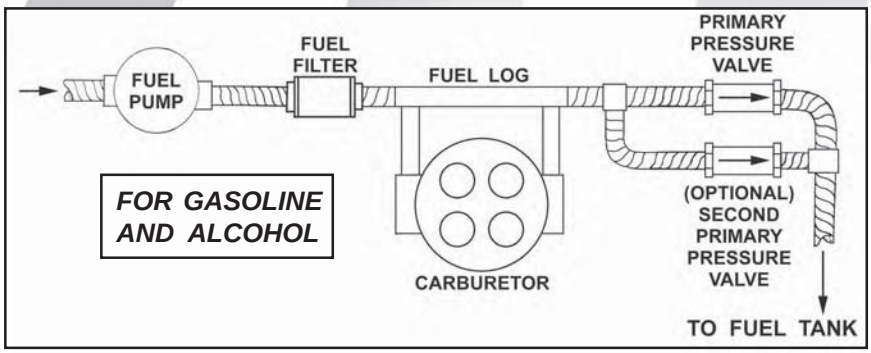

#5752


#5754


#10749

CARBURETOR FUEL SUPPLY - CONTINUED -

Call us to discuss your application; we will recommend the best setup for you.



SELECTING THE CORRECT PUMP

The chart shows pump sizes versus maximum horsepower output for carb supply systems, for pumps in good condition. The Chart uses 0.5 Brake Specific Fuel Consumption (BSFC) for gasoline and 1.1 BSFC for methanol. The pumps are driven at 1/2 crank speed, operate at a maximum of 50 PSI, and have 20% of the volume bypassed back to the fuel tank.

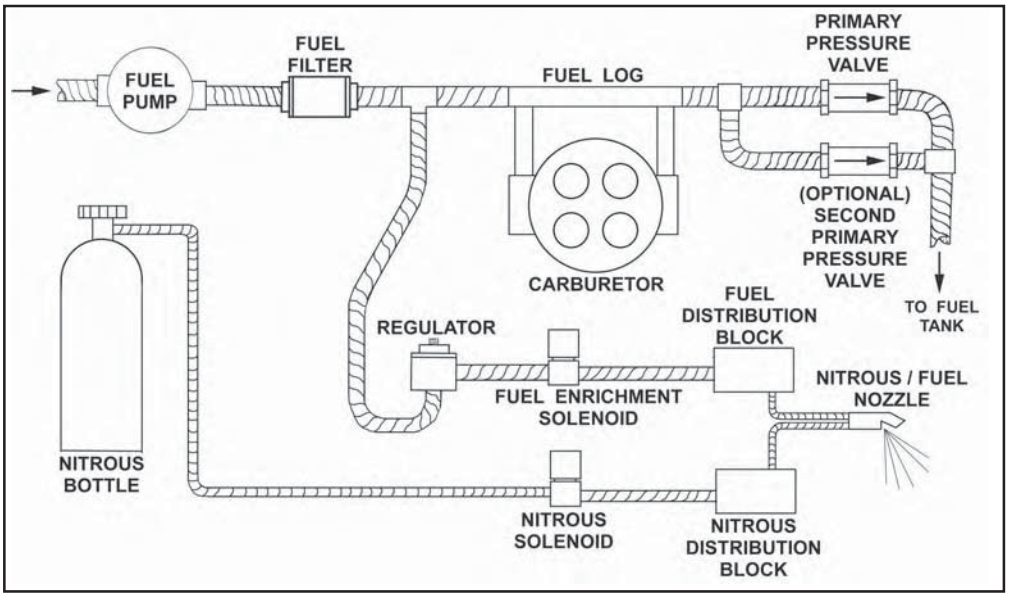
PUMP SIZE		MAXIMUM H.P. ON GASOLINE Engine RPM		MAXIMUM H.P. ON ALCOHOL Engine RPM	
KW	HILBORN	3500	7000	3500	7000
200	-00	420	840	190	380
400	-0	840	1680	380	760
500	-1/2	1120	2240	509	1018
700	-1	1760	3520	800	1600
1300	-2	3360	6720	1529	3054

We offer fittings and hose to properly plumb these systems.

