

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

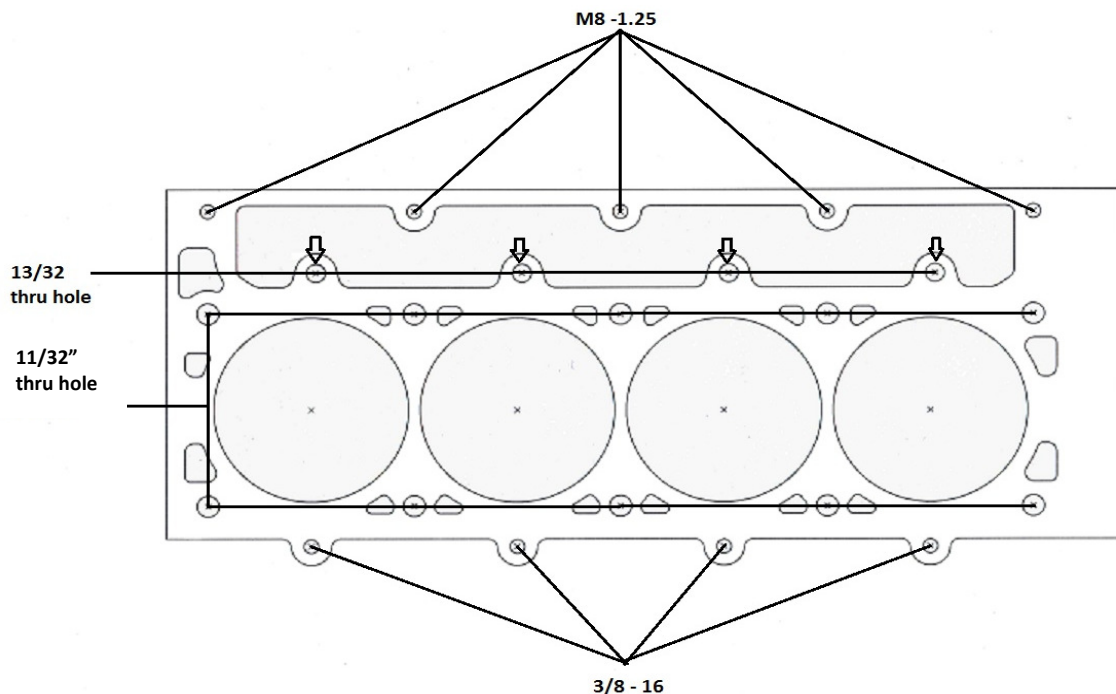
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



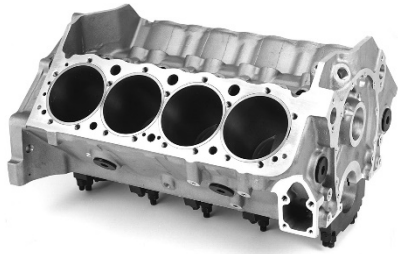
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

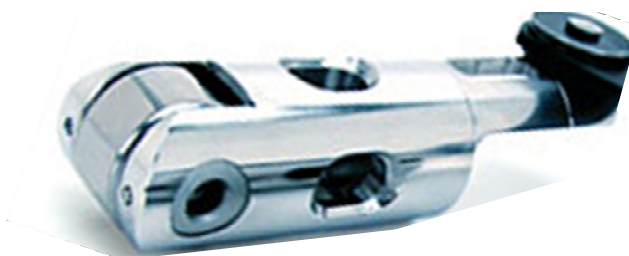


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

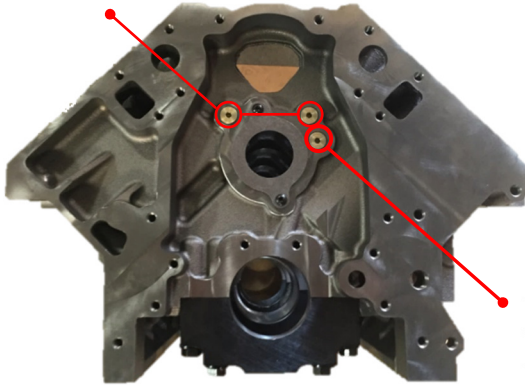
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

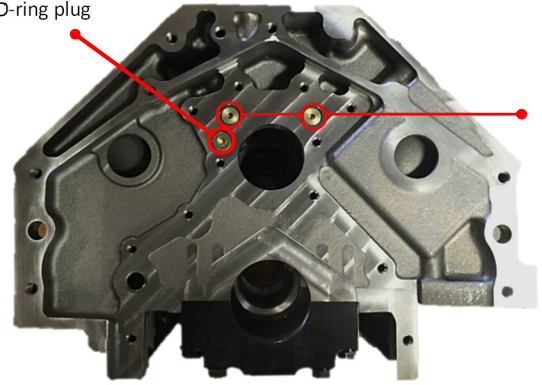
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



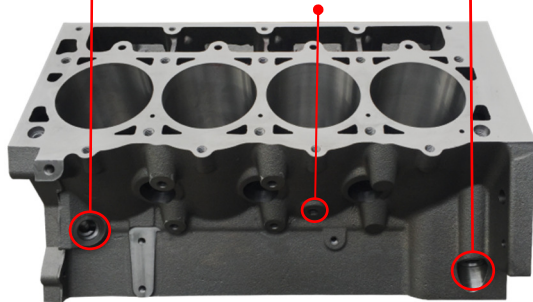
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

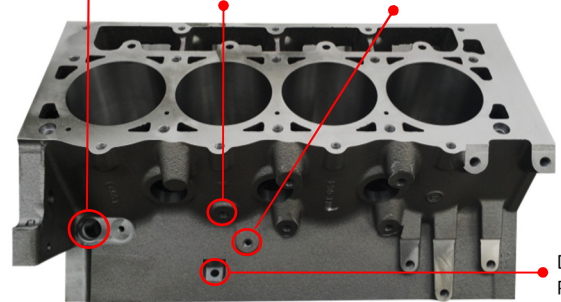


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

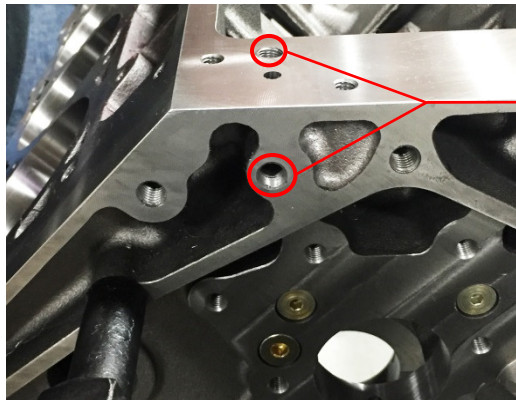
Knock sensor



SHP LS Next Passenger Side

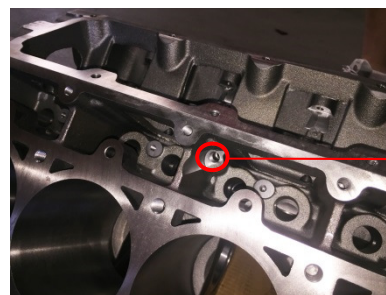
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



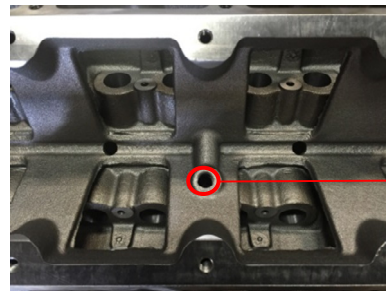
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



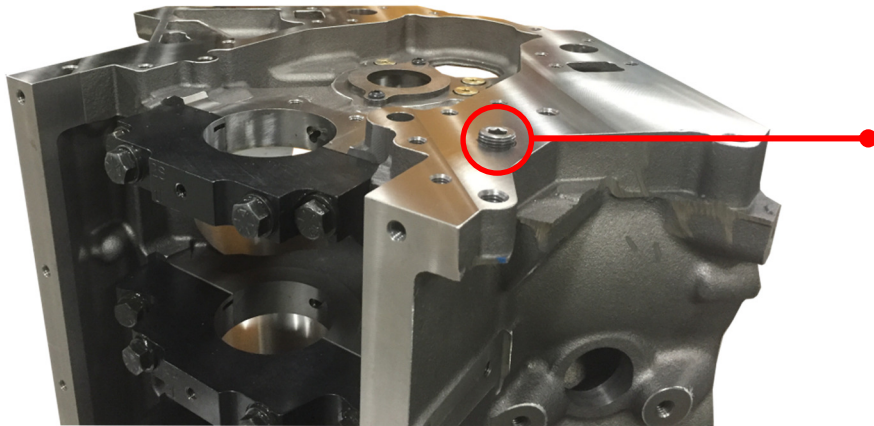
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

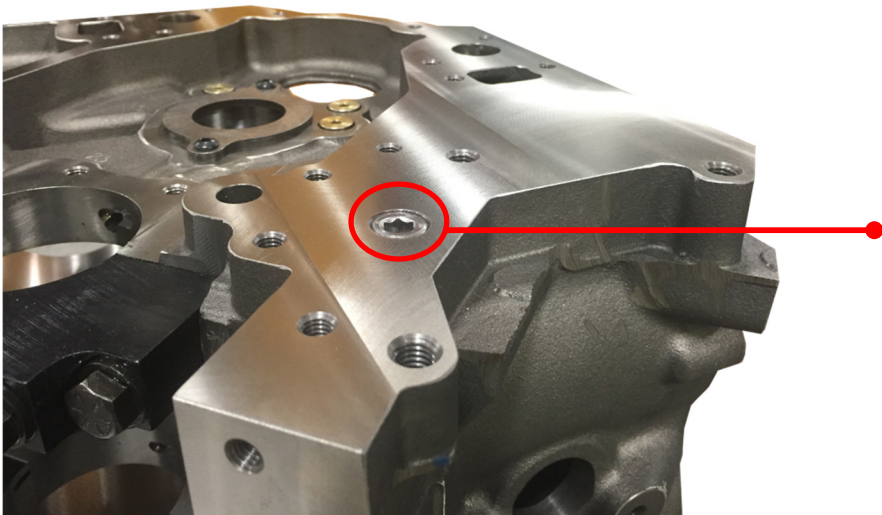


Top View of Valley Area:

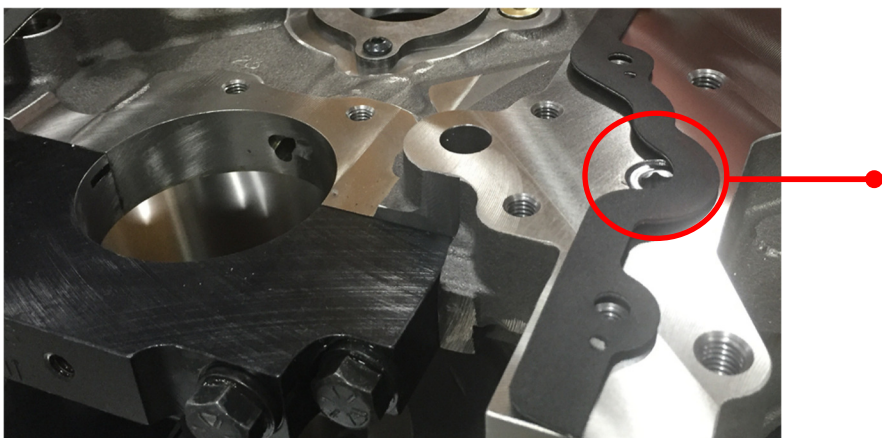
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	9.240"
Bore	4.000 & 4.125
Main Bearing Size	LS-1 (2.558" - 2.559")
Weight	227lbs
Largest Recommended Bore	4.185"
Largest Recommended Crank Stroke	4.125"
Camshaft Bearing Diameter	55mm babbitt
Stock Camshaft Position	4.885"
Cylinder Wall Thickness, min.	.215" @ 4.125"
Deck Thickness, min	.625 (5/8)

### Torque Specs - Main Caps

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloves timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter “buckets” for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

### SHP LS Next Blocks use LS2 – LS7 knock sensors

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

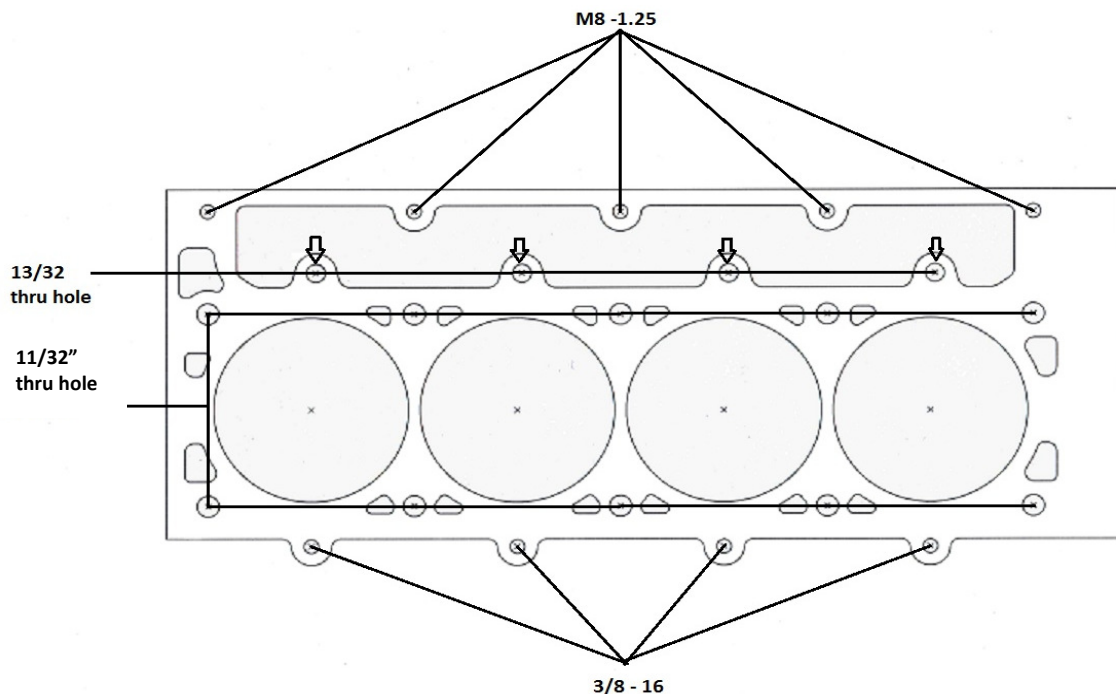
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



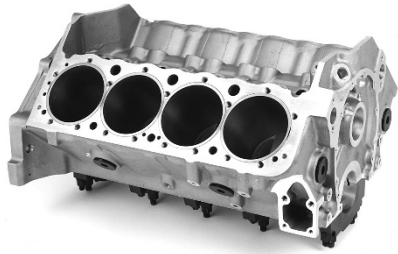
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

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**Figure 1:**  
Stock un-modified  
solid roller lifters

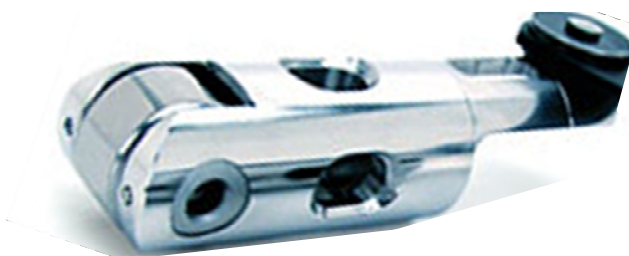


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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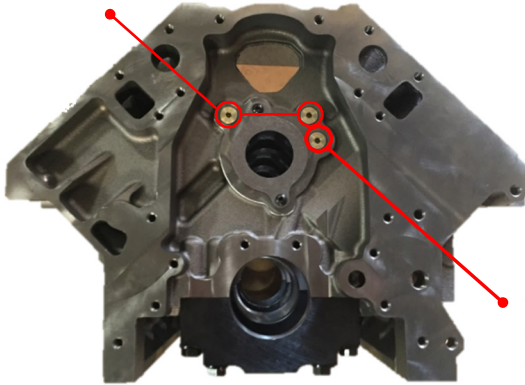
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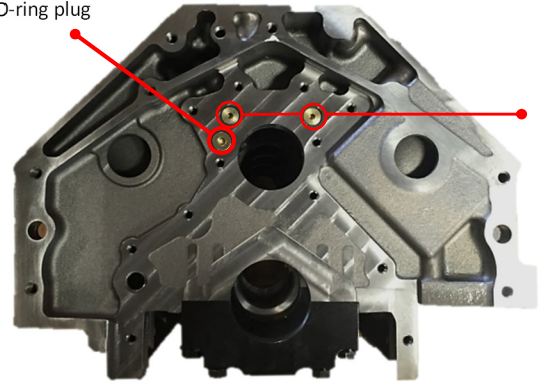
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



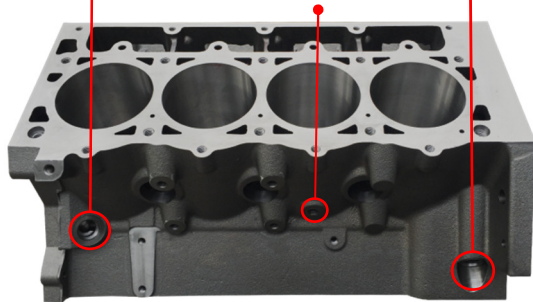
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

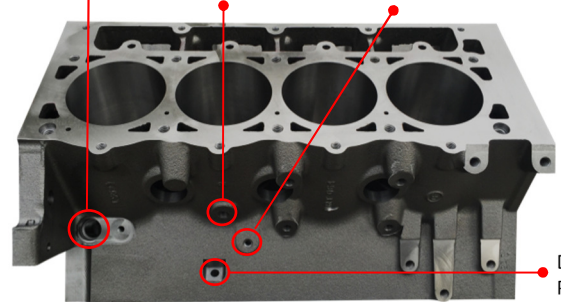


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

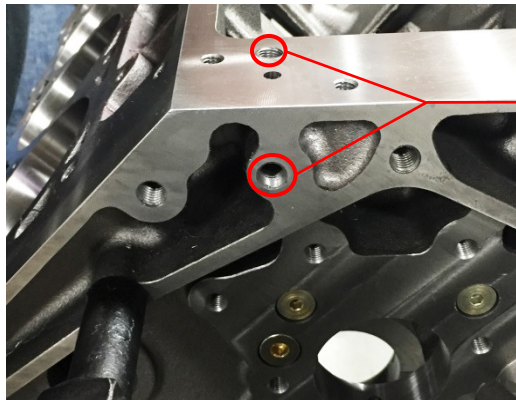
Knock sensor



SHP LS Next Passenger Side

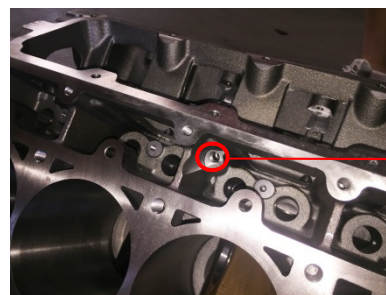
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



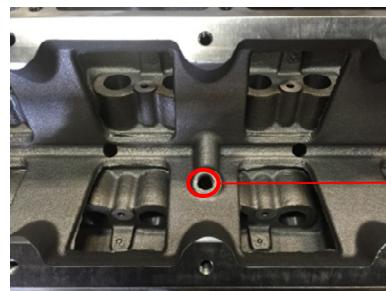
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



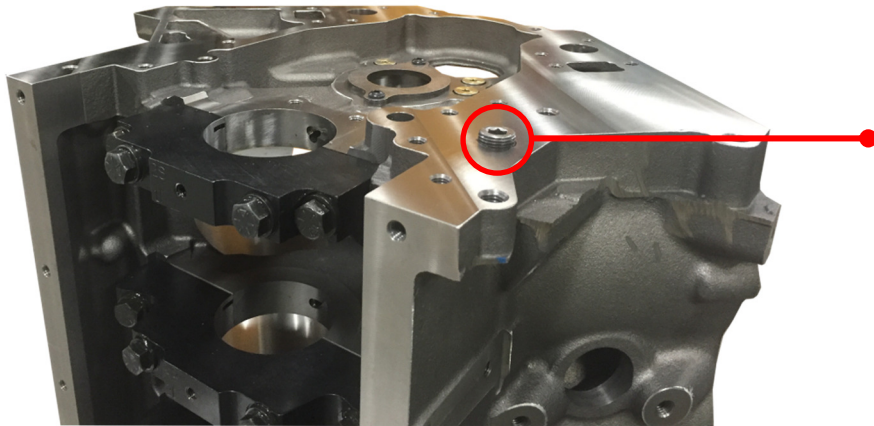
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

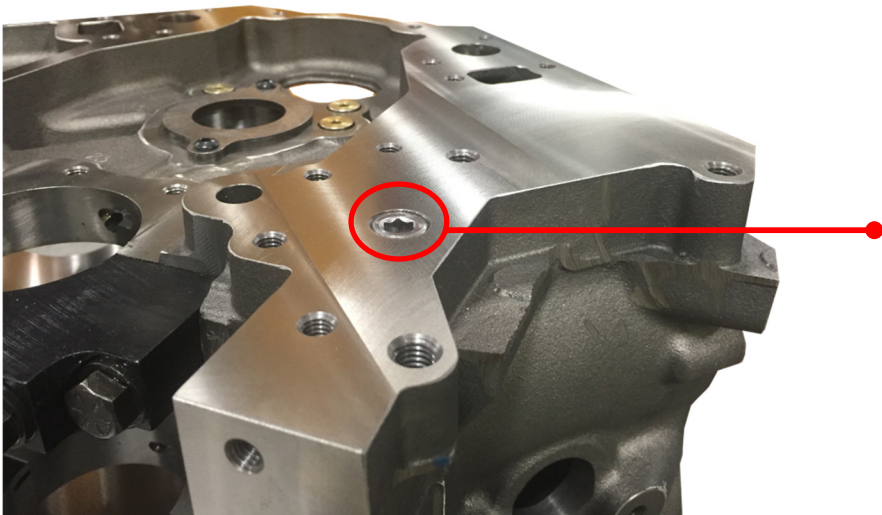


Top View of Valley Area:

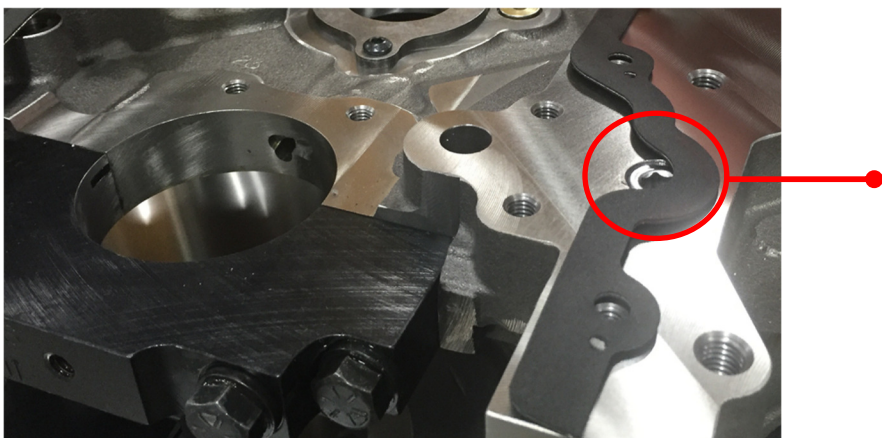
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	9.240"
Bore	4.000 & 4.125
Main Bearing Size	LS-1 (2.558" - 2.559")
Weight	227lbs
Largest Recommended Bore	4.185"
Largest Recommended Crank Stroke	4.125"
Camshaft Bearing Diameter	55mm babbitt
Stock Camshaft Position	4.885"
Cylinder Wall Thickness, min.	.215" @ 4.125"
Deck Thickness, min	.625 (5/8)

### Torque Specs - Main Caps

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter “buckets” for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

### SHP LS Next Blocks use LS2 – LS7 knock sensors

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

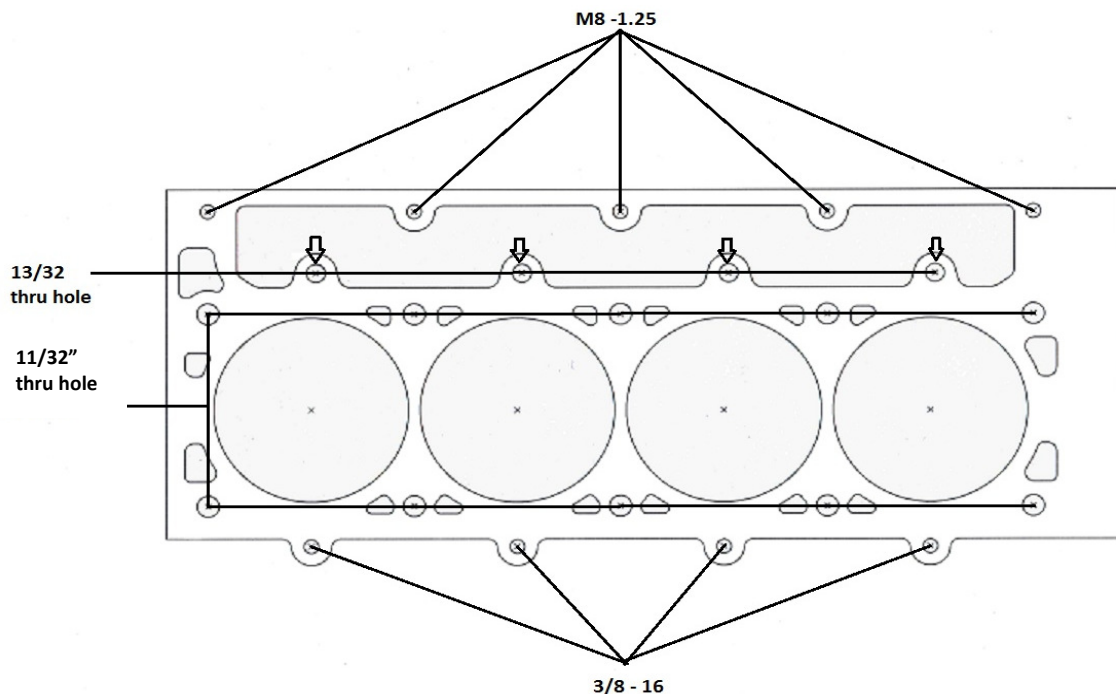
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



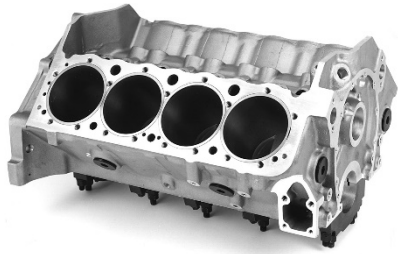
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

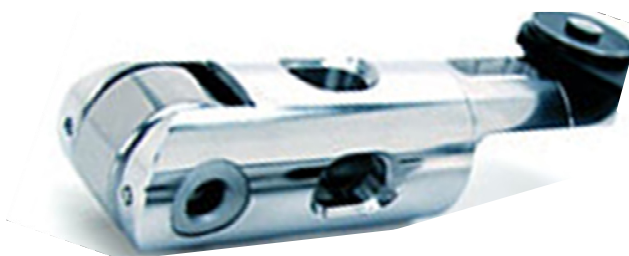


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

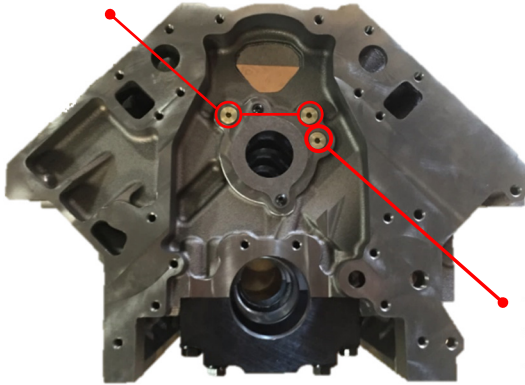
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

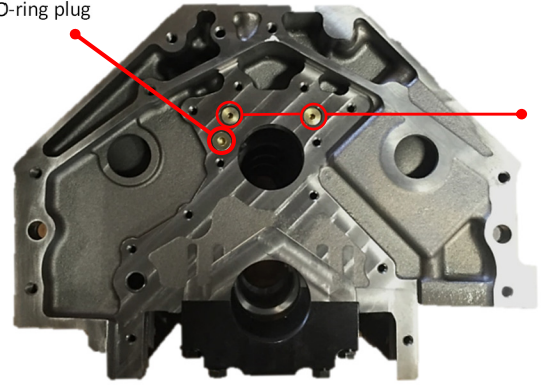
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



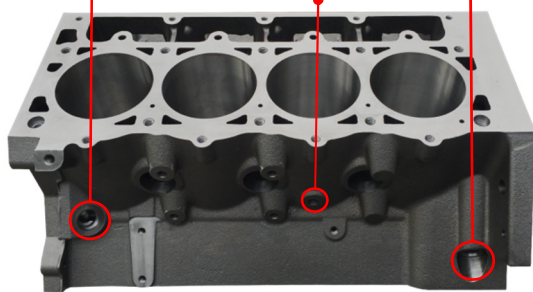
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

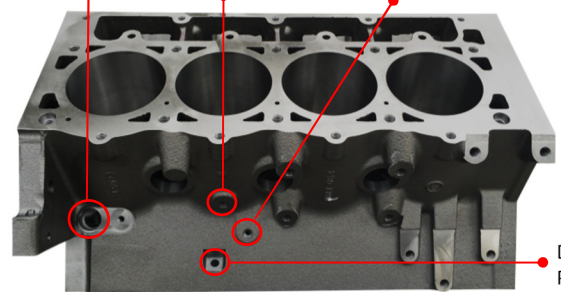


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

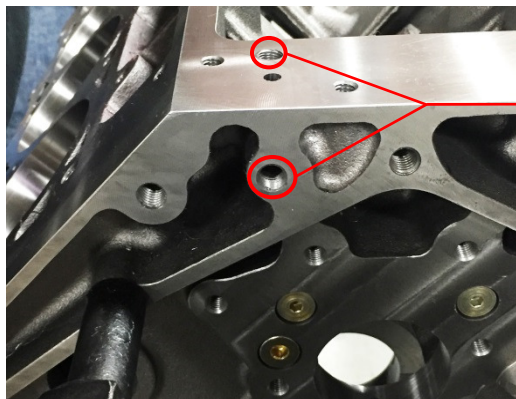
Knock sensor



SHP LS Next Passenger Side

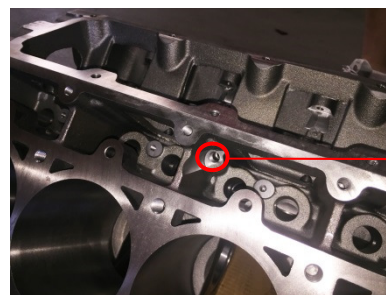
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



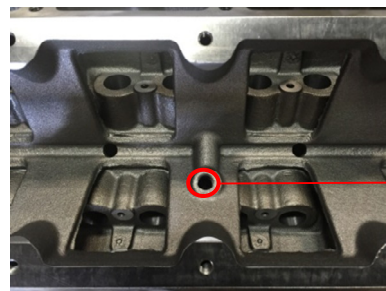
Oil Pressure Port:

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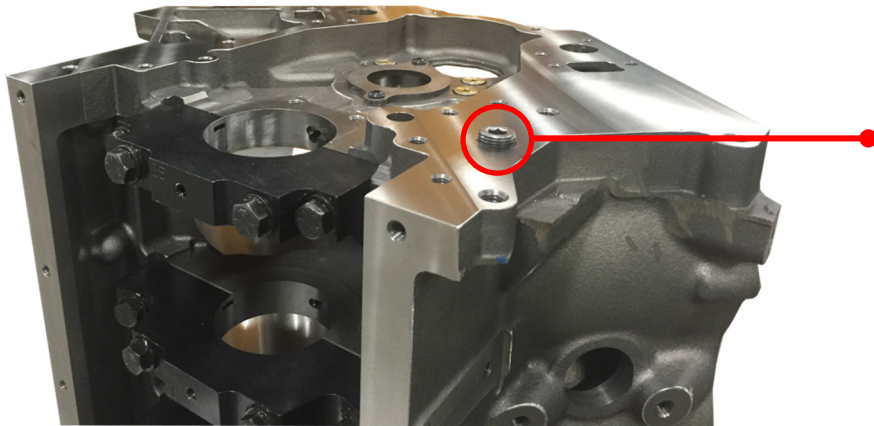
Drivers Side of Block:

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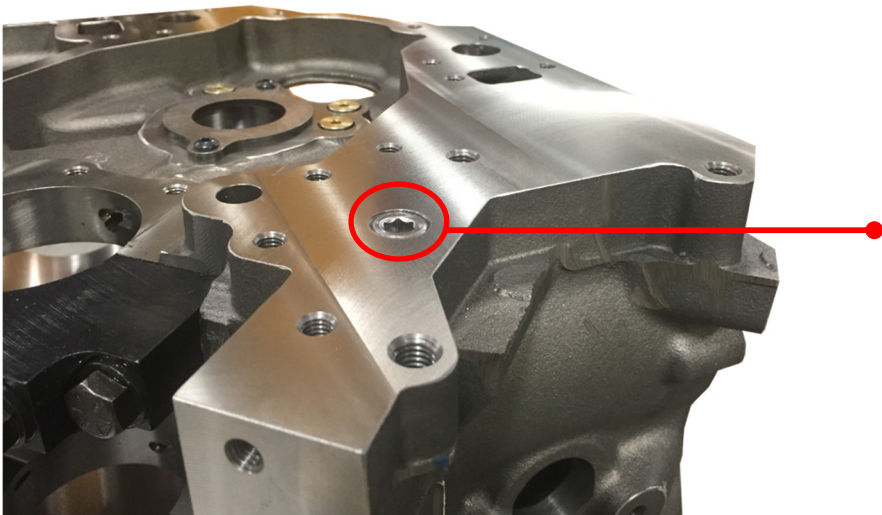


Top View of Valley Area:

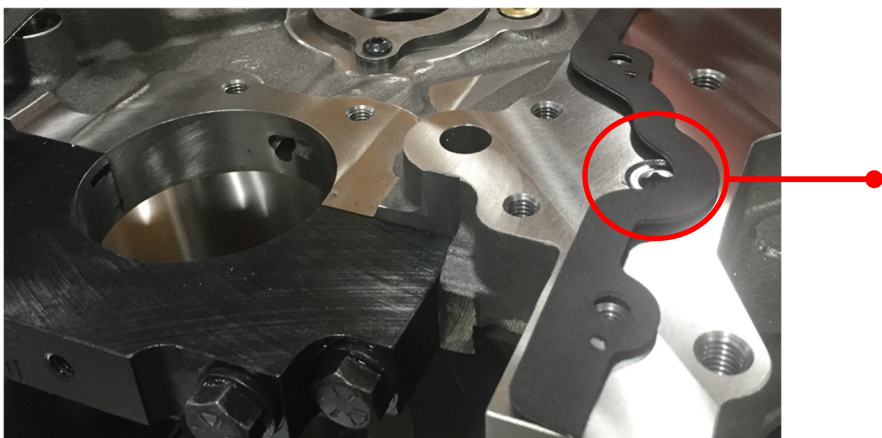
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

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**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

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SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

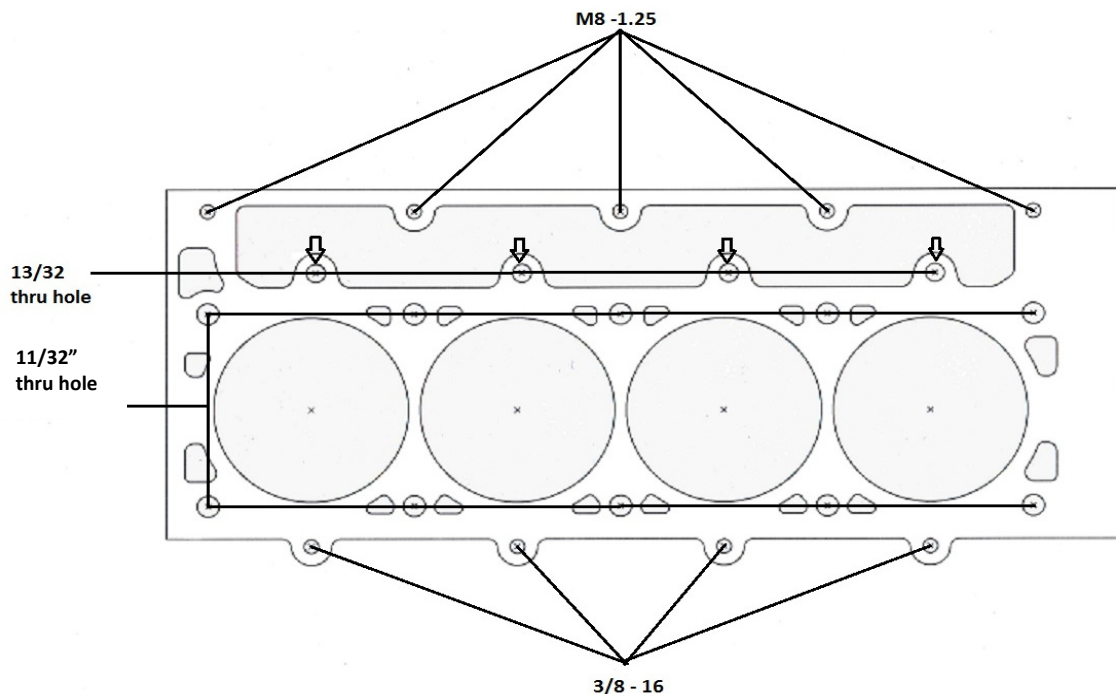
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



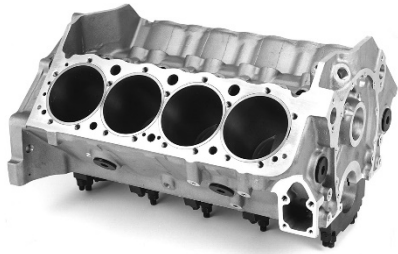
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Upon receiving this block it should be thoroughly inspected for shipping damage.

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Cylinder bores - Oil passages - Deck surfaces - All threads

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- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

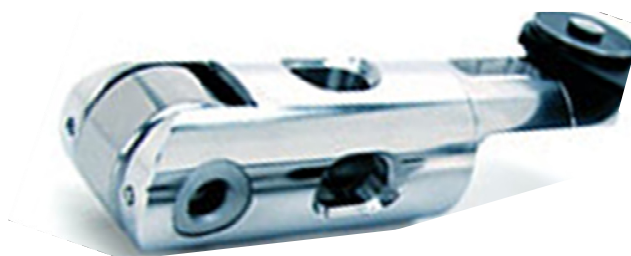


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

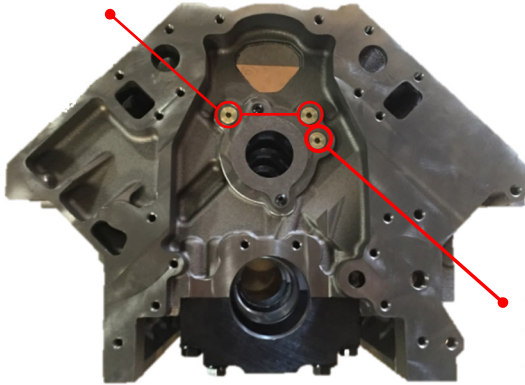
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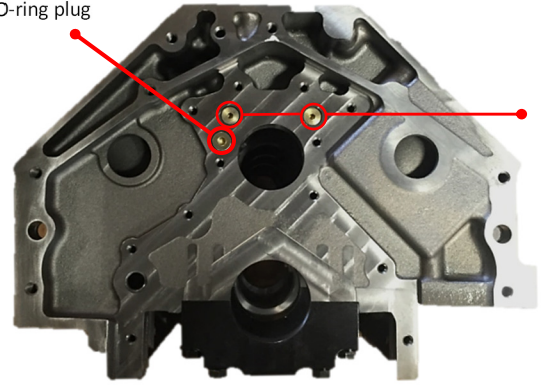
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



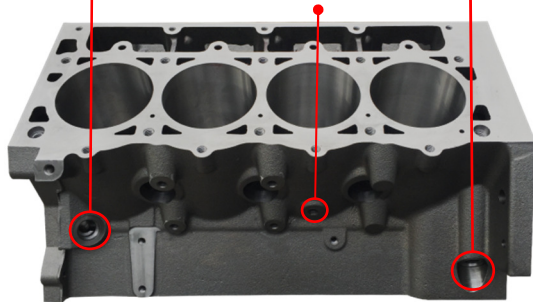
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

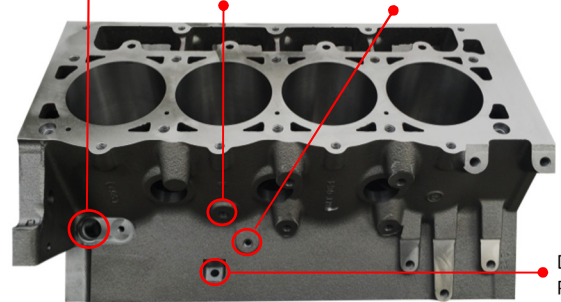


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

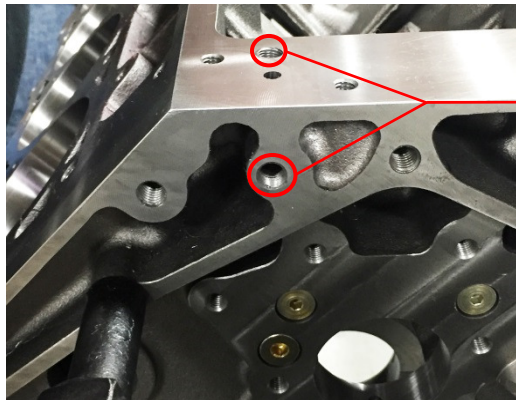
Knock sensor



SHP LS Next Passenger Side

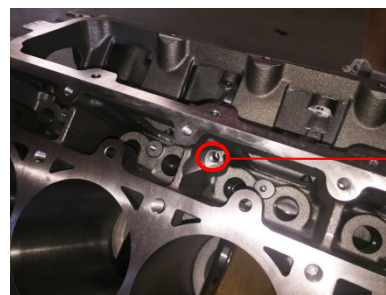
1/2" AN O-ring plugs

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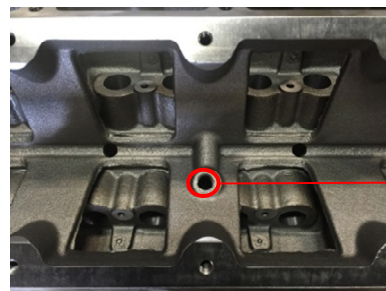
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These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



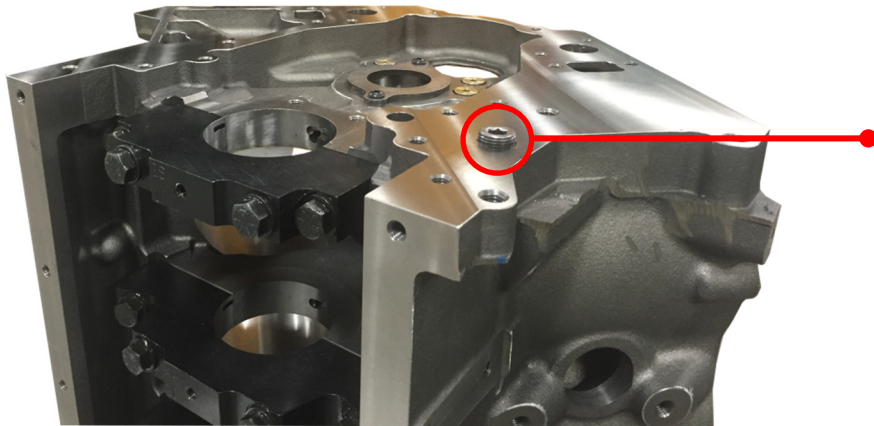
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

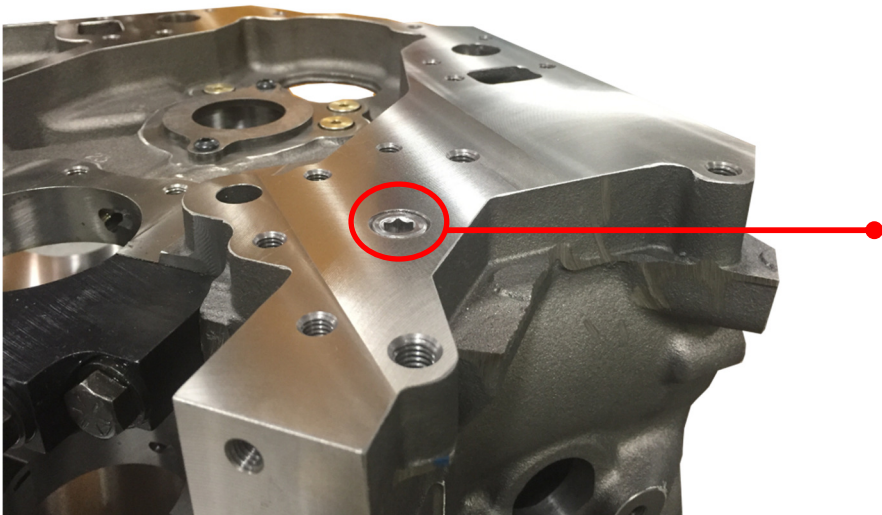


Top View of Valley Area:

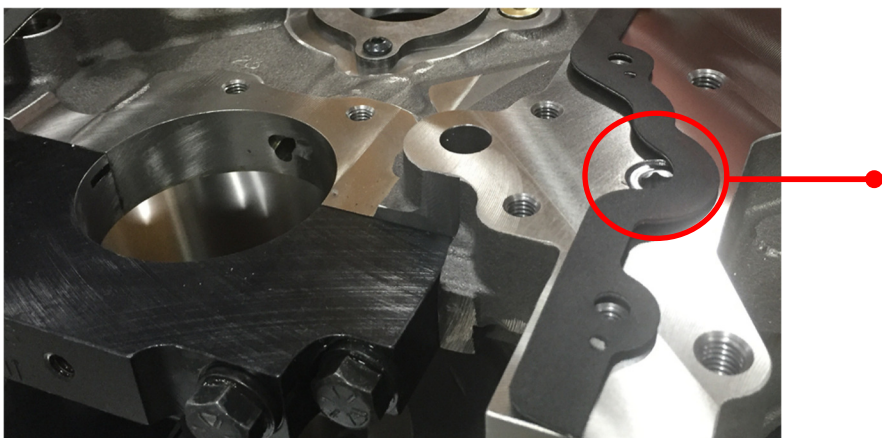
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

**Torque Specs - Main Caps**

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE: Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.**

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

**SHP LS Next Blocks use LS2 - LS7 knock sensors**

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

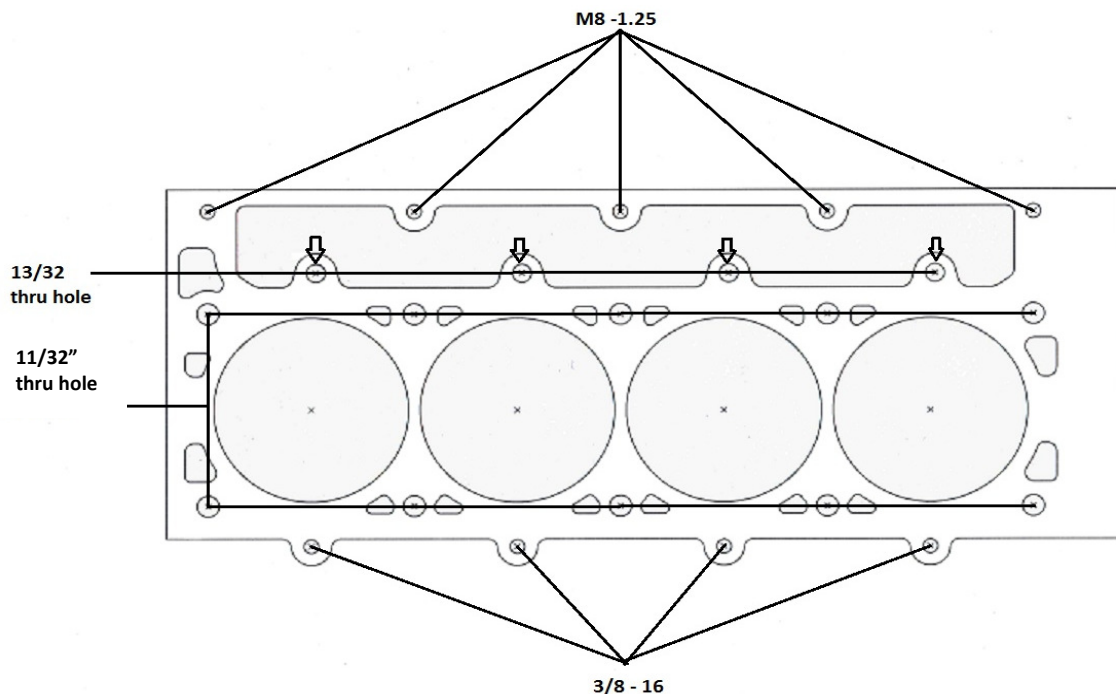
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



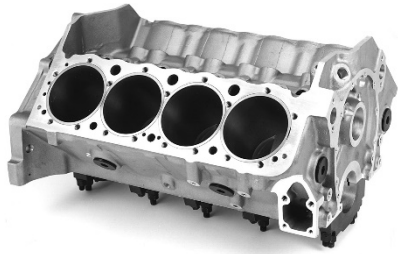
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
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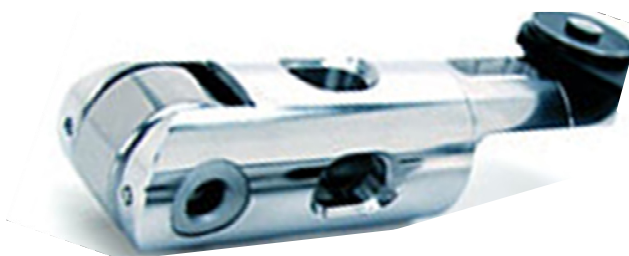


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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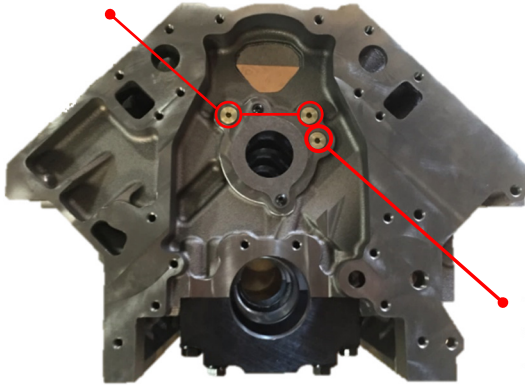
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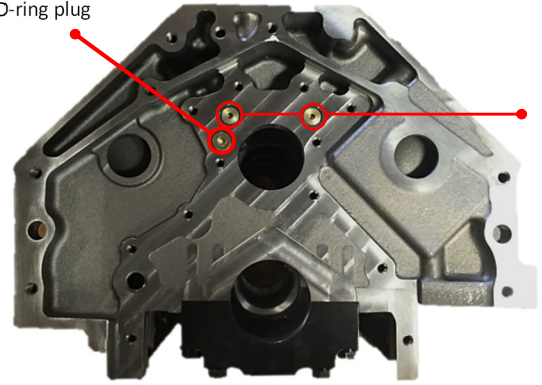
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



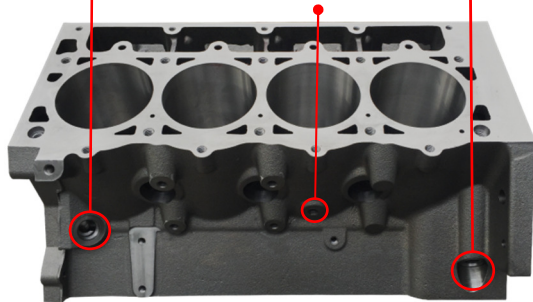
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Oil in -10AN w/O-ring

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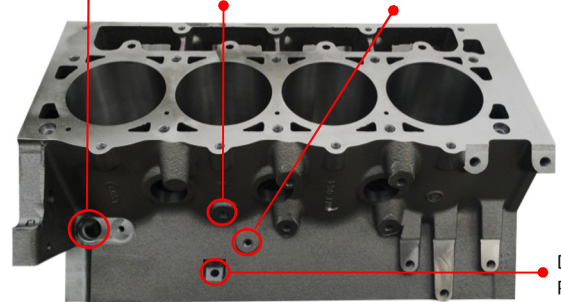


SHP LS Next Drivers Side

Crank sensor

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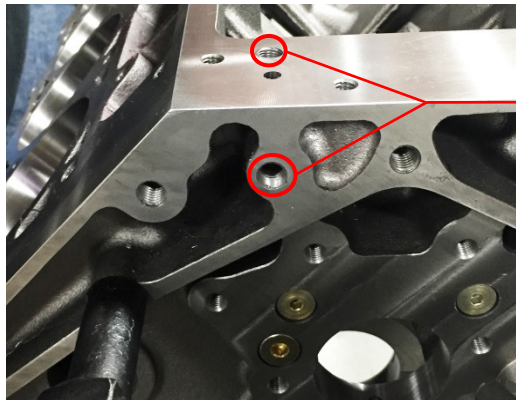
Knock sensor



SHP LS Next Passenger Side

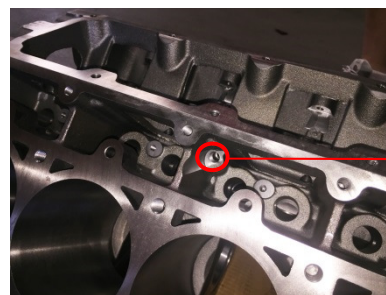
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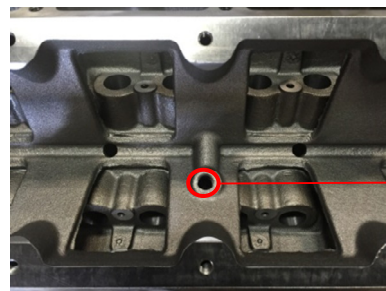
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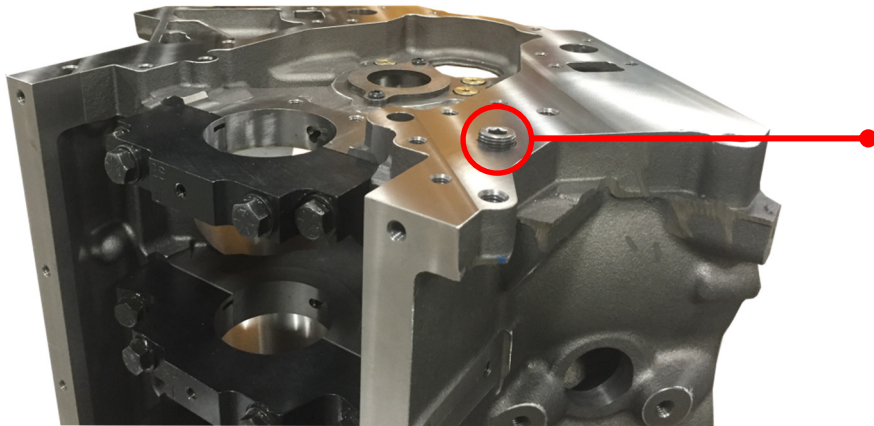
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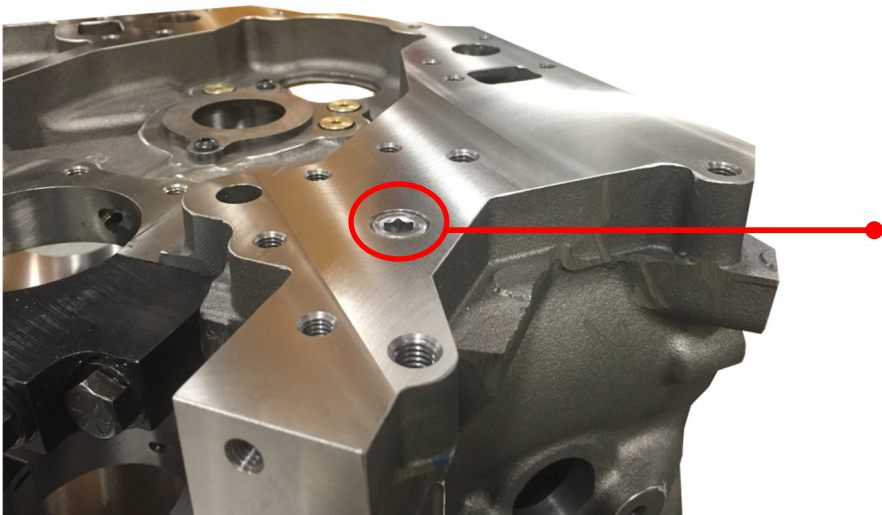


Top View of Valley Area:

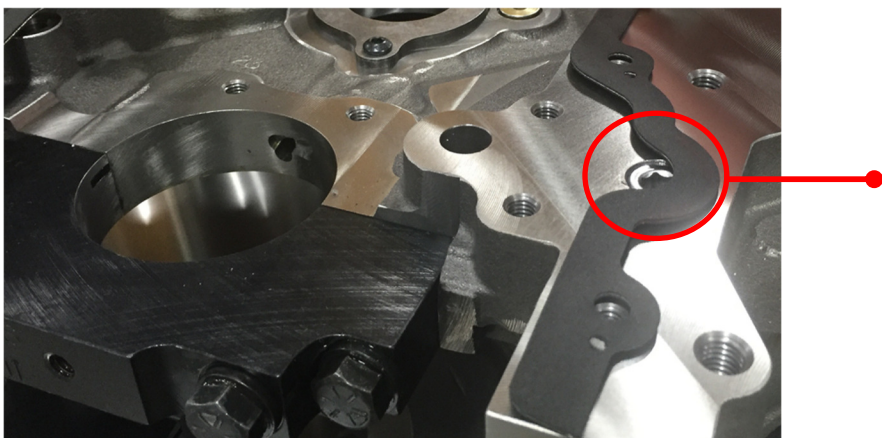
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

**Torque Specs - Main Caps**

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

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**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

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**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

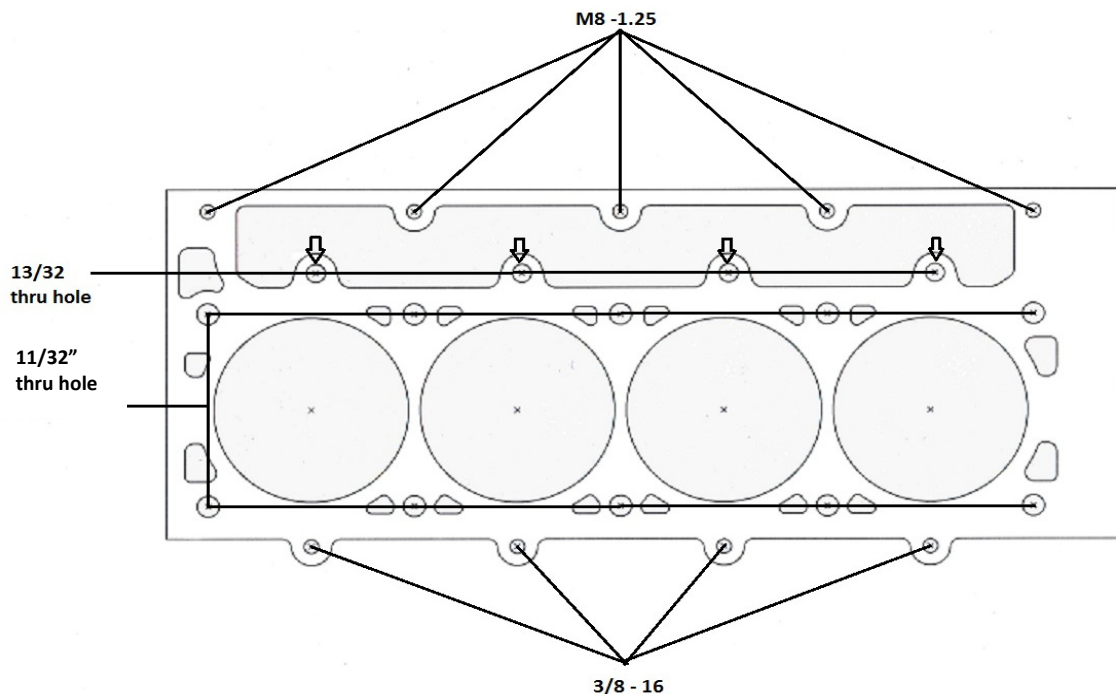
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



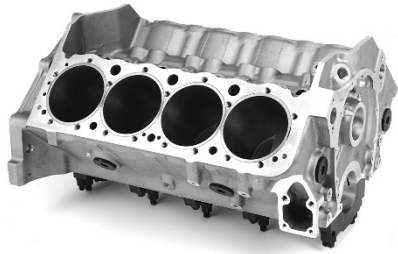
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

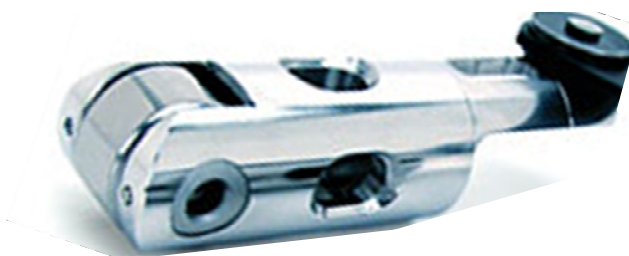


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

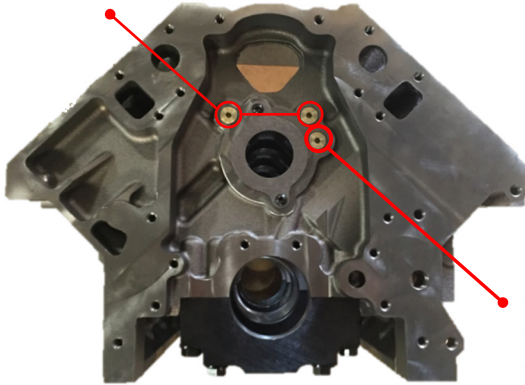
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

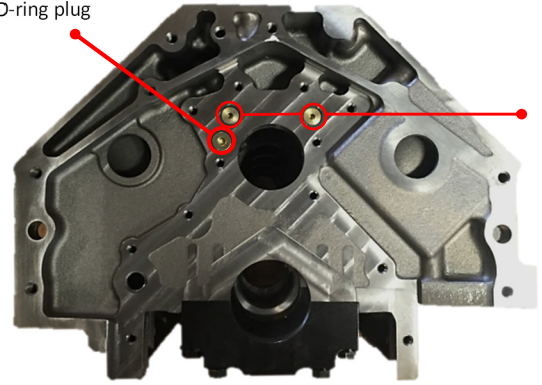
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



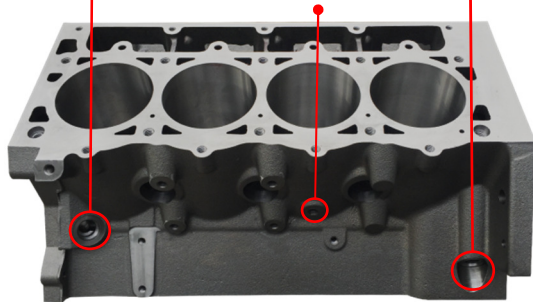
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

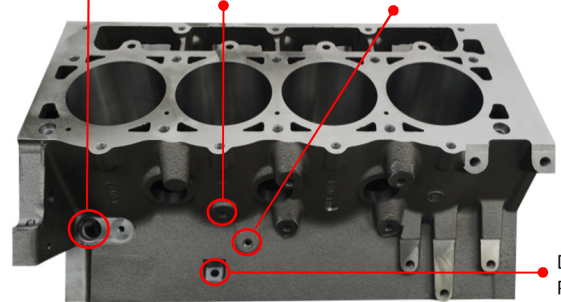


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

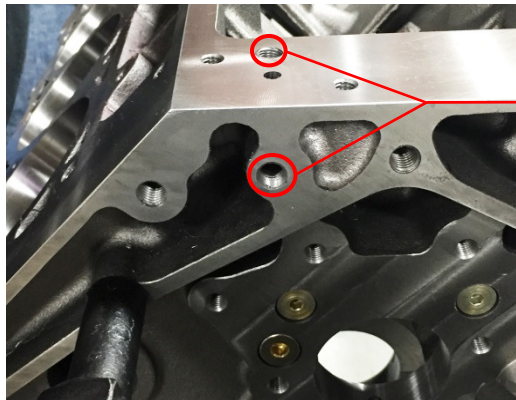
Knock sensor



SHP LS Next Passenger Side

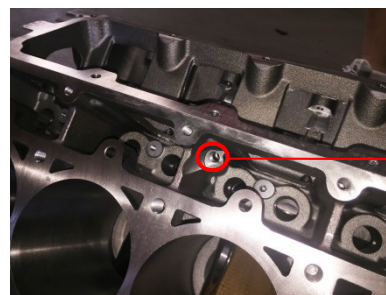
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



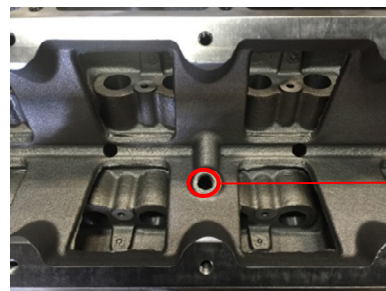
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



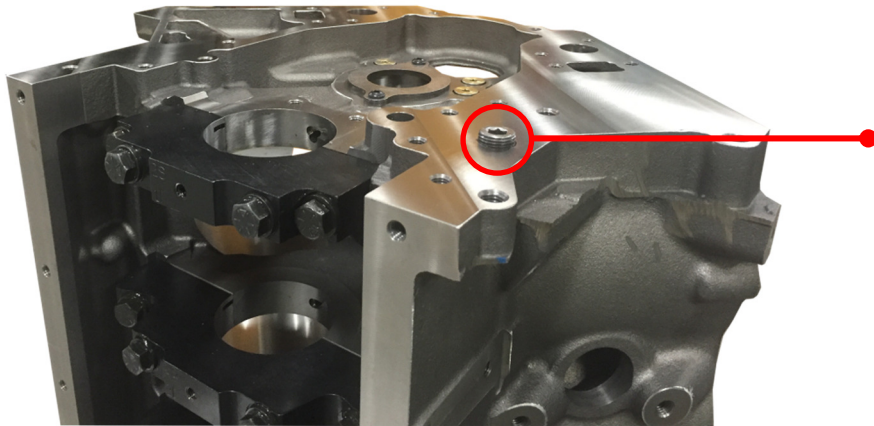
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

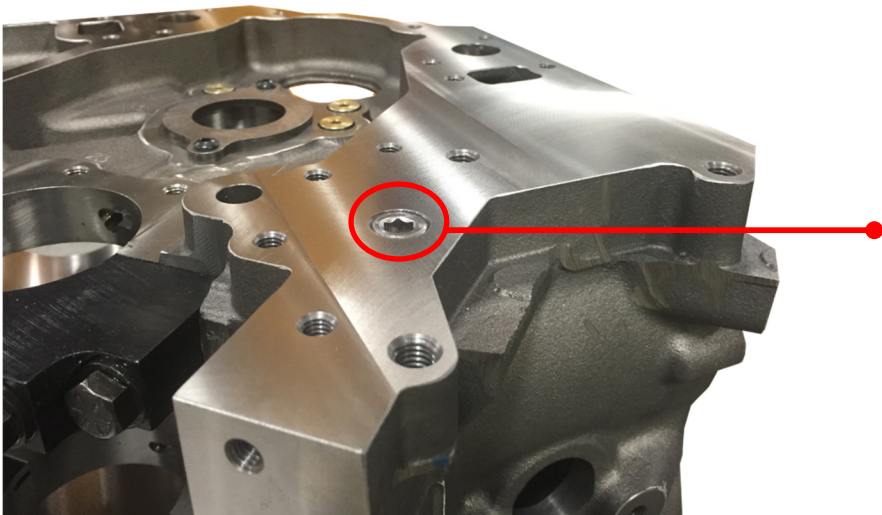


Top View of Valley Area:

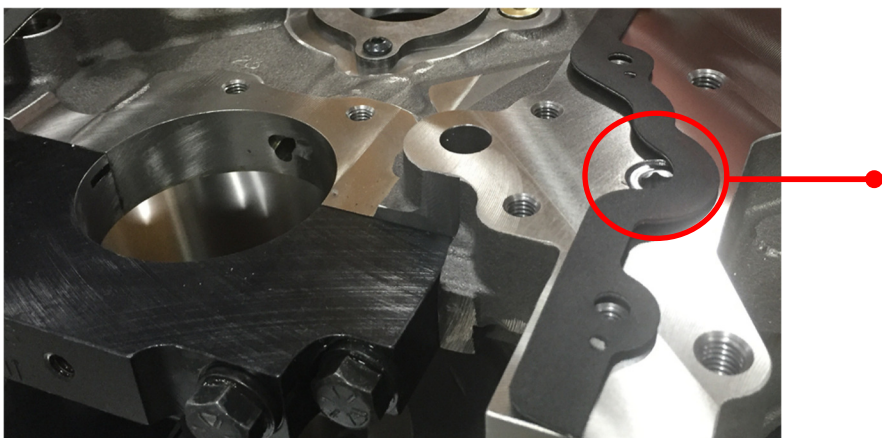
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

**Torque Specs - Main Caps**

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE: Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.**

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

**SHP LS Next Blocks use LS2 - LS7 knock sensors**

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

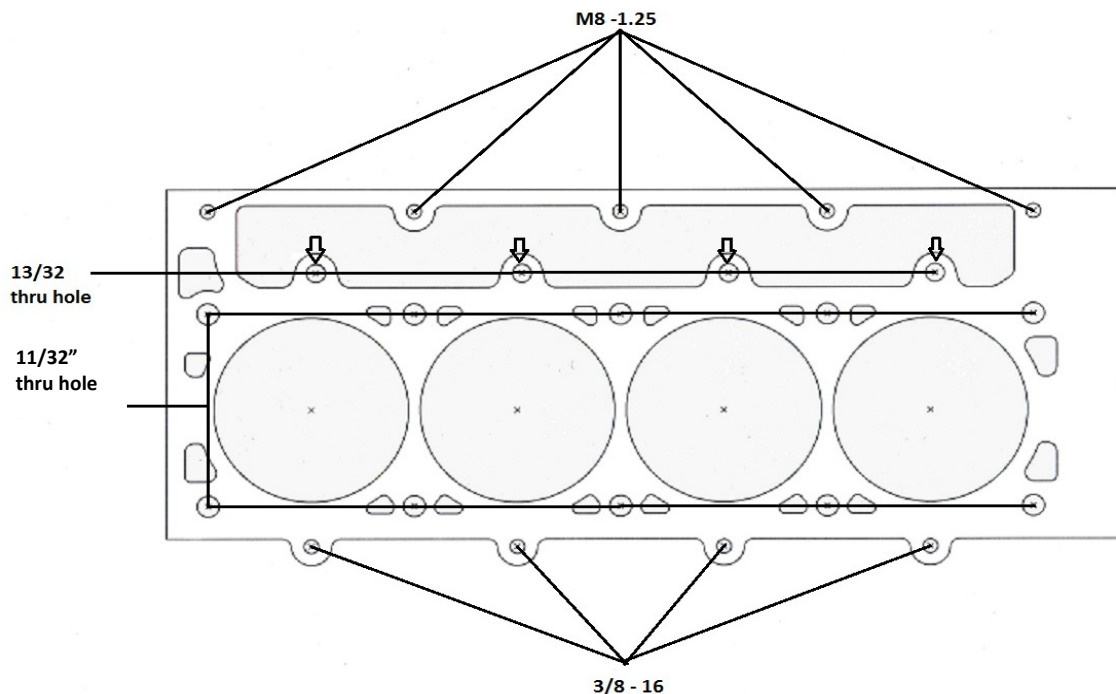
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

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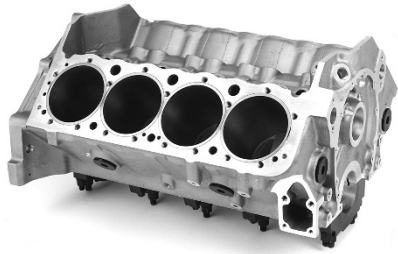
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Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
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<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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**Figure 1:**  
Stock un-modified  
solid roller lifters

