Arrow Shark

X-30 Marine Engine

Owner Manual

www.arrowshark.com

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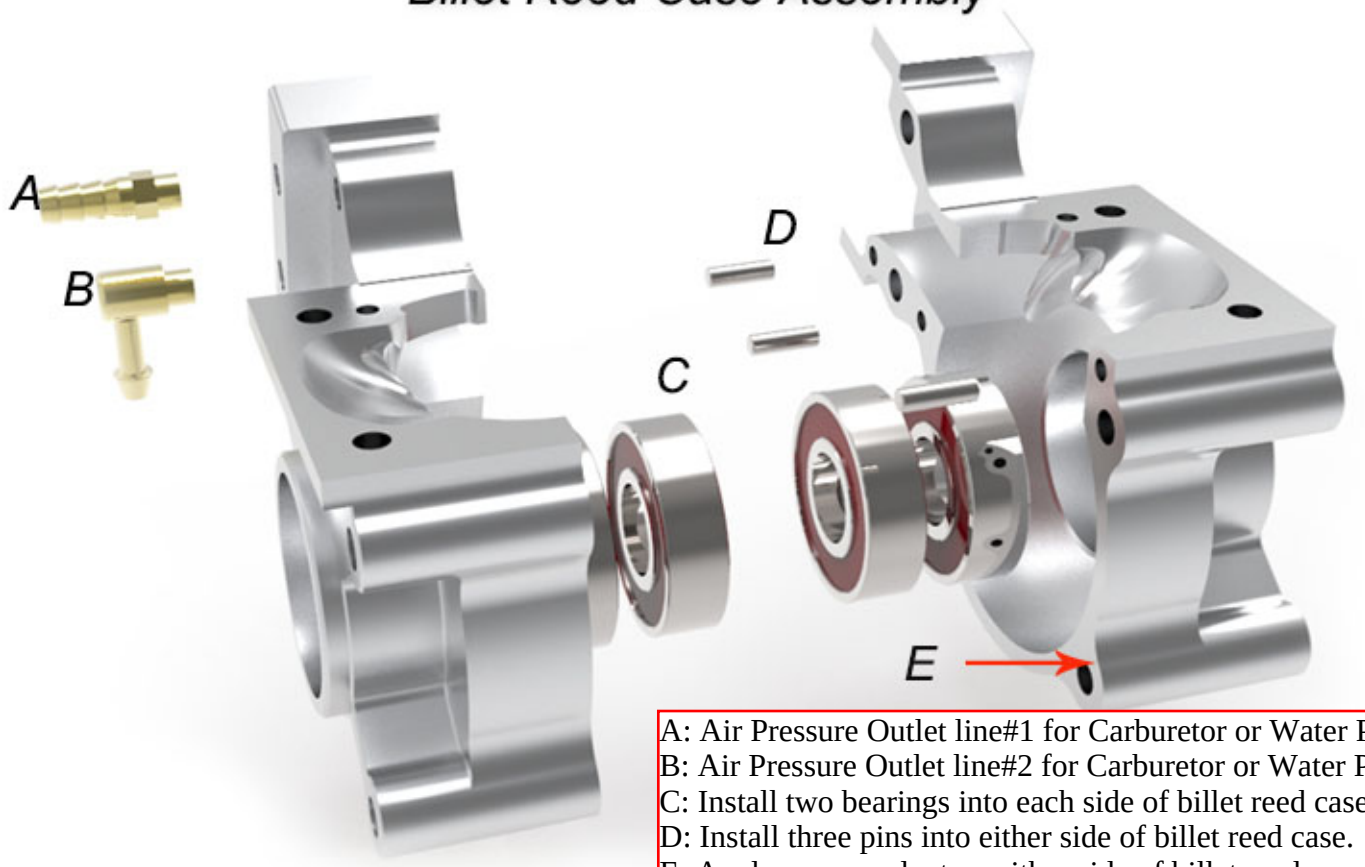
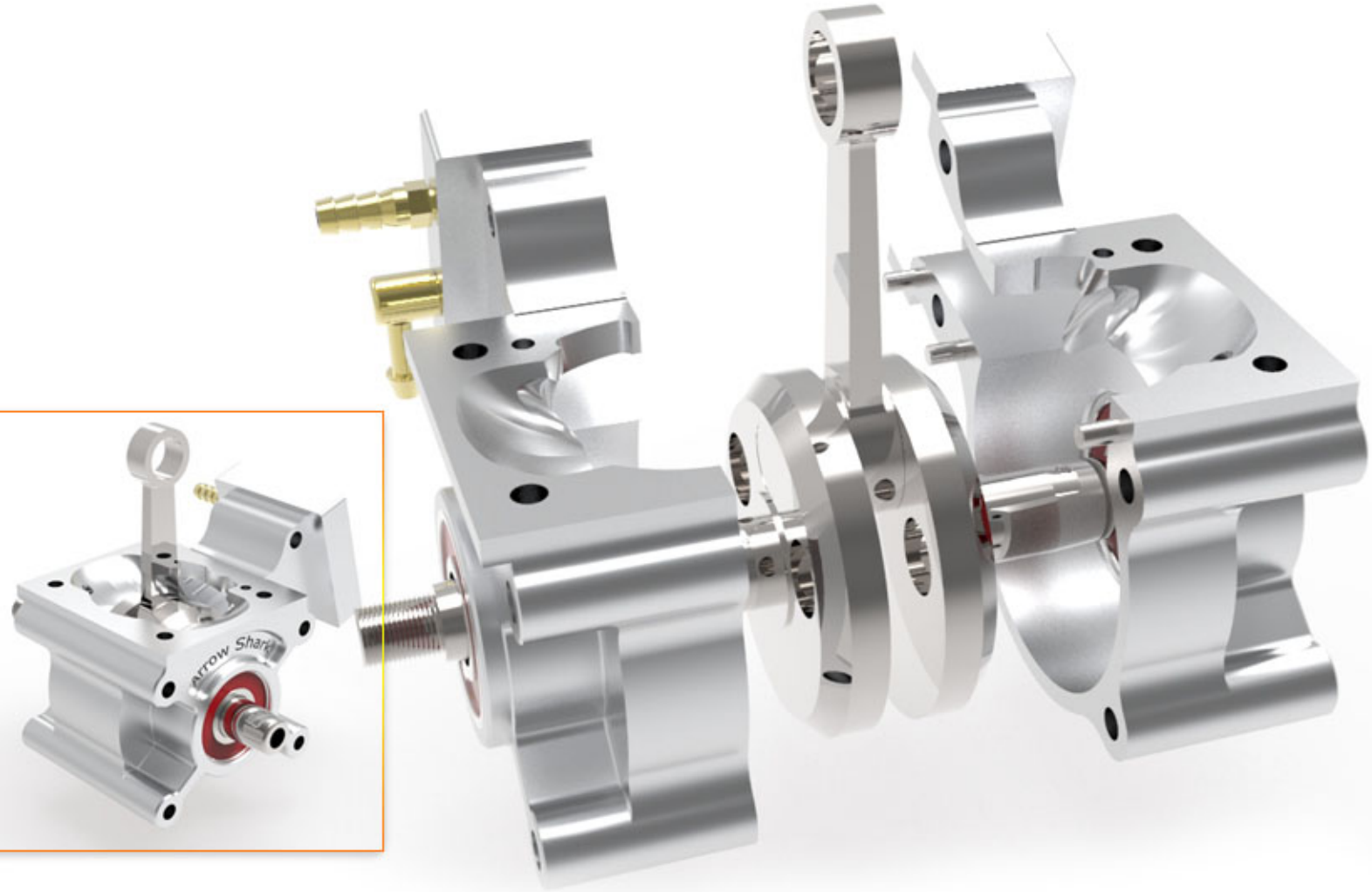
Billet Reed Case Assembly



A: Air Pressure Outlet line#1 for Carburetor or Water Pump.
B: Air Pressure Outlet line#2 for Carburetor or Water Pump.
C: Install two bearings into each side of billet reed case.
D: Install three pins into either side of billet reed case.
E: Apply some sealant on either side of billet reed case for better sealing.



Slide the both side of billet reed case onto the crankshaft and match the pin holes, close them together as shown in above picture.

Piston Assembly

1: Using needle nose pliers, install the first “C” Clip into the piston by slowly turning it into the slot hole. This “C” Clip should be installed in the hole facing the billet coil mounting plate, while the Arrow sign on the piston should be facing the exhaust side.

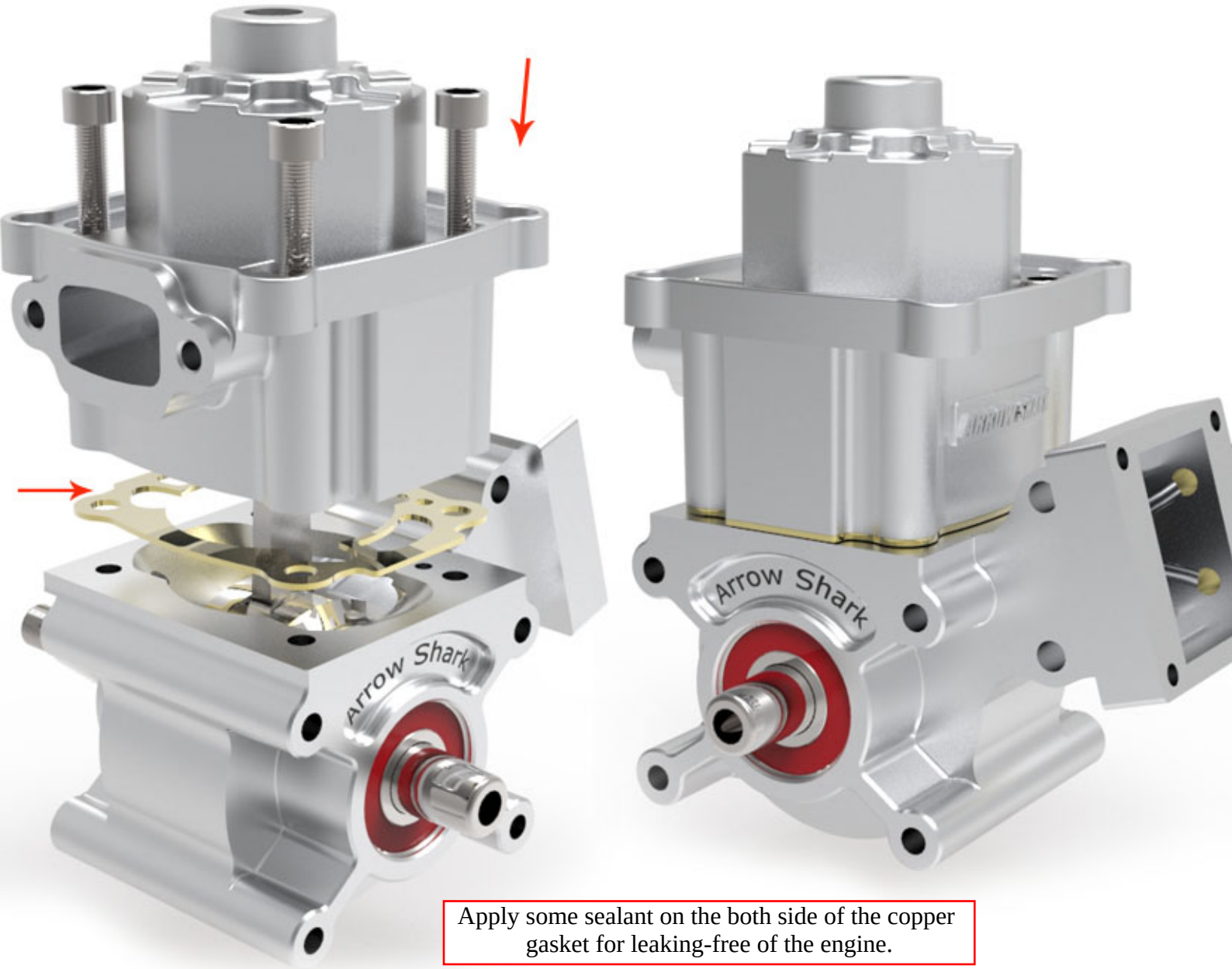
2: Insert the wrist pin into the entry of the other hole on the piston – but do not push it in yet, just leave it in the hole opening.

3: Install both wrist pin bearings and washers to the crankshaft connecting rod.

4:Match the wrist pin to the hole on the connecting rod, and push the pin all the way through.

5: Insert the second “C” Clip to secure the wrist pin in place.
6: Slowly slide the piston ring into the slot in the piston.
Note: Do not try to open the ring wide - you will snap it if you do so.
7: Make sure the opening side of the piston ring is always facing to the engine carburetor side, and the arrow sign always face exhaust side. Piston Assembly Completed!