See Pages #182-186 for "FITTINGS" ; Page #187 for "HOSE AND HOSE ENDS"

MECHANICAL PUMP SUPPLYING CARBURETOR SYSTEM, WITH NITROUS OXIDE

The mechanical pump MUST be capable of supplying the required volume at the RPM the nitrous is engaged. Just because the pump is large enough to feed the engine at 7000 RPM with nitrous, DOES NOT mean it is big enough to supply the volume of fuel at 3500-4000 RPM with nitrous. When engaging the nitrous at low RPM, a larger pump will be required to get the volume needed. DO NOT CONFUSE VOLUME WITH PRESSURE. There may be plenty of pressure before the nitrous is engaged, but when the enrichment solenoid opens and starts to flow volume the pressure will immediately drop. Call us!



#5785

#5786

#5787

CARBURETOR VALVES

5785	Primary pressure relief valve, hard anodized aluminum 6 AN jet can
5786	Primary pressure relief valve, brass high-flow 6 AN jet can
5787	Primary pressure relief valve, brass 8 AN jet can
5788	Labor to flow test and set above #5785, #5786, and #5787 valve for specific application

U and L BENDS / CONNECTOR HOSE

IN STOCK FOR IMMEDIATE SHIPMENT

OTHER SIZES AND CENTERLINE RADIUSES MAY BE AVAILABLE. PLEASE CALL !!!

BENDS ARE MANDRELL FORMED TO BE SMOOTH AND WRINKLE-FREE

-- EXCELLENT FOR EXHAUST HEADERS, COLD AIR DUCTING, COOLANT PLUMBING, TURBOCHARGER DUCT WORK, ETC.

U-BENDS : ALUMINUM

3003-0 and 6061-0 alloy

Part #	O.D.	Wall	C.L.R.	Material	"W"	Leg
5885	1 3/4"	.065"	3"	3003-0	8"	4"
5886	1 3/4"	.065"	4"	3003-0	9.750"	4"
5887	1 3/4"	.065"	5"	3003-0	11.750"	4"
5888	1 3/4"	.065"	6"	3003-0	13.750"	4"
5884	2"	.065"	4"	3003-0	10"	4"
5889	2"	.065"	5"	3003-0	12"	4"
5891	2"	.065"	6"	3003-0	13.880"	4"
5892	2 1/4"	.065"	4"	3003-0	10.250"	4"
5895	2 1/4"	.065"	5 1/4"	3003-0	12.500"	4"
5893	2 1/4"	.065"	6"	3003-0	14.250"	4"
5894	2 1/2"	.065"	4"	3003-0	10.500"	4"
5898	2 1/2"	.065"	6"	3003-0	14.500"	4"
5897	3"	.065"	4 1/2"	6061-0	12"	4"

U-BENDS : STAINLESS STEEL

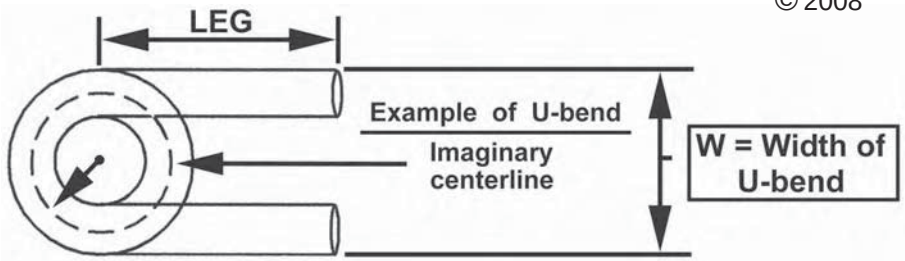
Type 321 has excellent resistance to fatigue and cracking at elevated temperatures.