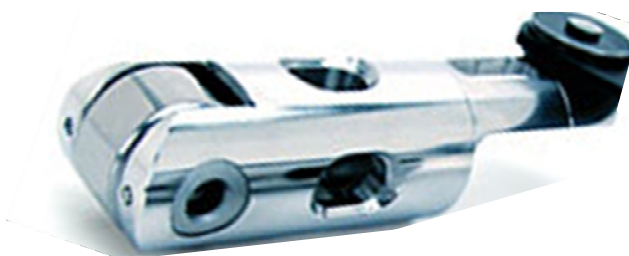


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

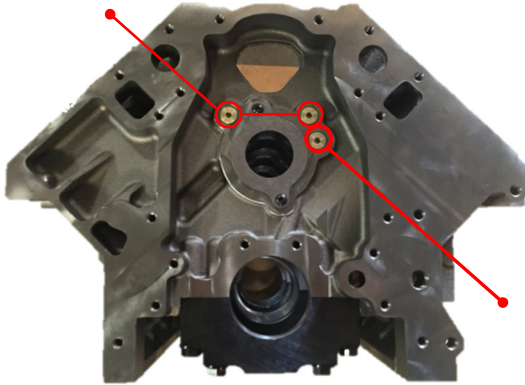
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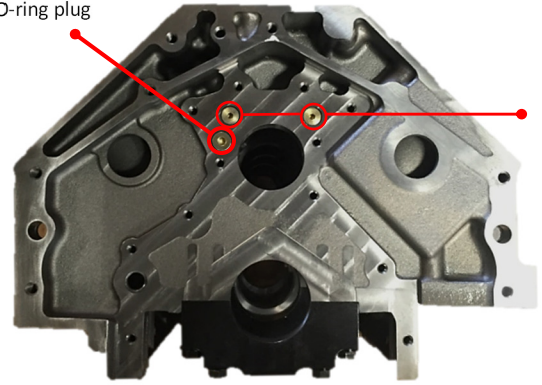
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



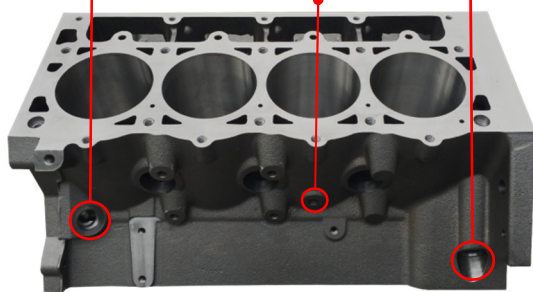
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

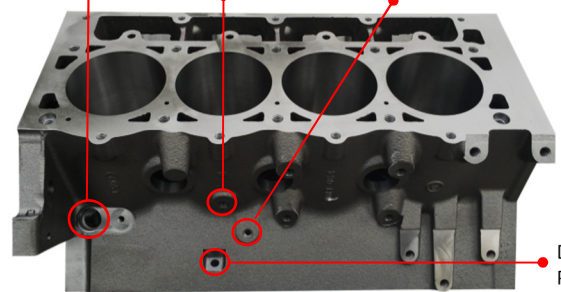


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

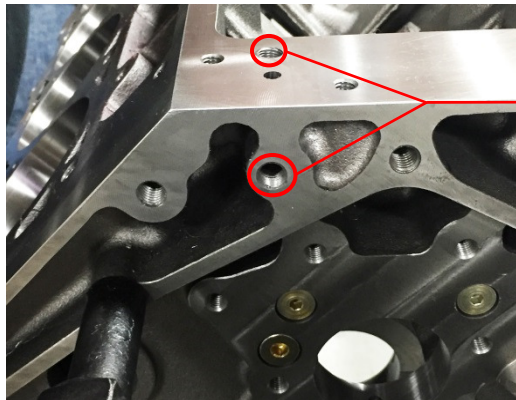
Knock sensor



SHP LS Next Passenger Side

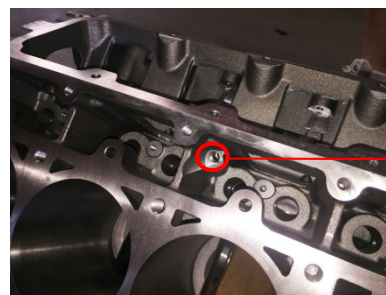
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



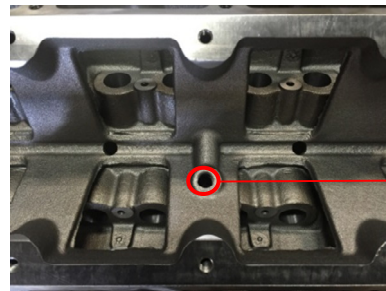
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



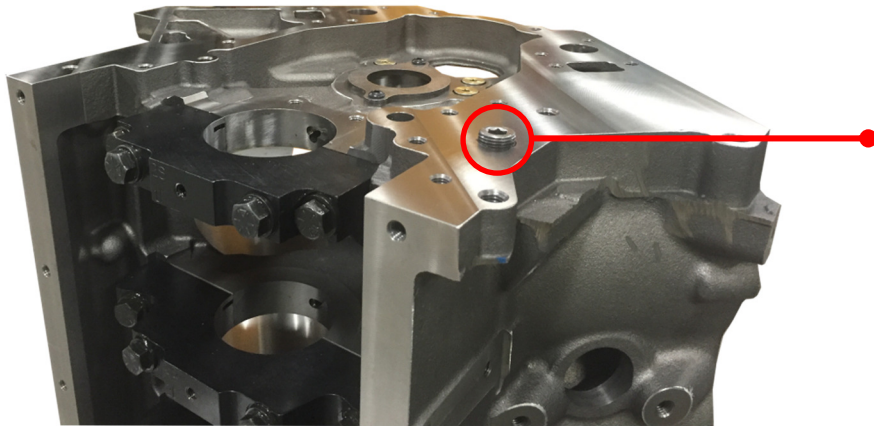
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

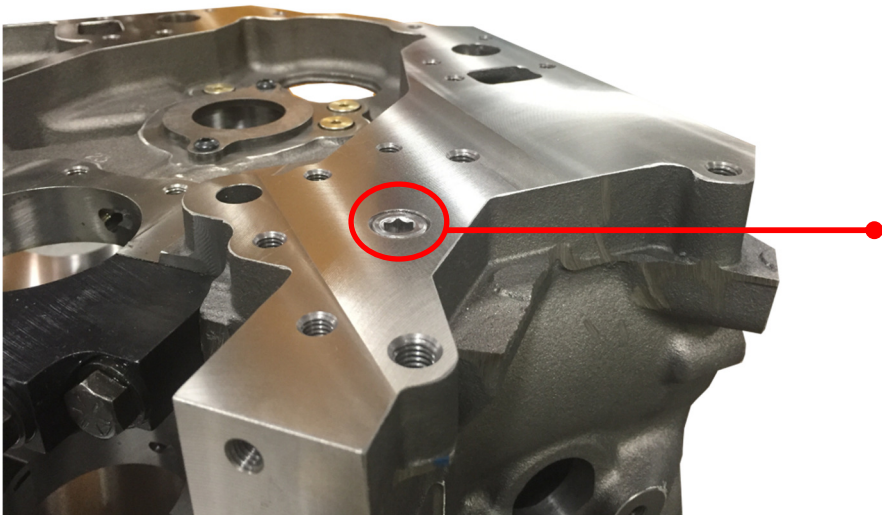


Top View of Valley Area:

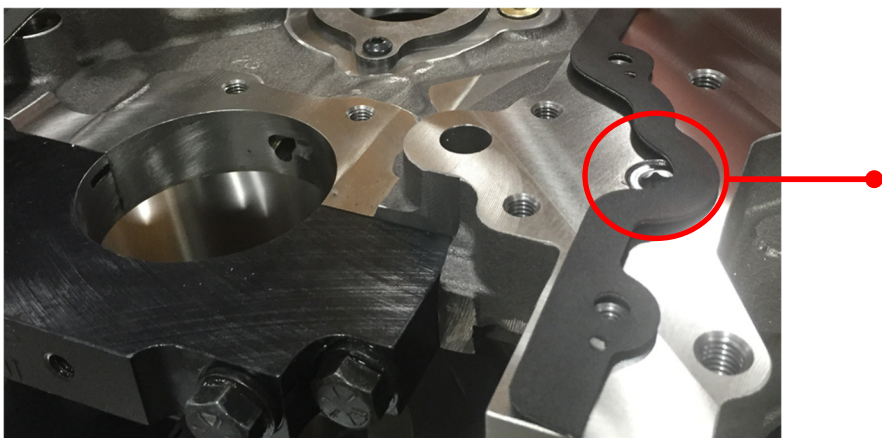
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	9.240"
Bore	4.000 & 4.125
Main Bearing Size	LS-1 (2.558" - 2.559")
Weight	227lbs
Largest Recommended Bore	4.185"
Largest Recommended Crank Stroke	4.125"
Camshaft Bearing Diameter	55mm babbitt
Stock Camshaft Position	4.885"
Cylinder Wall Thickness, min.	.215" @ 4.125"
Deck Thickness, min	.625 (5/8)

### Torque Specs - Main Caps

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE: Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.**

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter “buckets” for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

### SHP LS Next Blocks use LS2 – LS7 knock sensors

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

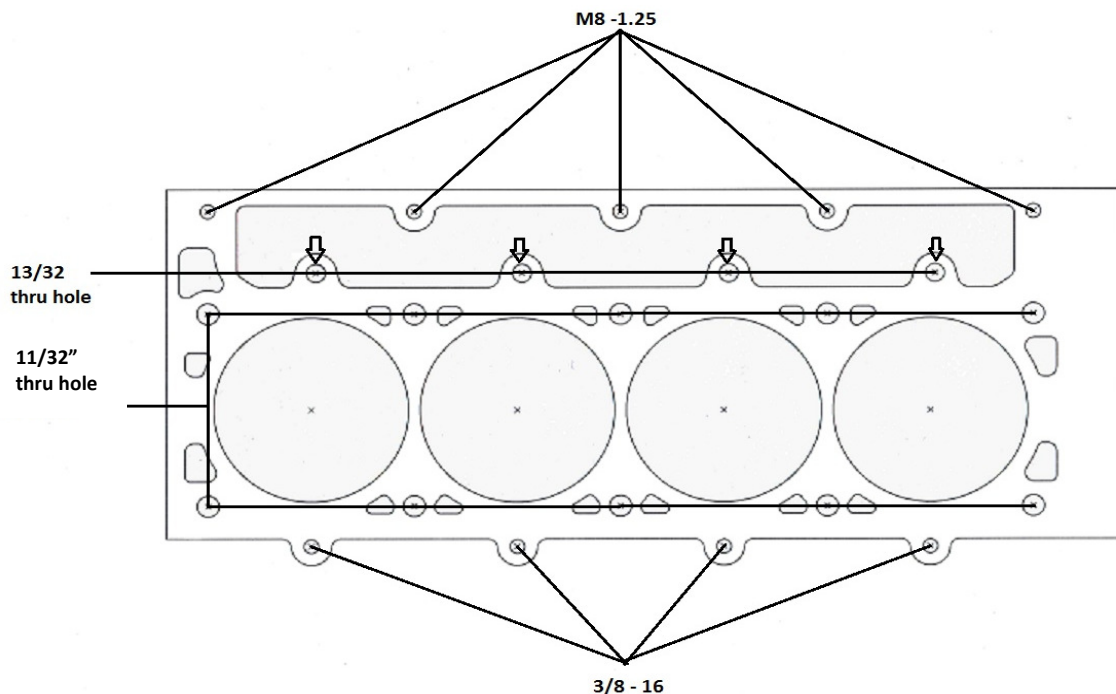
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



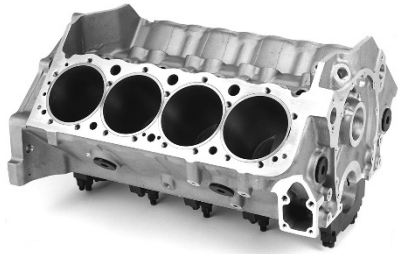
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

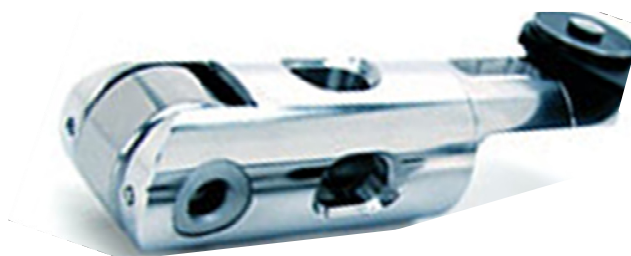


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

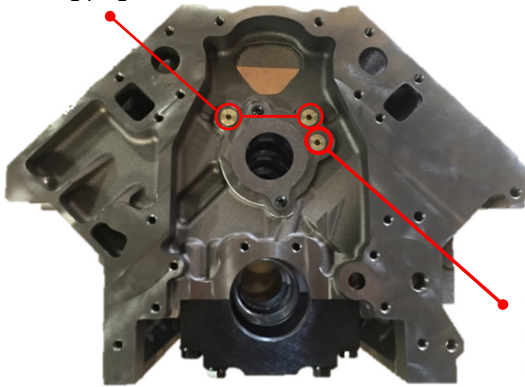
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

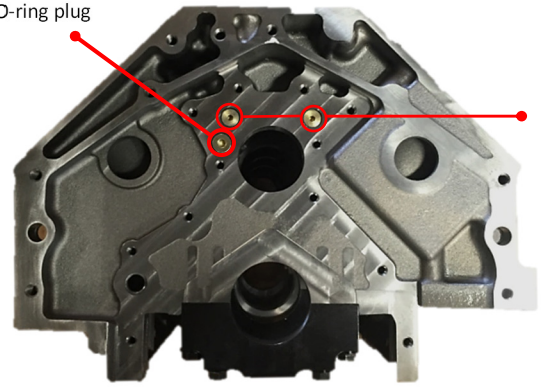
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



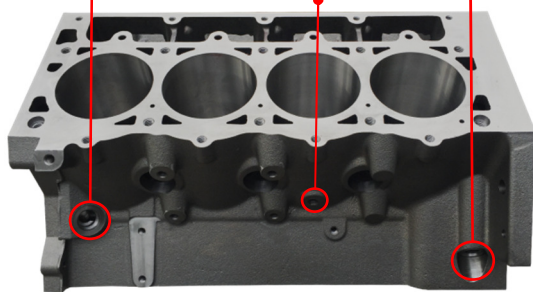
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

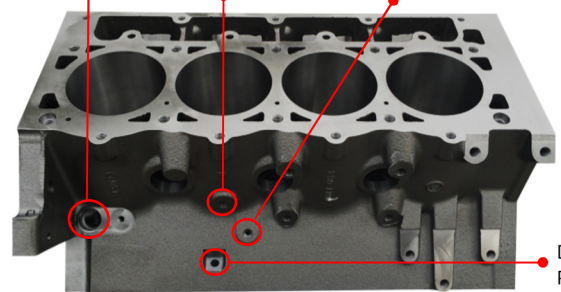


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

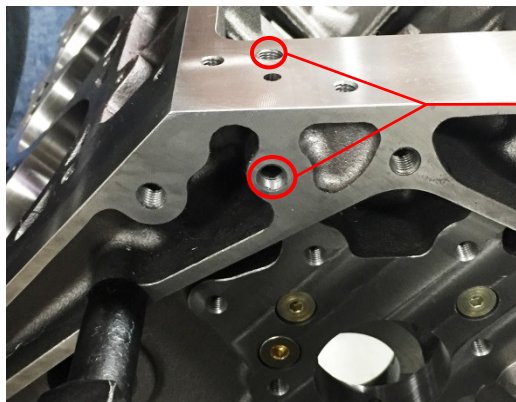
Knock sensor



SHP LS Next Passenger Side

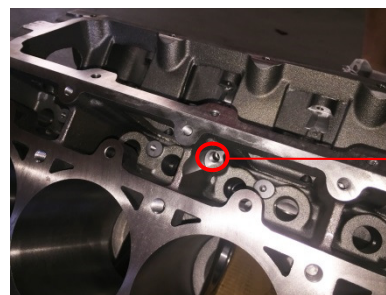
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



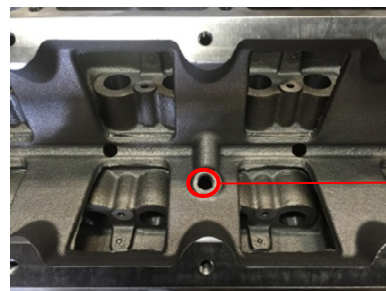
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



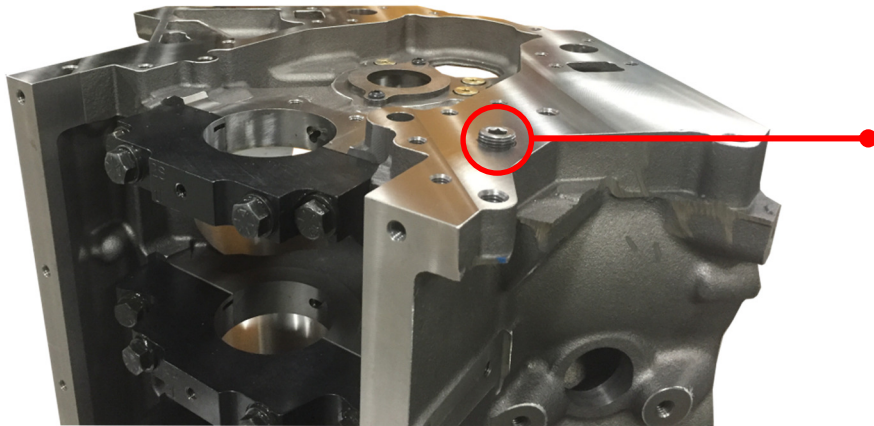
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

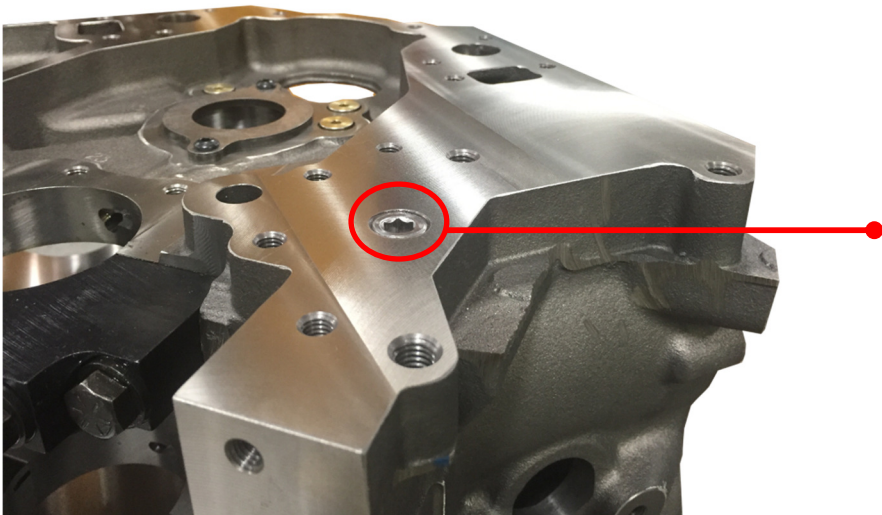


Top View of Valley Area:

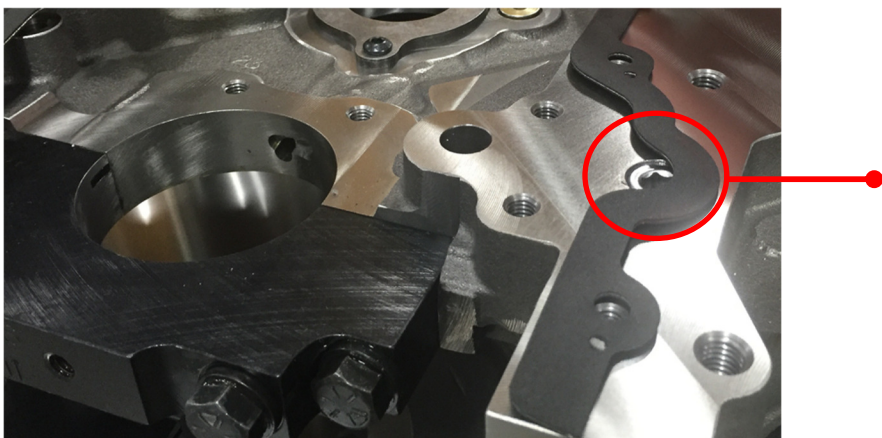
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

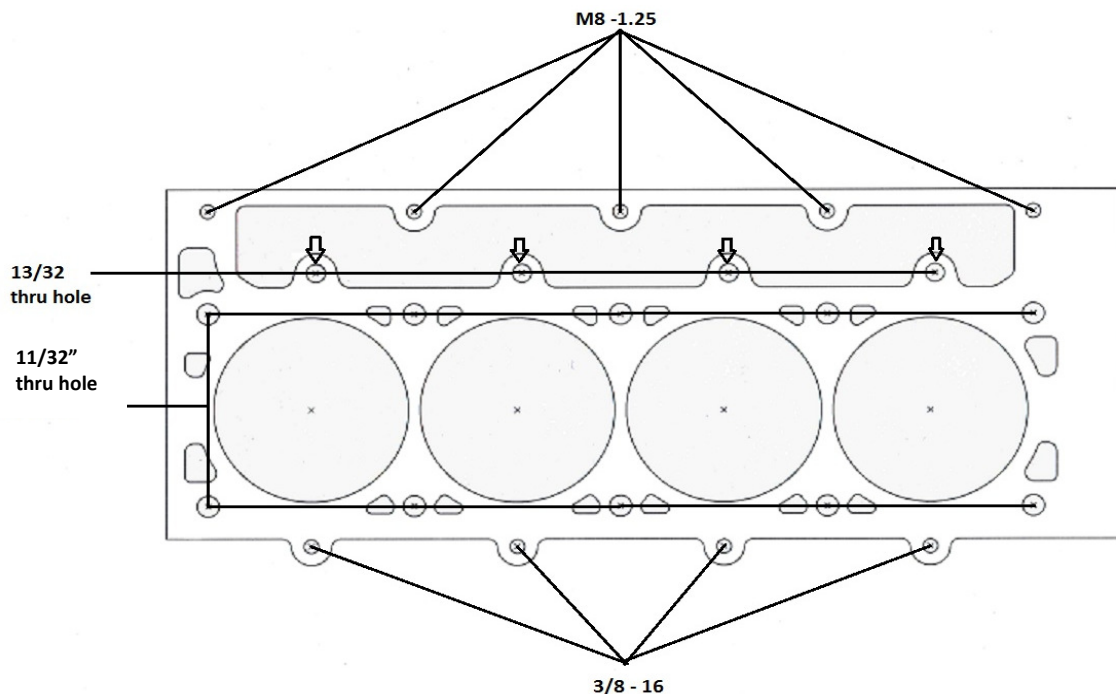
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



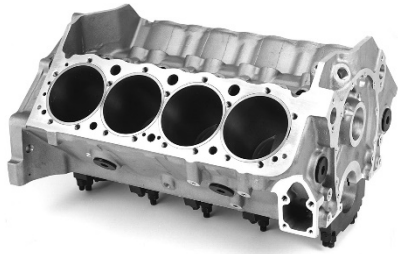
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

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**Figure 1:**  
Stock un-modified  
solid roller lifters

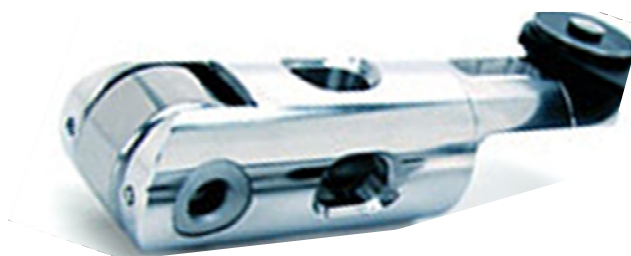


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

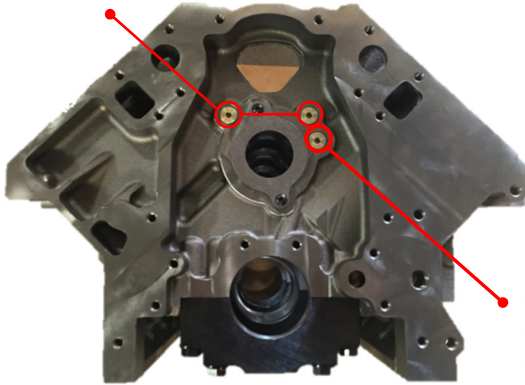
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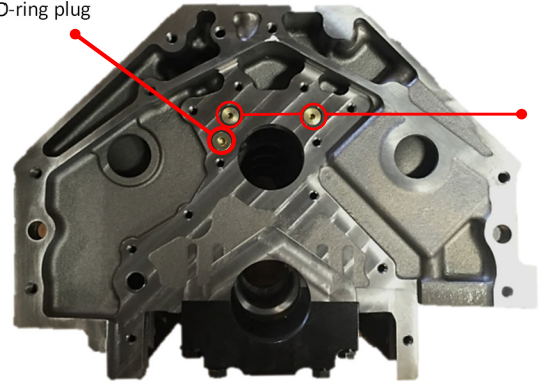
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



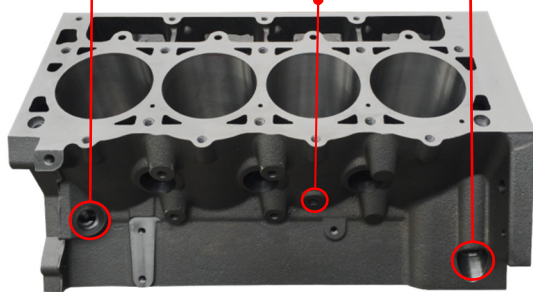
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

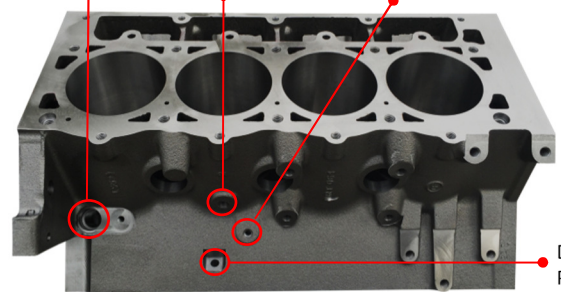


SHP LS Next Drivers Side

Crank sensor

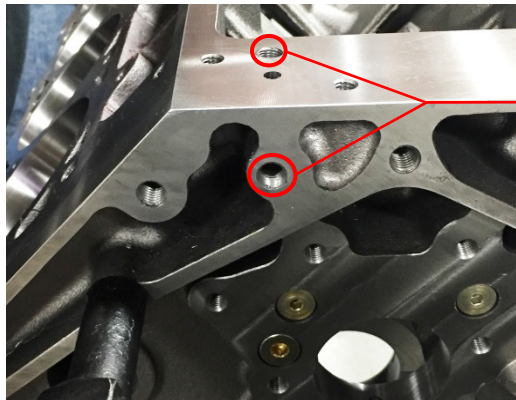
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Knock sensor



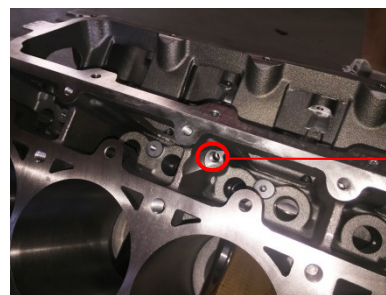
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



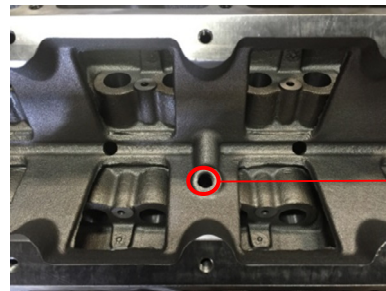
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These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



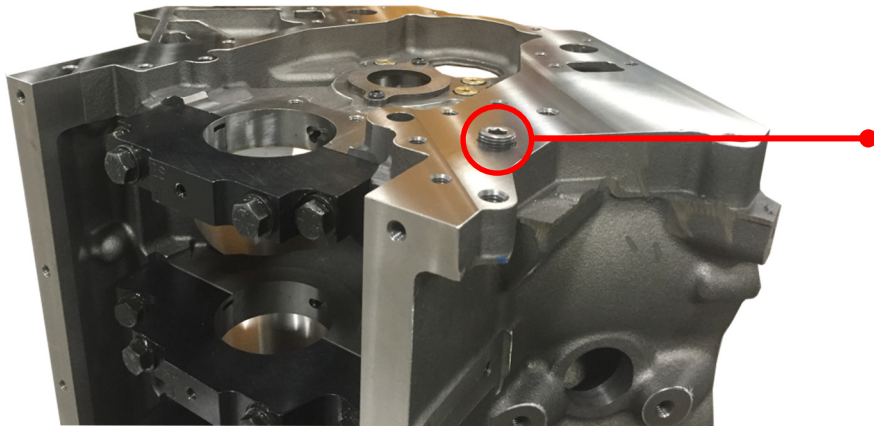
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

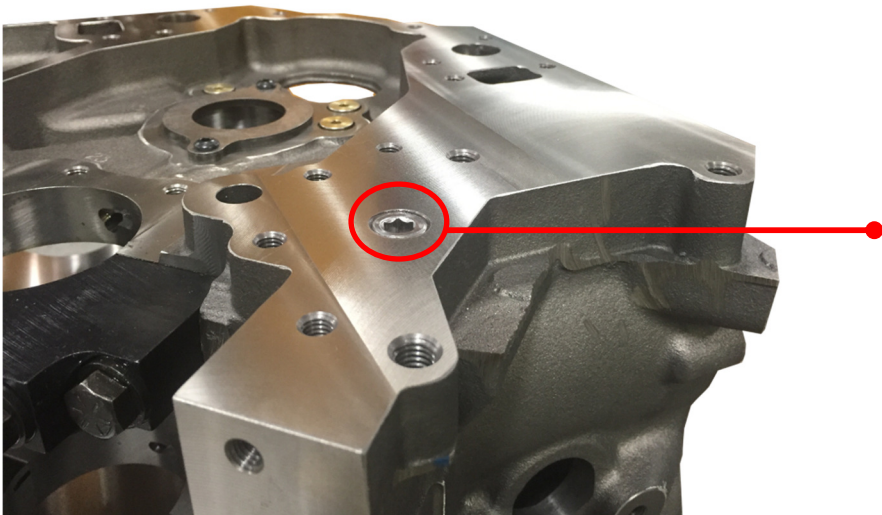


Top View of Valley Area:

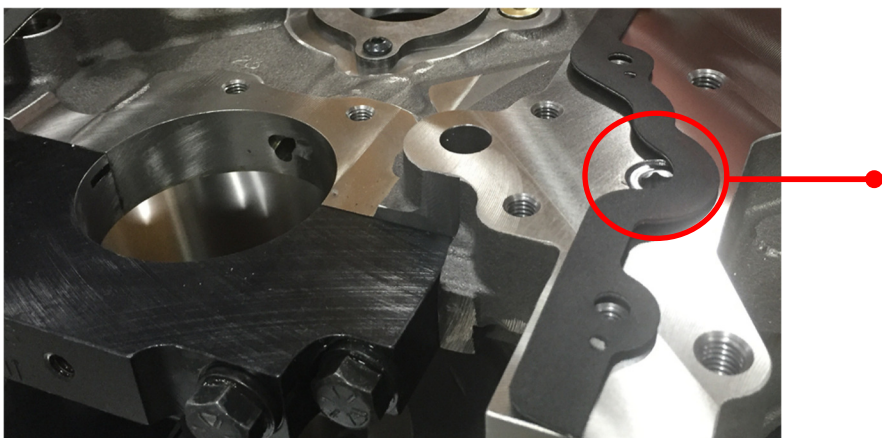
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

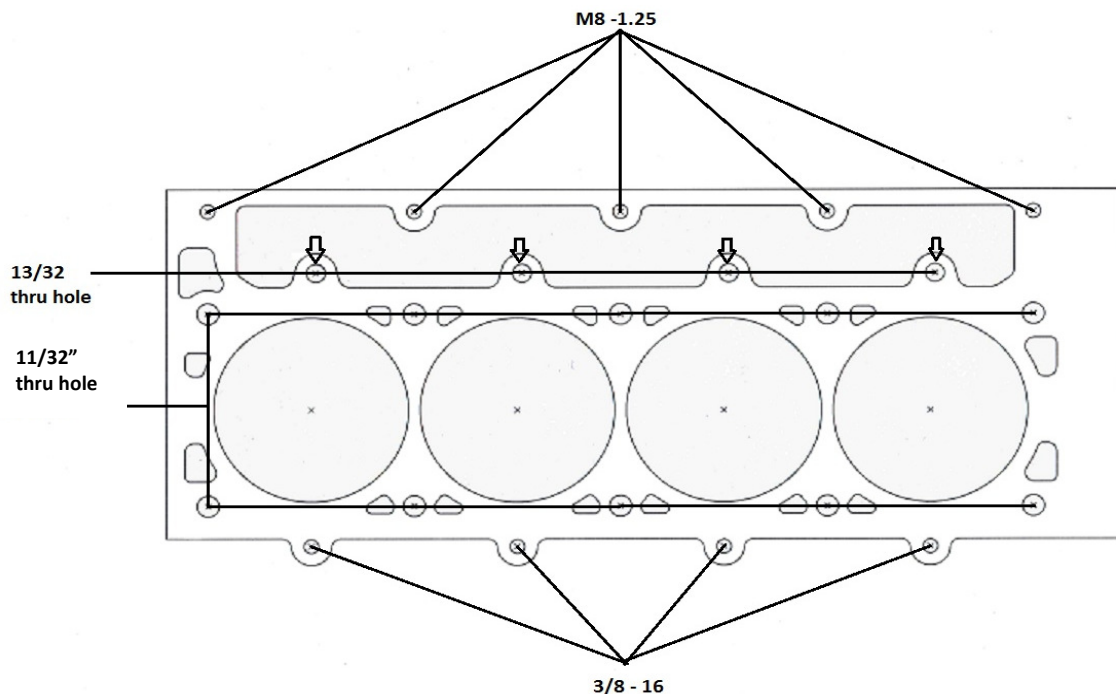
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



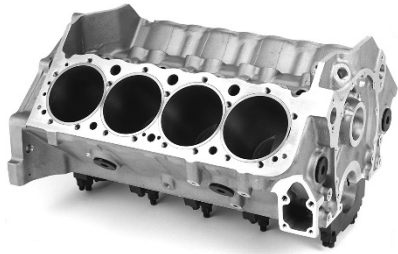
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

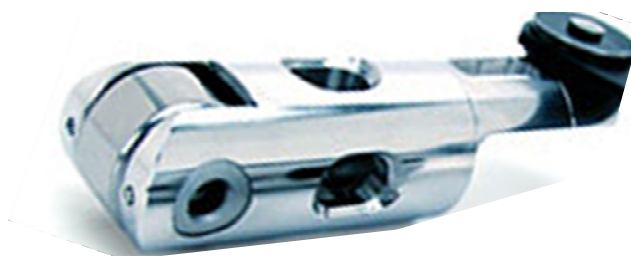


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

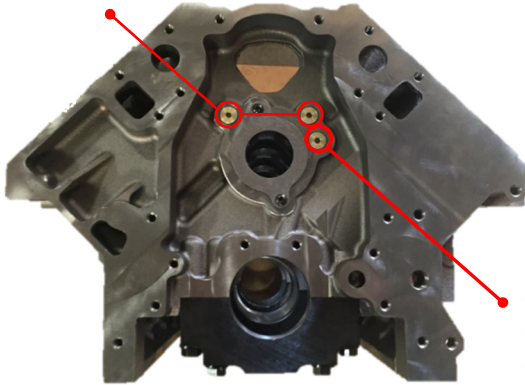
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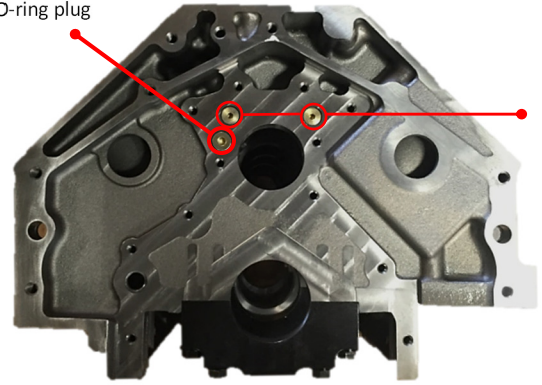
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



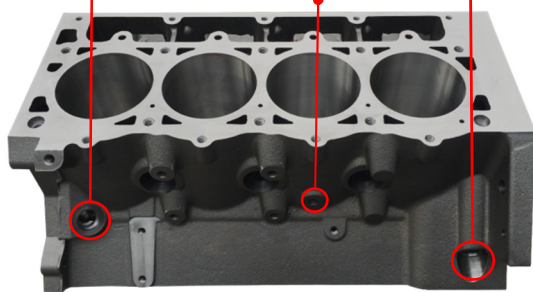
SHP LS Next Rear

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Oil in -10AN w/O-ring

1/4" pipe / Water drain

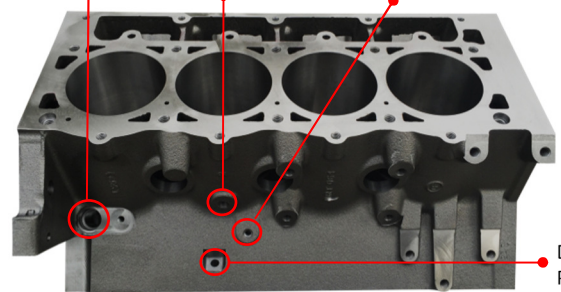


SHP LS Next Drivers Side

Crank sensor

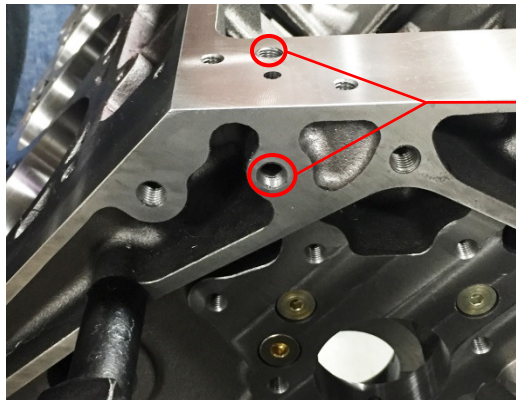
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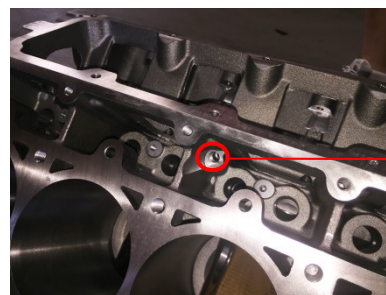
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



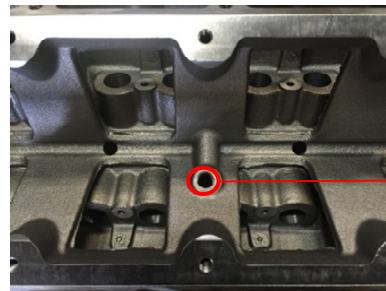
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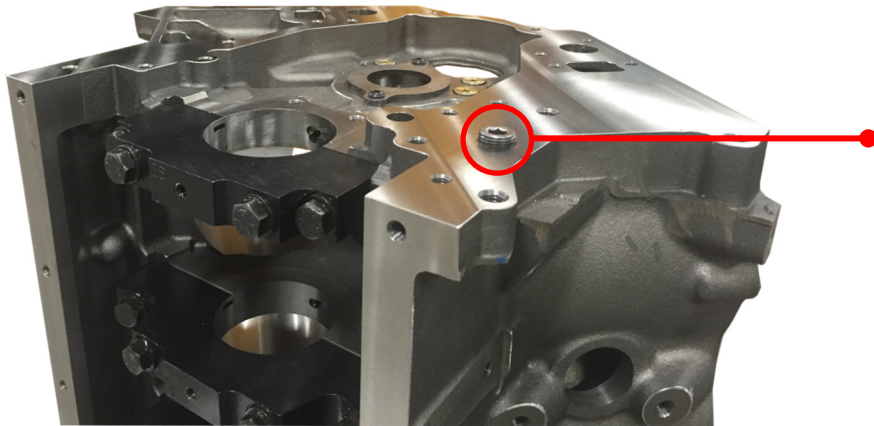
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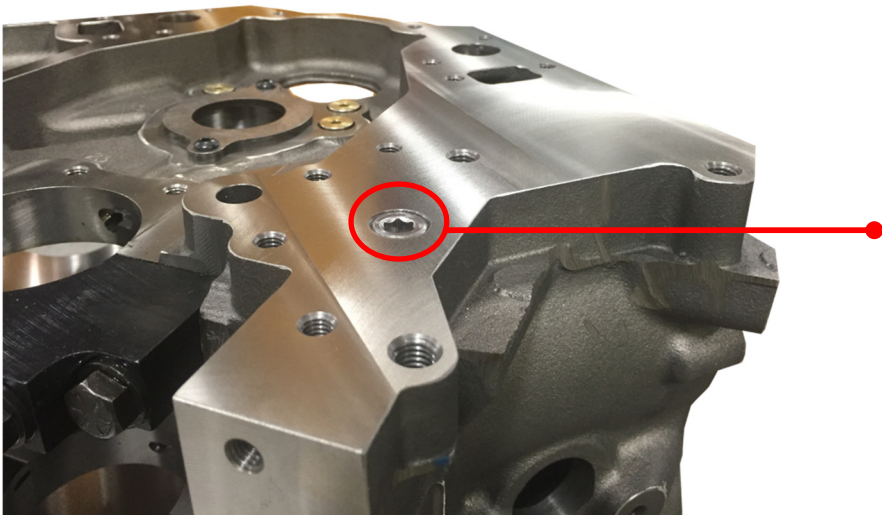


Top View of Valley Area:

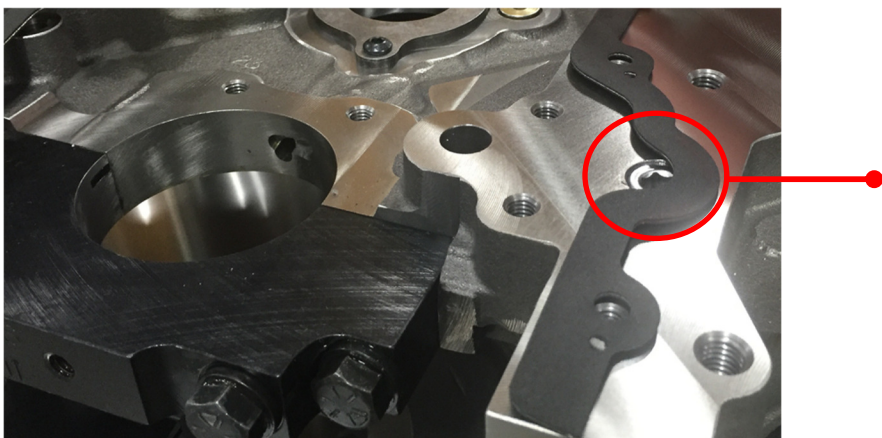
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Largest Recommended Bore .....	4.185"
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Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

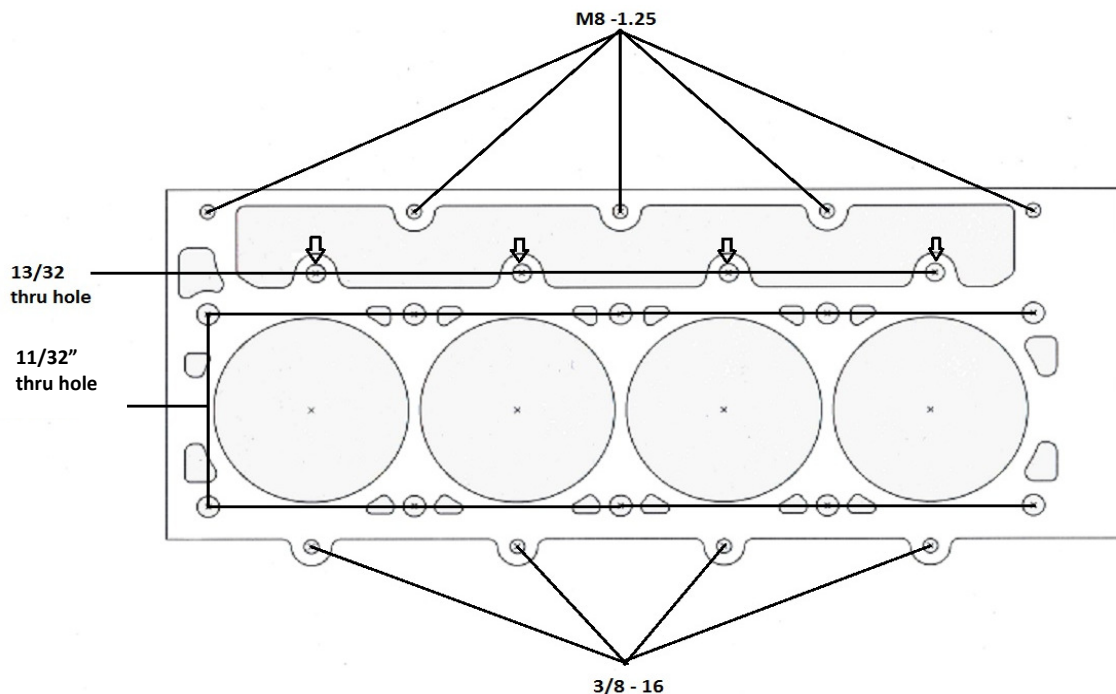
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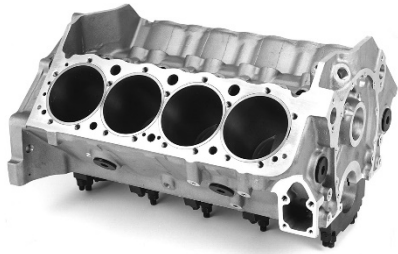
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Cylinder bores - Oil passages - Deck surfaces - All threads

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- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
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Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

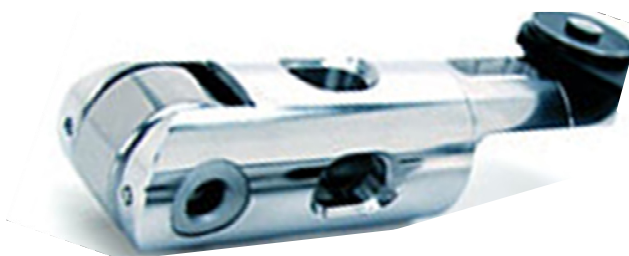


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

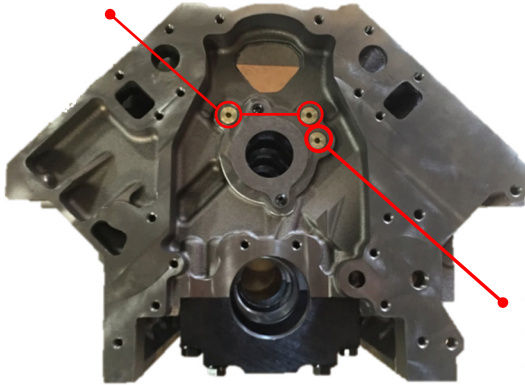
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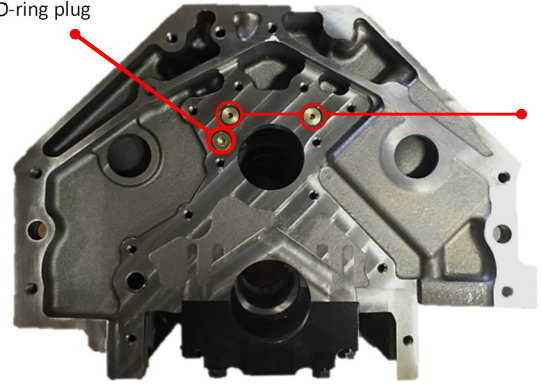
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



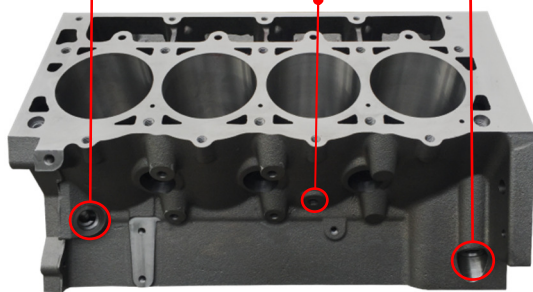
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

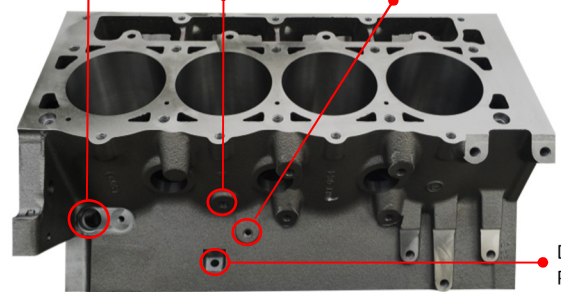


SHP LS Next Drivers Side

Crank sensor

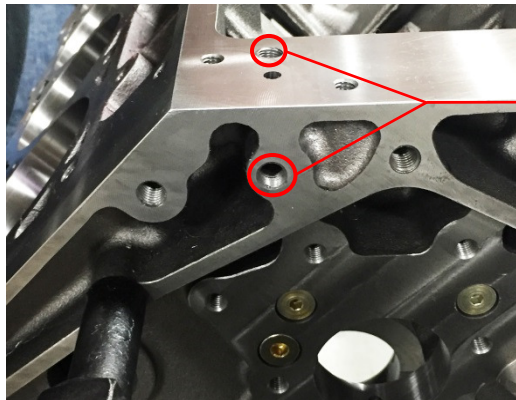
1/4" pipe / Water drain

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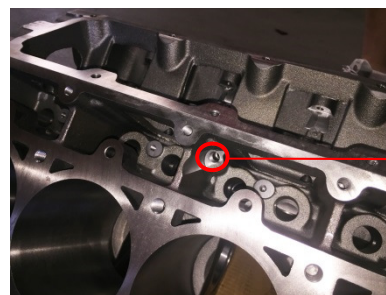
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



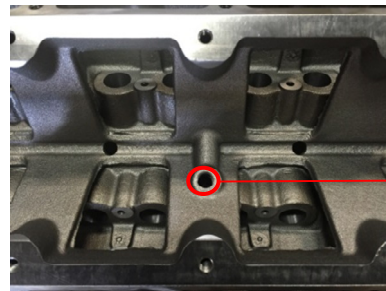
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These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



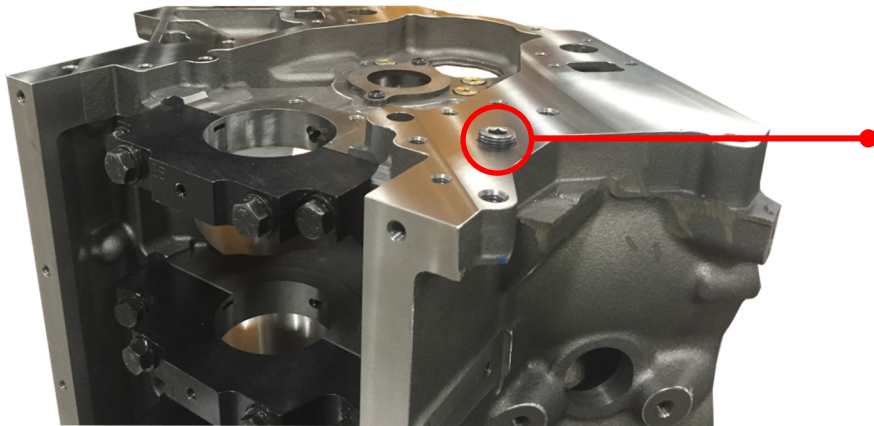
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

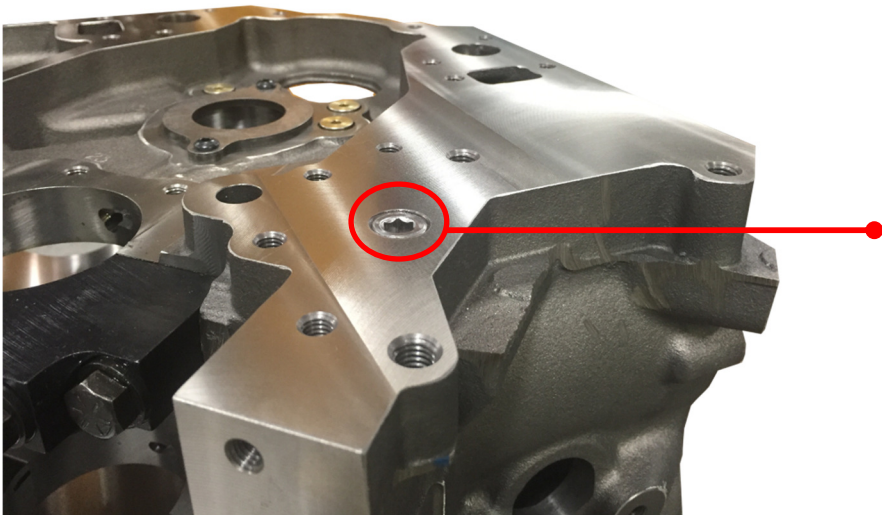


Top View of Valley Area:

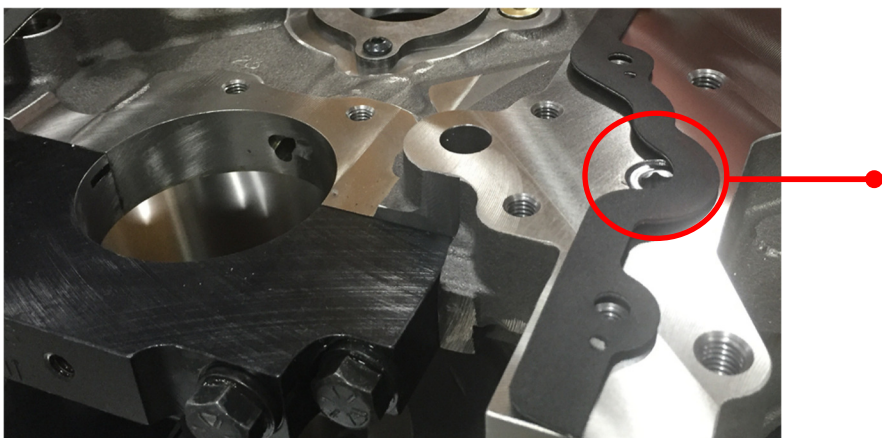
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

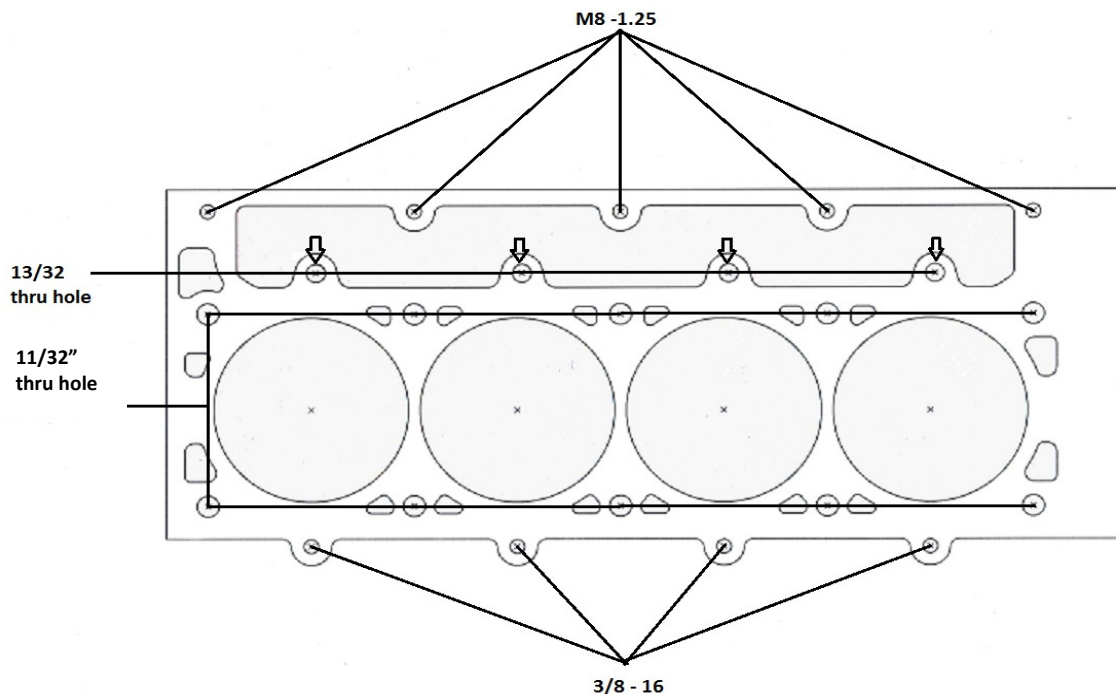
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



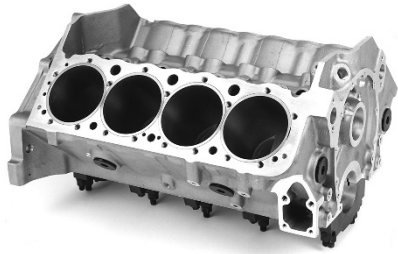
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
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<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
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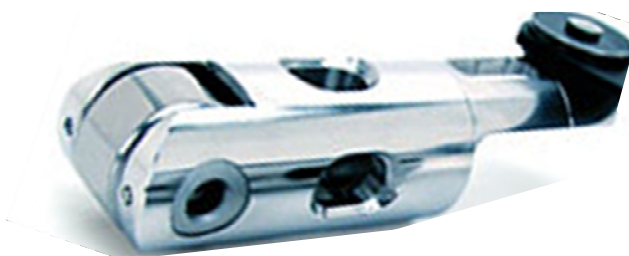


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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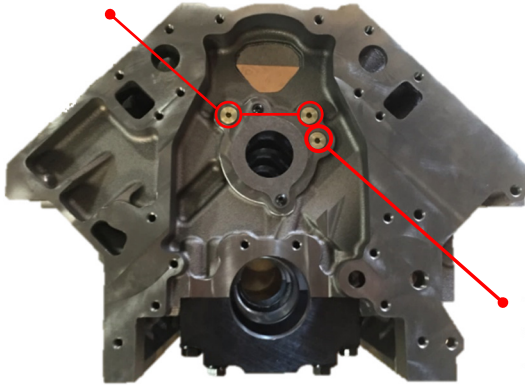
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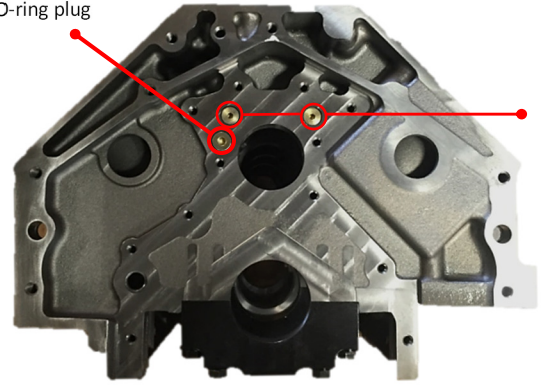
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



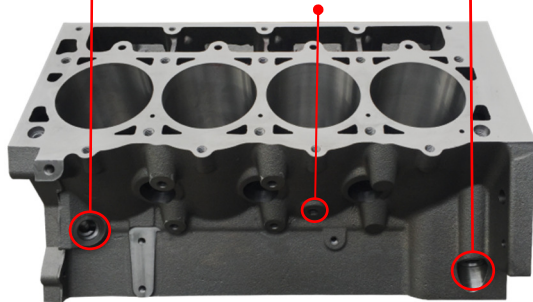
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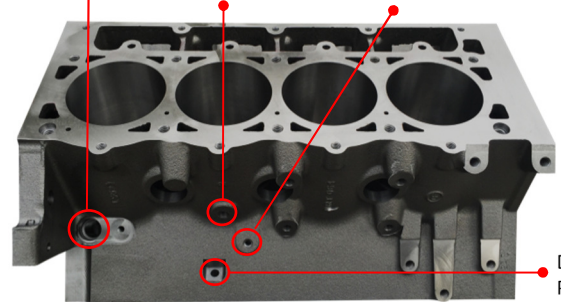


SHP LS Next Drivers Side

Crank sensor

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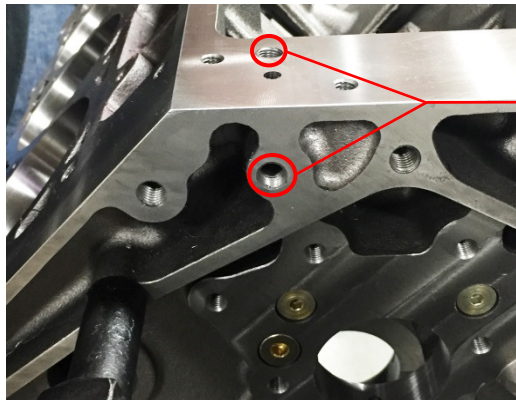
Knock sensor



SHP LS Next Passenger Side

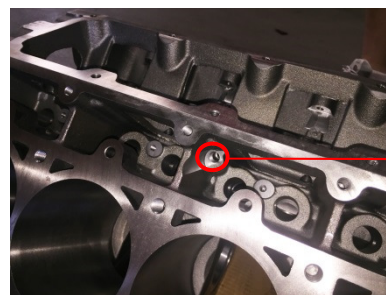
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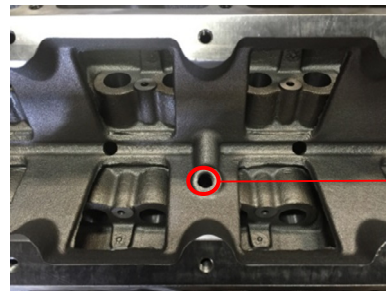
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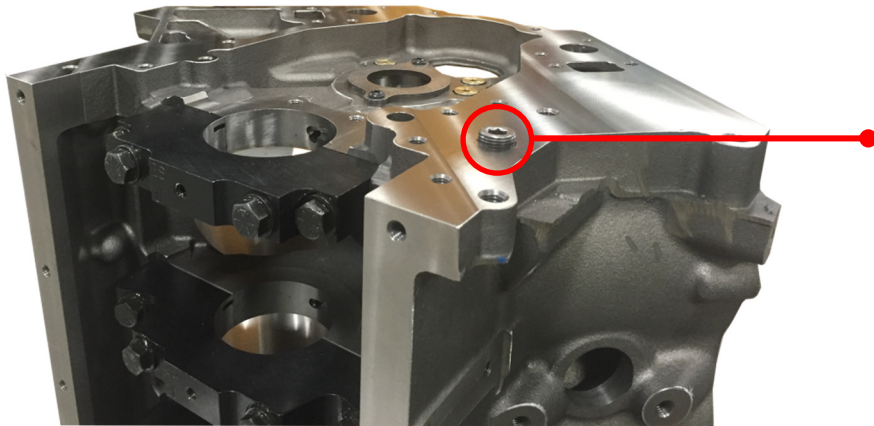
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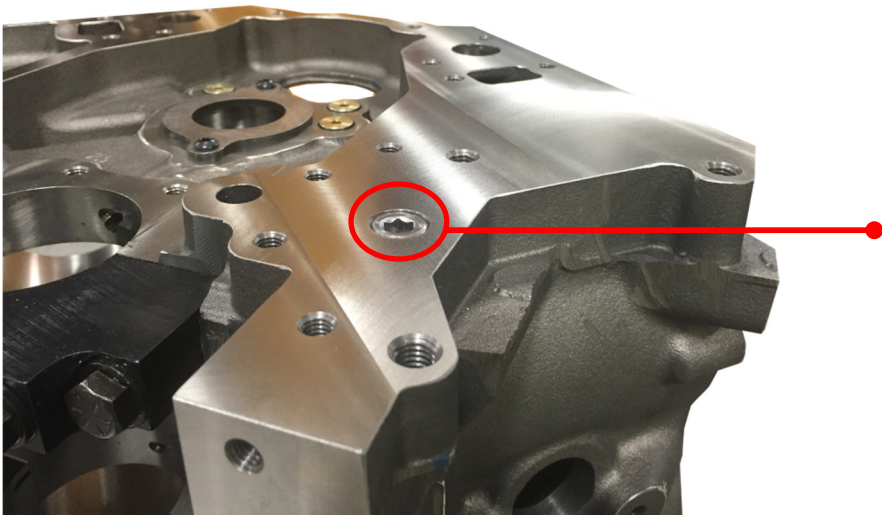


Top View of Valley Area:

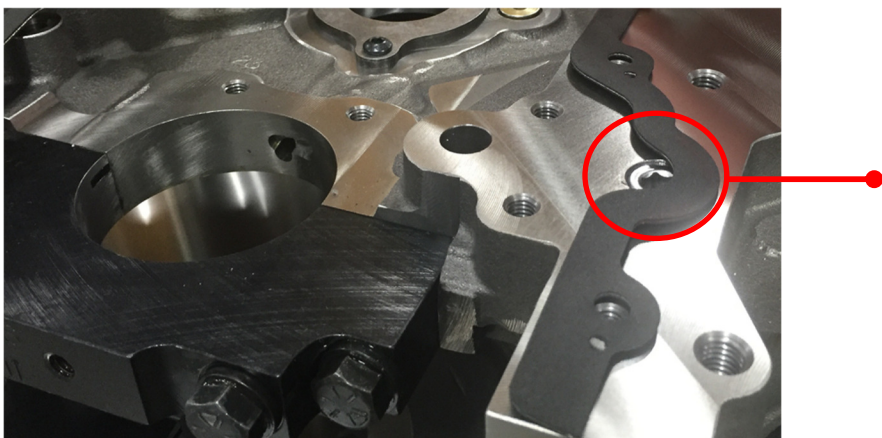
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

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The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

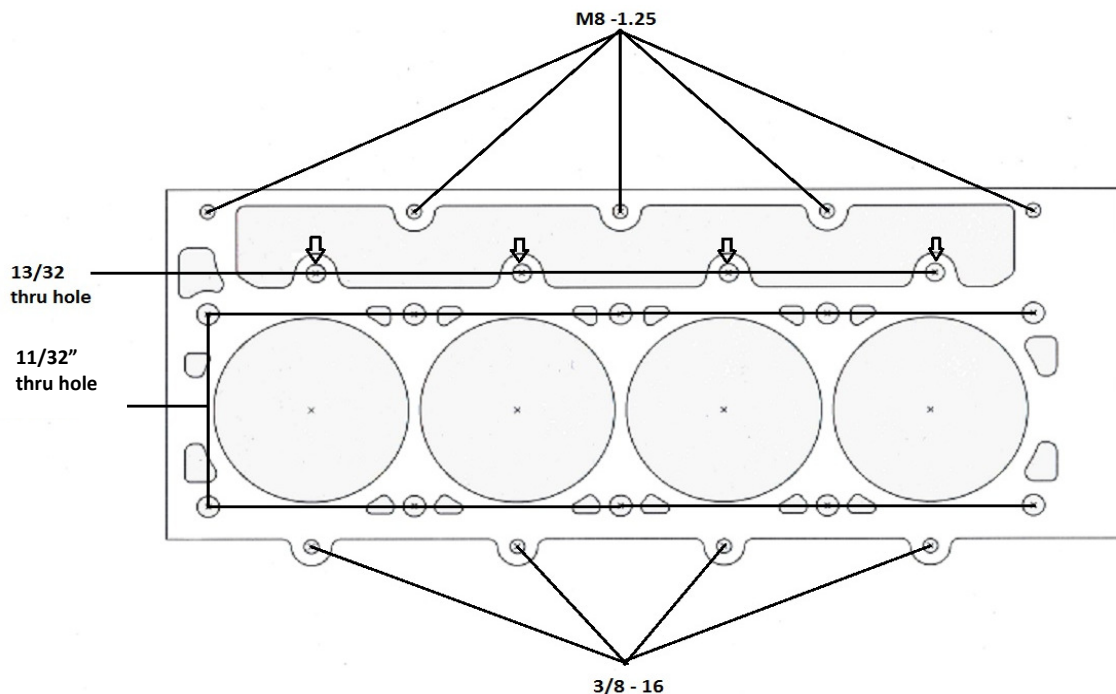
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Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



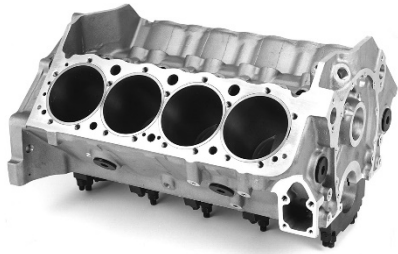
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

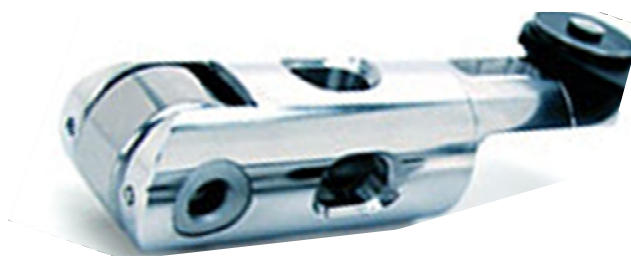


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

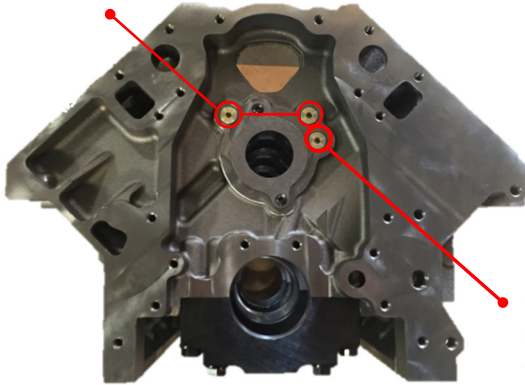
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

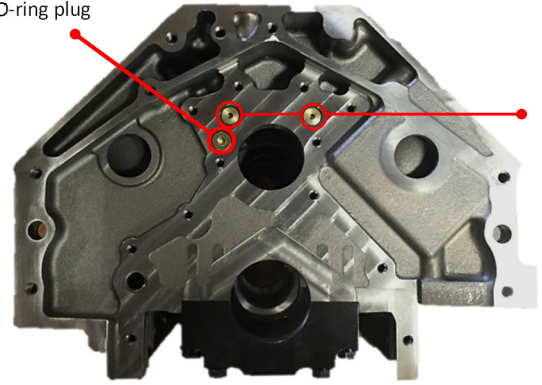
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



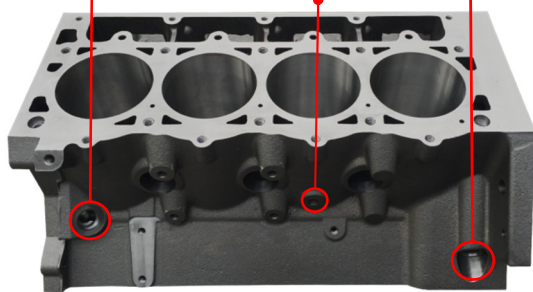
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

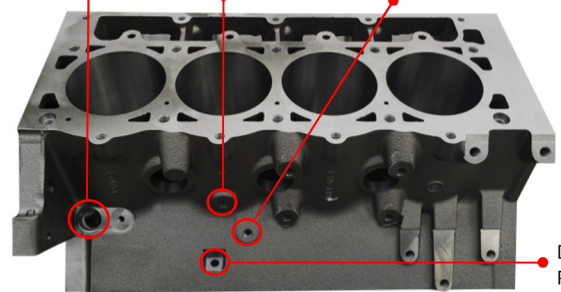


SHP LS Next Drivers Side

Crank sensor

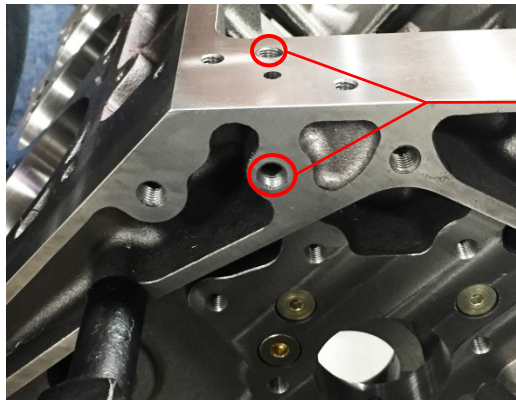
1/4" pipe / Water drain

Knock sensor



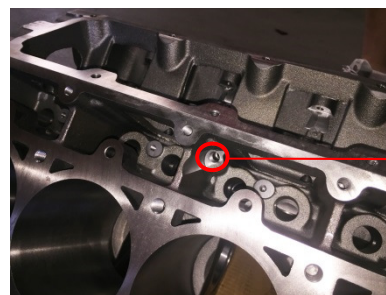
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



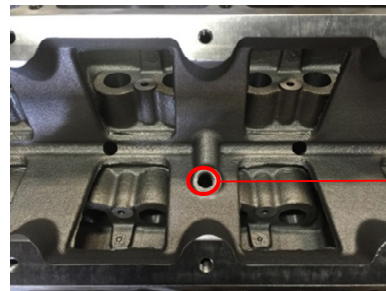
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



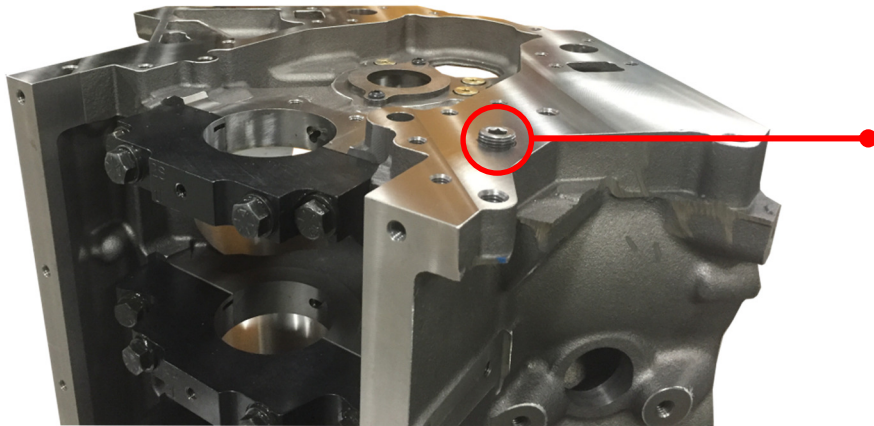
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

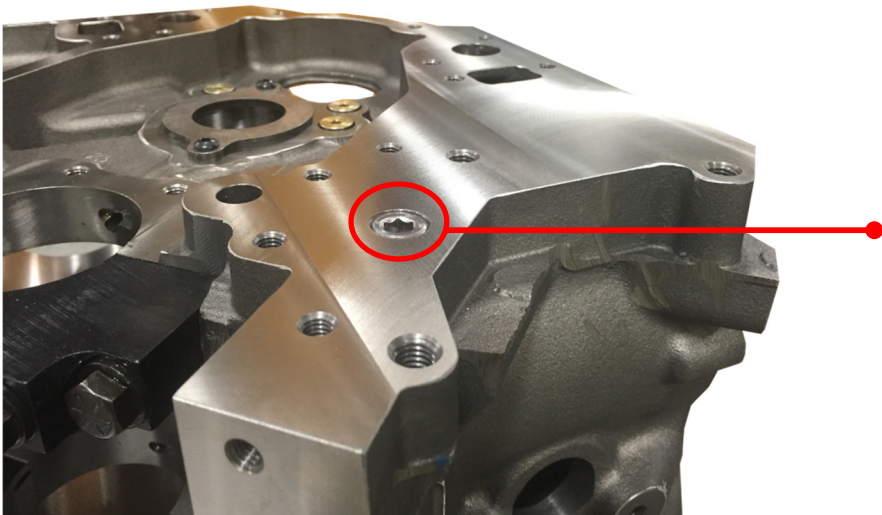


Top View of Valley Area:

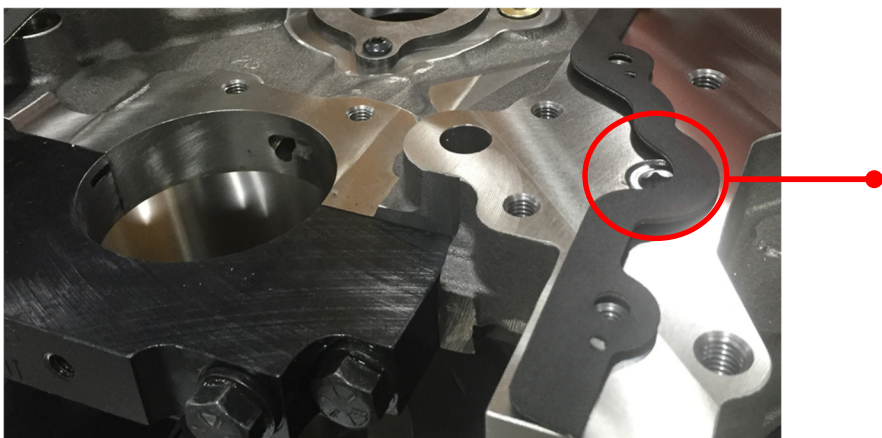
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

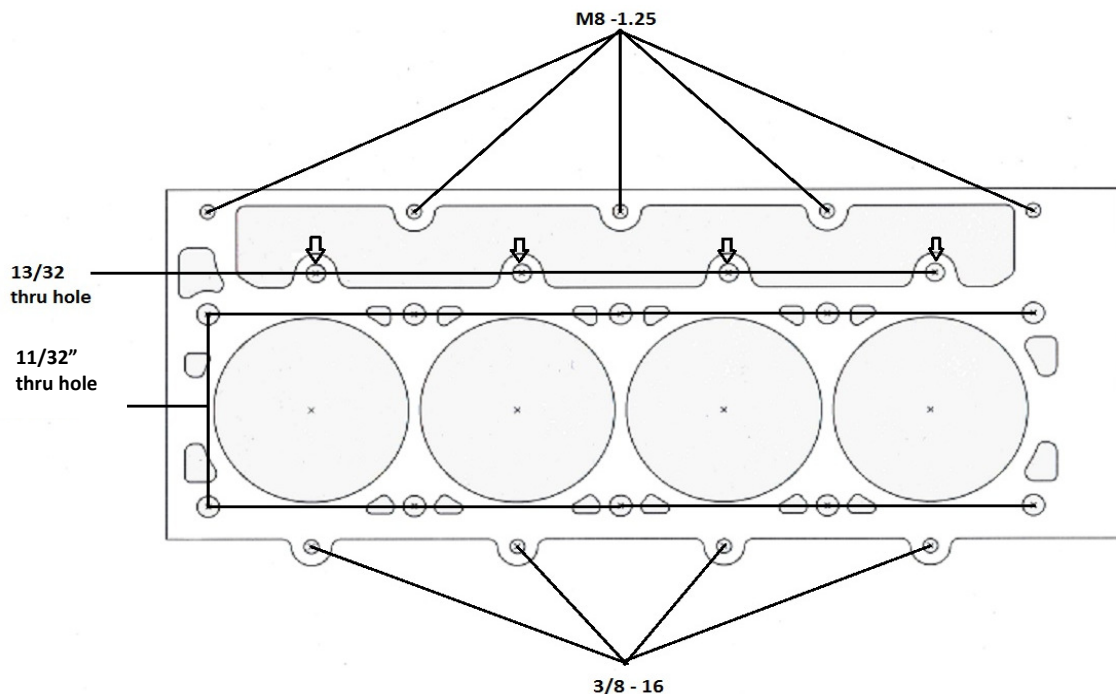
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

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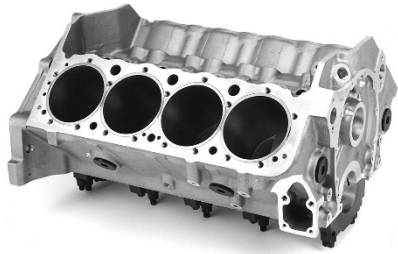
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Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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Upon receiving this block it should be thoroughly inspected for shipping damage.

