



Aluminum Small Block - Technical Notes

Deck Height	.....	9.025	9.325	9.500
Bore	.....	4.000 or	4.125	
Main Bearing Size	.....	350 (2.45)	400 (2.65)	
Weight	.....	95 lbs		
Largest Recommended Bore	.....	4.165"		
Largest Recommended Crank Stroke	.....	4.125"		
Camshaft Bearing OD (BBC journal)	.....	2.120"		
Camshaft Position Raised	.....	.391"		
Deck Thickness	.....	.562" (9/16)		
Sleeve O.D.	.....	4.300"		
Oversize O.D. Available	.....	+.010 & +.020		
Sleeve Thickness	.....	4.000 = .150"	4.125 = .087"	4.165 = .060"
Sleeve Length	.....	9.025 = 5.625"	/ 9.325 = 5.925"	/ 9.500 = 6.100"
Sleeve Press	.....	.001" - .0015"		
Torque Specs - Main Caps	1-4	7/16" studs	75	ft lbs w/ CMD # 3 high pressure lube
	1-4	10mm x 7/16" studs	65	ft lbs w/ CMD # 3 high pressure lube
	Rear	1/2" studs	100	ft lbs w/ CMD # 3 high pressure lube
Stud Length in block - Head & Main	.....	1.770"	(1.550 thru + .270 bottom bullet)	
(6) Center 7/16" studs =		4.605" OA		
(4) End 7/16" studs =		3.980" OA		
(2) Rear 1/2" studs =		4.690" OA		

It is *mandatory* to use our Stud Kits as they have the correct thread, bottom length & bullet.

Using incorrect studs can cause serious leaks & damage.

Head stud holes are blind. They do not go into the water jacket.

Locktite # 620 is recommended when installing the head and main studs into the block.

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

Actual deck height will be .005" - .010" taller for additional machining requirements.

Camshaft snout must be machined to SBC size to accommodate SBC gear or sprocket.

Cam bearing OD should be deburred before installation.

Set screw provisions to retain roller cam bearings.

Special Timing gear is required for raised camshaft.

Pan rails are spread .800" total, requiring a wide oil pan and gasket PN# 1839 FelPro.

When initially removing main caps, the caps & block should be deburred before reinstalling. This will insure that correct main size is maintained.

Additional rod clearance may be necessary at bottom of cylinders.

Stock engine mount holes, front & side.

Screw in freeze plugs are provided (1 5/16" threads)

Cam plug dia = 2 3/8". The plug is installed backwards. A snap ring is recommended for retention.

When a mechanical fuel pump is used, a +.200" push rod is required (5.950" OA) Dart PN# PR200FP

Timing cover and Oil pump dowel pins are .246" O.D. in dart blocks

When a wet sump oiling system is used, a BBC oil pump driveshaft is needed.

Note: Be sure to check distributor to oil pump shaft clearance with distributor, intake manifold and oil pump installed on block. When using a wet sump you must plumb oil into inlets at front or rear of block. (1/2" NPT)

Before honing sleeves or decking block you **MUST** install a torque plate using a head gasket with a steel wire. This will seat the sleeves in the block. Some engine builders heat the block to about 200 deg before installing the torque plate, then leave it at 200 deg for 30-45 minutes for extra assurance that the sleeves are seated properly. The sleeves should be above the deck .002" when new and .000" - .002" when used.

Head Gasket & Cylinder Head Installation: You must use sealer on the head stud threads. Use silicone around all coolant holes and head studs on both sides of gasket. Pack the counter bore around the head stud with silicone leaving a small amount sticking up around the stud. This exact procedure should seal all coolant leaks.

Manifold Installation: With some intake manifolds the distributor will not fit into the block. The distributor hole is at 5 degrees instead of the stock 4 degrees for extra clearance for the larger oil pump driveshaft.

Solution: Machine hole in manifold, then re-machine top surface to match. Use collar on distributor if possible. Do not use o-ring at top of distributor to seal it. Remove the o-ring and use gaskets.

Note: Make sure that distributor groove is lined up with lifter supply hole. If distributor is too high or too low it will expose the oil galley at the bottom.

Note: The fuel pump pushrod bore is machined for a .500" rod. Be sure to check the clearance because of the inconsistencies in the diameters of push rods.

If a dry sump oiling system is used you must plug the oil inlet hole in the rear main cap or in the block, underneath the rear main cap. (1/4" NPT)

Block has provisions for dry sump scavenge in the valley area. If no scavenge is used at this Location or a wet sump is used; a 9/16" oil drain must be drilled to insure sufficient oil return. The hole should be at the rear of the block and centered in the valley.

PRIORITY MAIN OIL SYSTEM

Oil feed can be directed through the front or the rear oil inlet.