Cylinder Assembly

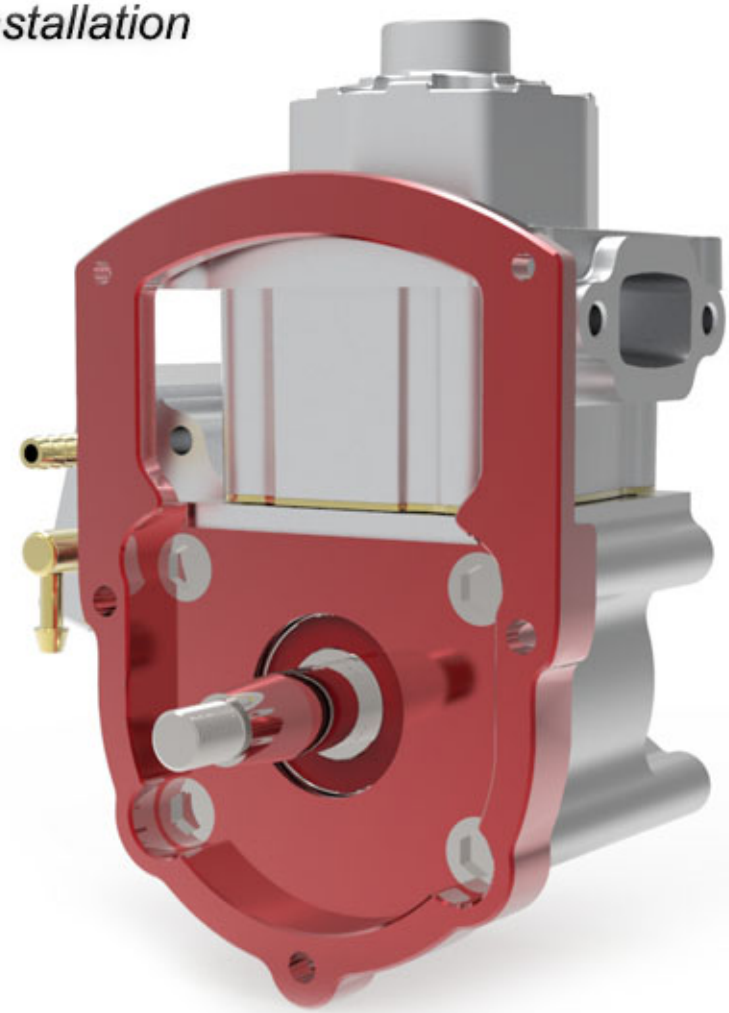


Apply some sealant on the both side of the copper gasket for leaking-free of the engine.

Use a small slotted screwdriver to fully adjust the piston ring into the cylinder, then screw down the bolts through the cylinder all the way into the crankcase. Tighten the bolts a little at a time in turn until they are fully secure. All bolts must applied with mid strength loctite.

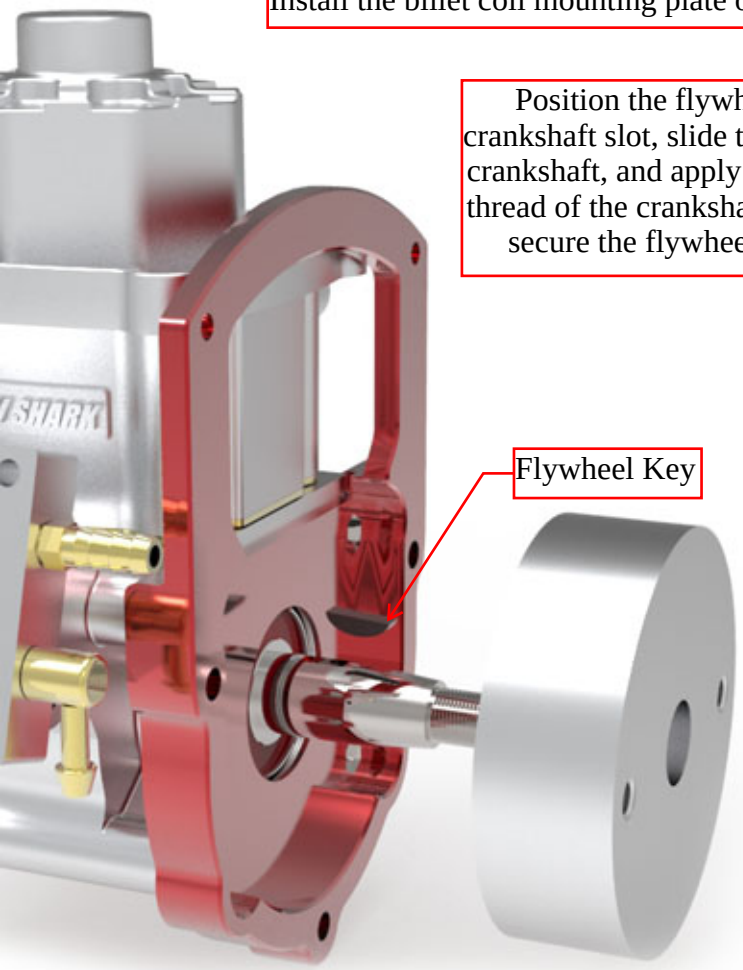
Note: Before fully tighten the bolts, using finger to turn the crankshaft for few circles and make sure the piston moves up and down freely without any resistance.

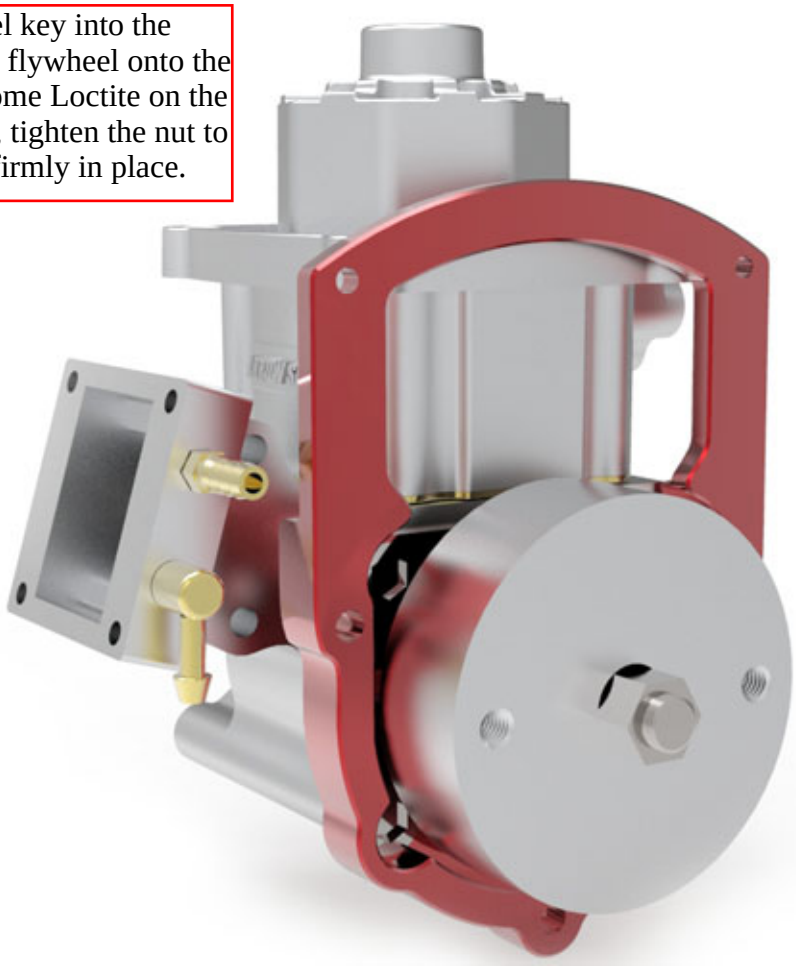
Flywheel Installation



Install the billet coil mounting plate onto the back piece of the crankcase.

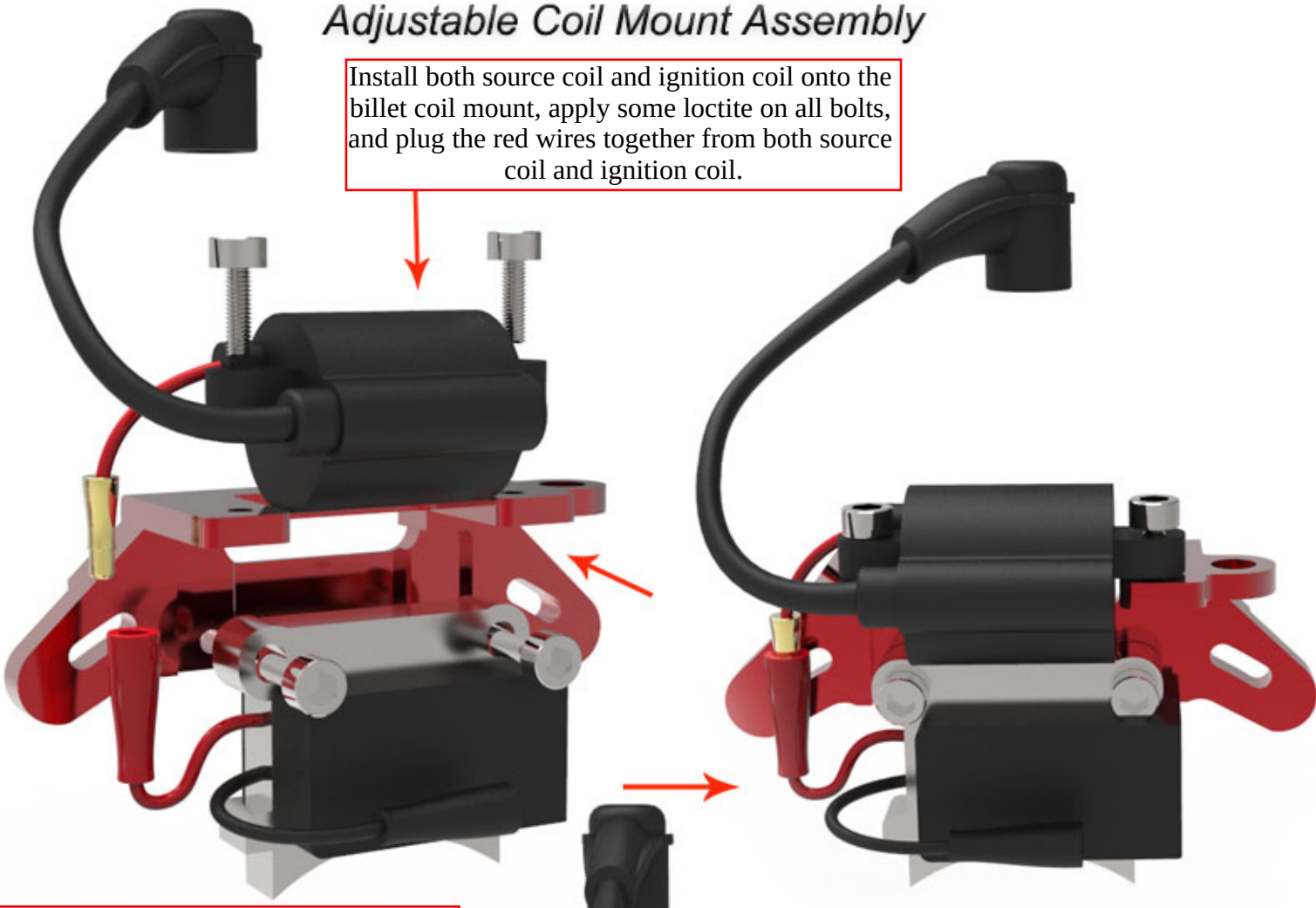
Position the flywheel key into the crankshaft slot, slide the flywheel onto the crankshaft, and apply some Loctite on the thread of the crankshaft, tighten the nut to secure the flywheel firmly in place.