Part #	O.D.	Wall	C.L.R.	"W"	Leg
5879	1 1/2"	.065"	.065"	6.50"	4"
5870	1 1/2"	.065"	.035"	7.50"	4"
5871	1 1/2"	.065"	.065"	7.50"	4"
5872	1 3/4"	.065"	.065"	7.75"	4"
5873	1 3/4"	.065"	.065"	9.88"	4"
5874	1 3/4"	.065"	.065"	11.88"	4"
5875	2"	.065"	.065"	8.25"	4"
5876	2"	.065"	.065"	13.88"	4"
5877	2 1/8"	.065"	.065"	9.25"	4"
5878	2 1/8"	.065"	.065"	12.75	4"

L -BENDS : ALUMINUM

3003-0 and 6061-0 alloy

Part #	O.D.	Wall	C.L.R.	Material	Legs
5882	3"	.065"	3"	304	4"
5896	3"	.065"	3"	6061-0	4"
5899	3 1/2"	.065"	3"	6061-0	4"



To determine centerline radius:

1) Imagine a circle that matches the centerline (the imaginary line running through the center of the tube) of the radiused end of the bend.The center of that circle is the center point.
2) Measure from the center point to any point in the arc of the imaginary circle. This measurement is the centerline radius.

U and L BENDS / CONNECTOR HOSE

CONNECTOR HOSE - STRAIGHT

*** Hose sold ONLY in 18" and 36" sections ***

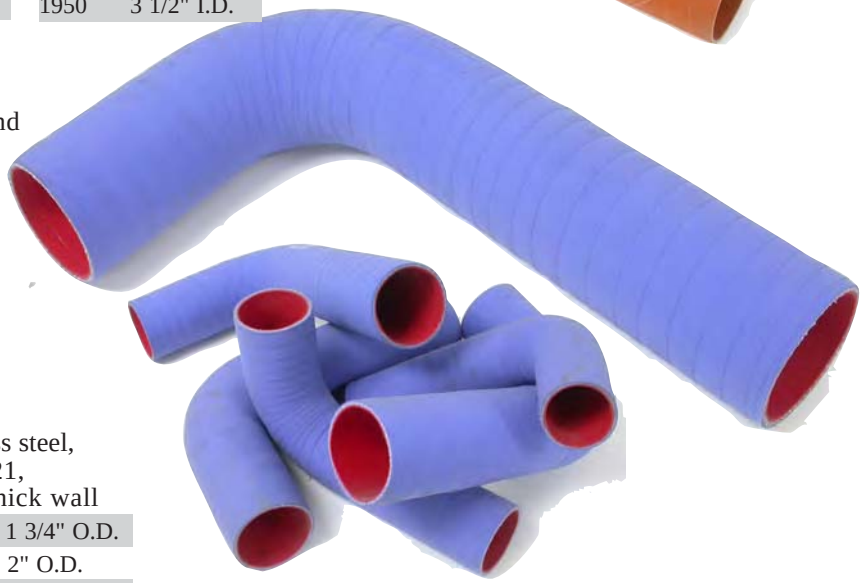
3-ply glass fiber reinforced silicone, orange. Silicone provides mechanical, thermal, electrical and chemical superiority over rubber or any other elastomer. It is resistant to: wide range of temperature, hardening, cracking, moisture, steam, chemicals, solvents, fuels, oils. It is strong yet flexible, and gives long service life.

18" LONG		36" LONG	
1835	1 3/4" I.D.	1941	1 3/4" I.D.
1836	2" I.D.	1942	2" I.D.
1837	2 1/8" I.D.	1924	2 1/8" I.D.
1838	2 1/4" I.D.	1943	2 1/4" I.D.
1839	2 3/8" I.D.	1944	2 3/8" I.D.
1840	2 1/2" I.D.	1945	2 1/2" I.D.
1841	2 5/8" I.D.	1946	2 5/8" I.D.
1842	2 3/4" I.D.	1947	2 3/4" I.D.
1843	3" I.D.	1948	3" I.D.
1844	3 1/4" I.D.	1949	3 1/4" I.D.
1845	3 1/2" I.D.	1950	3 1/2" I.D.