Oil is directed to the main bearings first, then to the cam bearings.

If lifter oiling is restricted, restrictors must be installed in the front and rear lifter galleys to prevent oil from bypassing and feeding from opposite end.

FOR ADDITIONAL INFORMATION SEE DIAGRAM ON BACK

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.

SPECIAL 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 and connecting rod to block. All parts must be checked before any type of machining or assembly is attempted.

IT IS GOOD ENGINE BUILDING PRACTICE TO **ALWAYS** CHECK THE FIT OF THE DISTRIBUTOR BEFORE ANY MACHINING OR CLEANING IS COMPLETED.

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

We Also Stock Parts that are Unique to this Block.

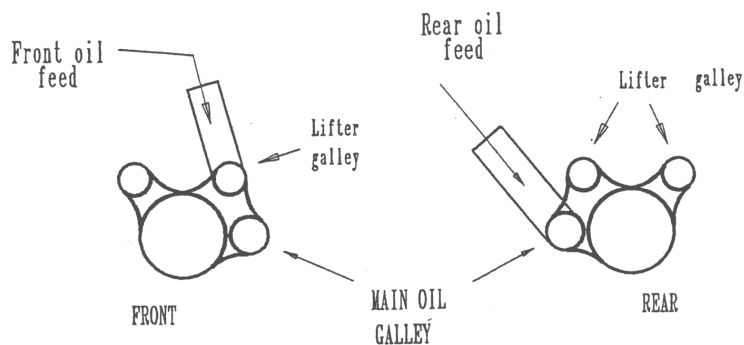
Timing Chain Set	67110002
Gear Drive assembly	67130002
Head Stud Sets (specify cylinder head type)	Call for PN#

***DART* ALUMINUM SBC Block**

Part#	31711152 thru 31712232
Material:	RMR Cast Aluminum Alloy
Bore:	4.00" & 4.125"
Bore & stroke:	4.165" x 4.125" max recommended
Cam bearing bore ID:	BBC - 2.1195"- 2.1205"
Cam bearings:	Special coated, grooved, w/3 oil holes
Cam bearing O.S.	+.010", +.020", +.030"
Cam bearing press:	.002"
Camshaft position:	Raised .391" Optional .434"
Camshaft to Crank Ø	4.912"
Camshaft snout:	SBC on all
Cam Drive:	Timing chain, Gear drive & Belt drive for raised cam
Cam Plug:	2.375" dia. Cup plug Dart PN# 32510000
Cam Plug snap ring:	.030" thick Dart PN# 32610000
Cubic inch:	450" max recommended
Cylinder Wall Thickness:	N/A
Deck Height:	9.025", 9.325", 9.500"
Deck Thickness:	.625" min.
Fuel Pump:	Mechanical pump provision
Fuel Pump Pushrod:	+ .200" long 5.950" OA Dart PN# PR200FP
Freeze Plugs:	Threaded 1 5/16" OD (1.312") Dart PN# 32310000
Lifter Bores:	SBC .8427" - .8437"
Main bearing size:	2.450" (350) 2.650" (400)
Main bearing bore:	(350) 2.6401" / -.001" (400) 2.8401" / -.001"
Main caps:	Steel - 4 bolt .005" press
Oil system:	Wet or Dry Sump - Main Priority Oiling
Oil Pump shaft:	BBC shaft with wet sump
Oil Filter:	No provision
Oil Pan:	Pan Rails spread .400" each side
Rear Main Seal	350 main - std seal / 400 main - Fel-Pro# 2909
Serial No.	Left front & main caps
Sleeve OD:	4.300"
Sleeve O.S.	+ .010" & +.020" available
Sleeve thickness:	4.00" bore - .150" 4.125" bore - .087" 4.165" bore = .060"
Sleeve Length:	9.025" = 5.625" / 9.325" = 5.925" / 9.500" = 6.100"
Starter:	Mounts on either side
Studs, Mains:	(4) studs, #2, #3, #4 have 7/16" splayed bolts
Studs, heads:	Must use Dart head studs
Studs holes, Head:	Blind holes
Stud length in block:	1.770" - 1.550" thru + .270 bottom bullet
Timing chain/gears	Must use raised cam components
Timing Cover:	Can use stock cover / Mag w/fuel pump provision avail.
Torque Specs:	1-5 7/16" studs - 75 ft lbs
	2-4 10mm x 7/16" studs - 65 ft lbs
	Rear 1/2" studs - 100 ft lbs
Weight:	95 lbs