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**Figure 1:**  
Stock un-modified  
solid roller lifters

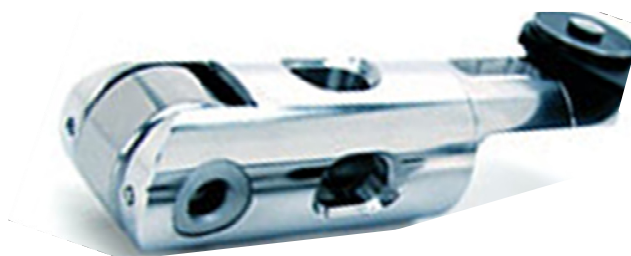


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

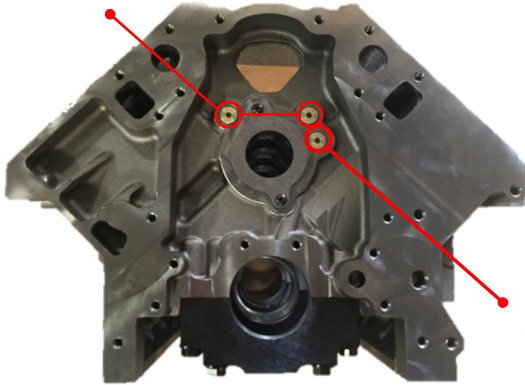
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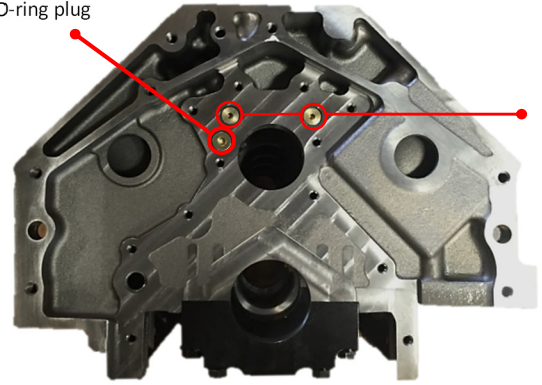
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



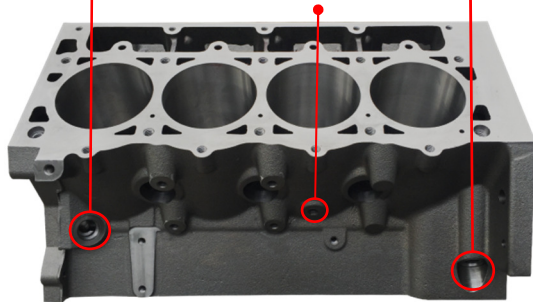
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

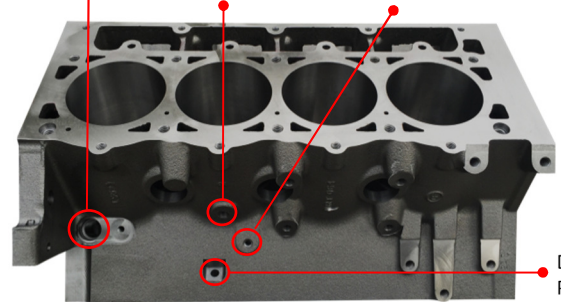


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

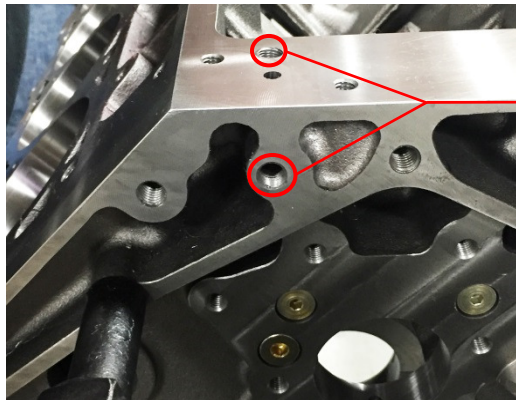
Knock sensor



SHP LS Next Passenger Side

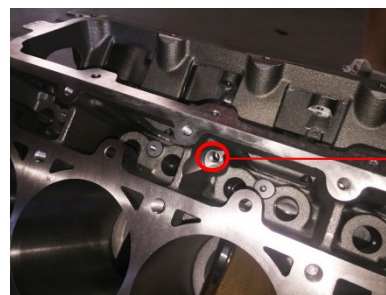
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



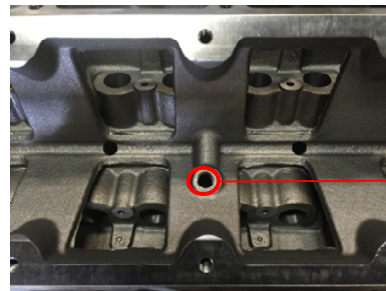
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



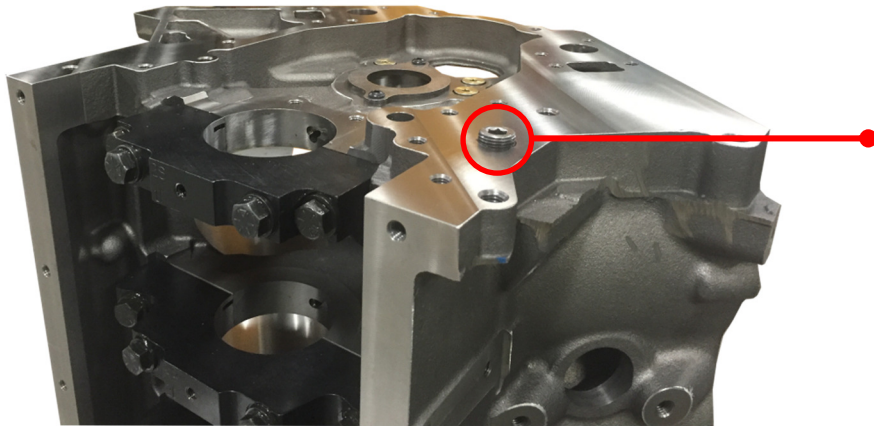
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

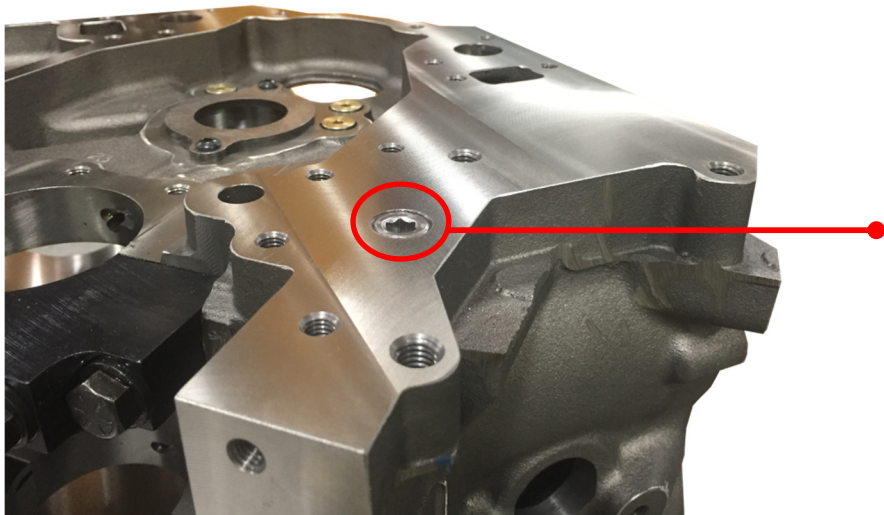


Top View of Valley Area:

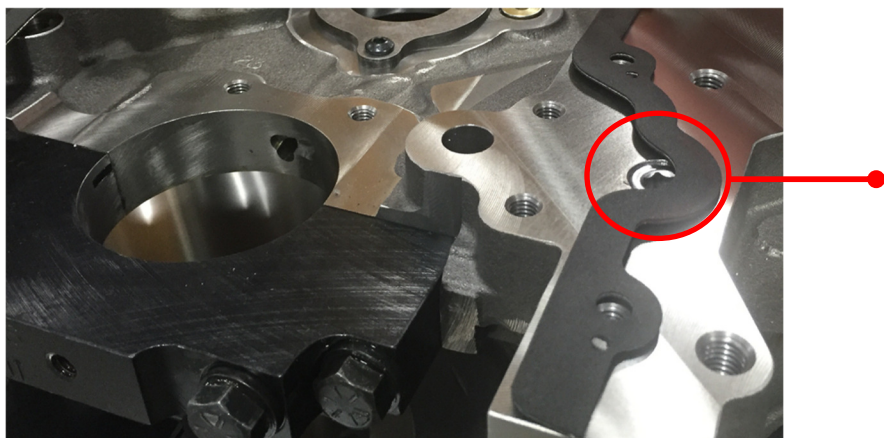
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

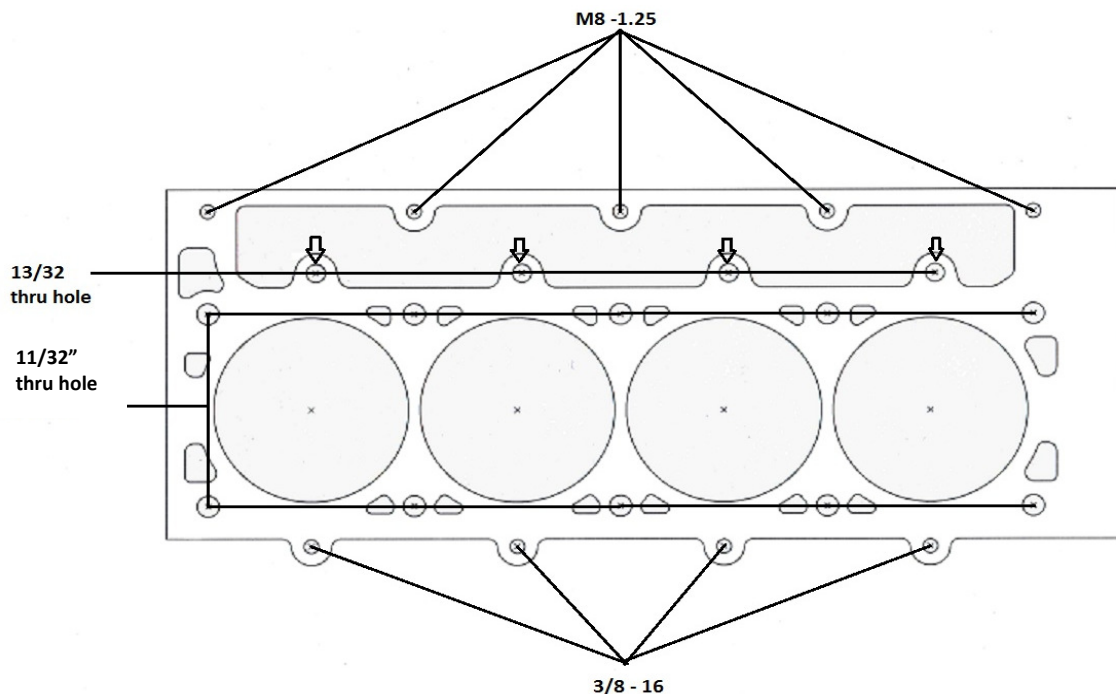
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



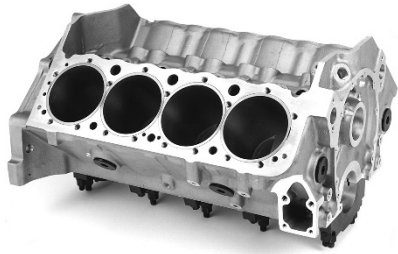
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

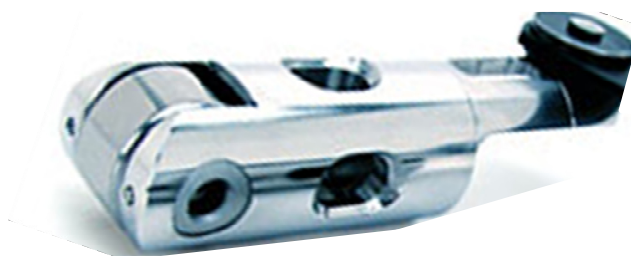


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

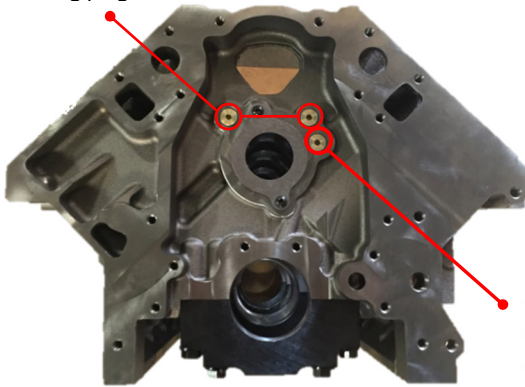
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

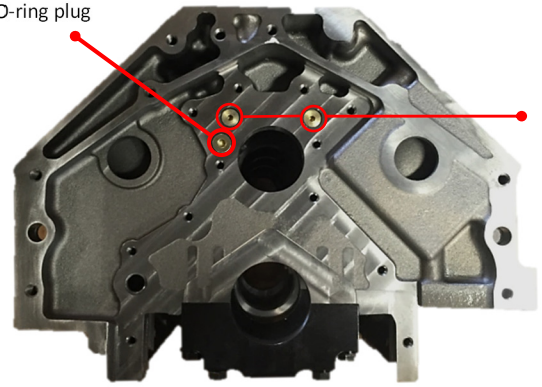
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



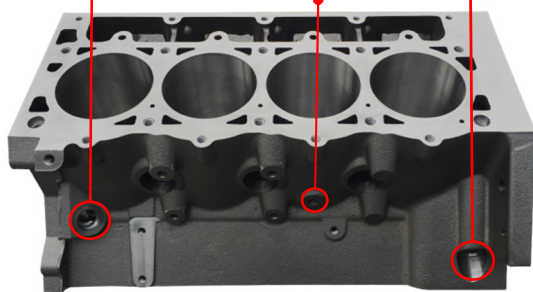
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

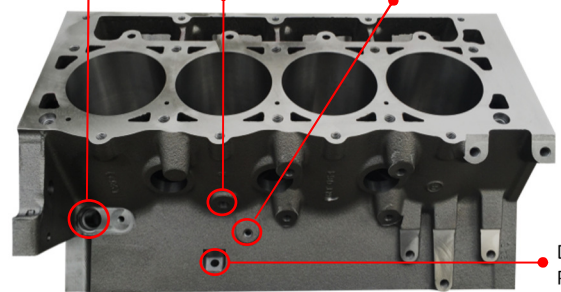


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

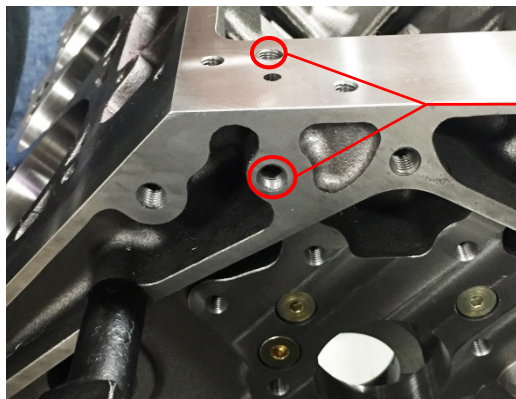
Knock sensor



SHP LS Next Passenger Side

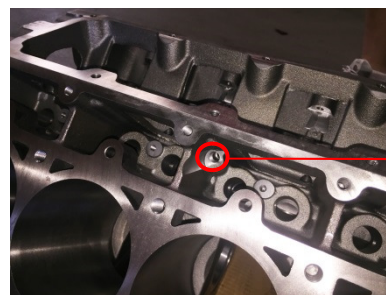
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



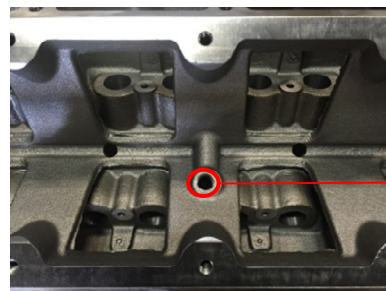
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



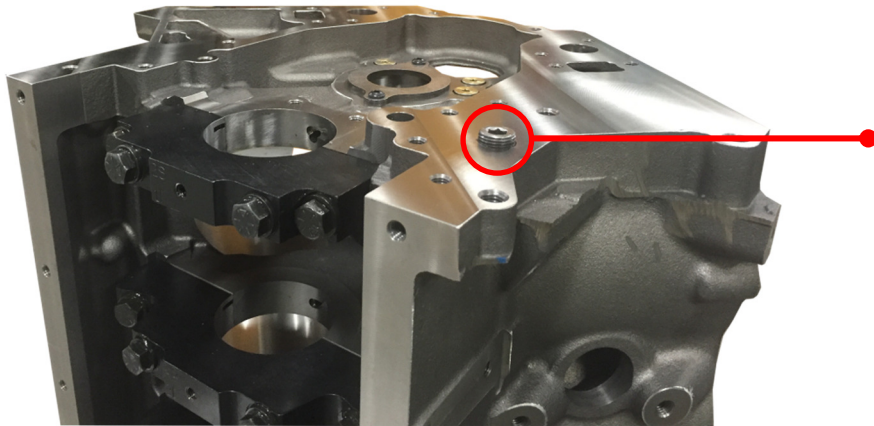
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

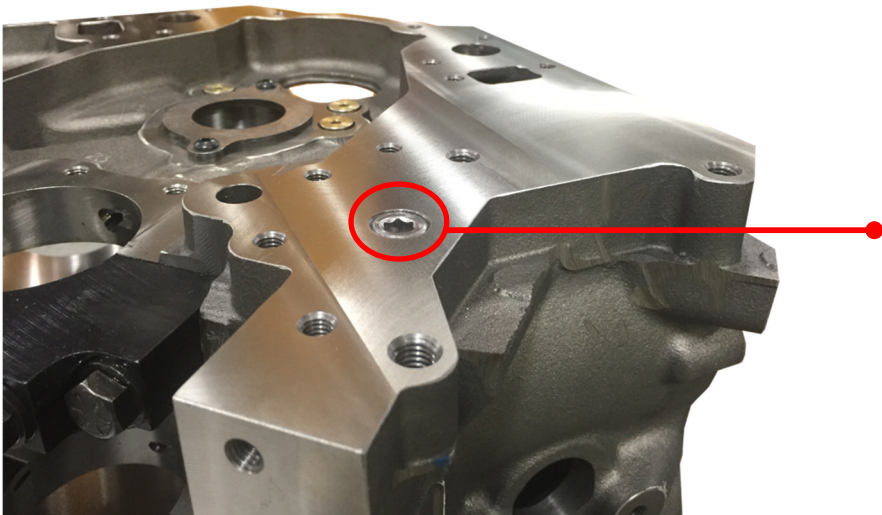


Top View of Valley Area:

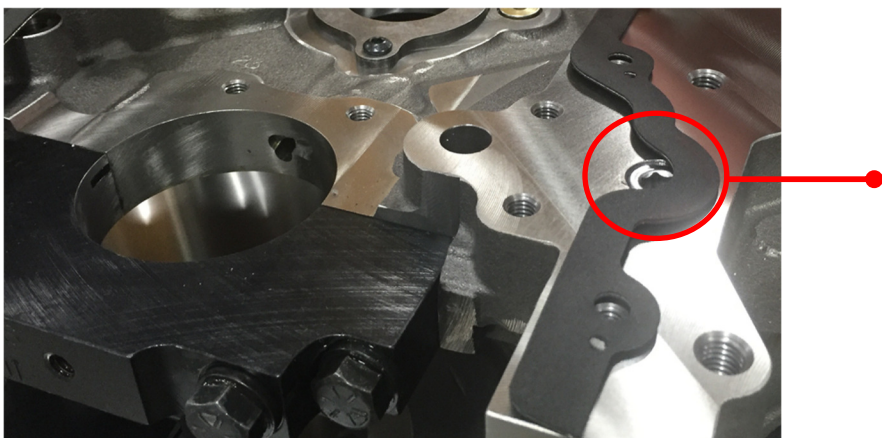
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

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SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

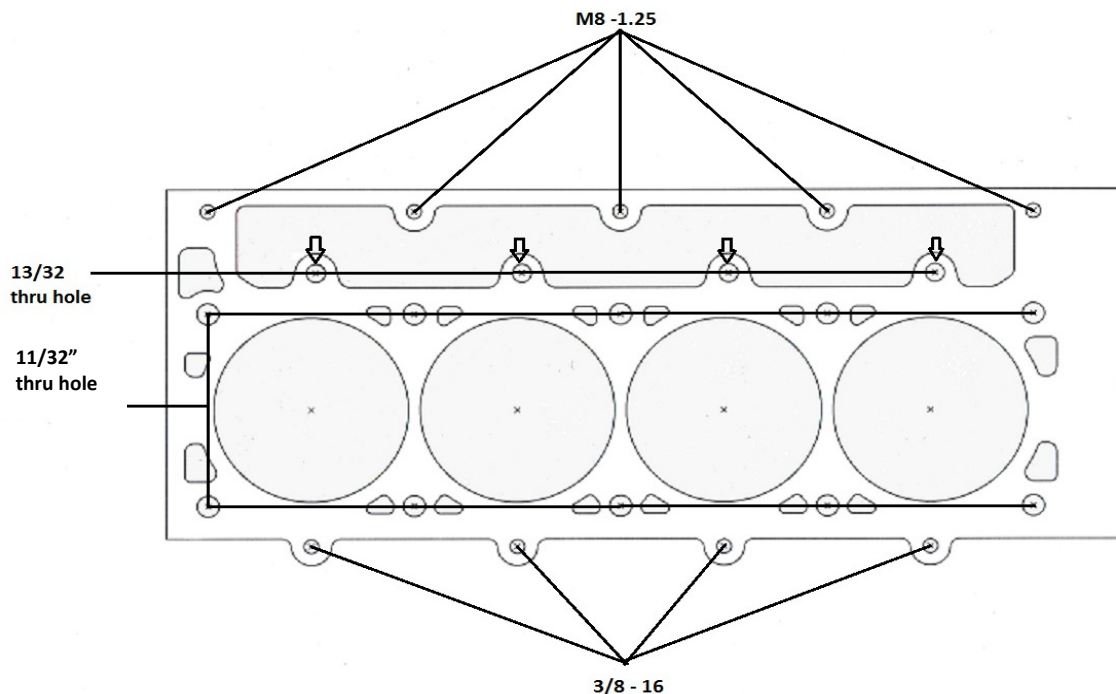
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



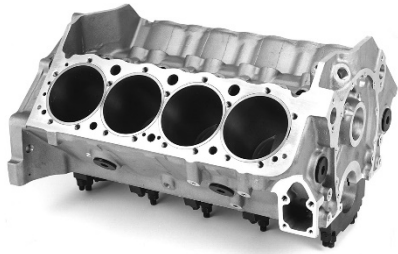
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
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Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

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**Figure 1:**  
Stock un-modified  
solid roller lifters

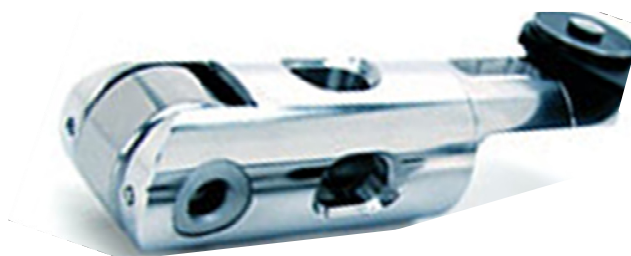


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

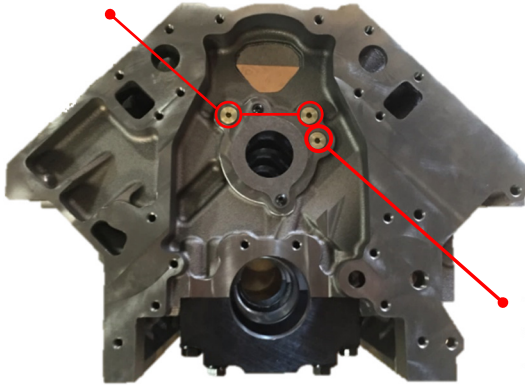
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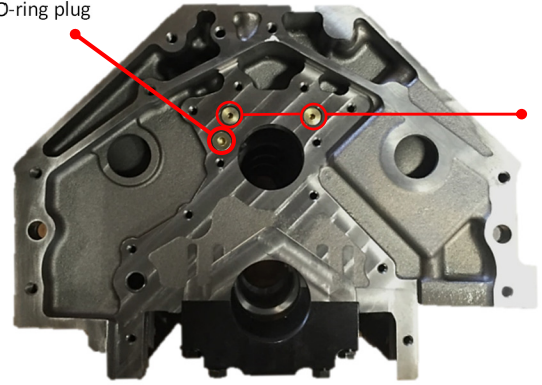
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



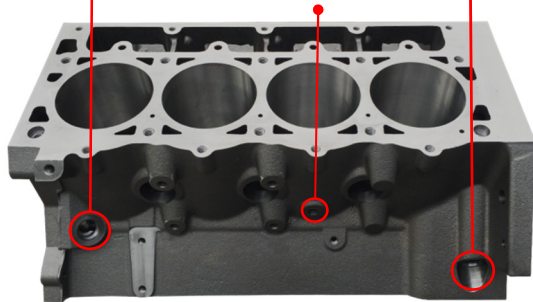
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

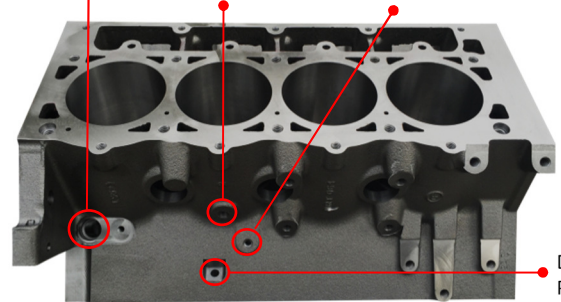


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

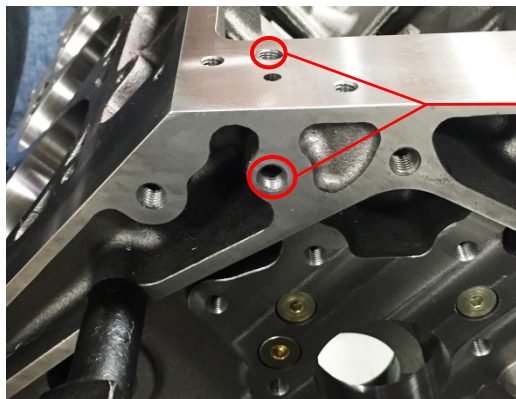
Knock sensor



SHP LS Next Passenger Side

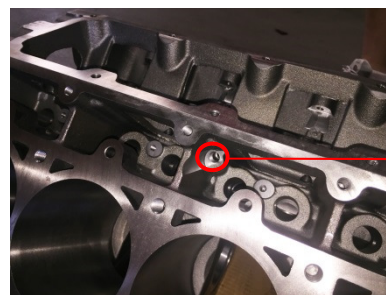
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



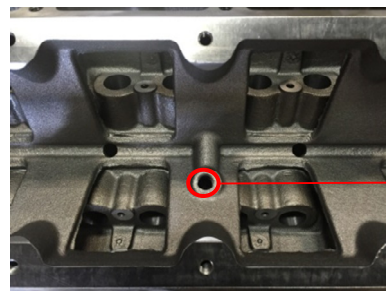
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



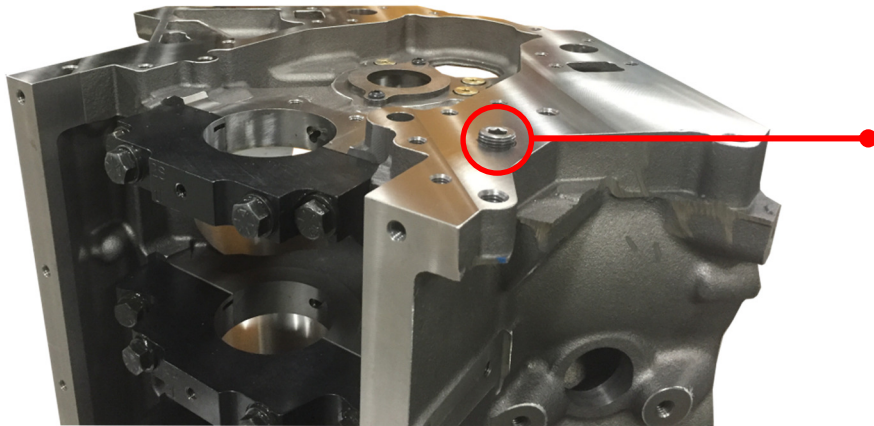
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

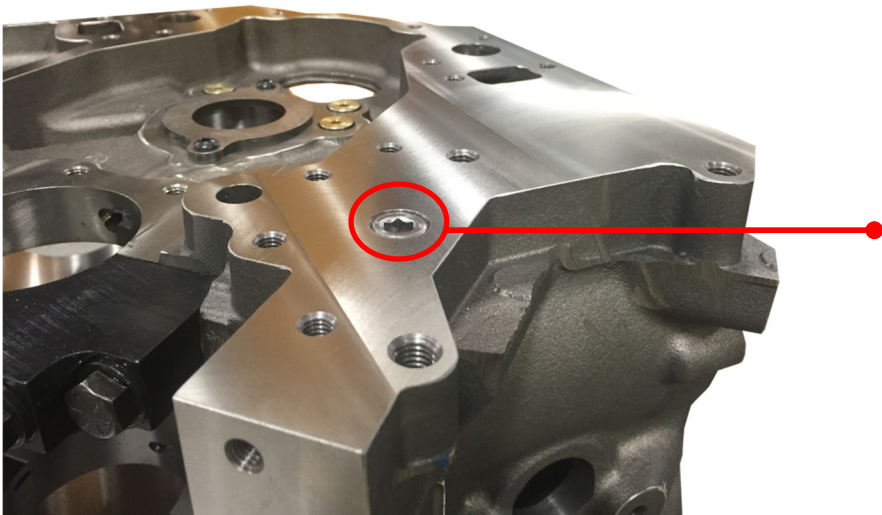


Top View of Valley Area:

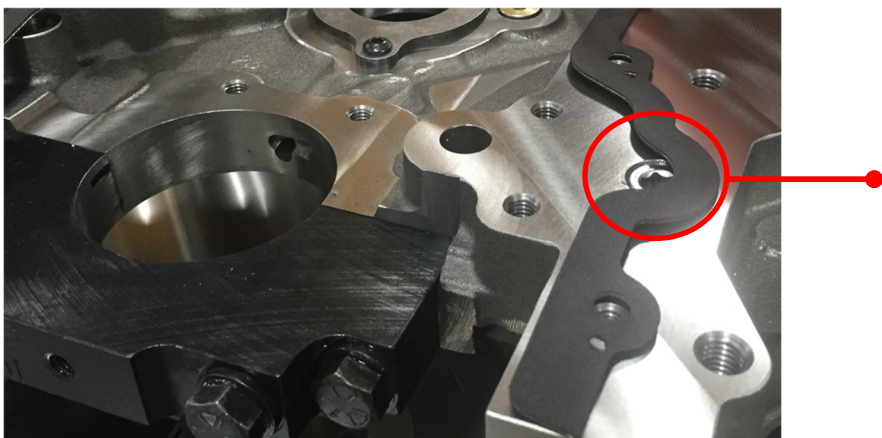
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

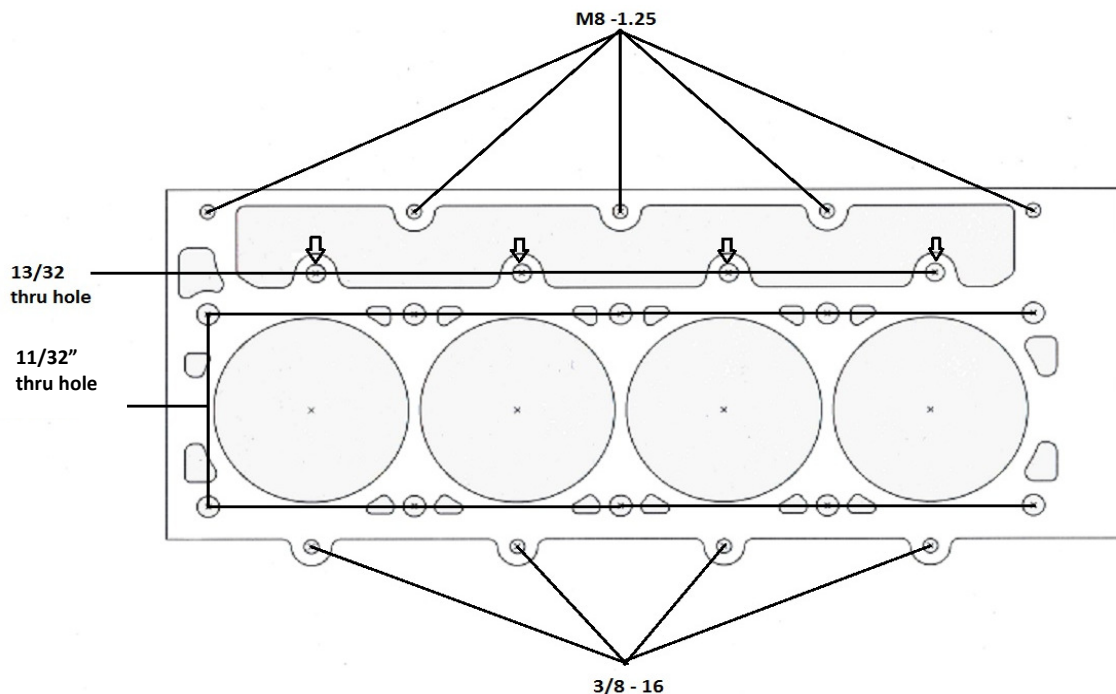
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



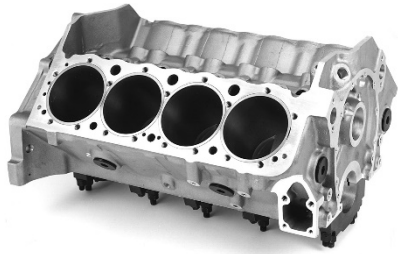
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

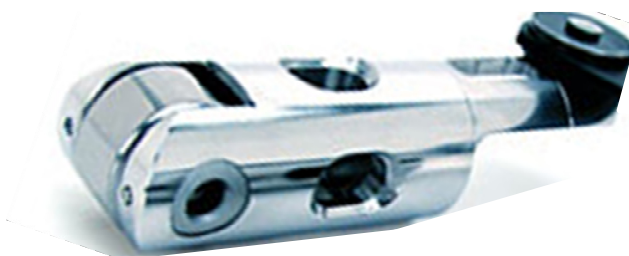


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

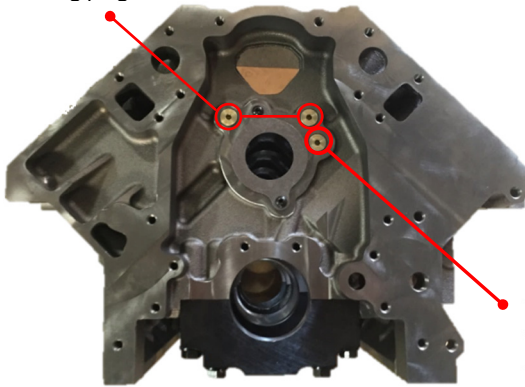
**CAUTION!**



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

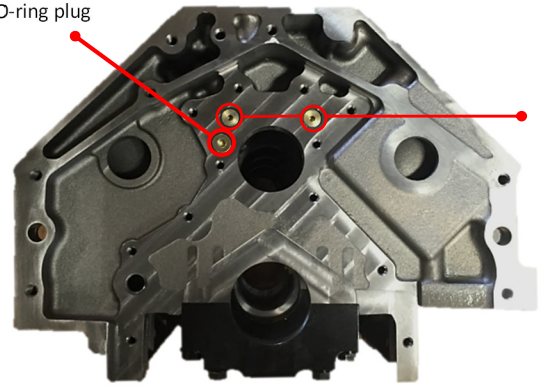
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



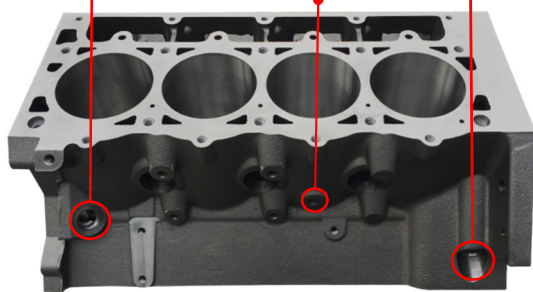
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

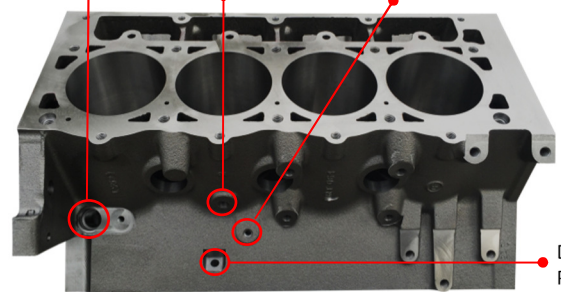


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

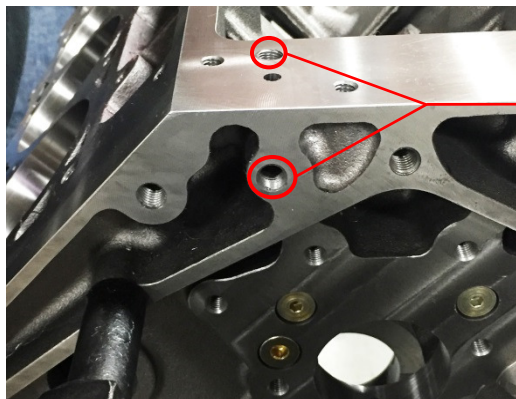
Knock sensor



SHP LS Next Passenger Side

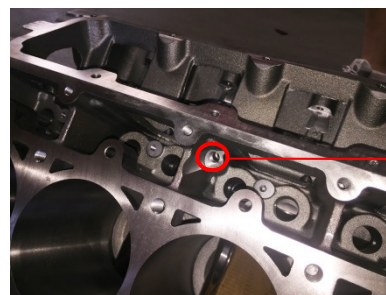
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



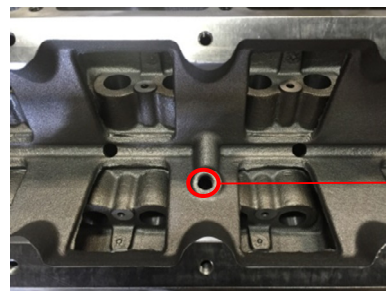
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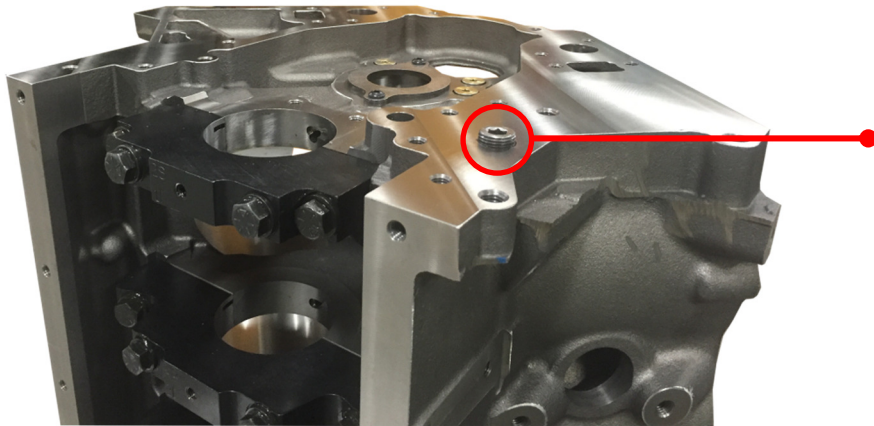
Drivers Side of Block:

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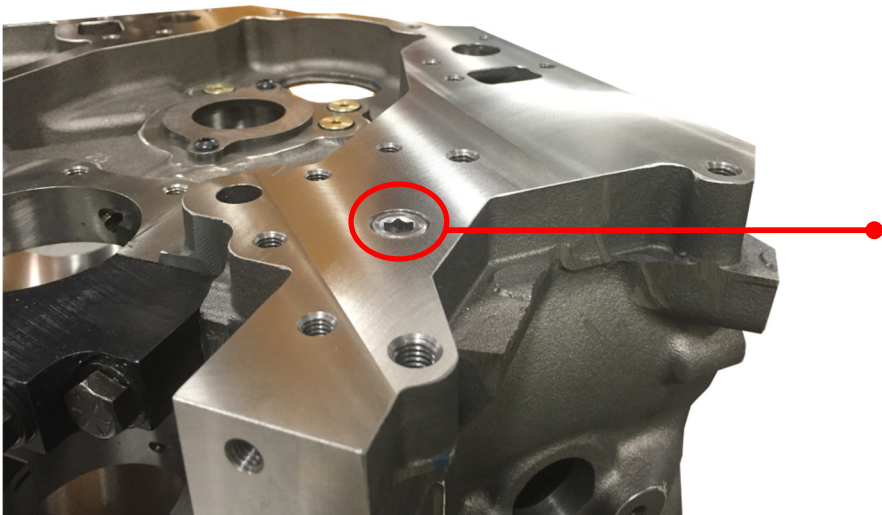


Top View of Valley Area:

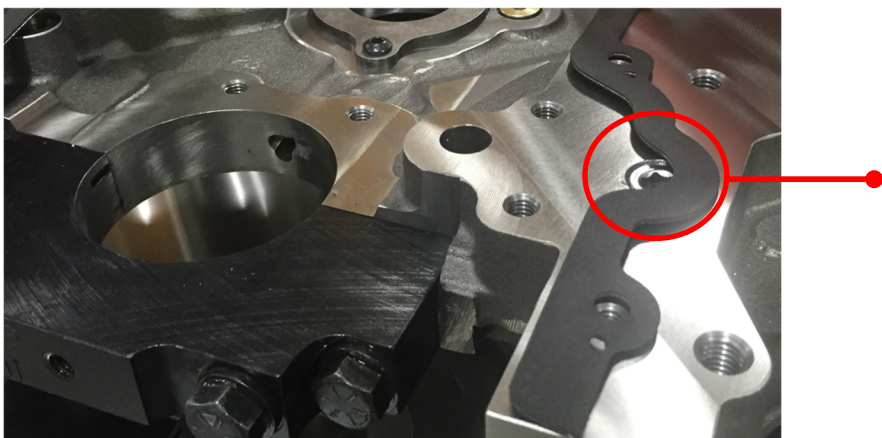
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The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

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**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

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SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

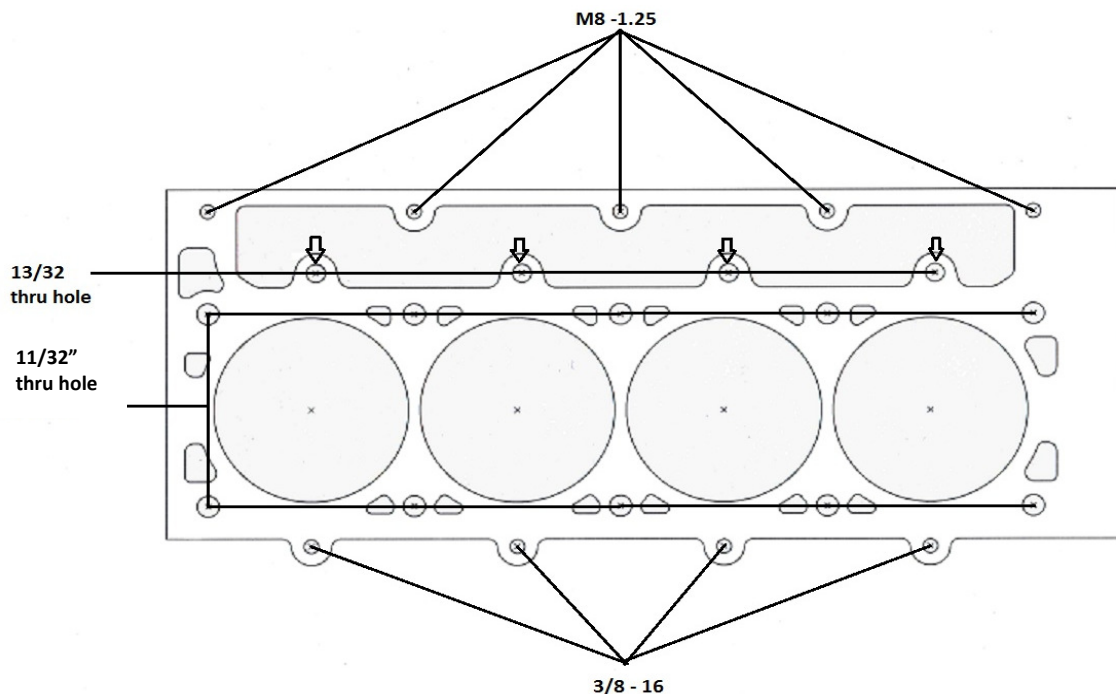
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



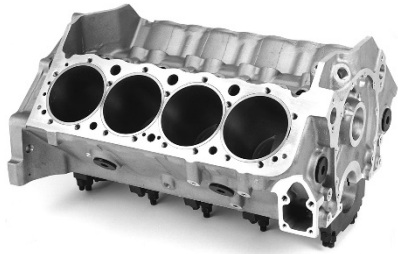
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

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CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

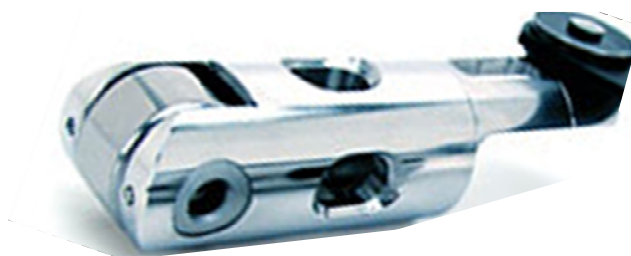


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

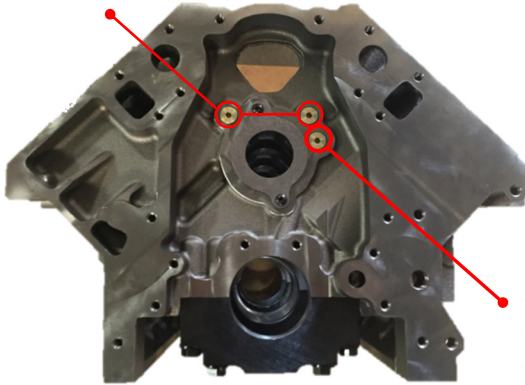
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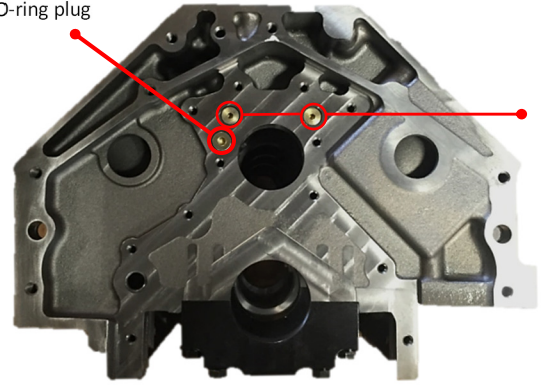
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



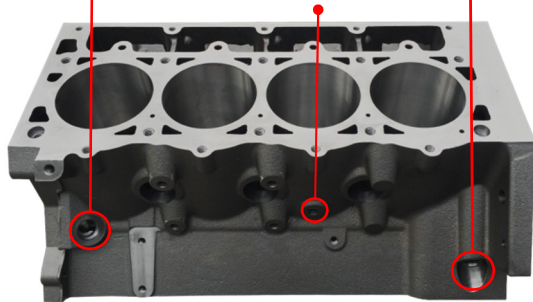
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

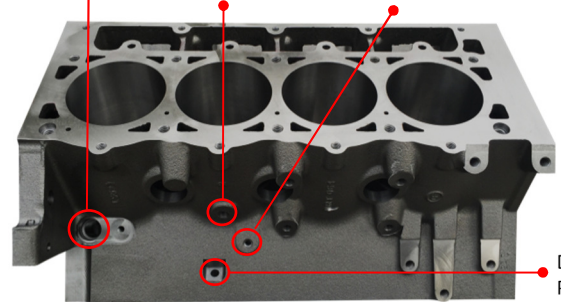


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

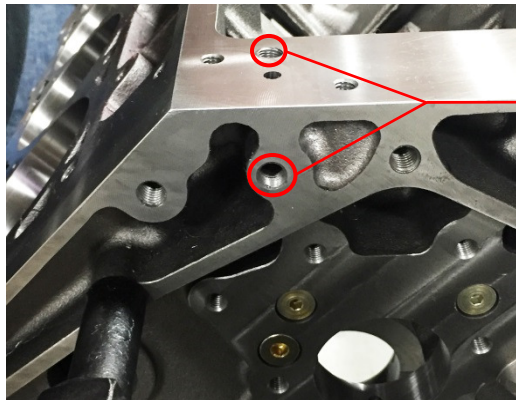
Knock sensor



SHP LS Next Passenger Side

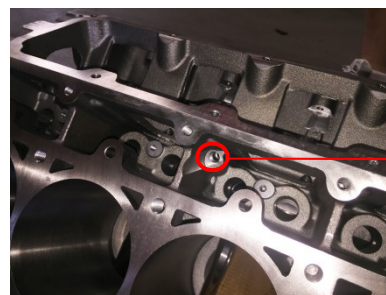
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



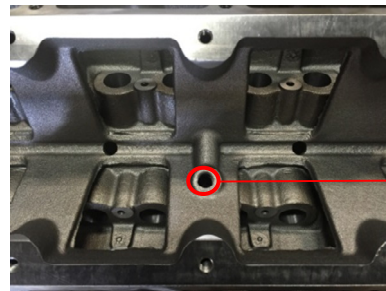
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



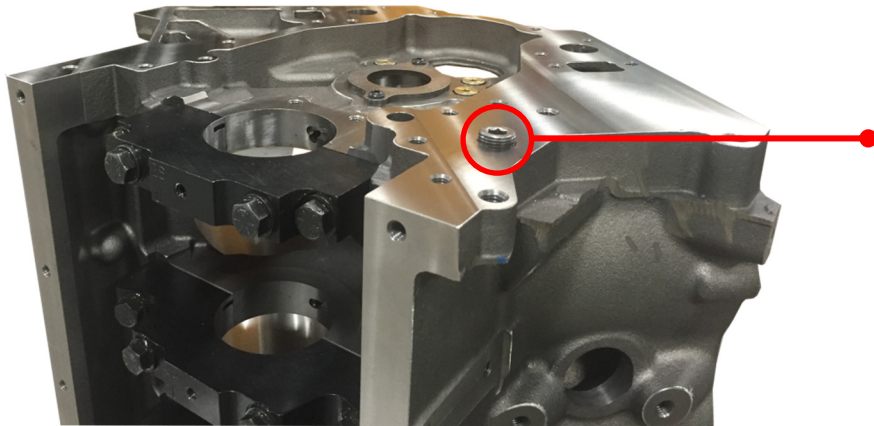
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

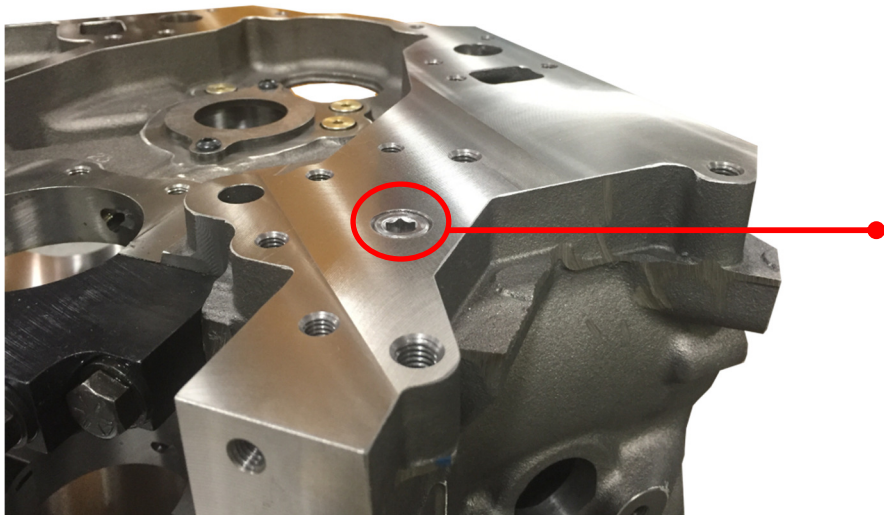


Top View of Valley Area:

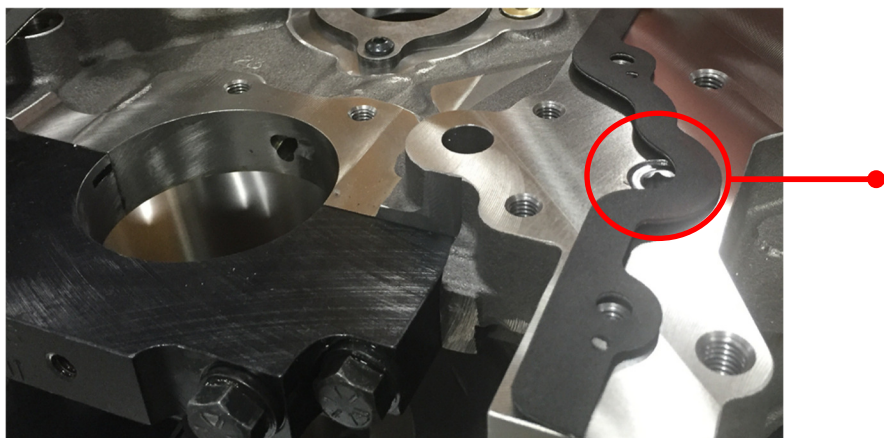
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

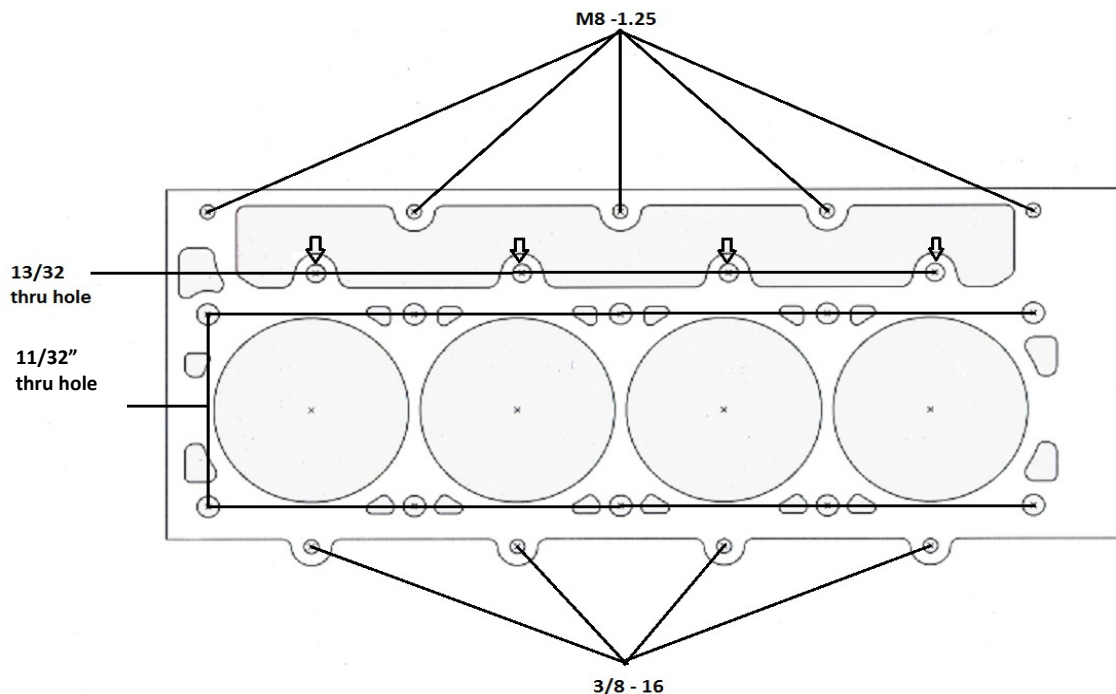
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



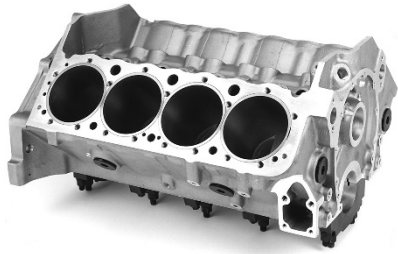
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
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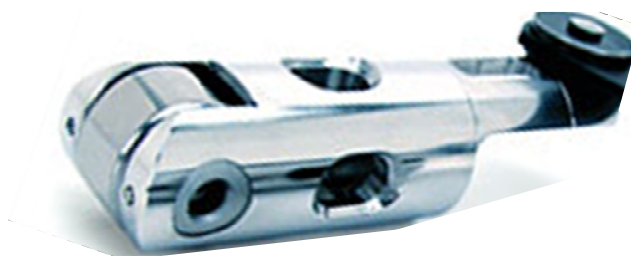


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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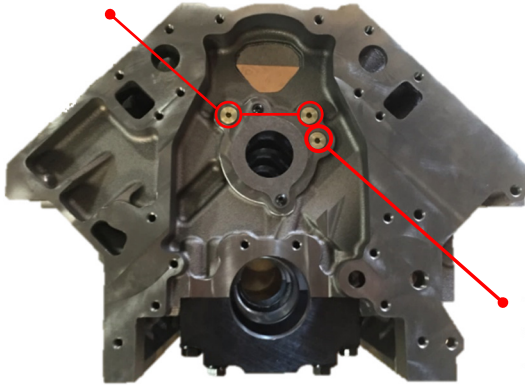
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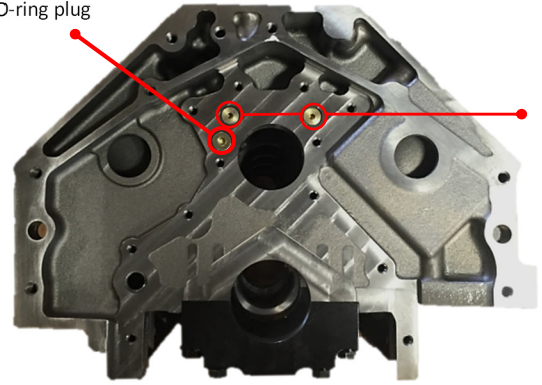
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



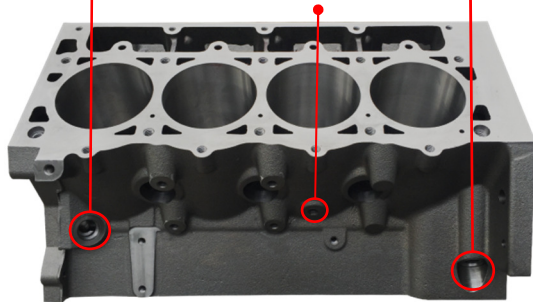
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Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

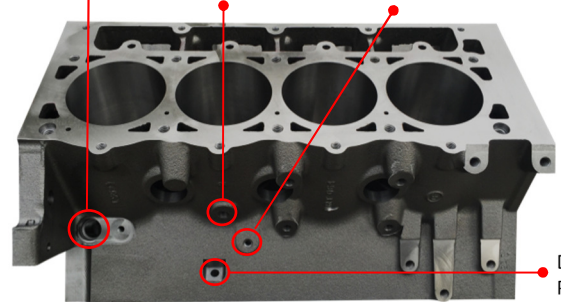


SHP LS Next Drivers Side

Crank sensor

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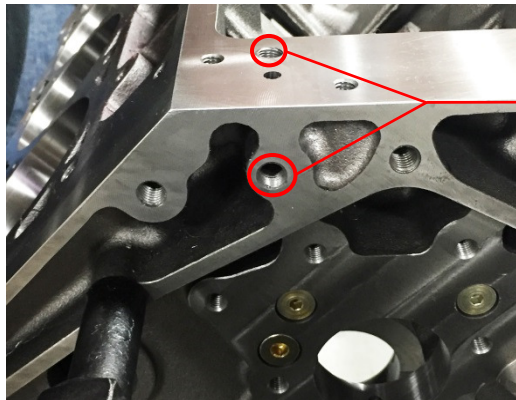
Knock sensor



SHP LS Next Passenger Side

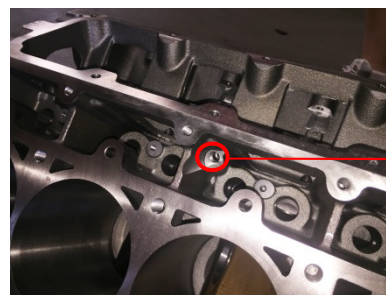
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### \*\*\* IMPORTANT \*\*\*



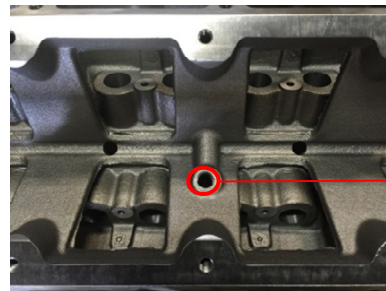
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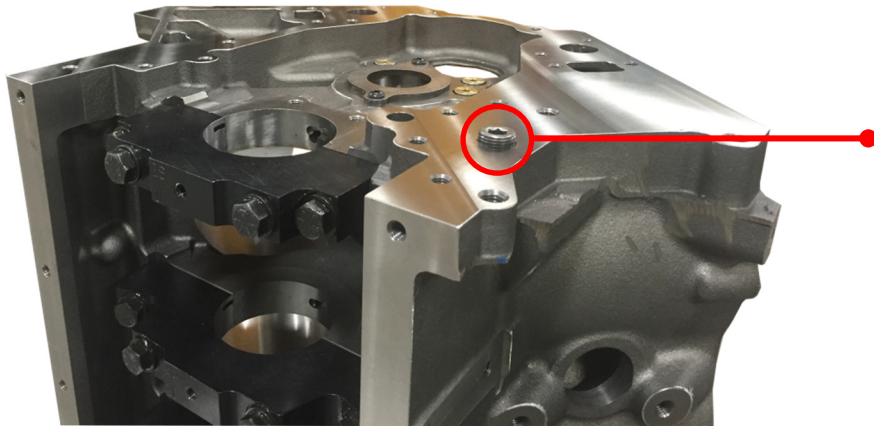
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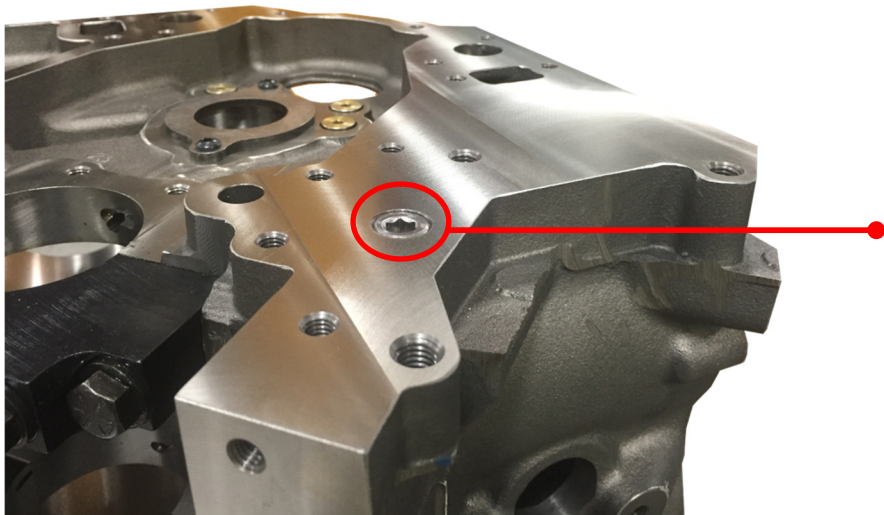


Top View of Valley Area:

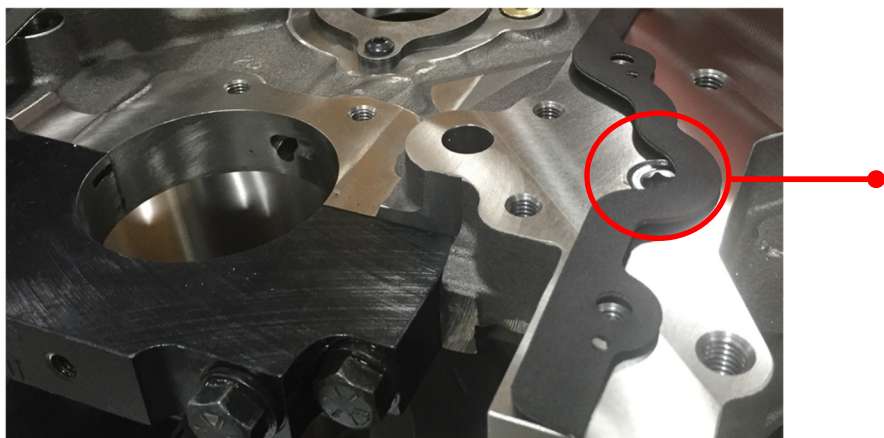
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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Cam bearing O.D. should be deburred before installation.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

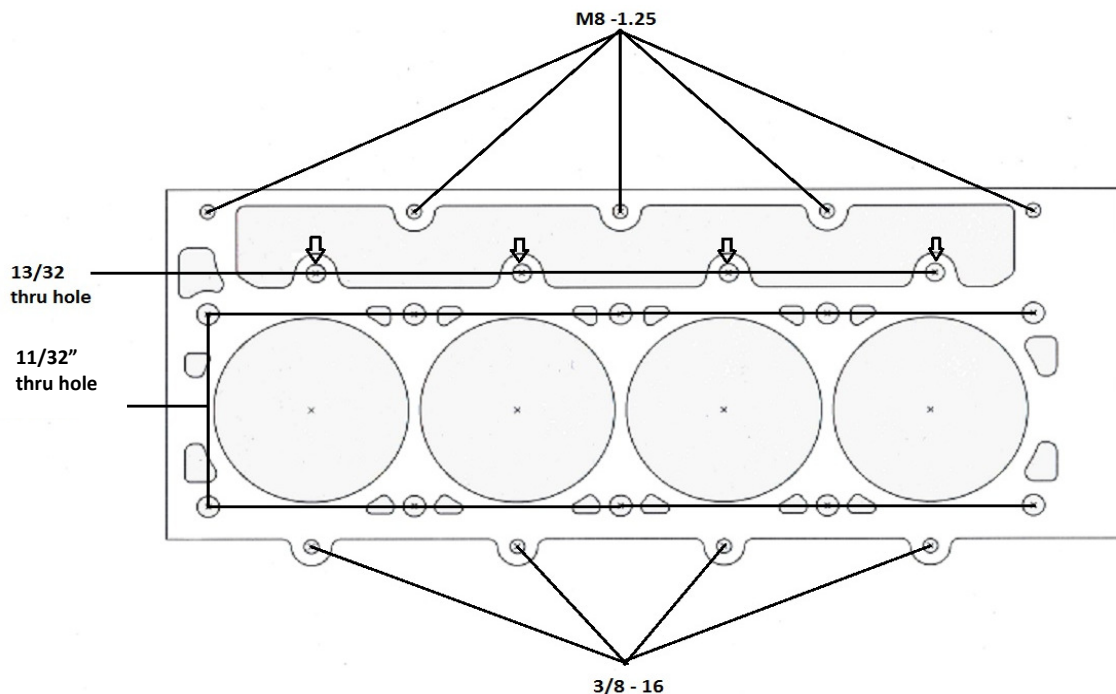
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If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



