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Mfg: Honda **Make:** XR50R **Year:** All
Product: 81.2cc E-Stage Bore Up Kit (part # 010-1-05-522)
 88cc S-Stage Bore Up Kit (part # 010-1-05-502)



88cc S-Stage Kit shown

Parts List

QTY.	DESCRIPTION	81.2CC E-STAGE PART NUMBER	88CC S-STAGE PART NUMBER
1	CYLINDER	N/A	010-1-02-02
1	PISTON	010-1-02-522	010-1-02-502
1	CAMSHAFT	N/A	N/A
1	PISTON RING SET	010-1-15-018	010-1-15-014
2	C-CLIPS	N/A (INCLUDED W/ PISTON)	N/A (INCLUDED W/ PISTON)
1	WRIST PIN	N/A (INCLUDED W/ PISTON)	N/A (INCLUDED W/ PISTON)
1	GASKET KIT	010-1-13-023	010-1-13-050

Technical Specifications

XR50	Stock	81.2cc E-Stage Kit & 88cc S-Stage Kit
Bore	39.0mm	50mm (E), 52.0mm (S)
Stroke	41.4mm	41.4mm
Compression Ratio	10.0 : 1	11.5 : 1
Intake Valve	19.0mm	19.0mm
Exhaust Valve	16.0mm	16.0mm

Intake & Exhaust Valve clearance should be 0.05mm
 (+/- 0.02mm tolerance)

Warranty

Warranty
 Two Brothers Racing products are intended for closed course competition purposes only, and therefore are sold "as is" without warranty. Two Brothers Racing specifically disclaims any warranties of merchantability or fitness for a particular purpose and disclaims all responsibility for consequential and incidental damages or any other losses arising from the use of these products or parts.

IMPORTANT - PLEASE READ CAREFULLY

We recommend that this performance engine kit be installed by a qualified motorcycle technician. If you have any doubts as to your ability to install this performance engine kit, please consult with your local motorcycle dealer. Read all instructions first before starting installation. Make sure the motorcycle and exhaust system are completely cool before starting the installation. Also, make sure the bike is secure on the sidestand or ideally a rear service stand during installation. Be sure to save all stock components for possible use later.

Disassemble the Stock 50cc Engine

1. Shut off fuel petcock



Remove the stock manifold



Remove air cleaner assembly



Remove the fuel and air hoses from the carburetor



2. Remove stock exhaust system



3. Remove spark plug



4. Remove cylinder head cover



Remove left side cover



5. Remove left side crank case cover



6. Remove both tappet covers



7. Rotate the cam gear to the "O" mark, be sure the flywheel is on the corresponding "F" and "T" marks. Remove cam sprocket (you will need to keep the flywheel stationary in order to prevent the cam sprocket from rotating).



8. Loosen cylinder head side bolt. Loosen cam chain roller bolt



9. Remove cylinder head cover (x4 bolts & x4 washers)



10. Remove cylinder head (DO NOT LOSE THE KNOCK PINS, you will be reusing these)



11. Remove the cylinder head side bolt



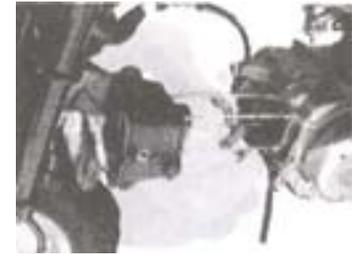
Remove cam chain roller bolt



Remove cam chain roller



Remove cylinder



12. Remove c-clip and wrist pin
Remove piston (USE A CLEAN RAG TO PLUG THE CRANKCASE - BE CAREFUL NOT TO GET ANY DIRT, DUST OR FOREIGN BODY IN THE CRANKCASE)



13. Remove the cylinder base gasket, o-ring and knock pins (USE A CLEAN RAG TO PLUG THE CRANKCASE - BE CAREFUL NOT TO GET ANY DIRT, DUST OR FORGIEN BODY IN THE CRANKCASE)