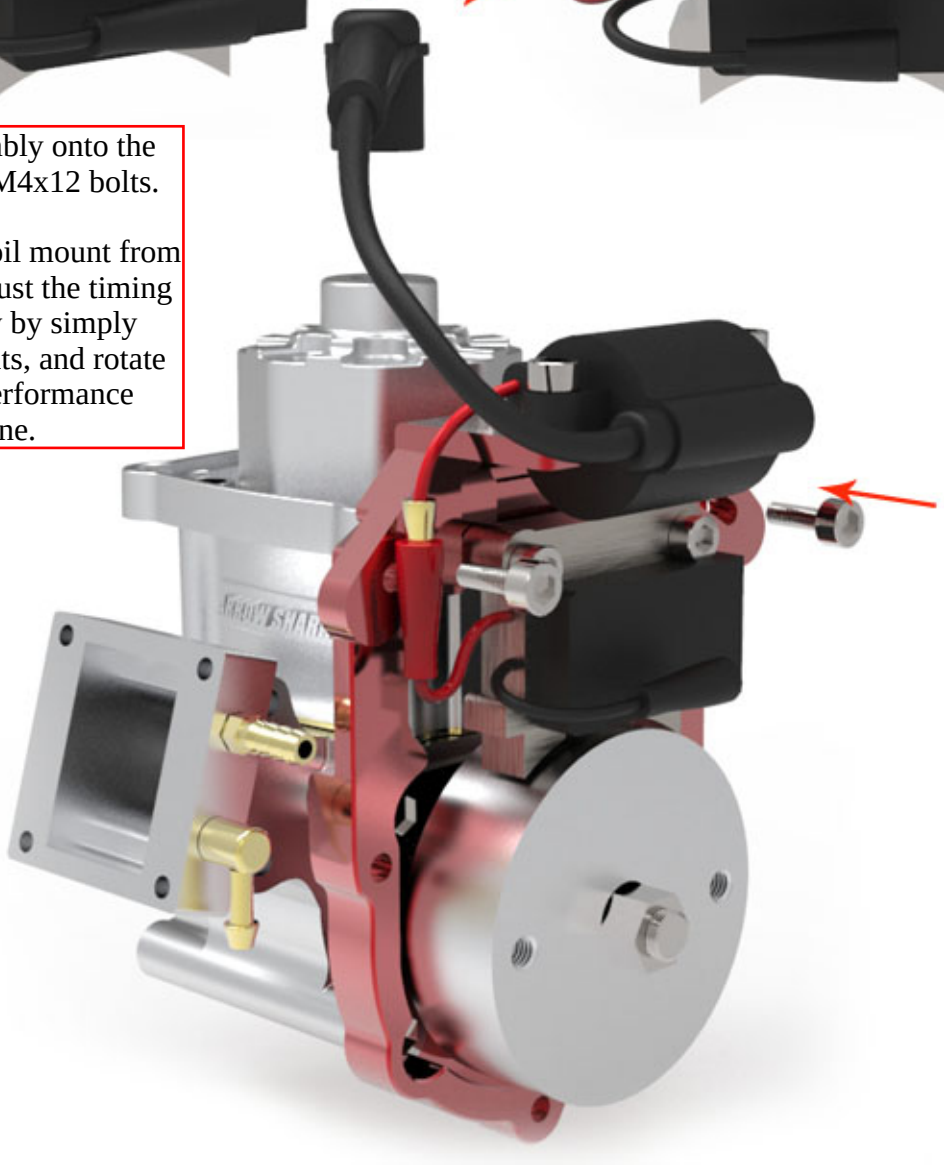
Adjustable Coil Mount Assembly

Install both source coil and ignition coil onto the billet coil mount, apply some loctite on all bolts, and plug the red wires together from both source coil and ignition coil.

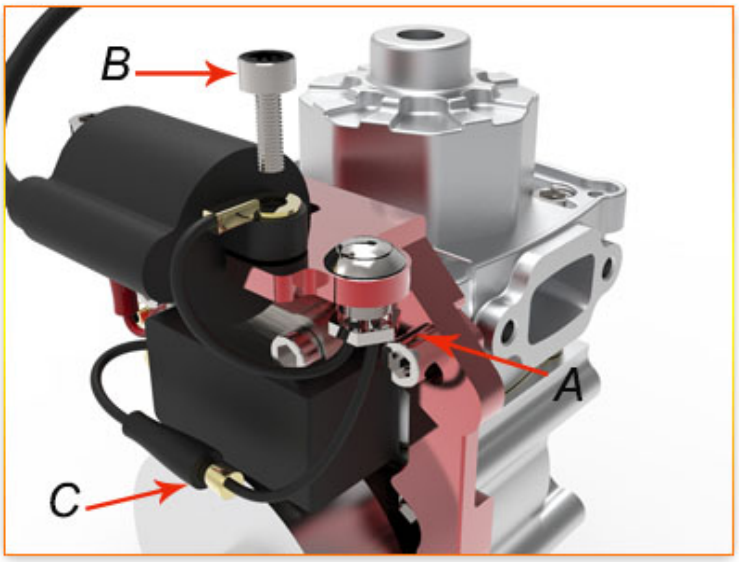


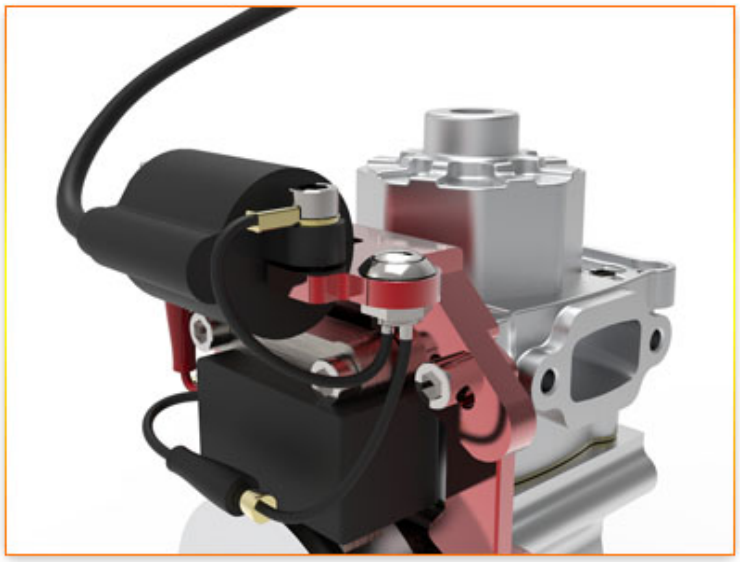
Install the coils mount assembly onto the engine back plate with two M4x12 bolts.

This exclusive design billet coil mount from Arrow Shark allow you to adjust the timing up to 10 degrees either way by simply loosing these two M4X12 bolts, and rotate it left or right to the best performance timing for the engine.



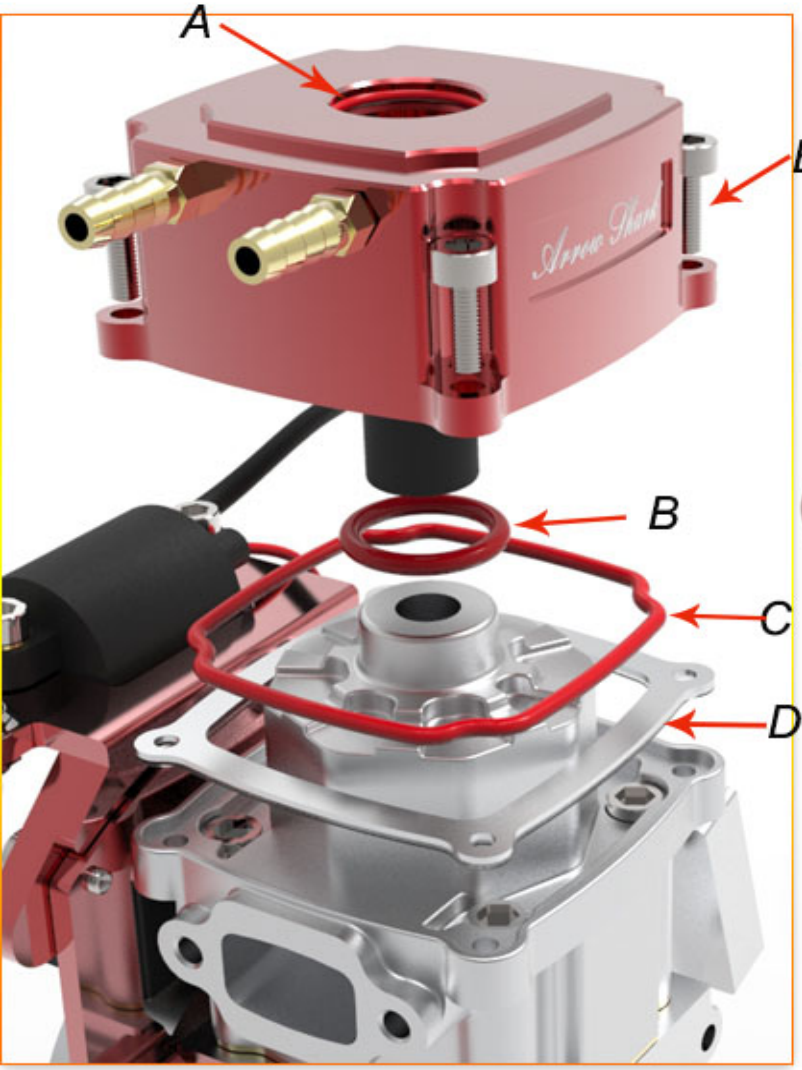
Kill Switch Installation

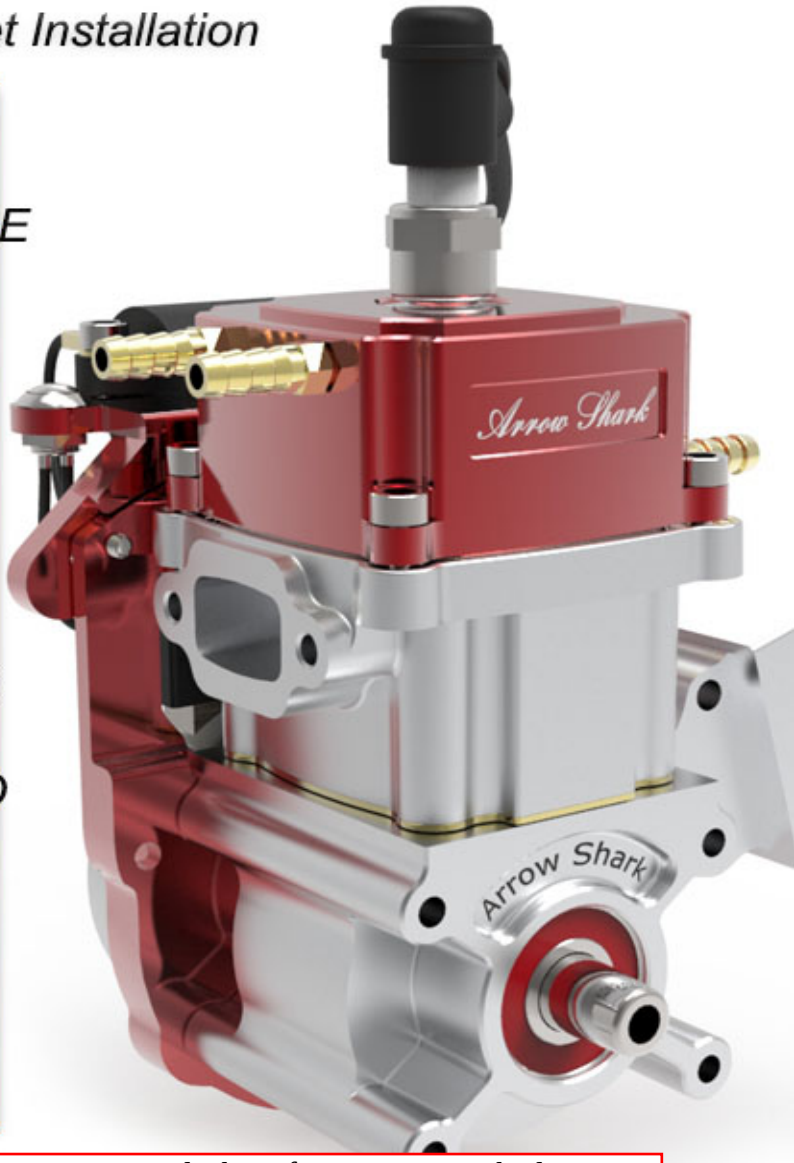




A: Install the kill switch into the bill coil mount hole and secure it with the nut comes with the switch.
B: Ground the wire on the coil mount with the same bolt that securing the ignition coil.
C: Connection the other wire from kill switch with the black wire from source coil.

Water Jacket Installation





A: This O-ring installs inside top of water jacket to prevent water leaking from center spark plug area.
B: This O-ring installs on the top of cylinder to against the inside bottom of water jacket.
C: This O-ring installs on the bottom slot of the water jacket.
D: This aluminum gasket combines with silicone will be installed on the top of cylinder against the " C" O-ring to prevent any water leaking from the bottom of water jacket. (aluminum part face up)
E: Securing bolts for water jacket, tighten them when all sealing rings in place.