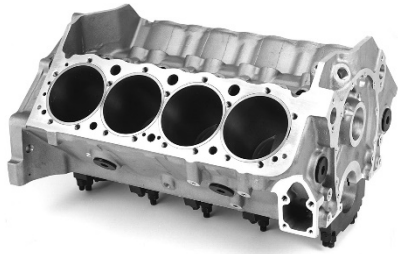
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

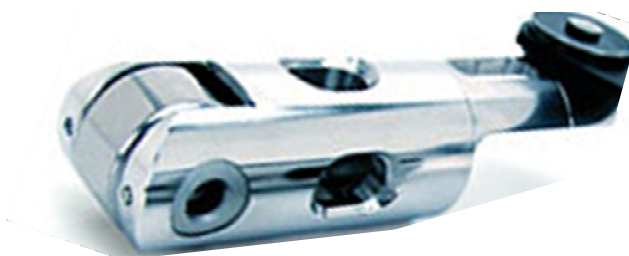


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

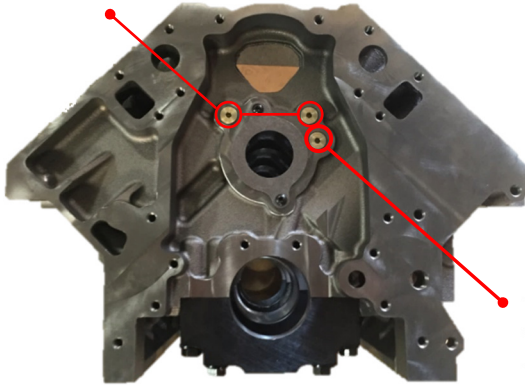
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

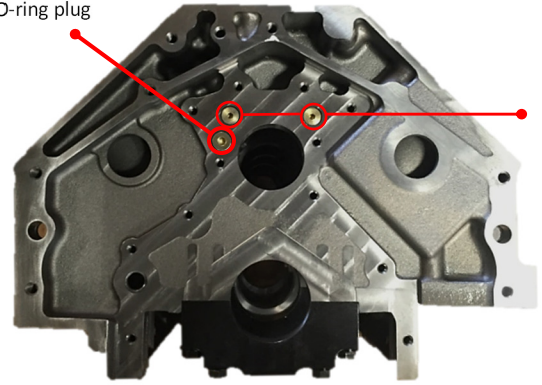
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



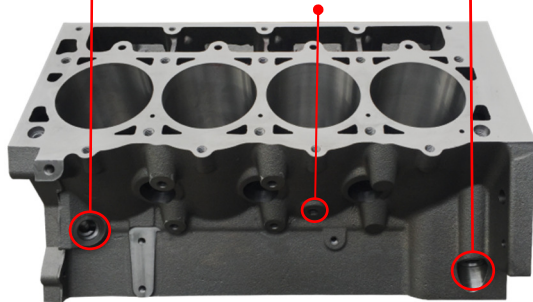
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

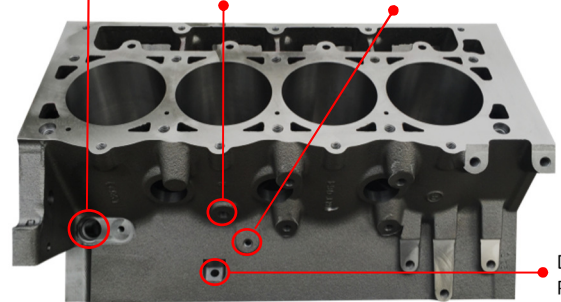


SHP LS Next Drivers Side

Crank sensor

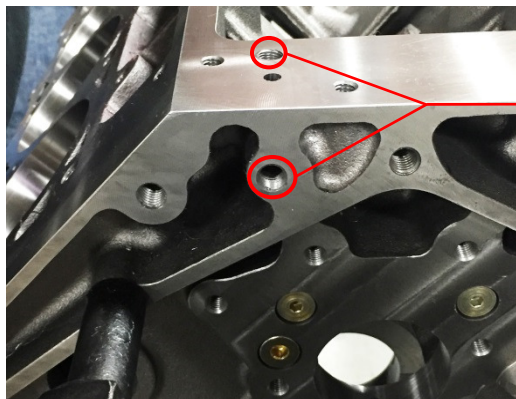
1/4" pipe / Water drain

Knock sensor



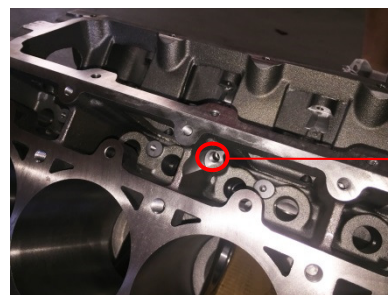
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



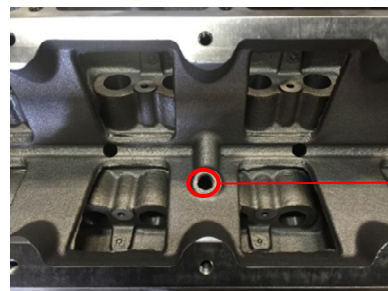
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



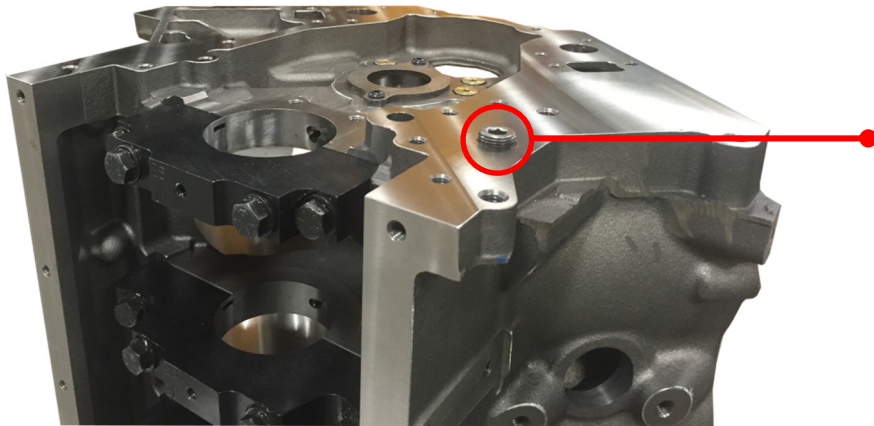
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

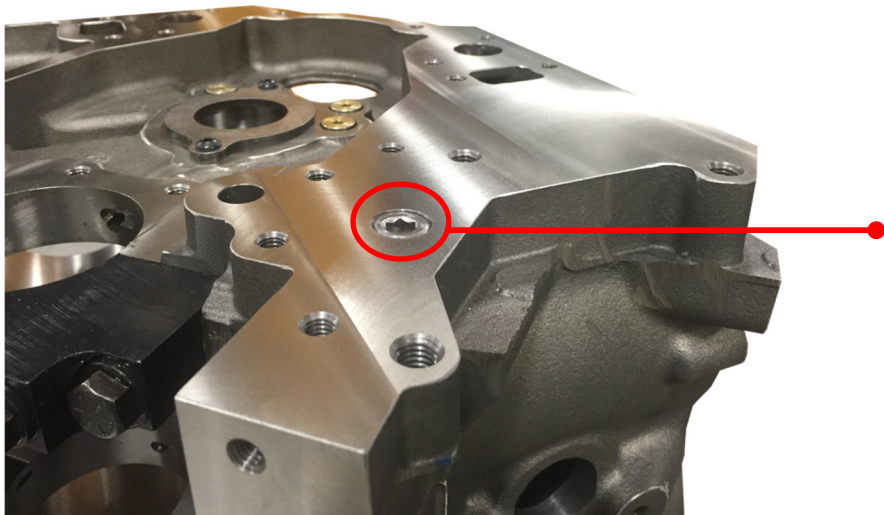


Top View of Valley Area:

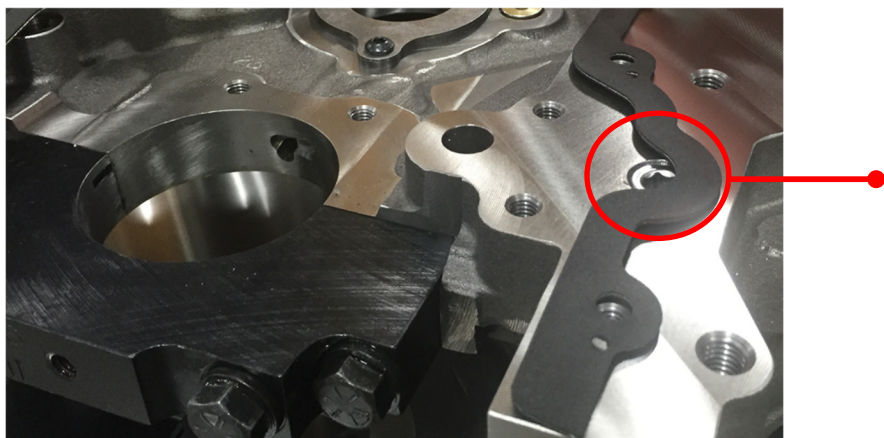
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

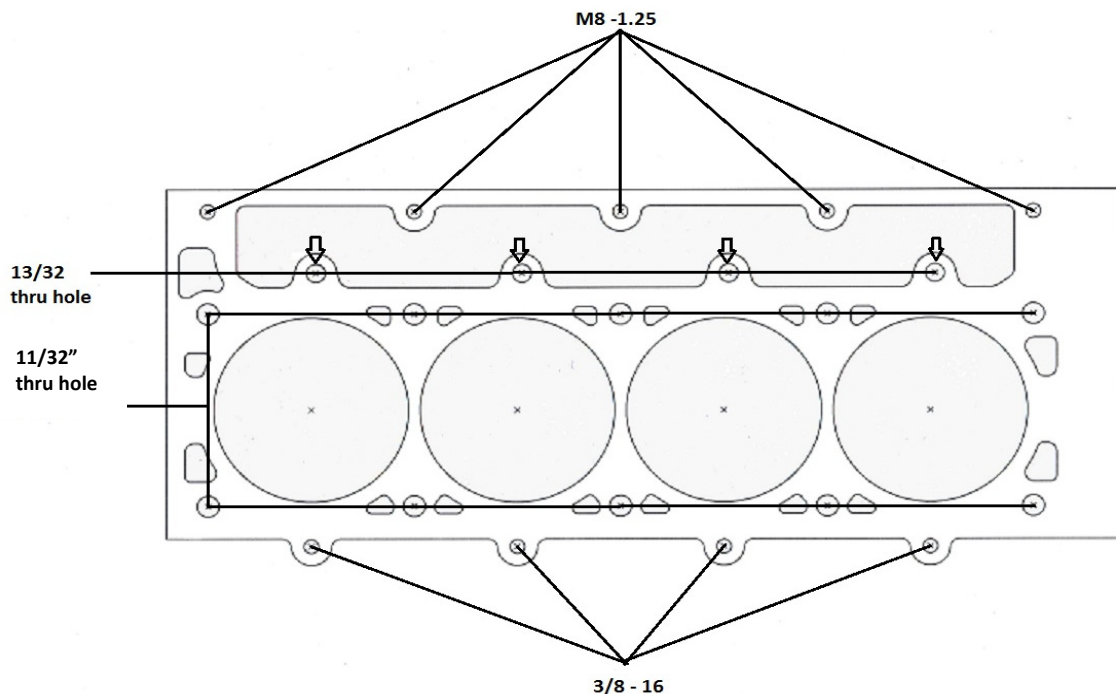
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



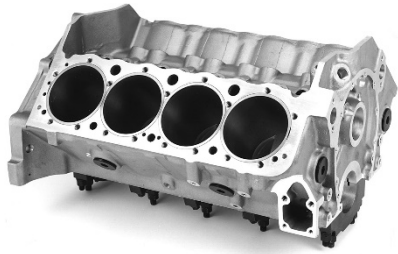
**We stock parts that are unique to this block:**

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Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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Prior to machining and assembly please inspect the following items:

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Stock un-modified  
solid roller lifters

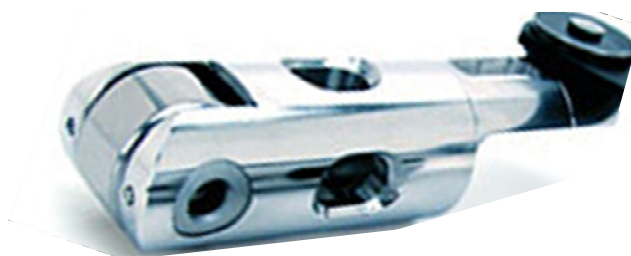


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

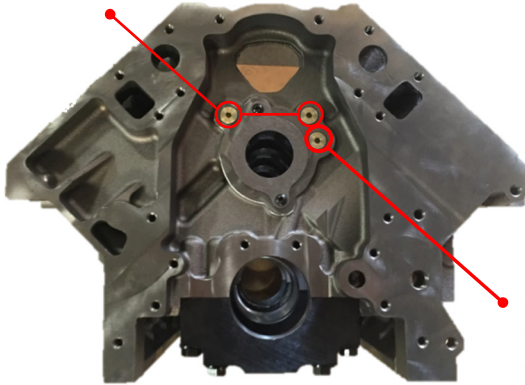
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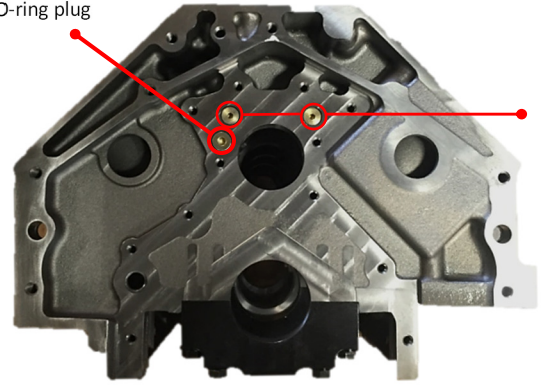
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



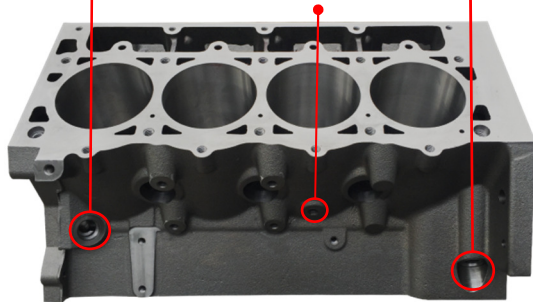
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

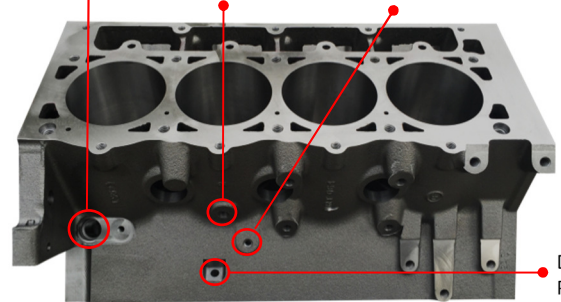


SHP LS Next Drivers Side

Crank sensor

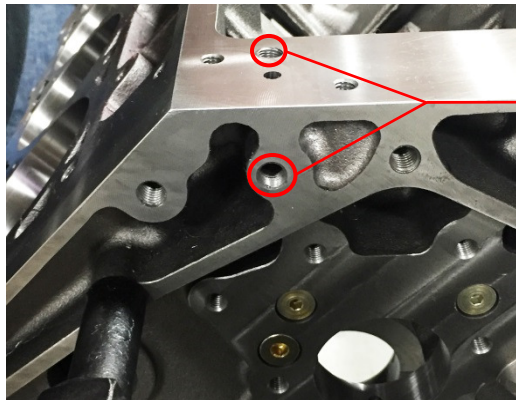
1/4" pipe / Water drain

Knock sensor



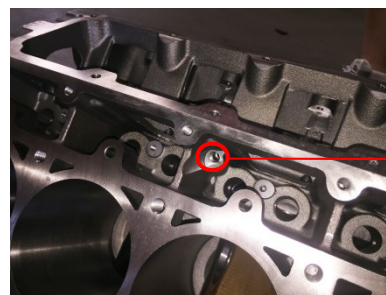
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



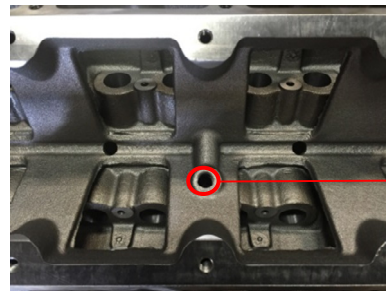
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



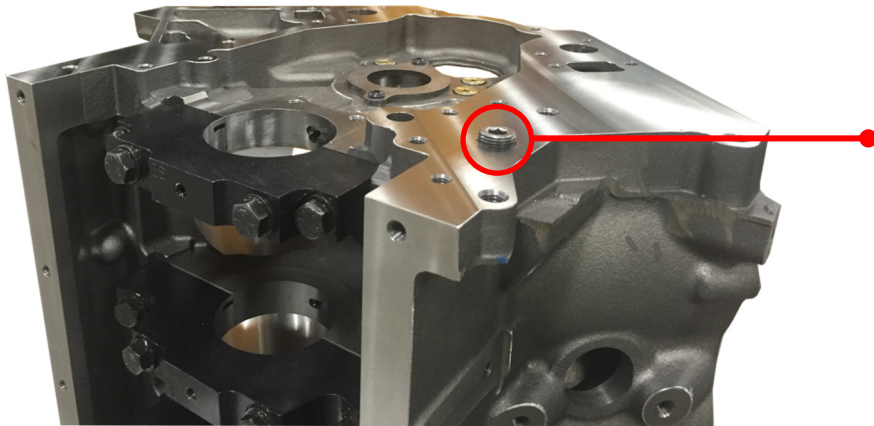
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

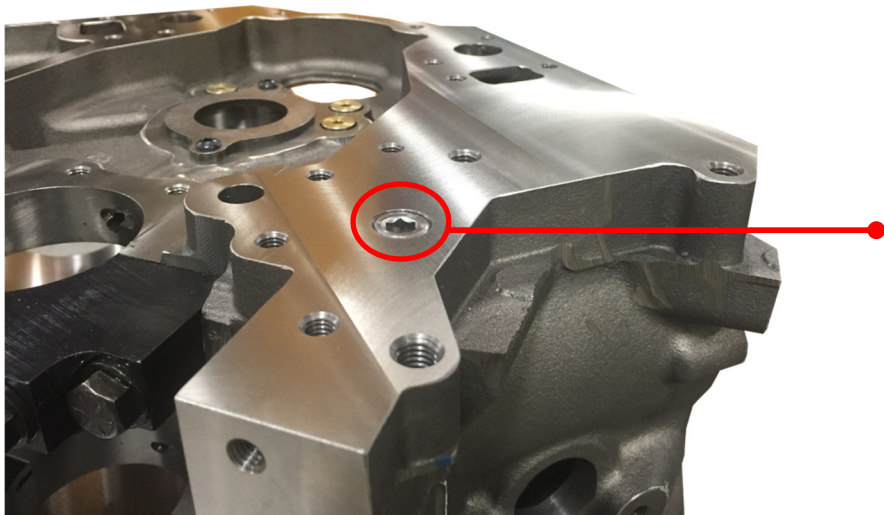


Top View of Valley Area:

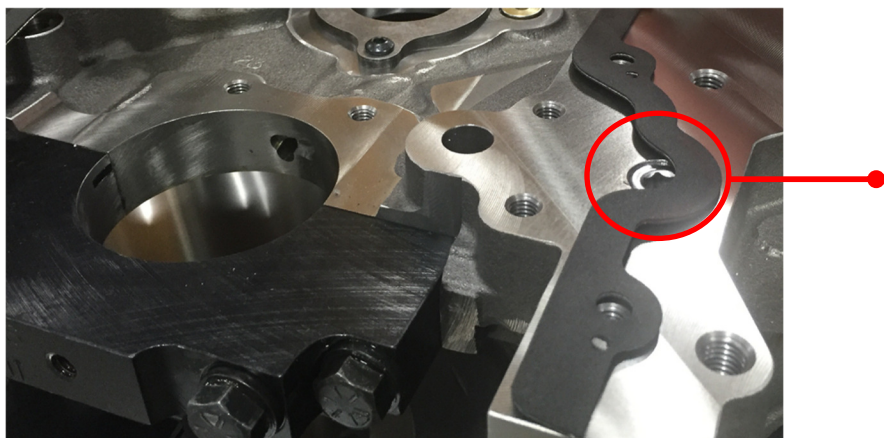
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

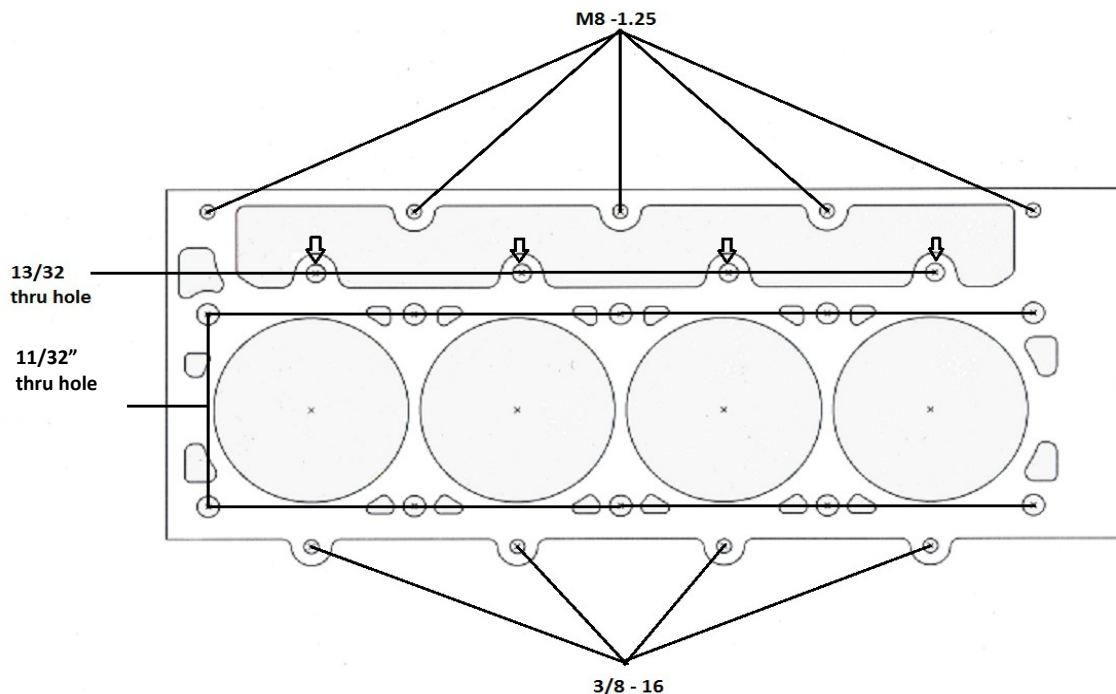
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



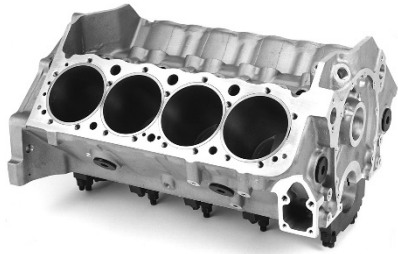
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

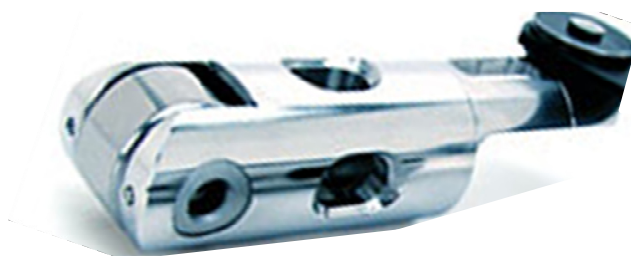


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

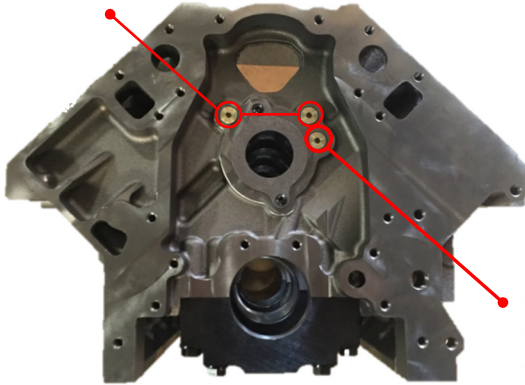
# CAUTION!



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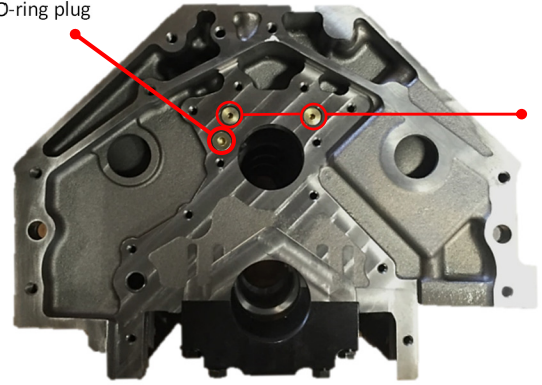
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



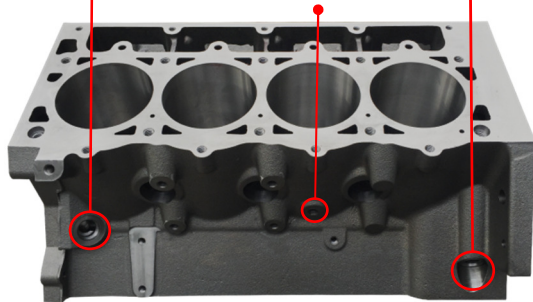
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

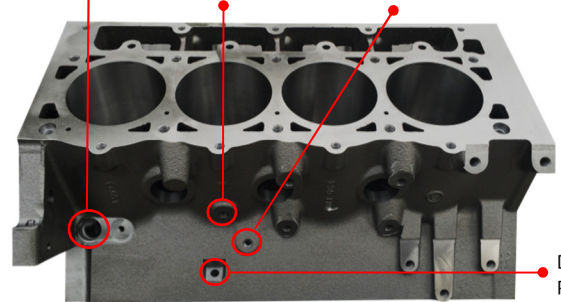


SHP LS Next Drivers Side

Crank sensor

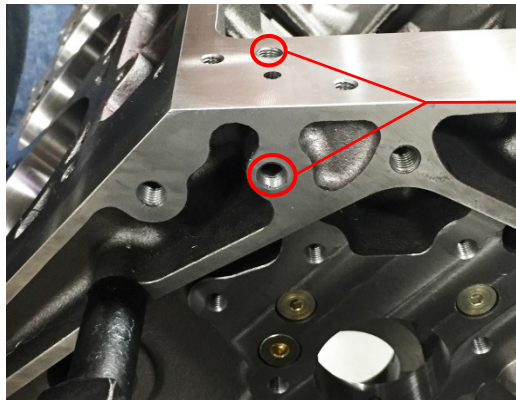
1/4" pipe / Water drain

Knock sensor



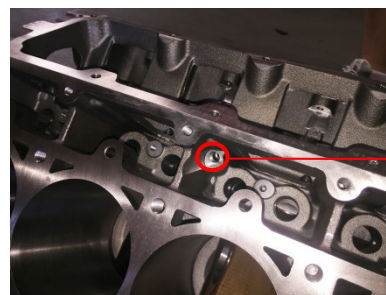
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



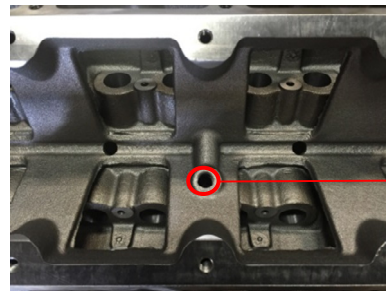
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



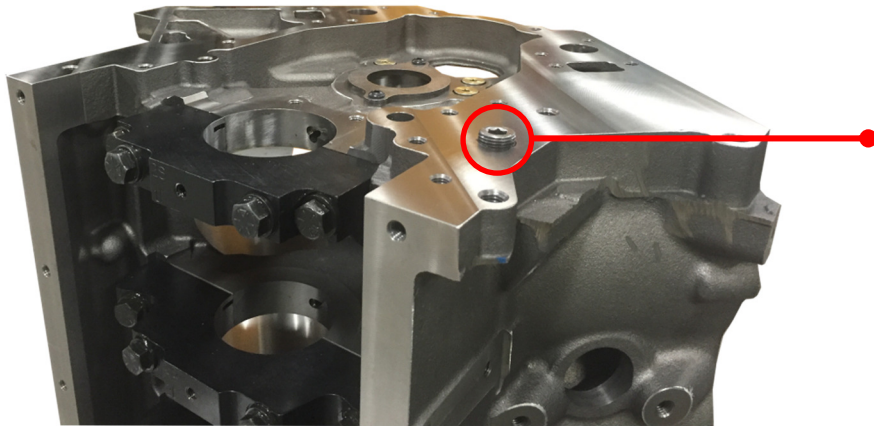
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

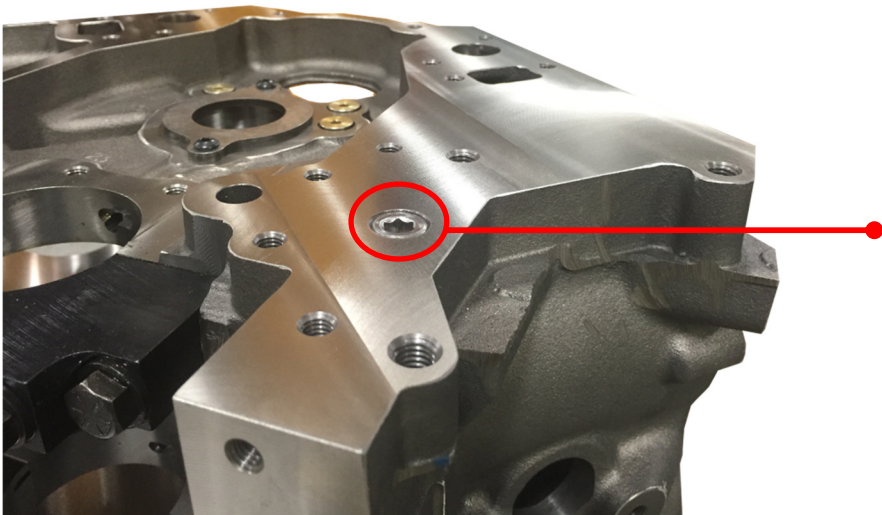


Top View of Valley Area:

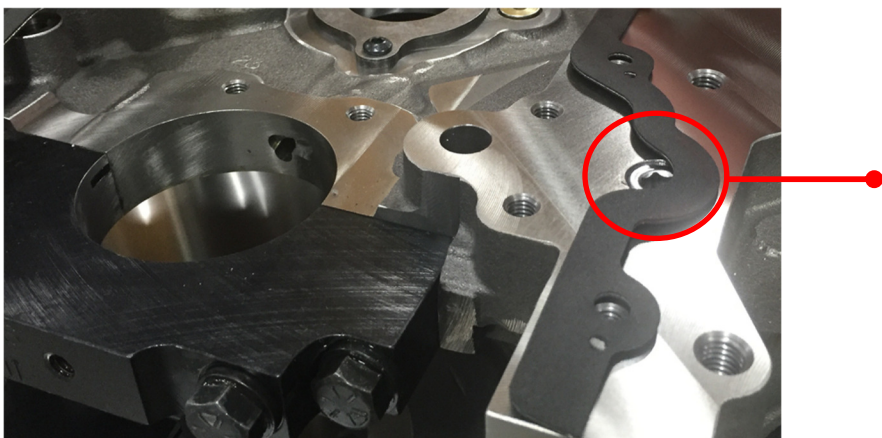
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

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**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

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Head bolt holes are blind.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

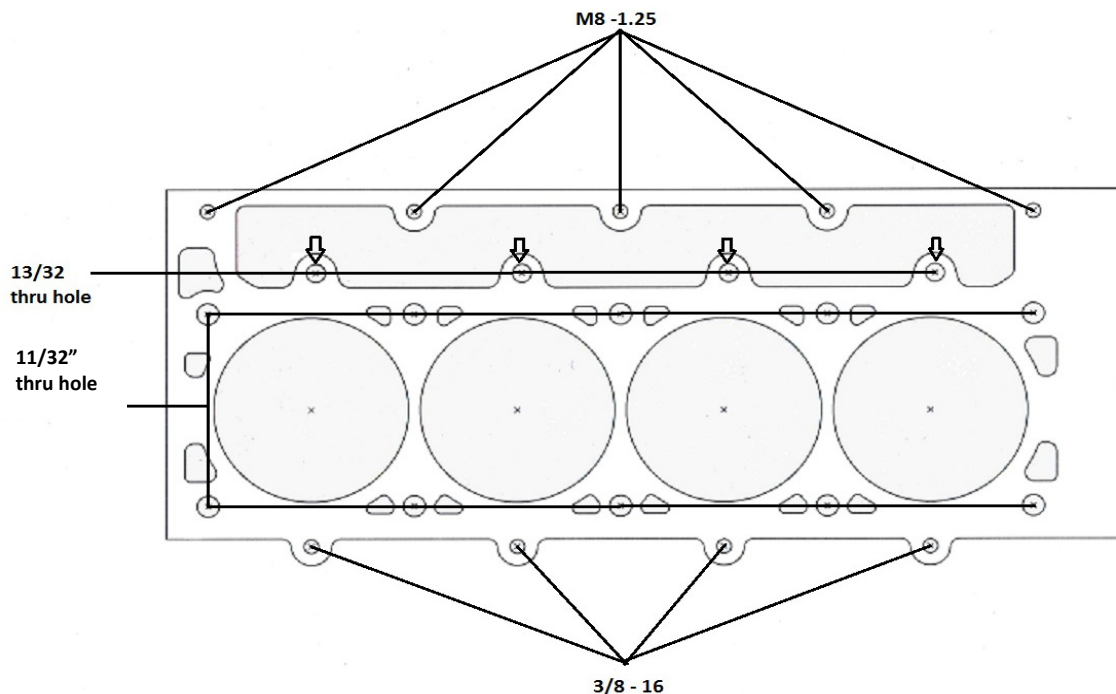
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Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

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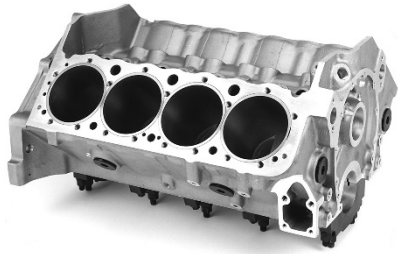
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Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
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<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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Upon receiving this block it should be thoroughly inspected for shipping damage.

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Stock un-modified  
solid roller lifters

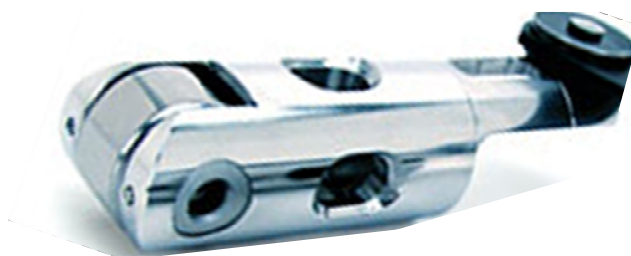


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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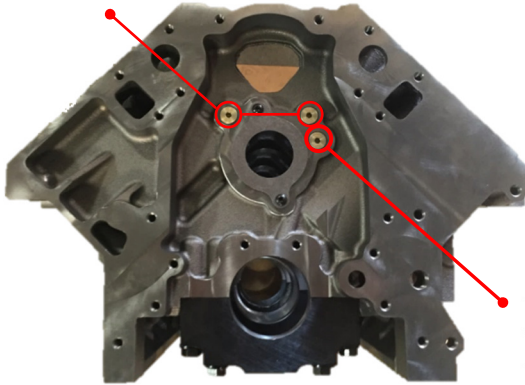
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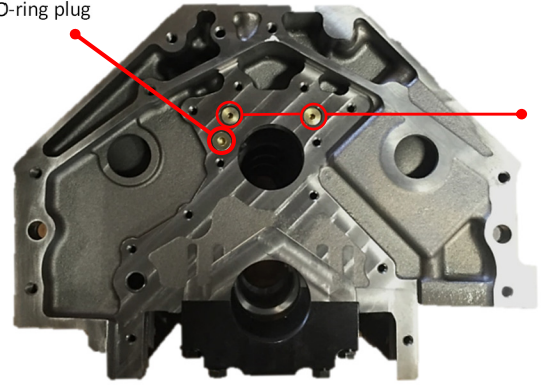
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



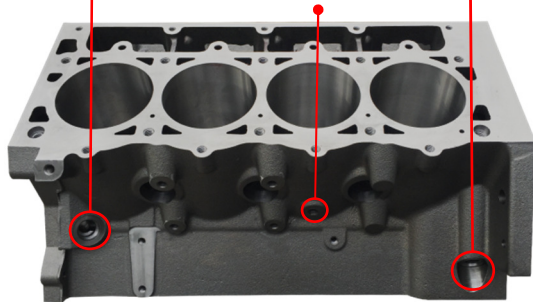
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

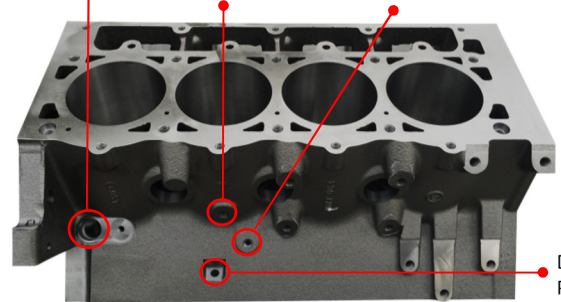


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

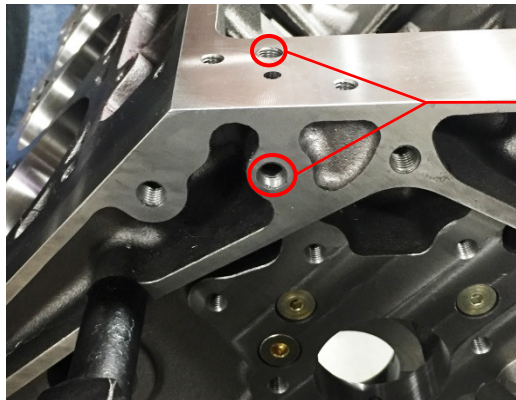
Knock sensor



SHP LS Next Passenger Side

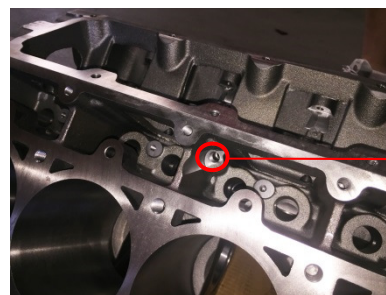
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



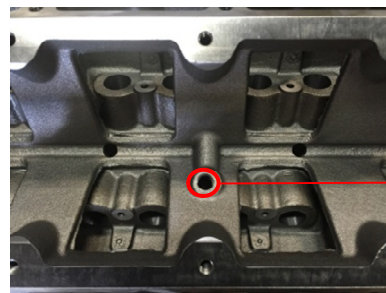
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



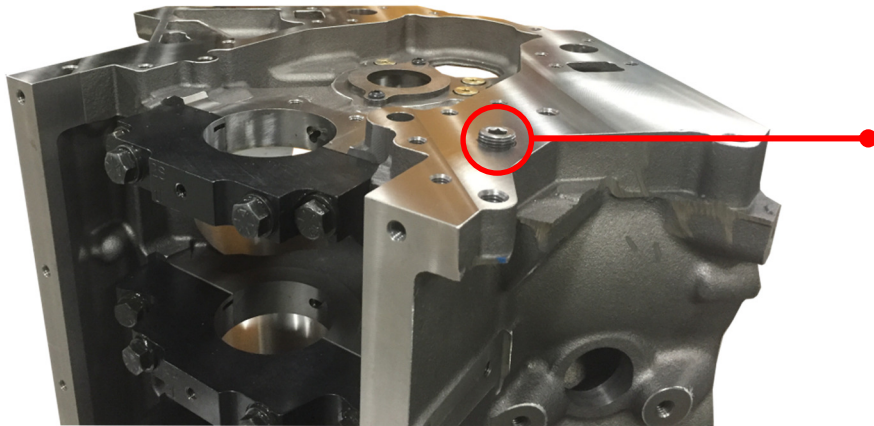
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

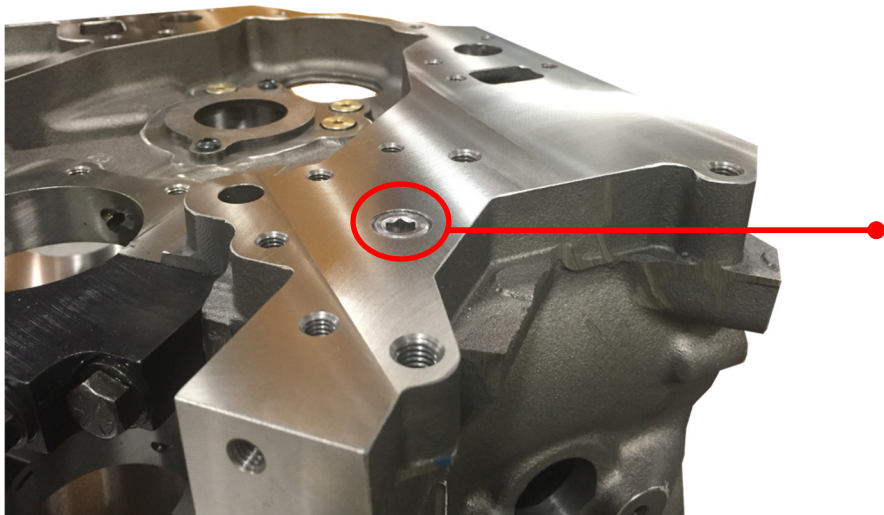


Top View of Valley Area:

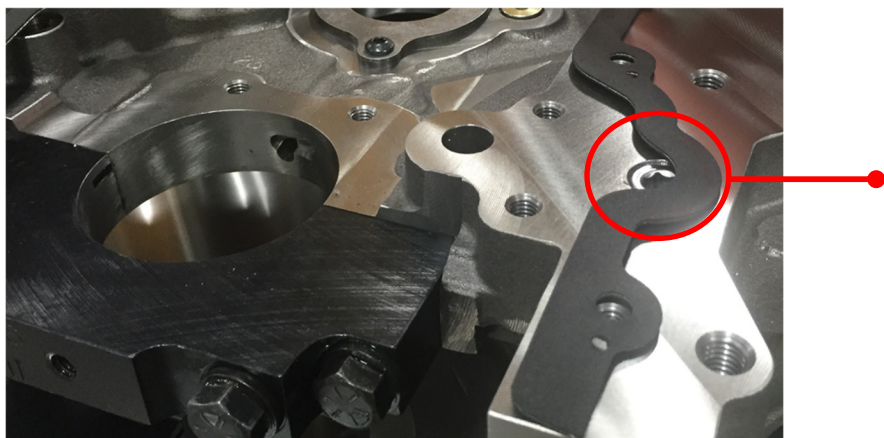
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

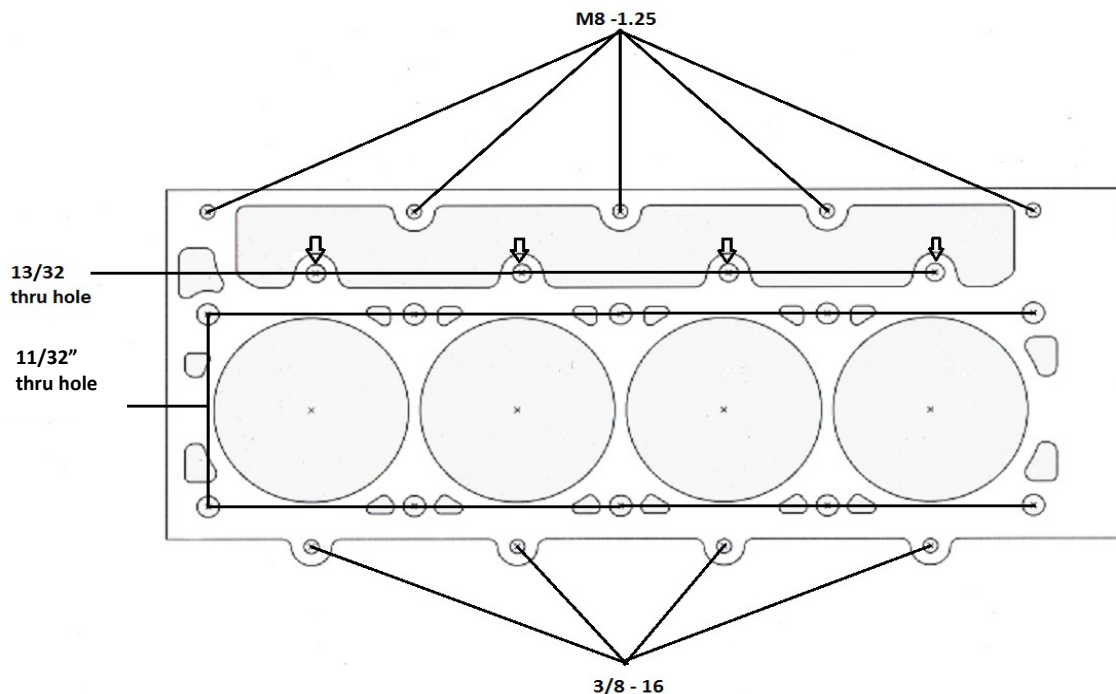
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



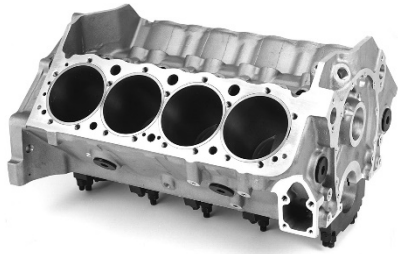
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

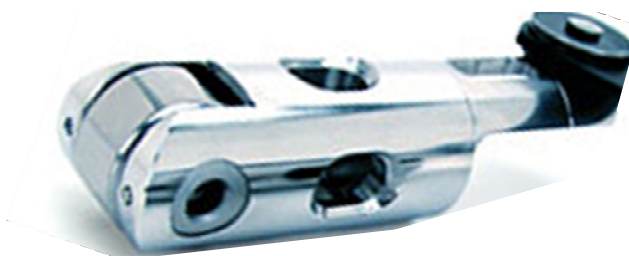


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

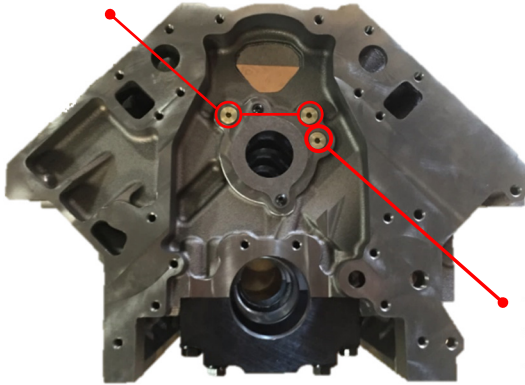
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

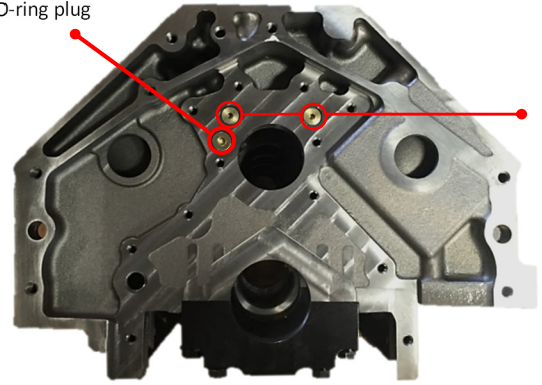
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



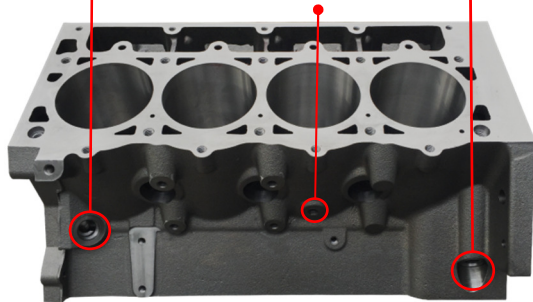
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

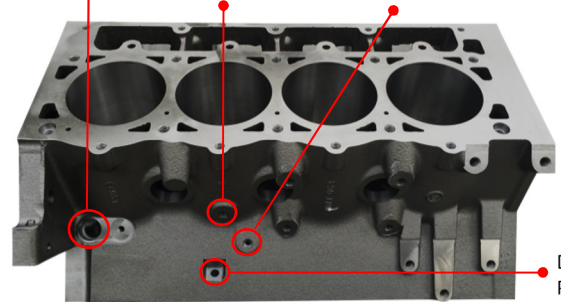


SHP LS Next Drivers Side

Crank sensor

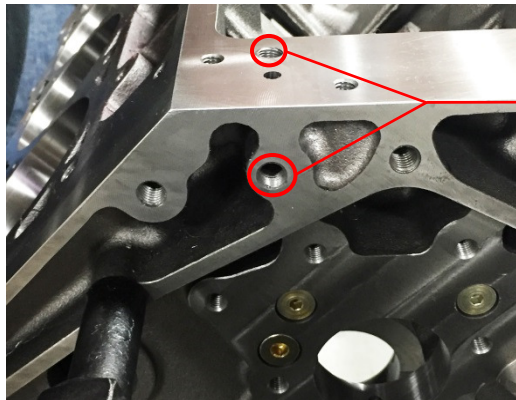
1/4" pipe / Water drain

Knock sensor



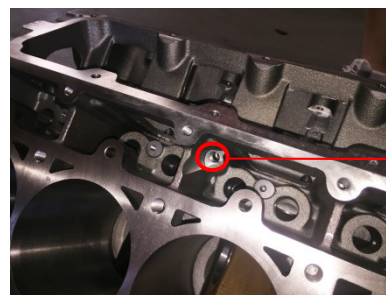
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



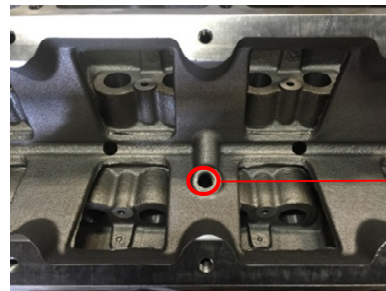
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



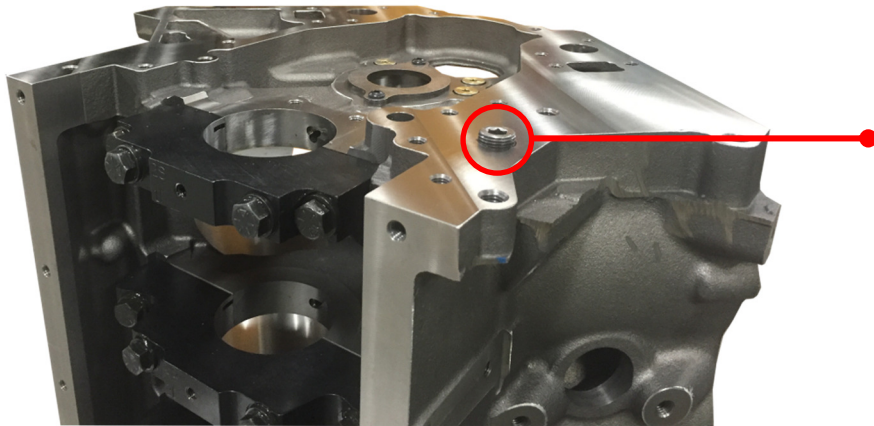
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

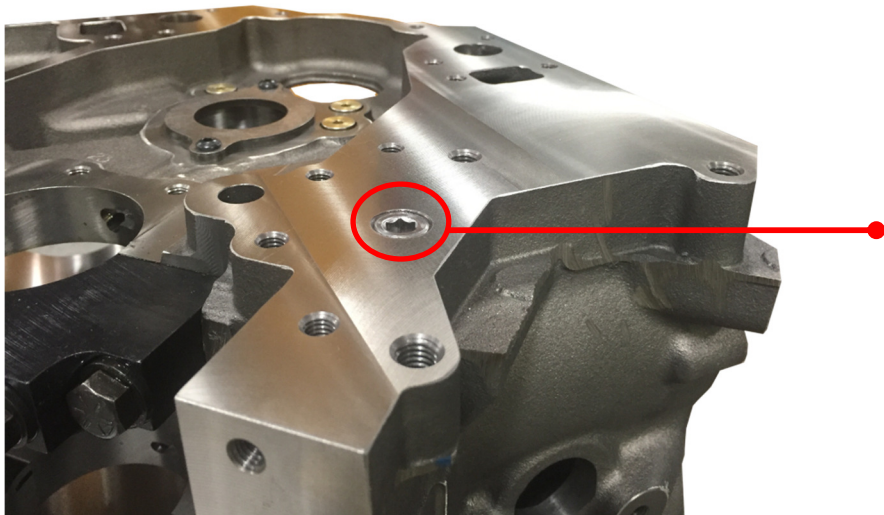


Top View of Valley Area:

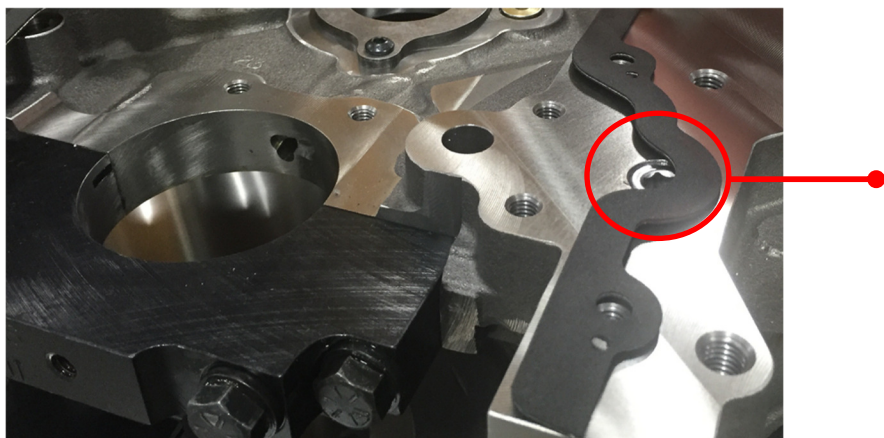
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	9.240"
Bore	4.000 & 4.125
Main Bearing Size	LS-1 (2.558" - 2.559")
Weight	227lbs
Largest Recommended Bore	4.185"
Largest Recommended Crank Stroke	4.125"
Camshaft Bearing Diameter	55mm babbitt
Stock Camshaft Position	4.885"
Cylinder Wall Thickness, min.	.215" @ 4.125"
Deck Thickness, min	.625 (5/8)

### Torque Specs - Main Caps

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE: Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.**

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter “buckets” for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

### SHP LS Next Blocks use LS2 – LS7 knock sensors

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

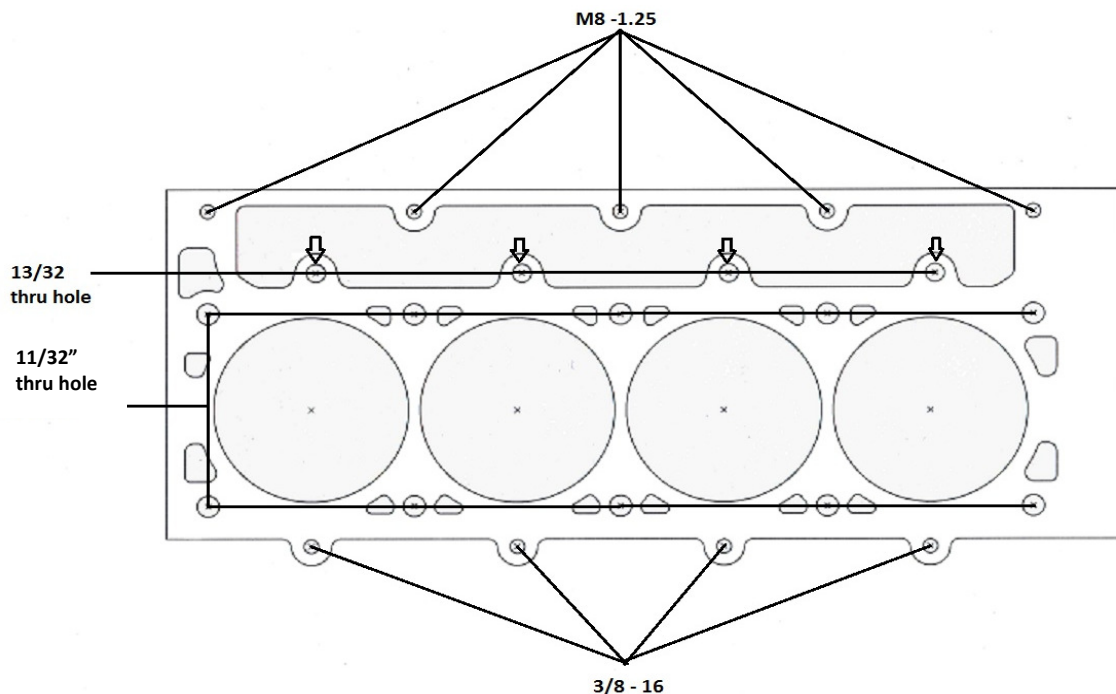
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



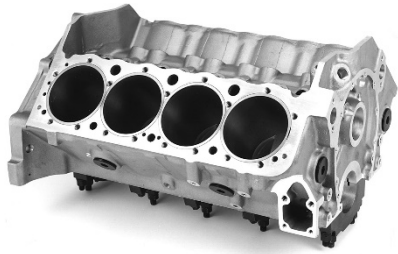
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

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CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

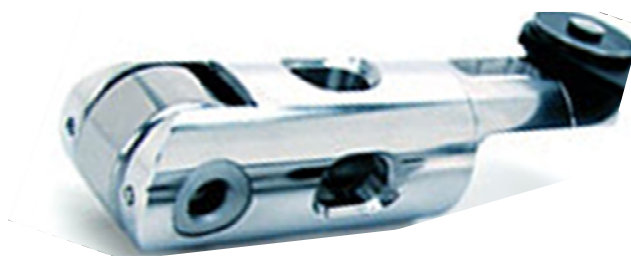


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

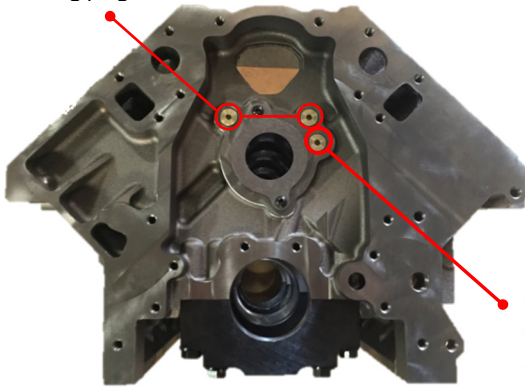
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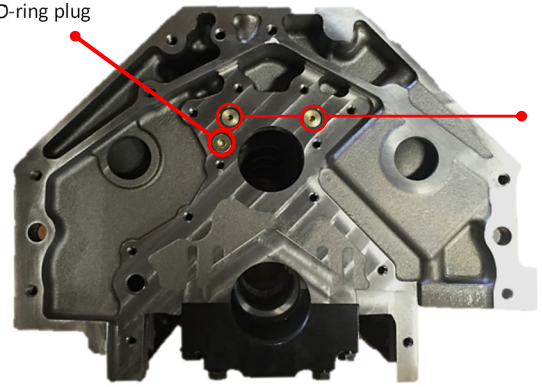
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



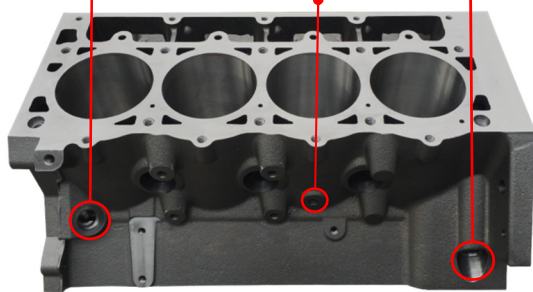
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

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1/4" pipe / Water drain

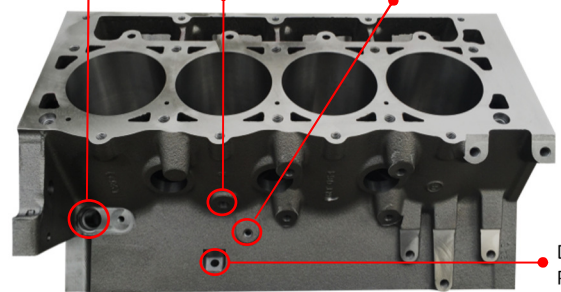


SHP LS Next Drivers Side

Crank sensor

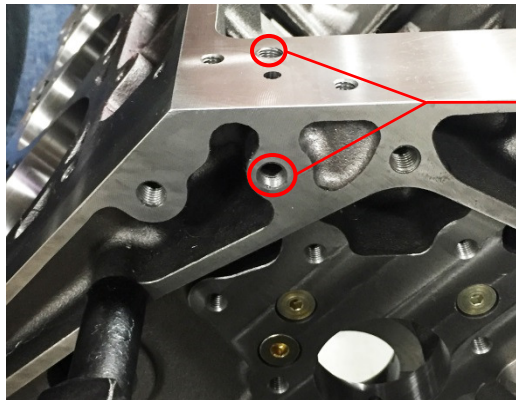
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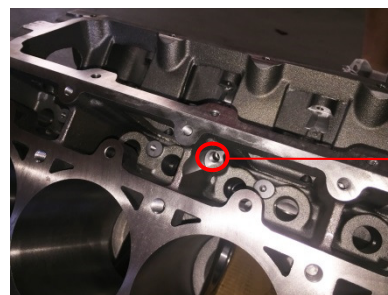
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



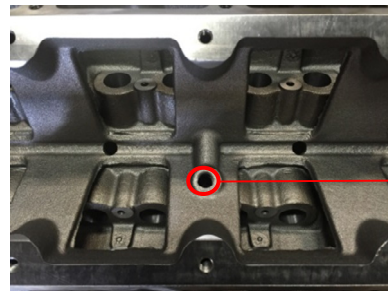
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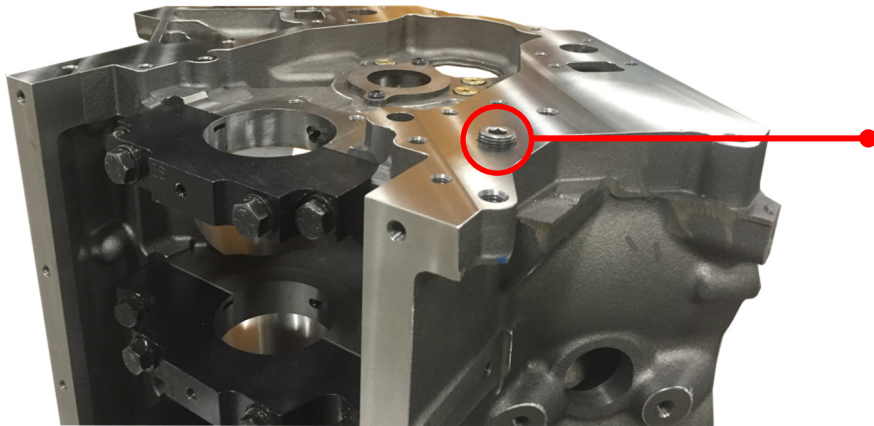
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

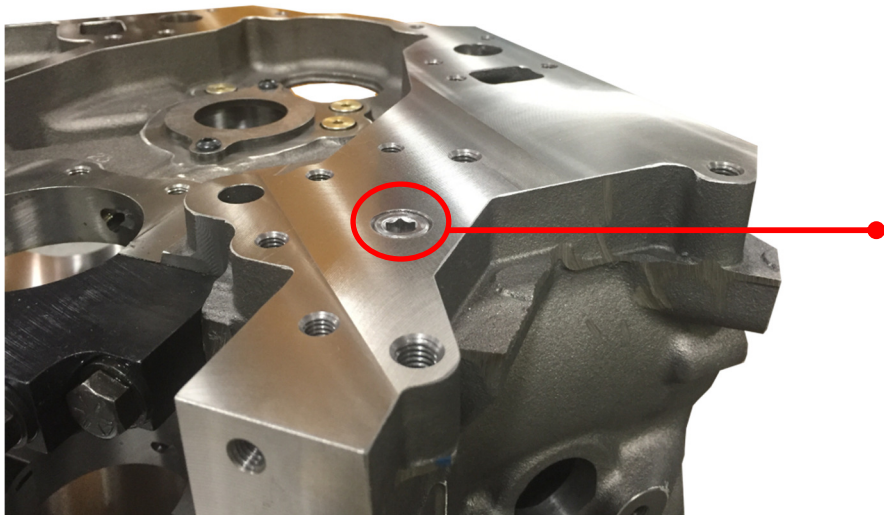


Top View of Valley Area:

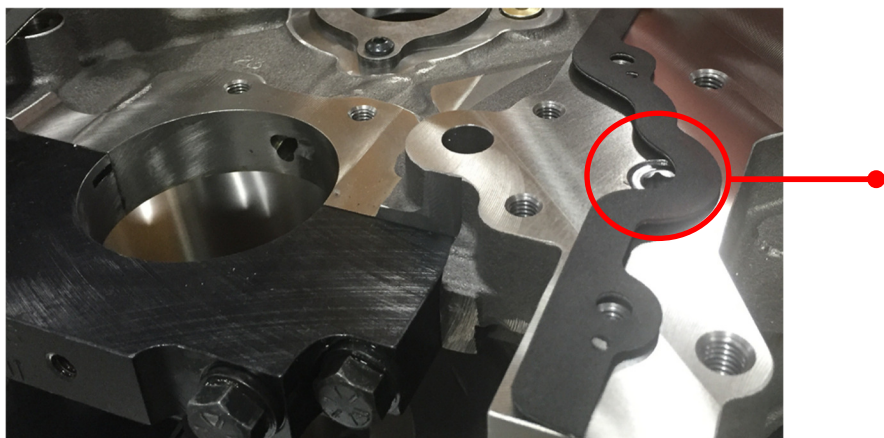
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

**Torque Specs - Main Caps**

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE: Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.**

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloyes timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

**SHP LS Next Blocks use LS2 - LS7 knock sensors**

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

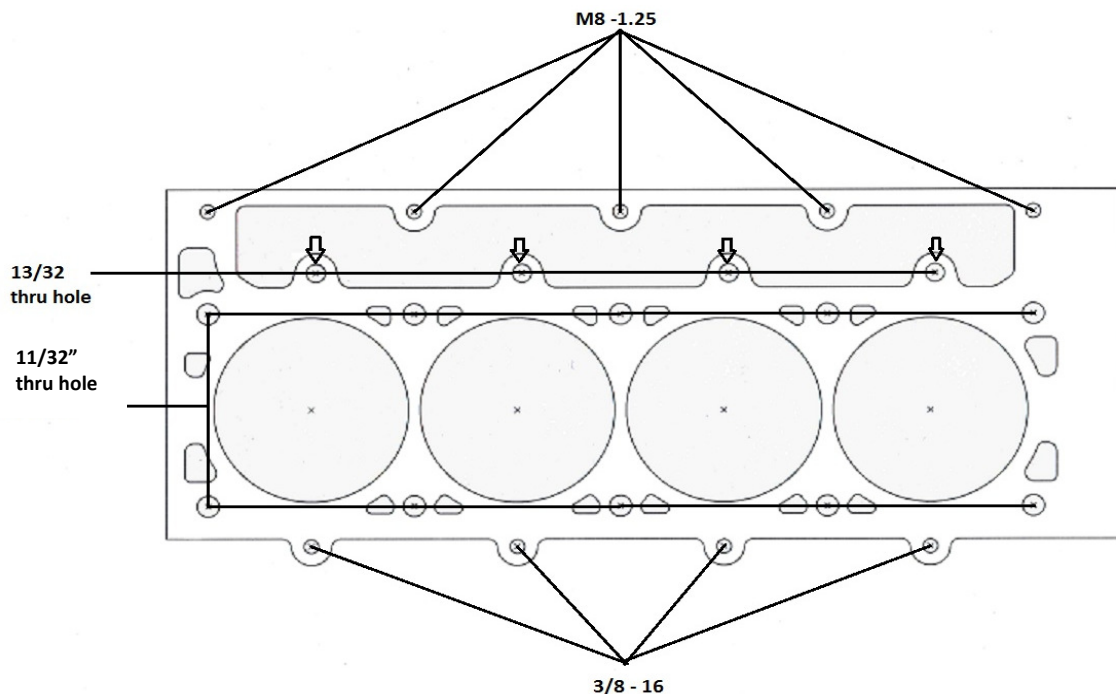
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Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

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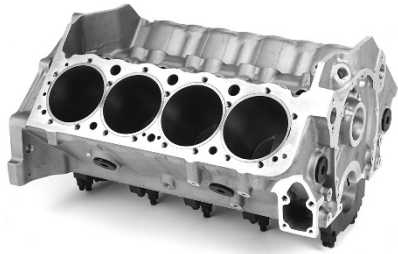
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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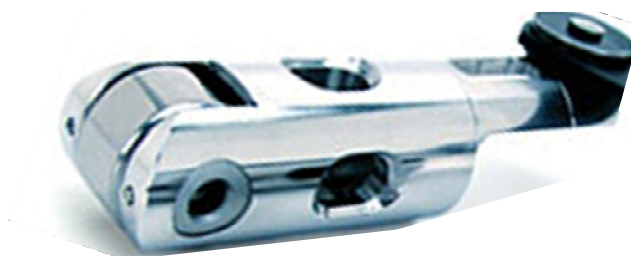


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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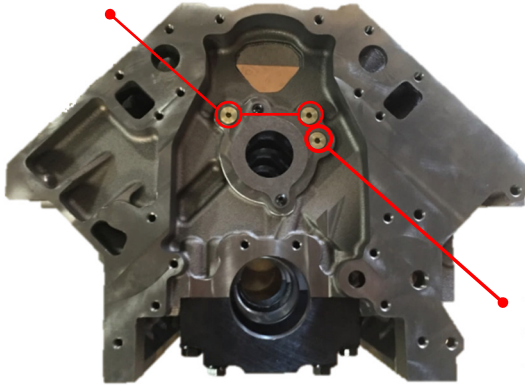
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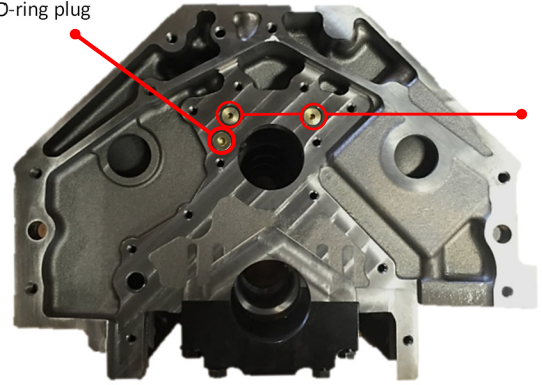
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



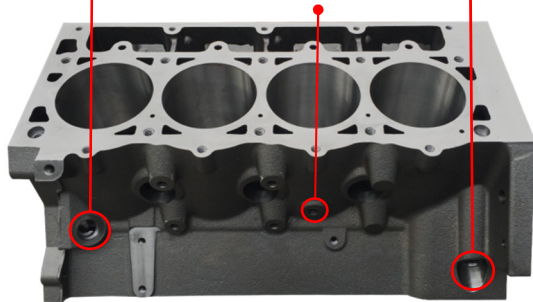
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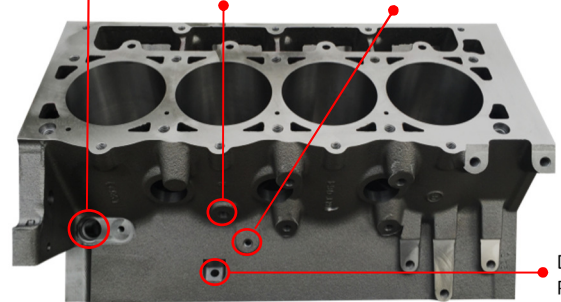


