

Product: 1992 Kawasaki Ninja ZX-7R/ZXR 750R Motorcycle Racing Kit Manual
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Ninja ZX-7R ZXR 750R

'92 Racing Kit Manual

This Manual contains only the information of the racing kit parts. Refer to the base manual listed below for information of the original model.

Base Manual	Part Number
Ninja ZX-7R/ZXR750R Motorcycle Service Manaul	99924-1139-01

'93 MAIN HARNESS # 26030-1206 A

Congratulation on your purchase of racing kit parts for the '92 ZXR750R.

IMPORTANT

This manual provides how to install racing kit parts for the '92 ZXR750R and how to tune up basically.

As for the basic knowledge, refer to the Service Manual for the ZXR750R (P/No. 99924-1139-01).

When you participate in a race, it is necessary to modify the machine for the regulation. So we want you to ask for the tuning up shop.

In this manual, the following abbreviations are used.

SB	:	Super Bike racing
Enduro	:	Enduro racing

⚠ WARNING

AFTER ANY MODIFICATION TO TURN THE VEHICLE TO A COMPETITION MACHINE, IT SHOULD NOT BE USED ON PUBLIC STREETS, ROADS OR HIGHWAYS. THE USE OF THIS VEHICLE SHOULD BE LIMITED TO PARTICIPATION IN SANCTIONED COMPETITION EVENTS UPON A CLOSED COURSE.

⚠ CAUTION

When operating the engine, be careful not to trouble persons with noise. Do not run the engine with loud engine and exhaust noise.

DISCLAIMER OF WARRANTY

ON OPTIONAL TURNING PARTS FOR RACING ARE NO WARRANTIES EXPRESSED OR IMPLIED.

BASIC WORKS IN INSTALLING KIT PARTS

We are going to make up the original ZXR750R for the racing machine. We recommend that the rider himself should do the basic works, removing parts or installing parts etc., given advices from the tuning shop. In a race, although trouble will be apt to happen, if you participate in basic works, you can discriminate causes of trouble, so you can return the race soon.

But concerning difficult technical works, you should ask tuning shop.

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General Specifications

Item		'92 ZXR750R Racing	
Engine :			
Compression ratio		13.2	
Maximum horsepower		140 PS or more/13 000 rpm	
Maximum torque		84 N-m (8.6 kg-m, 62 ft-lb)	
Igniter		Digital Igniter	
Ignition timing		5° BTDC @500 rpm 10° BTDC @1 000 rpm 45° BTDC @5 000 ~ 9 000 rpm 42.5° BTDC @9 500 rpm	
*Clearance between piston head and valve:			
Inlet		0.70 mm or more (Crankshaft timing @12° ATDC)	
Exhaust		1.30 mm or more (Crankshaft timing @12° BTDC)	
Valve timing :	Inlet	Open	43° (BTDC)
		Close	69° (ABDC)
	Exhaust	Open	69° (BBDC)
		Close	39° (ATDC)
		Duration	292°
		Duration	288°
*Camshaft timing (Cam lift center):			
Inlet		103 + 2° (ATDC)	
		- 1°	
Exhaust		105 + 2° (BTDC)	
		- 1°	
Fuel		Racing gasoline	
Engine oil:	Brand (Recommended oil)	CASTROL "Formular RS" or SYNTRON	
	Viscosity	SAE 15W-50, 20W-50	
	Level	Between upper and lower levels of oil level gauge.	
Drive Train:			
Transmission gear ratio :	1st	2.375 (38/16)	
	2nd	1.895 (36/19)	
	3rd	1.619 (34/21)	
	4th	1.409 (31/22), Optional 1.500 (33/22)	
	5th	1.292 (31/24), Optional 1.391 (32/23)	
	6th	1.200 (30/25), Optional 1.292 (31/24)	
Final drive reduction ratio		2.294 (39/17) ~ 2.933 (44/15)	
Overall drive ratio (Top gear)		4.831 ~ 6.177	
	(Optional top gear)	5.201 ~ 6.649	

* When the clearance between the valve and the piston head is smaller than the standard specification, turn the installed position of the camshaft sprocket on the camshaft and change the camshaft timing.

Item		'92 ZXR750R Racing
Frame :		
Steering damper :	Damper force	8 kg
Front wheel :	Type	Dry slick tire
	Rim size	Width 3.5 x inner diameter 17 in
Rear wheel :	Type	Dry slick tire
	Rim size	Width 5.5 x inner diameter 17 in
Electrical Equipment:		
Spark plug		NGK R016-10
Battery :	without alternator	12 V 7 Ah or more
	with starter motor	12 V 9 Ah or more
Alternator (for enduro) :	Type	Single-phase AC
	Rated output	14.5 A-12 V/6 000 rpm ~ 16.5 A-12 V/10 000 rpm
	Voltage regulator	Separated from alternator

Racing Kit Service Data

Item	Standard
Carburetor(All Racing):	
Main jet	#155 (standard), 150, 152, 158, 160, 162
Jet needle mark	OBFHP
Jet needle clip position	4th groove from top
Pilot screw	0 (Closed)
Air screw	1-1/2
Main air jet	#200
Slow jet	#60
Camshaft:	
Cam height: Inlet	36.88 ~ 37.09 mm
Exhaust	36.63 ~ 36.84 mm
Cylinder Head, Valves:	
Valve clearance: Inlet	0.16 ~ 0.21 mm
Exhaust	0.21 ~ 0.25 mm
Valve seat surface outside diameter:	
Inlet	28.3 ~ 28.7 mm
Exhaust	24.3 ~ 24.7 mm
Squish:	
(between piston shoulder and cylinder head):	0.7 ~ 0.85 mm (require head gasket selection)
Drive Chain:	
Chain slack	20 ~ 25 mm (No load --- 1G)
Front Fork:	
Rebound dumping	4th click from fully seated position (full clockwise until the adjuster stops)
Ignition System:	
Spark plug	NGK R016-10 (racing plug)
Spark plug tightening torque	13 N-m (1.3 kg-m, 113 in-1b)
IC igniter	Modified timing advance curve for high speed engine rpm
Overrev limit	14 000 rpm (standard: 12 200 rpm)

Periodic Maintenance Chart (for SB)

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. The initial maintenance is vitally important and must not be neglected.

OPERATION	FREQUENCY					
	Each race (300 km)	Every 3 races (1 000 km)	Every 5 races	Every 10 races	As required	
Engine						
Clutch plate -- check*		•				
Oil pump chain -- check		•				
Throttle grip play -- check*	•					
Spark plug -- clean/gap*	•					
Carburetor -- check*/adjust	•					
Camshaft chain tensioner -- adjust	•					
Engine oil -- change		•				
Oil filter -- replace						•
Valve lapping			•			
Cylinder head/valve -- decarbonization			•			
Piston -- clean/check*			•			
Cylinder -- check			•			
Piston/cylinder clearance -- check*			•			
Piston ring -- replace			•			
Crankshaft main bearing -- check*				•		
Connecting rod big end bearing -- check*				•		
Engine sprocket -- check*	•					
Coolant -- change						•
Radiator hoses, connections -- check*	•					
Frame						
Brake operation -- check*	•					
Brake lining or pad wear -- check*	•					
Brake fluid level -- check*	•					
Brake fluid -- change						year
Brake master cylinder cup and dust seal -- replace						year
Brake caliper piston seal and dust seal -- replace						year
Brake hose -- replace						2 years

OPERATION	FREQUENCY					As required
	Each race (300 km)	Every 3 races (1 000 km)	Every 5 races	Every 10 races		
Frame						
Drive chain -- adjust	●					
Drive chain -- lubricate	●					
Drive chain wear -- check*	●					
Drive chain guide -- replace	if damaged					
Front fork -- clean/check*	●					
Front fork oil -- change	First change after 2 races, then every 5 races					
Nut, bolt, and fastener tightness -- check*	●					
Fuel system -- clean	●					
Fuel hose, fuel filter -- replace						●
Steering play -- check*	●					
Steering stem bearing -- grease			●			
Rear sprocket -- replace						●
General lubrication of chassis -- perform	●					
Wheel bearing (rear) -- grease				●		
Swing arm pivot, uni-trak linkage -- grease			●			
Swing arm pivot, uni-trak linkage -- check*			●			

* : Replace, add, adjust, clean, or torque if necessary.

Preparation

Before Installing:

- Refer to the regulations because the parts are different depending on each races. Modify the parts based on your race regulation.
 - Main Removal Parts for both Super Bike and Enduro Races.
 - Lights, Cooling fan
 - Rear View Mirror
 - Side stand
 - Starter lockout switch
 - Starter motor (Super Bike only)
 - Remove the side stand switch. When the optional main harness is not used, connect removing Black/Yellow and Green/White Leads directly.
 - Required Parts in Enduro Racing:
 - Electric Starter
 - Alternator
 - Regulator/Rectifier
 - Head light (Check on your regulation)
 - Tail light (Check on your regulation)
 - Standard Main harness
- For the others, use the same parts as the Super Bike version.
- Gaskets are also included in this racing kit parts, use them as follows.
 - Head Gasketsfor squish adjustment
 - Other Gasketsfor spare

'92 Racing Parts Information for '91 Racing Machine

'91 racing machine can be turned engine performance up equally to the '92 machine by installing the following '92 kit parts.