CONNECTOR HOSE - 90-DEGREE ELBOWS

4-ply reinforced silicone. Blue on the outside and red on the inside.

1880	2" I.D. x 4" radius, 10 1/2" x 18 1/2" legs
1881	2 1/4" I.D. x 2 1/4" radius, 8 1/2" x 18" legs
1882	2 1/2" I.D. x 3" radius, 6" x 10" legs
1883	2 3/4" I.D. x 3 1/2" radius, 8" x 14" legs
1884	3" I.D. x 3" radius, 7 1/2" x 12" legs



TUBE SECTIONS

Aluminum, type 6061, .065" thick wall		Stainless steel, type 321, .065" thick wall	
5860	1 3/4" O.D.	5866	1 3/4" O.D.
5861	2" O.D.	5867	2" O.D.
5862	2 1/4" O.D.	5868	2 1/8" O.D.
5863	2 1/2" O.D.		
5864	3" O.D.		

Metal Tubing: Standard length in stock is 36"
We can cut special lengths

Note on Connecting Tubing :
Putting a bead around the end of both of the tubes is OK, but under boost conditions there is still a good chance that the two pieces will blow apart causing not only loss of boost but depending on where fuel is being injected a fire hazard. The ***best*** thing to do is to weld an ear/flange on both pieces then either safety wire them together, or even better, bolt them together.

BAND CLAMPS

Stainless steel worm gear style, .560" wide band.

1870	Range of hose O.D. from 1 13/16" to 2 3/4"
1871	Range of hose O.D. from 2 1/16" to 3"
1872	Range of hose O.D. from 2 5/8" to 3 1/2"
1873	Range of hose O.D. from 2 13/16" to 3 3/4"

Rick Essary's alcohol Super Stock Pulling Tractor

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O-RINGS / PLASTIC CAPS / JET NUTS

O-RINGS

Kinsler stocks a wide range of sizes and compounds. The following are commonly used sizes and applications.

3074	Set for Kinsler 6 AN high flow jet can bypass valves, jet sealing and body, for gas/alky
3116	Jet sealing in 6 AN jet can, gas/alky
3117	Set for Kinsler quick disconnect, gas/alky ONLY, buna-n
3119	Set for Kinsler quick disconnect, nitro ONLY, E.P.
3413	Kinsler Jet Selector Valve, main body to cap, large diameter
3414	Kinsler Jet Selector Valve, rotor shaft to main body, gas/alky
8172	Kinsler fuel filter #8170, #4148, #4156, two required
8173	Element sealing to filter body #8170, #4148, #4156
8601	Kinsler Monster Mesh series filters, end cap to body sealing, two required
8602	Kinsler Monster Mesh series filters, element to end cap sealing
4904	Fuel filter #4900, one required
4909	Fuel filter #4905 and #4906, one required
6059	Shaft seal, shut-off valve #6036 & #6039, specify fuel
6140	3 AN, buna-n, package of ten
6141	4 AN, buna-n, package of ten
6142	6 AN, buna-n, package of ten
6143	8 AN, buna-n, package of ten
6144	10 AN, buna-n, package of ten
6145	12 AN, buna-n, package of ten
3522	Barrel valve spool shaft, Kinsler/Hilborn/Crower, gas/alky
3524	Kinsler barrel valve base plug
2965	K-W fuel pump front cover o-ring
2828	Hilborn fuel pump front cover, model PG-150 A, B, C
2829	Hilborn fuel pump front cover, model PG-175
16180	Kit for Enderle square type barrel valve, gas/akly
16181	Kit for Enderle square type barrel valve, NITRO. only
16182	Kit for Enderle high-flow nitro. type barrel valve, gas/alky
16183	Kit for Enderle high-flow nitro. type barrel valve, NITRO. only
2395	Kinsler/Enderle screw-in nozzle insert, each
2397	Kinsler/Hilborn 1/2-20 thread nozzle, each
7249	Kinsler top adapter to manifold, 2 3/16" to 2 1/2", package of eight
7248	Kinsler top adapter to manifold, 2.9" big block, package of eight
10197	Bosch EFI injector

Note: O-rings and seals for Lucas Metering equipment see Pages #208-209.