Super Oil Pump

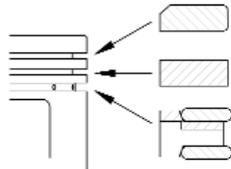
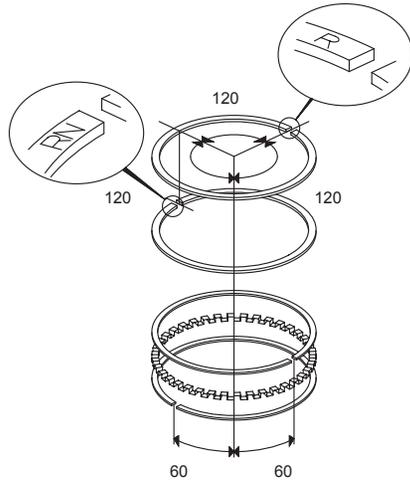
STOP ->>> If you are installing a Super Oil Pump (Part # 010-1-016-005) do so at this time. Please refer to the Super Oil instructions for this procedure.

Assemble the 81.2cc or 88cc Engine

1. Install the left c-clip into the piston (arrow on top of piston points down)
Lightly coat the piston rings with CLEAN motor oil



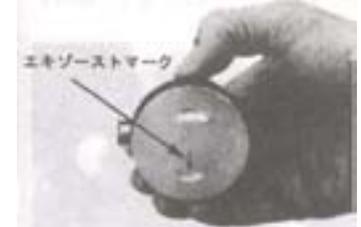
("R" mark is the top ring, "RN" mark is second from top) Install piston rings (bottom ring first) referencing the diagram.



Lightly coat the connecting rod and wrist pin with CLEAN motor oil



Install the piston onto the connecting rod (arrow on piston points down)



Install wrist pin into the piston and through the connecting rod

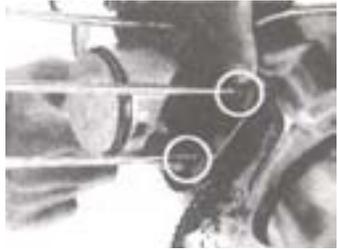


Install right side c-clip into piston
Install one of the **black** rubber seals in the recessed hole on the engine case.



2. Install cylinder gasket





Reinstall the knock pins
Lightly coat the cylinder wall with CLEAN motor oil



Install the cylinder onto the studs (BE CAREFUL NOT TO DAMAGE PISTON/RINGS/CYLINDER DURING INSTALLATION)



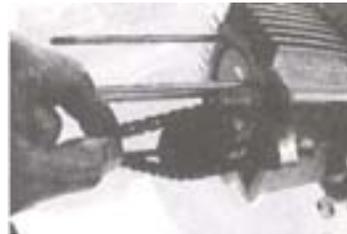
Pull the cam chain through the cylinder



Finish installing the cylinder flush onto the crankcase



Install the cam chain roller into the cylinder



Loosely install the cam chain roller bolt
Loosely install the cylinder side bolt



3. Remove tappet nut/bolt (x2 from end of the rocker arm) from the cylinder head



Install one of the cam sprocket bolts into the end of the cam shaft and use it to pull out the stock cam shaft



Install the new cam shaft



Reinstall tappet nut/bolt (x2 from end of the rocker arm) back into the rocker arms



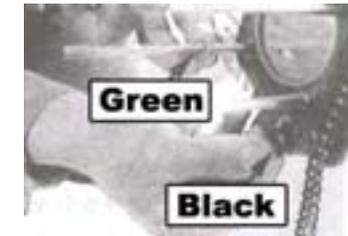
4. Install x2 knock pins into the top of the cylinder



Install cylinder head gasket (BE SURE TO USE CONTACT CLEANER ON THE GASKET MOUNT AREA ON THE CYLINDER TO ENSURE A GOOD SEAL) onto the cylinder



Install one of the black rubber seals (included in the Takegawa gasket kit bag) into the recessed hole on the cylinder. Install the green rubber seal over the stud (ref: picture for proper location)