ALUMINUM & CAST IRON BLOCKS



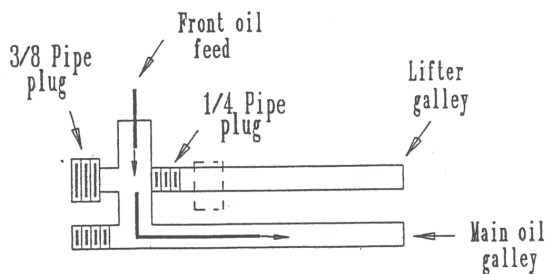
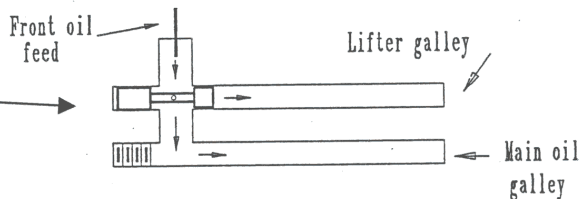
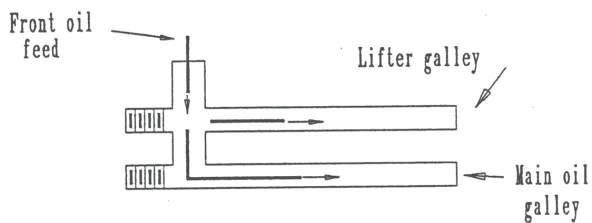
NOTE

Conventional restrictor will block Main oil feed before it reaches the main oil galley. This could restrict oil supply to main oil galley.

SOLUTION

1/4" pipe plug can be drilled for desired flow to lifters. Plugs should be installed *flush* so they don't restrict oil flow in the passage.

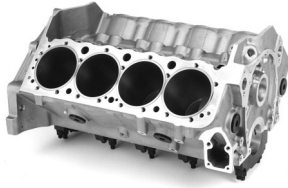
All threaded plug holes in blocks are National Pipe thread and use tapered pipe plugs. We recommend using female allen socket plugs. Various length plugs are available from Pioneer for adjusting the depth of the plug.



Pioneer Automotive Parts - pipe plugs

1/4" NPT (restrictors)	PP584	.325" OA	3/8" NPT (outer)	PP554	.375" OA
	PP625	.333"		PP560	.410"
	PP567	.375"		PP637	.460"
	PP507	.460"			

IMPORTANT



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 galleries. Use hot soapy water and rinse with hot water first, followed by cold water which helps reduces rust.

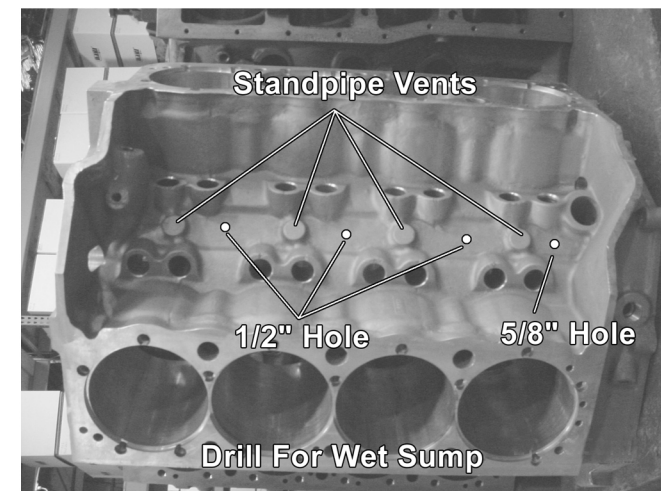
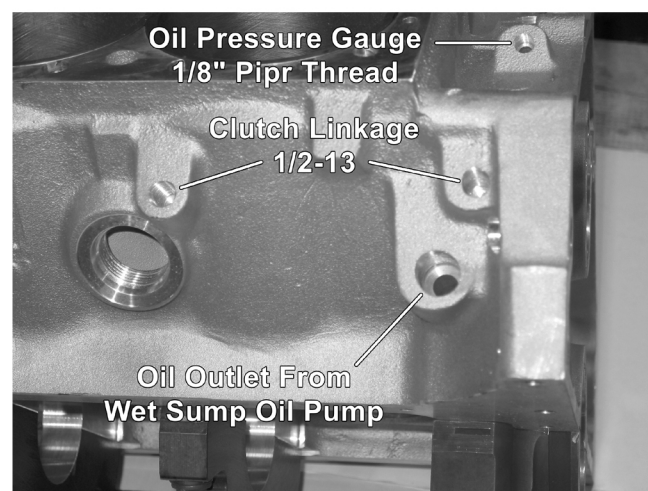
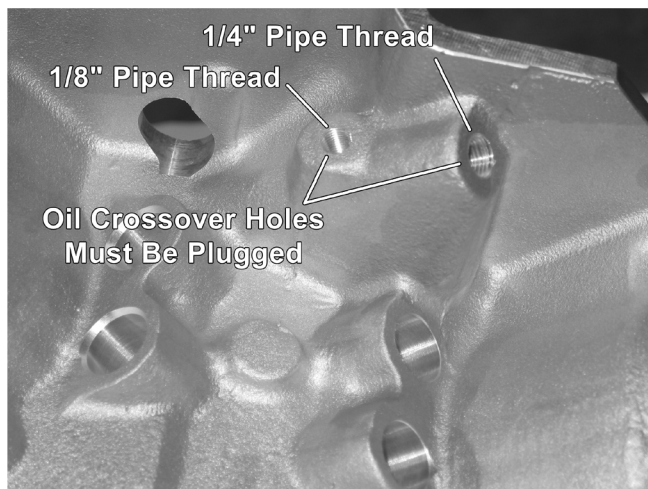
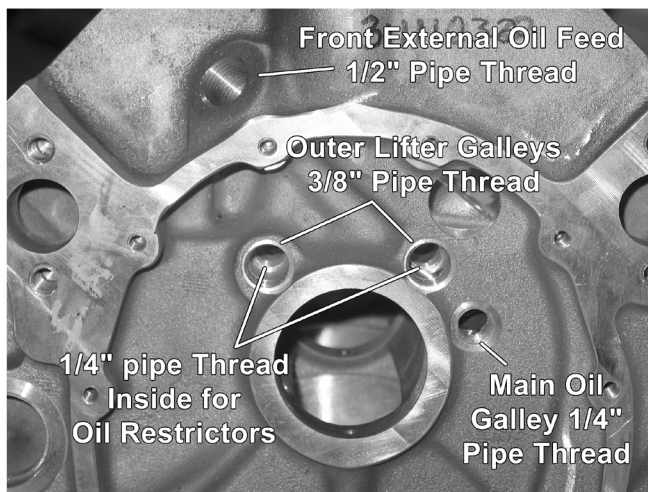