SHP LS Next Drivers Side

Crank sensor

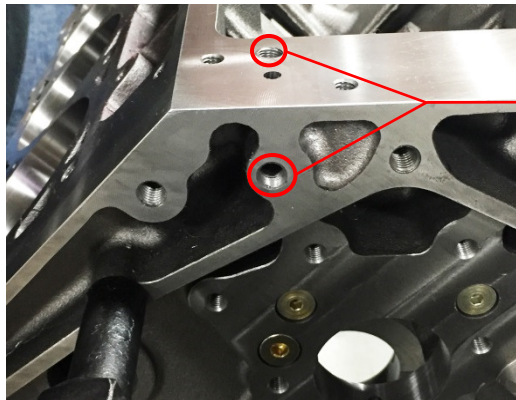
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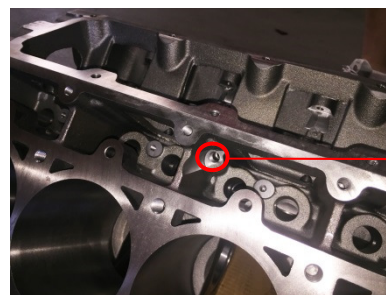
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### \*\*\* IMPORTANT \*\*\*



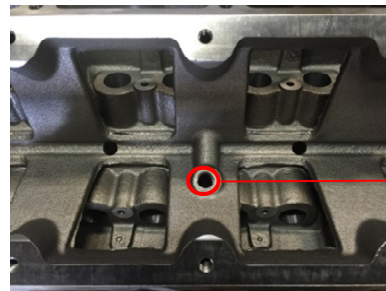
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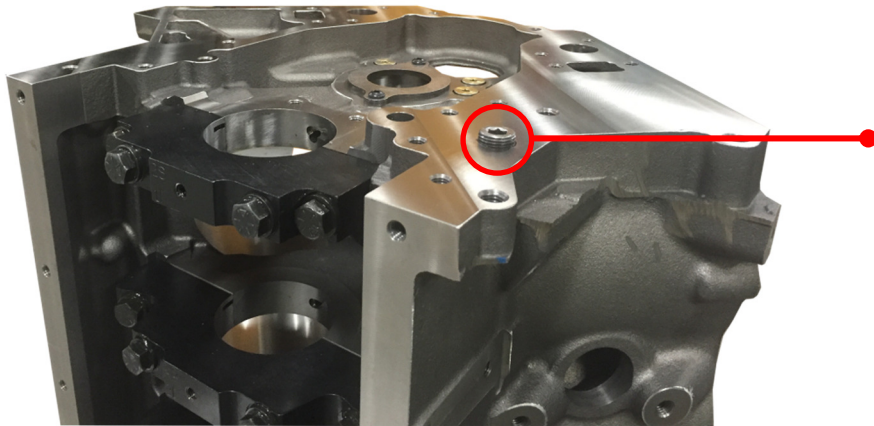
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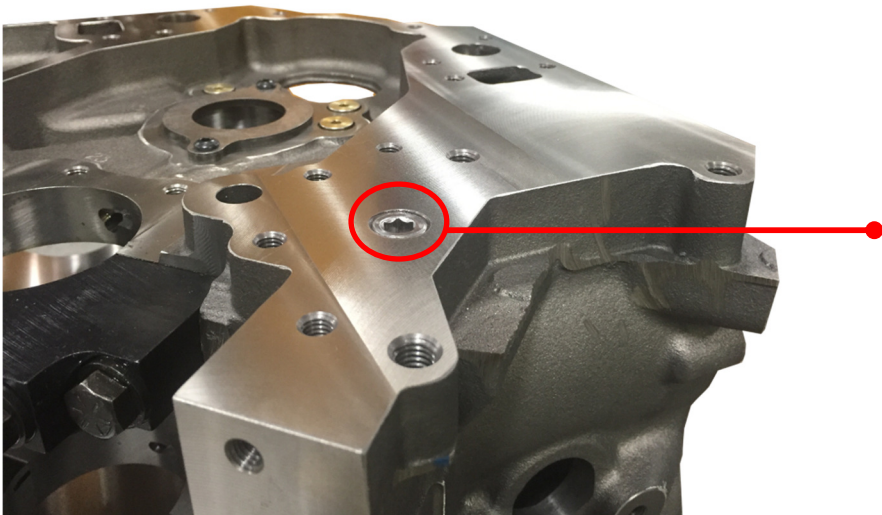


Top View of Valley Area:

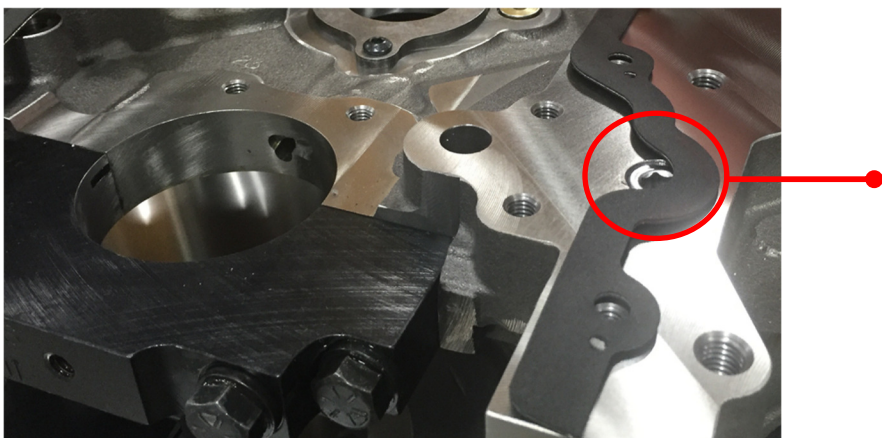
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### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

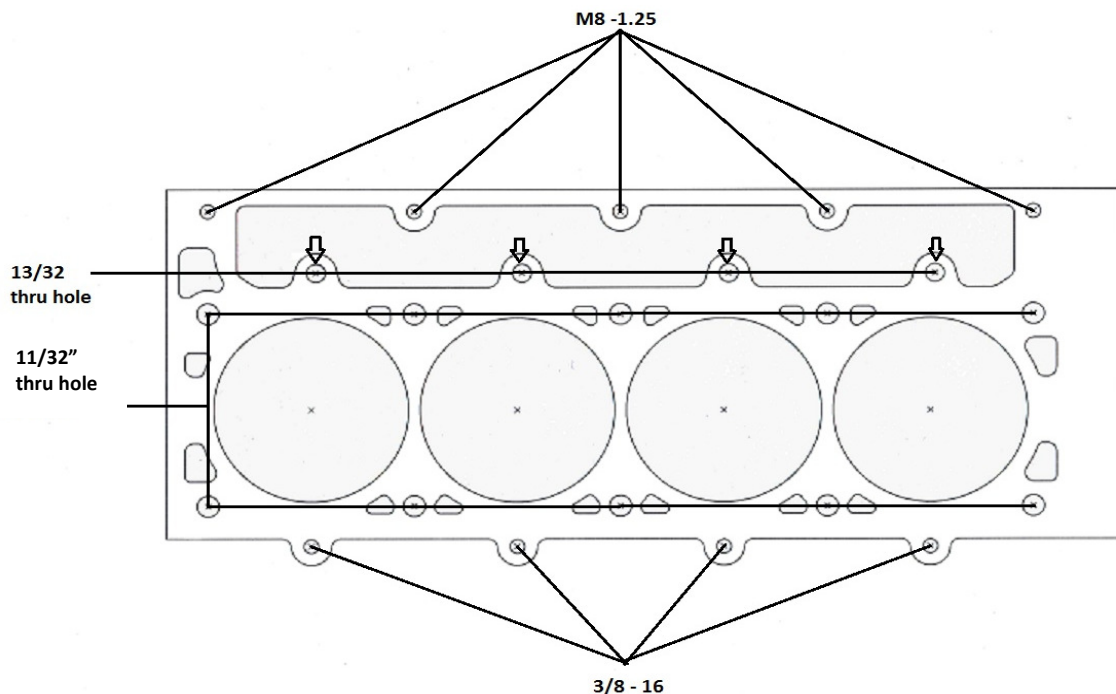
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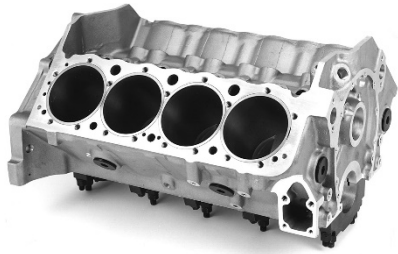
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Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

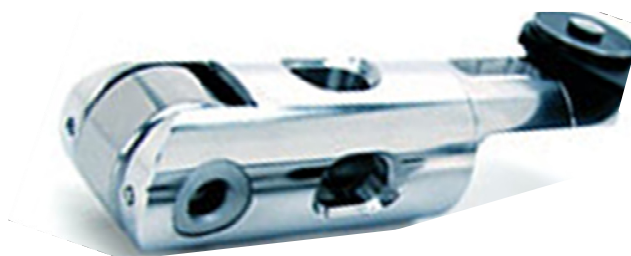


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

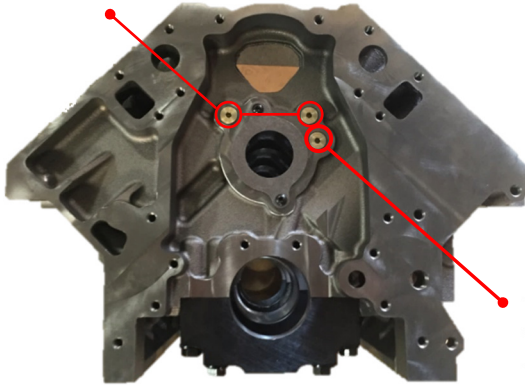
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

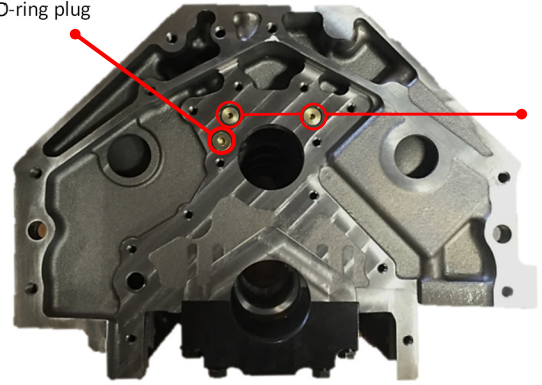
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



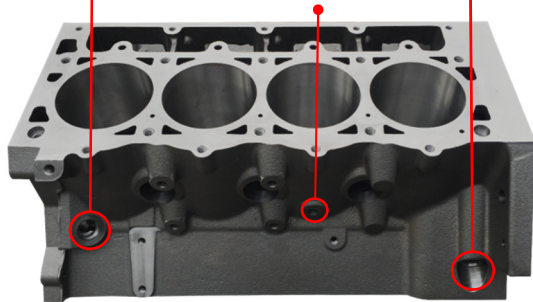
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

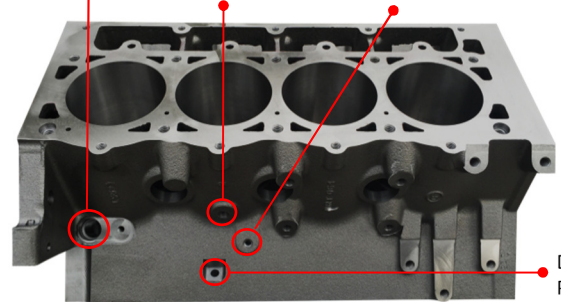


SHP LS Next Drivers Side

Crank sensor

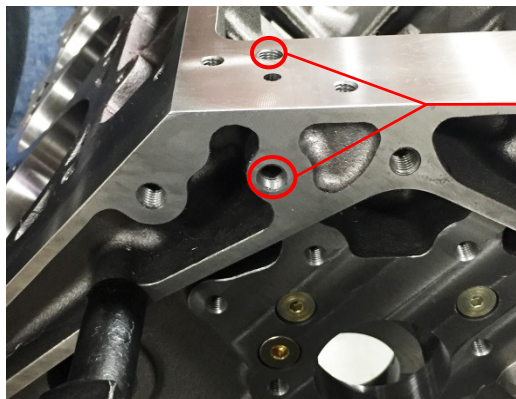
1/4" pipe / Water drain

Knock sensor



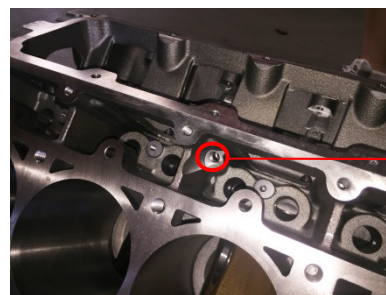
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



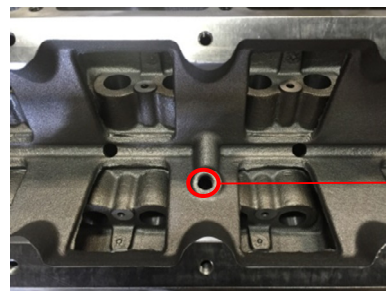
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



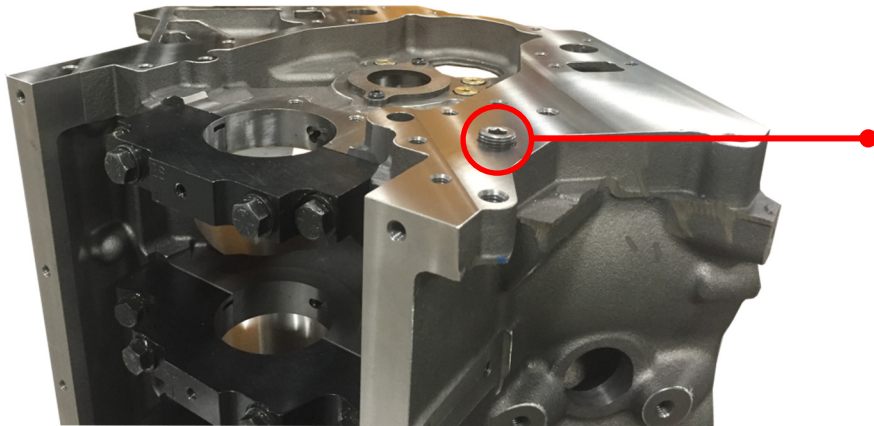
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

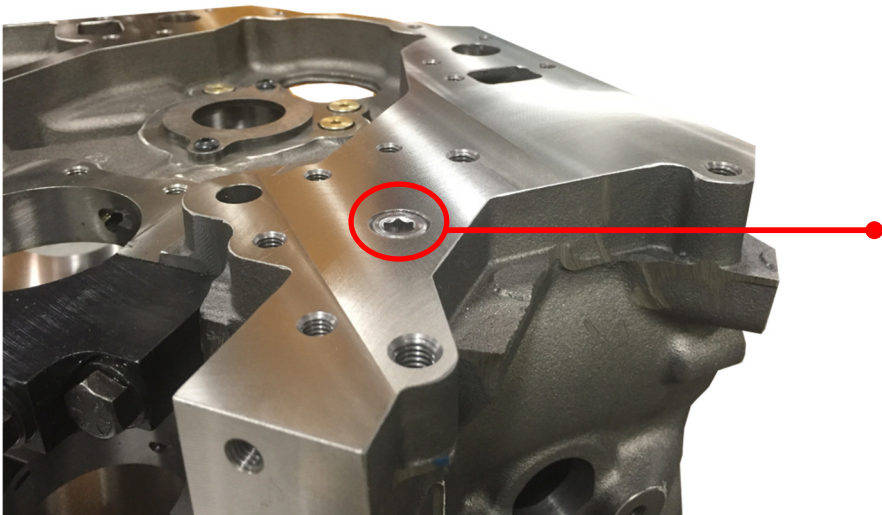


Top View of Valley Area:

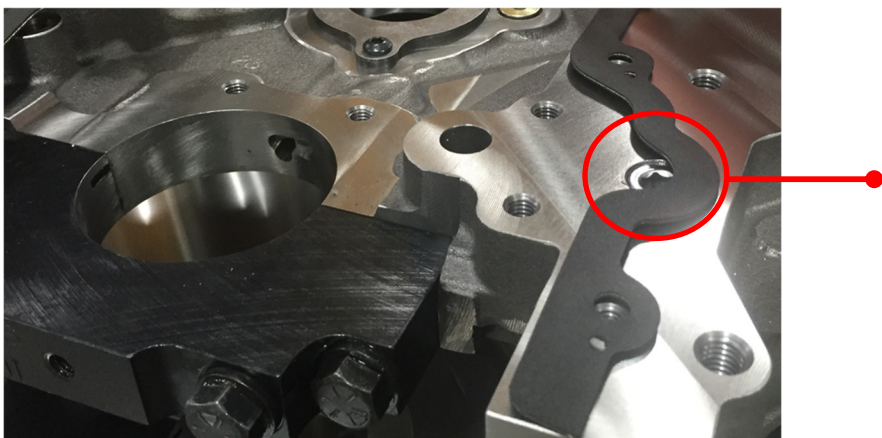
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

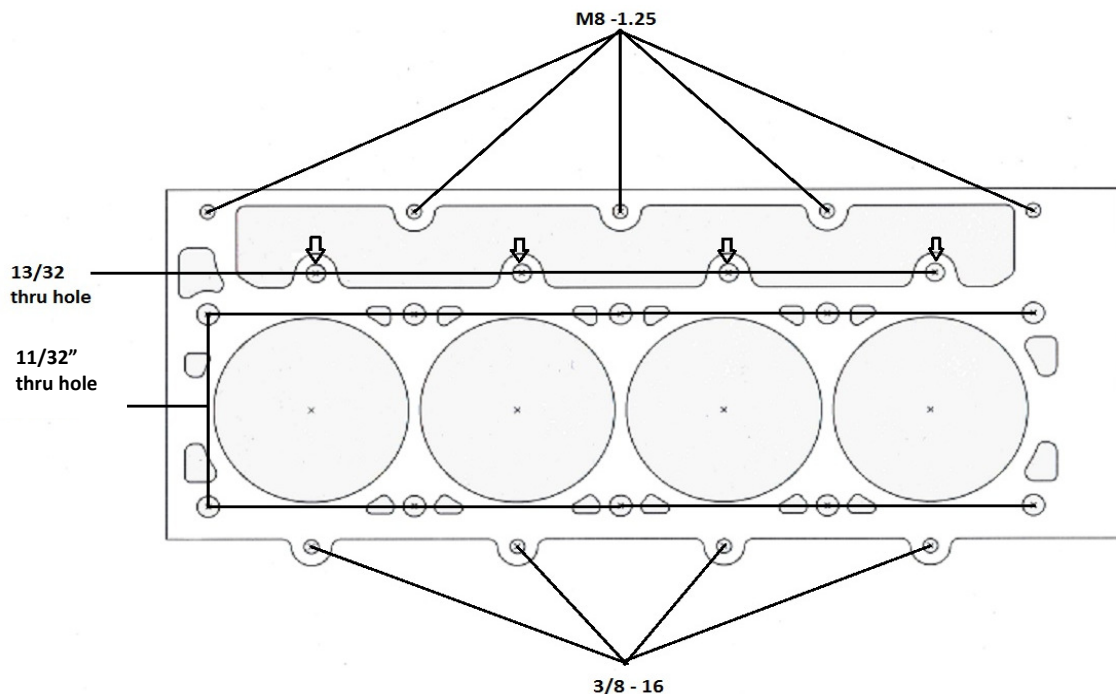
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



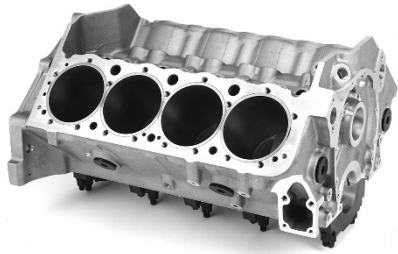
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
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SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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**Figure 1:**  
Stock un-modified  
solid roller lifters

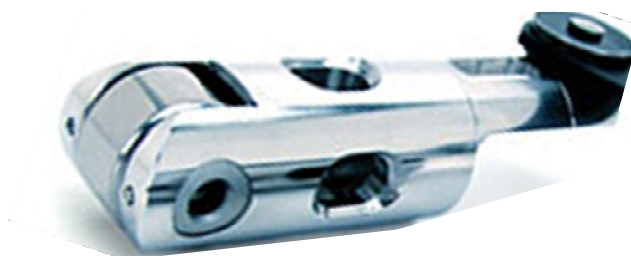


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

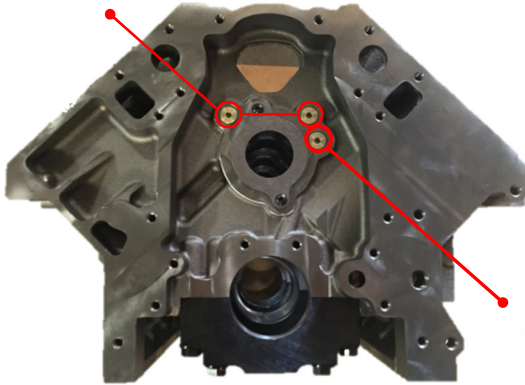
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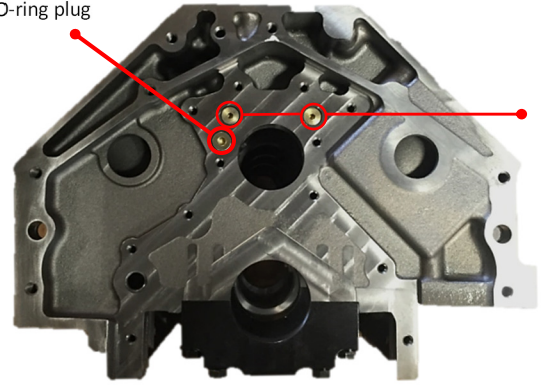
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



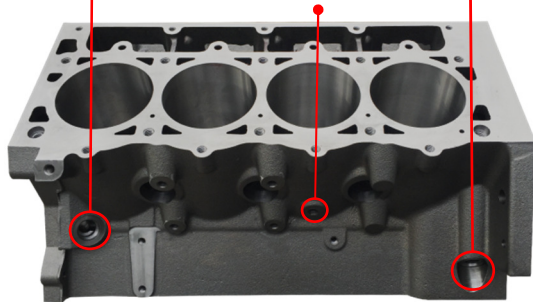
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

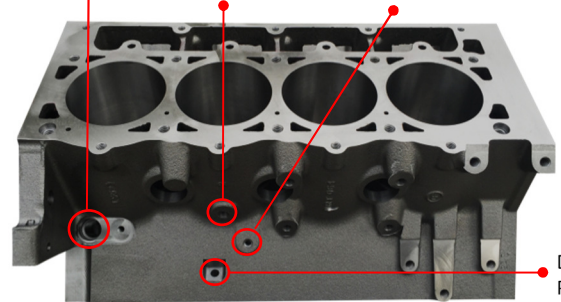


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

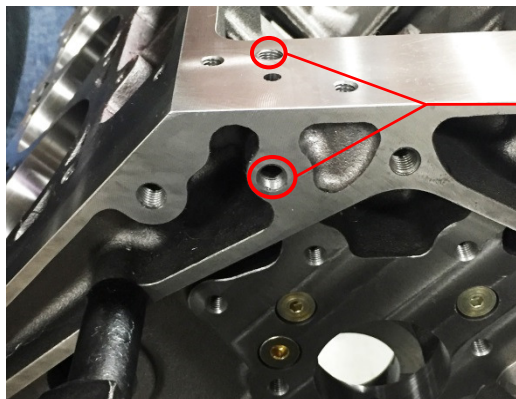
Knock sensor



SHP LS Next Passenger Side

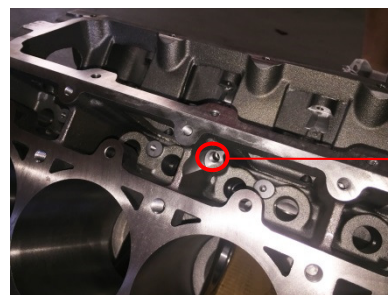
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



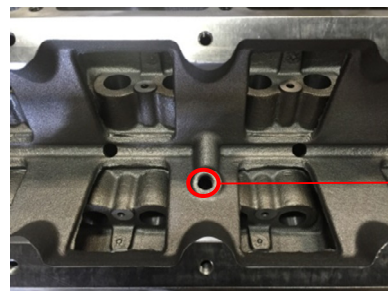
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



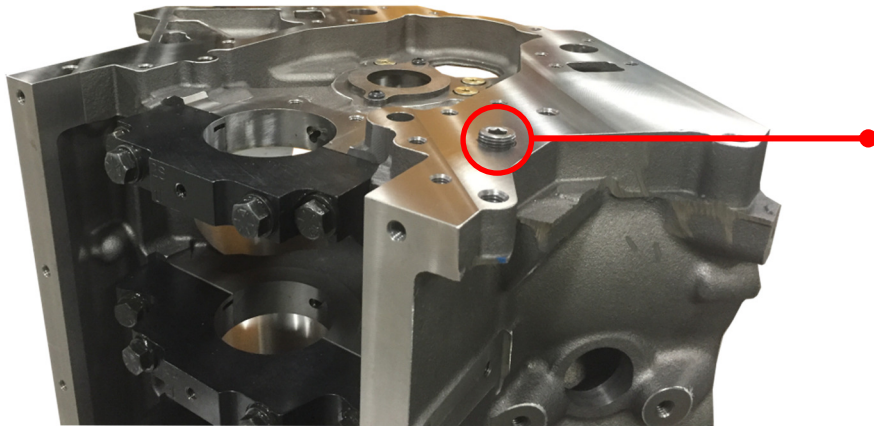
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

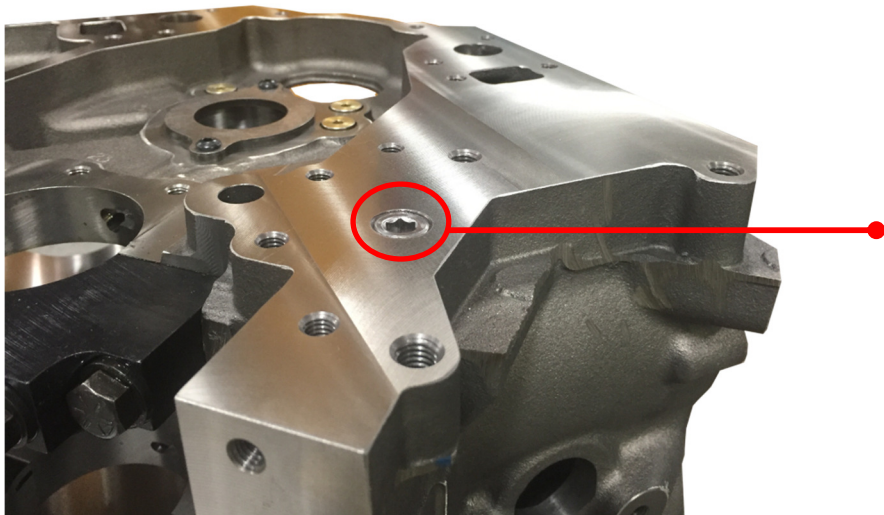


Top View of Valley Area:

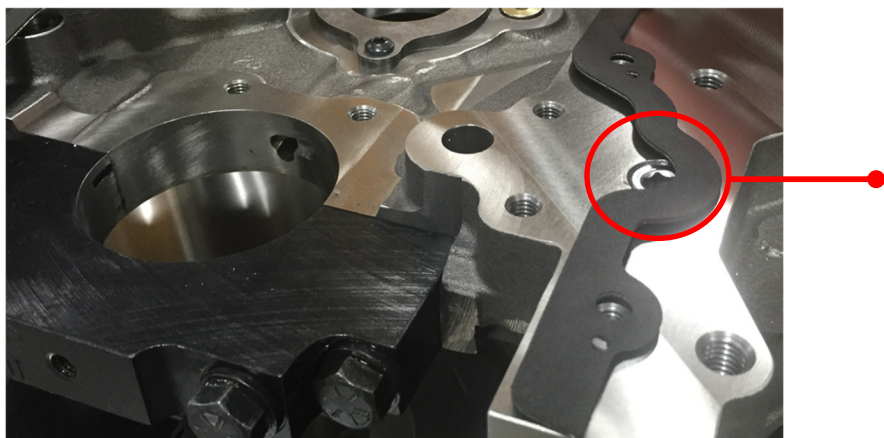
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

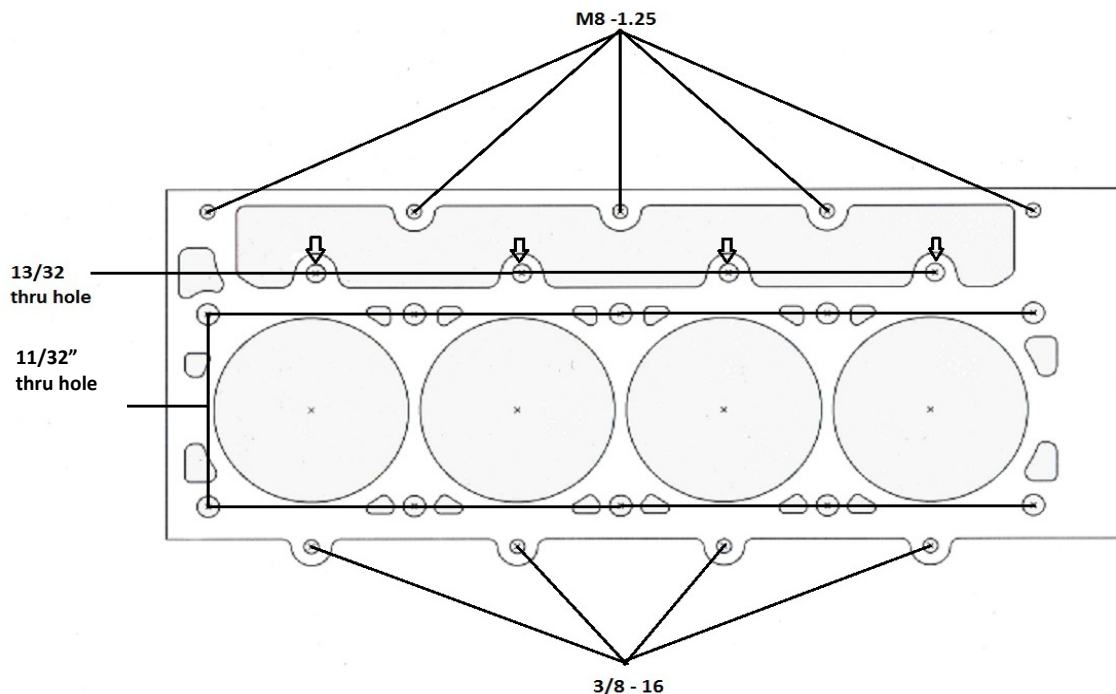
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



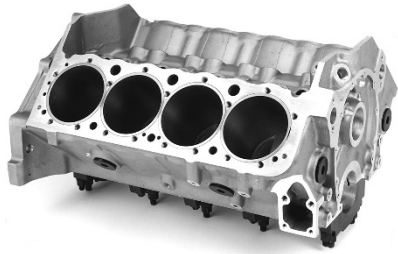
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

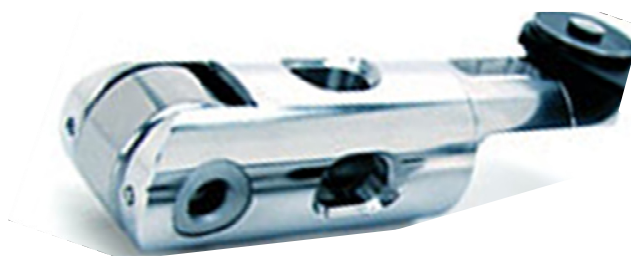


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

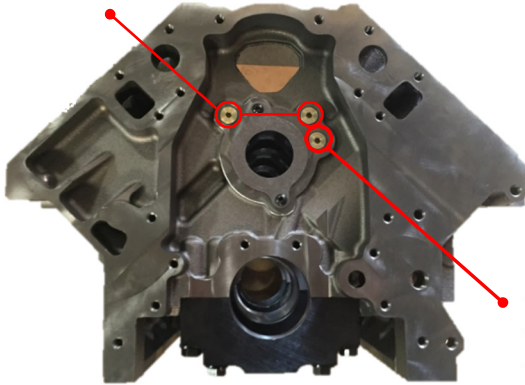
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

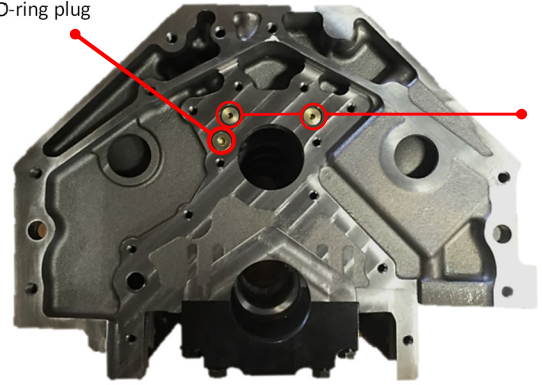
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



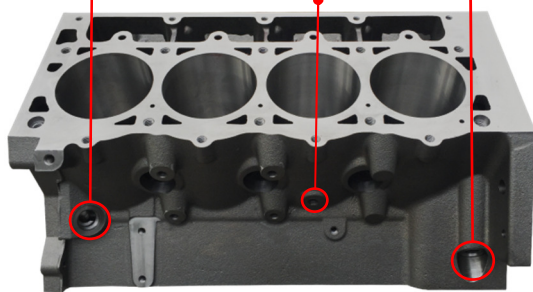
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

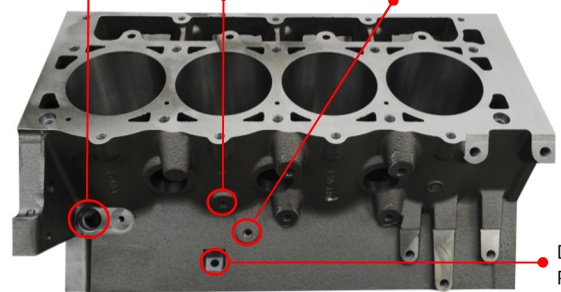


SHP LS Next Drivers Side

Crank sensor

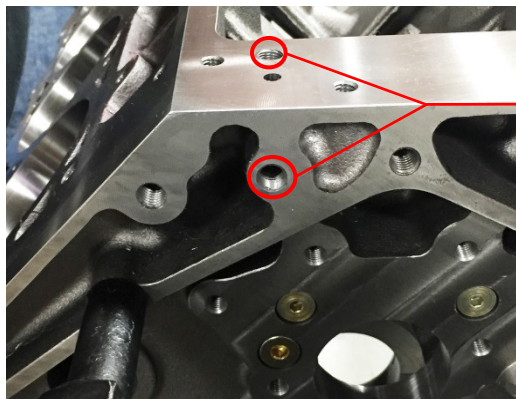
1/4" pipe / Water drain

Knock sensor



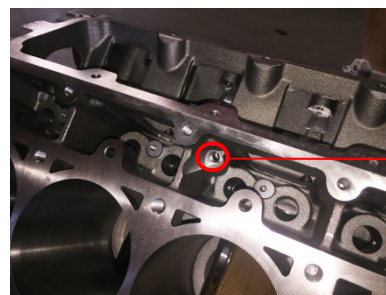
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



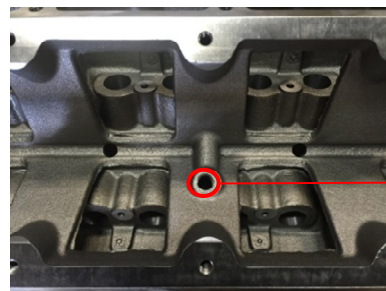
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



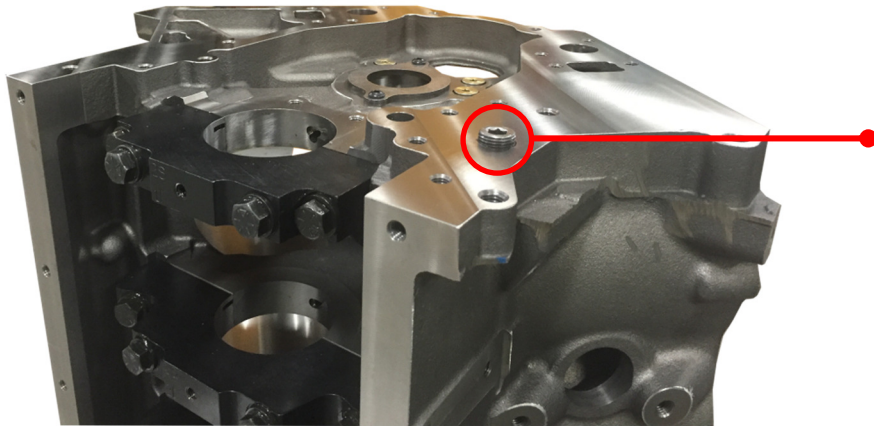
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

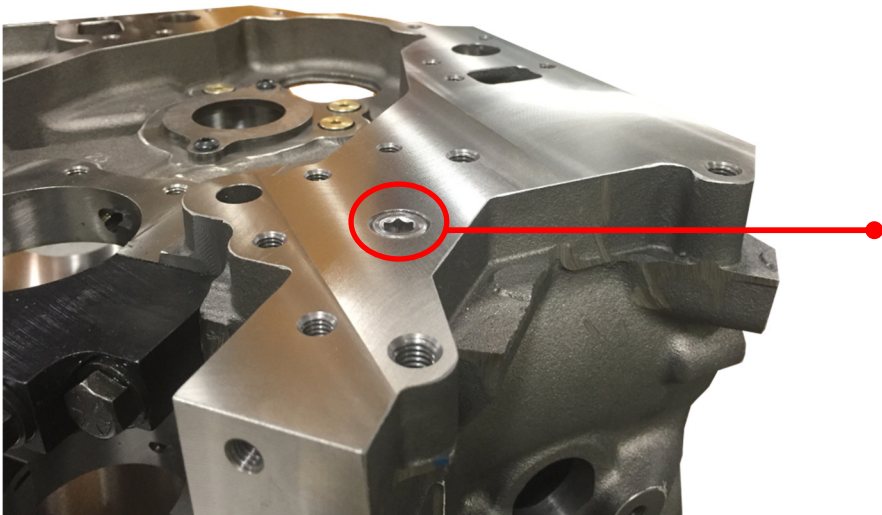


Top View of Valley Area:

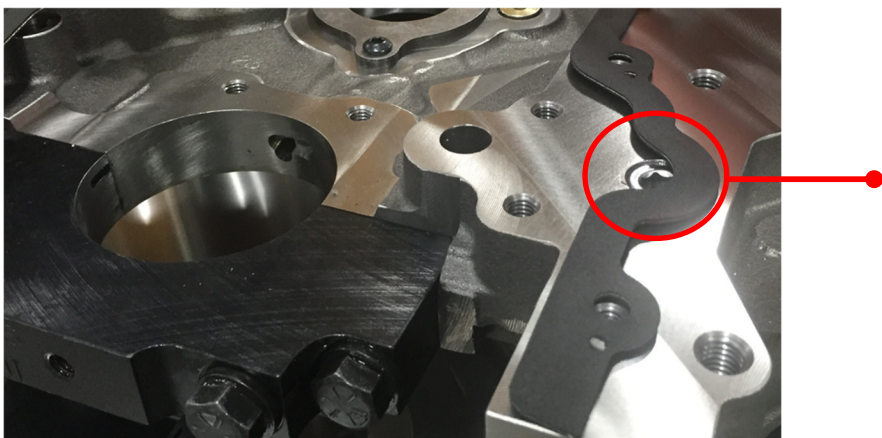
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	9.240"
Bore	4.000 & 4.125
Main Bearing Size	LS-1 (2.558" - 2.559")
Weight	227lbs
Largest Recommended Bore	4.185"
Largest Recommended Crank Stroke	4.125"
Camshaft Bearing Diameter	55mm babbitt
Stock Camshaft Position	4.885"
Cylinder Wall Thickness, min.	.215" @ 4.125"
Deck Thickness, min	.625 (5/8)

### Torque Specs - Main Caps

**7/16" bolts**

**65 ft lbs w/ CMD # 3 high pressure lube.**

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE: The block is designed for a single row timing chain for compatibility with O.E. fuel injection.**

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE: The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.**

**NOTE: Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.**

**NOTE: If you are using aftermarket cam profiles you must use the correct components for the application.**

**NOTE: with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.**

**Actual deck height will be .002" - .005" taller for additional machining requirements.**

**Factory style Cloves timing gear is required PN# 9-3658TX3.**

**Cam bearing O.D. should be deburred before installation.**

**The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.**

**Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.**

**SHP LS Next blocks have O.E. Starter mounting only.**

**Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.**

**Head bolt holes are blind.**

**Loctite # 271 is recommended when installing the head and main bolts/studs into the block.**

**Studs should *never* be torqued into block. They should only be lightly snugged.**

**When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.**

**SHP LS Next Blocks use LSX lifter “buckets” for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.**

### SHP LS Next Blocks use LS2 – LS7 knock sensors

**SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers**

**Press-in freeze plugs are sold separate PN# 32820000B**

**Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000**

**The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.**

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

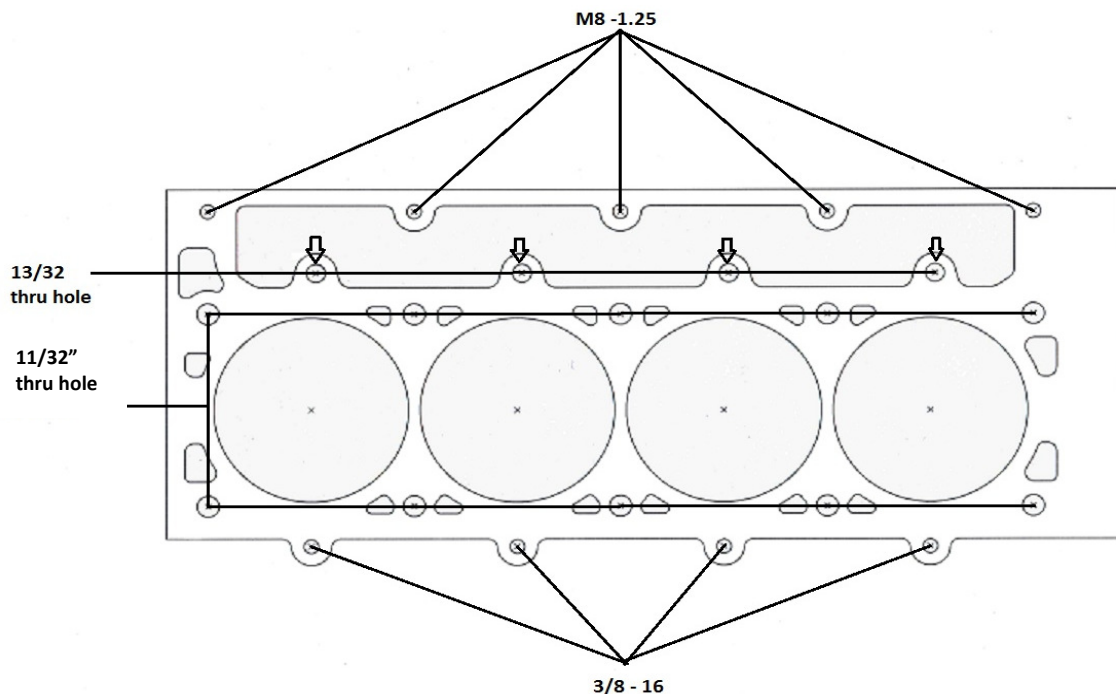
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



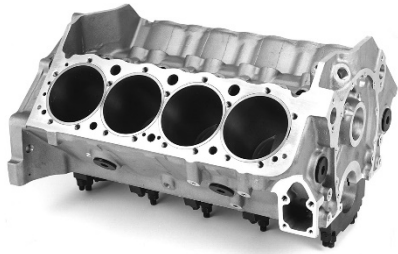
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
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SHP LS Next Iron Block parts Kit	32000018	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:  
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**Figure 1:**  
Stock un-modified  
solid roller lifters

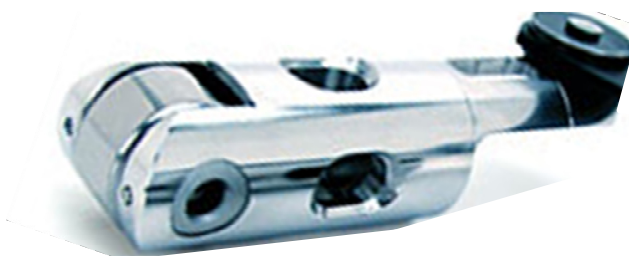


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

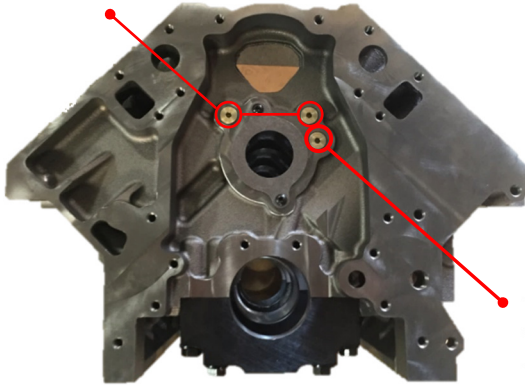
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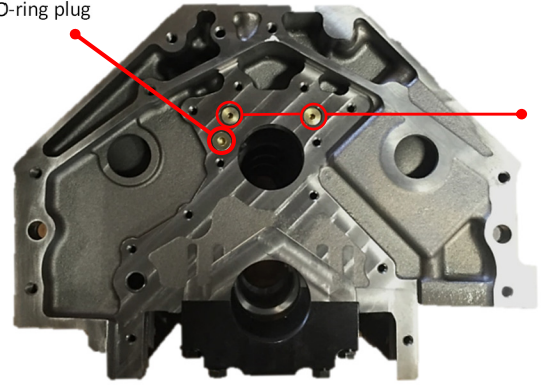
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



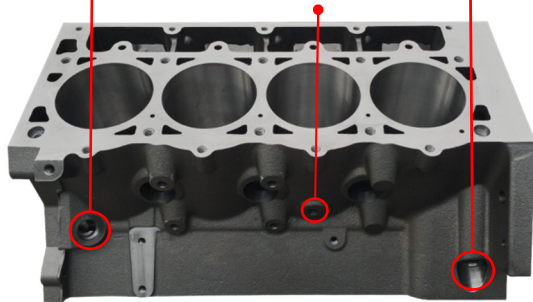
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

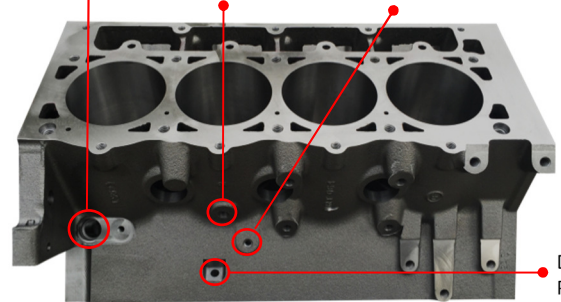


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

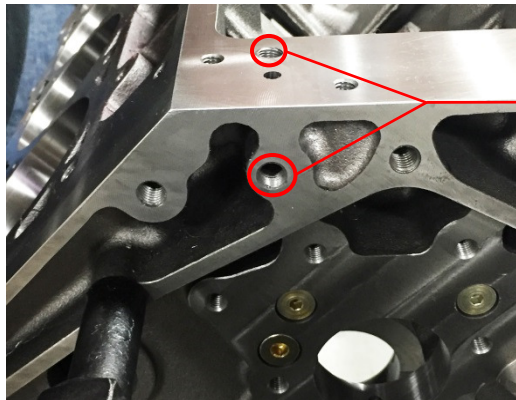
Knock sensor



SHP LS Next Passenger Side

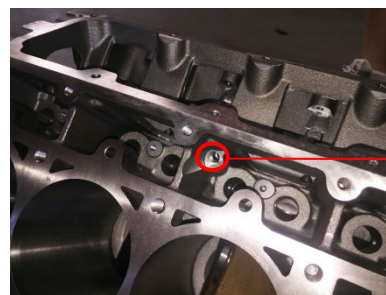
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



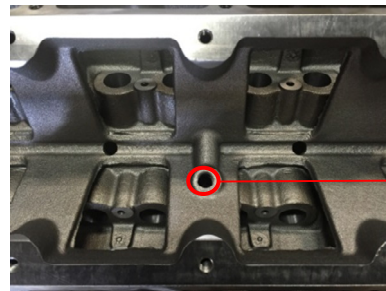
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



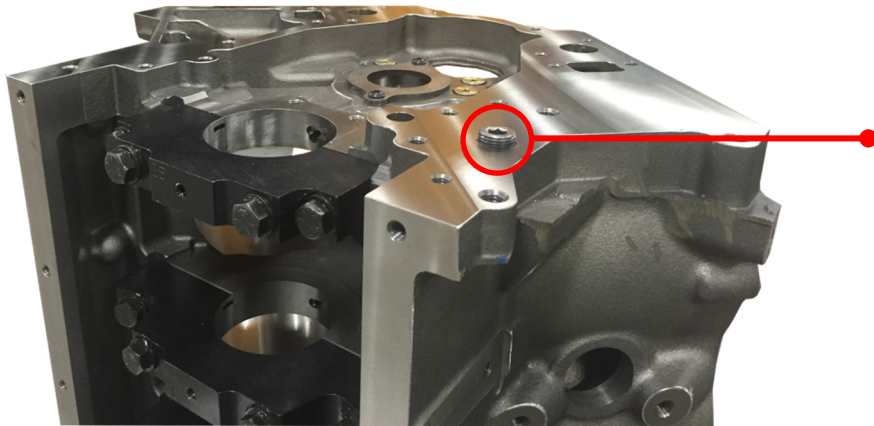
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

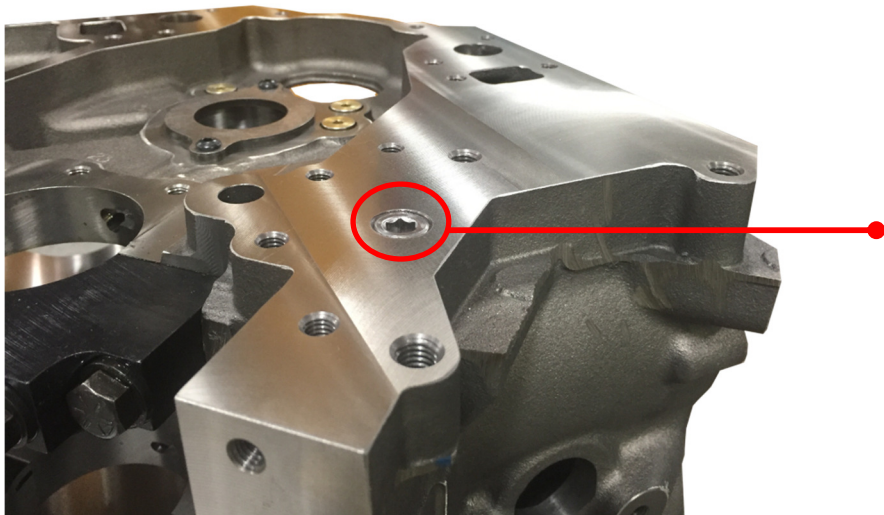


Top View of Valley Area:

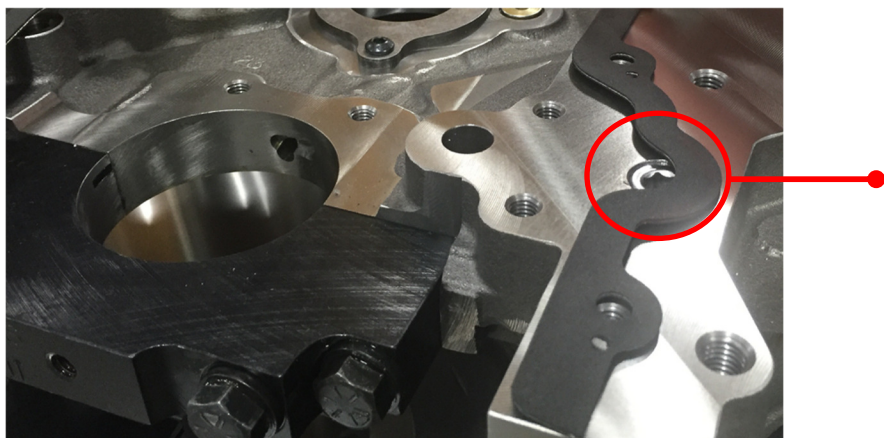
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

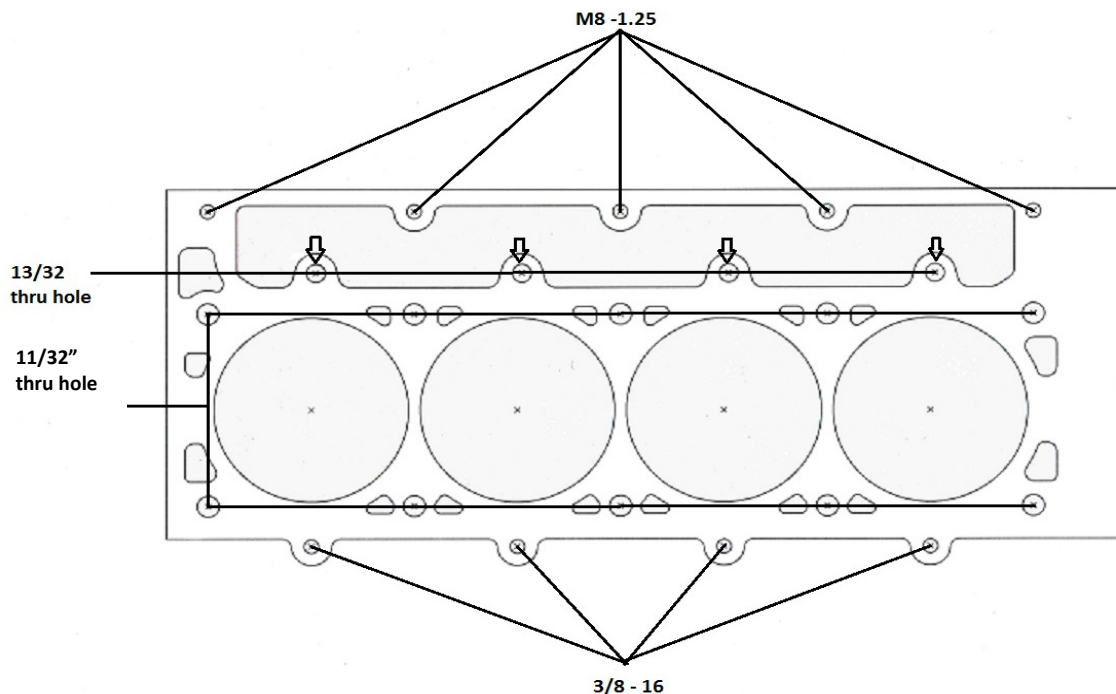
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



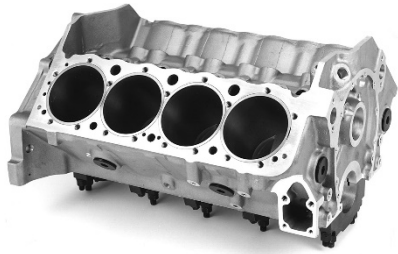
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

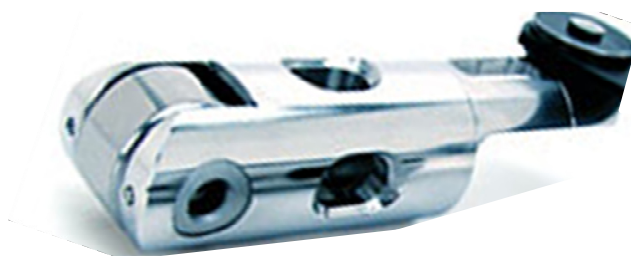


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

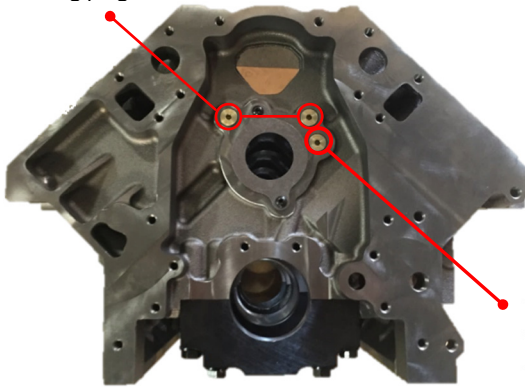
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

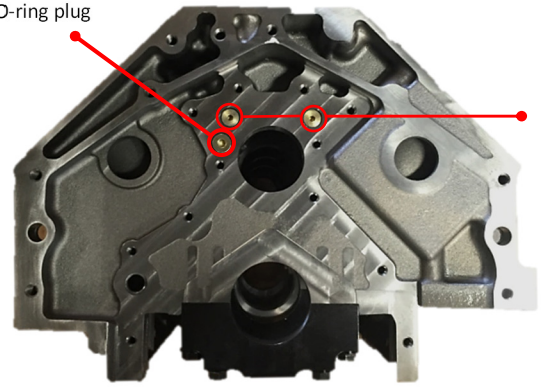
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



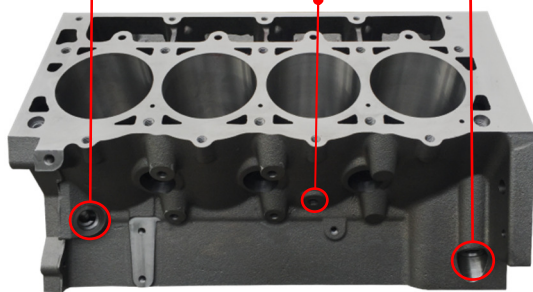
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

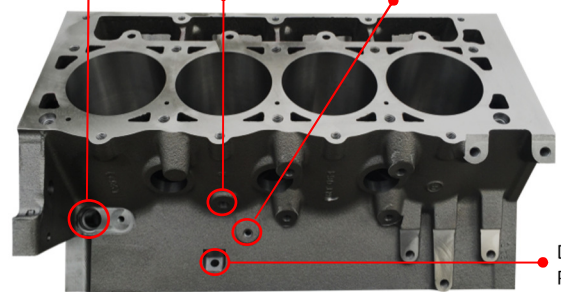


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

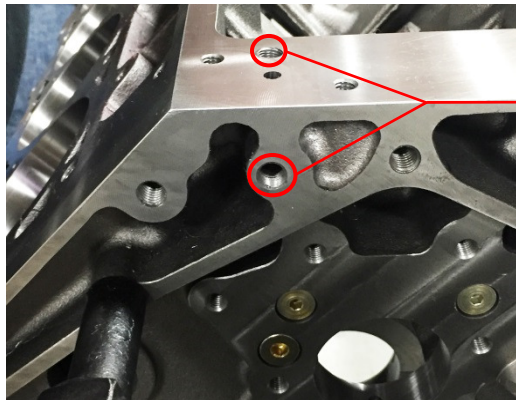
Knock sensor



SHP LS Next Passenger Side

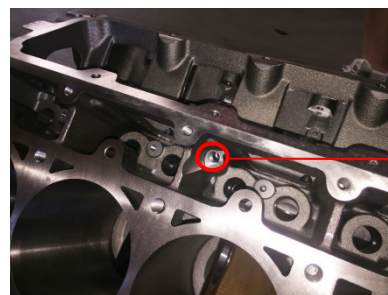
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



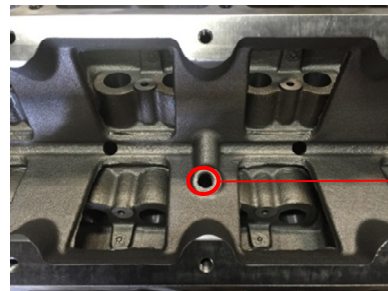
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



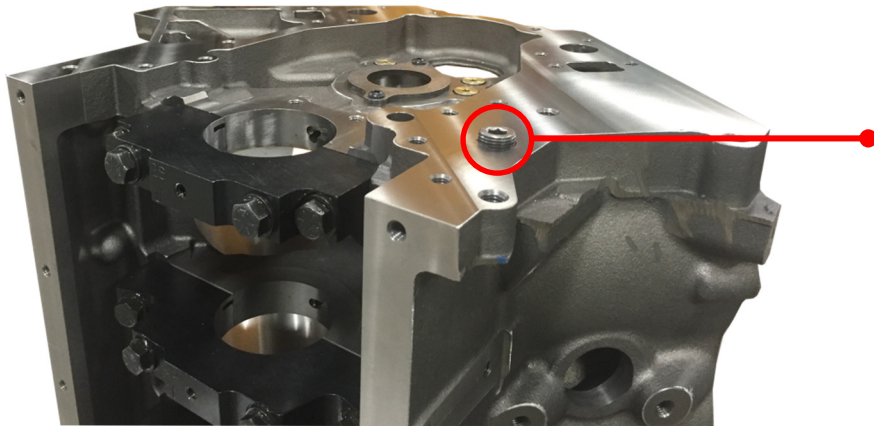
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

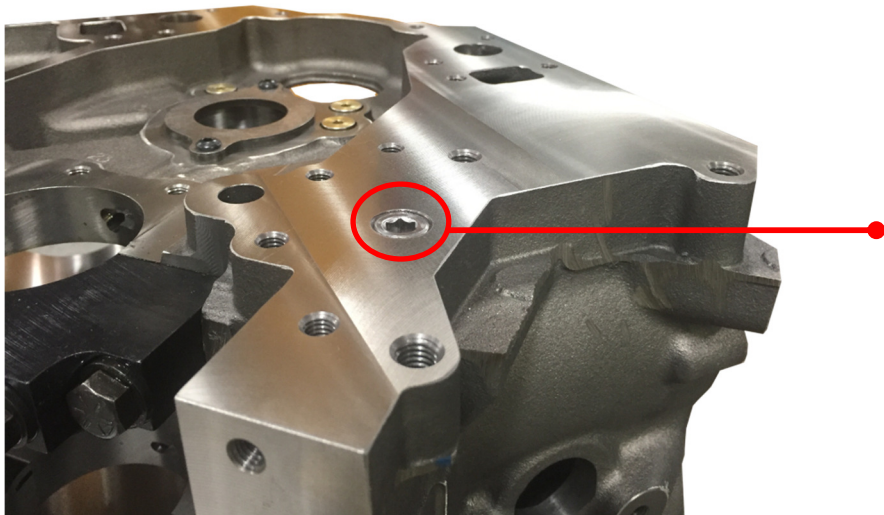


Top View of Valley Area:

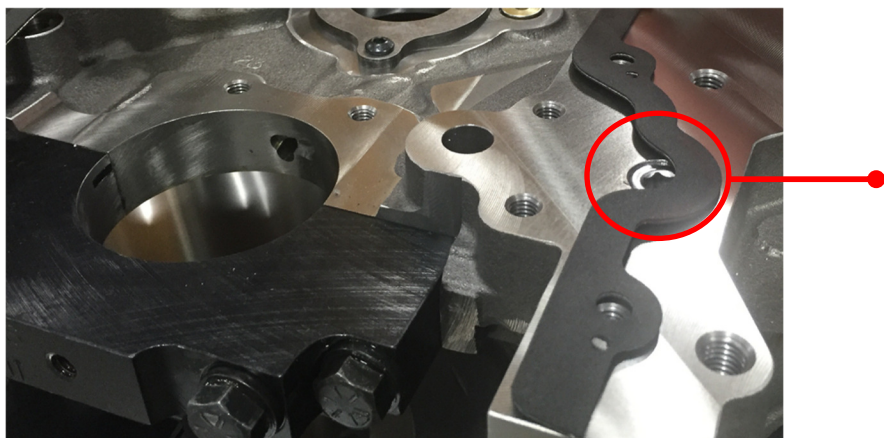
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

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When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

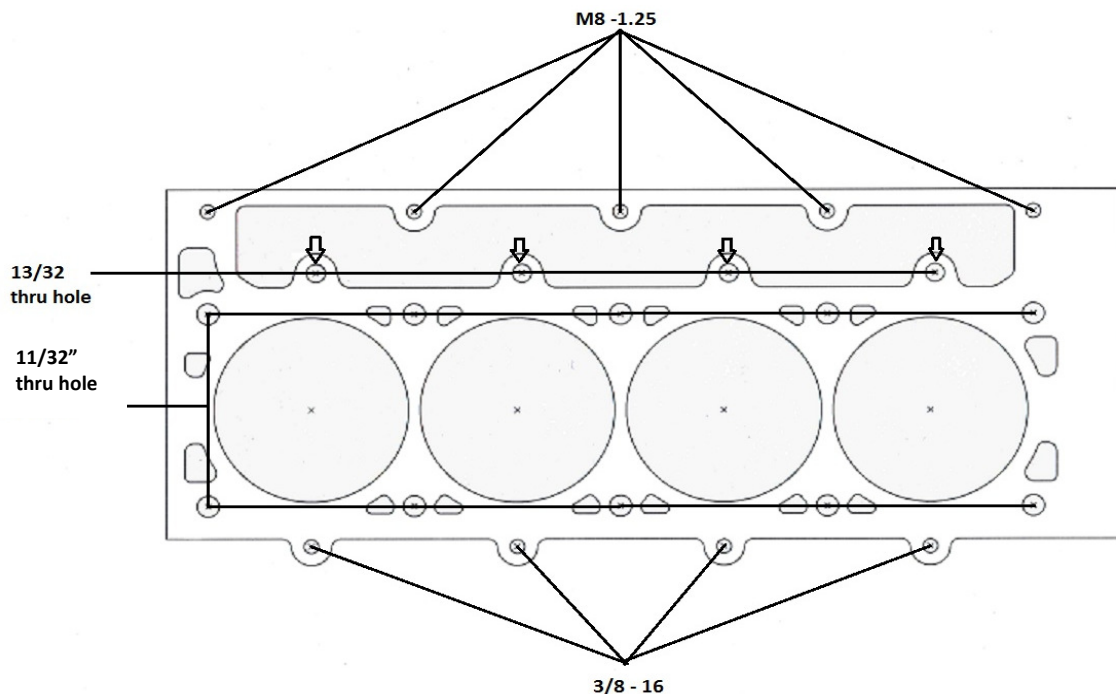
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



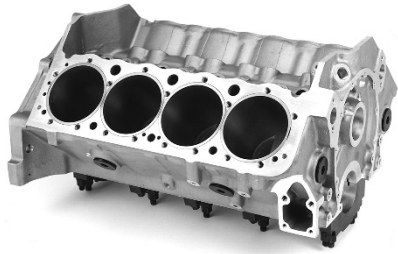
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:  
Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
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- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

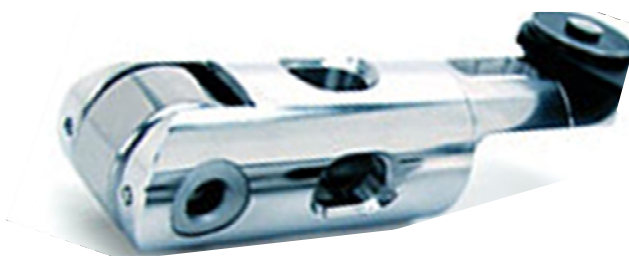


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

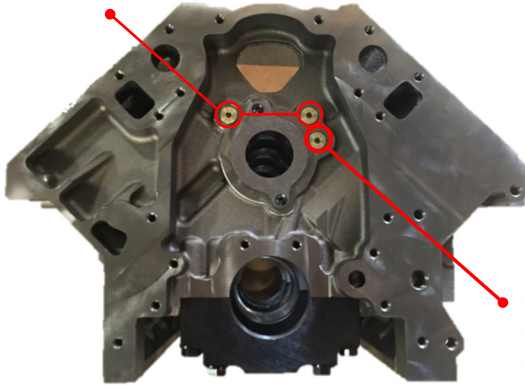
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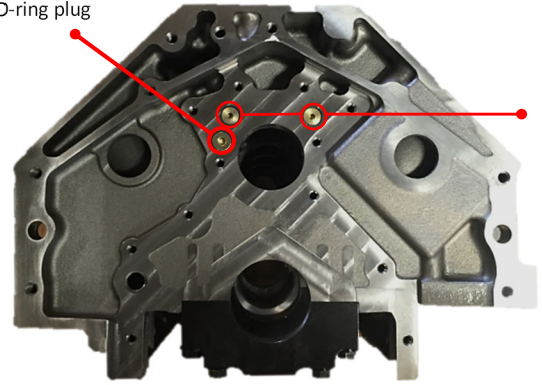
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



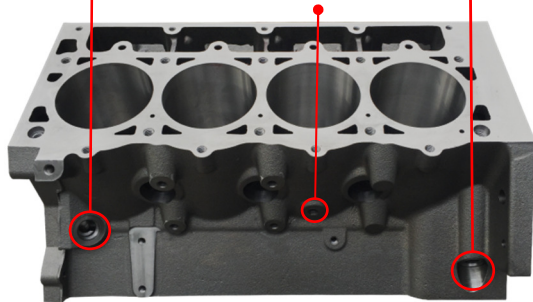
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

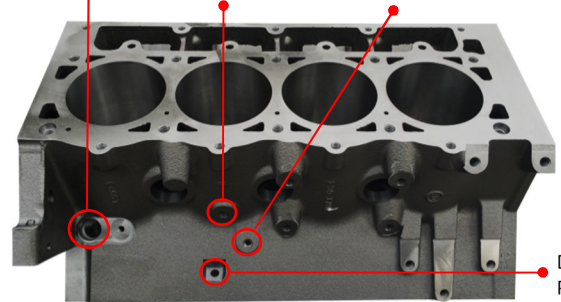


SHP LS Next Drivers Side

Crank sensor

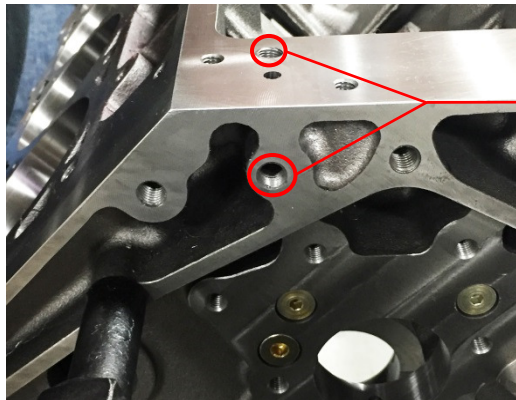
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Knock sensor



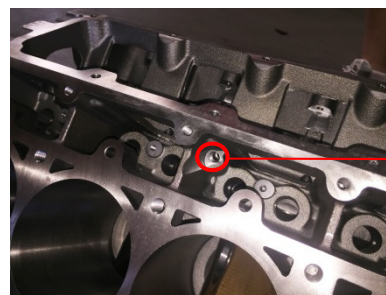
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



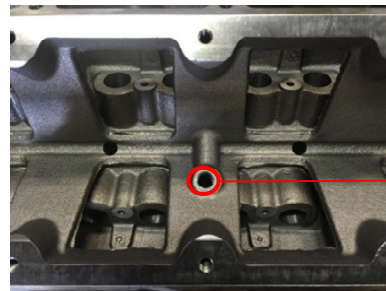
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



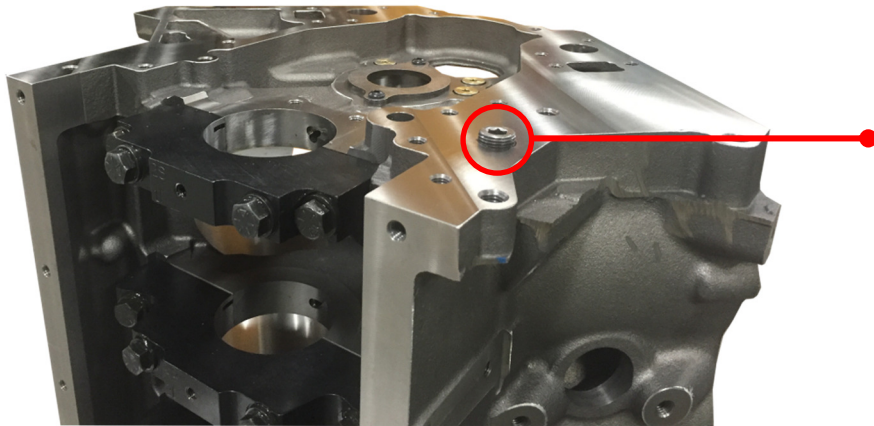
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