JET NUTS

Light weight and compact. Only 40% of the weight of conventional elastic stop nuts.

1851	8-32, cadmium plated, 6-point, package of 10
1853	10-32, cadmium plated, 6-point, package of 10
1855	1/4-28, cadmium plated, 6-point, package of 10
1857	1/4-28, black oxide plated, 12 point, package of 10
1859	5/16-24, cadmium plated, 6-point, package of 10
1861	3/8-24, cadmium plated, 6-point, package of 10

WASHER O-RINGS (stat-o-seals)

Steel or aluminum washer with o-ring/seal attached around inside diameter.

3010	Kinsler and Hilborn 6 AN jet can body / Kinsler and Hilborn barrel valve secondary outlet fitting or plug
3009	Specially machined on diameter for Kinsler 'Xtra-Light' barrel valve secondary outlet fitting
6163	6 AN
6137	8 AN
6138	10 AN
6139	12 AN
22011	10mm, used on pumps #22002, #22003
6130	12mm, used on Bosch fuel pump outlet #10208, #10210, #10211, and #10212
6131	14mm, used on Bosch fuel pump inlet #10210
6132	16mm
6133	18mm, used on Bosch fuel pump inlet #10211
8283	1/4" BSP (commonly used on Lucas metering equipment)
8284	3/8" BSP (commonly used on Lucas metering equipment)

PLASTIC CAPS AND PLUGS

Ideal for protecting throttle bores on manifold, fitting flares and threads, and keeping a fuel system clean. Caps and plugs have ribs for easy finger griping. Plugs have male flare to help prevent line or fitting leakage.

CAPS

6201	3 AN, package of 10
6203	4 AN, package of 10
6205	6 AN, package of 10
6207	8 AN, package of 10
6209	10 AN, package of 5
6211	12 AN, package of 5
6212	16 AN, package of 5

PLUGS

6200	3 AN, package of 10
6204	6 AN, package of 10
6206	8 AN, package of 10
6208	10 AN, package of 5
6210	12 AN, package of 5

THROTTLE BORE PLUGS FOR KINSLER SMALL BLOCK CHEVROLET MANIFOLD

6213	2 1/4", red, package of 8
6214	2 1/2", red, package of 8
6215	2 5/8", red, package of 8
6216	2 13/16", yellow, package of 8

IGNITION / METRI-PACK CONNECTORS

KINSLER'S 'SHORTY' DISTRIBUTOR HEAD

Accepts standard GM distributor cap and rotor.

Available with :

3/8" hex or tang drive
Magnetic pickup or points
With or without advance weights

Ideal for engine applications where there is a clearance problem with the distributor location in the block.

Distributor head with 3/8" hex drive

Distributor head with .165" thick tang drive

Magnetic pickup with advance weights

3/8" hex drive head on front cover, driven by spud bolted to camshaft

3/8" hex drive head mounted on fuel pump belt drive

Tang drive head installed on right angle drive

Tom Heltzel's Ultima GTR Spyder, powered by an Aurora 4.0L with Accel Gen. VII engine management

Terry D'Anca's 68' Camero powered by a 410 'sprint car' small block Chevrolet with EFI

Jim Fueling's Land Speed Streamliner. Small block Chev V8 with Kinsler 3-piece manifold

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MISC.

#5922 *#5912*

KINSLER PRESSURE GAUGES

Standard Kinsler series gauges feature an adjustable calibration screw. Pressure capturing equipment available, see Page #186.