Dart Aluminum SBC Sleeve Installation and Removal Procedure

- 1.) Check cylinder bore concentricity and deburr bottom of sleeve for removal.
- 2.) Install short length bolts with washers in 1 or 2 bolt hole locations around each sleeve that will not be removed. This will prevent the sleeves from falling out when the block is flipped over.
- 3.) Heat the block in an oven at 300°F for approximately 30 - 45 min. **(STOP! When removing block from oven use caution! The block will be extremely hot and could burn you!)**
- 4.) Push / Drive out damaged sleeve(s) with sleeve driver from bottom side up towards the deck surface. (Note: If the cylinder measured out of round in (Step 1) and will not drive out the sleeve will have to be bored out due to distortion.)
- 5.) When the block cools check sleeve bore concentricity and I.D measurement. The standard sleeve O.D should measure 4.300" O.D making the block sleeve bore 4.2985" I.D to maintain the required .0015" press fit for the entire sleeve surface area. If this interference fit is not possible due to damage or the bore being out of round you will need to overbore the block and install a + .010, +.020 or +.030 O/S sleeve depending on how far the block needs to go for clean up. When installing an oversized sleeve the press fit specification will stay the same as above at .0015" total interference.
- 6.) When the block has been sized for the required sleeve re-heat block as specified in step # 3 and push the sleeve in from the deck side down. Make sure the sleeve is clocked correct so that the interlocking flats on the sleeve will line up with the adjacent sleeves on either side.
- 7.) Remove all small retaining bolts that were used to hold in the non removed sleeves and use a torque plate to seat all sleeve(s) in the sleeve bores.
- 8.) Measure sleeve to deck height and mill according to your engine building specs. Most engine builders run the sleeve height anywhere from .000" - .002" above the deck for proper gasket sealing.

If you have any questions please contact our technical department at 1-248-362-1188 and we can assist you with the R&R procedure if needed.

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Troy, MI 48084
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1-248-362-2027



Aluminum Race Series Small Block Chevy



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

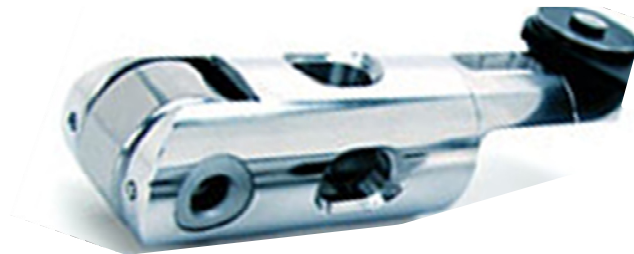


Figure 2:
Dart oil galley modification
from band to pushrod oil hole



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