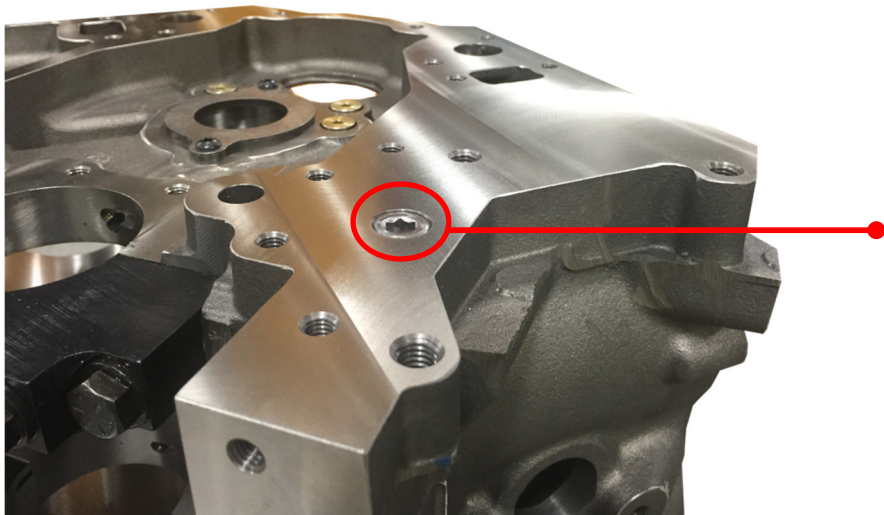


Top View of Valley Area:

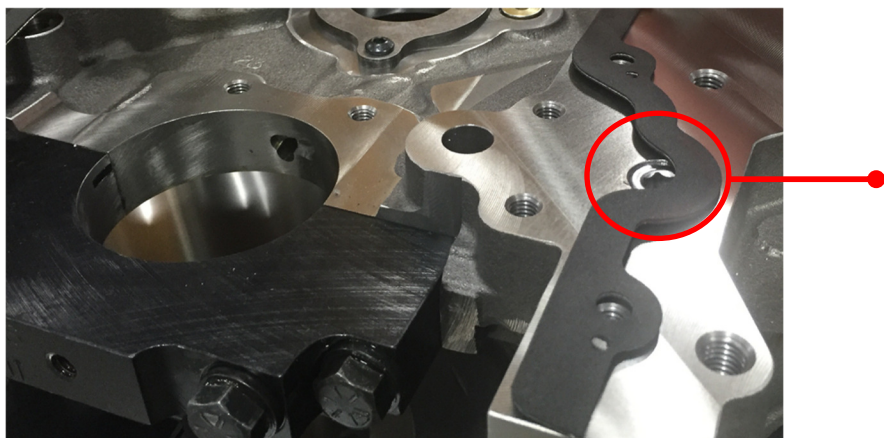
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

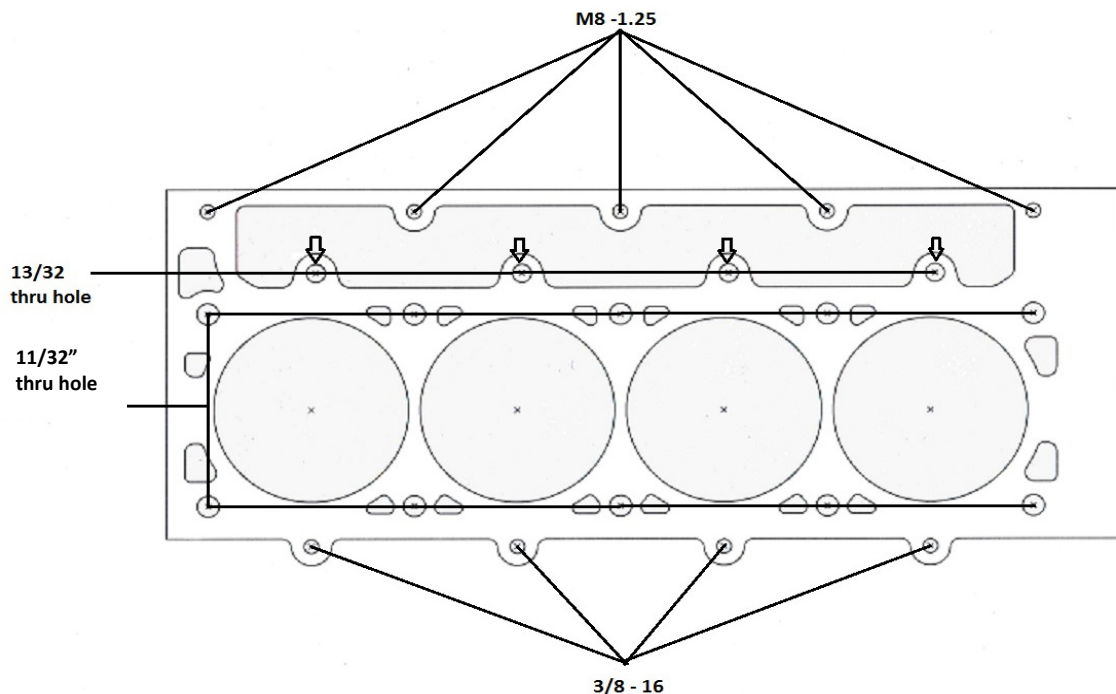
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



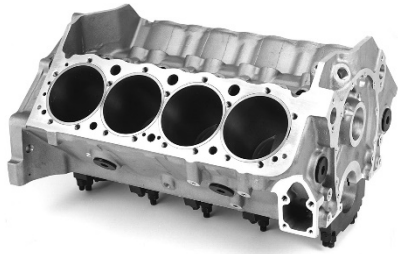
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:  
Cylinder bores - Oil passages - Deck surfaces - All threads

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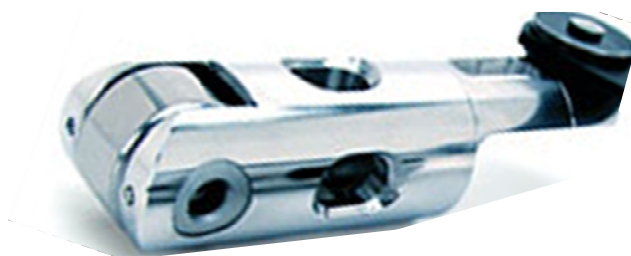


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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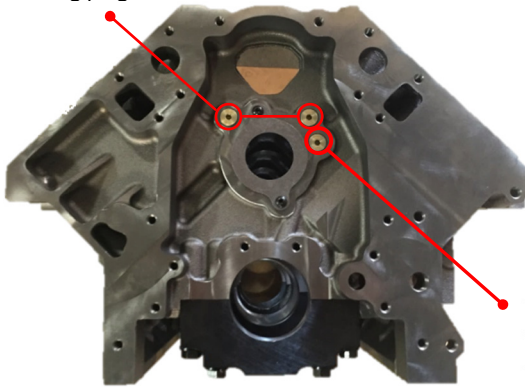
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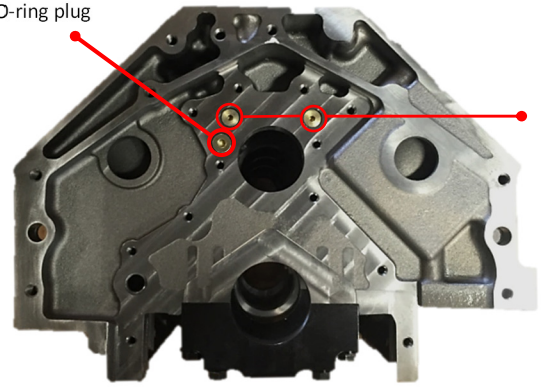
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



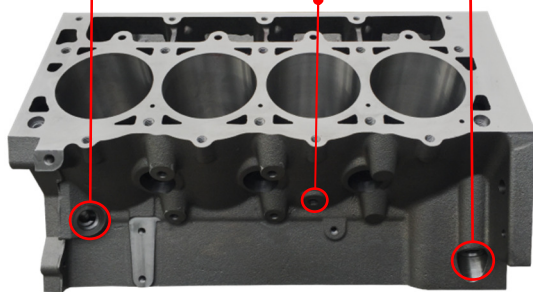
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Oil out -10AN w/O-ring

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1/4" pipe / Water drain

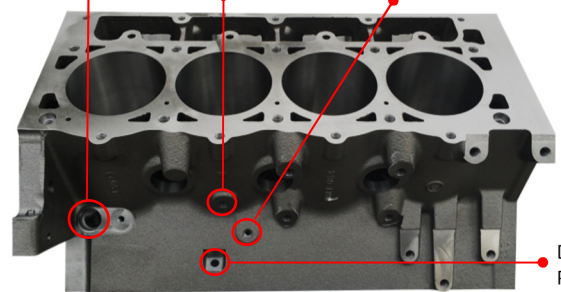


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

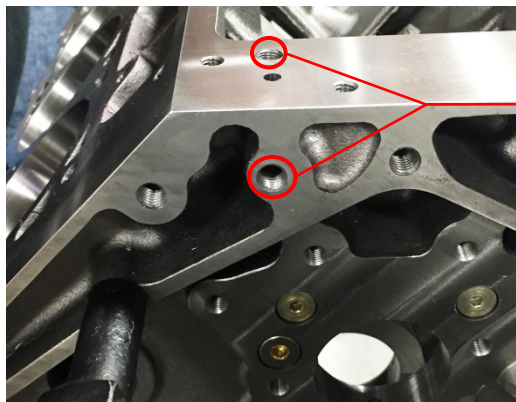
Knock sensor



SHP LS Next Passenger Side

1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



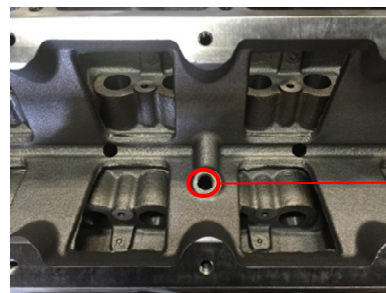
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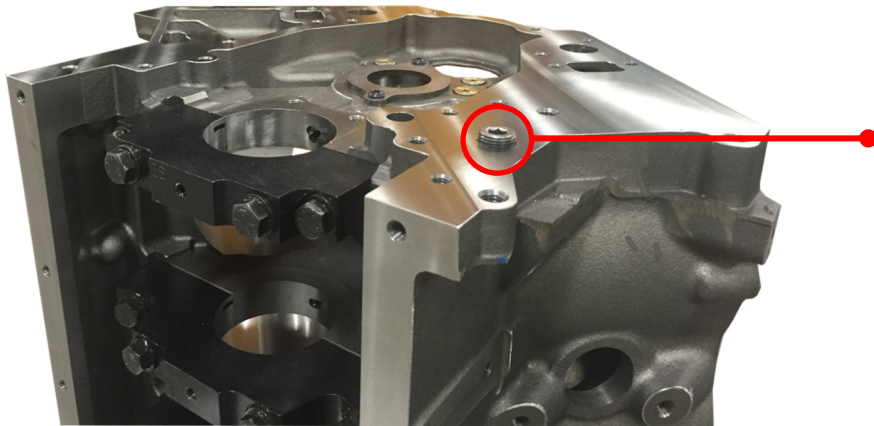
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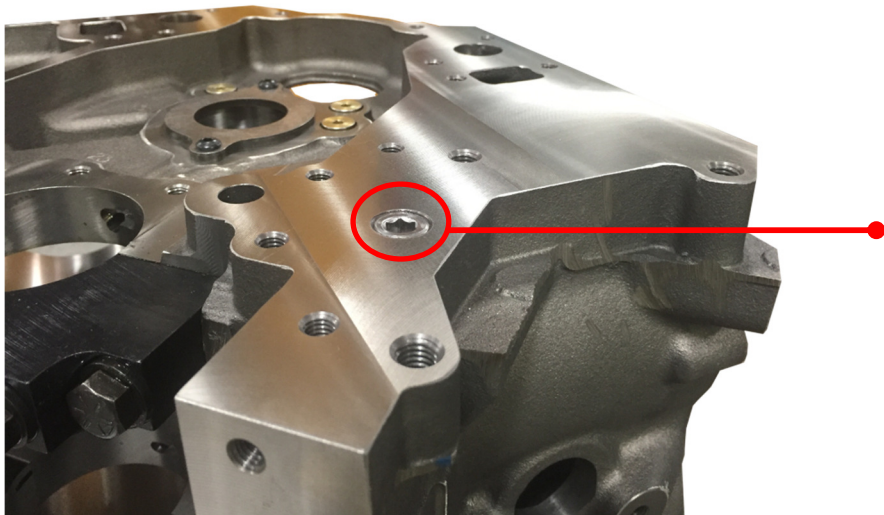


Top View of Valley Area:

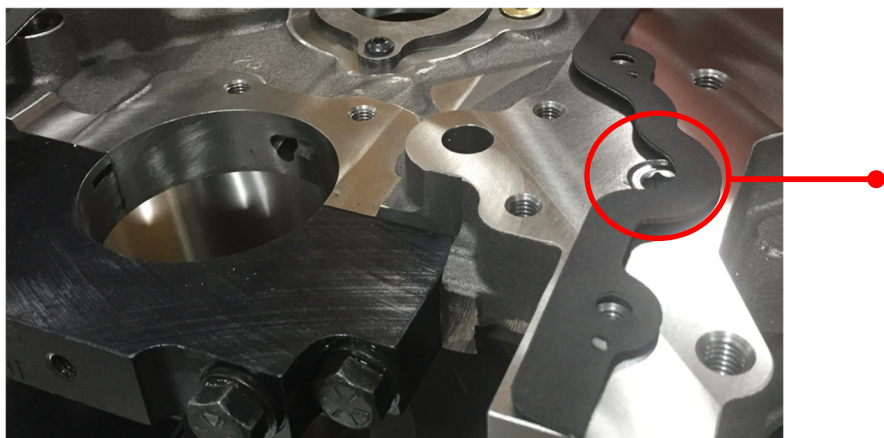
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

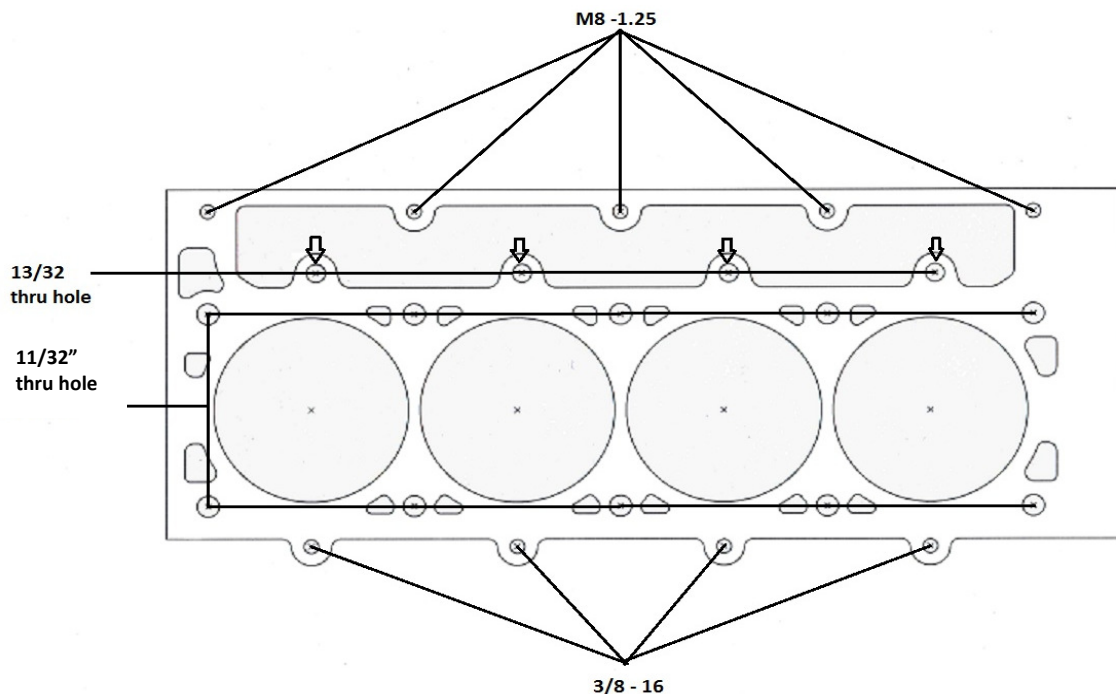
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Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



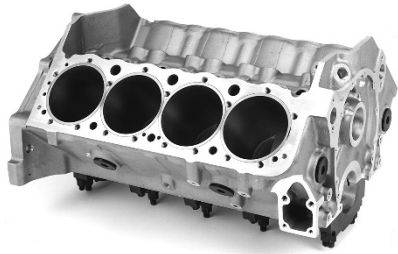
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:  
Cylinder bores - Oil passages - Deck surfaces - All threads

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- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

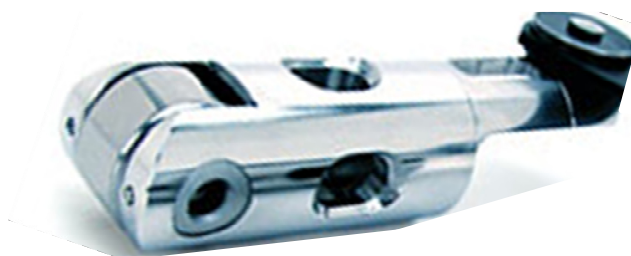


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

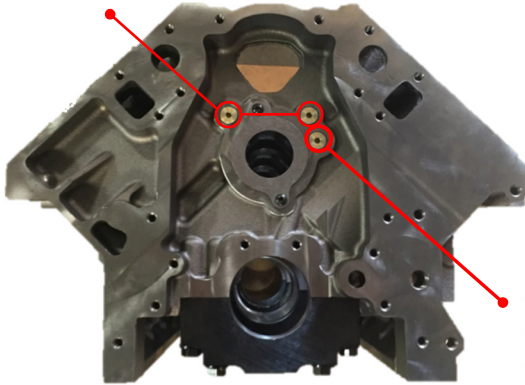
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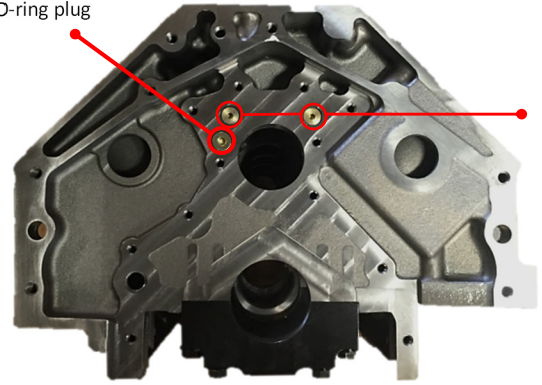
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



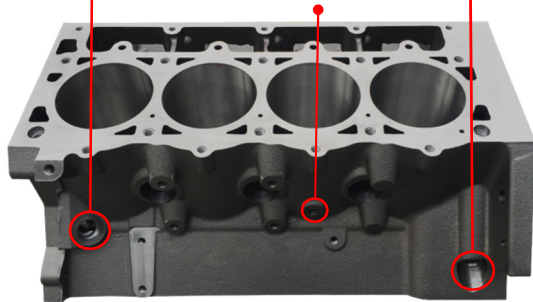
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

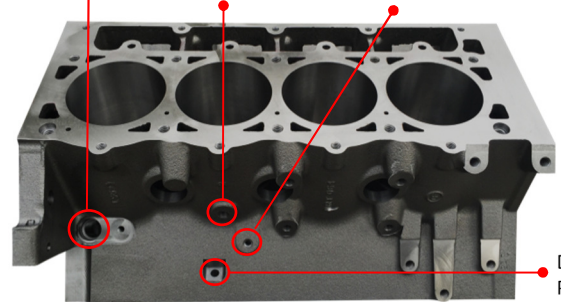


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

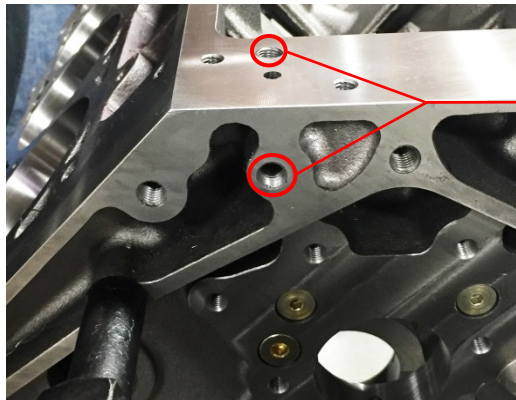
Knock sensor



SHP LS Next Passenger Side

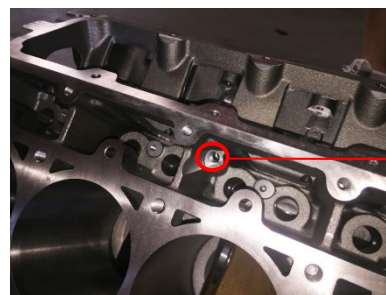
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



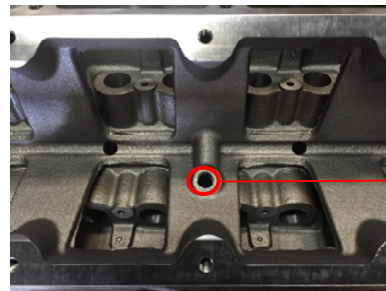
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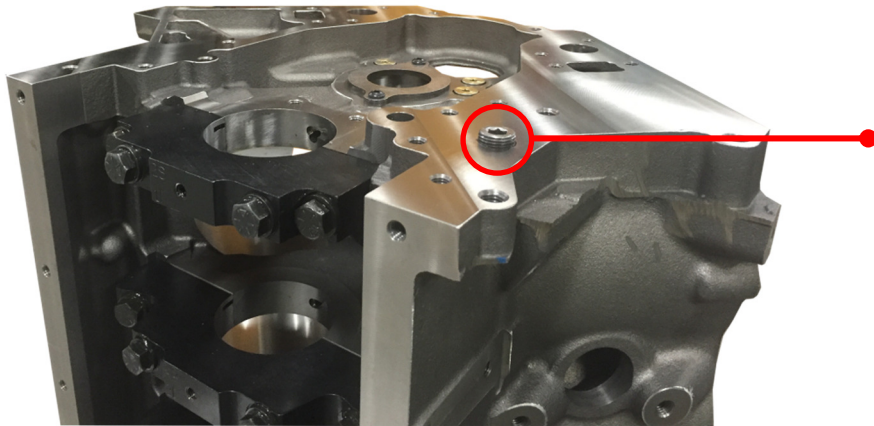
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

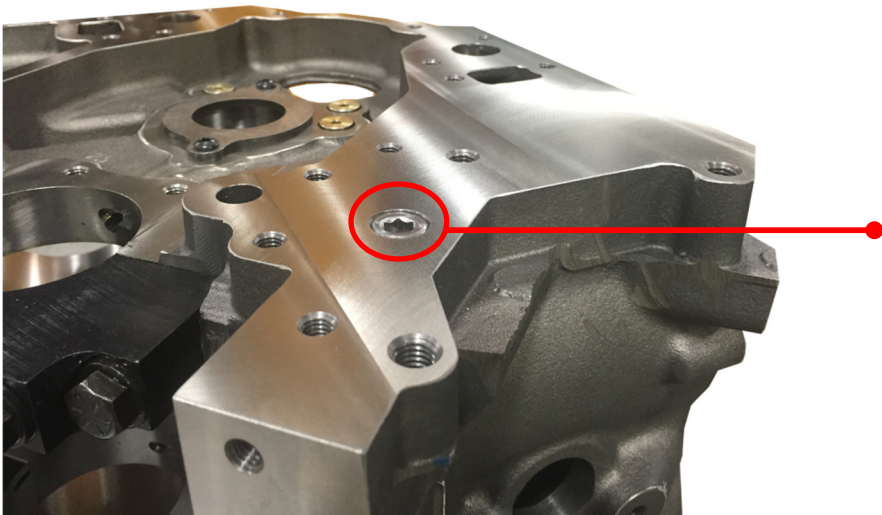


Top View of Valley Area:

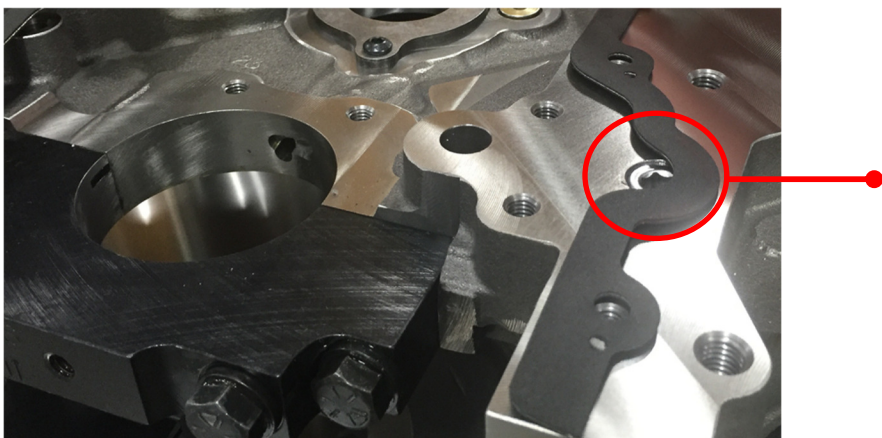
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The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

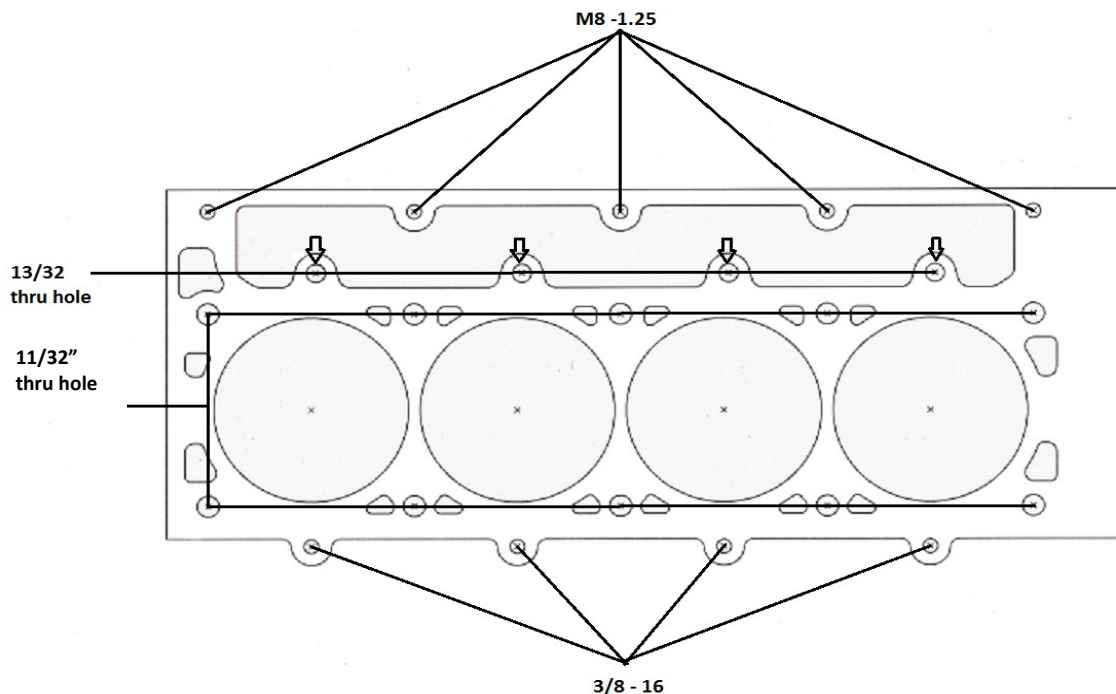
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



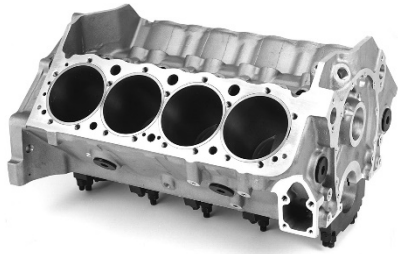
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
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<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
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<b>Weight:</b>	227 lbs w/ main caps



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Stock un-modified  
solid roller lifters

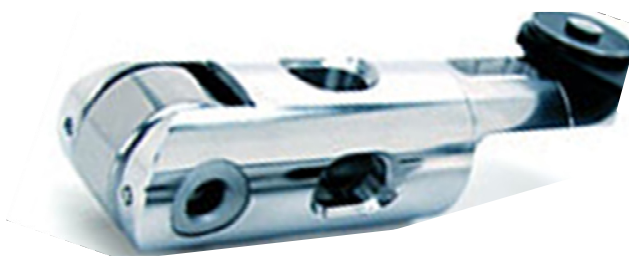


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

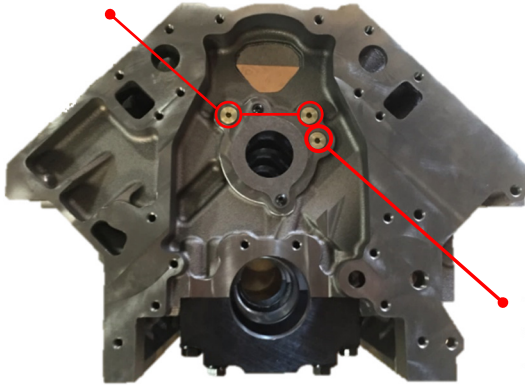
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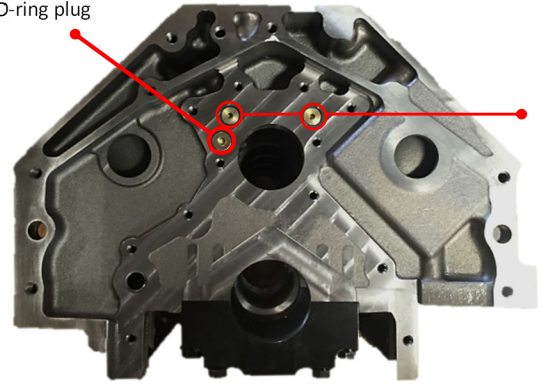
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



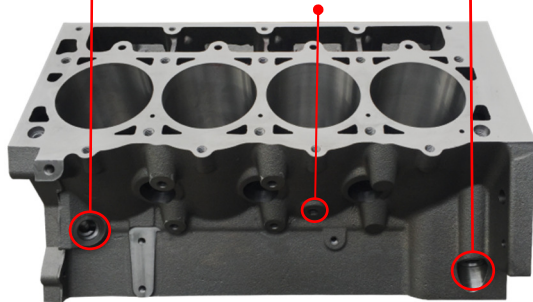
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

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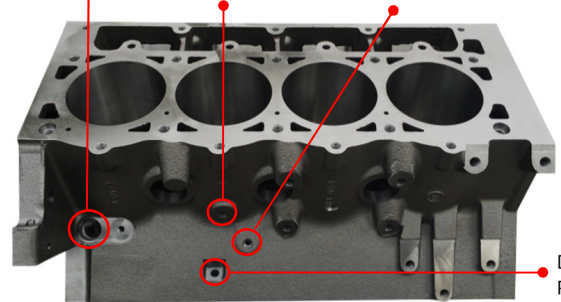


SHP LS Next Drivers Side

Crank sensor

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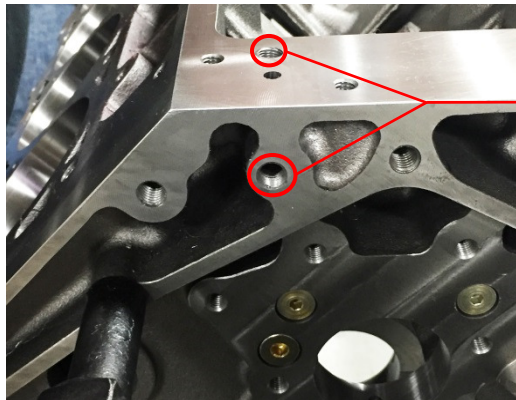
Knock sensor



SHP LS Next Passenger Side

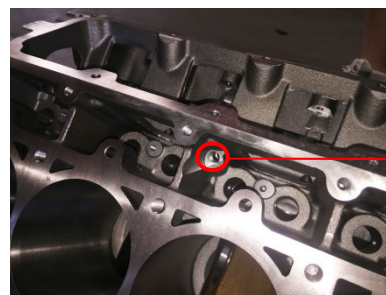
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



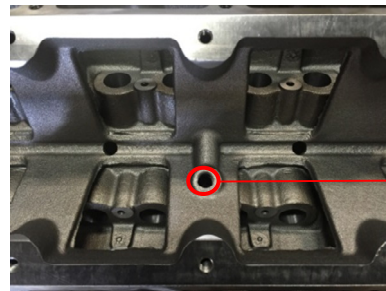
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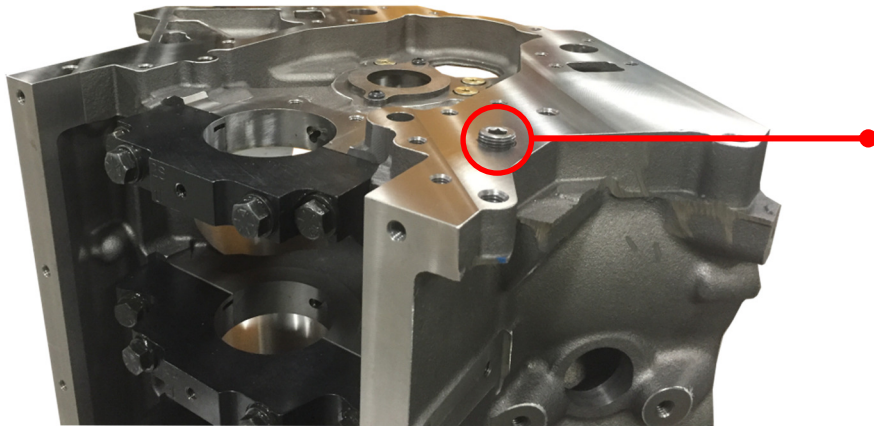
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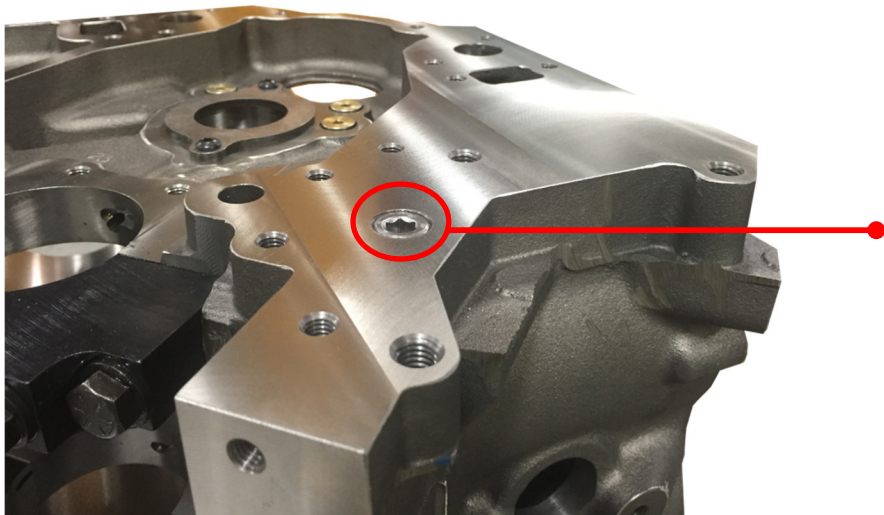


Top View of Valley Area:

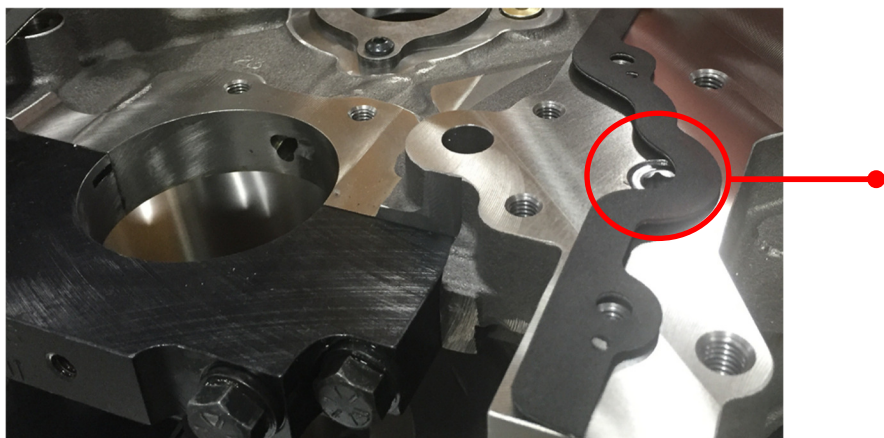
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

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7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

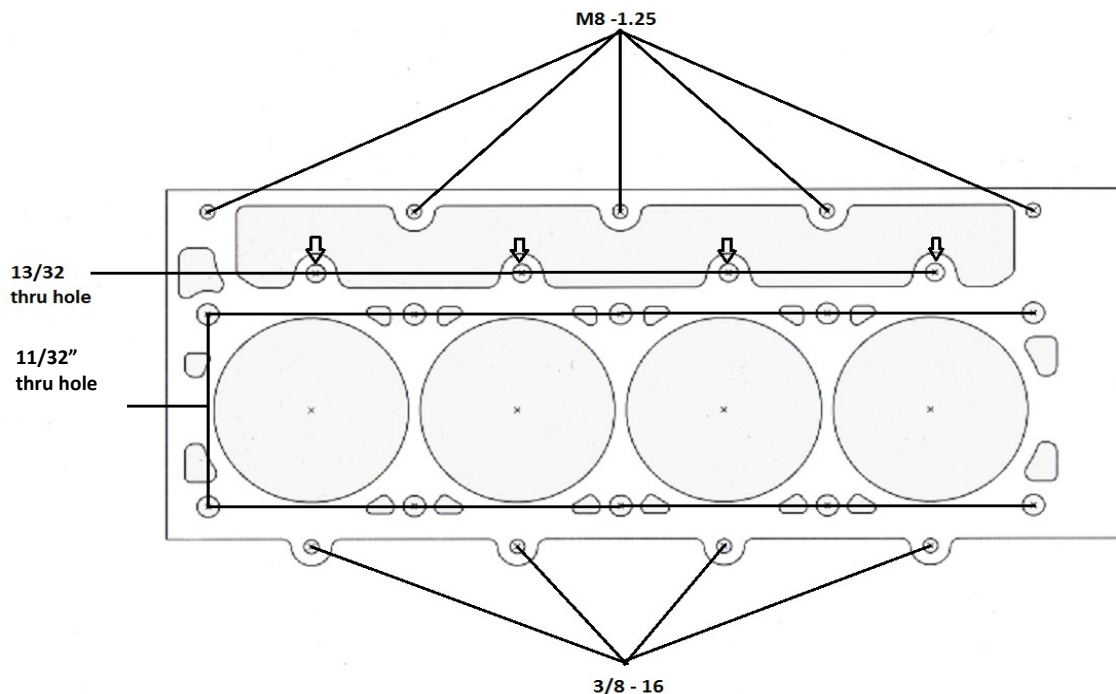
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



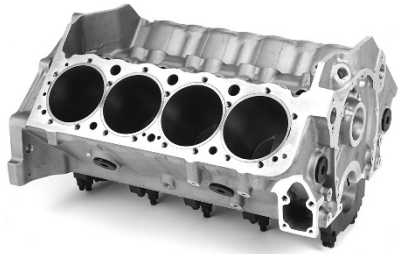
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

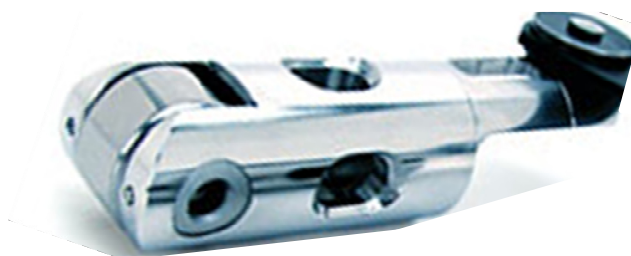


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

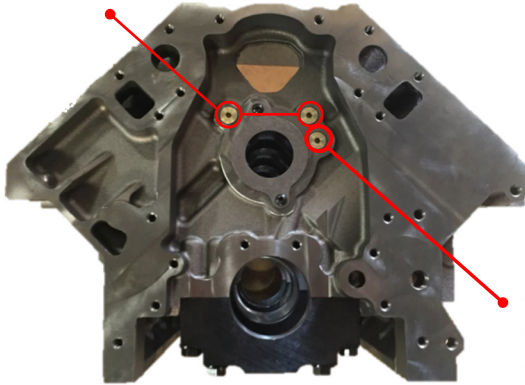
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

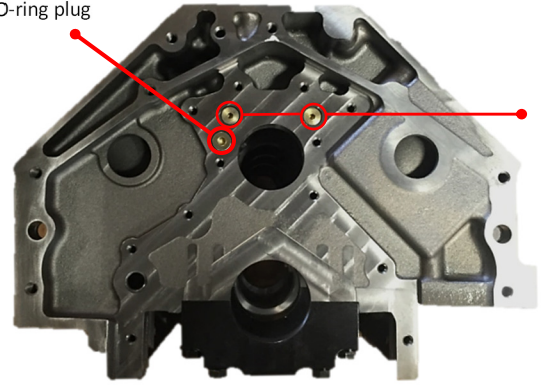
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



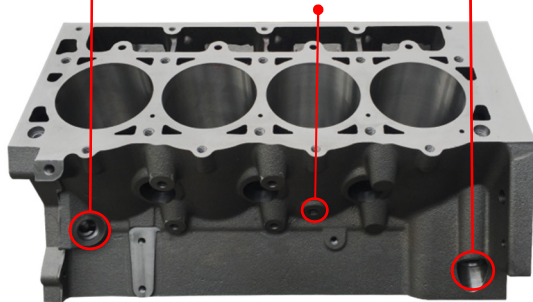
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

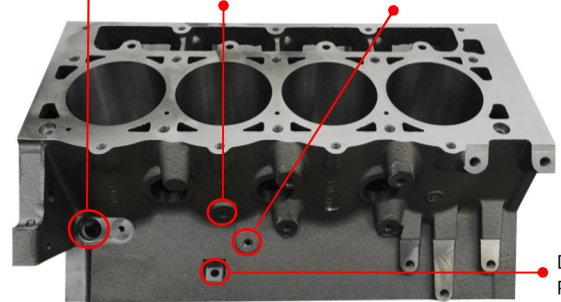


SHP LS Next Drivers Side

Crank sensor

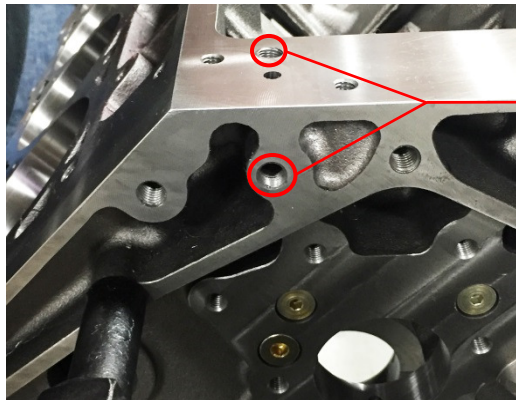
1/4" pipe / Water drain

Knock sensor



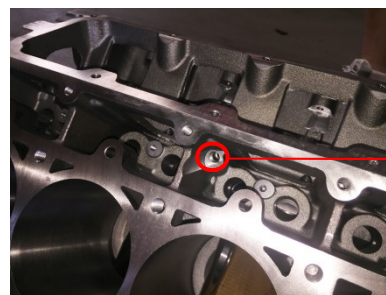
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



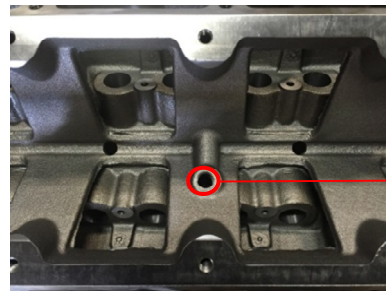
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



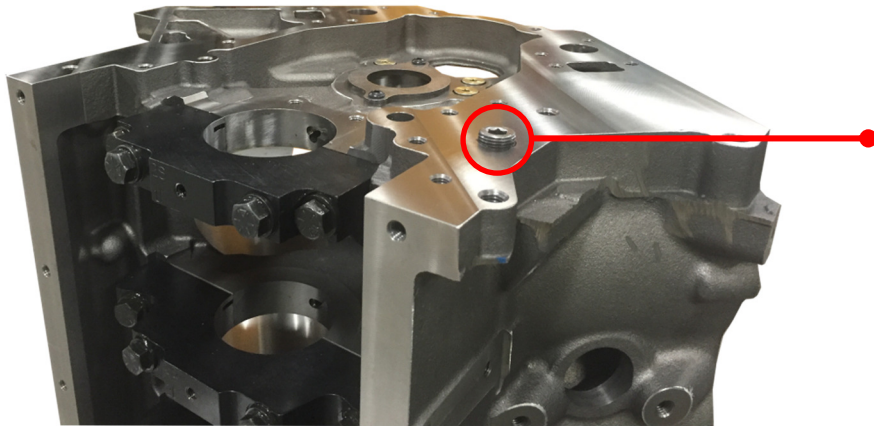
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

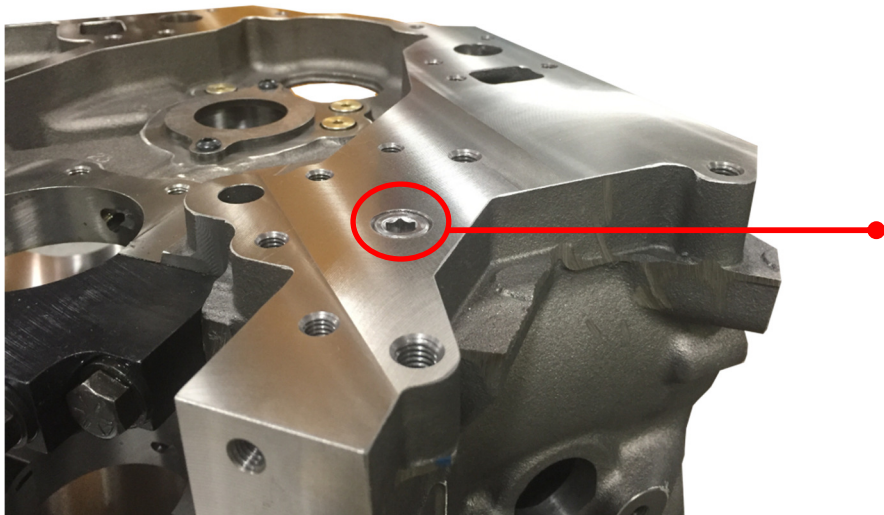


Top View of Valley Area:

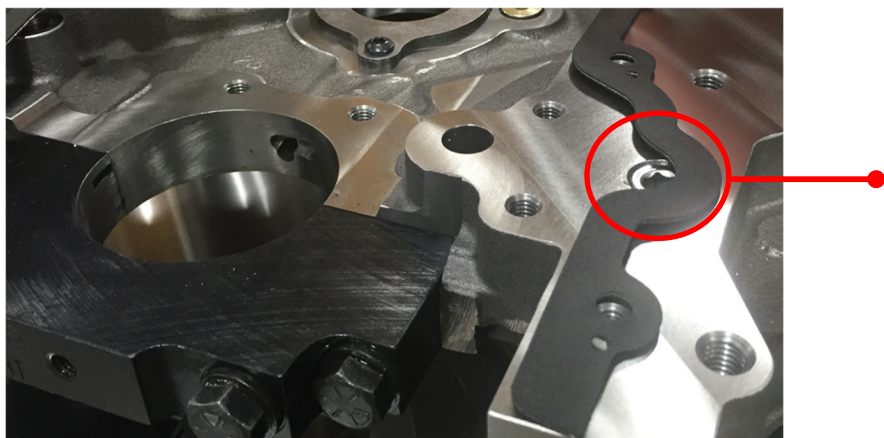
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

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Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

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SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

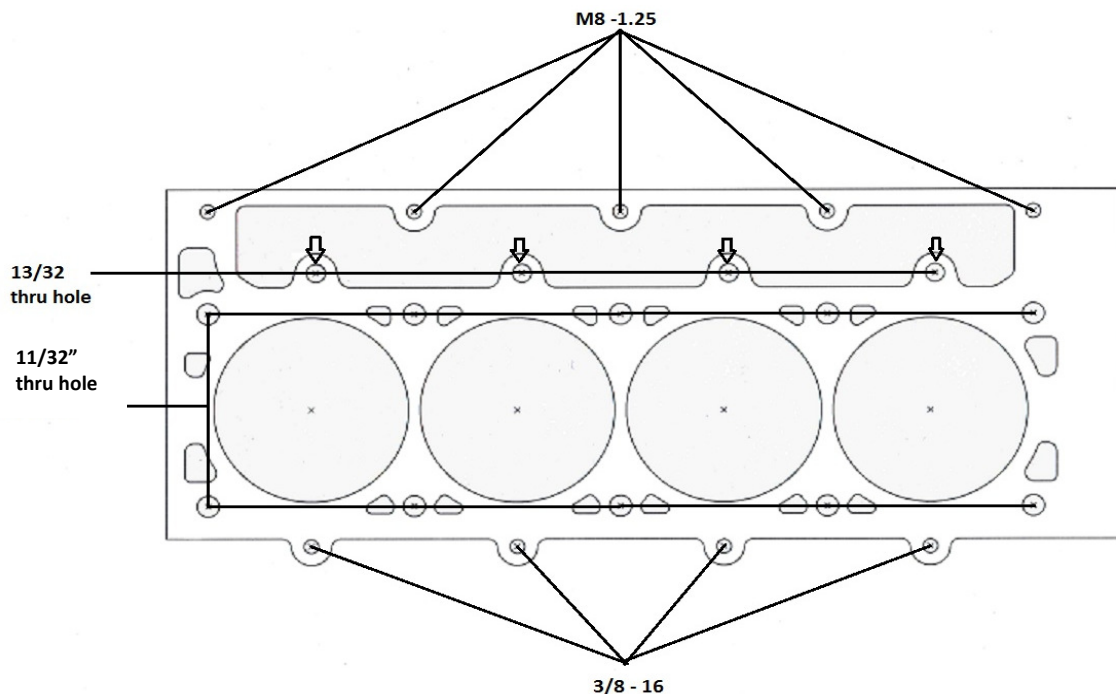
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



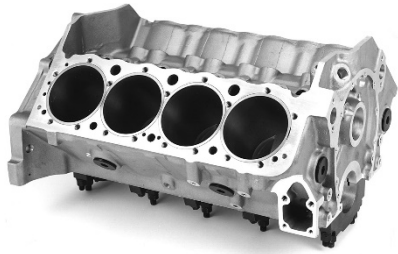
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
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SHP LS Next Iron Block parts Kit	32000018	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

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- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



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**Figure 1:**  
Stock un-modified  
solid roller lifters

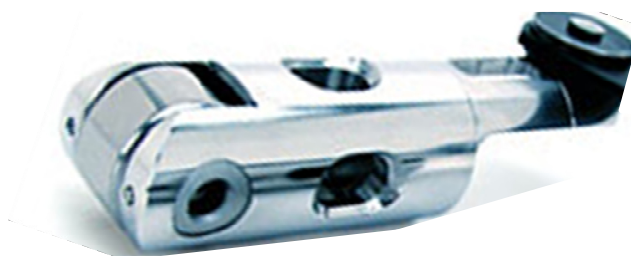


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

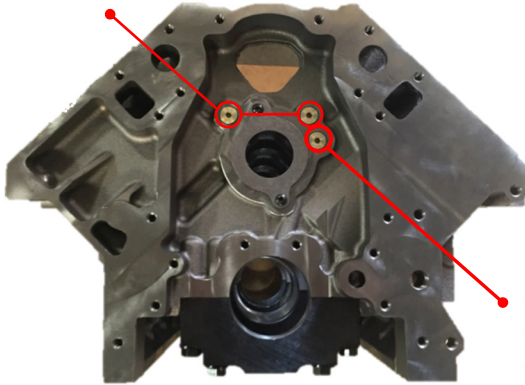
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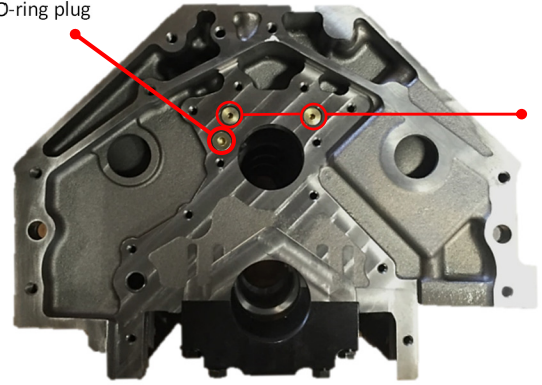
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



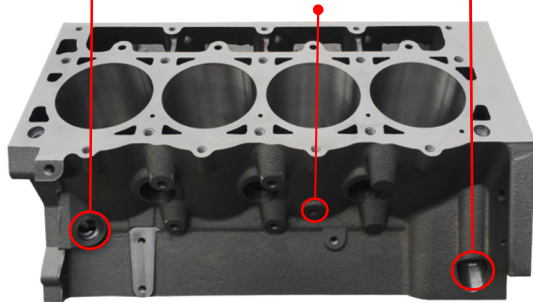
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

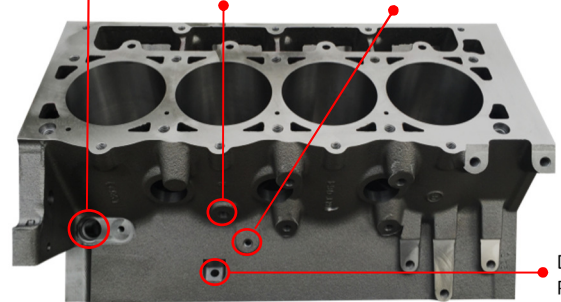


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

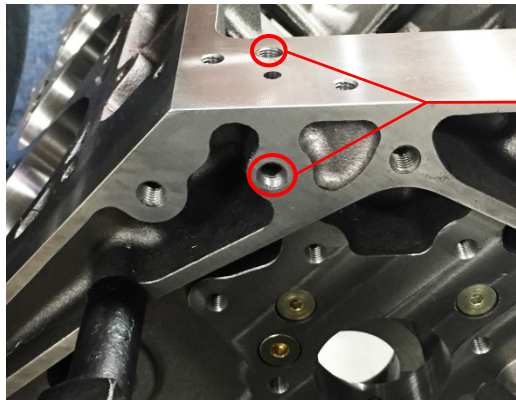
Knock sensor



SHP LS Next Passenger Side

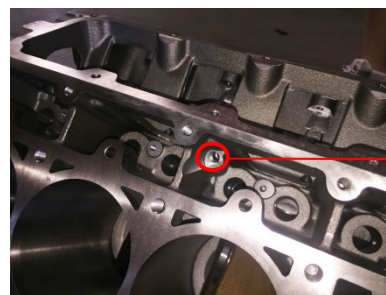
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



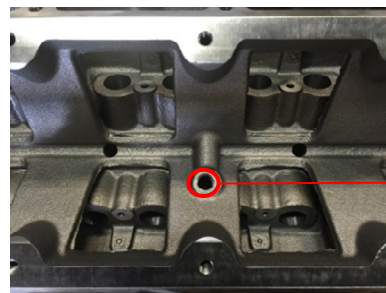
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



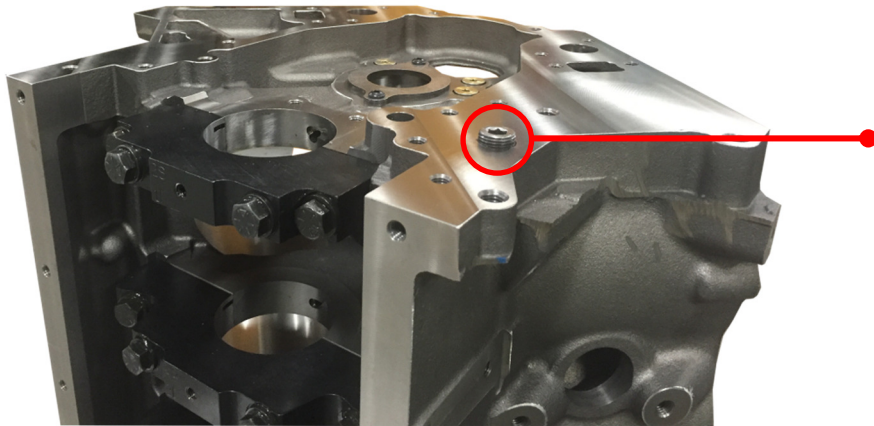
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

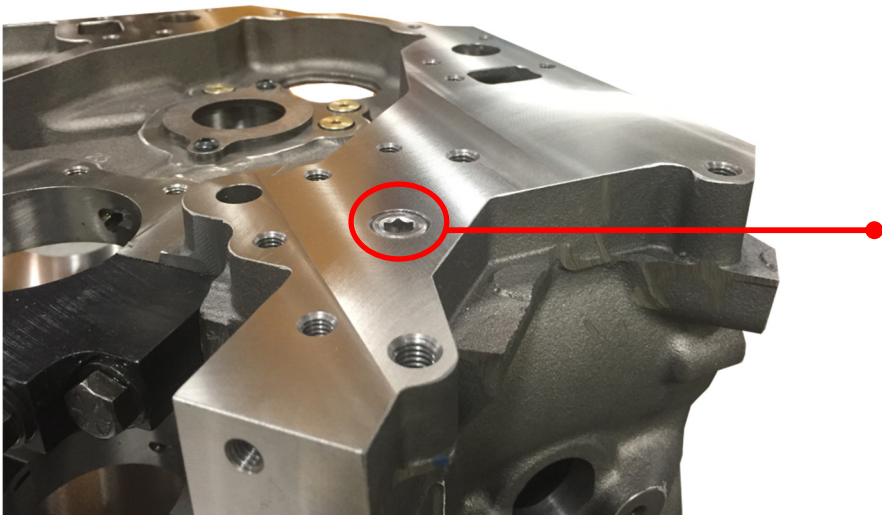


Top View of Valley Area:

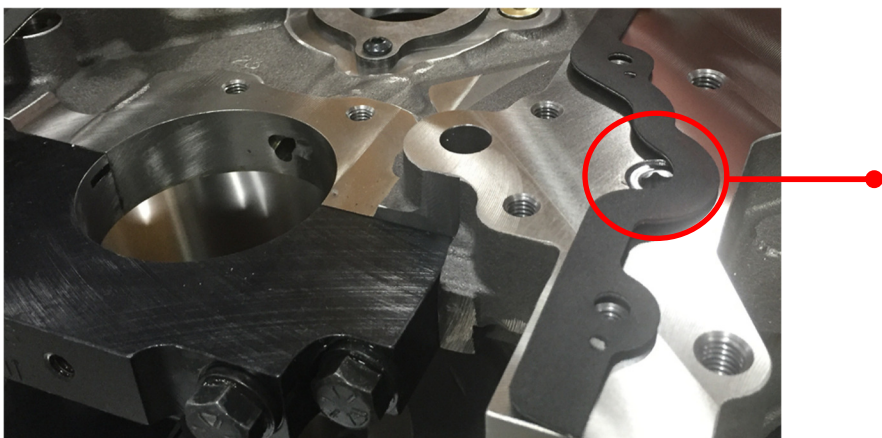
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

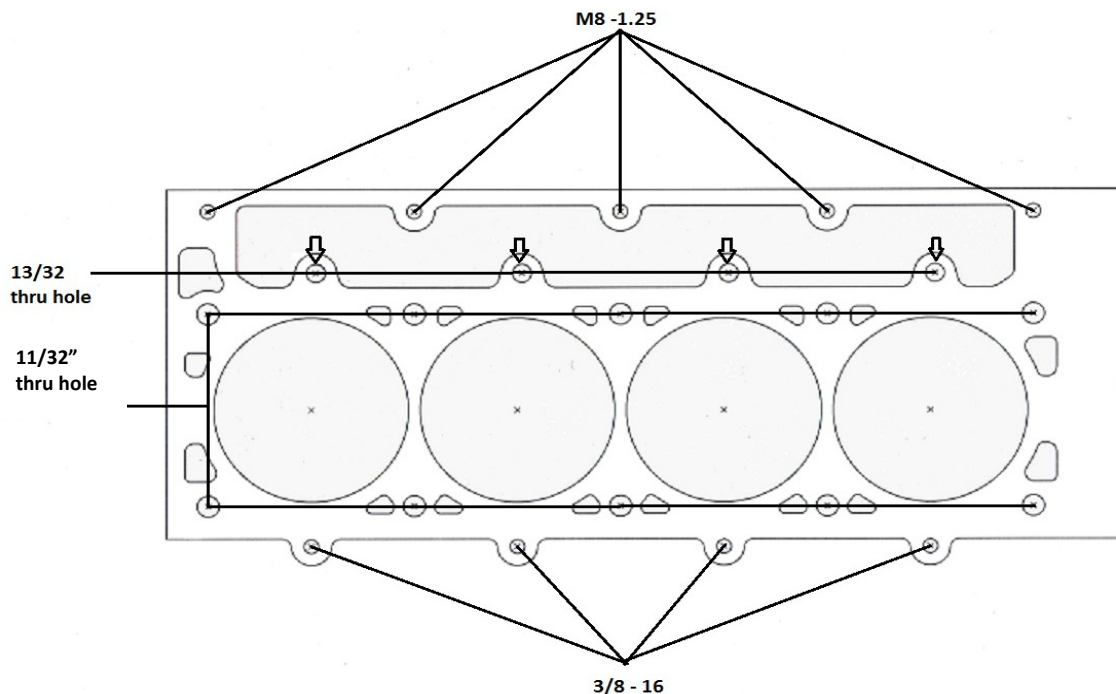
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



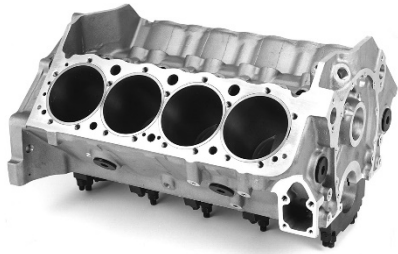
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbitt cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

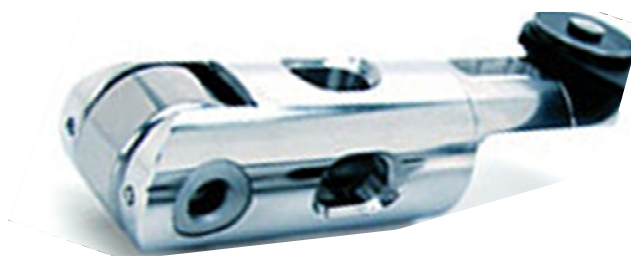


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

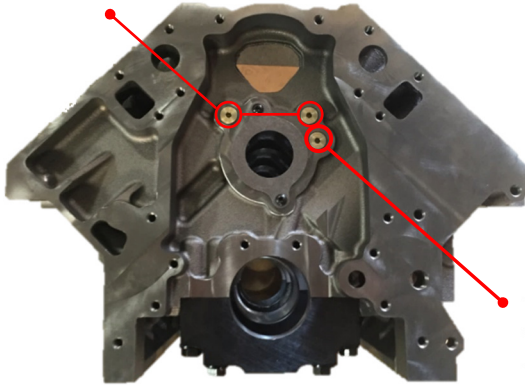
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

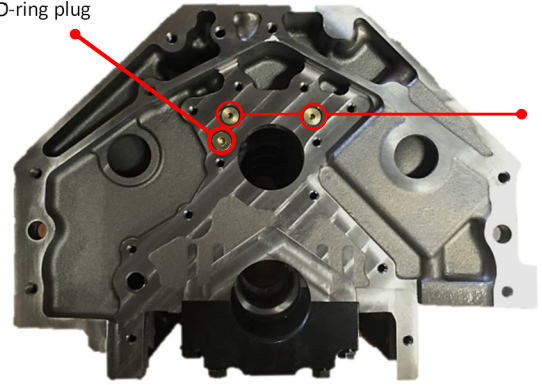
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



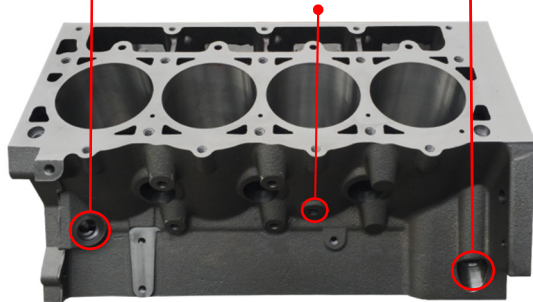
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

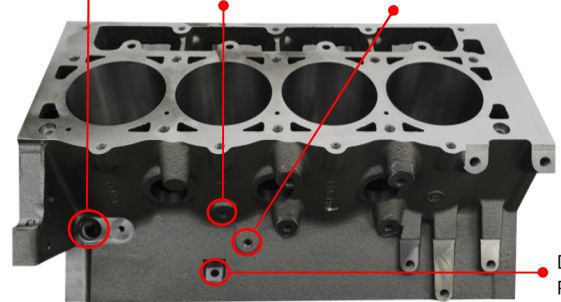


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

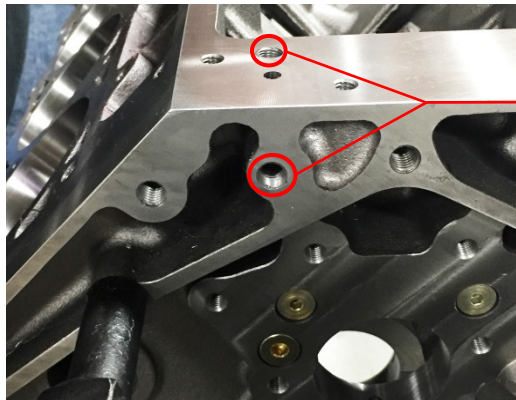
Knock sensor



SHP LS Next Passenger Side

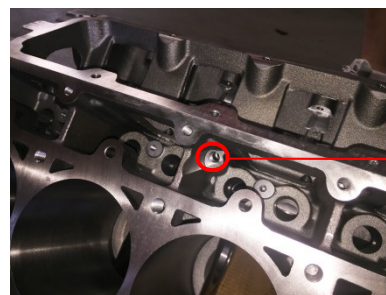
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



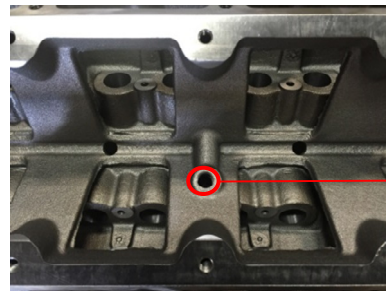
Oil Pressure Port:

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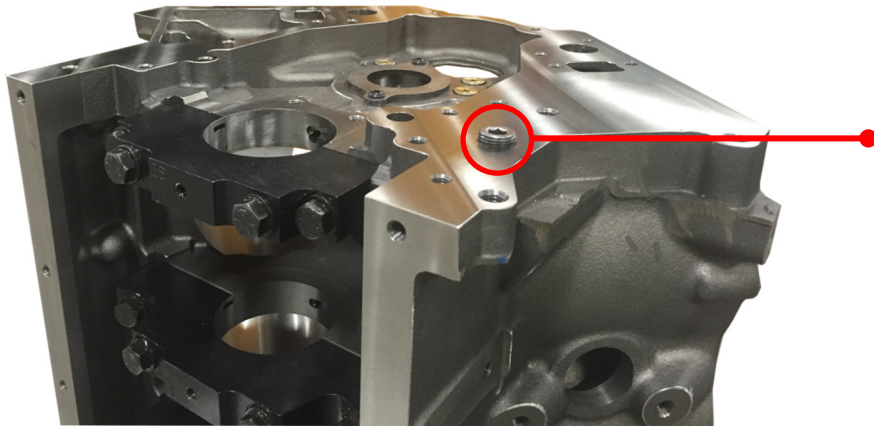
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

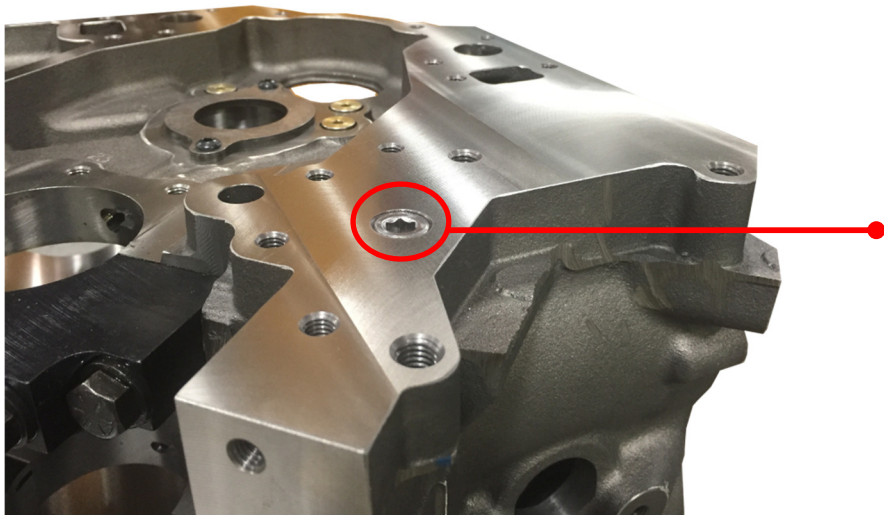


Top View of Valley Area:

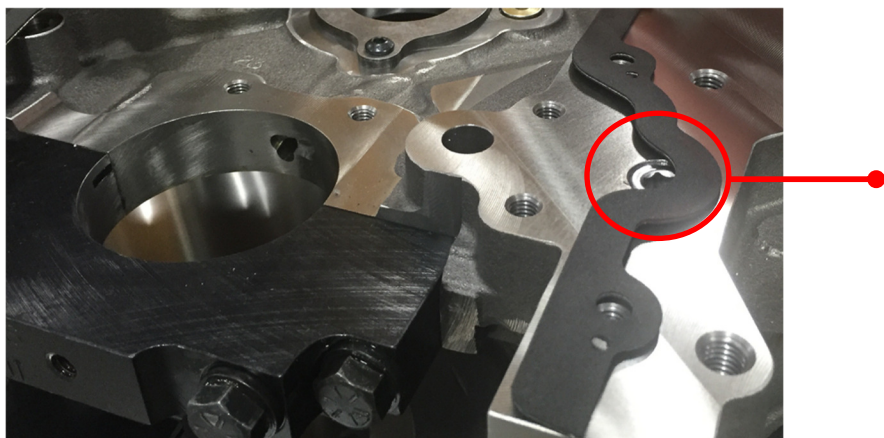
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The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

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SHP LS Next blocks have O.E. Starter mounting only.

