

DART Aluminum FORD 351 Small Block – Technical Notes

Deck Height	.....	9.200" Cleveland	
		9.500" Windsor	
Bore	.....	4.00" or 4.125" unfinished	
Main Bearing Size	.....	Cleveland 2.749"	
Weight	.....	9.200" – 91 lb / 9.500" – 93 lb	
Maximum bore	.....	4.165"	
Maximum recommended stroke	.....	4.250"	
Camshaft Journal diameter	.....	Standard Ford	
Camshaft Position	.....	Standard Ford	
Cam bores	.....	2.200"	
Deck thickness, min.	.....	.675"	
Sleeve O.D.	.....	4.300"	
Oversize O.D. available	.....	+ .010" & + .020"	
Sleeve thickness	.....	4.00" = .150" 4.125" = .087"	
Sleeve Length	.....	9.200 = 5.575" / 9.500 = 5.850"	
Sleeve press	.....	.0005" - .001"	
Torque Specs – Main caps	1 – 5	1/2" studs = 100 ft lbs	
	2 – 4	7/16" studs = 65 ft lbs	
	1 & 5	3/8" bolts = 35 ft lbs	

Note: All torque specs are with thread lube.

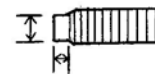
Standard 351 Windsor timing chain, timing cover, gear or belt drive can be used.
 Actual deck height will be .001" - .005" taller for additional machining requirements.
 Standard 351W oil pump fits correctly even with the 4 bolt front main cap.
 When initially removing main caps, the caps and block should be deburred before reinstalling.
 This will insure that correct main size is maintained.
 Screw-in 1 5/16" (1.312") freeze plugs and 2 3/8" cam plug are provided.

1/2" HEAD STUDS

Stud length in block is 1.780" (1.480" thread + .300" bullet)

You must use head studs with this amount of thread, bottom length and bullet.

.375" OD x .300" deep



Head studs are available from Dart for all popular cylinder heads.

Head stud holes are blind. They do not go into the water jacket.
 A sealant/antiseize *must* be used on the head studs. Loctite #620 is recommended.
 Studs should *never* be torqued into the block. They should only be lightly snugged.

CAM BEARINGS O.D. should be deburred before installation.

All our cam bearings are coated for cooler operation, more reliability and extended life.

Camshaft bearing bores are 2.200" I.D. on all 5 cam bores.

The cam bearings have 5 different I.D.s to fit the stock ford cam journals but common O.D.s.

<u>Position</u>	<u>Brg#</u>	<u>Part#</u>	<u>Cam OD</u>
Front #1	B384	32210051	2.081"
#2	B385	32210061	2.066"
#3	B386	32210071	2.051"
#4	B387	32210081	2.036"
Rear #5	B388	32210091	2.021"
Complete Set		32210041	

Cam bearing sets for cams with common 2.081" size on all journals are available from Dart or Durabond # 351RHP.

Cam bearings sets for 2.051" common journals are available from Dart or Ford # M-6261-C351.

Oversize cam bearings are available in +.010" and .020".

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. Fill the counterbore around the head stud with silicone leaving a small amount sticking up around the stud. Install the head gasket and put silicone around the stud on the top side of the gasket. This exact procedure should seal all coolant leaks.

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, before decking.

WET / DRY SUMP with EXTERNAL OIL PUMP

When using a dry sump system or a wet sump with external oil pump you must block off the oil pump outlet hole in the block next to the front main cap. We recommend drilling and tapping for a 3/8" NPT plug. The oil filter inlet hole can be block using a -12AN plug utilizing an o-ring style washer to seal it.

The recommended inlet is at the rear of the block on top of the bell housing area. This will provide **TRUE PRIORITY MAIN OILING** as it delivers oil directly into the main oil galley and feeds the main bearings before it feeds the lifter galleys. This increases the oil flow to the mains and drastically reduces the oil pressure requirements. It is 1/2" NPT thread and is at a 2° angle to help the fitting clear the cylinder head. Using a 45° fitting will help clear the head but some clearancing may have to be done. If this method is used the -10AN feed hole at the front of the block also must be plugged (see below).

If the front external oil feed is used you must plug the 1/2"NPT feed at the rear of the block.

-10AN FITTING

The oil feed hole at the left front corner is a -10AN thread, NOT a tapered pipe thread. If you are not using this hole use an O-ring Boss Plug. You can drill this plug for your oil pressure tap if desired. The following are part numbers for this -10AN plug:

Aeroquip # 4024
Goodridge # 4024

Earls # 981410
Russell # 660290

2/8/2008

LIFTER GALLEY RESTRICTORS

The lifter feed at the front & rear of the lifter valley are threaded for an 1/8" NPT plug. There are two lifter feed passages under the cross over plug (1/2" NPT). It is the one coming from the main oil galley, towards the passenger side. The threaded portion is between the main oil galley and the passenger side lifter oil galley. This restricts both right & left lifter galleys. Because it restricts both sides the orifice size in the 1/8" NPT plug should be large enough to feed both sides. These restrictors are located at both ends of the block. To restrict the lifters you need to either install restrictors at both ends or plug one end and restrict the other. Some engine builders prefer to plug the end they are feeding the main oil galley from and install restrictors at the opposite end. This gives you priority main oiling before feeding the lifters.

HYDRAULIC ROLLER LIFTERS

Having dual lifter galley feeds at each end of the lifter valley as described above is a very useful feature but it does interfere with the OEM Ford sheet metal hydraulic roller lifter retainer that Ford and some aftermarket cam companies furnish in their kits. You *can not* use an OEM style retainer or hydraulic roller lifter in these blocks. *You must use a tie-bar style hydraulic roller lifter.* Crane Cams manufactures tie-bar hydraulic roller lifters that fit this application. These are also available from Ford Motorsports. Most other cam companies are in the process of producing them. All other standard flat tappet hydraulic, solid and roller lifters are suitable for this application.