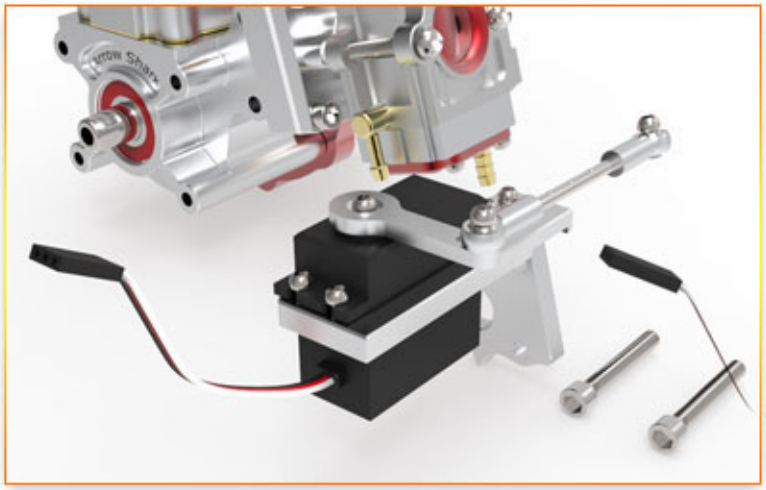
M-39X Carburetor Installation

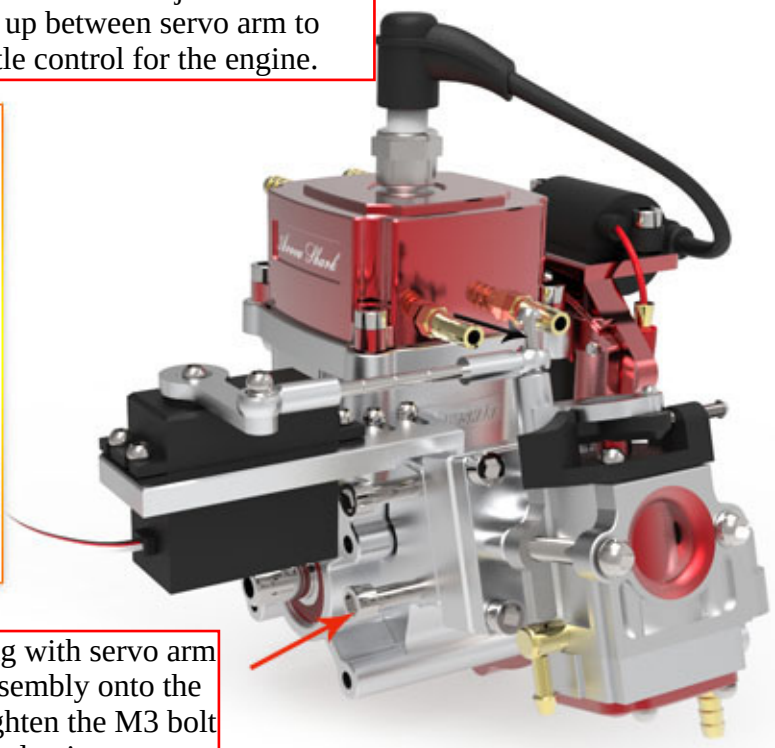
Insert the billet reed valve assembly into the reed case with supplied Teflon gasket and secure them together with four of M4x12 bolts.

Insert the supplied M5x40 bolts via the supplied Teflon gasket and carburetor, and then tighten them to secure the M-39X carburetor to the billet reed valve.

Built-In Throttle Control Installation

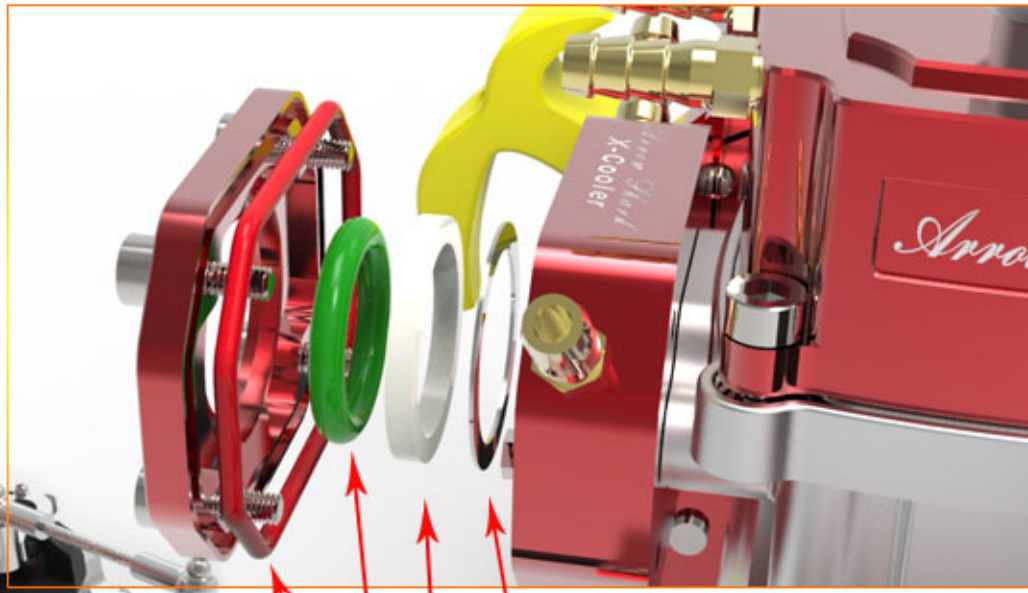
The X-30 comes with a exceptional design of built-in throttle control device positions the carburetor's low speed needle on the top which makes the needle adjustment more convenience than never before, the straight linkage set up between servo arm to carburetor adapting arm delivers perfect smooth throttle control for the engine.

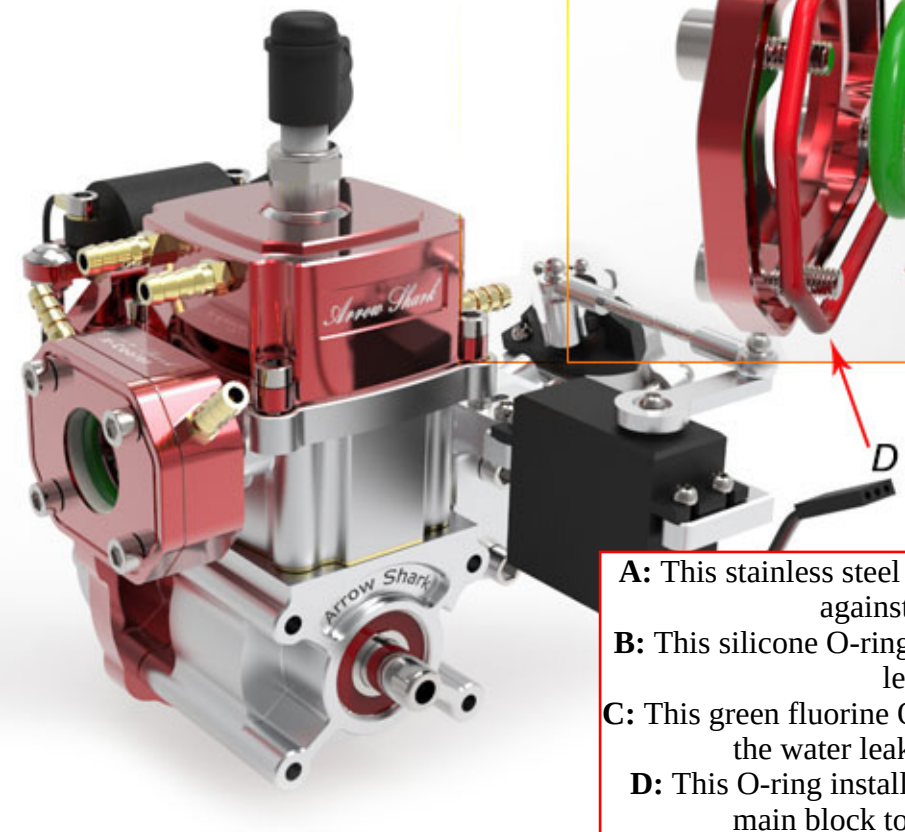




Install the throttle servo onto the billet mounting along with servo arm and control tie-bar, then install the throttle control assembly onto the reed case and secure it with two M5x40 bolts, also tighten the M3 bolt on the other side of the tie-bar into the carburetor adapting arm.

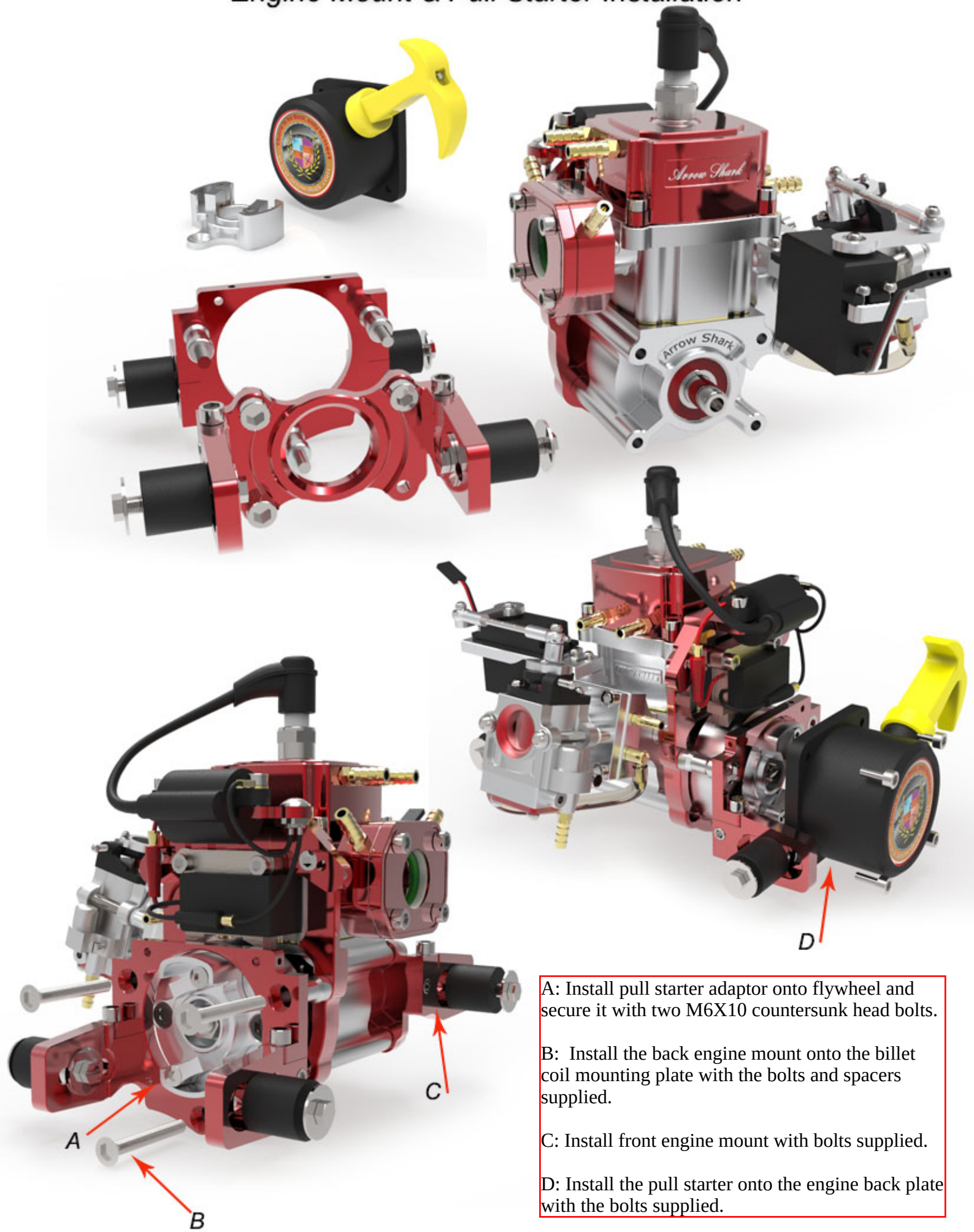
X-Cooler Exhaust Cooling Flange Installation





A: This stainless steel gasket installs at center hole of the X-Cooler base against the flat flange on the steel header.
B: This silicone O-ring installs behind the header flange to prevent water leaking into the exhaust header.
C: This green fluorine O-ring installs behind the silicone O-ring to prevent the water leaking out from the center hole of the cover.
D: This O-ring installs in the groove of the X-Cooler cover against the main block to prevent the water leaking from join area.