Item	Parts	P/No.	Q'ty	Point
Exhaust Muffler	Exhaust pipe # 1	18049-1606	1	Exhaust Muffler kit increases engine middle speed performance. The engine peak performance is nearly the same as '91 model. Muffler Body is for lowering exhaust note.
	Exhaust pipe # 2	18049-1607	1	
	Exhaust pipe # 3	18049-1608	1	
	Exhaust pipe # 4	18049-1609	1	
	Exhaust manifold unit	39178-1205	1	
	Joint Pipe	18049-1610	1	
	Muffler body unit	18090-1201	1	
Valve Train	Valve spring	49078-1118	16	Valve train kit increases their own durability and reduces loss of mechanical friction.
	Camchain tensioner ass'y	12048-1117	1	
Combustion Chamber	Piston	13001-1374	4	Kit piston improves combustion efficiency and increases compression ratio to 13.2. Two head gaskets are provided for squish adjustment.
	Cylinder head gasket	11004-1242	1	
	Cylinder head gasket	11004-1243	1	
Oil Pump Gear Train	Clutch housing	13095-1254	1	Oil Pump gear train kit reduces mechanical friction loss in this train by changing teeth of drive shaft sprocket and oil pump sprockets.
	Needle bearing	92046-1215	2	
	Collor	92143-1579	1	
	Spacer	92026-1422	1	
	Sprocket (drive shaft)	21053-1060	1	
	Sprocket (oil pump)	12046-1135	1	
	Chain guide	12053-1302	1	
	Bolt	130P0630	2	
Oil Pump	Rotor	16154-1102	1	Kit oil pump reduces mechanical friction loss of pump by lowering oil pressure at high engine speed.
	Body	16160-1192	1	
Ignition System	Igniter	21119-1358	1	Kit igniter changes ignition timing for high speed engine rpm.

NOTE 1) : Do not use oil pump gear train parts for enduro racing. Enduro machine should use the original gear train.

NOTE 2) : The kit igniter must be used together with the kit valve spring as a set.

Racing Parts for Super Bike

We have provided the following racing parts for the entry of the Super Bike race. These parts "however" will not delivered as a kit. So please order each parts.

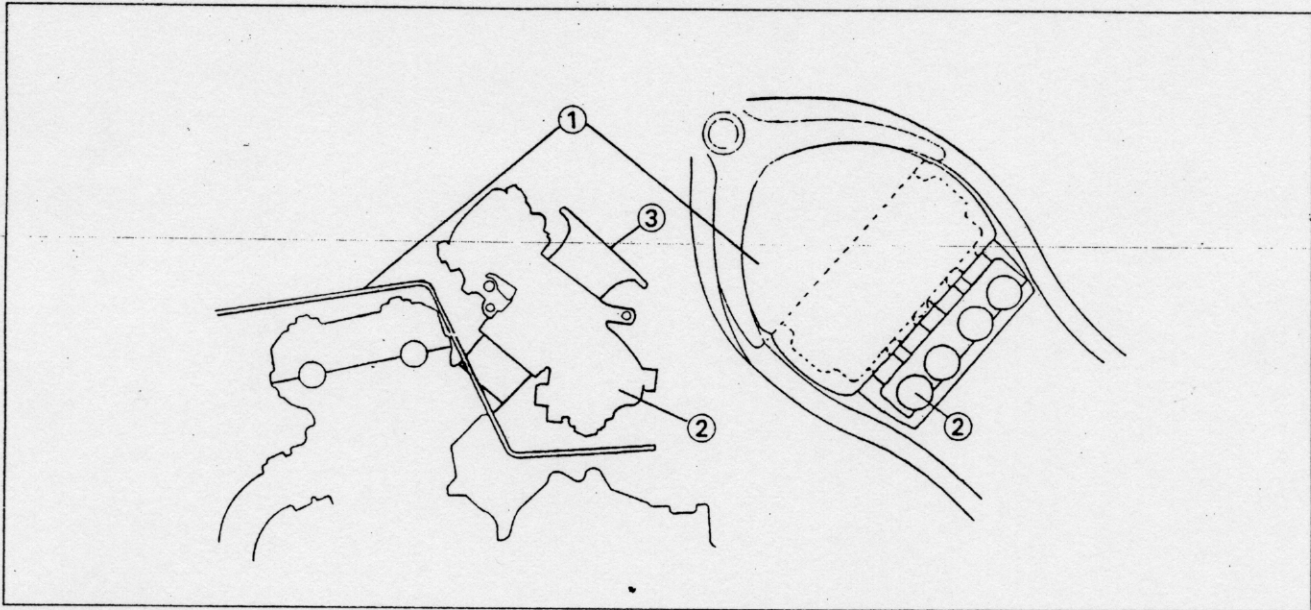
Item	Parts	P/No.	Q'ty
Carburetor parts	Kit carburetor	99997-1069	1
Engine guard	Guard (Left)	55020-1407	1
	Guard (Right)	55020-1408	1
	Plain washer	410B0800	4
Ignition system	Spark plug, NGK RO16-10	92070-1181	4
	Igniter	21119-1358	1
Seal plug for starter motor mounting hole	Starter motor hole plug	92066-1332	1
	Starter motor hole plug	92066-1333	1
	O-ring, 24.4 mm	92055-1262	1
	Nut	312G0600	1
	Flanged bolt	130G0625	1
Muffler	Holder (Exhaust) plate	18069-1106	4
	Holder (Exhaust) inner	18069-1107	4
	Holder (Exhaust) outer	18069-1108	4
	Socket bolt	92150-1535	8
	Spring	92144-1352	12
	Exhaust pipe #1	18049-1606	1
	Exhaust pipe #2	18049-1607	1
	Exhaust pipe #3	18049-1608	1
	Exhaust pipe #4	18049-1609	1
	Exhaust manifold unit	39178-1205	1
	Exhaust joint pipe	18049-1610	1
	Muffler body unit	18090-1201	1
	Muffler stay	35011-1562	1
	Flanged bolt M8 x 30	92002-1178	3
	Clamp	92170-1059	1
	Gasket	92104-1055	1
Seal Plug for alternator mounting hole	Plug	92066-1363	1
	O-ring	92055-1357	1
	Flanged bolt M8 x 20	132G0820	1

Item	Parts	P/No.	Q'ty
Oil pump gear train	Clutch housing	13095-1254	1
	Spacer	92026-1422	1
	Needle Bearing	92046-1215	2
	Collar	92143-1579	1
	Spring	92081-139	6
	Sprocket (drive shaft)	21053-1060	1
	Sprocket (oil pump)	12046-1135	1
	Chain guide	12053-1302	1
	Chain	92057-1343	1
	Rotor (oil pump)	16154-1102	1
	Body (oil pump)	16160-1192	1
	Bolt	130P0630	2
Camshaft Chain Tensioner	Tensioner Assy	12048-1117	1

Carburetor Setting Parts Assembly

Shroud:

- Install a shroud on the cylinder head as shown to shut off the hot air flow coming from the radiator and engine.
- The shroud is not included in the kit parts.
- Prepare the shroud by yourself using a paper pattern which is inserted in this Racing kit Manual.
 - Suggested Material : Polypropylene
 - Suggested Thickness : 1.0 ~ 2.0 mm
- If possible, attach heat insulating pads under side of the shroud for more effectiveness.
- Install air ducts on the intake port of the carburetor. The air ducts are included in the kit carburetor.



1. Shroud
2. Carburetor: 99997-1069

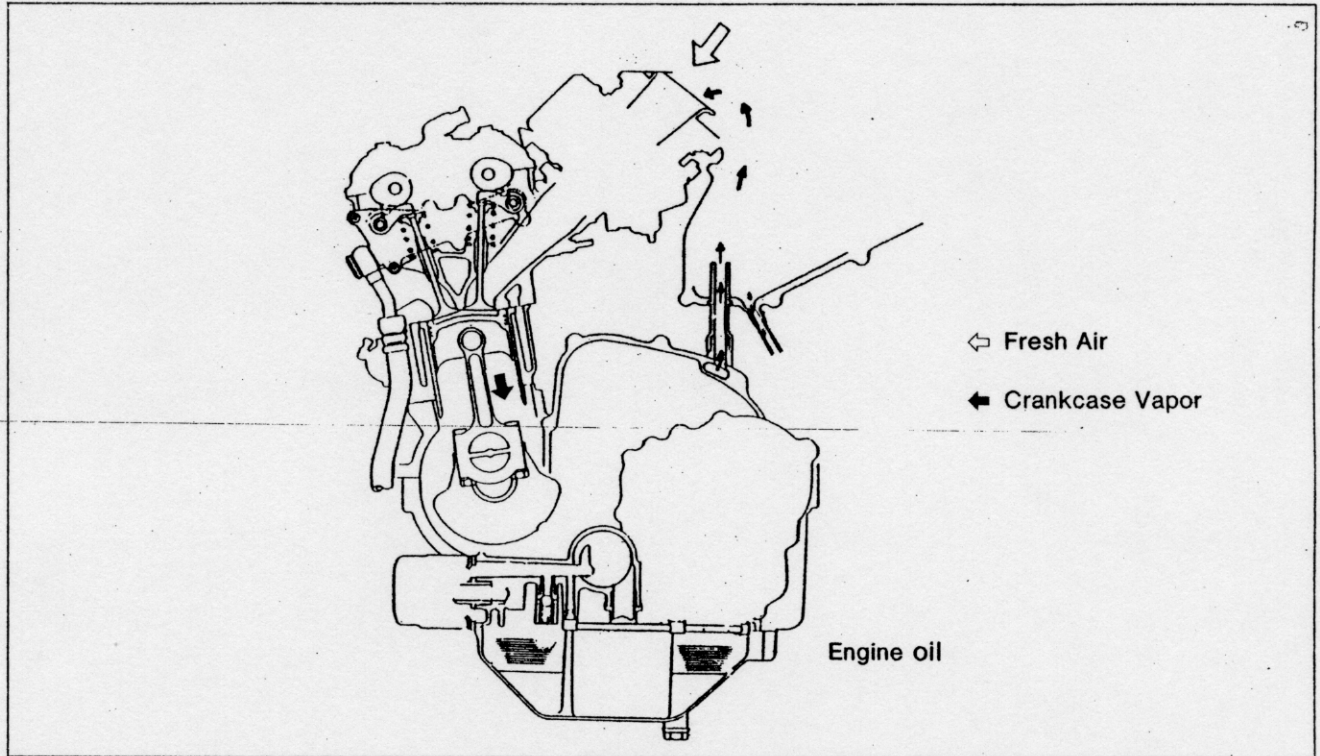
3. Duct: 14073-1518

Air Cleaner Housing (SB):

'92 Super Bike racing regulation requires a device that eliminates release of crankcase vapor into the atmosphere.