PIPE PLUGS All front and rear oil galleys are tapped 1/4" NPT. They are a straight thread, not a tapered thread. When using a 1/4" NPT tapered pipe plug the diameter of the plug determines how deep the plug goes into the threaded hole. If the plug is too shallow it can be threaded with a 1/4" NPT tapered pipe die to the desired size. *NOTE: Sizes from various manufacturers vary to a great extent.*

Various length plugs are available from Pioneer for adjusting the depth of the plug.

PP584	.325" OA
PP625	.333"
PP567	.375"
PP507	.460"

NOTE: Due to variations in lifter sizes and clearance preference, most of our engine builder customers prefer the lifter bores sized on the small size of the specification. Sometime these bores will need to be lightly honed. The lifter bore spec is .8747"-.8757". *Most lifter manufacturers recommend .0015"-.002" clearance. ALWAYS CHECK lifter to bore clearance.*

SPECIAL NOTE: With a multitude of crankshaft, rod & piston combinations available it is very important to check clearance of all moving parts, especially crankshaft counter weight and connecting rod to block. Because the cylinder barrels have been extended for more piston skirt support with stroker kits you may have to clearance the bottom of the bores for rod clearance. Be careful if you need to add counter weight clearance at the oil pump area. Be sure to leave enough material to seal the oil pump mounting flange. All parts must be checked before any type of machining or assembly is attempted.

It is good engine building procedure to ALWAYS check the fit of the distributor before any machining or cleaning is done.

OIL PANS

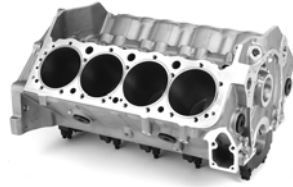
Some oil pans, including stock pans will not clear the 4-bolt front & rear main caps. You need to use a pan that is specifically made for 4-bolt end caps. Most manufacturers should stock pans for this block. Moroso & Canton have these.

When using a front sump oil pan you can use Ford part# M-6059-D351 (std rotation water pump) or M-8501-B50 (reverse rotation) front cover with provision for a dipstick. The dipstick needs to be in the oil pan with a rear sump. The DART blocks do not have a provision for a dipstick.


FORD 351 SB Aluminum Block

Part#	31344195 - 31345295
Material:	355-T61 Virgin Aluminum Alloy
Bore:	4.00" or 4.125" unfinished
Bore & stroke:	4.165" x 4.250" max recommended
Cam bearing bore ID:	SVO 2.203"- 2.205"
Cam bearings:	Special coated, grooved, w/3 oil holes
Cam Bearing O.S.	+ .010", +.020", +.030"
Cam bearing press:	.002" - .003"
Cam journal OD:	Standard Ford SB (can be bored for 55mm)
Cam Plug:	2.375" dia. cup plug
Cam Plug snap ring:	.030" thick
Cylinder Wall Thickness:	.250" min
Cubic inch:	463" max recommended
Deck Height:	9.200" & 9.500"
Deck Thickness:	.675" min.
Fuel Pump:	Mechanical pump provision
Freeze Plugs:	Threaded 1 5/16" OD
Lifter Bores:	Std Ford .8747" - .8757" Honed to size
Lifters:	Std Ford - Hyd rollers need tie-bar style lifters
Main journal size:	2.749" Std 351 Cleveland
Main bearing bore:	2.9415" - 2.9425" Honed to size
Main thrust width:	.913" - .915"
Main cap press:	.003" - .004"
Main caps:	Steel - 4 bolt, all 5
Main cap register:	Dowel pinned & deep stepped register on each side
Oil system:	Std Wet Sump or SVO dry sump Priority Main oiling with external pump (wet or dry)
Oil Filter:	Standard filter
Oil Pan:	Standard 351W oil pan
Rear Main Seal	Std 1 piece seal - FelPro# 2921 or 2942 4.500"x 3.750" SVO
Serial No.	Right front & main caps
Sleeve OD:	4.300"
Sleeve O.S.	+ .010" & +.020" available
Sleeve thickness:	4.000" bore = .150" / 4.155" bore = .072"
Sleeve Length:	9.200" deck = 5.575" 9.500" deck = 5.850"
Studs, head:	1/2" Bind holes
Timing chain/gears	Standard components, 351W cover
Torque Specs:	1-5 1/2" studs - 105 ft lbs 2-4 7/16" bolts - 65 ft lbs 1 & 5 3/8" bolts - 35 ft lbs
Weight, approx:	93 lbs - 9.500" 91 lbs - 9.200"

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

Honing Procedures for



- **HONING OIL** Sunnen MAN 845-55

- **SPEED & FEED** CK-10 (C&E) Pulleys
 CV-616 185 rpm 50 strokes per minute

- **HONING**
 - 1) **Rough** .003" from size Sunnen C30A-25
 - 2) **220** to size Sunnen C30A-55
 - 3) **280** 3 strokes Sunnen C30J-65
 - 4) **400** 3 strokes Sunnen C30J-85

- **REHONE (deglaze)**
 - 1) **220** 3 strokes Sunnen C30A-55
 - 2) **280** 3 strokes Sunnen C30J-65
 - 3) **400** 3 strokes Sunnen C30J-85

• **RA should be 26 - 28**

• **SHOE ASSEMBLY TECHNIQUE**

Titanium or hard shoe from Sunnen on one side of honing head.

Delrin (engineering plastic) attached to brass shoe holder & trimmed to size on other side. (Delrin bars can also be purchased from your local plastic supplier)

***** DO NOT use bronze shoe *****

• **FRESH OIL IS CRITICAL**

All supplies from Sunnen Products