Engine Mount & Pull Starter Installation



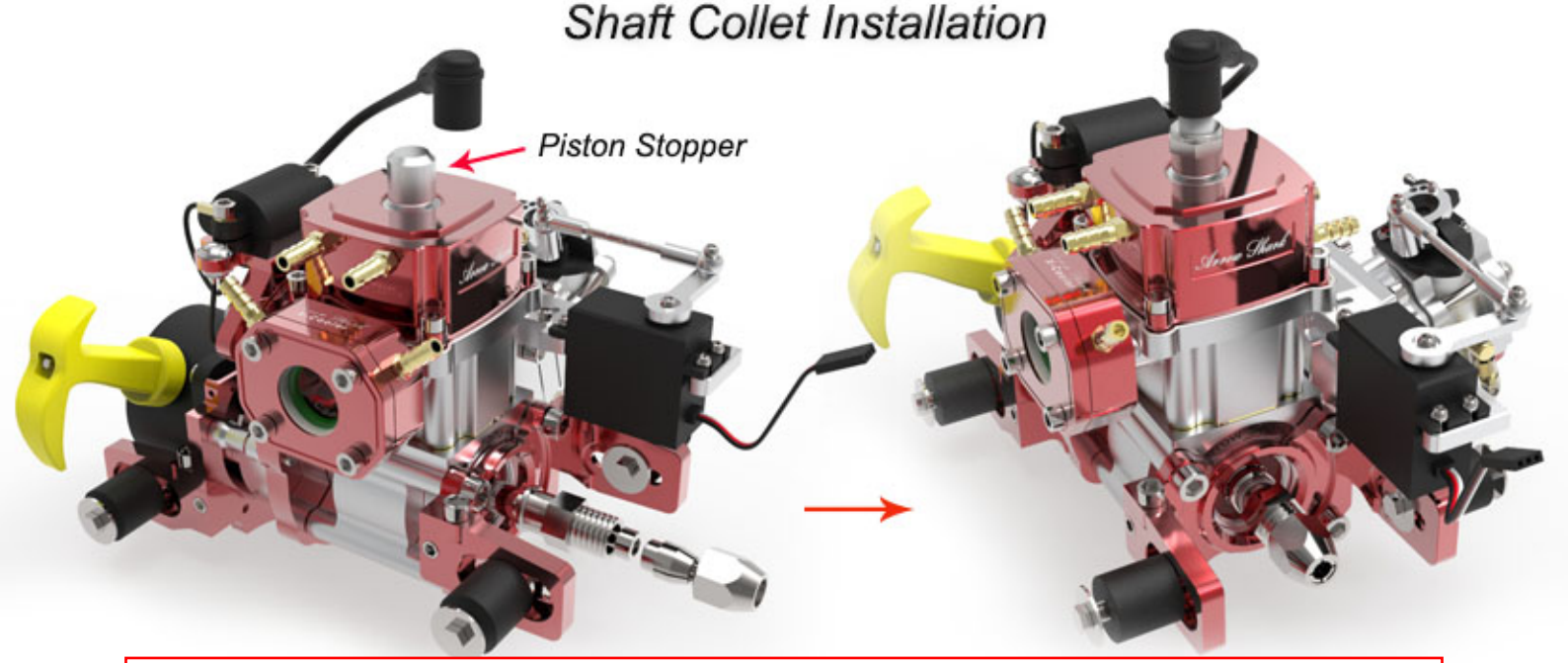
A: Install pull starter adaptor onto flywheel and secure it with two M6X10 countersunk head bolts.

B: Install the back engine mount onto the billet coil mounting plate with the bolts and spacers supplied.

C: Install front engine mount with bolts supplied.

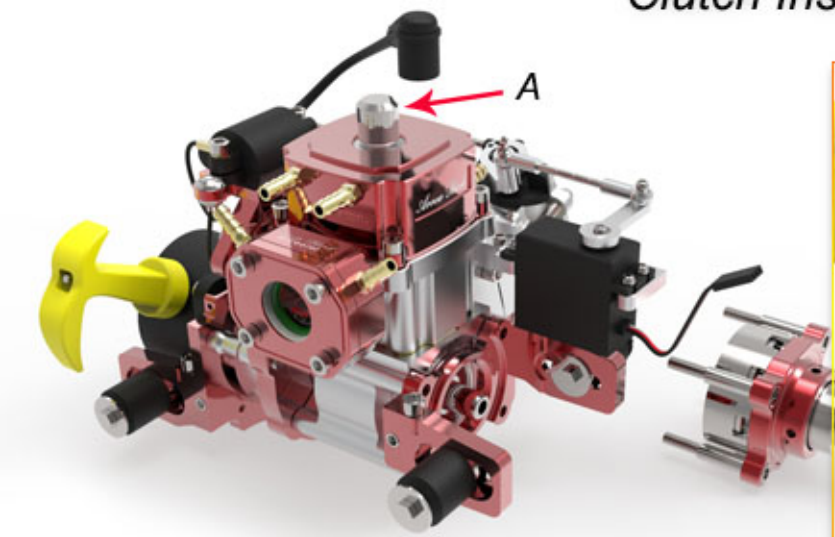
D: Install the pull starter onto the engine back plate with the bolts supplied.

Shaft Collet Installation

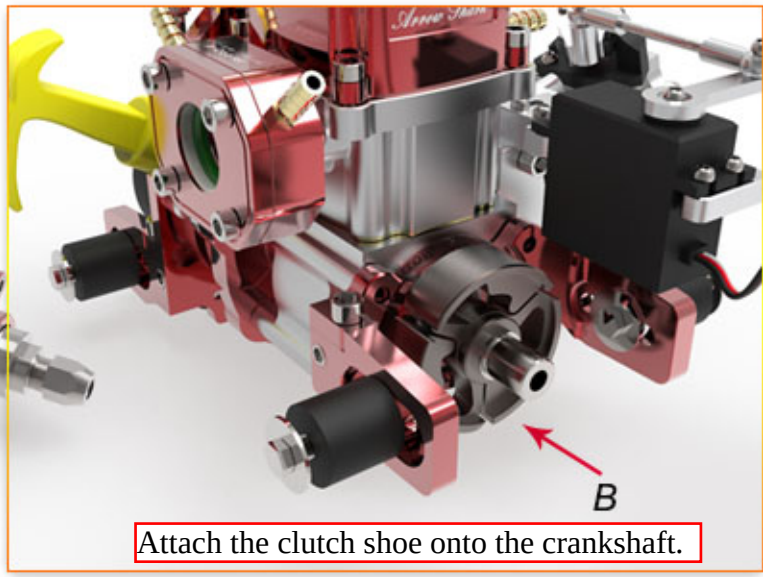


Screw the piston stopper into the spark plug hole, and install the shaft collet base on the crankshaft and tighten it with supplied M6x16 bolt, then insert the front adaptor into the base, screw the top cap down.

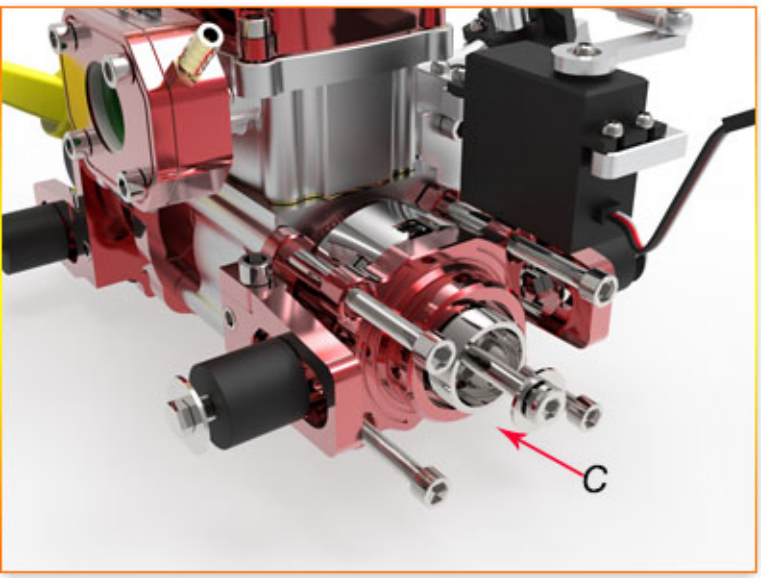
Clutch Installation



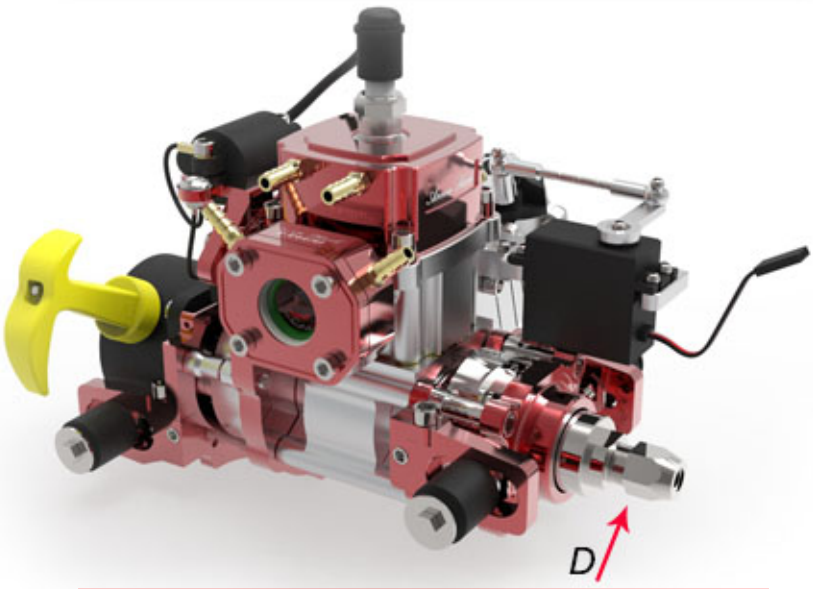
Install the piston stopper into the spark plug hole.



Attach the clutch shoe onto the crankshaft.

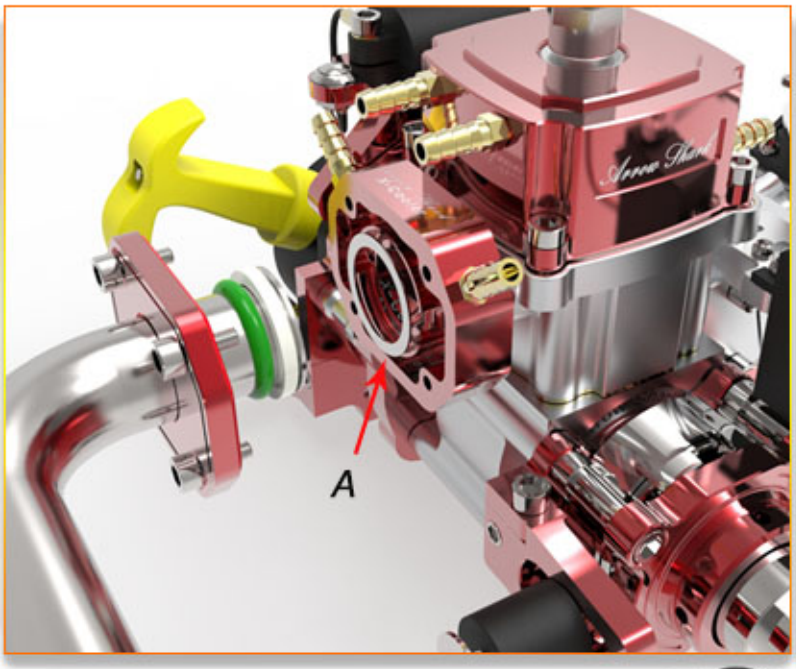


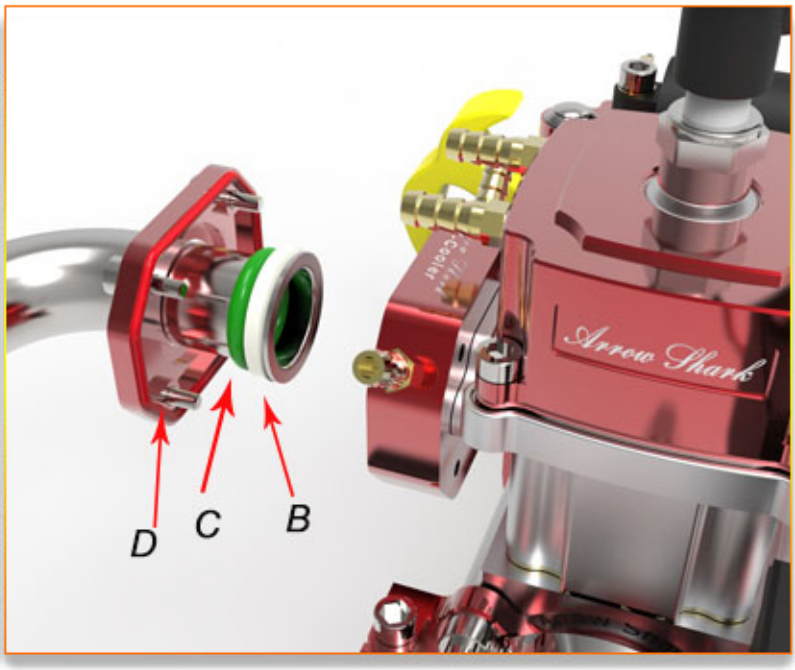
Match the clutch bell with front plate onto clutch shoe and tighten it with supplied M5x40 bolts and spacers, then secure the M6 center bolt and washer into crankshaft, the M6 bolt must be applied with loctite before tighten.