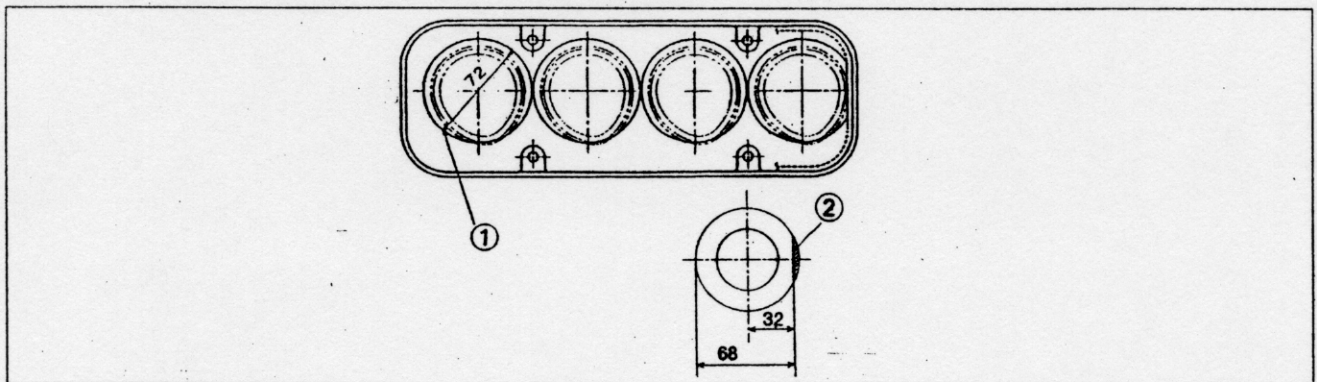
With the standard ZXR750R, the crankcase vapor is led into the air cleaner housing to avoid release of the vapor and this meets with the new regulation, therefore Kawasaki recommend use of the original device.

Crankcase Emission control System



However, the following modification is required.

- Enlarge the four air ducts mating holes of the air cleaner housing to accept the kit air ducts.
- Cut the left side of the #1 air duct to meet shape of the air duct with the modified air cleaner hole.
- The air cleaner element and the intake silencer which are located in the air cleaner housing are not needed for this device, so remove them for weight reduction.



1. Enlarge Holes about 72 mm 2. Cut Section

Carburetor:

Replace the carburetor setting parts with the kit parts.

Carburetor Setting Parts

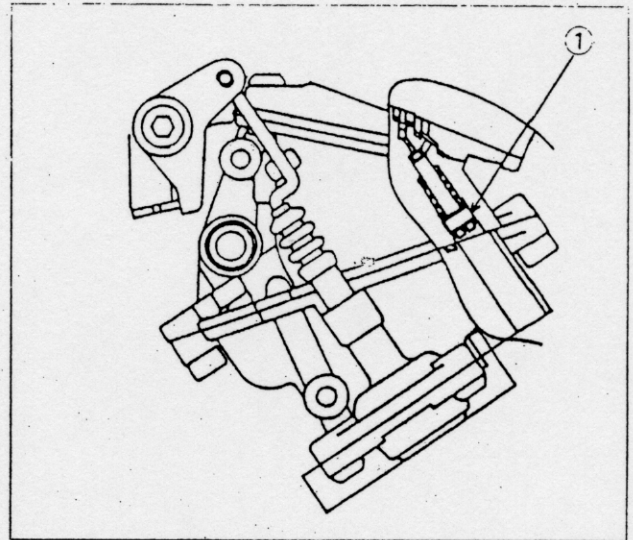
Items	Original Setting	Kit Setting
Make, type	Keihin, FVKD39	←---
Idle speed	1 050 ~ 1 150 r/min (rpm)	---
Carburetor synchronization vacuum	Less than 2.7 kPa (2 cm Hg) difference between any two carburetors	←---
Main jet	#138	#155 (Kit standard setting) #150, #152, #158, #160, #162
Main air jet	#100	#200
Jet needle: #1, 4	OBEMP	OBFHM with clip: 4th groove from top
#2, 3	OBFMP	OBFHM with clip: 4th groove from top
Slow jet	#42	#60
Pilot screw	1 5/8 turns out	0 (Closed)
Slow air jet	#120	1 1/2 turns out (Air screw)
Starter jet	#55	←---
Service fuel level	3.0 mm above fuel level line	←---
Float height	9.0 mm	←---
Throttle switch		Not needed
Accelerator pump		Fuel flow rate is increased.
Float bowl		Bolt is installed on bowl for Main Jet replacement.

Idle Speed Adjustment

- Turn the adjusting screw in or out to obtain suitable engine revolution.
 - Turn Clockwise : increase engine revolution
 - Turn Counterclockwise : decrease engine revolution

Adjustment of Idle Fuel/Air Mixture Ratio

- Turn the pilot screw in or out to obtain proper fuel/air mixture at idling.
 - Turn Clockwise : lean mixture
 - Turn Counterclockwise : rich mixture
- A proper fuel/air mixture ratio can be obtained by using CO meter.



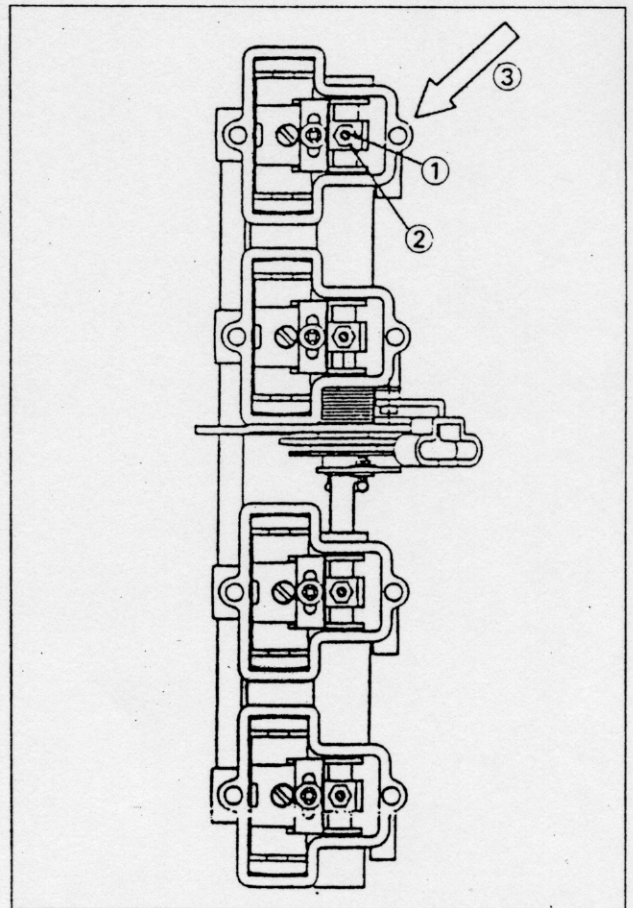
1. Pilot Screw

Initial Synchronization

If engine idling is especially rough, it may be necessary to synchronize the throttle valves with synchronization screw and nut before making the idling adjustment.

Function

Synchronization Screw	Synchronization Screw
<p>Screw Position: Turn the synchronization screw clockwise</p>	<p>Screw Position: Turn the synchronization screw counterclockwise.</p>
<p>Situation: The throttle valve comes down.</p>	<p>Situation: The throttle valve comes up.</p>



1. Synchronization Screw 3. Master Carburetor
2. Synchronization Nut

There are two ways to obtain initial synchronization. Choose one of the following two methods.

- (1) Measure the carburetor intake vacuum. If the difference in vacuum readings between any two cylinder is greater than 2 cm Hg reset synchronization screw.
- (2) Inspect throttle valve clearance of all four carburetors. If the clearance between the throttle valve and the bottom of carburetor is different, adjust the throttle level.