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Head bolt holes are blind.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

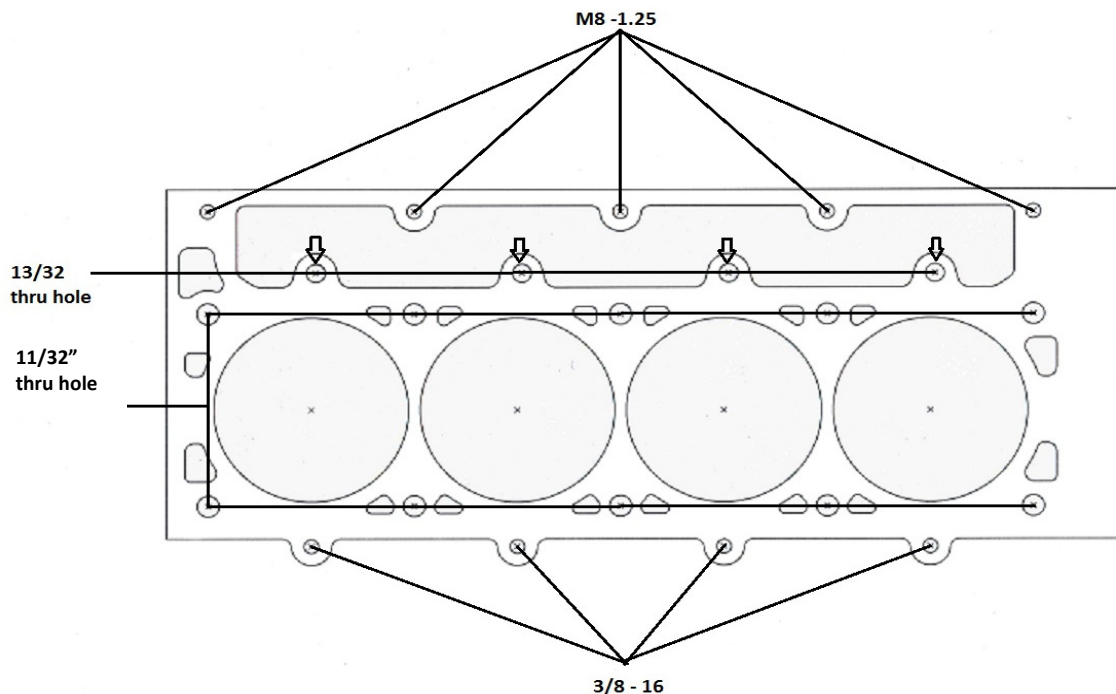
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



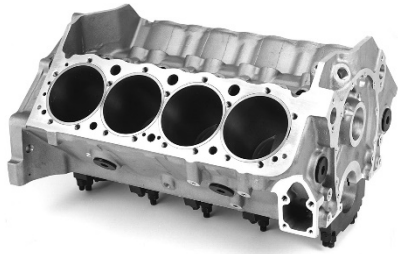
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

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- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

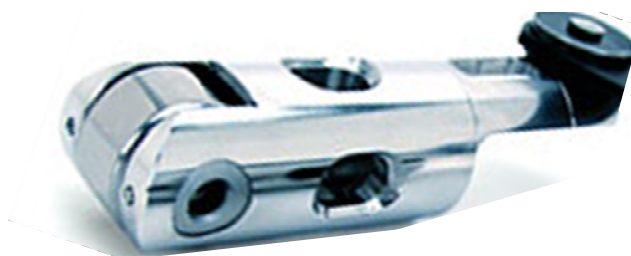


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

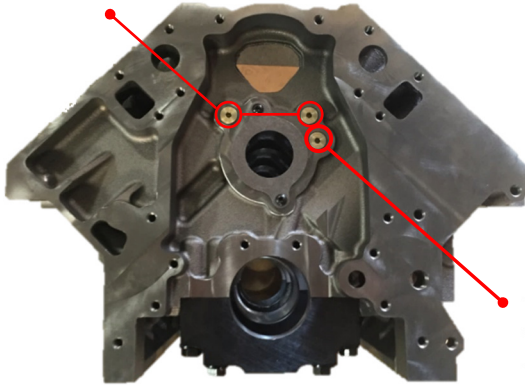
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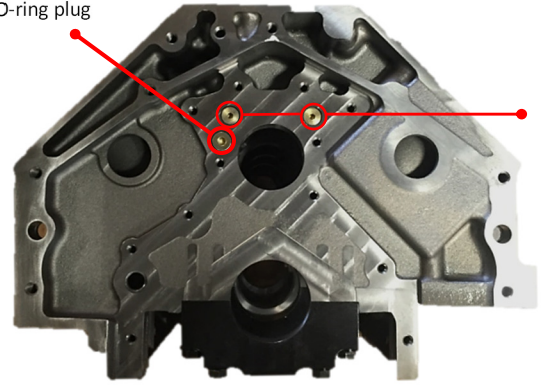
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



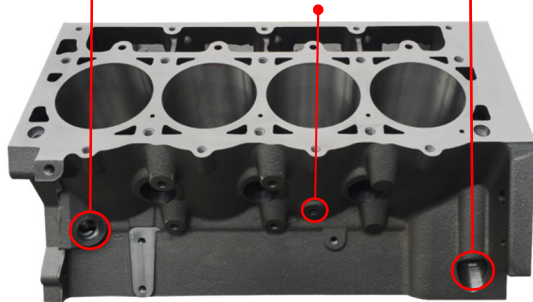
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

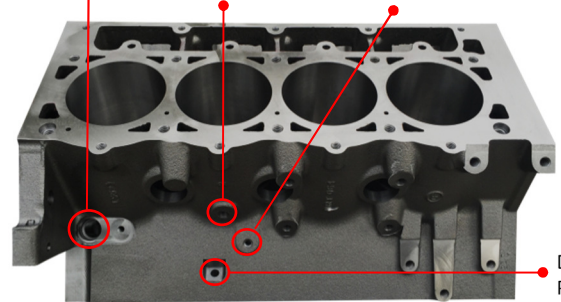


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

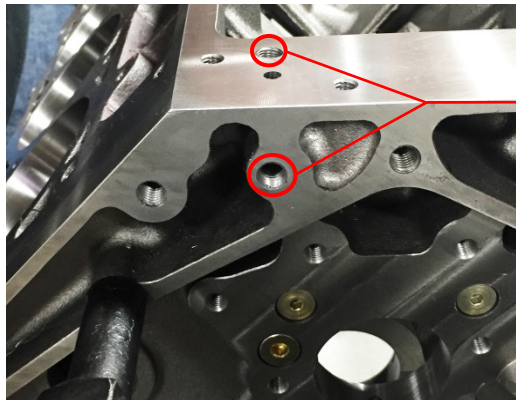
Knock sensor



SHP LS Next Passenger Side

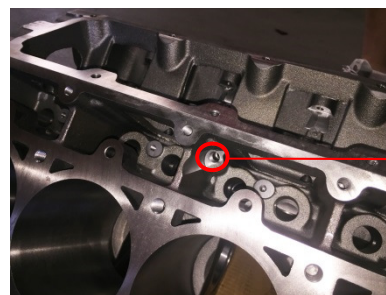
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



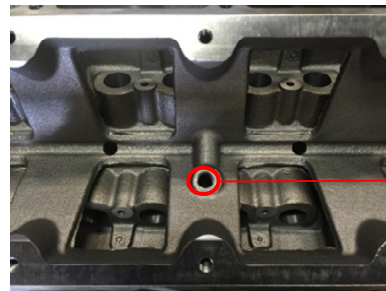
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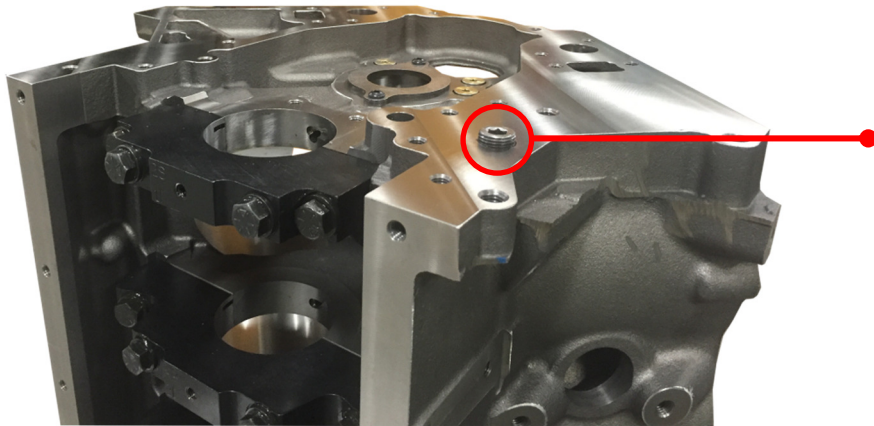
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The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

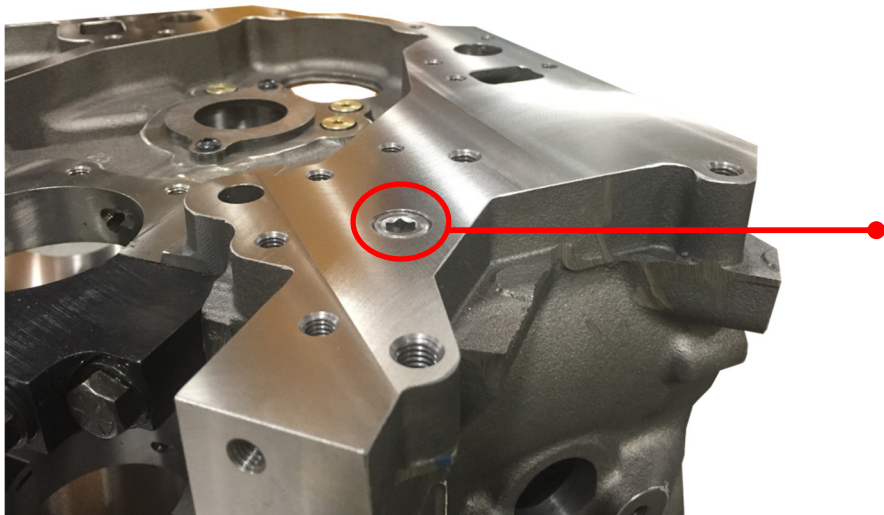


Top View of Valley Area:

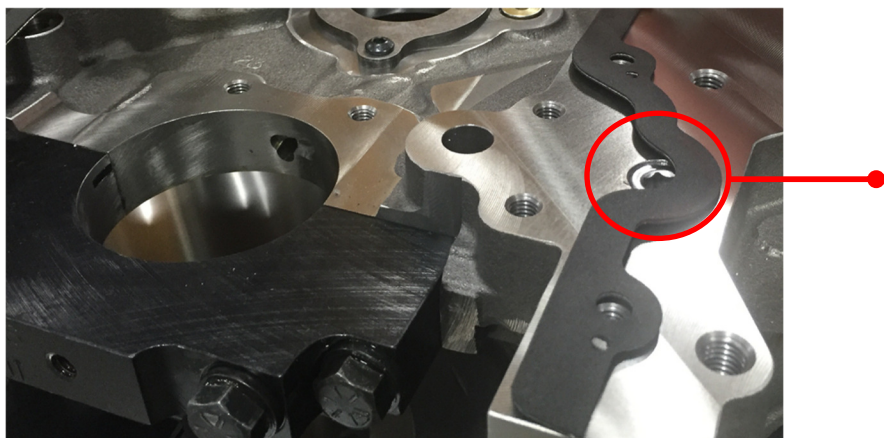
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height	.....	9.240"
Bore	.....	4.000 & 4.125
Main Bearing Size	.....	LS-1 (2.558" - 2.559")
Weight	.....	227lbs
Largest Recommended Bore	.....	4.185"
Largest Recommended Crank Stroke	.....	4.125"
Camshaft Bearing Diameter	.....	55mm babbitt
Stock Camshaft Position	.....	4.885"
Cylinder Wall Thickness, min.	.....	.215" @ 4.125"
Deck Thickness, min	.....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

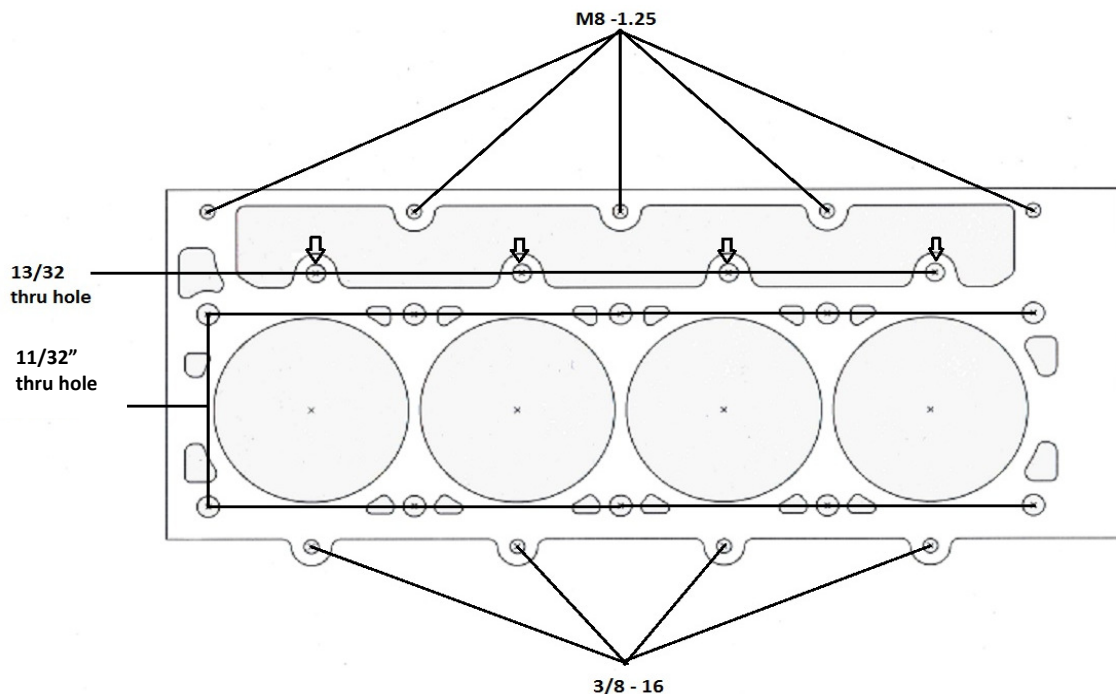
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



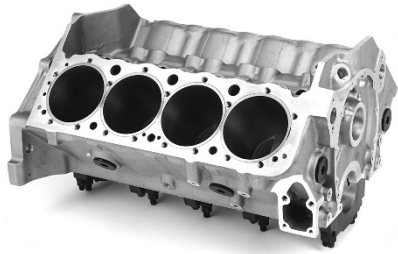
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



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Stock un-modified  
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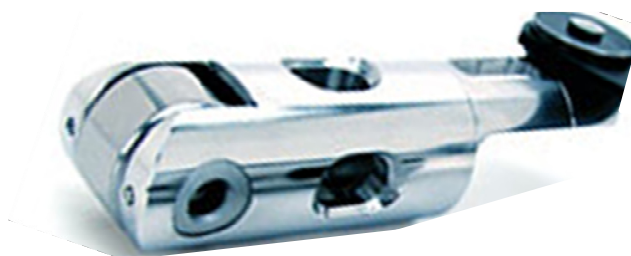


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

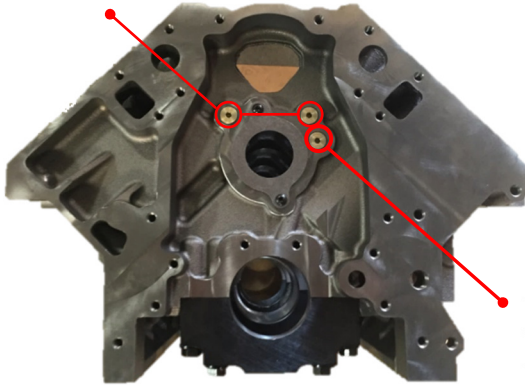
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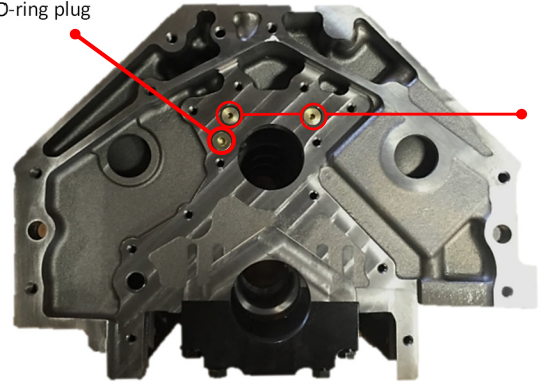
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



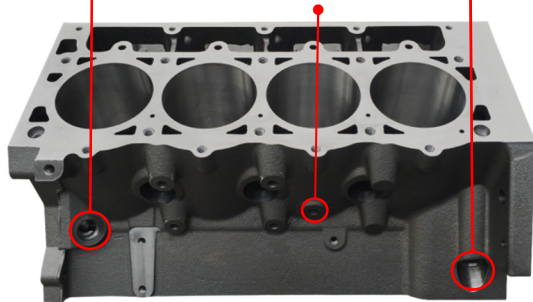
SHP LS Next Rear

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1/4" pipe / Water drain

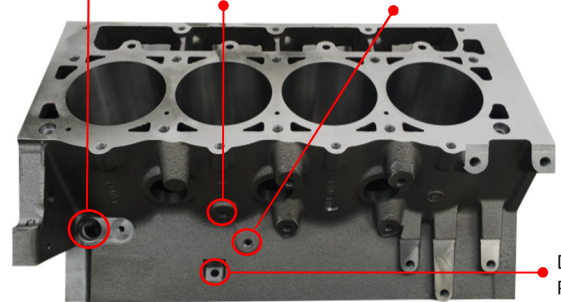


SHP LS Next Drivers Side

Crank sensor

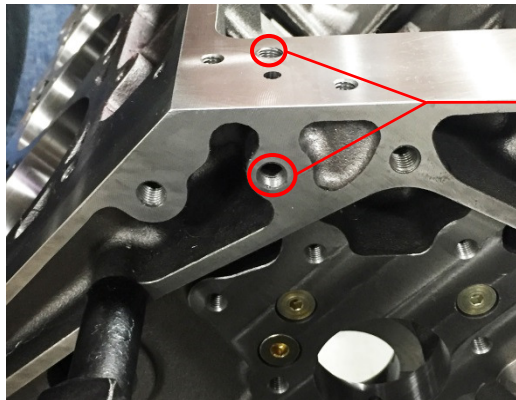
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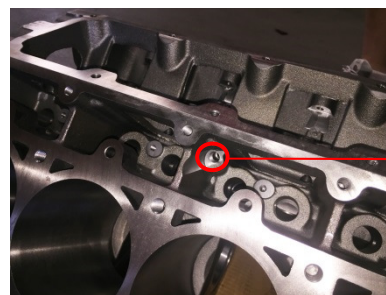
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



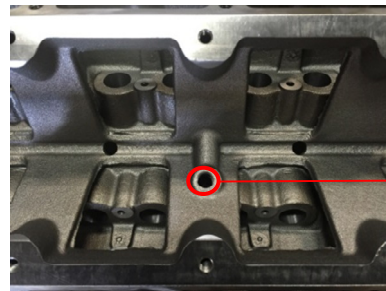
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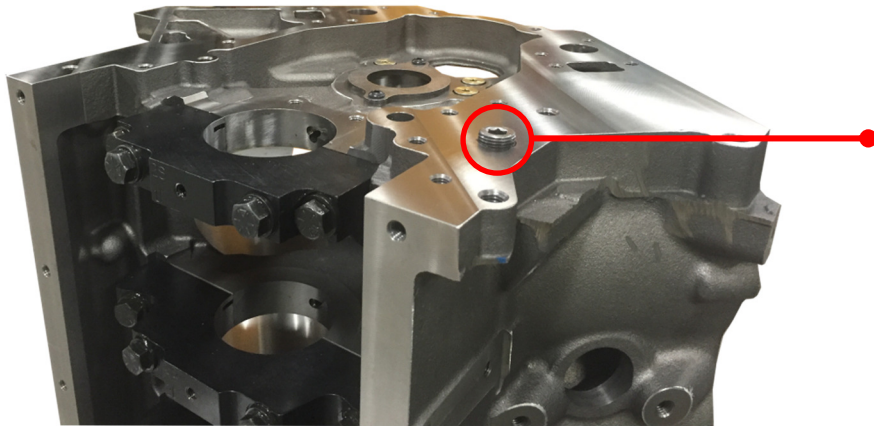
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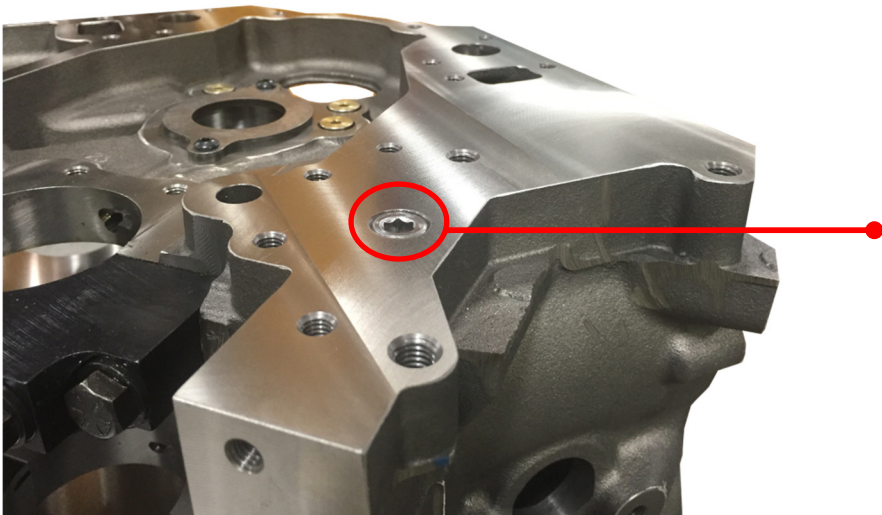


Top View of Valley Area:

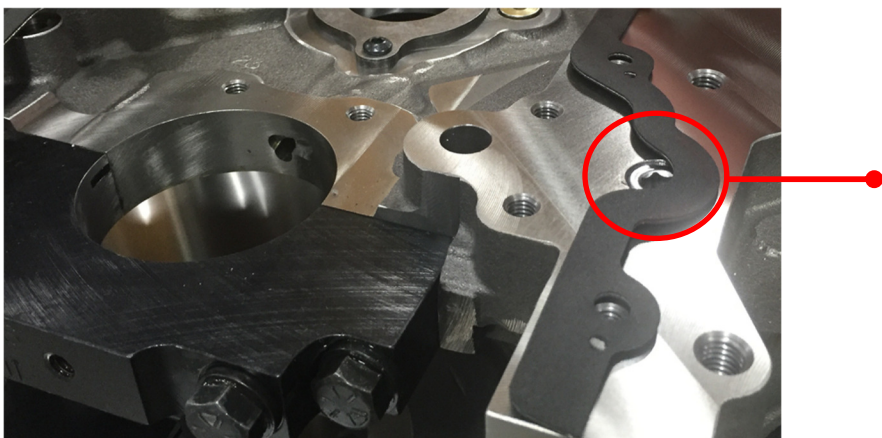
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

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7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

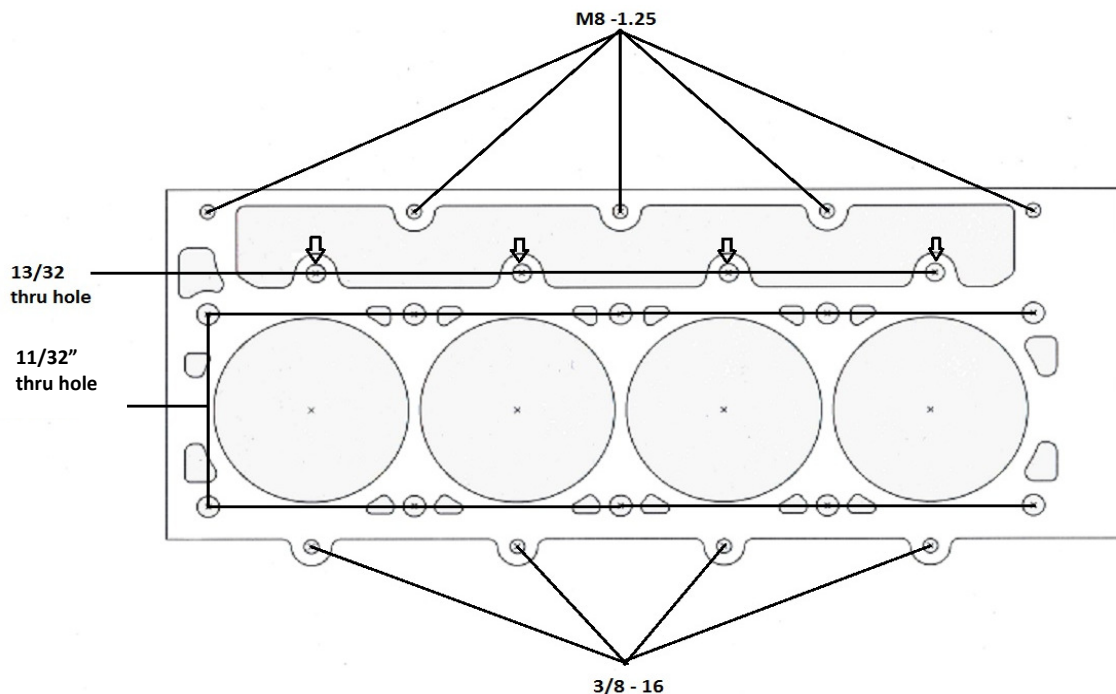
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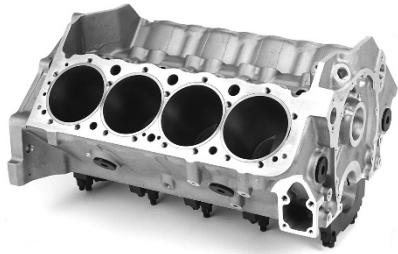
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

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Cylinder bores - Oil passages - Deck surfaces - All threads

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- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

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CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

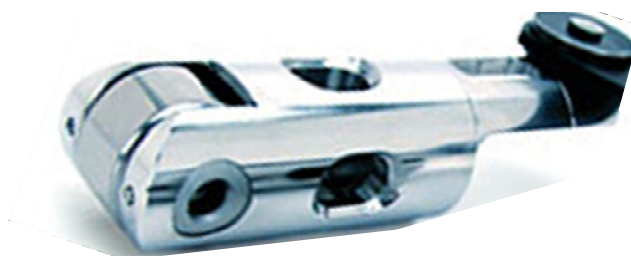


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

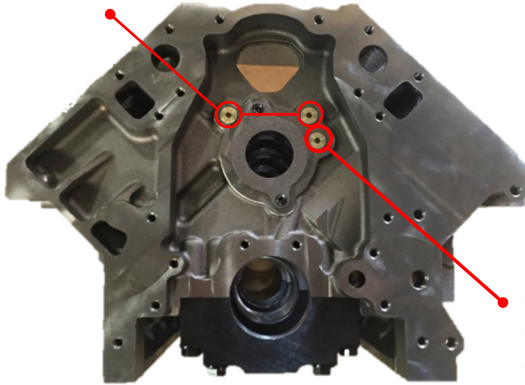
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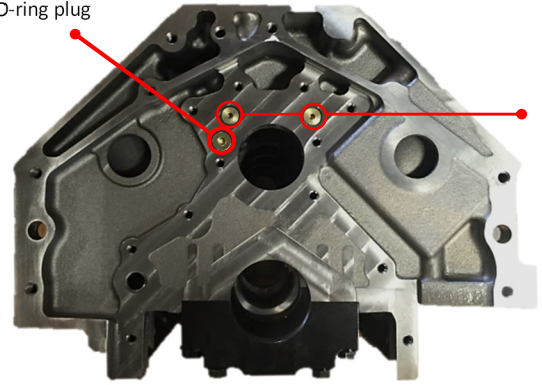
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



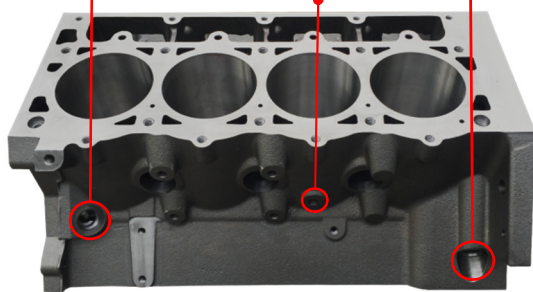
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

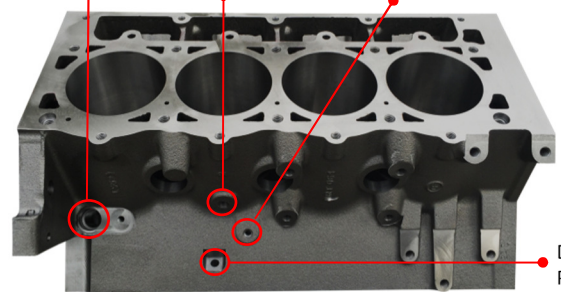


SHP LS Next Drivers Side

Crank sensor

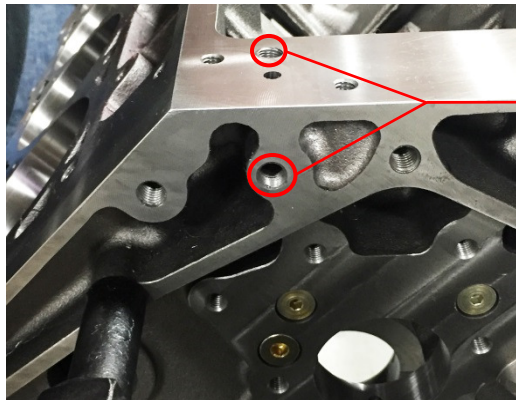
1/4" pipe / Water drain

Knock sensor



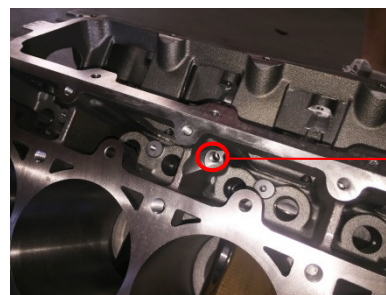
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



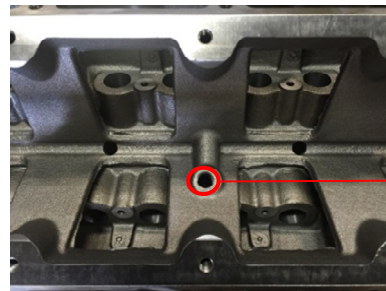
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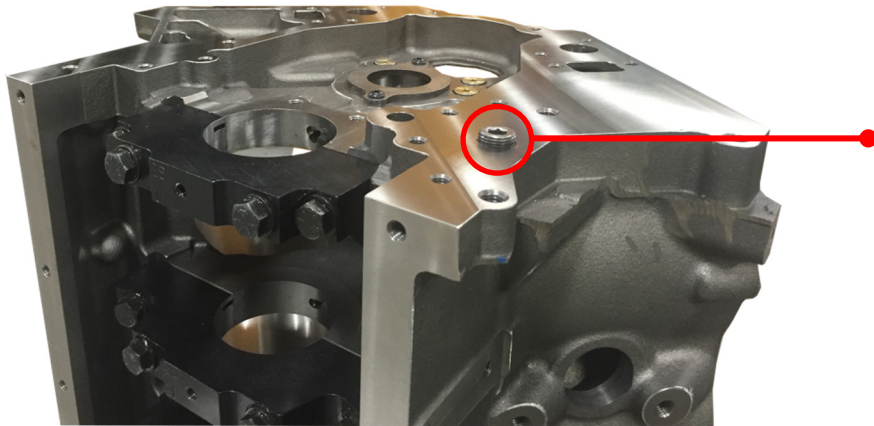
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

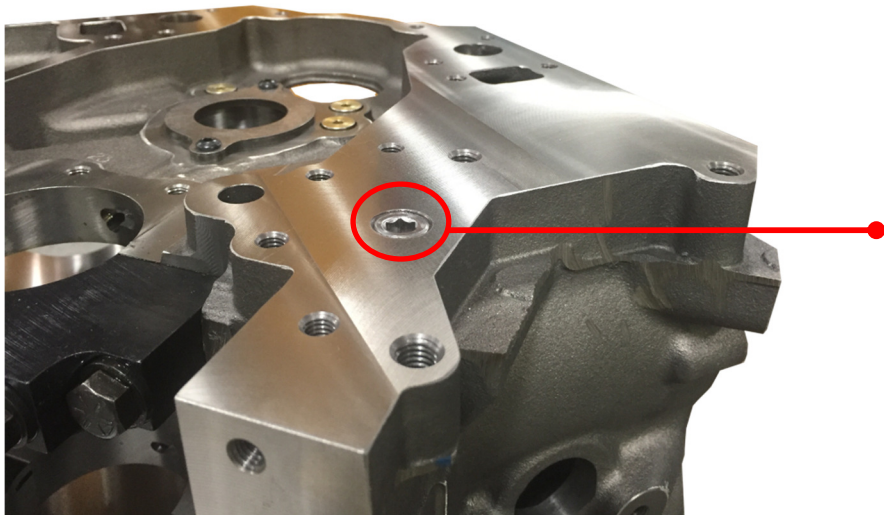


Top View of Valley Area:

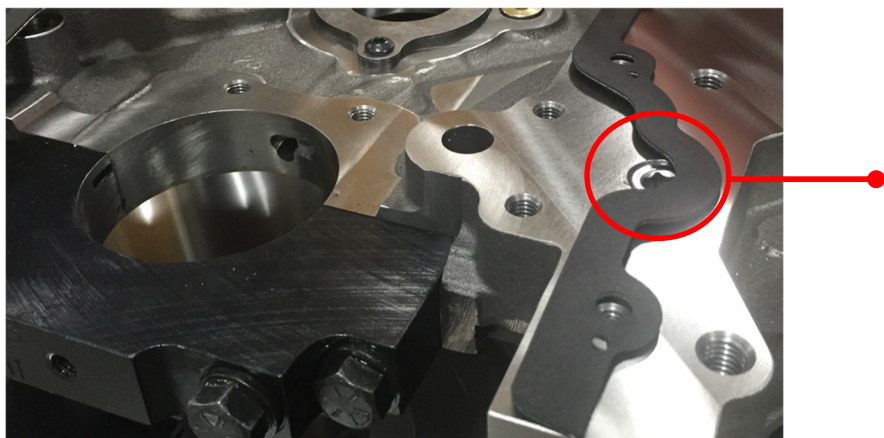
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The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

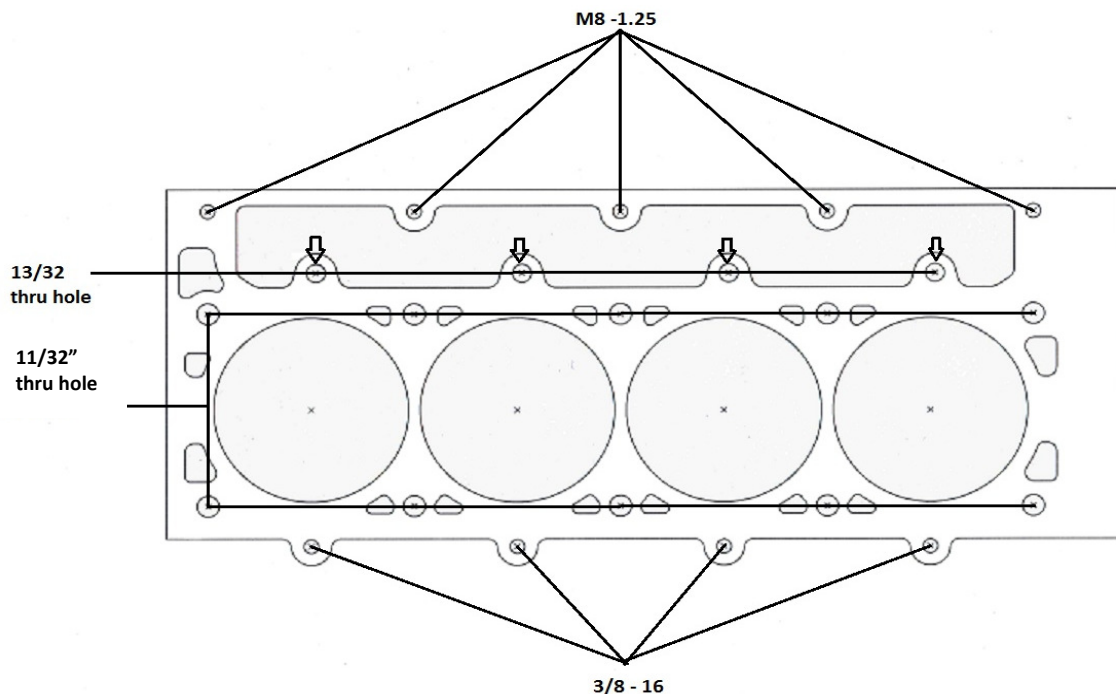
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



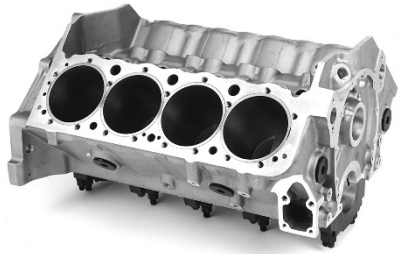
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
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<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
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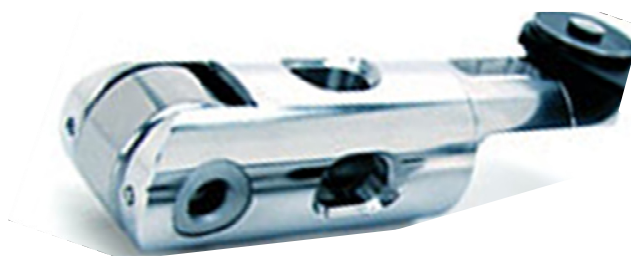


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

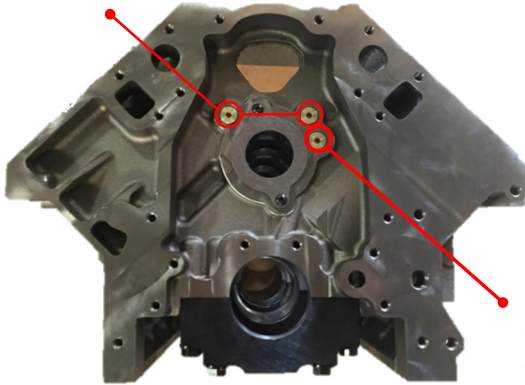
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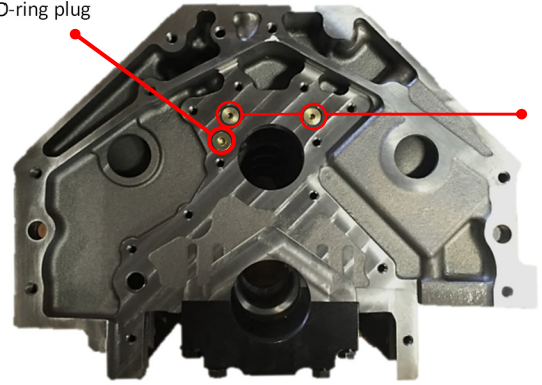
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



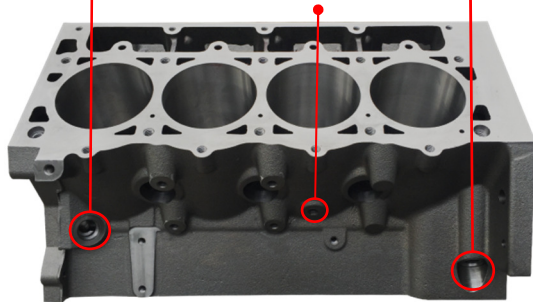
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

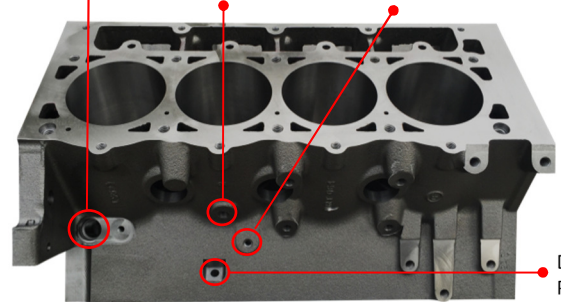


SHP LS Next Drivers Side

Crank sensor

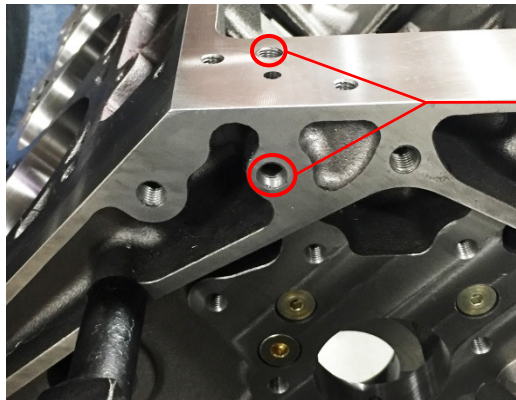
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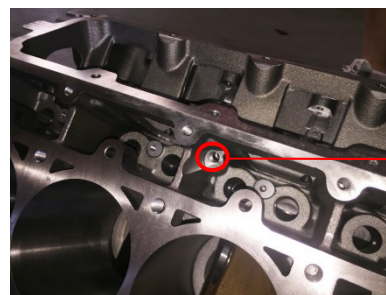
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



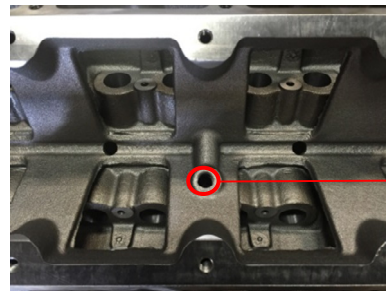
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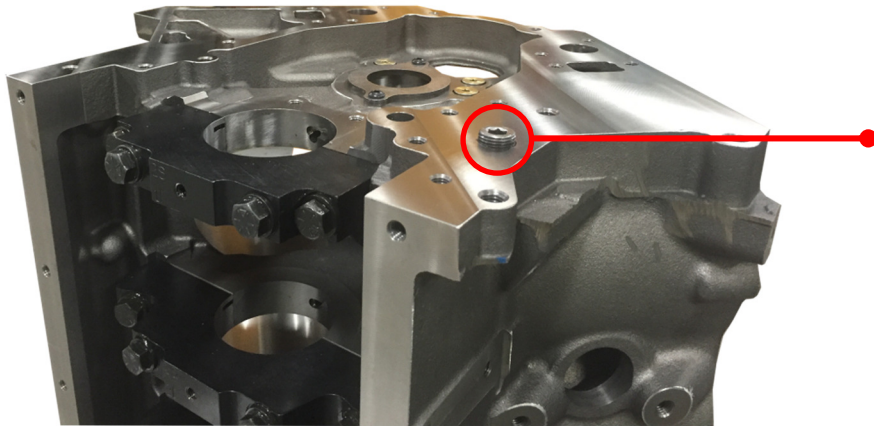
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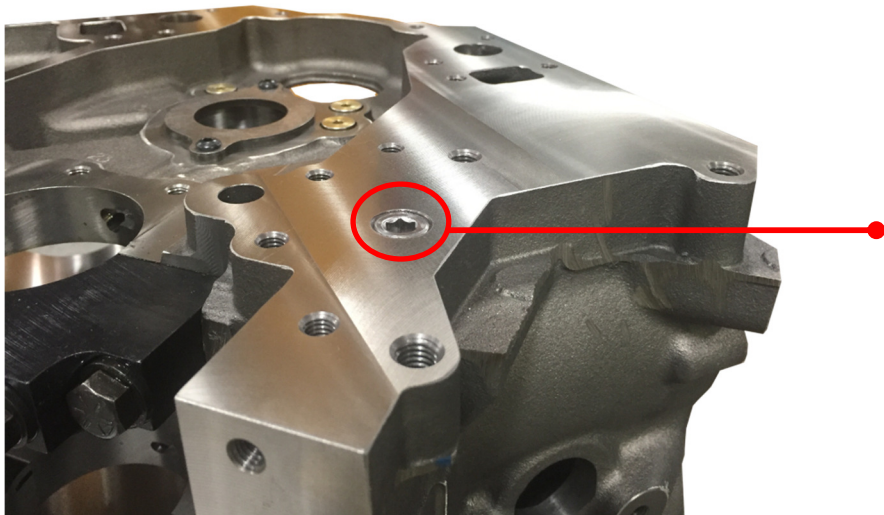


Top View of Valley Area:

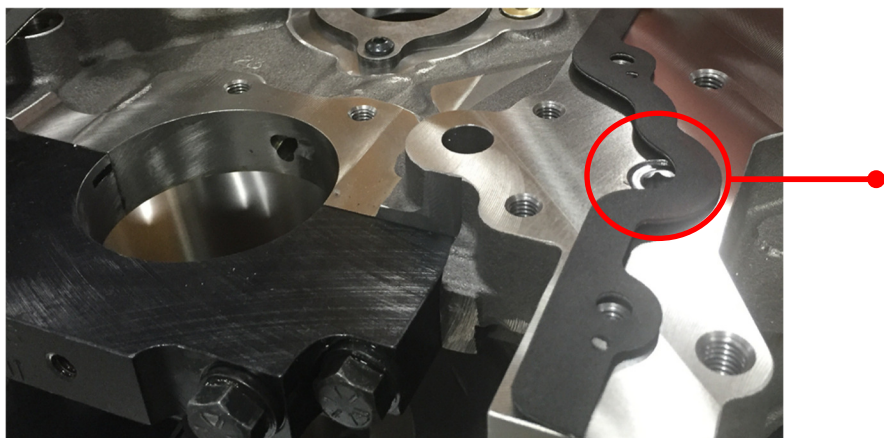
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Largest Recommended Crank Stroke .....	4.125"
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Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

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7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

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Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

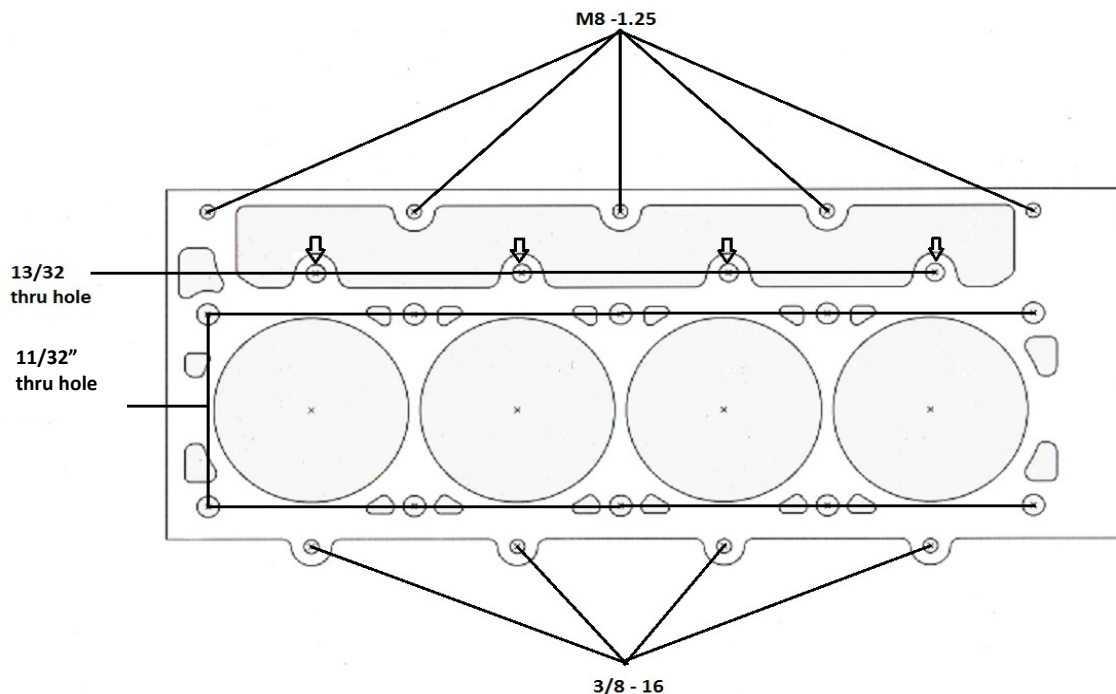
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



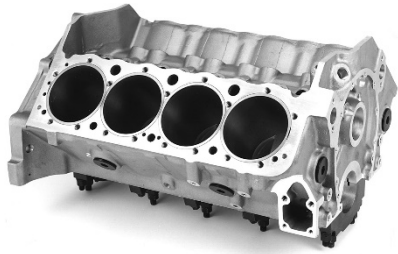
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

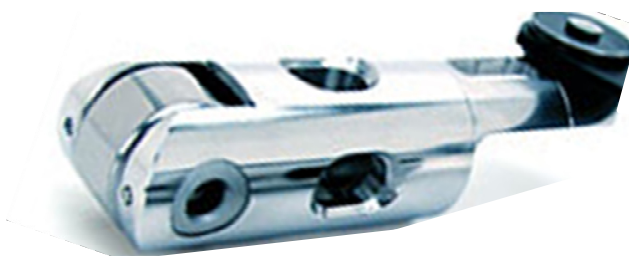


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

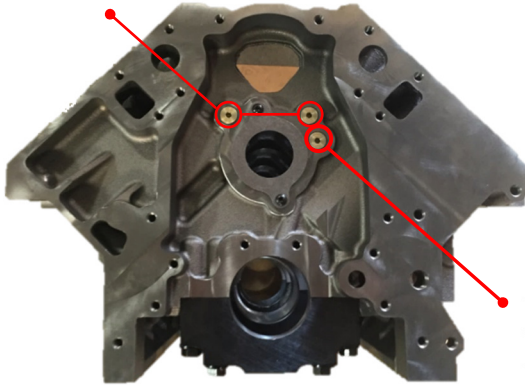
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

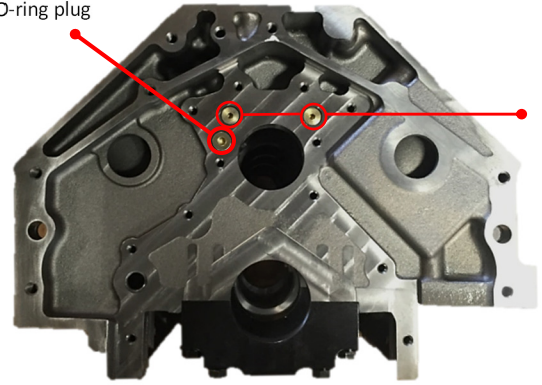
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



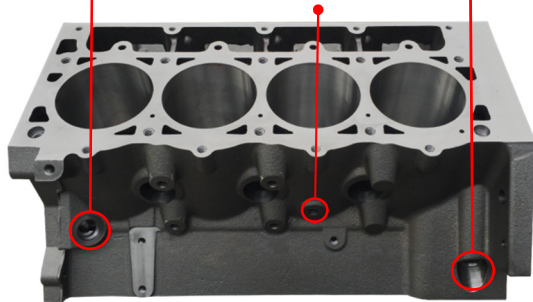
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

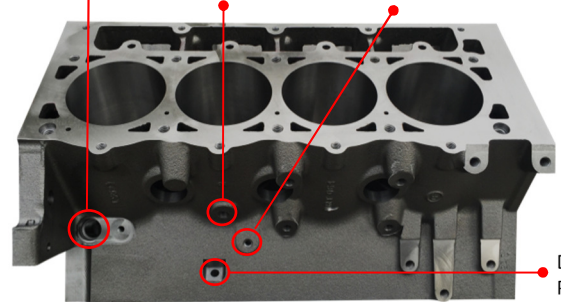


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

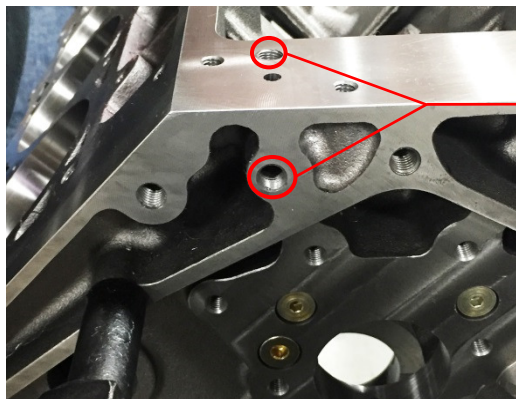
Knock sensor



SHP LS Next Passenger Side

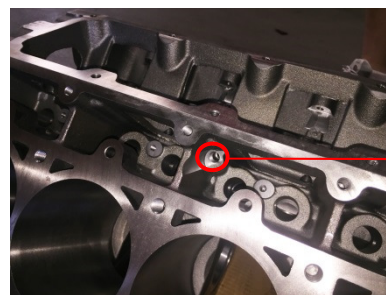
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



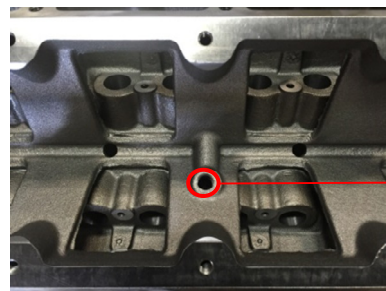
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



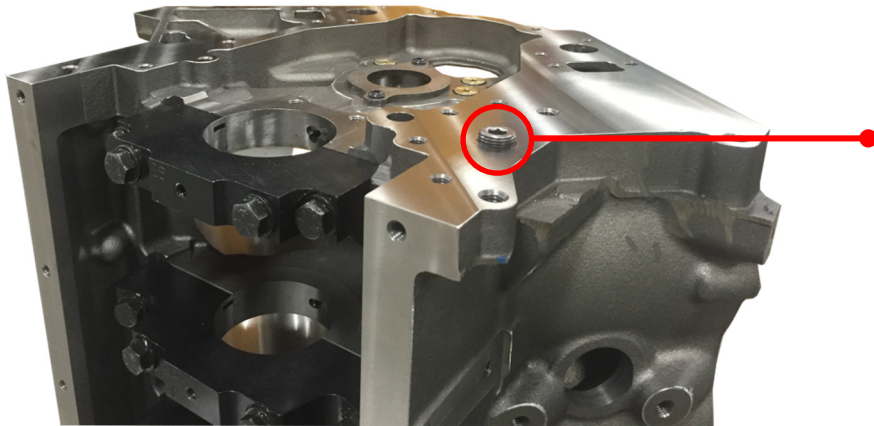
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

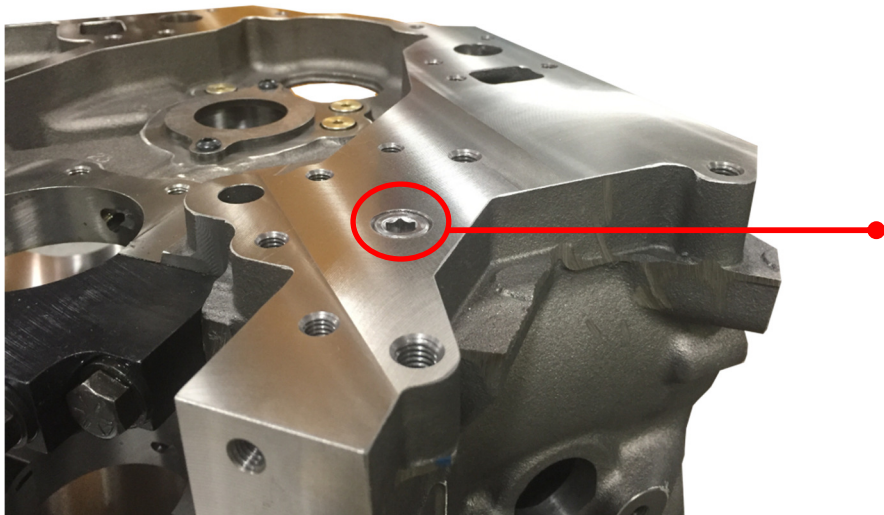


Top View of Valley Area:

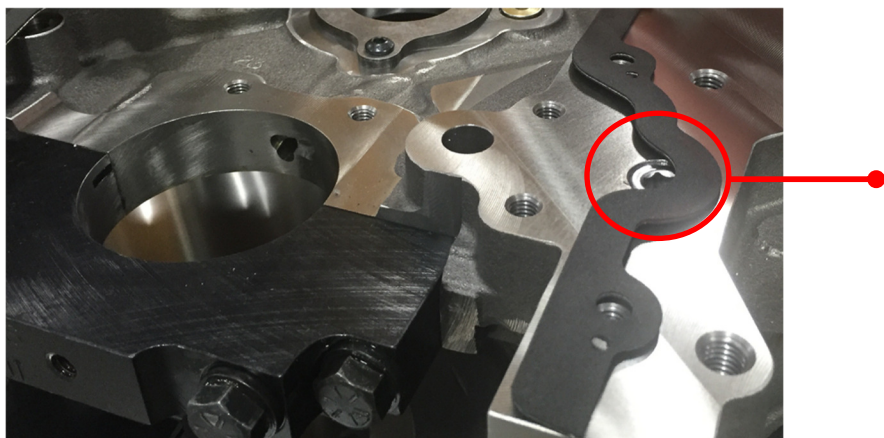
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

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SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

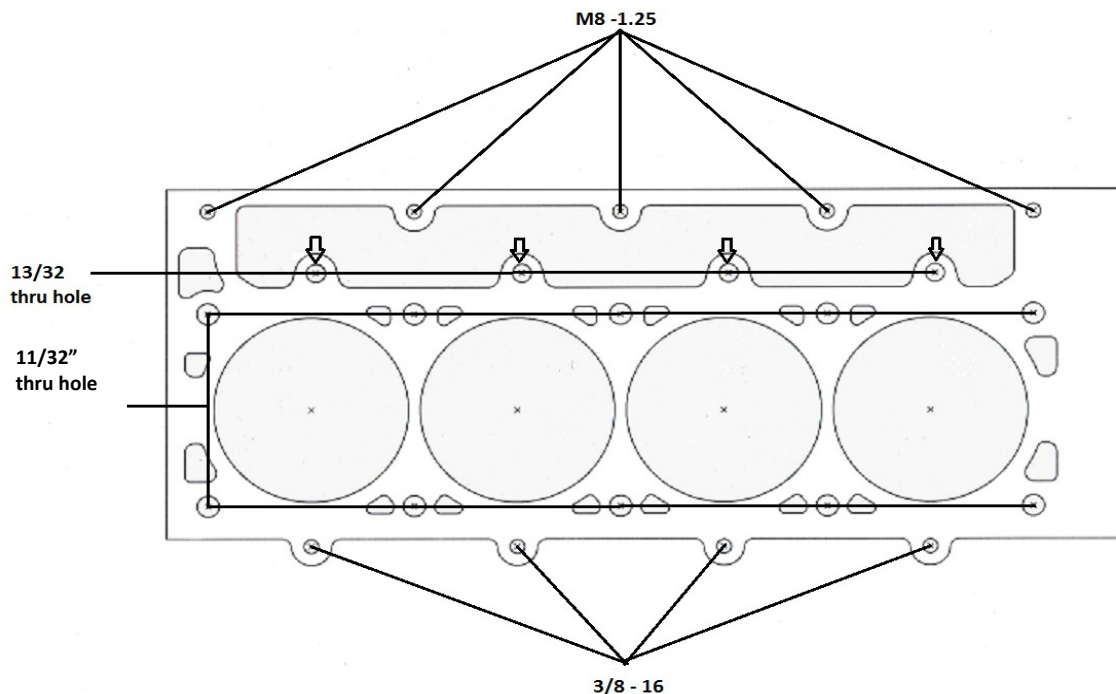
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



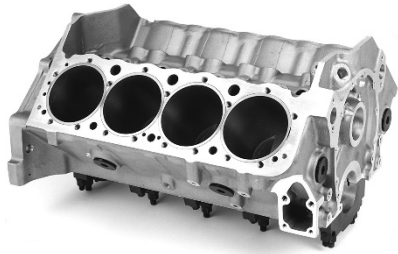
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Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
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## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
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<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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Upon receiving this block it should be thoroughly inspected for shipping damage.

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**Figure 1:**  
Stock un-modified  
solid roller lifters

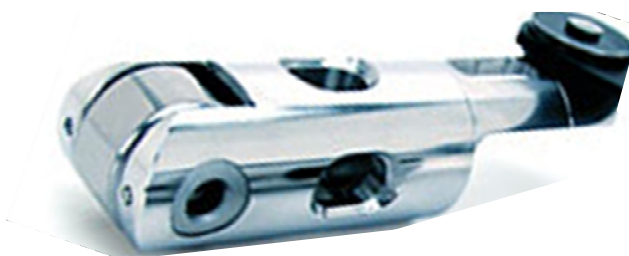


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

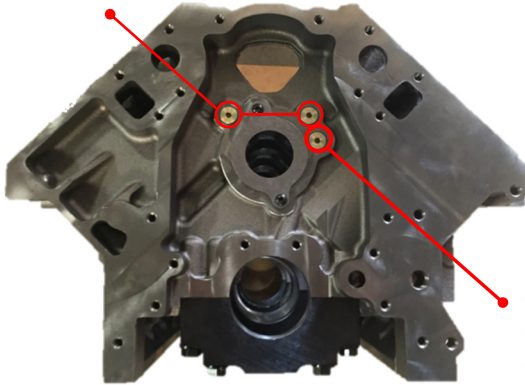
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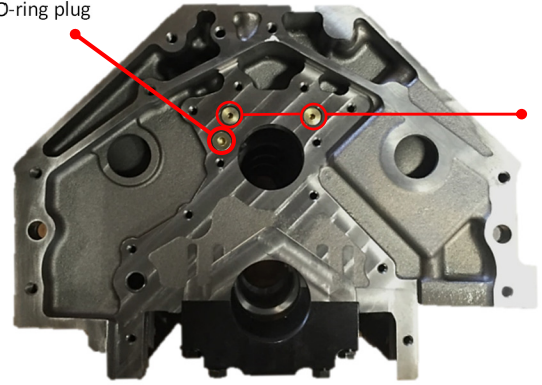
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



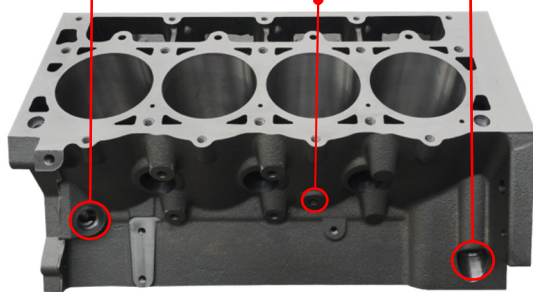
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

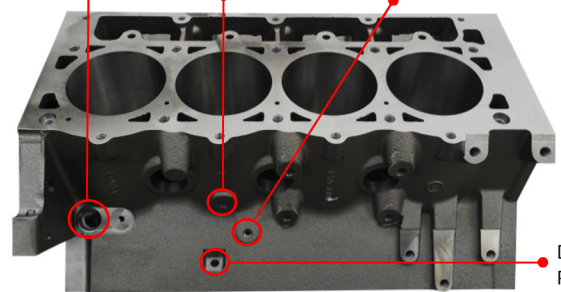


SHP LS Next Drivers Side

Crank sensor

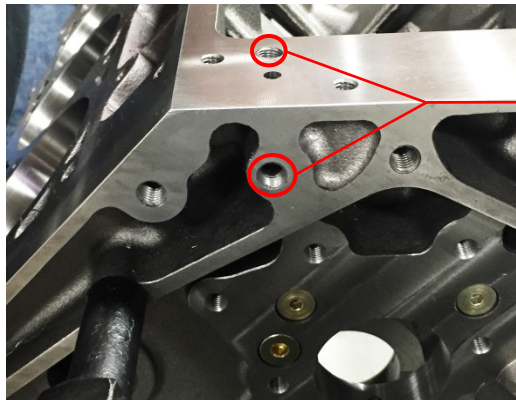
1/4" pipe / Water drain

Knock sensor



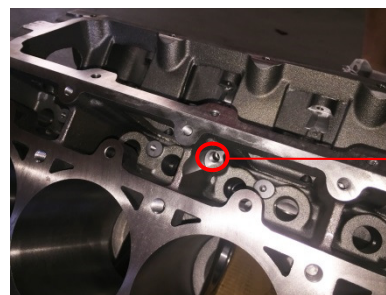
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



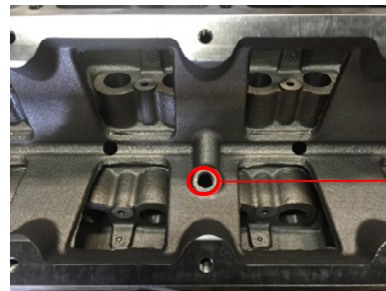
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



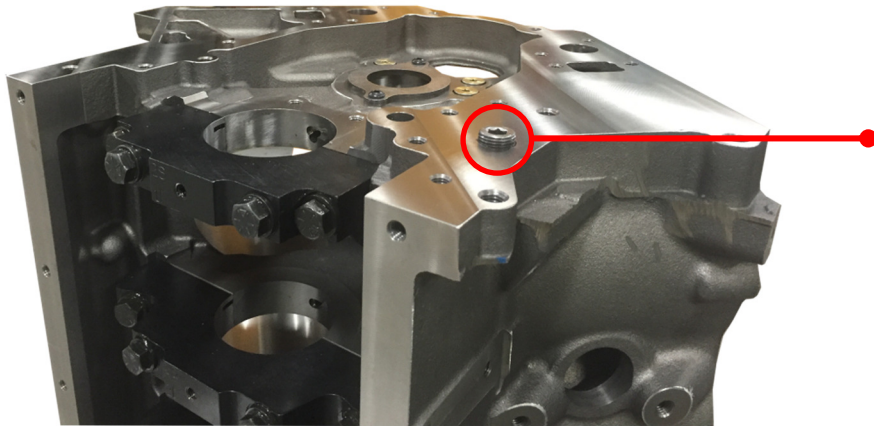
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

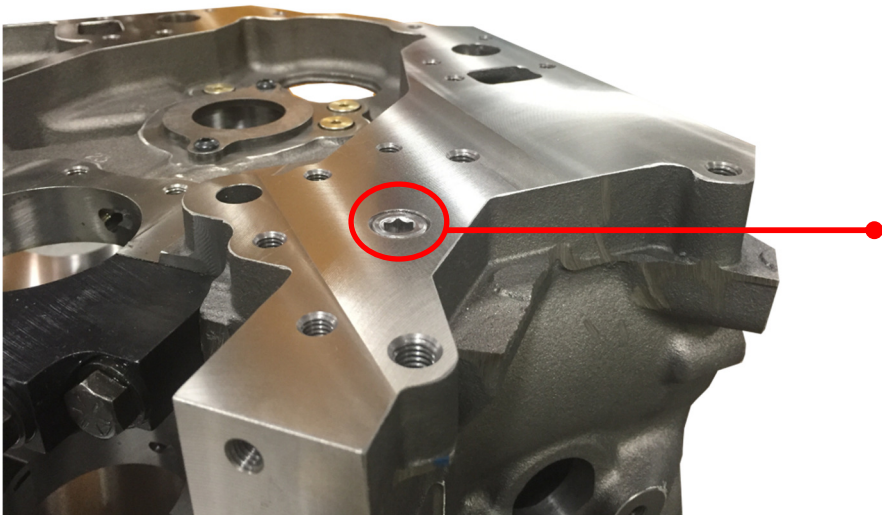


Top View of Valley Area:

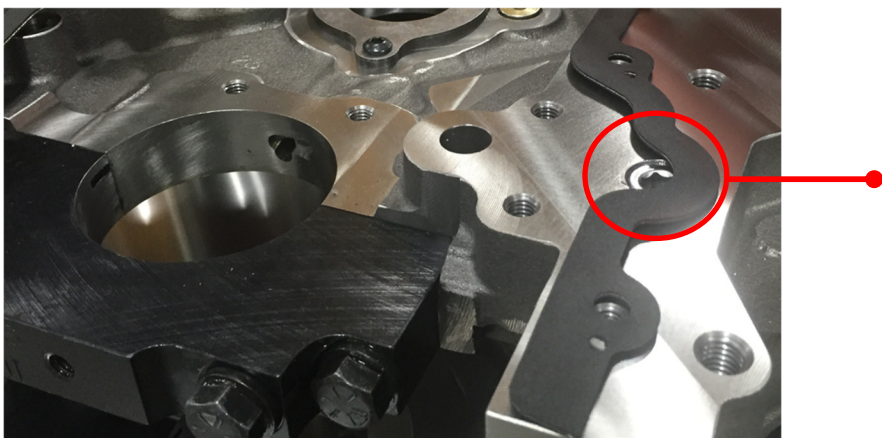
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

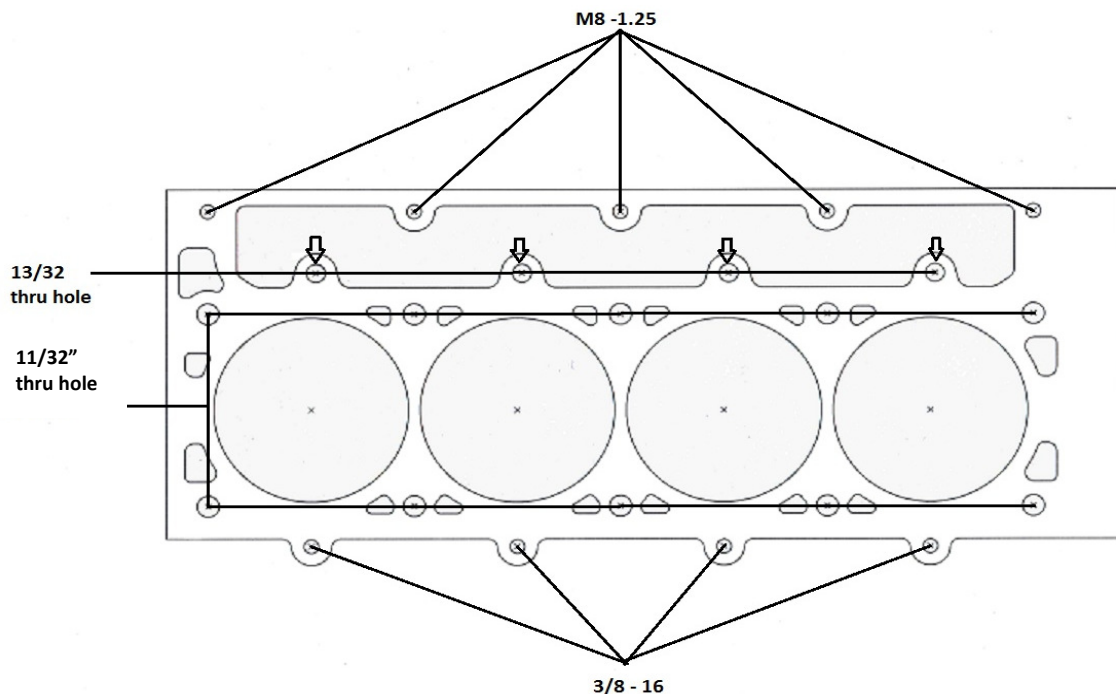
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



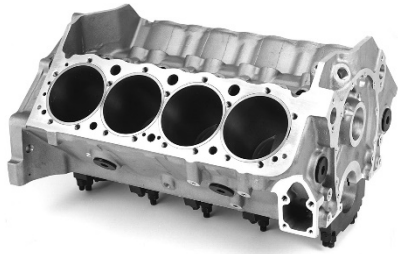
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

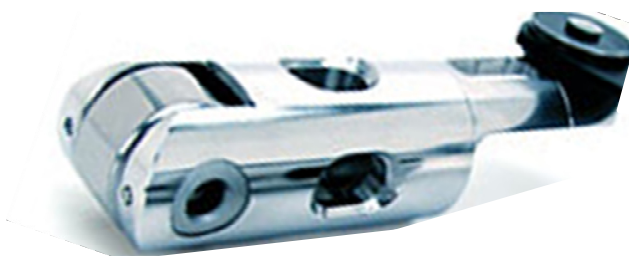


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

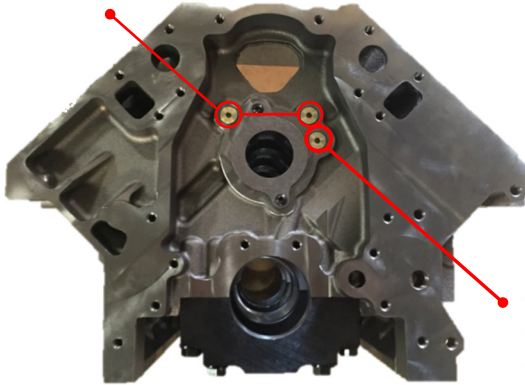
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

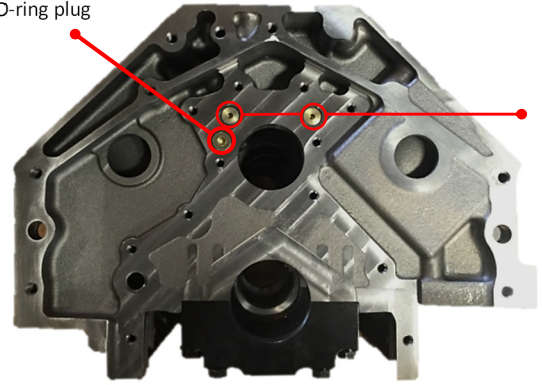
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



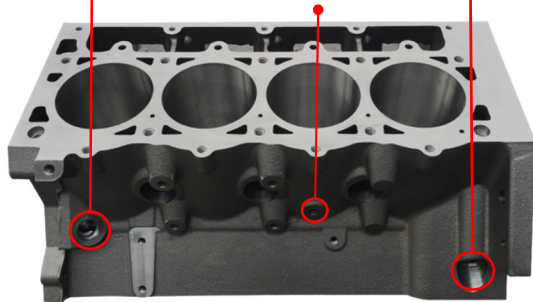
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

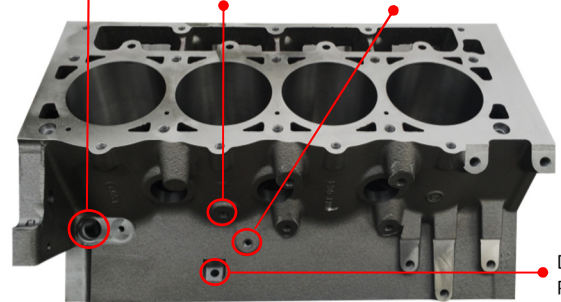


SHP LS Next Drivers Side

Crank sensor

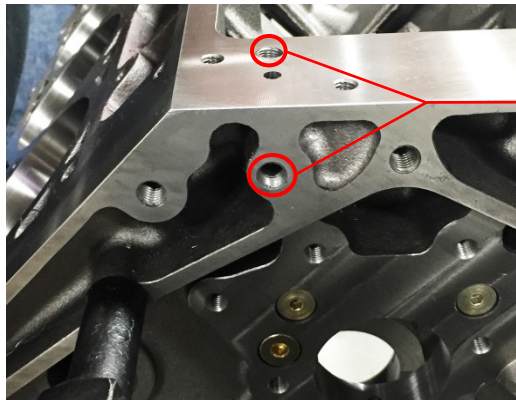
1/4" pipe / Water drain

Knock sensor



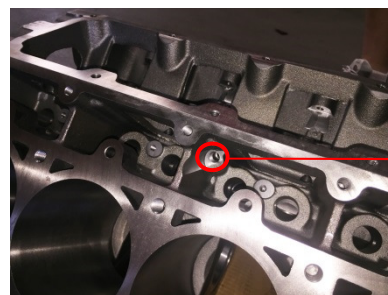
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