STANDARD
Gauge has 2" face, 1/8"NPT male on back, steel case.

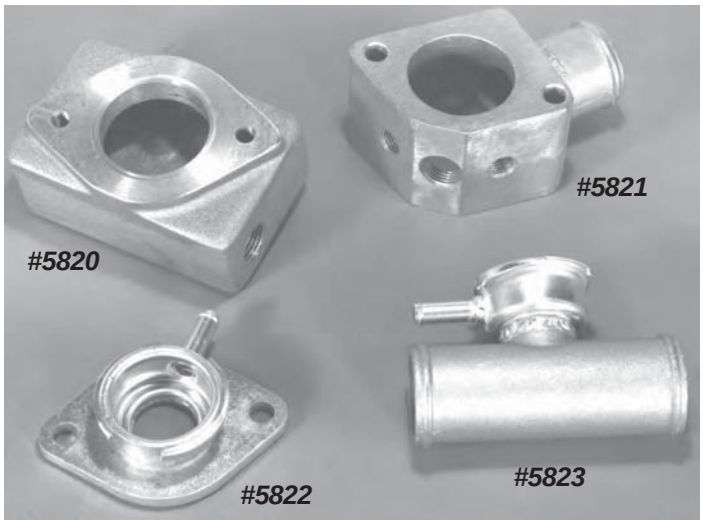
5920	0-15 PSI
5921	0-30 PSI
5922	0-60 PSI
5923	0-100 PSI
5924	0-160 PSI
5925	0-200 PSI

GLYCERIN FILLED
Gauge has 1 1/2" face, 1/8" NPT male on back and stainless steel case. Not adjustable.

5933	0-15 PSI
5934	0-30 PSI
5935	0-60 PSI
5936	0-100 PSI

GLYCERIN FILLED
Gauge has 2 1/2" face, 1/4" NPT male on back and stainless steel case. Not adjustable.

5910	0-30 PSI
5911	0-60 PSI
5912	0-100 PSI
5914	0-160 PSI
5913	0-200 PSI



ENGINE COOLANT SYSTEM CONNECTORS

Great for installing a thermostat or plumbing a coolant system to any injection or carburetor manifold.

5820	Remote thermostat housing, cast aluminum, 'as cast' finish, uses GM style thermostat and waterneck, 2 3/8" tall x 3" wide x 4 1/2" long, 1 1/4 lbs, three 1/2" NPT ports and two 5/16-18 mounting bosses on bottom, hardware sold seperately
5824	Same as #5820 but with 'polished' finish
5821	90 degree filler adapter for 1 1/2" hose, 2 3/8" tall, one 1/2" NPT port and two 1/4" NPT ports, cast aluminum
5822	Filler cap, bolts to thermostat pad
5823	Hose filler adapter, for 1 1/2" inside diameter hose

ANTI SEIZE COMPOUND

Prevents thread galling or seizing. Ideal for nozzles and fittings with pipe threads, jet can assembly, fuel filter assembly, etc. We use this to assemble many of our products that will require disassembly. Very fuel resistant and is easily applied to threads. Thick paste-like substance stays where you put it. No messy clean-up!

1920	1 pint, re-sealable metal can

EPOXY, COMMERCIAL GRADE

1916	Two part adhesive, commercial grade, high strength, 3000 PSI shear strength, green in color when mixed

EPOXY PUTTY

Molds like clay, hardens solid in one hour, heat resistant up to 300 degrees F, cures chemically--doesn't shrink, smooths into place with a wet fingertip, NO odor...cleans up with water before hardening, adheres to damp surface, even cures under water.

Can be sanded, drilled, machined, sawed and painted. Use on metal, wood, brick, stone, concrete, plastic, glass, and tile.

We use this putty to repair corroded water passages in intake manifolds.

1917	Putty, two part, 1-pound

APPAREL AND BOOKS

Right front of hat

Left rear of hat

KINSLER RIPPER HAT

Red and black with Kinsler's 'Dragon' logo, claw, and 'rip' embroidered. Adjustable velcro elastic strap. Make a statement without saying a word!