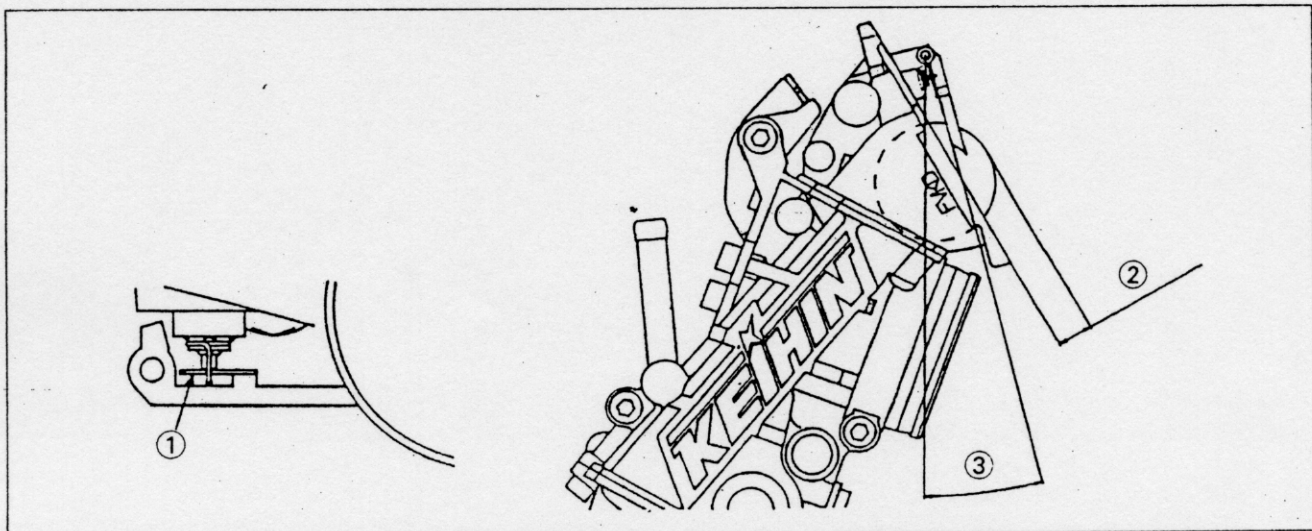
Procedure

- (1) #4 Master Carburetor
#4 synchronization screw should not be adjusted since this screw is adjusted at the factory as a master carburetor.
If the idle adjustment is needed, adjust it with the throttle stop screw.
- (2) #1, #2, #3 carburetors
Adjust the idle speed with the synchronization screw on each carburetor.
If the throttle valves of #1, #2 and #3 are positioned too low, the throttle stop screw on #4 carburetor will not be effected.

Float Height

With the carburetors inclined as shown, measure the float height.

If the measurement is out of specification, adjust it by bending the tongue on the float arm.



1. Tongue

2. Float Height

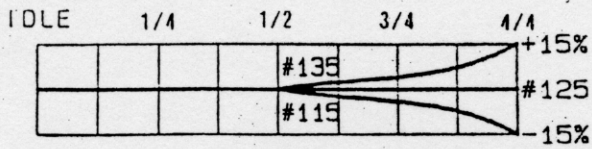
3. Approx. 15 degrees

Working Range of Each Carburetor Component

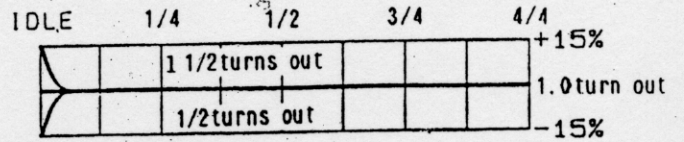
Carburetor setting changes are made by changing or adjusting the following carburetor components.

The following components, the jet needle, main jet and slow jet, regulate the flow of fuel; main air jet, slow air jet, and pilot screw regulate the flow of air. The following charts indicate the working range of each components.

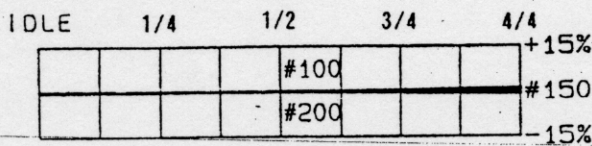
(1) Main Jet



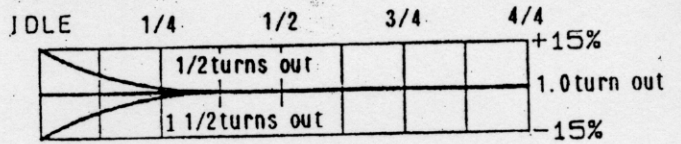
(6) Pilot Screw



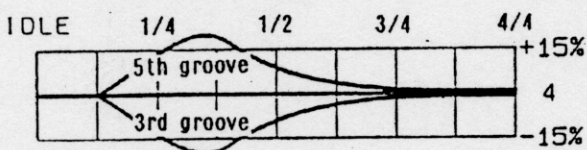
(2) Main Air Jet



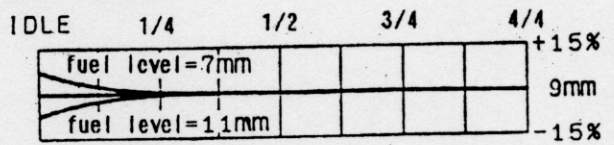
(7) Air Screw



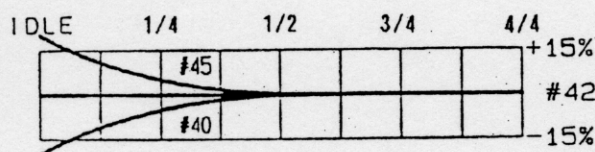
(3) Jet Needle (with groove)



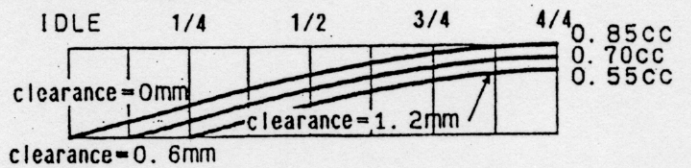
(8) Fuel Level



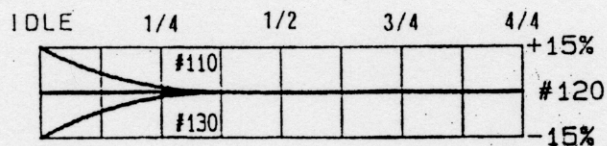
(4) Slow Jet



(9) Accelerator Pump Output Timing



(5) Slow Air Jet

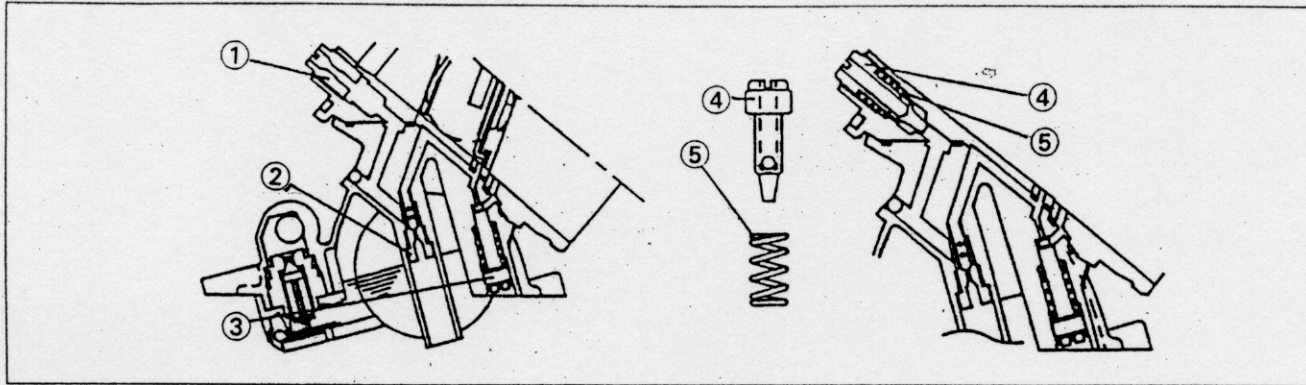


Pilot System Setting Parts

- Replace the slow jet with the kit.
- Replace the slow air jet with the kit air screw and spring.

Original Carburetor

Kit Carburetor

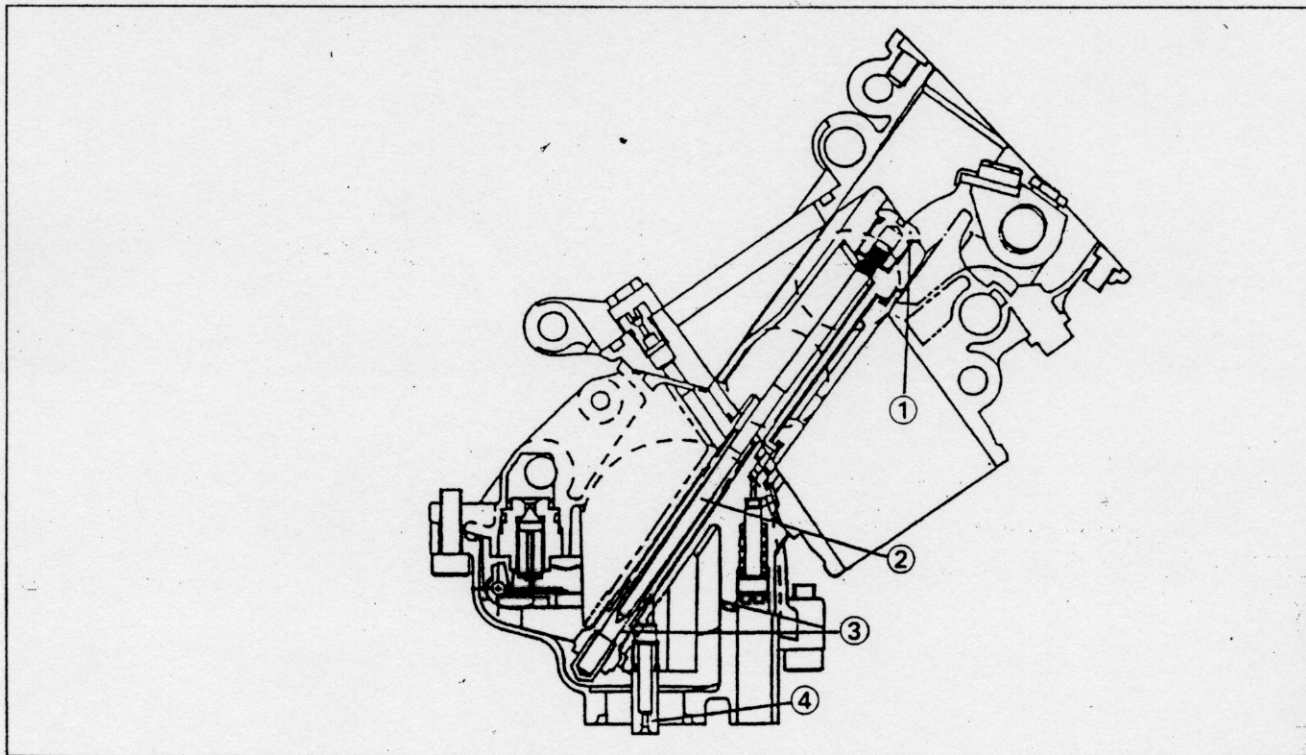


1. Slow Air Jet
2. Slow Jet
3. Pilot Screw

4. Air Screw
5. Spring

Main System Setting Parts

- Replace the main air jet, main jet, and jet needle with each kit.



