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SERVICE INFORMATION

WORKING PRACTICE

Use caution when working with gasoline. Always work in a well-ventilated area and away from sparks or open flames. When disassembling fuel system parts, note the locations of the O-rings. Replace them with new ones on re-assembly. The float bowls have drain plugs that can be loosened to drain residual gasoline.

SPECIAL TOOLS

Common Tool	
Float gauge	07401-0010000
Special Tools	
Carburetor Throttle Wrench	07908-4220100
Carburetor Pilot Screw Wrench	07908-4220200

TORQUE VALUES

Front bracket	0.40-0.60 kg-m (3-4 ft-lb)
Rear bracket	0.28-0.42 kg-m (2-3 ft-lb)
Choke valve	0.06-0.12 kg-m (5-11 in-lb)
Front and rear brackets between three carburetors	0.28-0.42 kg-m (2-3 ft-lb)
Throttle joint holding nut	0.28-0.42 kg-m (2-3 ft-lb)

SPECIFICATIONS

Venturi dia.	28 mm (1.1 in)
Setting mark	VB60A
Float level	15.5 mm (0.61 in)
Main jet	Pri.: 65 2nd: 98
Idle speed	900 ± 100 rpm
Throttle grip free play	2-6 mm (0.08-0.24 in)
Fast idle	2,000±500 rpm (after break-in)
Pilot screw	See page 4-26



TROUBLESHOOTING

Engine Cranks but Won't Start

1. No fuel in tank
2. No fuel to carburetor
3. Engine flooded with fuel
4. No spark at plug (ignition malfunction)
5. Air cleaner clogged
6. Intake air leak
7. Improper choke operation
8. Improper throttle operation

Hard Starting or Stalling after Starting

1. Improper choke operation
2. Ignition malfunction
3. Fast idle speed incorrect
4. Carburetor malfunction
5. Fuel contaminated
6. Intake air leak
7. Incorrect idle air/fuel mixture
8. Idle speed incorrect

Rough Idle

1. Ignition malfunction
2. Idle speed incorrect
3. Incorrect carburetor synchronization
4. Incorrect carburetor air/fuel mixture
5. Carburetor malfunction
6. Fuel contaminated

Misfiring during Acceleration

1. Ignition malfunction
2. Incorrect carburetor air/fuel mixture
3. Faulty air cutoff valve or accelerator pump

Backfiring

1. Ignition malfunction
2. Incorrect carburetor air/fuel mixture
3. Carburetor malfunction
4. Faulty air cutoff valve or accelerator pump

Poor Performance (Driveability) and Poor Fuel Economy

1. Fuel system clogged
2. Ignition malfunction
3. Incorrect carburetor air/fuel mixture
4. Faulty accelerator pump

Lean Mixture

1. Clogged fuel jets
2. Piston stuck closed
3. Faulty float valve
4. Float level low
5. Fuel cap vent blocked
6. Fuel strainer clogged
7. Restricted fuel line
8. Air vent tube clogged
9. Intake air leak
10. Pilot screw misadjusted

Rich Mixture

1. Clogged air jets
2. Faulty float valve
3. Float valve too high
4. Choke stuck closed
5. Pilot screw misadjusted
6. Stuck closed air cutoff valve
7. Clogged air cleaner



CARBURETOR REMOVAL

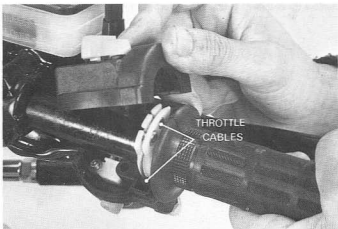
NOTE

To remove the carburetors, the engine must be tilted.

Refer to Section 5 "ENGINE REMOVAL AND INSTALLATION".

Disconnect the throttle cables at the throttle grip housing before tilting the engine.

Remove the choke cable at left handlebar switch housing.



Loosen the air cleaner connecting band.
(For more information, refer to Section 5).

Tilt the engine.



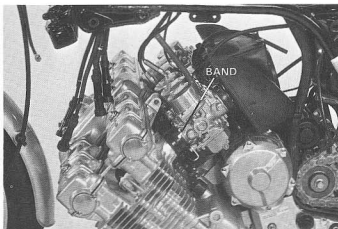
Loosen the carburetor manifold bands.
Remove the carburetor assembly with the chamber.

NOTE

For easy removal, loosen the cylinder head side bands.

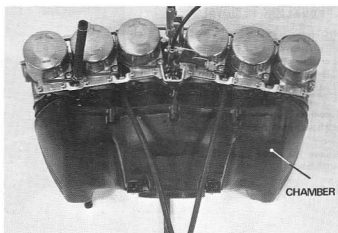
CAUTION

Apply equal force to each carburetor.

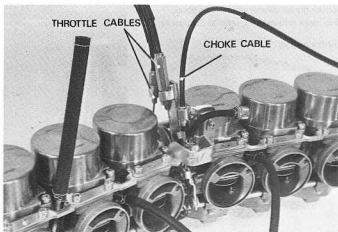




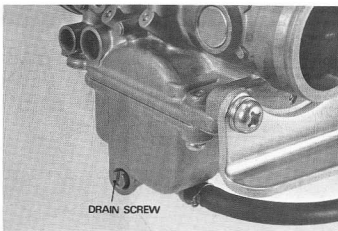
Remove the chamber from the carburetor.



Disconnect the throttle and choke cables.



Drain the fuel by loosening each drain screw.





VACUUM CYLINDER DISASSEMBLY

Remove the vacuum cylinders from the carburetor bodies.

Carefully lift the vacuum piston out with the needle and compression spring.

NOTE

Inspect the vacuum piston and cylinder for wear, nicks, scratches or other damage. Make sure that the piston and jet needle move up and down freely in the cylinder.