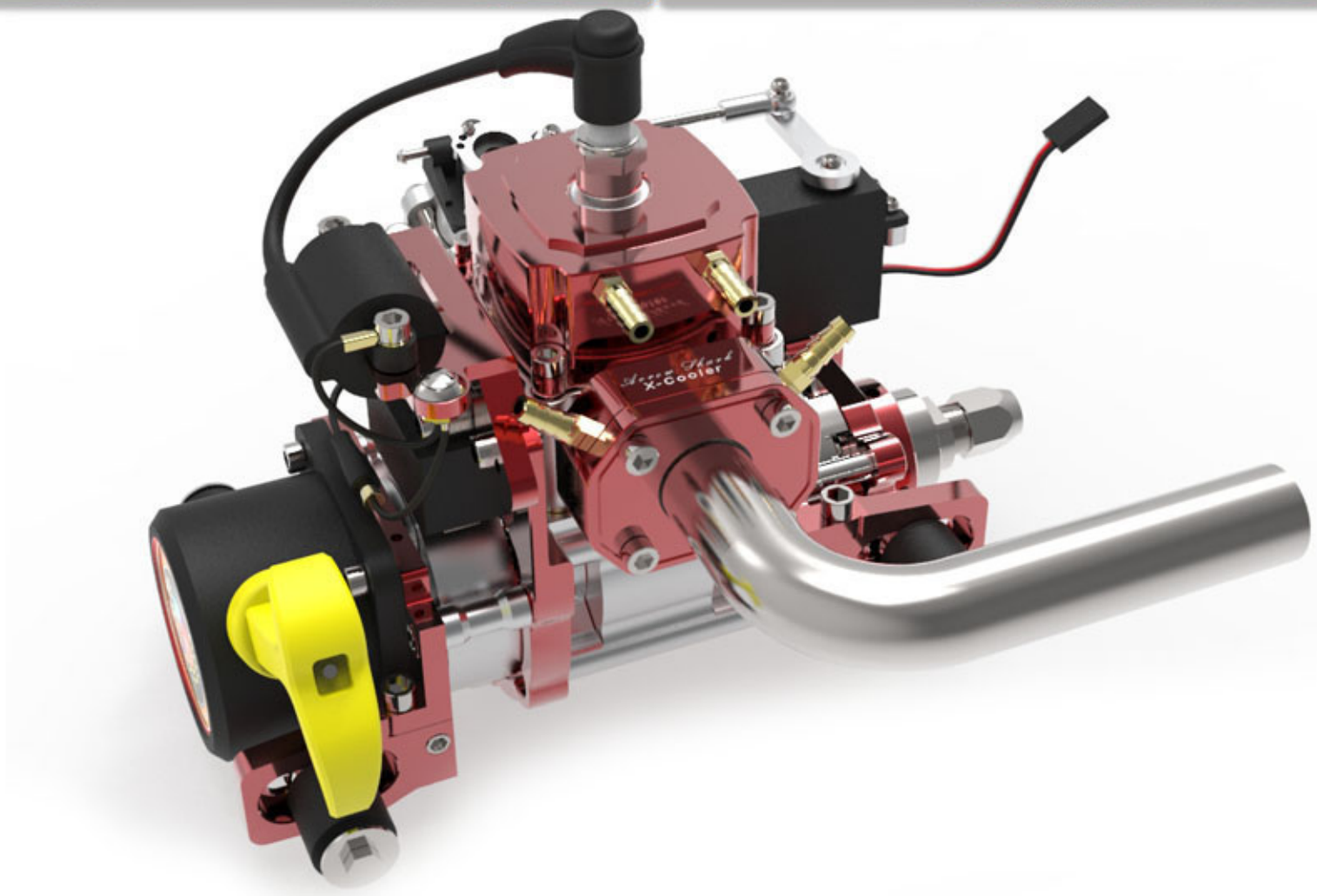


After all bolts are tighten, turn the clutch bell by finger to make sure it is spinning freely, then, screw in the front adaptor and install the insert and cap.

Exhaust Header Installation

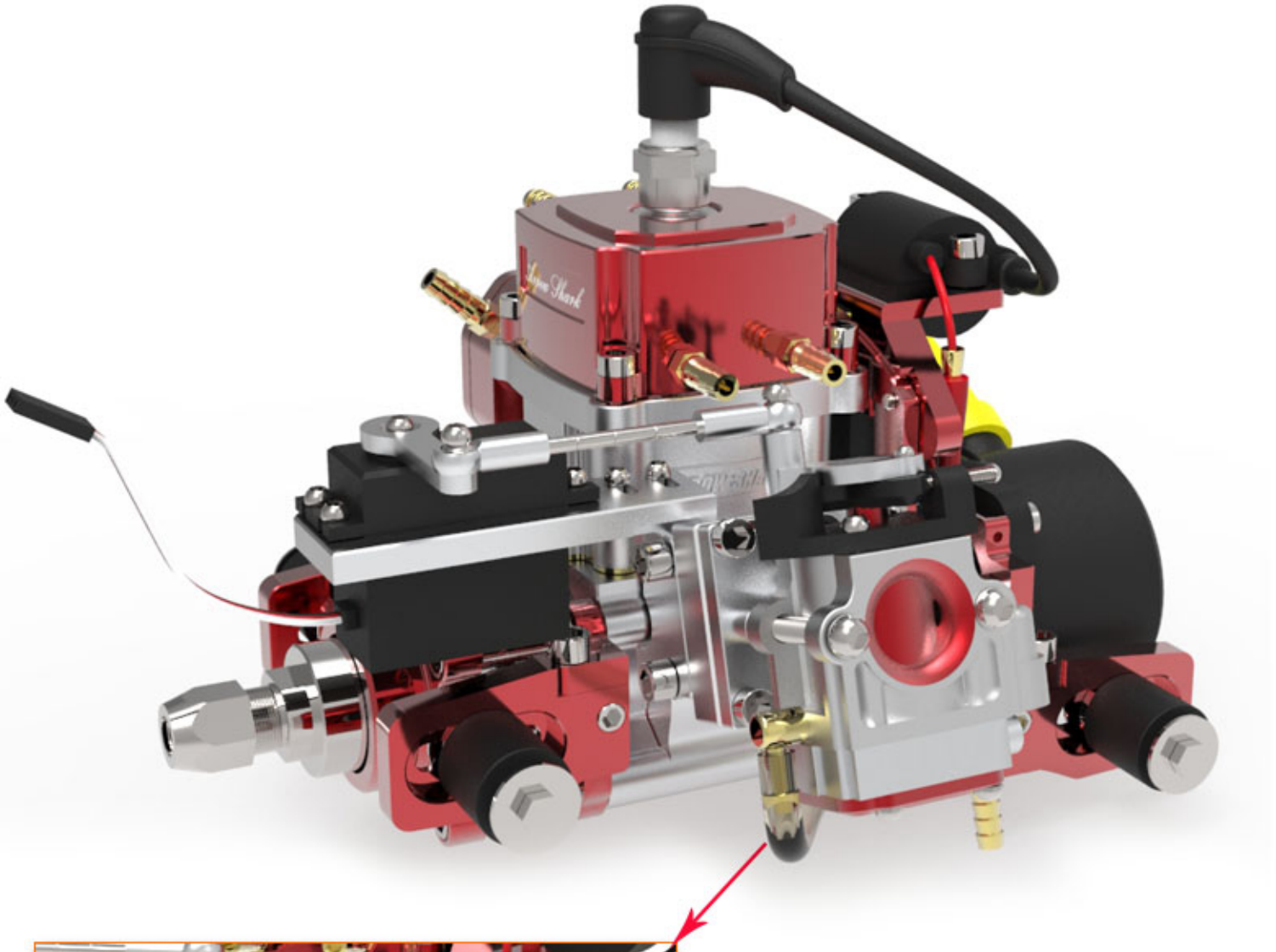


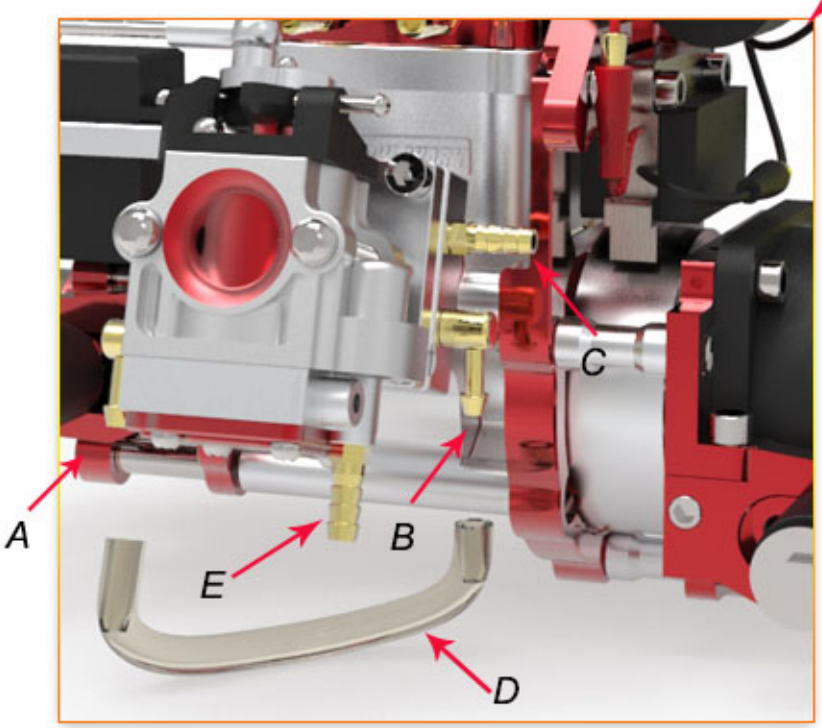




A: This stainless steel gasket installs at center hole of the X-Cooler base against the flat flange on the steel header.
B: This silicone O-ring installs behind the header flange to prevent water leaking into the exhaust header.
C: This green fluorine O-ring installs behind the silicone O-ring to prevent the water leaking out from the center hole of the cover.
D: This O-ring installs in the groove of the X-Cooler cover against the main block to prevent the water leaking from join area.

Installation of Air Pressure Tube



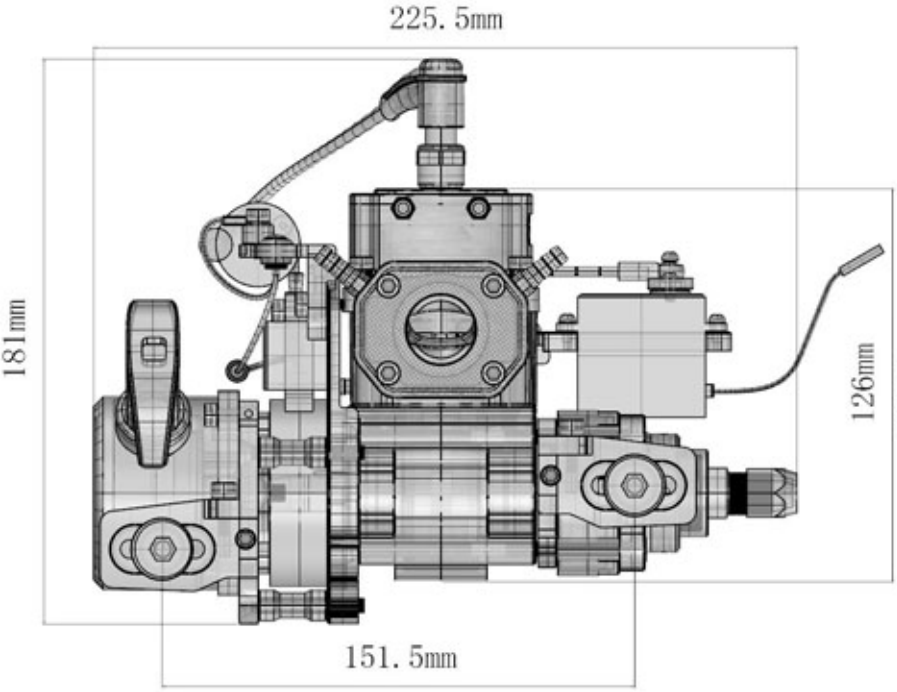


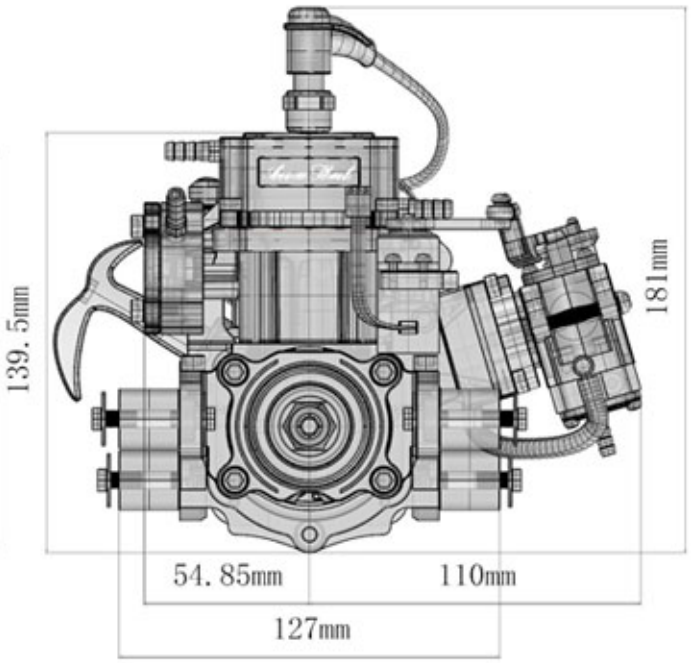
The X-30 marine engine comes with unique design of pop-off pressure for the incoming gas, there is a pulse nipple has been installed on the M-39X carburetor with a pulse-line connection to the X-30 billet reed case for delivery the pressure from engine to M-39X for the most smooth and effective gas conveying.