1. Needle Set Screw
2. Jet Needle

3. Needle Jet
4. Main Jet

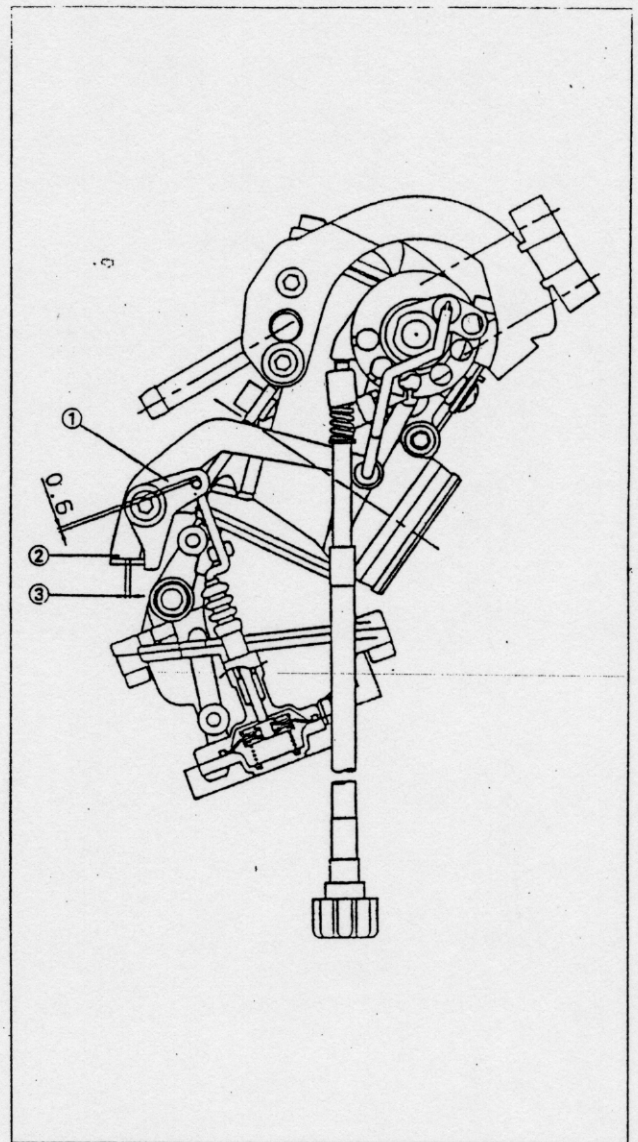
Accelerator Pump Adjustment

The fuel output timing of fuel pump can be changed by changing clearance between pump rod and link lever A.

The link lever standard clearance is 0.6 mm.

Decreasing the clearance makes faster the output timing and increasing it makes slow the timing.

The clearance can be changed by getting wider or narrower the link lever B opening.

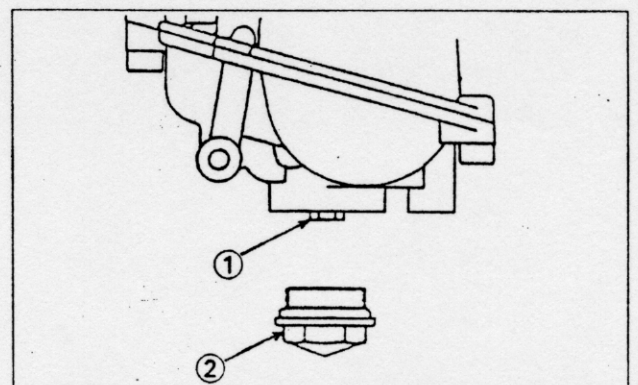


1. Link Lever A
2. Link Lever B

3. Link Lever B Opening

Main Jet (MJ) Replacement

- (1) Remove the holding bolt at the lower part of the float bowl.
- (2) The top of the main jet can be seen. Remove it with a wrench.
- (3) Installation is reverse of the removal.



1. Main Jet

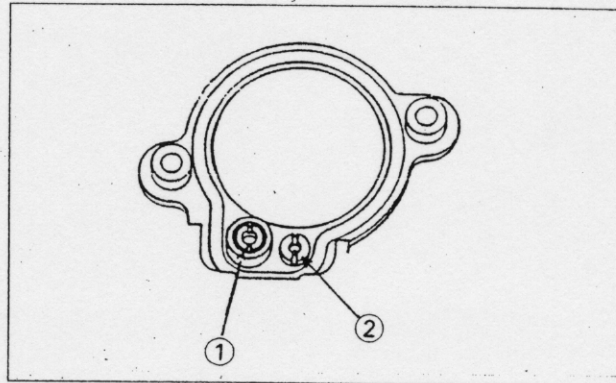
2. Holding Bolt

Jet Needle (JN)

- (1) Remove the carburetor top cover.
- (2) With the throttle grip fully opened, unscrew the jet needle set screw with a minus screw driver.
- (3) Pull out the jet needle.
- (4) Installation is reverse of the removal.

Main Air Jet, Slow Air Jet (MAJ, SAJ)

These are installed in front part of the carburetor intake port. Be careful not to take the main air jet for slow air jet.

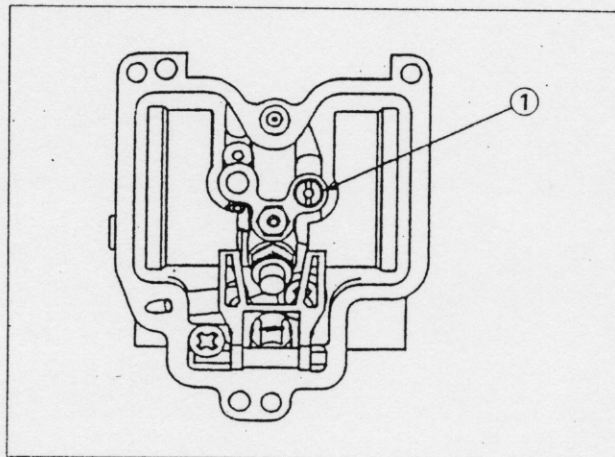


1. Slow Air Jet

2. Main Air Jet

Slow Jet (SJ)

- (1) Remove all four float bowls with fuel hoses connected.
- (2) Remove the slow jet with minus screwdriver.
- (3) Installation is reverse of the removal.
- (4) Make sure that the O-ring is firmly seated in the groove.