Install cylinder head onto studs



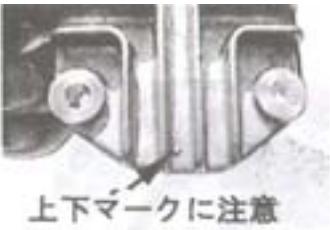
(BE SURE TO PULL CAM CHAIN THROUGH CYLINDER HEAD, use a screwdriver to keep cam chain from falling back through slot)



Install the cylinder head cover gasket and cylinder top cover onto the cylinder head



(BE SURE TO ALIGN MARKS ON CYLINDER HEAD AND CYLINDER HEAD TOP COVER)



Install the washers (x1 copper goes on left-lower corner, x3 regular) and nuts. Torque nuts to 9 ft lbs.



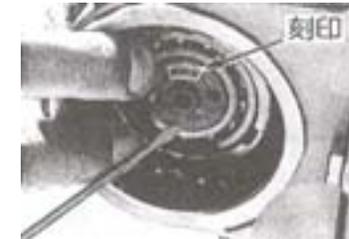
Tighten the cam chain roller and cylinder side bolt, torque both bolts to 8 ft lbs.



5. Align flywheel to the "F" and "T" marks



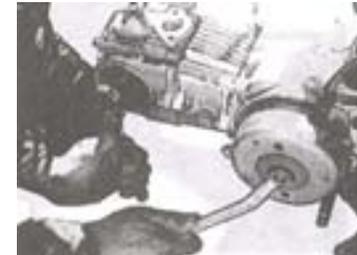
Align the cam shaft to the Takegawa logo is at the 12 o'clock position.



Install the cam sprocket onto the cam shaft (THIS CAN BE VERY TRICKY, TAKE YOUR TIME)



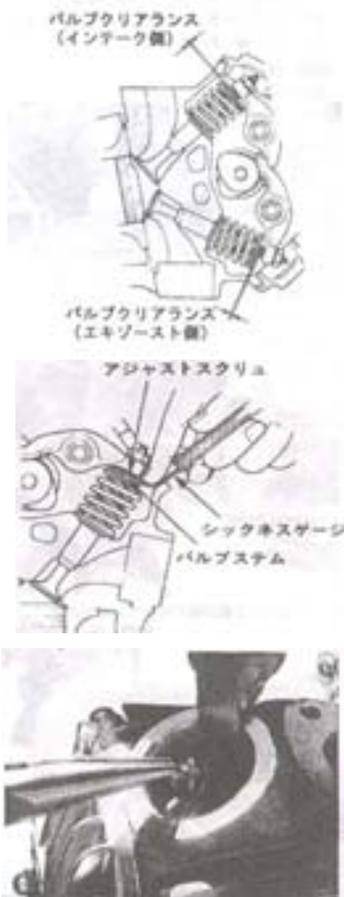
Install the cam sprocket bolts (secure the flywheel with a wrench to prevent it from rotating) and torque to 7 ft lbs.



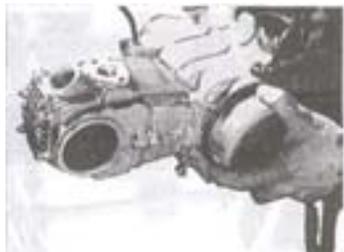
6. Adjust valve timing and tappets (BE SURE THE FLYWHEEL IS ON THE "T" MARK AND THE CAM SPROCKET IS ON THE "O")



Intake & Exhaust Valve clearance should be 0.05mm (+/- 0.02mm tolerance)



Once valve clearance has been set rotate engine COUNTERCLOCKWISE twice and realign the "T" and "O" marks



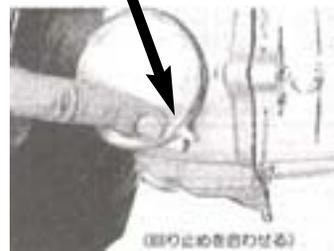
Recheck valve clearance again if there is no gap you have done everything correctly, if you find a gap reset valve clearance and turn over engine COUNTERCLOCKWISE twice. Repeat until proper valve clearance is accomplished.