A: Air pressure intake pulse nipple on carburetor.
B: Air pressure outlet nipple #1 (could be straight nipple) for either carburetor or water pump.
C: Air pressure outlet nipple #2 for either carburetor or water pump.
D: Pressure tube between #A to #B or #C.
E: Gas intake nipple for connecting the tube to delivery the gas from gas tank to carburetor.

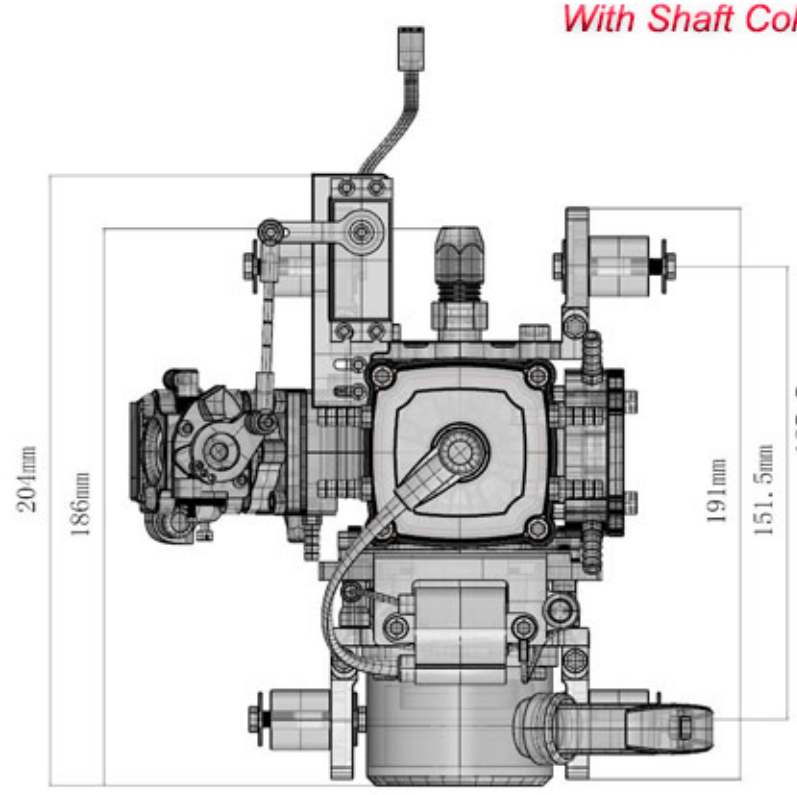
Dimension Guide

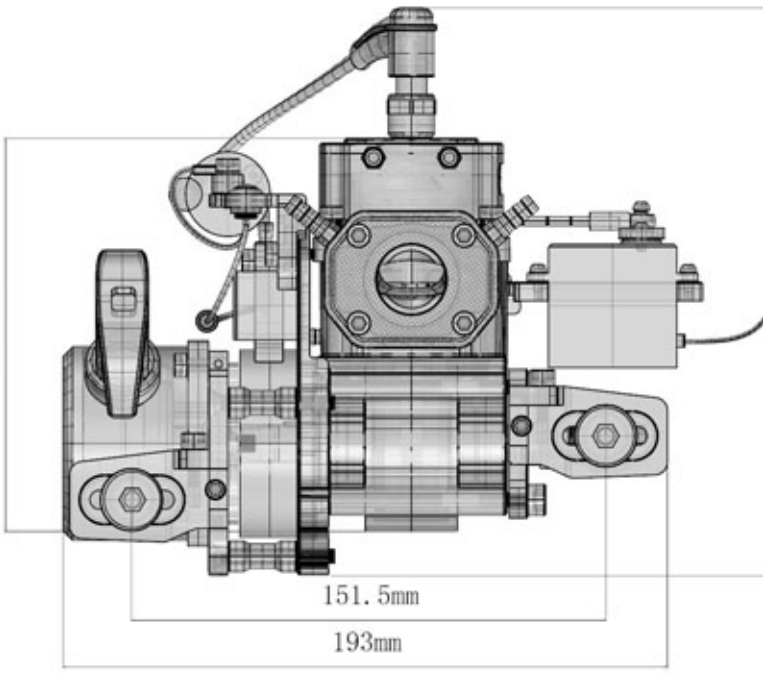
With Clutch Installed





With Shaft Collet Installed





Specification of X-30

Six Transfer Ports Cylinder
Billet Reed Crankcase
1mm+ Full-Circle Crankshaft
Billet Reed Valve & Carbon Fiber Petals
CG position Changeable Billet Mount V2
Triple Seals Billet Water Jacket
Modified M-39X Carburetor
X-Cooler Water-Cooled Flange
15KG Metal Gear Throttle Servo
Heavy Duty Pull Starter

Bore & Stoke: 36mm by 29mm
Capacity: 29.5cc

Weight: 2360 grams (With Engine Mount & Shaft Collet)
Weight: 2700 grams (With Engine Mount & Clutch)

Regarding Horse Power

For the development of X-30 and X-60 marine engine, the horse power was not the priority factor of our consideration, as these two version engine were not planned to make for racing, they were designed to work with our 2020 large scale carbon fiber RC boat line, and most of our RC boat packages equip with billet scale drives and related hardware which considering as heavy setting package compare to the race boat set up, so it more likely better suit for the leisure run rather than competition racing.

At most of the time, the horse power specification is just for the reference purpose, a well performance boat is not depending on a single super high horse power engine, it is a precisely calculating combination set up with countless time spending on the testing until getting the result of satisfactions, therefore, we will not risk to sacrifice the stability of the engine performance for getting slightly more horse power, we would prefer to focus on the user-friendly functional design of these engines and setting up each of our boat packages correctly.

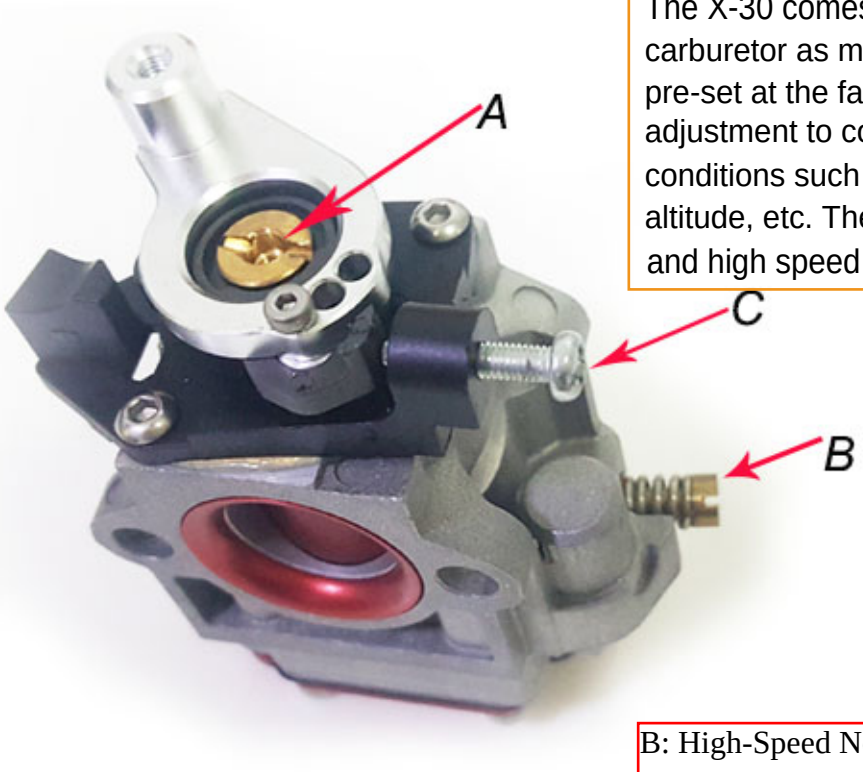
However, the current version of the X-30 and X-60 that we manufactured considering as a “stock” Version engine, it still have a big room left for the experts to reform it and make it becoming a real racing monster.

Thank you for choosing the Arrow Shark X-30 Marine Engine, If this is your first purchase from Arrow Shark, welcome to our “family”. There are countless enthusiasts around the world enjoying the fun and excitement of our boats, engines and scale drives, and we sincerely hope that you will soon happily feel to be part of this. We also hope you will obtain many hours of enjoyment and satisfaction, as well as pride of ownership, from your new engine and any other new products from our 2020 new releasing.

M-39X Carburetor Setting

Needle Setting

The X-30 comes with a Arrow Shark M-39X Pro-Mod carburetor as mentioned above, and the carb has been pre-set at the factory. However, it may require little adjustment to compensate for different ambient conditions such as varying temperature, humidity, altitude, etc. The carb has three adjustments - the low and high speed needles and the idle screw.



A: The Low-Speed Needle: The low speed needle of the M-39x carburetor is hidden in the center of the carburetor barrel. You need to use a small precision flat blade screwdriver to adjust it. When adjusting the Low-Speed Needle, apply Loctite#222 on the needle thread in order to hold the needle in position during operation.

The Low-Speed Needle is set at 7 turns out from fully closed (or fully screwed in).

B: High-Speed Needle: The High-Speed Needle is set approximately 2 turns out from fully closed.

C: Idle Screw: Set this at the lowest RPM where the engine idles reliable without stopping. Screwing the idle screw in will make your engine rev faster.

Setting Your Throttle Servo

You will need to adjust the radio settings for your throttle servo. This needs to be set so that the engine idles smoothly when your radio transmitter trigger (or other throttle control if not a wheel/trigger transmitter) is at its neutral position. You may need to adjust the throttle pushrod linkage and/or use your throttle trim to adjust the idle speed up or down to get a reliable idle. When your trigger is pulled fully open for high speed, the servo movement should have the engine's throttle barrel fully open. You may need to adjust your pushrod linkage and/or the servo's travel so that the throttle barrel is fully open with the trigger pulled all the way, but the servo should not stall by trying to force the barrel further than it will go. Finally, the servo should be adjusted so that it fully closes the barrel and stops the engine when you push the trigger (or apply the "brake" in RC car terms).

Your radio should also be equipped with a "Fail Safe" system which closes the throttle in the event of radio failure or loss of signal. If this is not an integral facility within your radio, you will need to fit a separate Fail Safe – these are readily available from good hobby stores. Follow the radio or Fail Safe instructions and set it so that the M-39X barrel is fully closed when your transmitter is turned off.

M-39X Adjustment Tips

When adjusting the needles from their standard settings, move them only 1/8 of a turn a time. Check the results then adjust further as needed. Never attempt to tune the high-speed needle by running the engine at full throttle out of the water! This is very dangerous and damages the engine. The following tips may assist in setting your M-39X Carburetor for optimum engine performance.