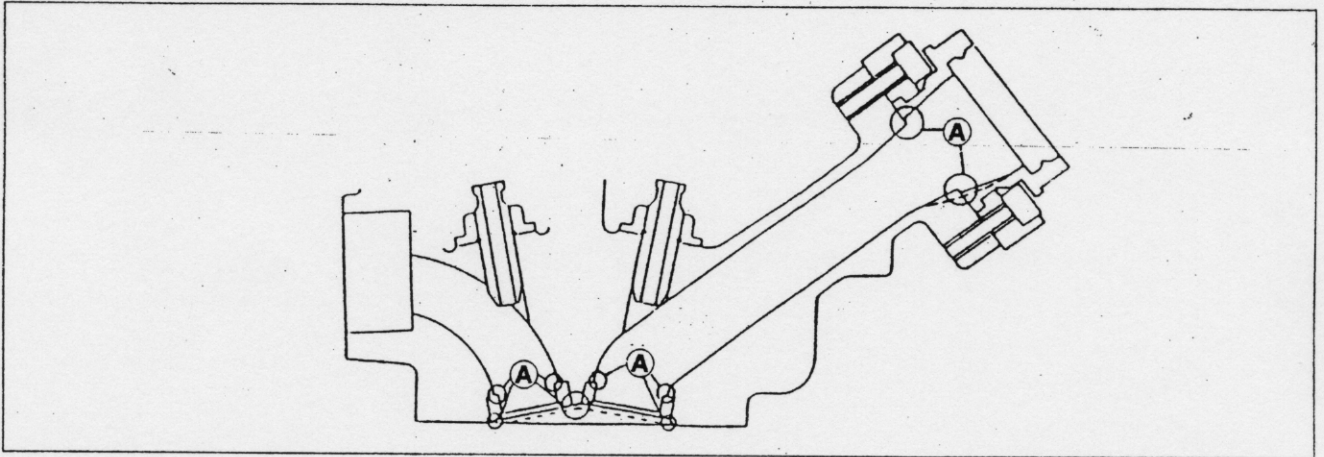


1. Slow Jet

Engine Parts Installation

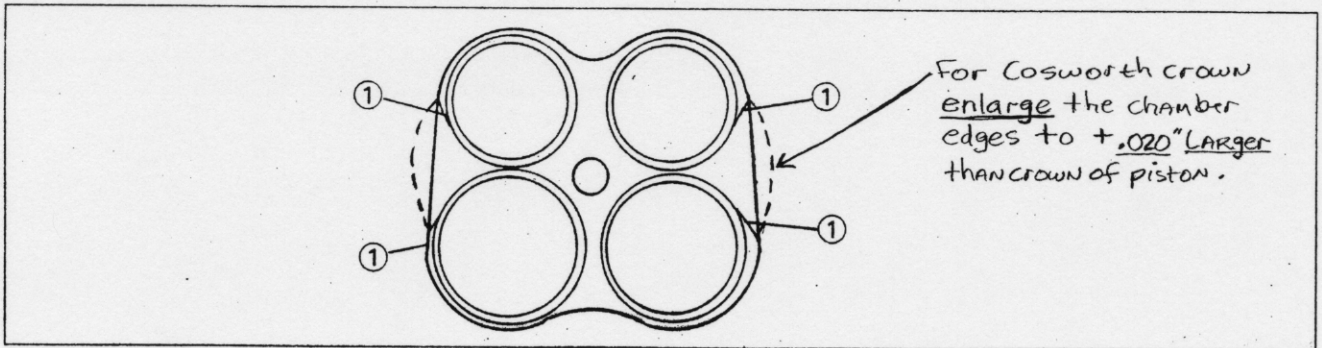
Cylinder Head:

- Grind off and Smooth any stepped portion in the following area.
 - Inside of the intake port
 - Inside of the exhaust port
 - Mating surface between the valve seat and ports
 - Mating surface between the carburetor holder and inlet port
- Chamfer the machining edge of the cylinder head where the valve seat is installed, also smooth the dome of the combustion chamber.
- Use the following tools for these cylinder head modifications.
 - Hand Grinder
 - Oil stone for eliminating any sharp edge
 - Emery cloth for smooth any shapes as final process

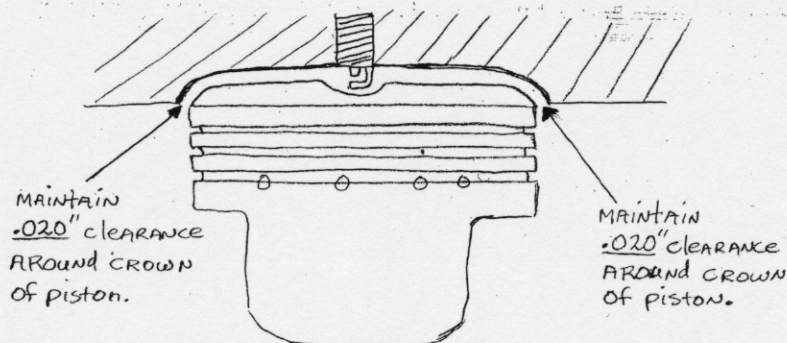


A : Stepped Portions - - - : Combustion Chamber Dome

- The combustion chambers are modified by cutting work but the edges shown must be hand finished for smooth corner.



1. Edges (4)



Valves:

Replace the valves with the kit parts.

The original part can be used as it is. But there are the following difference between the original parts and kit parts.

- Changed the valve head angle to reduce its weight.
- Flatten the valve head surface to increase compression ratio. This valve matches the shape of the combustion chamber well.

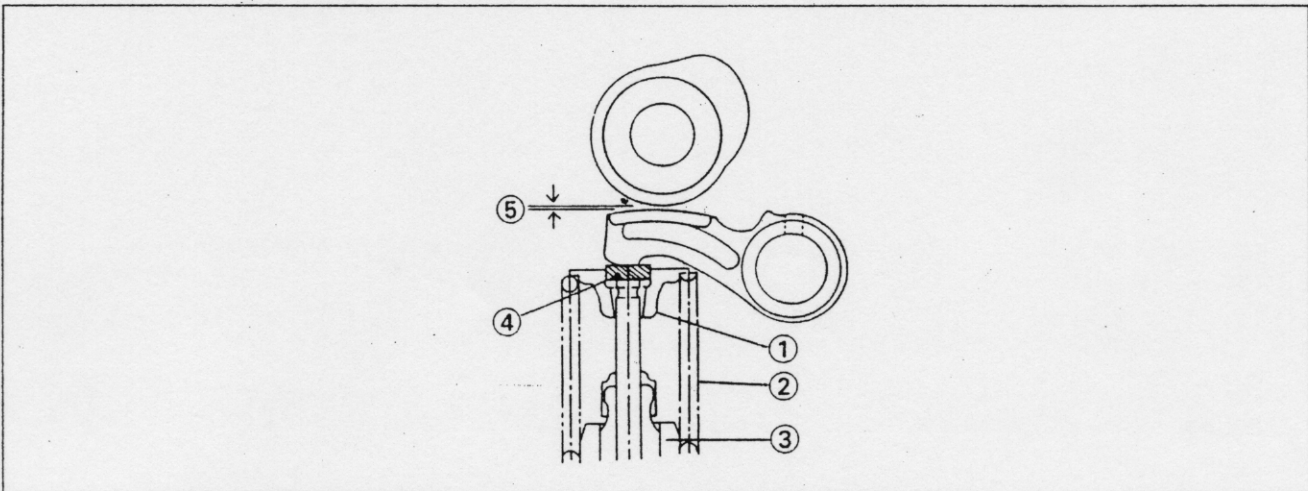
Replace the valve spring, spring sheet, and spring retainer with the kit parts.

The '92 kit valve spring has rather reliable durability than '91 kit one. This valve spring must be used whenever the '92 kit igniter is used. ID mark of this valve is red color.

- The spring is a single spring. Install the spring so that the closed coil end is facing toward the valve seat downwards.
- The retainer is made of an aluminum forging. This reduces the inertial mass of the valve train.
- Check the valve clearance using the thickness gauge. If the clearance is out of the limit, change the shim and adjust it. (Measure the clearance when the engine is cool.)
- Measure the clearance when the cam lobe top is opposite side of the rocker arm.
- To prevent engine trouble, adjust the valve clearance within the specified value. However you can get best performance when the intake is 0.21 mm and exhaust is 0.25 mm.

Valve Clearance

Intake : 0.16 ~ 0.21 mm
Exhaust : 0.21 ~ 0.25 mm

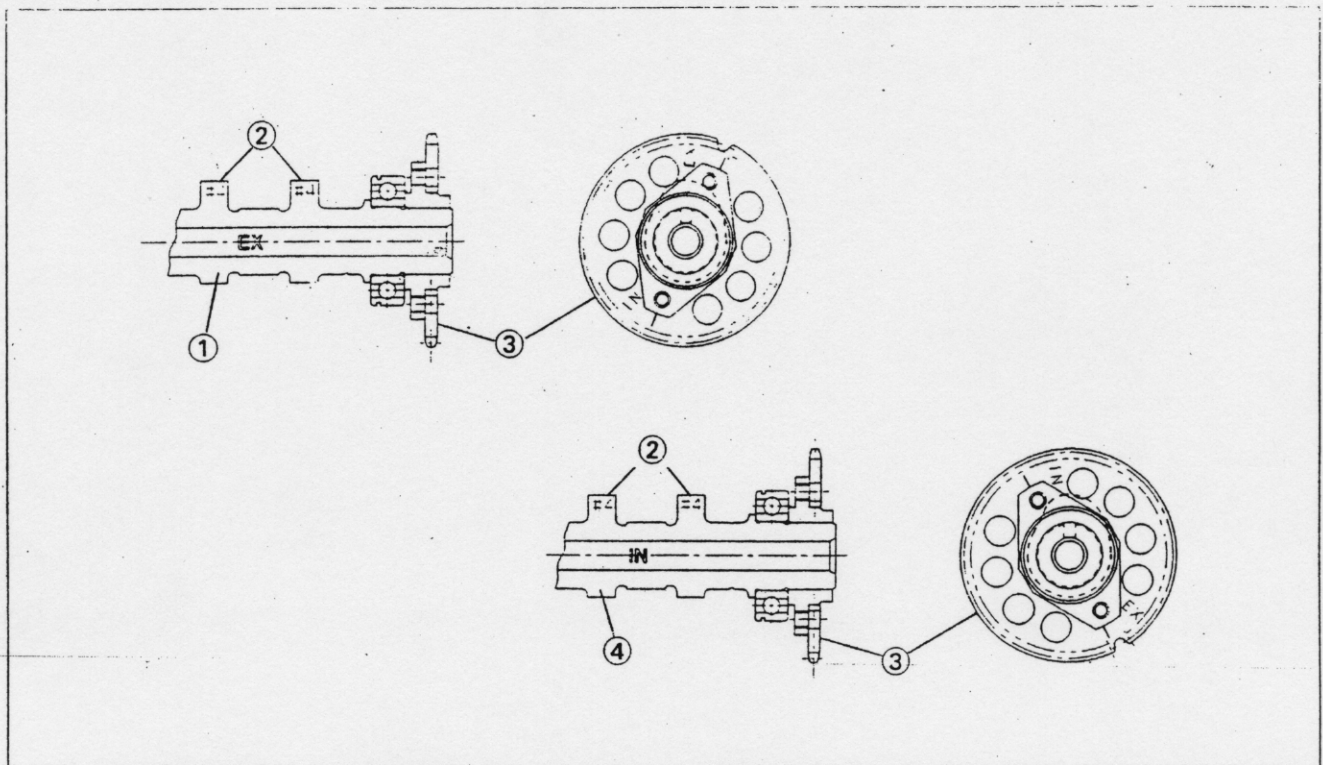


1. Spring Retainer: 12009-1071
2. Spring: 49078-1118
3. Spring Seat: 16007-1165

4. Shim (STD part)
5. Clearance

Camshaft:

- The kit camshaft has bigger valve lifter and wider valve timing than the original one.
- Replace the camshaft sprocket for the kit parts. The intake camshaft sprocket is the same as the exhaust camshaft sprocket. It has long holes and is bolted on the camshaft so as to be able to adjust the valve timing.
- Install the camshaft as follows.
- The illustrations shows camshaft sprockets positions when the top section of both exhaust and inlet #4 cam lobe is upward.
- Install the exhaust camshaft sprocket so that the EX mark is top.
- Install the inlet camshaft sprocket so that the IN mark is top.