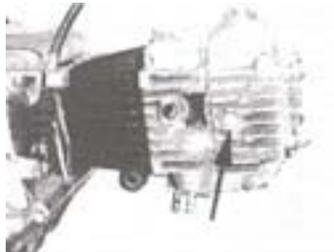
Reinstall all remaining engine covers



7. Install left side cylinder head gasket and cover. Be sure to fully tighten left side cover, tab must touch



Tighten right cylinder head hex bolt, torque to 9 ft. lbs.



8. Install spark plug.
9. Reinstall exhaust system.
10. Install new carburetor and air filter (if purchased). Be sure not to over oil the air filter. If you have purchased the 81.2cc E-Stage or 88cc S-Stage COMBO KIT you will have an extra #85 main jet for your Keihin PC18 carburetor. Try either the #85 or the #92 (already installed in carburetor) before calling tech support.
11. Install left engine cover. Reinstall gear shift lever, torque to 1.0kg-m
12. **Double check your work before starting the bike and double check the engine oil level!**

5 things to double check to ensure proper operation of your Takegawa 81.2cc E-Stage or 88cc S-Stage Kit. Please check IN ORDER as that they appear on this list:

1. Double check the timing. The cam gear *must* be aligned on the "O" mark/hash mark on the head of the motor. This hash mark can be found at the 9 o'clock position.

The flywheel *must* be aligned on the "T" mark/hash mark on the engine case. This hash mark can be found at the 12 o'clock position.

2. Double check the valve clearances.

If you have metric tappet gauges the clearance is .05mm (intake & exhaust).

If you have american tappet gauges the clearance is .002" (intake & exhaust).

3. Be sure you properly reattached the ground wire and it is touching bare metal. This step is often overlooked when installing a new carburetor.
4. *Do not* over oil the air filter. Too much oil on the air filter will cause your bike to run very poorly. Only a minimal application of oil is ever required.
5. Be sure your carburetor is properly jetted, refer to the last page of these instructions for jetting tips. To ensure maximum performance be sure to use a Two Brothers Racing XR50 exhaust system (part # 005-300104). Using the stock exhaust system or a different aftermarket exhaust system will not allow optimum performance.

Baseline settings (you will need to adjust these settings to fine tune your carburetor). These settings are for use with the Two Brothers Racing exhaust system.

Main Jet: #85 or #92 (try both main jets!)
Air Screw: 1-1/2 turns from bottom
Needle Clip: middle position

Tuning Tips and General Information on how to tune your XR50 Carburetor from Two Brothers Racing:

How does a carburetor work?

All carburetors work under the basic principle of atmospheric pressure. Atmospheric pressure presses on everything at about 15 (PSI). As the piston goes down a low-pressure area is formed above the piston. This low pressure also causes a low pressure inside the carburetor. Since the air pressure is higher outside the engine and carburetor, air will rush inside the carburetor and the engine until the pressure is equalized. The moving air going through the carburetor will pick up fuel and mix it with the air. The ratio of air and fuel is called an air fuel ratio, this ratio varies but the optimum ratio is about 12.8 (12.8 grams of fuel to 1 gram of air) the action of getting to this ratio is called jetting.

Basic Carburetor Adjustments:

Carburetor adjustments on your XR50 carburetor are made based on throttle position and not engine speed. There are four basic adjustments that can be easily made on your carburetor; we list them here based on throttle position. These are basic adjustments that can be easily applied based on simple diagnostic techniques.

Idle Adjustment:

By turning the idle screw in or out you can decrease or increase the speed of the idle. The idle screw can either be located on the right or left side of the carburetor (depending on the manufacturer) The idle screw will sometimes have a spring behind it and or a plastic knob so that you can adjust it by hand. To achieve an accurate adjustment the engine must be at normal operating temperature. Ten minutes of normal riding should do the trick. The idle speed should be set at around 1700 RPM give or take 100 RPM.