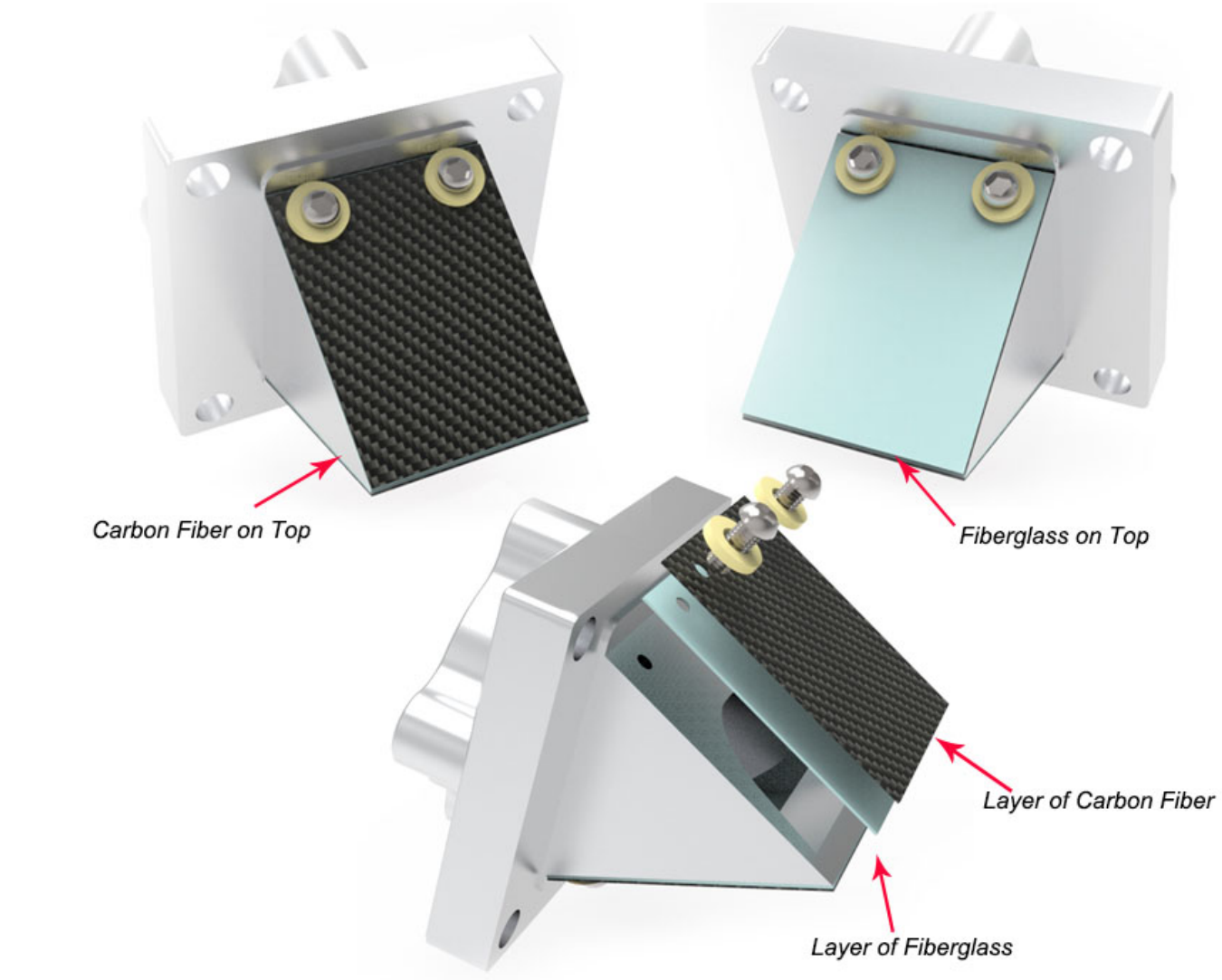
A: Low-Speed Needle

If the engine is easy to start, and idles a little rough (rich), and responds well when you open the throttle with a brief show of smoke through the exhaust, then the low speed needle is close to being correct. If the engine tends to hesitate or bog down when you open the throttle quickly (especially when the engine is cold), or if the idle speed is too high even with the throttle barrel nearly closed, the low speed needle is probably to lean and you need to screw it out (1/8 of a turn at a time). If the engine floods easily and is hard to start, the low speed needle is probably set to rich and you need to screw it in slightly.

B: High-Speed Needle

When this needle is correctly set, the engine will run cleanly, accelerate well from half throttle without hesitation, and will not lose RPMs during turns. It is tempting to lean the high speed needle to optimize the mixture for peak power and on-water RPM, but going too lean can be risky as the engine will suffer from overheating and reduced lubrication. This can lead to damage or shorter life for your engine. If the engine stops or loses RPMs when your boat is running on the water, the high speed needle is probably set too lean and you need to screw it out slightly. If the engine is not running cleanly and seems to hesitate or not reach peak RPMs, then the high speed needle is probably set too rich and you need to screw it in slightly. Running with a slightly rich mixture may cause a small drop in top speed, but it will allow your engine to run cooler and with good lubrication for reliability and long life.

Carbon Fiber Petals Installation



The reed valve petals in X-30 was custom compounded by high quality carbon fiber and fiberglass sheet in order to achieve optimum flapping tension control for the long lasting performance, the both side of the petal can be installed for the operation, when fiberglass side is damaged, just simply flip it over and use carbon fiber side till both sides damage, then replace a new one.

Starting X-30

Note: *Before starting your engine, make sure that it is securely mounted in your boat with appropriate fuel and exhaust systems. Read through all the following instructions before starting. If your radio is installed and your throttle servo linked to the engine, ensure that the carburetor controls operate as explained in the "Carb Settings" section. If the engine is connected to your flex shaft drive and propeller, check that they are properly aligned and that due care is taken to keep everything well clear of the prop. Remember that the prop is very sharp, and also that the engine and exhaust will get quite hot when running. Do not run the engine for more than a minute without a supply of cooling water, and never run the engine at more than low revs with the boat out of the water.*

The X-30 comes with a Pro-Mod -39X racing carburetor which does not have a primer bulb, choke or return gas line like the more common WT644 or WT711 carbies that are usually fitted to stock Zenoah or CY engines. The M-39X carb gives ultimate performance but does require a different starting procedure. Having prepared your engine and boat in the usual way (with full regard to all safety aspects), and having filled your fuel tank, follow these steps for easy starting:

* Manually choke the engine by blocking the carb intake venturi with your thumb or finger and slowly pull the starter rope a few times. The M-39X venturi is much larger than other carbies, so you may need to wear a glove for your thumb or finger to fully seal the venturi for effective choking of the engine.
* Check that fuel is being sucked along the gas line up to the carb; continue slowly pulling the starter rope until the gas line is clear or bubbles and you can feel fuel wetting your thumb or finger.
* Remove your thumb or finger from the carb and open the throttle a bit less than half way.
* Slowly pull the starter rope one more time to check the engine is not flooded (see below).
* Smartly pull the starter rope in the usual way until the engine starts.
* Bring the throttle back to a steady idle - DO NOT allow the engine to over-rev as this can cause damage.

If too much fuel is sucked into the engine as you choke it, the engine will be flooded and will not start. It may be harder to pull over on the starter as the excess fuel increases compression. If this happens:
1. Remove the spark plug and carefully wipe dry the electrodes with a clean rag before setting the plug safely aside.
2. Hold the clean rag just above the plug hole and pull the starter rope smartly a few times to clear the excess fuel.
3. Re-install the spark plug and open the throttle a big less than half way.
4. Slowly pull the starter rope to check that compression is back to normal.
5. Smartly pull the starter rope in the usual way until the engine starts.
6. Bring the throttle back to a steady idle.

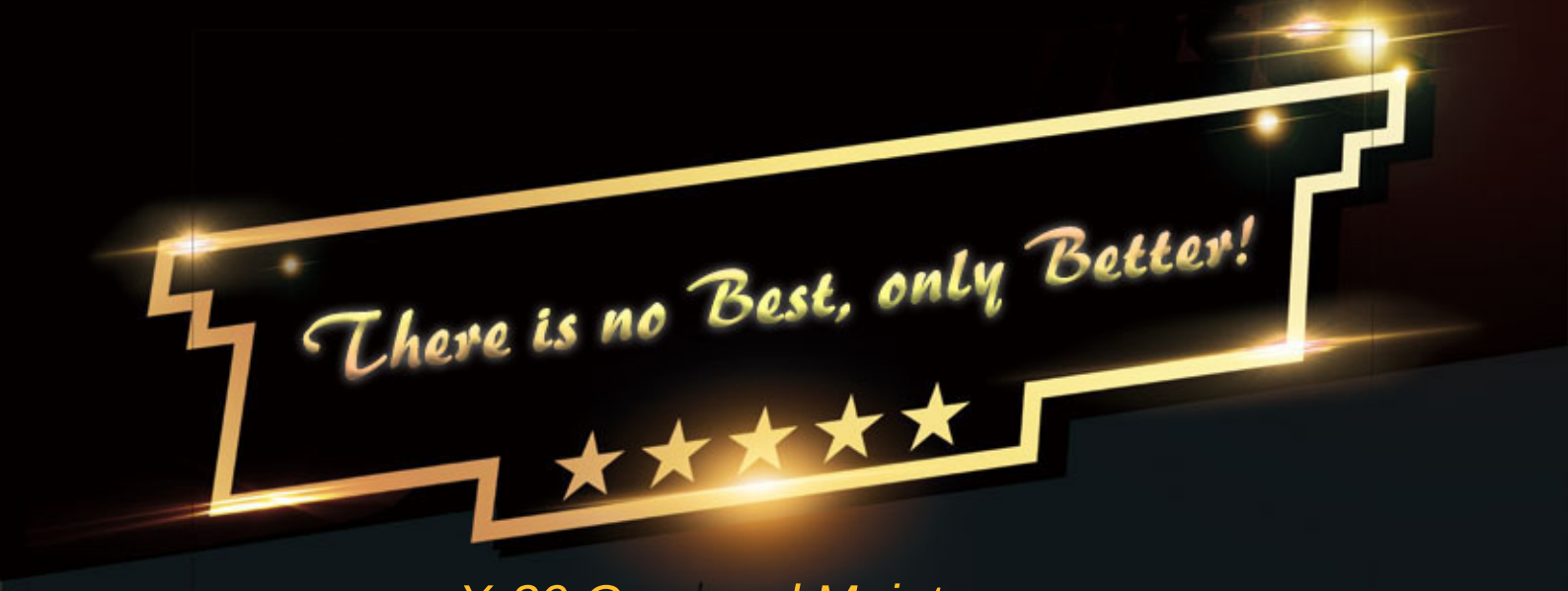
For "hot re-starts" you may not need to choke the engine. Check that the fuel line is full of gas without any bubbles and smartly pull the starter rope. If the engine doesn't start after a few pulls, then manually choke the engine as above and slowly pull the starter rope until you can feel fuel wetting your thumb or finger before removing it from the carb venturi. Slowly pull the starter one more time to check the engine is clear, and then pull smartly until the engine starts.

Breaking-in X-30

To ensure long life and good performance from your engine, you MUST break it in properly. To obtain the optimum fuel for your engine, mix 87 or 90 Octane regular pump gas with 100% Synthetic Quality oil at a ratio of 16:1 (6% oil). Another choice for oil is quality marine outboard engine oil. Operate your engine at about 1/2 to 3/4 maximum throttle opening during the break-in process. DO NOT run at full throttle while breaking in your engine. Patience is very important here; the boat will run more slowly during the break-in process and the engine's output power will increase gradually over the first 3-4 tanks of fuel. Once the engine is broken in, the power will increase substantially.

Engine Performance Tips

Tuned exhaust pipes boost engine power by using the pressure waves generated by exhaust gases to literally pull more fuel into the cylinder. However, to achieve this, it is critical to have the right length for the exhaust gases as they travel from the exhaust manifold to the “belly” of the tuned pipe (that’s where the pipe is at its widest diameter). For our X-30 Engine, this distance is between 320mm to 330mm which needs to be measured from the exhaust port along the curves of header and then along the tuned pip to its “belly”. The shorter tuned length will increase more RPM, whilst longer tuned length will increase more torque from engine.



X-30 Care and Maintenance

A: Keep your engine clean. Spray it with WD40 or a similar product after each outing and wipe it clean to prevent corrosion to avoid any build-up of dirt that might enter the engine cause wear or overheating.

B: Do not allow your engine to run with too lean a fuel mixture – this causes overheating and rapid wear or even damage.

C: Do not run your engine with a damaged or unbalanced prop; this causes vibration and can damage your engine or cause other problems including with your radio equipment.

D: Do not overheat the engine. Frequently check that cooling water is flowing from the outlets in your hull and never allow your engine to run for more than a minute or so at idle without water flowing through the cylinder jacket and exhaust cooling fittings.

E: Avoid using old fuel in the engine. Always run all of the fuel out of the engine. After running for the day, use after-run oil and work it into the engine by pulling the starter 2-3 times. If you run your boat in salt water, flush the cooling system afterwards with fresh water for several minutes. Drain all water from the cooling system.

F: Store your engine somewhere that is not subject to extreme temperature change.

G: If you are not planning to run your engine for more than a month, drain the fuel tank and remove any fuel from inside the carburetor by running the engine at idle until it stops by running out of fuel. Keeping gasoline inside the carburetor over an extended period of time will damage the diaphragm valve and clog passages inside the carburetor.

Arrow Shark

RC Marine