1. Exhaust Camshaft

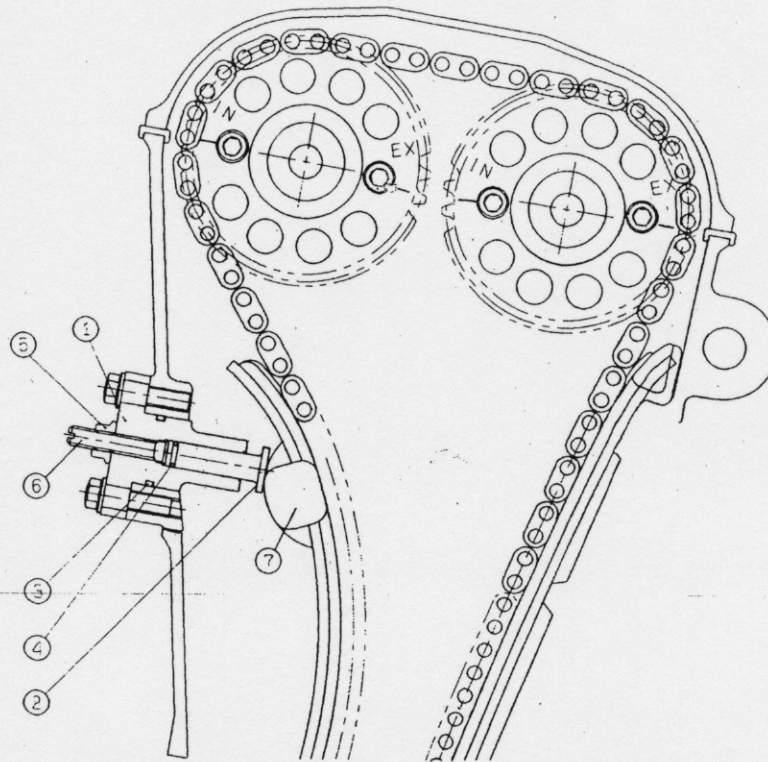
2. Inlet Camshaft

3. Sprocket

4. No. 4 Cam

Camshaft Chain Tensioner:

- Replace the camshaft chain tensioner with the kit to increase durability of tensioner.
- Apply the engine oil to the tensioner rod, O-ring and adjusting screw, insert them into the tensioner body.
- Check to see that the tensioner rod turns freely in the body, if not, polish the tensioner rod or fine the female threads in the adjusting screw hole with a tap (Diameter x Pitch = 6 mm x 1.0 mm).
- Install the tensioner on the cylinder block with the tensioner rod is fully pushed back.
- Turn the adjusting screw in with a screw driver until it becomes hard to turn.
- Turn the crankshaft clockwise several times and then screw the adjusting screw in again to take up any gap and tighten the locknut.
- Never forward the tensioner rod forcibly, this will increase mechanical loss of the tensioner and may damage to the chain guide.
- The camshaft tensioner must be adjusted at every race.



- | | |
|------------------|--------------------|
| 1. Tensioner | 5. Nut |
| 2. Tensioner Rod | 6. Adjusting Screw |
| 3. O-ring | 7. Chain Guide |
| 4. O-ring | |

Piston:

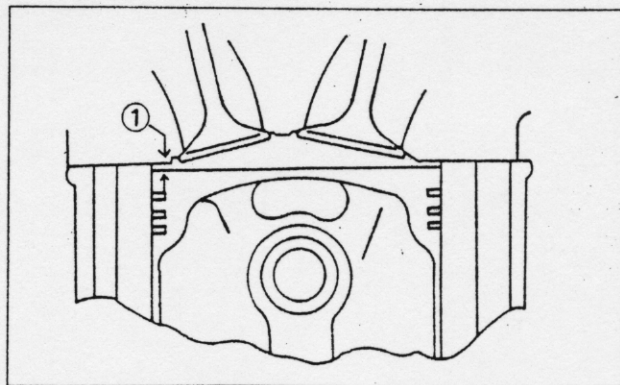
- The shape of the piston head is changed to set the compression ratio 13.0.
- The high compression ratio causes engine knocking. Use the high octane number gasoline (racing gasoline; ex. Shell AV-100 etc.) for preventing engine knocking.
- Use the original piston rings and piston pins.
- When replacing for the kit piston, inspect the piston squish.
- Position the piston at the Top Dead Center, and put the small piece of the solder on the shoulder of the piston. Install the cylinder head gasket and cylinder head, and tighten the head bolt with the specified torque. The thickness of the collapse solder is the size of the squish.
- Remove the cylinder head and measure the thickness of solder.

Squish Measurement

0.7 ~ 0.85 mm

- The most preferable squish measurement is 0.7 mm.

- When the squish is less than 0.7 mm, replace the head gasket with a kit (P/No. 11004-1243, ID mark "70") and measure the squish again, if the squish is still under the specification, smooth the piston shoulder.
- When the squish is more than 0.7 mm, replace the head gasket with a kit (P/No. 11004-1242 ID mark "60") and measure the squish again, if the squish is still over 0.7 mm, smooth the cylinder top surface.

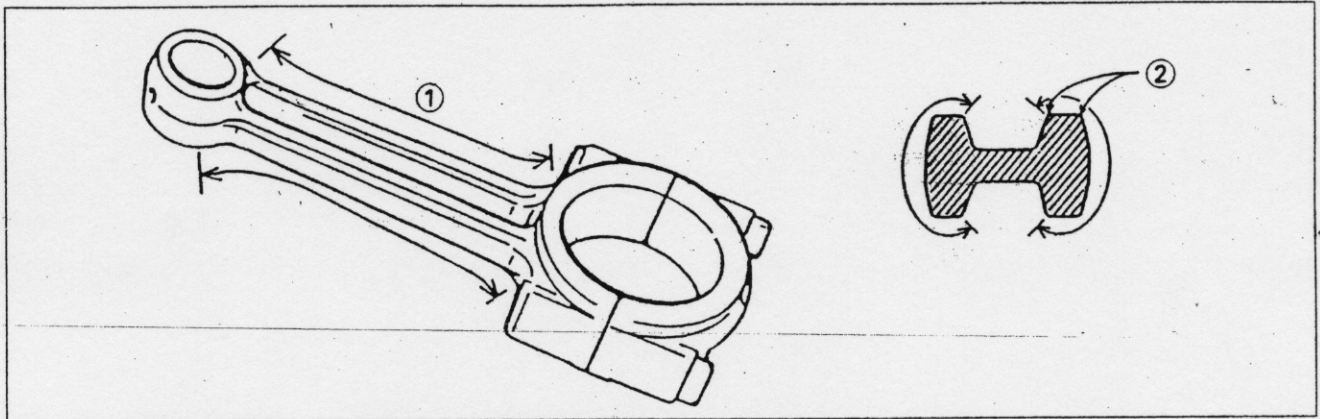


1. Squish

Connecting Rod:

To increase durability, further increase the inertial mass and keep balance between each cylinder, it had better modify the connecting rod as follows.

- When removing the connecting rod from the crankshaft, write the number of the cylinder on it, and keep it with the metal and connecting rod cap.
- The connecting rod body and it's cap are machined together at the factory in the assembled state, so they must be replaced as a set.
- The connecting rod weight marks on both the body and cap should be located on the same side.
- Using the oil stone (about #120), grind the connecting rod side faces for smooth surfaces.



1. Polishing Direction and Area (Move the oil stone in this direction)
2. Chamfer Edges

- Grind the connecting rods so that the difference of each connecting rod's weight must be within 4 g.
- Polish the connecting rod side faces and bosses with the buffing machine or oil stone (about #200 ~ #300).

A. Connecting Rod Big end Clearance

Making the big end clearance larger than the standard specification.

Larger clearance will reduce the mechanical loss and will improve higher the engine performance.

- Measure the clearance using a plastigauge.

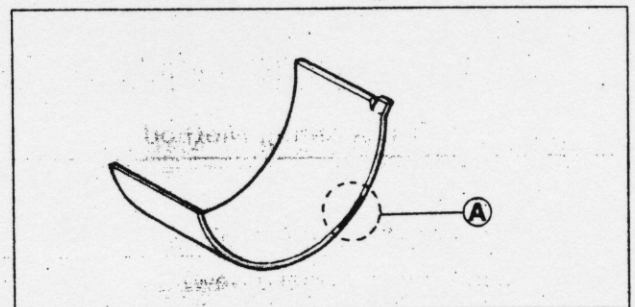
Connecting Rod Big End Clearance

Original Machine:	38 ~ 65 micron
Racing Machine:	50 ~ 70 micron

- The clearance can be changed by replacing the big end bearing insert with one type of thinner one as shown.