1043	Kinsler 'Ripper' hat

KINSLER T-SHIRT

Kinsler 'Dragon' shirts are white with large colorful fire breathing 'Dragon' tearing out through the back.

1060	T-shirt: small, medium, large, and x-large
1061	T-shirt: 2x-large
1062	T-shirt: 3x-large

NOTE - ORDER T-SHIRTS ONE SIZE LARGER THAN YOU WEAR. THEY ARE 100% COTTON AND SHRINK ONE SIZE.

KINSLER BASEBALL HAT

Baseball cap, light brown corduroy with Kinsler's 'Dragon' logo embroidered. Dark blue bill with strap type adjustment, vented back half with vents in the top.

1041	Kinsler baseball cap

KINSLER PATCH

1048	2 1/4" wide x 3 3/8" tall, 4-color, ebroidered

KINSLER DECAL

Kinsler's 'Dragon' logo, 4-color.

1023	4 1/2" wide x 4 3/4" tall
1025	7" wide x 7 1/4" tall

KINSLER SHOP APRON

Tie one on!

1087	Navy blue, double pocket, with Kinsler 'Dragon' logo
1088	Black, double pocket, with Kinsler 'Dragon' logo

KINSLER JACKETS

Black wool body with black lambskin leather sleeves. Kinsler's 'Dragon' logo embroidered on back. Seven snap closure with two exterior pockets on front and one interior pocket. A real hit with the ladies! They are expensive to make so we are selling them at our cost.

1084	Kinsler jacket, small
1085	Kinsler jacket, medium
1086	Kinsler jacket, large
1087	Kinsler jacket, x-large

KINSLER POSTER

Yes, we have some early Kinsler posters left in stock. It has driver, two cars, boat, and motorcycle logo on heavy paper. 20 5/8" x 25" image size.

1050	Kinsler racing driver poster, includes shipping tube

1015 **SPEEDBOAT**

Written by D.W. Fostle, 217 pages, hardbound. Wonderfully illustrated using the Rosenfeld Collection of wood powerboat photos. Traces the boats and the men that built and raced them from 1900 through 1955. Interesting stories on rum runners, the aircraft engine powered and super big race boats. We all love this book! 3.2 pounds of history.

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Kinsler Fuel Injection, Inc.
1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

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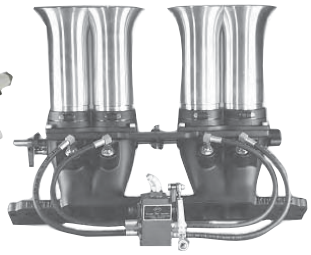
SMALL BLOCK CHEVROLET and MOPAR


Dragon Claw


ASCS Dragon Claw


Monster


Traditional


4-Cylinder

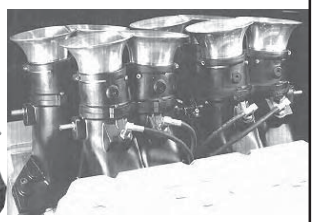
BIG BLOCK CHEVROLET


Dragon Claw


Traditional


Cross Ram


Big Chief


Pontiac Pro Stock

FORD


Small Block SVO


Small Block Windsor


Modular 4.6/5.4L


Big Block TFS and Hemi

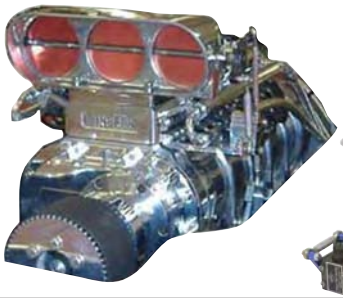

Super Cobra Jet


EFI Tunnel Ram


'Standard' Series

'Dominator' Series

4-Barrel Throttle Body


EFI Blower Hat


Throttle Bodies