Idle -> 1/4 Throttle – air screw and pilot jet:

Off idle to 1/4 throttle is monitored by the airscrew and pilot jet. The air screw regulates how much air enters the pilot circuit. If the screw is turned in, it reduces the amount of air and richens the mixture. If it is turned out, it opens the passage more and allows more air into the circuit that results in a leaner mixture. If you have to turn the air screw out more than 2 turns to get good performance you need the next size smaller pilot jet.
Air screw turned in = RICHER
Air screw turned out = LEANER

1/8 -> 3/4 Throttle – jet needle and needle jet:

The jet needle is the most effective component in this range. The jet needle is a long tapered rod that controls how much fuel can be drawn through the carburetor venturi. The thinner the taper the richer the mixture. The needle jet is where the jet needle slides. The needle jet and jet needle work together to control the fuel flow between the 1/8 and 3/4 throttle opening range. Most of the tuning is done with the jet needle, the needle jet rarely needs to be changed. The jet needle has grooves cut into the top. A clip goes into one of these grooves and holds the needle from falling or moving from the slide. The clip position can be adjusted to make the engine run richer or leaner.
Jet Needle Clip UP = LEANER
Jet Needle Clip Down = RICHER

1/4 -> Full Throttle – main jet:

The main jet is located under the float bowl in the middle of the floats. Sometimes the main jet will have a plastic shroud around it called a “jet baffle” The main jet comes into play as the throttle opens up past 3/4 throttle. At 3/4-full throttle when the jet needle is pulled far enough out of the needle jet the size of the hole in the main jet begins to regulate fuel flow. The bigger the number on the main jet the bigger the hole. The bigger the hole the more fuel that can flow which results in a richer mixture.
Main Jet = Bigger the number, bigger the hole, RICHER the mixture.
Main Jet = Smaller the number, smaller the hole, LEANER the mixture.

Jetting Considerations:

Air temperature, altitude, and humidity all affect the jetting and how your bike will run.

Air Temperature:

When the temperature goes up the air density decreases, thus you have less air available for combustion and your air fuel ratio becomes richer. When the air temperature goes down the air density goes up and your engine runs leaner.

Air Temp High = Less Air and a richer mixture
Air Temp Low = More Air and a leaner mixture

What do I do if the air temp is higher than normal?

Air screw turned out = LEANER
Jet Needle Clip UP = LEANER
Main Jet = Smaller the number, smaller the hole, LEANER the mixture.
What do I Do if the air temp is lower than normal?
Air screw turned in = RICHER
Jet Needle Clip Down = RICHER
Main Jet = Bigger the number, bigger the hole, RICHER the mixture.

Altitude:

The higher the altitude the less dense the air becomes, hence a richer mixture. The lower the altitude the more dense the air and the leaner the mixture.

High Altitude = Less dense air so you will want lean the mixture if you normally ride at a lower altitude
Low Altitude = More dense air, so you will want to richen up the mixture if you normally ride at a higher altitude.

What do I do if I normally ride at 5000 feet and I go down to sea level to race?

Air screw turned in = RICHER
Jet Needle Clip Down = RICHER
Main Jet = Bigger the number, bigger the hole, RICHER the mixture.

Humidity:

When the humidity in the air increases the air-fuel mixture becomes richer so you should lean out the mixture.

What do I do if I normally race in dry air conditions (like Arizona) and I go to a very humid climate to race (like Florida)?

Air screw turned out = LEANER
Jet Needle Clip UP = LEANER
Main Jet = Smaller the number, smaller the hole, LEANER the mixture.

Throttle Position:

Idle Set at 1700 RPM + or – 100 RPM

Idle -> 1/4 Air screw Turn in for Richer out for Leaner

1/4 -> 3/4 Needle Jet Clip up =Leaner
Needle Clip Down = Richer

3/4 -> Full Main Jet (bigger the number richer the mixture)

Conditions:

Air Temperature High = (less air so you have lean out the mixture)
Air Temperature Low = (more air so you have to richen the mixture)

Altitude High = (lean the mixture)
Altitude Low = (Richen the mixture)

Humidity High = (Lean out the mixture)
Humidity Low = (Richen the mixture)

Exploded diagram of 81.2cc E-Stage and 88cc S-Stage Engine