Big End Bearing Insert Thickness

P/No.	Color Size Mark	Thickness
92028-1623	Blue	1.485 ~ 1.490 mm
92028-1624	Black	1.480 ~ 1.485 mm
92028-1625	Brown	1.475 ~ 1.480 mm



- In case of the thinner one has been installed on the original machine, use it as it is. Reboring of the big end does not required.

A. Size Color Mark

Connecting Rod Bolts/Nuts Tightening (Plastic Region):

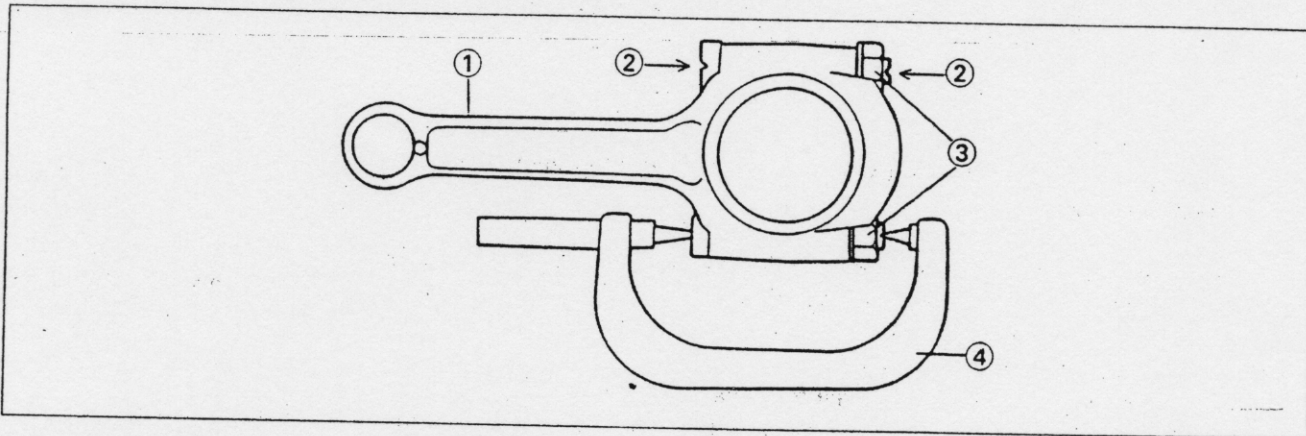
The connecting rod big end is bolted using the "plastic region fastening method" as introduced on this machine.

This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.

- There are two types of the plastic region fastening. One is a bolt length measurement method and other is a tightening torque method. Observe one of the following two but the bolt length measurement method is preferable.
- There are two values of the nut tightening torque as shown, select item according to your bolt conditions.
- Apply a thin coat of a molybdenum disulfide grease to seated surface of the connecting rod bolts and nuts.

(1) Bolt Length Measurement Method

- Install the connecting rod bolts in the connecting rod.
- Tighten the connecting rod nut temporarily.
- Make indent on both bolt head and bolt tip.
- Set a point micrometer as shown.
- Tighten the big end cap nuts until the bolt elongation is come to specified length as shown. This is a more reliable and preferable way to tighten the big end cap nuts.



- 1. Connecting Rod
- 2. Indent with a punch.
- 3. Nuts
- 4. Fit micrometer pins onto dents.

(2) Tightening Torque Method

- First, tighten the nuts to the specified torque, and then tighten the nuts 120° more.

⚠ CAUTION

Plastic Region bolts are used, so, in case of disassembling connecting rod, replace bolts and nuts with new ones.

If you intend to reuse bolts and nuts, tighten then with different tightening torque as shown table.

Connecting Rod Tightening Method

Connecting rod bolt/nut condition	Tightening Method	
	Bolt Elongation	Tightening Torque
Non-used bolt and nut (Brand New)	0.3 mm ~ 0.32 mm	2.6 kg-m plus 120°
Ones mounted on newly obtained connecting rod assembly	0.26 mm ~ 0.28 mm	1.8 kg-m plus 120°
Ones mounted on stock machine	0.26 mm ~ 0.28 mm	1.8 kg-m plus 120°

Connecting Rod Bolt and Nut Useful Time Limit

Connecting Rod Bolt/Nut Condition	Useful Time Limit		
	1	2	3
Ones obtained only as single nut	possible	possible	possible
Ones mounted on newly obtained connecting rod assembly	possible	possible	impossible
Ones mounted on stock machine	impossible (exchange them for new ones)		

Transmission:

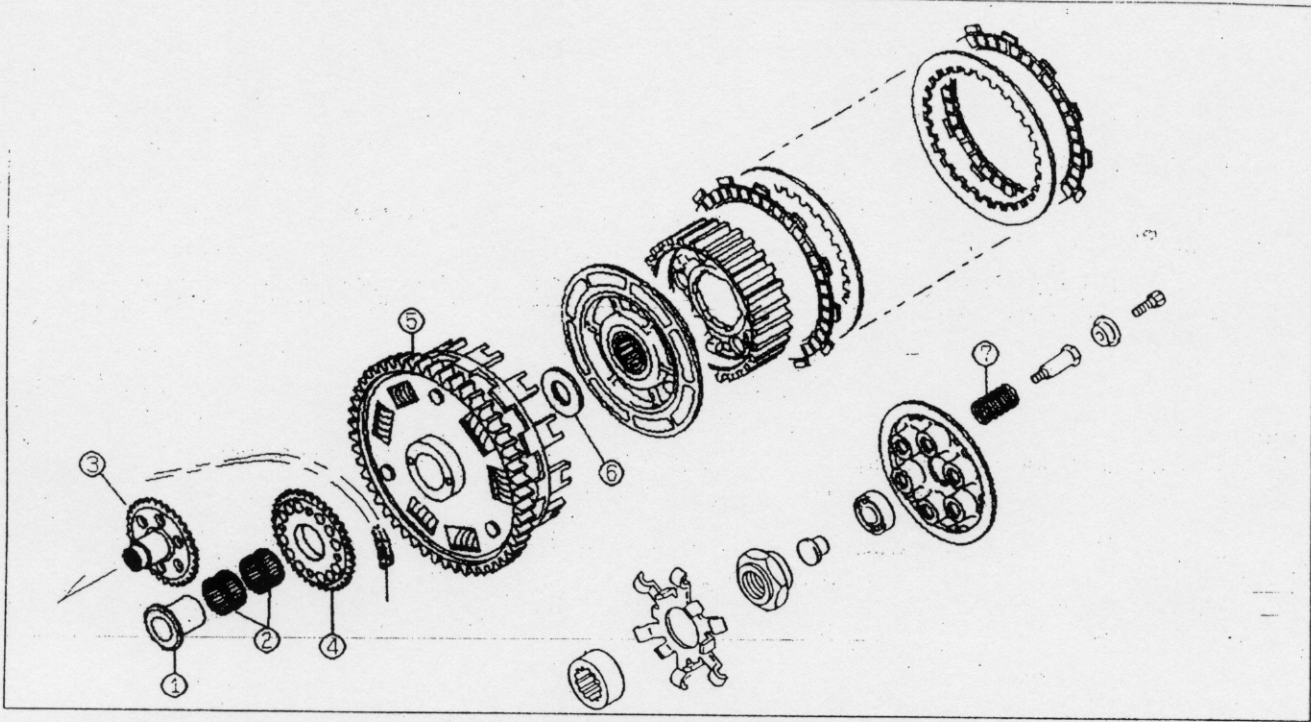
The original model has been mounted the cross ratio transmission so that it can be used in a race. Besides, You can select the following gears as optional parts.

	Input	Output (Ref.)	Gear Ratio	Stock Gear Ratio
4th	13260-1268	13260-1271	1.500 (33/22)	1.409 (31/22)
5th	13260-1269	13260-1272	1.391 (32/23)	1.292 (31/24)
Top	13260-1270	13260-1273	1.292 (31/24)	1.200 (30/25)

Clutch:

Replace the clutch housing and clutch spring with the kit parts.

- The clutch housing (13095-1254) is provided for the super bike racing and the clutch spring (92081-139) is for all racing use.
- For the super bike racing, use the kit clutch housing, drive shaft sprocket (21053-1060) and oil pump sprocket (12046-1135) as a set. These parts set will lower the oil pump maximum rpm about 27% and reduce mechanical friction loss in the oil pump gear train. For the enduro racing, use the original clutch housing.
- The kit spring tension is up to about 30% and for reliable clutch functioning.



1. Collar: 92143-1579
2. Needle Bearing: 92046-1215
3. Oil Pump Sprocket: 12046-1135
4. Sprocket: 21053-1060

5. Clutch Housing: 13095-1254
6. Spacer: 92026-1422
7. Clutch Spring: 92081-139

Starter Motor, Alternator and Oil Pump Driven Mechanism (SB):

- Remove the starter motor, alternator and their driven mechanism from the engine since these parts are not needed for the race. For the enduro racing, use either the original alternator or the kit one.
- Replace the oil pump gear train with kit parts.

1) Removal Parts

Starter Motor related parts

1. Idle Gear Shaft
2. Idle Gear
3. Starter Motor

Alternator related parts

4. Chain
5. Starter Clutch
6. Coupling
7. Alternator

Oil Pump Driven Mechanism

8. Oil Pump Sprocket
9. Drive Shaft Sprocket
10. Oil Pump Body
11. Oil Pump Rotor
12. Clutch Housing

Parts replacement with Kit

13. Chain Tensioner
14. Oil Pressure Switch