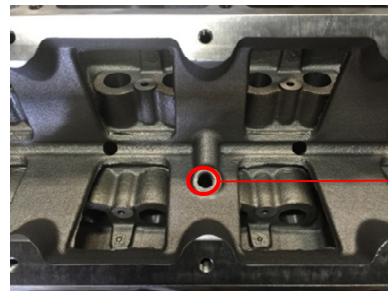
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



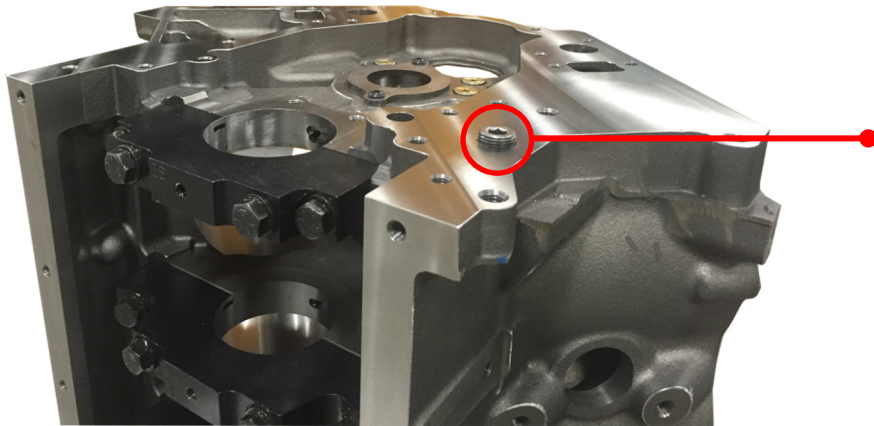
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

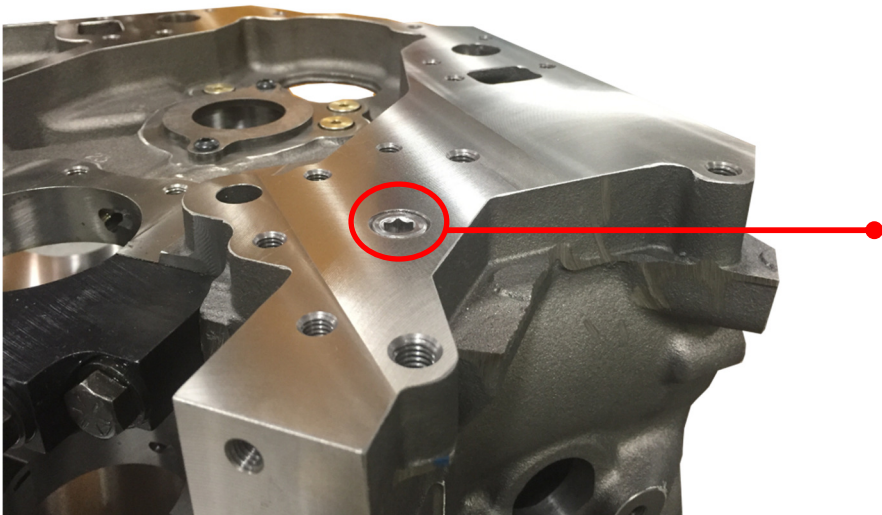


Top View of Valley Area:

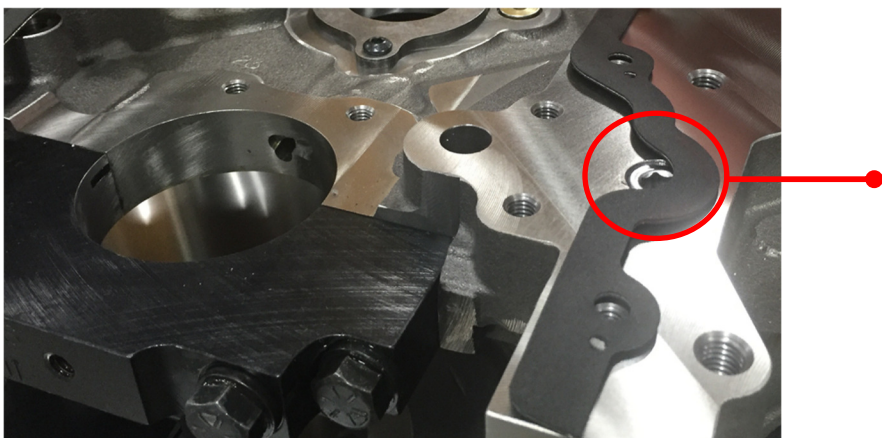
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

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SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

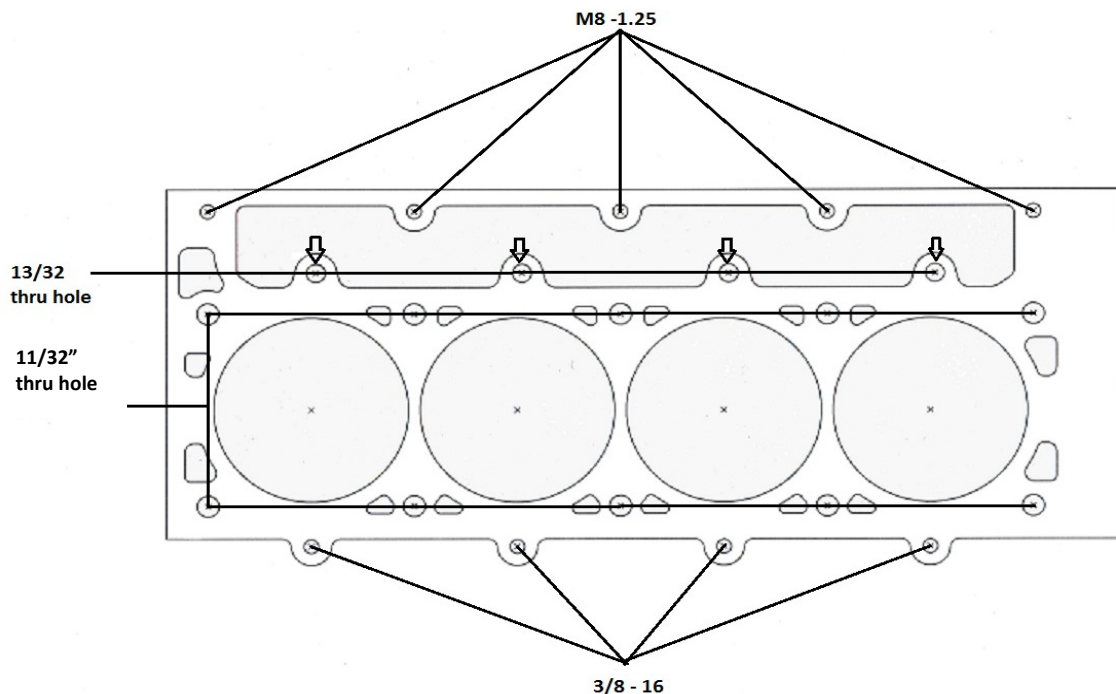
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



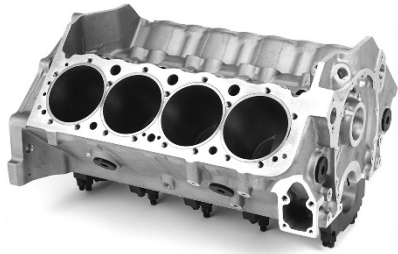
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

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## **MEASURING & MACHINING**

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**Figure 1:**  
Stock un-modified  
solid roller lifters

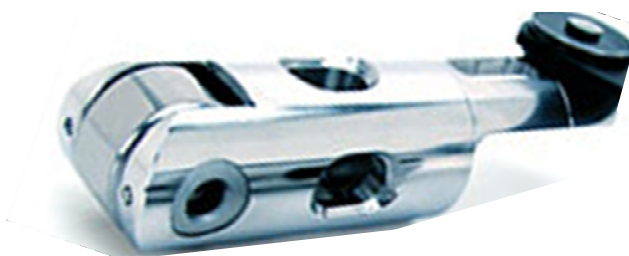


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

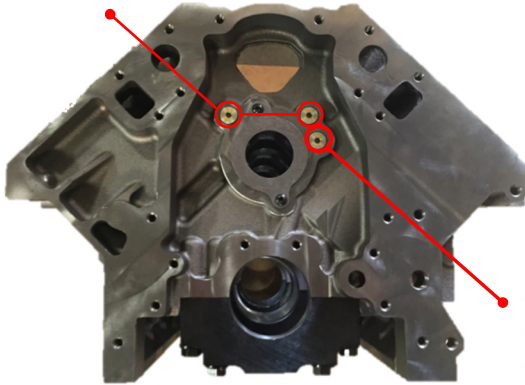
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

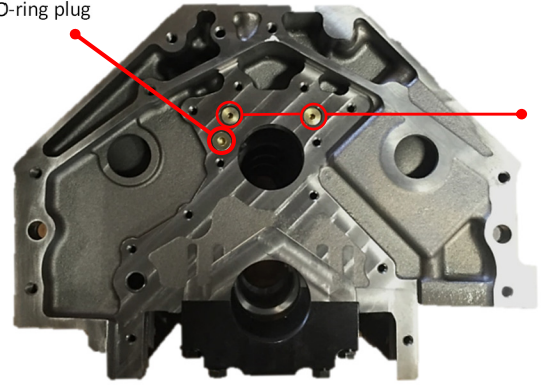
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



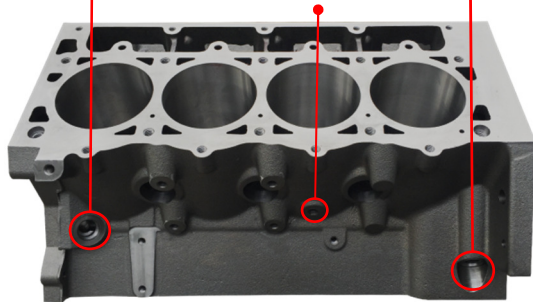
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

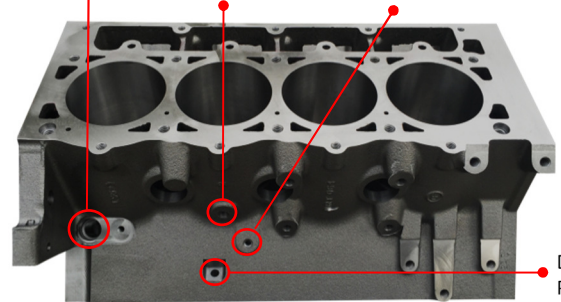


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

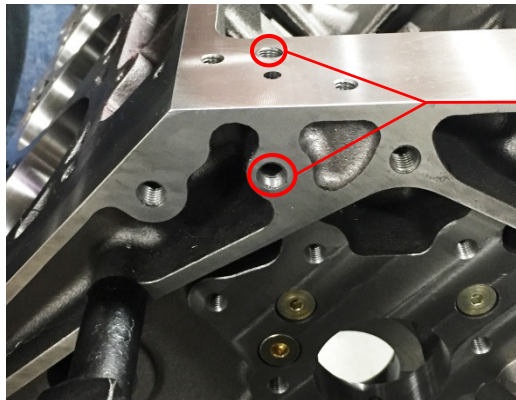
Knock sensor



SHP LS Next Passenger Side

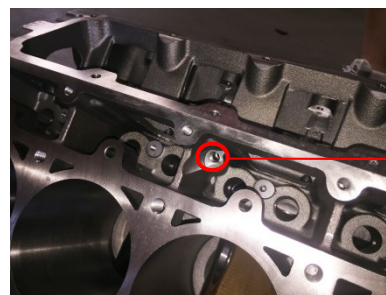
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



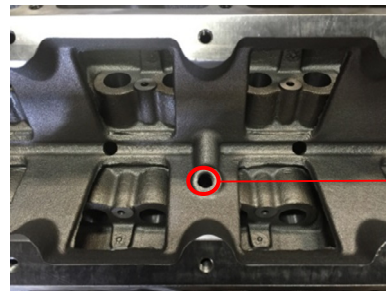
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



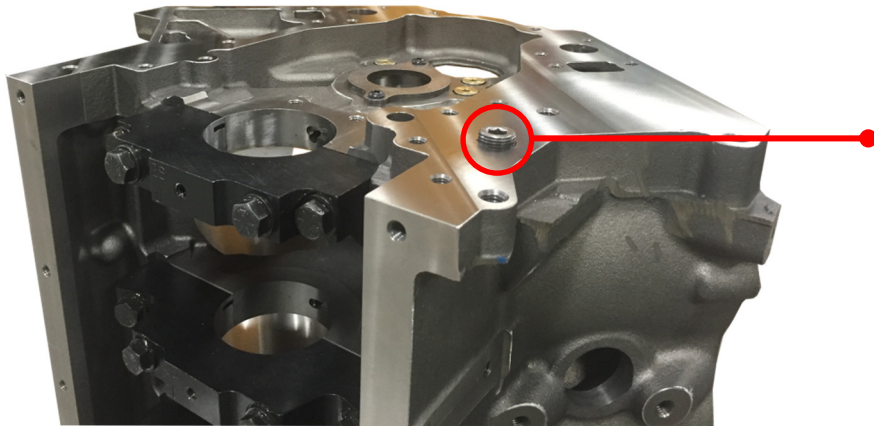
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

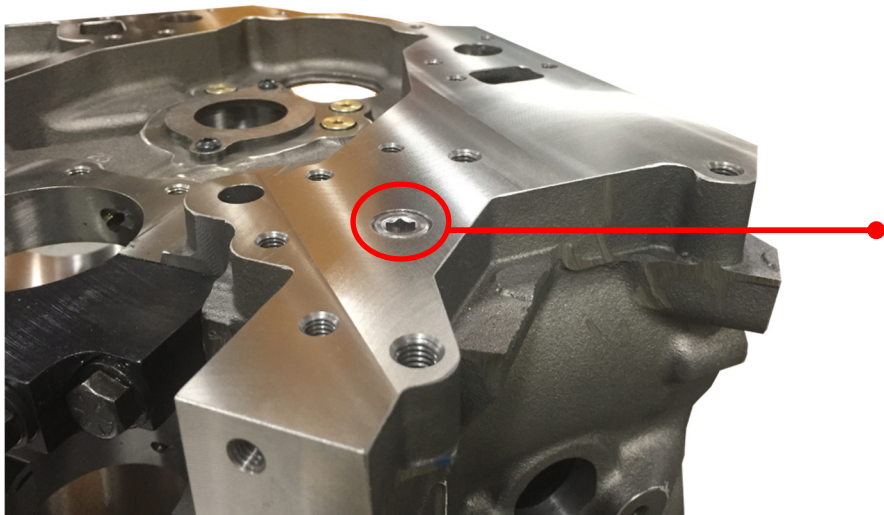


Top View of Valley Area:

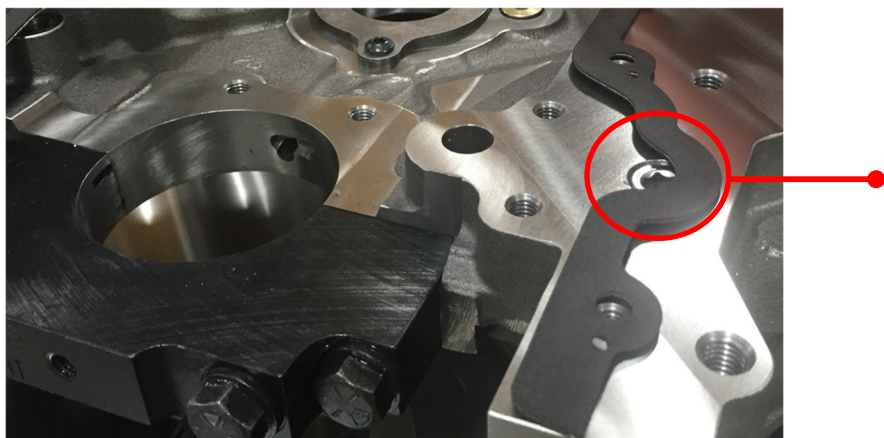
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

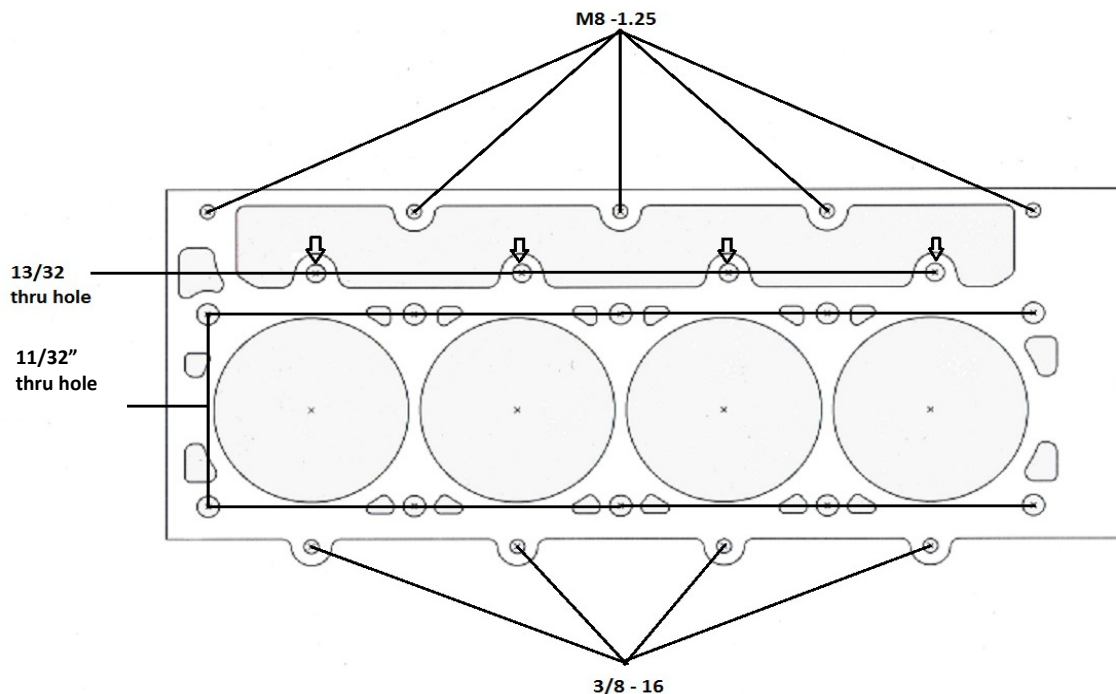
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



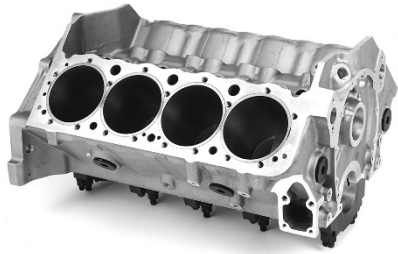
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

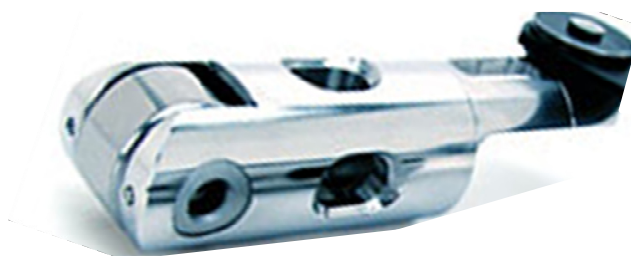


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

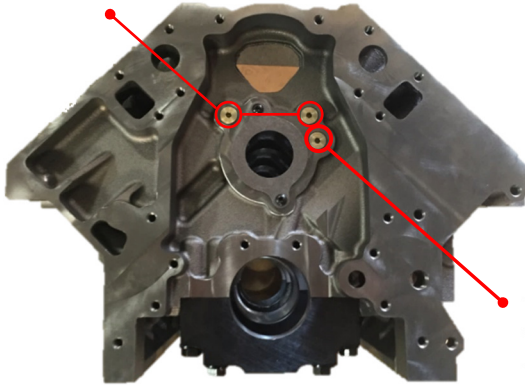
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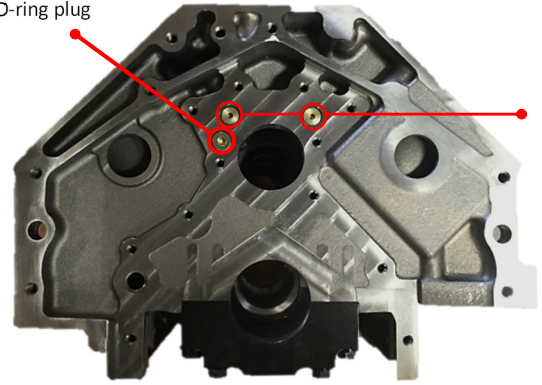
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



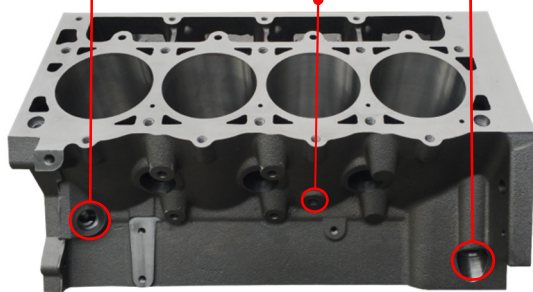
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

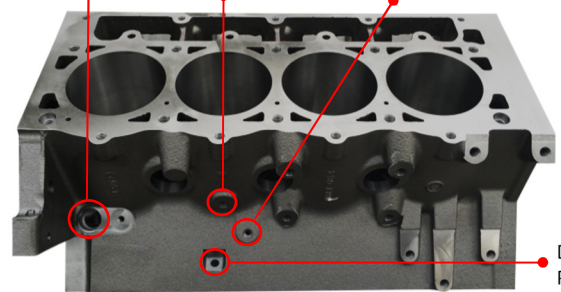


SHP LS Next Drivers Side

Crank sensor

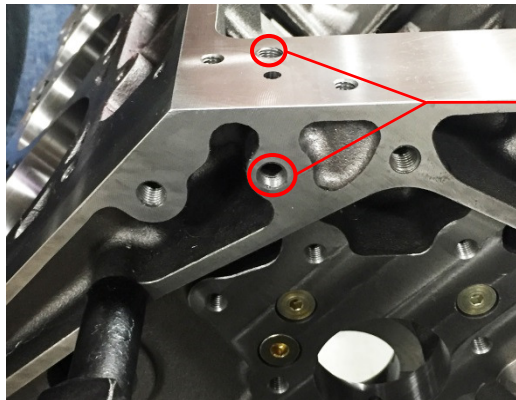
1/4" pipe / Water drain

Knock sensor



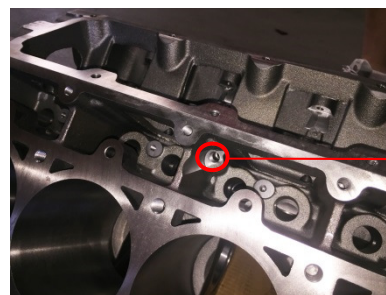
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



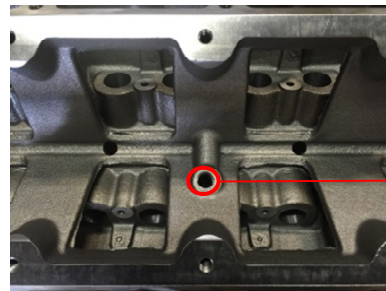
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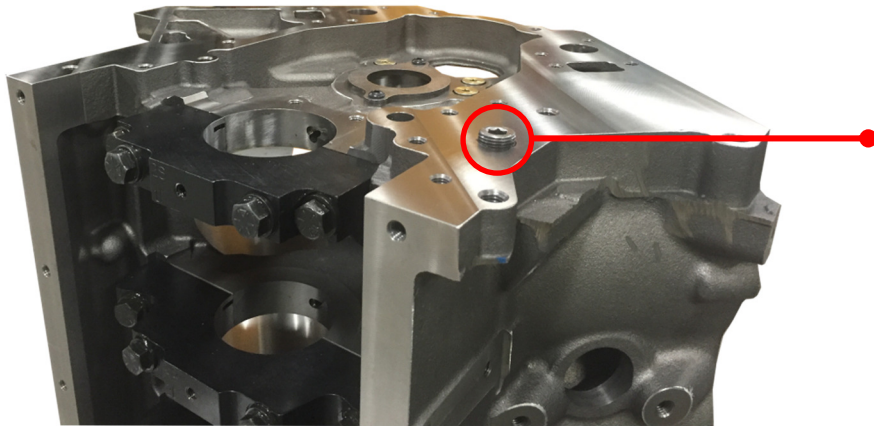
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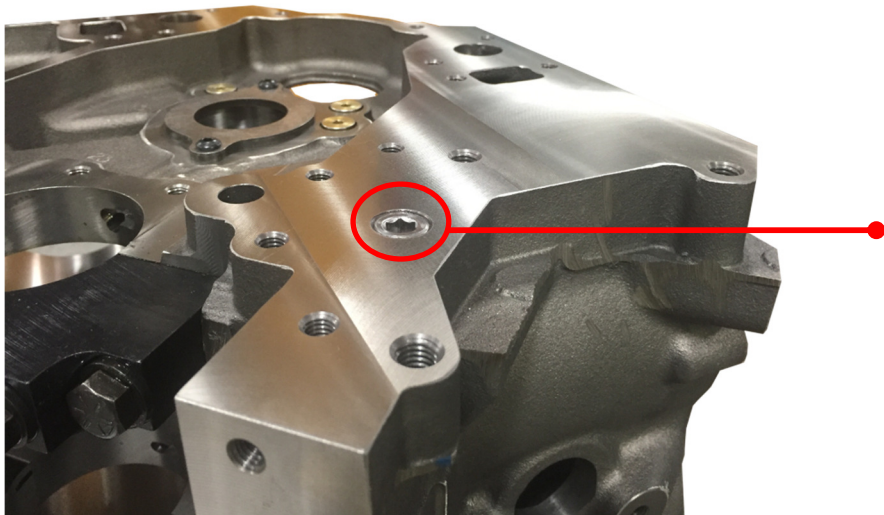


Top View of Valley Area:

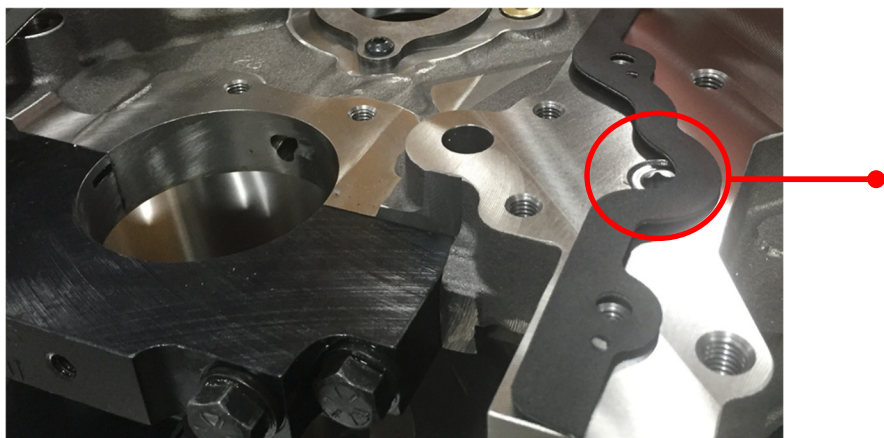
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Bore .....	4.000 & 4.125
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Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

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Cam bearing O.D. should be deburred before installation.

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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

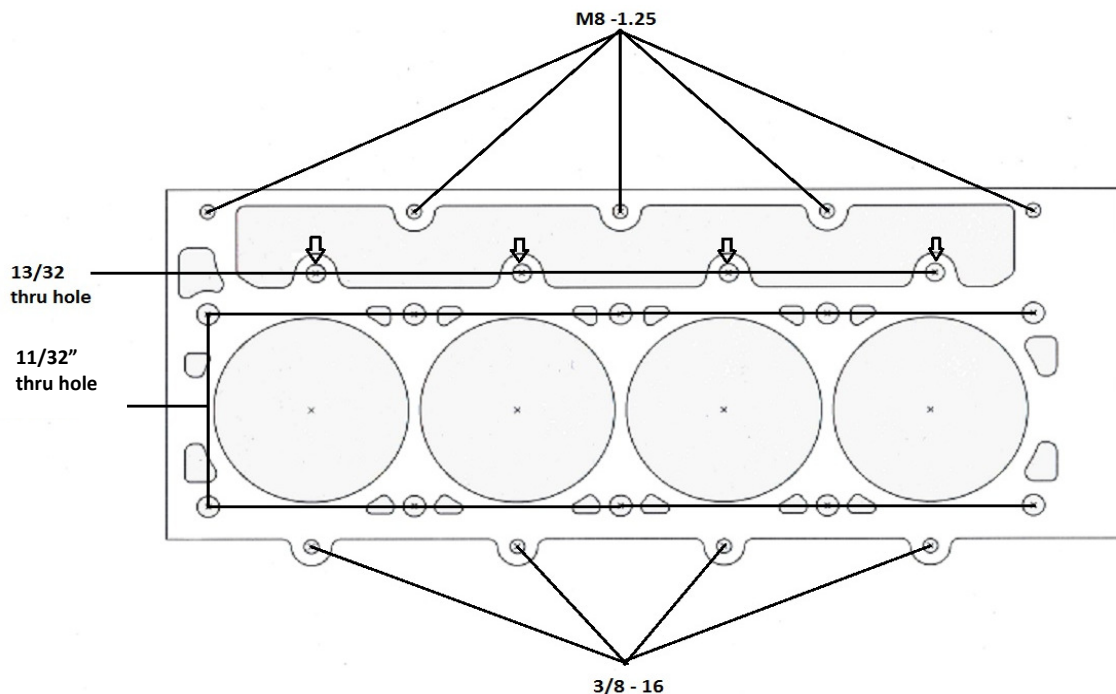
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

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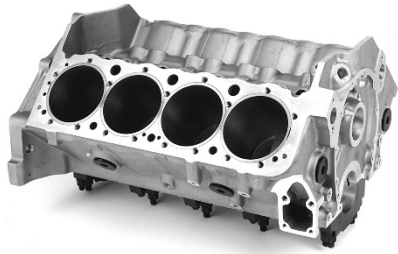
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



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Cylinder bores - Oil passages - Deck surfaces - All threads

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- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



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**Figure 1:**  
Stock un-modified  
solid roller lifters

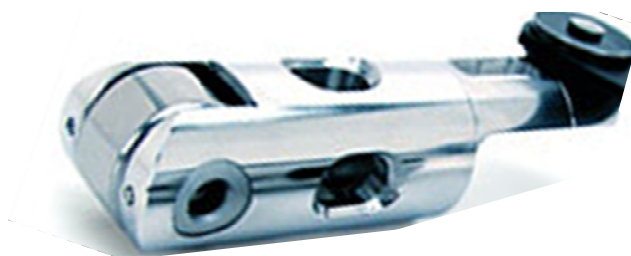


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

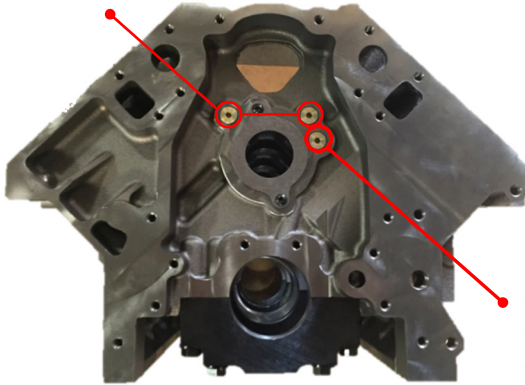
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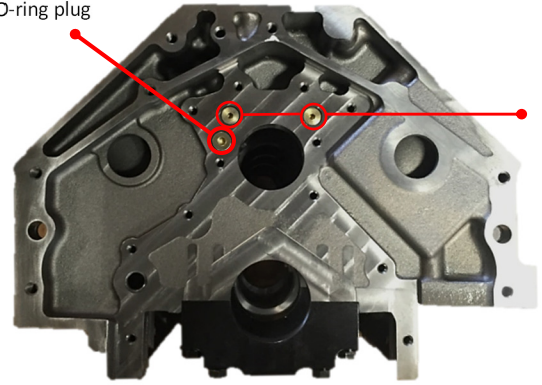
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



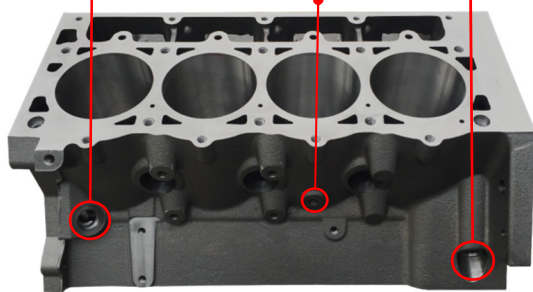
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

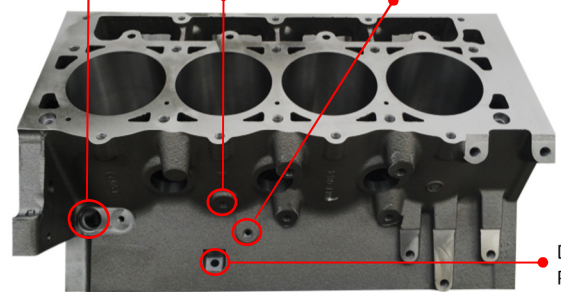


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

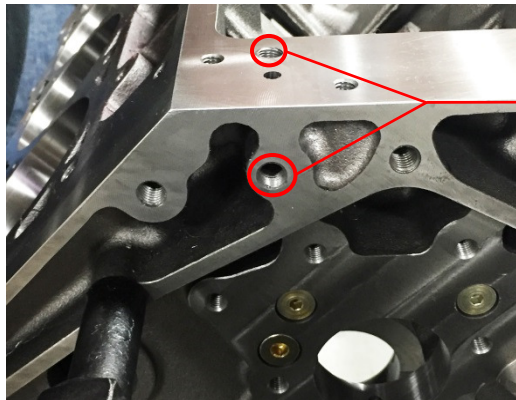
Knock sensor



SHP LS Next Passenger Side

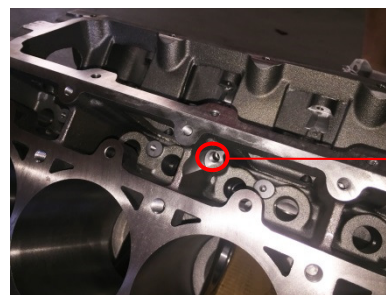
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



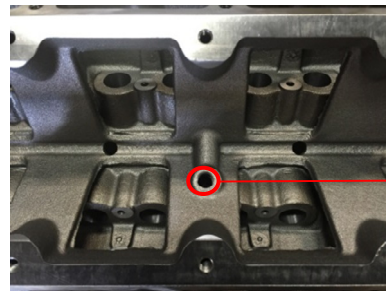
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These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



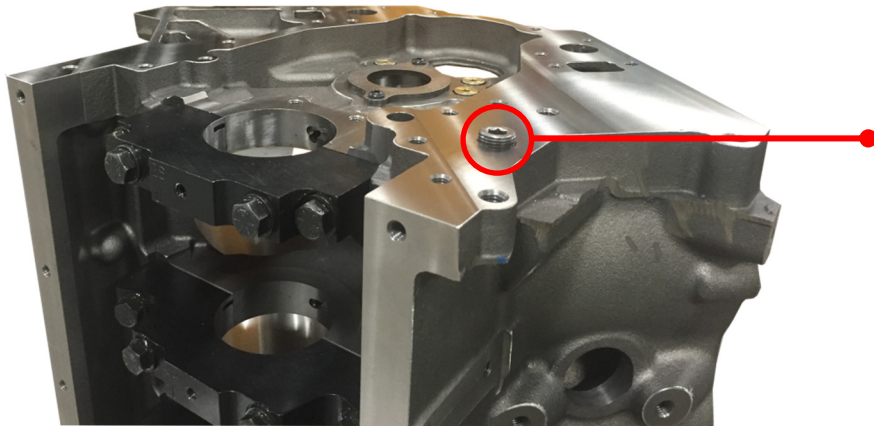
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

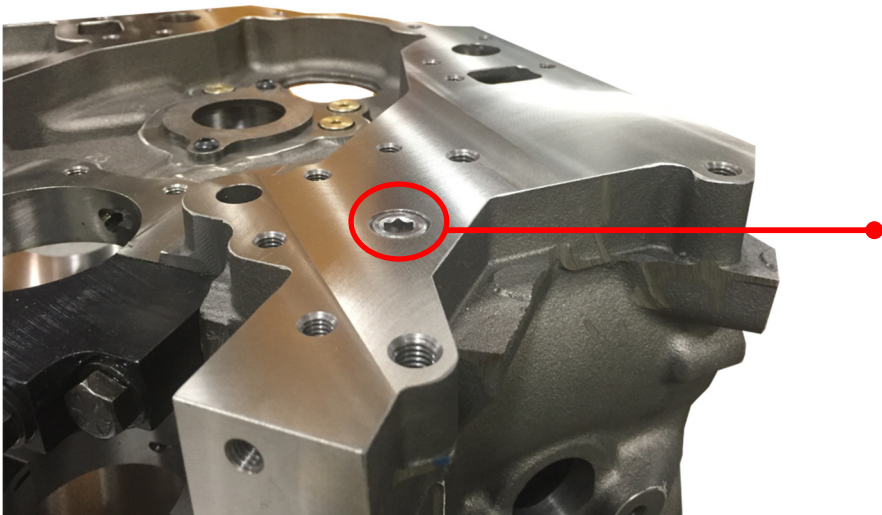


Top View of Valley Area:

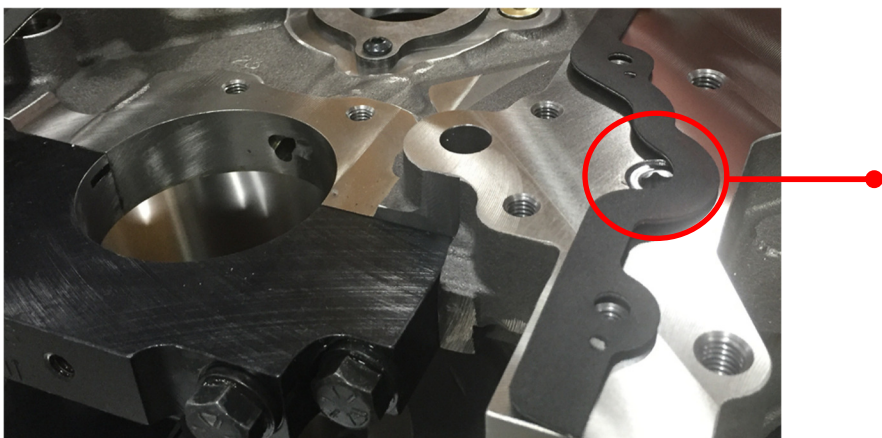
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The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.

Deck Height .....	9.240"
Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
Largest Recommended Bore .....	4.185"
Largest Recommended Crank Stroke .....	4.125"
Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
Deck Thickness, min .....	.625 (5/8)

Torque Specs - Main Caps

7/16" bolts

65 ft lbs w/ CMD # 3 high pressure lube.

**NOTE:** Before any assembly is started it is good engine builder practice to check the air gap on the crank sensor to the reluctor wheel. You should have between .020" - .040" Max for the sensor to read correctly.

**NOTE:** The block is designed for a single row timing chain for compatibility with O.E. fuel injection.

**\*When using a double roller chain set you must check for interference and block clearance accordingly.**

**NOTE:** The tapered portion of the stud body should never contact the deck or bolt hole counter bore. If the stud body does thread too deep and makes contact with the deck surface then you should use a small ball bearing in the bottom of the bolt hole to space up the stud accordingly.

**NOTE:** Due to variations in lifter sizes and clearance preferences, most of our Engine Builder customers prefer the lifter bores sized on the small end of the specification. Sometimes these bores will need to be lightly honed.

**NOTE:** If you are using aftermarket cam profiles you must use the correct components for the application.

**NOTE:** with a multitude of different crank, rod and piston combinations available, it is important to check clearance of all moving parts (especially crankshaft counterweight to block) before attempting any type of assembly. SHP LS Next Blocks have built in clearance for fully counterweighted crankshafts.

Actual deck height will be .002" - .005" taller for additional machining requirements.

Factory style Cloyes timing gear is required PN# 9-3658TX3.

Cam bearing O.D. should be deburred before installation.

The Main caps on SHP LS Next Blocks are drilled and tapped on the bottom for 5/16"-18 thread so that the caps can be removed with a slide hammer from the registers. When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Pan rails have factory width and are a revised skirted design so that factory or aftermarket oil pans may be used.

SHP LS Next blocks have O.E. Starter mounting only.

Additional rod clearance may be necessary at bottom of cylinders depending on rod design and stroke.

Head bolt holes are blind.

Loctite # 271 is recommended when installing the head and main bolts/studs into the block.

Studs should *never* be torqued into block. They should only be lightly snugged.

When installing the pipe plugs in the SHP LS Next oil galleys or water drains you must use a thread sealer to eliminate internal and external leaking and thread galling. We recommend Loctite 565 or a standard PTFE pipe sealer that is available at any auto parts store.

SHP LS Next Blocks use LSX lifter "buckets" for use with stock style lifters. Aftermarket tie bar lifters may also be used. Keyway lifters can be used with appropriate machining.

SHP LS Next Blocks use LS2 - LS7 knock sensors

SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

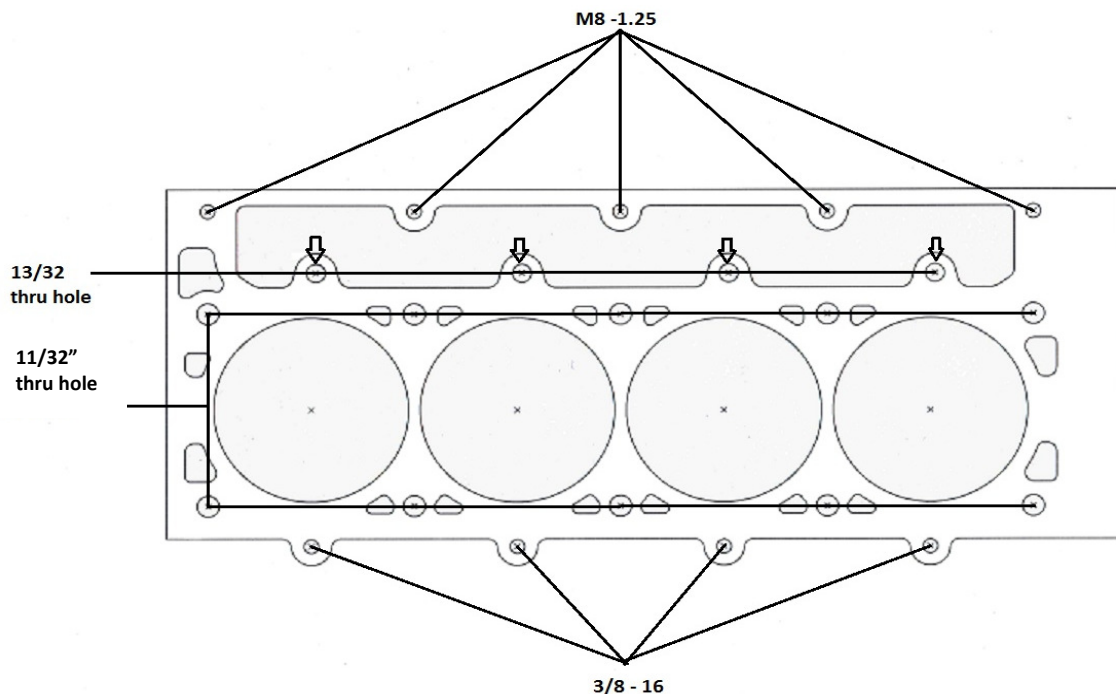
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



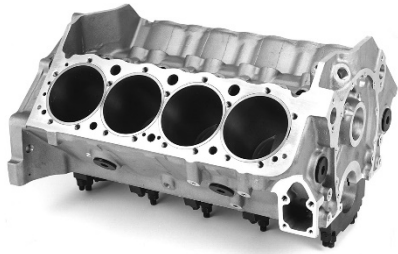
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
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<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
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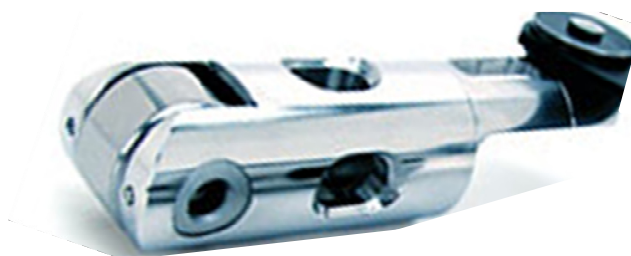


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



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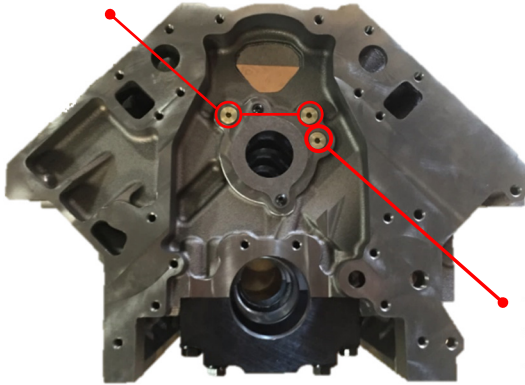
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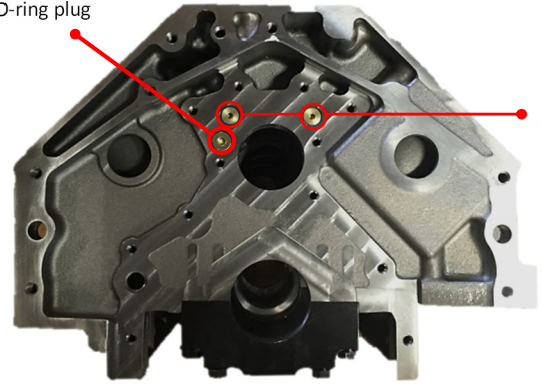
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1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



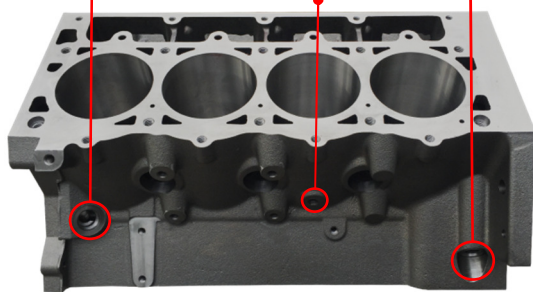
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

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Oil in -10AN w/O-ring

1/4" pipe / Water drain

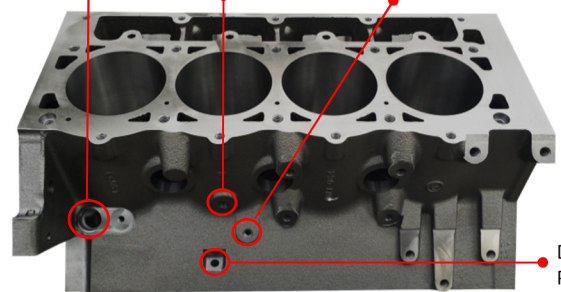


SHP LS Next Drivers Side

Crank sensor

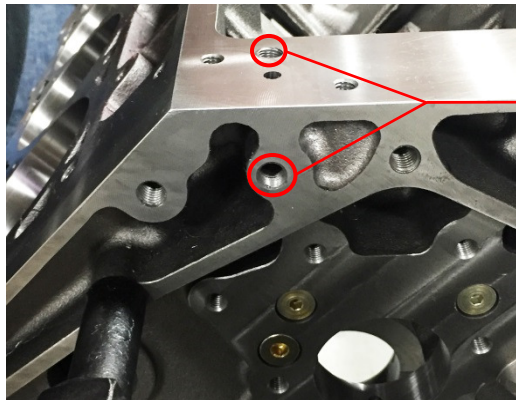
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Knock sensor



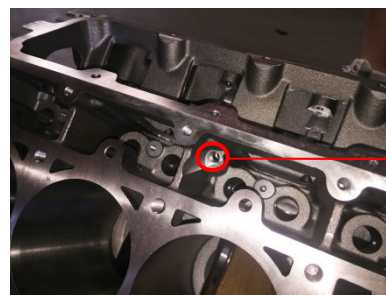
SHP LS Next Passenger Side

### \*\*\* IMPORTANT \*\*\*



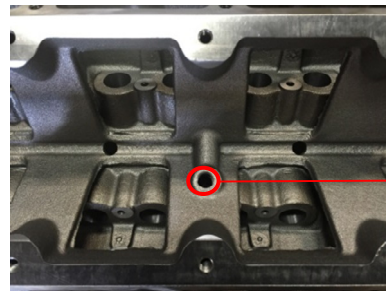
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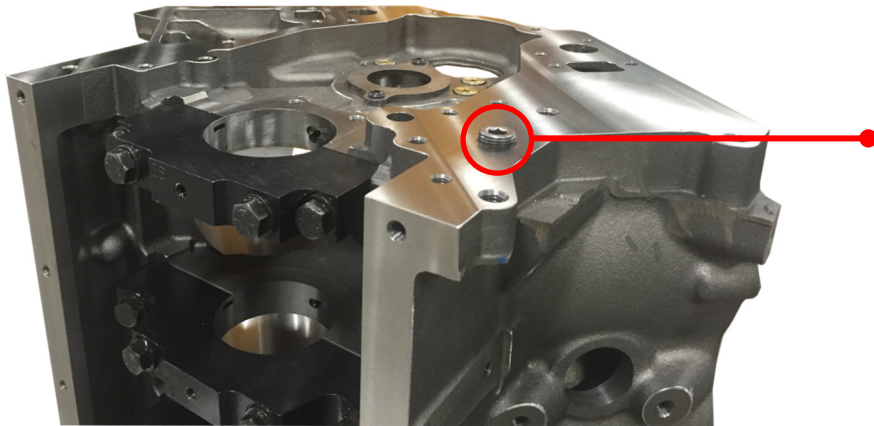
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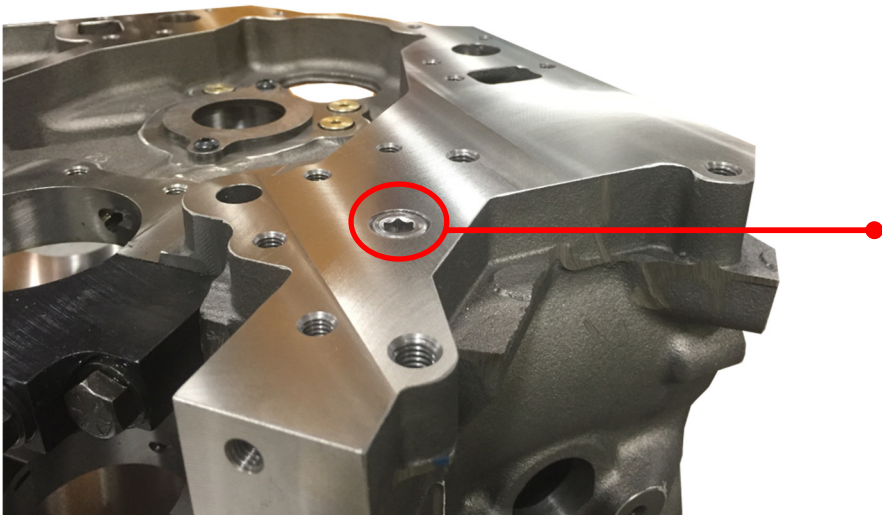


Top View of Valley Area:

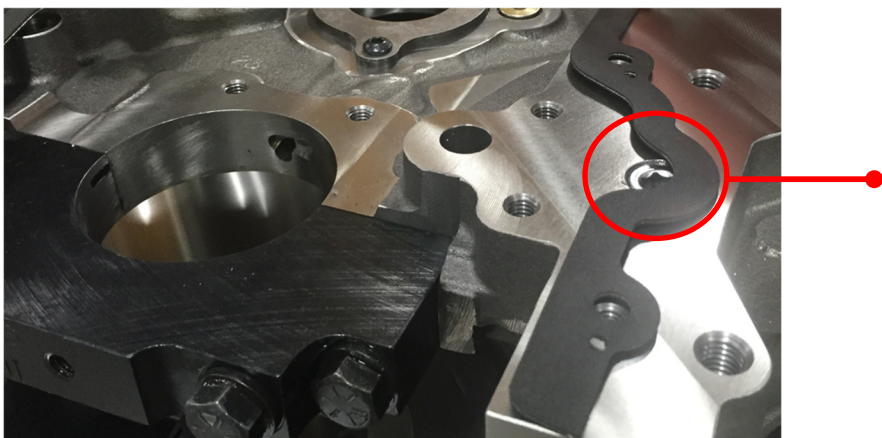
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The 3/8" Oil filter feed galley plug installed flush with the block surface.



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Bore .....	4.000 & 4.125
Main Bearing Size .....	LS-1 (2.558" - 2.559")
Weight .....	227lbs
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Camshaft Bearing Diameter .....	55mm babbitt
Stock Camshaft Position .....	4.885"
Cylinder Wall Thickness, min. ....	.215" @ 4.125"
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SHP LS Next Blocks use LS3, LS, LSX or Moroso P/N: 25176 Valley Covers

Press-in freeze plugs are sold separate PN# 32820000B

Front cam retaining plate & Bolts included and sold separate for replacement PN# 32226000

The block uses factory style crank driven oil pumps or aftermarket external, or dry sump systems.

### **PRIORITY MAIN OIL SYSTEM**

The oil feed (out from pump) is located on the front driver's side of the block just above the oil pan rail and is machined for -10 AN w/ o-ring (this must be plugged, unless you are using a remote mount oil filter. Then it would be oil feed to the remote mount oil filter).

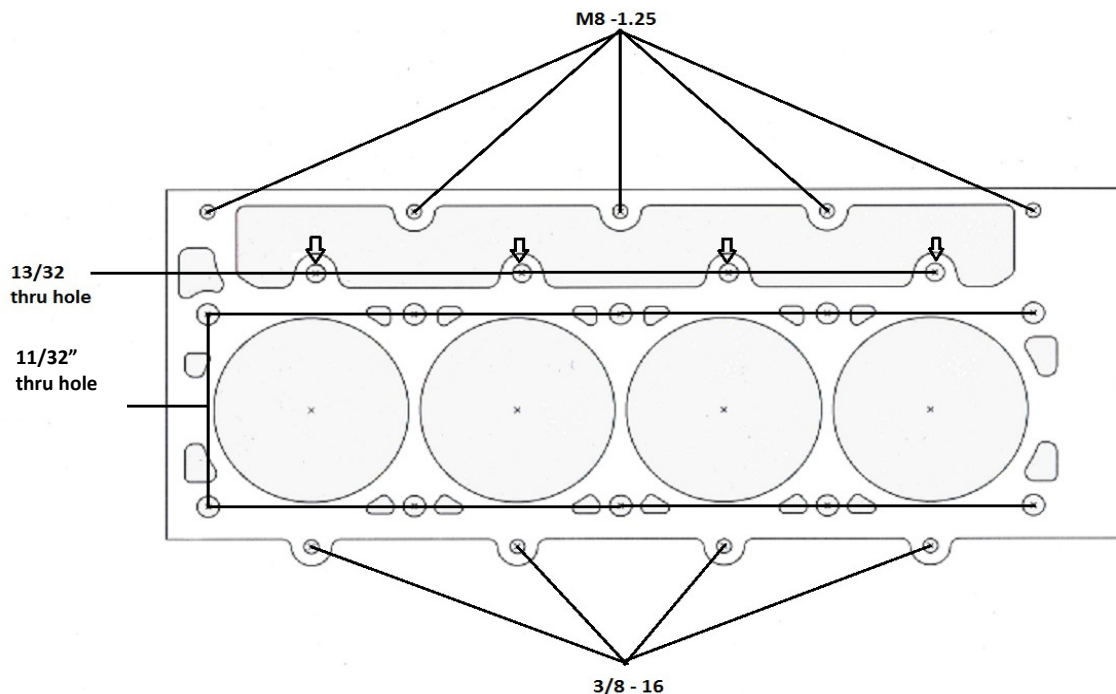
The Return hole (in from filter) is located on the rear driver's side bottom just above the oil pan rail and is machined for -10 AN w/ o-ring. (this also must be plugged, unless using a remote mount oil filter. This is then the oil return to the block from the remote mount oil filter.)

Oil is directed to the main bearings first, then to the cam bearings. The lifters are oiled utilizing a single center oil crossover fed from the main oil galley.

If lifter oiling is restricted, a 1/8" pipe plug restrictor must be installed in the center crossover just above the main oil galley. Our recommended starting point for restriction is .100" diameter with modified lifters. (See lifter mod sheet)

**Dart SHP LS Next head bolt sizes:** Have been upgraded to 7/16 -14 & 3/8-16 for increased strength and clamping force when using high cylinder pressure applications. Dart and ARP will have individual kits available for specific head application.

**Dart SHP LS Next Blocks:** Come machined for use with 6 bolts per cylinder and can be upgraded for use with 1/2" fasteners.



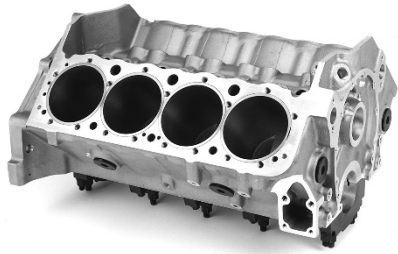
**We stock parts that are unique to this block:**

Head bolt kit for LS1 / LS6	66220010	
Head Stud Sets (specify cylinder head type)		Call for PN#
Special main bearings for SHP LS Next	9-MS2321H or 9-MS2321HX	
Cam retaining plate w/ bolts	32226000	
55mm Babbit cam bearings	32210101-5	
SHP LS Next Iron Block parts Kit	32000018	
SHP LS Next Iron Main Stud Kit	66311010	
Head Stud Kit 15 bolt Iron Block	66120018	
Head Stud Kit 23 bolt Iron Block	66120018B	
*Optional 1/2" Head Stud Kit 15 bolt Iron Block	66130018	
*Optional 1/2" Head Stud Kit 23 bolt Iron Block	66130018B	

## DART

## GEN III – Technical notes

<b>Part Number #</b>	31867111 - 31867211
<b>Material:</b>	Class 30 grey iron
<b>Bore:</b>	4.000" or 4.125" w/ 4.185" max bore
<b>Bore &amp; stroke:</b>	4.185" x 4.125" (Max recommended)
<b>Cam bearing bore ID:</b>	2.2998" – 2.3002"
<b>Cam bearings:</b>	55mm babbit Dart PN# 32210101-5
<b>Cam bearing O.S.</b>	+.010", +.020", and +.030" available
<b>Cam bearing press:</b>	.002" - .003"
<b>Camshaft position:</b>	Stock LS cam position
<b>Camshaft to crank Ø</b>	4.885"
<b>Camshaft snout:</b>	1.565" O.D
<b>Cam Drive:</b>	Accepts belt drive (*machining required) or stock chain drive.
<b>Cam retaining plate:</b>	Dart cam retaining plate / Cover. Dart PN# 32226000
<b>Cam Plug snap ring:</b>	N/A
<b>Cubic inch:</b>	454 cubic inch max
<b>Cylinder Wall Thickness:</b>	.215" @ 4.125" bore
<b>Deck Height:</b>	9.240" w / extended cylinder barrels .375" at bottom.
<b>Deck Thickness:</b>	5/8" (.625")
<b>Fuel Pump:</b>	Electric pump required
<b>Fuel Pump Pushrod:</b>	N/A
<b>Freeze Plugs:</b>	1.500" diameter Dart PN# 32820000B (Qty 6)
<b>Lifter Bores:</b>	.8427" - .8437" up to .937" keyed w/ 1.062" dia. Bushing
<b>Main bearing size:</b>	2.558" – 2.559" Dart PN# 9-MS2321H or 9-MS2321HX
<b>Main bearing bore:</b>	2.7508" – 2.7512"
<b>Main caps:</b>	4 bolt billet steel w/splayed centers & center thrust
<b>Oil system:</b>	Low volume priority main oiling system w/single center crossover
<b>Oil Pump:</b>	Melling or Stock LS oil pump
<b>Oil Filter:</b>	O.E.
<b>Oil Pan:</b>	O.E or Aftermarket
<b>Rear Main Seal</b>	Stock LS style with factory cover
<b>Serial No.</b>	Front passenger side below deck surface (XXXLSN)
<b>Sleeve OD:</b>	N/A
<b>Sleeve O.S.</b>	N/A
<b>Sleeve thickness:</b>	N/A
<b>Sleeve Length:</b>	N/A
<b>Starter:</b>	O.E.
<b>Main bolts:</b>	Inners – 7/16" x 3.600" Outer – 7/16" x 2.900"
<b>Studs, heads:</b>	Call for application
<b>Stud holes, Head:</b>	23 bolt pattern with 7/16", 3/8", and 8mm sizes
<b>Stud length in block:</b>	1.000" of thread depth
<b>Timing chain/gears:</b>	24x or 58x depending on application
<b>Timing Cover:</b>	Factory LS cover and front seal 2005 w/ cam sensor provision
<b>Torque Specs:</b>	All torque specifications w/ CMD #3 High Pressure Lube ½" = 105ft lbs 7/16" = 65 ft lbs 3/8" = 45 ft lbs 8mm = 22 ft lbs
<b>Weight:</b>	227 lbs w/ main caps



***This Block should be assembled only by experienced, professional engine builders.***

## **INSPECTION**

Upon receiving this block it should be thoroughly inspected for shipping damage.

Prior to machining and assembly please inspect the following items:

Cylinder bores - Oil passages - Deck surfaces - All threads

## **MEASURING & MACHINING**

- ❑ All initial measuring should be done before any machining has begun.
- ❑ Decks are CNC machined to standard deck heights. If you need a particular deck height always measure before machining.
- ❑ Main journals are finish line honed to the low to middle of the specification. They should be measured for your preference. If you have need for a different diameter you must realign hone this yourself.
- ❑ Crankshaft & rod clearance should always be checked before any machining is started. You need .060" clearance for rotating counterweights and rods.
- ❑ Due to variations in OD dimensions of the numerous lifter manufacturers, lifter bores are finish honed on the tight side of the tolerance to leave room for lifters that are larger than the standard.

## **WASHING**

- ❑ Final washing should be very thorough, paying particular attention to all oil galleys. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduce rust.



CHAMPIONSHIP ENGINE COMPONENTS

Here at Dart we are constantly improving upon our products to ensure that you are receiving the latest and most technologically advanced products in the industry. Through our extensive R&D we have found that valvetrain oil is crucial in a high performance engine. The following modification will correct oil volume to the valvetrain that may occur when using solid roller lifters in any block.

**Figure 1:**  
Stock un-modified  
solid roller lifters

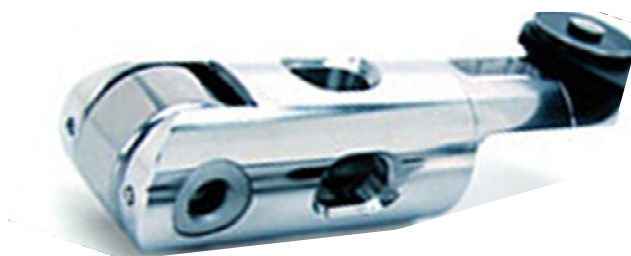


**Figure 2:**  
Dart oil galley modification  
from band to pushrod oil hole



We recommend a .020" deep x .080" radius wide groove from the pushrod feed hole to the oil band / machined feed hole in your solid lifters (**Front hole only** as shown in Figure 2 above) depending on your tooling & method. You can also do this with a cutoff wheel or a dremel. This allows you to use the restrictor provisions provided in your Dart block to tune oil volume to the lifter oil galley. This allows you to control the oil going to the pushrods, rocker arms and valve springs.

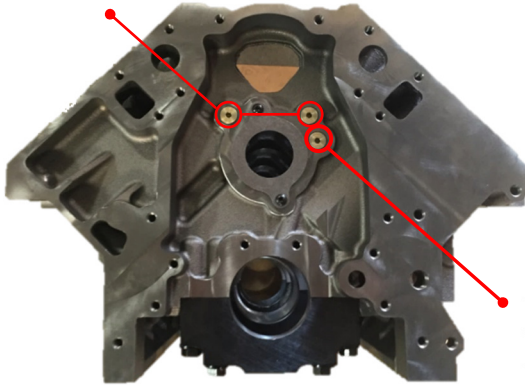
# CAUTION!



The use of lifters that are heavily lightened should not be used in Dart Blocks. The lightening holes will cause lifter oil to leak into the valley instead of oiling the pushrod, rocker arm and valvespring.

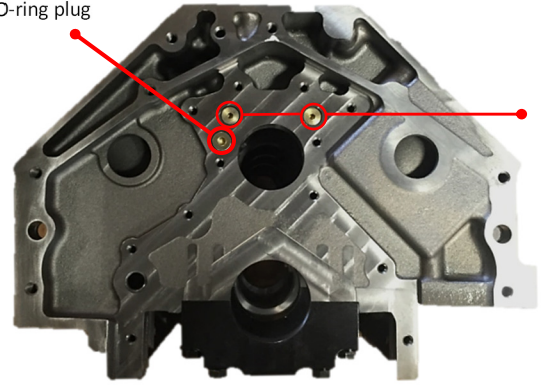
*Please call our technical staff with any questions Mon-Fri 9am-6pm E/T (248) 362-1188*

1/2" AN O-ring plugs



SHP LS Next Front

9/16" AN O-ring plug



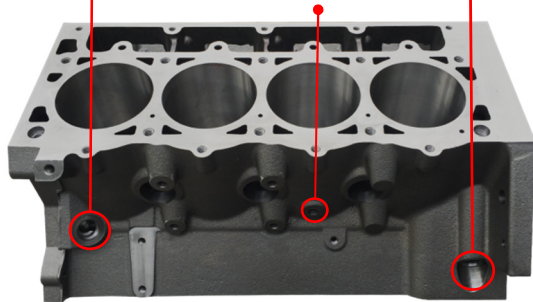
SHP LS Next Rear

9/16" AN O-ring plug careful upon removal and reinstallation as the #1 main feed is behind this plug.

Oil out -10AN w/O-ring

Oil in -10AN w/O-ring

1/4" pipe / Water drain

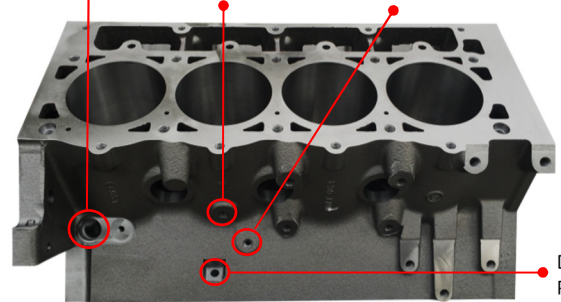


SHP LS Next Drivers Side

Crank sensor

1/4" pipe / Water drain

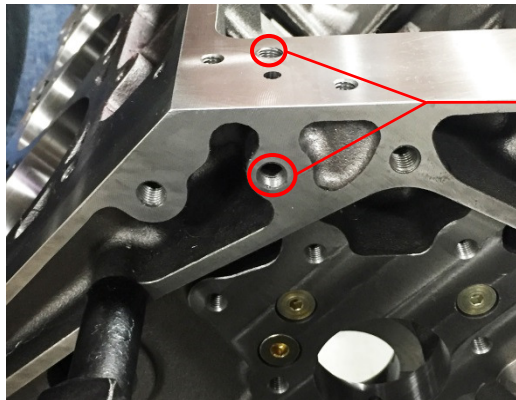
Knock sensor



SHP LS Next Passenger Side

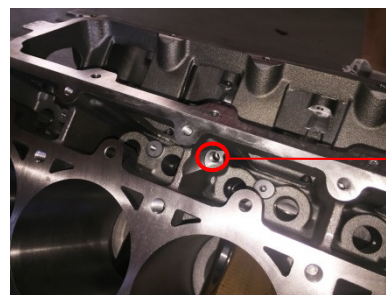
1/2" AN O-ring plugs

### \*\*\* IMPORTANT \*\*\*



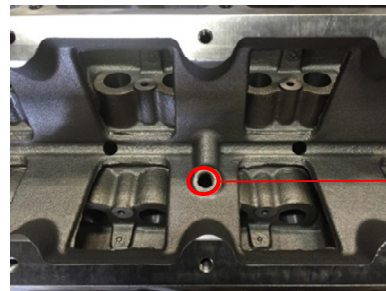
Oil Pressure Port:

These two 1/8" NPT holes marked in red need to be plugged (with supplied plugs) before the block is filled with oil. Otherwise these will leak oil as this is tied in to the pressure port.



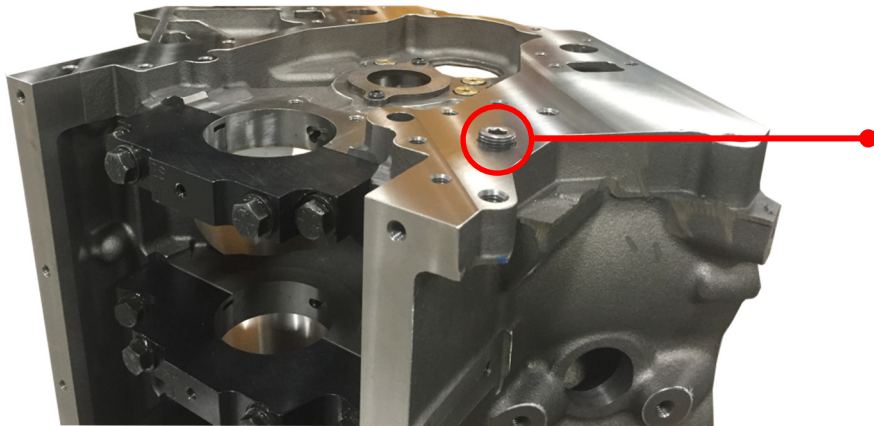
Drivers Side of Block:

The crossover in the lifter bucket area is 1/8" NPT and this needs to be plugged before cylinder head installation.

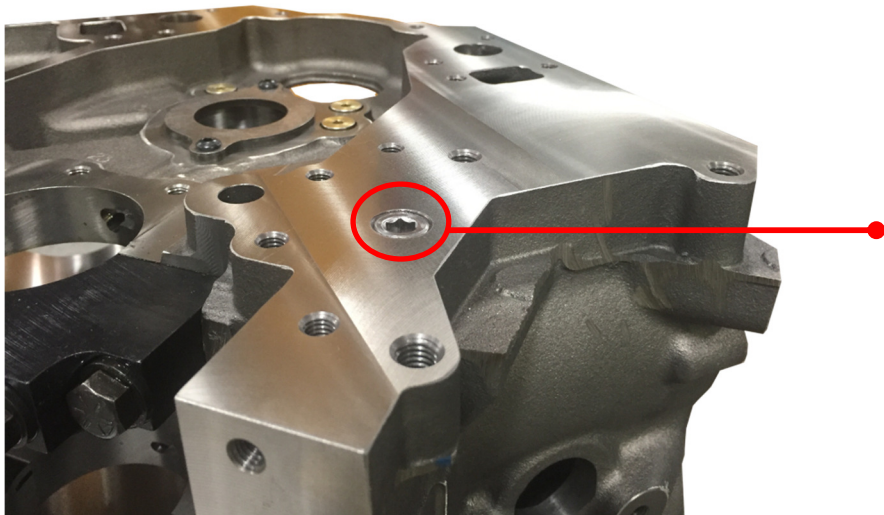


Top View of Valley Area:

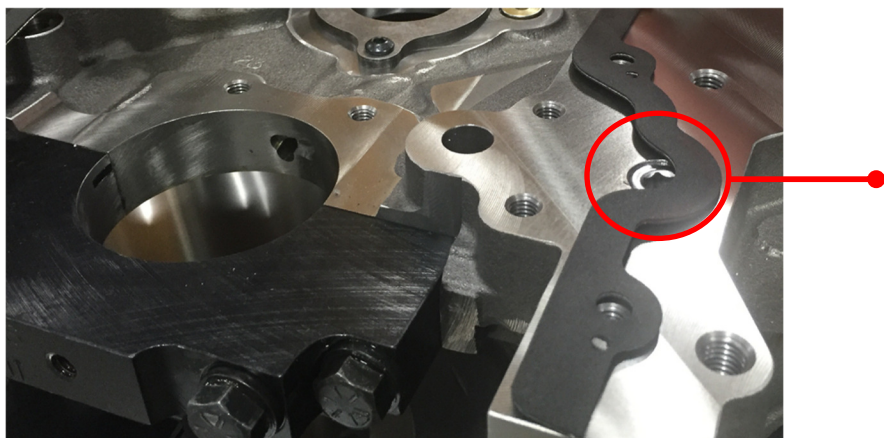
The crossover in the valley area is 1/4" NPT this must be plugged and is tapped internally for a 1/8" NPT restrictor.



The Supplied 3/8" pipe plug for the Oil filter feed galley must be installed flush with the block surface and must not protrude above in order to provide adequate clearance for the timing cover gasket to seal. *This procedure is the same for the rear of the block as well.*



The 3/8" Oil filter feed galley plug installed flush with the block surface.



With the 3/8" oil filter feed galley plug installed correctly the timing cover gasket (P/N: 65730001) will now have adequate clearance to provide optimal sealing.