Remove the full open stopper.

Remove the needle set screw.

Separate the jet needle from the piston.

NOTE

Inspect the needle and seat for deposits, bending, grooves, or other damage.

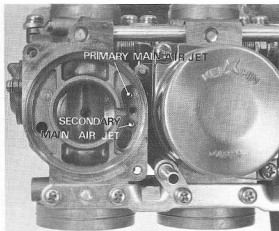
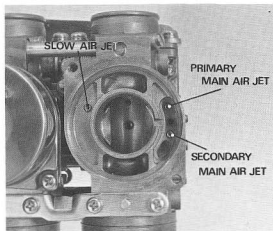
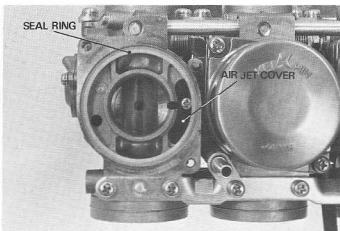
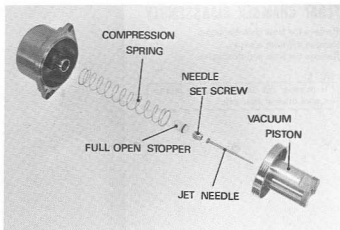
Carefully lift the seal ring off the carburetor body.

Remove the air jet cover.

Blow open the primary main air jet, secondary main air jet and slow air jet with compressed air.

NOTE

Never clean carburetor jets with wire or drills. This will enlarge the openings and result in excessive fuel consumption.





FLOAT CHAMBER DISASSEMBLY

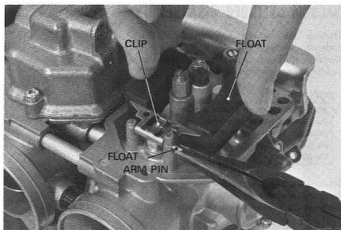
Remove the float chamber body.

Remove the float arm pin.

Remove the float and float valve.

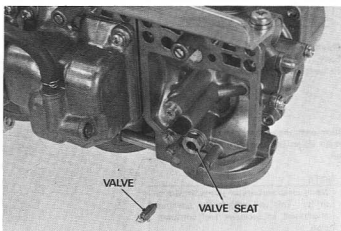
NOTE

Remember the direction of the clip to ensure original assembly.



Inspect the float valve and seat for grooves, nicks or deposits.

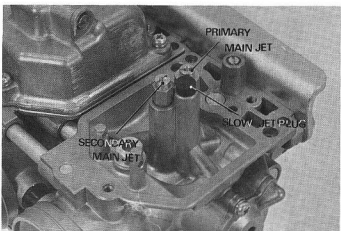
Inspect the float valve for operation.



Remove the secondary main jet.

Remove the primary main jet.

Remove the slow jet plug.





NOTE

The slow jet cannot be removed, it is a press fit.

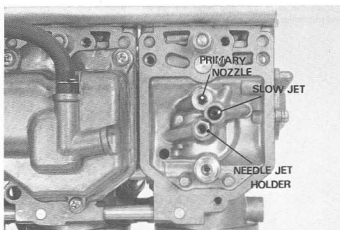
Remove the primary nozzle.

Remove the needle jet holder.

Tilt the carburetor to remove the needle jet. Blow all jets and body passages with compressed air.

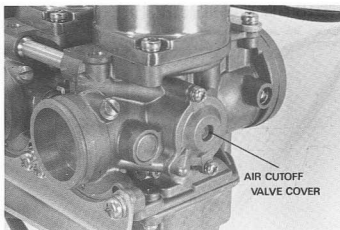
NOTE

- If the needle jet is difficult to remove, carefully press the needle jet from the cylinder side with a soft material stick.
- Before removing the pilot screw, record the number of turns until it seats. Do not damage the pilot screw threads when removing the plain washer and O-ring.

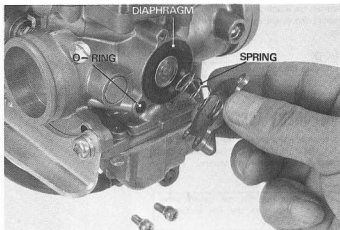


AIR CUTOFF VALVE DISASSEMBLY

Remove the air cutoff valve cover and spring.

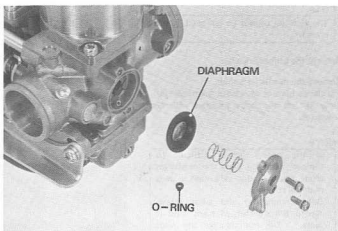


Remove the diaphragm and O-ring.



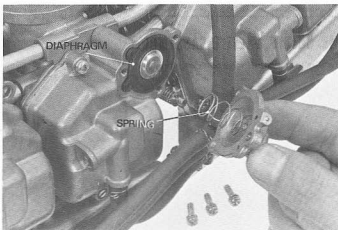


Inspect the diaphragm and valve for cracks and brittleness.



ACCELERATOR PUMP DISASSEMBLY

Remove the accelerator pump cover and spring.



Remove the diaphragm.
Inspect the diaphragm for cracks and brittleness.

NOTE

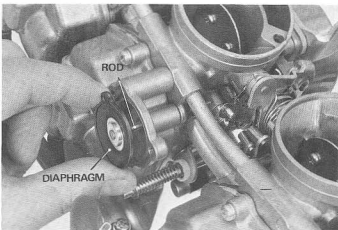
Be sure the rod is not bent.

COMPONENT ASSEMBLY

To assemble the accelerator pump, air cutoff valve, float chamber and vacuum cylinder, reverse the disassembly procedure.

NOTE

When installing the air cutoff valve O-ring, make sure the flat surface is toward the body.





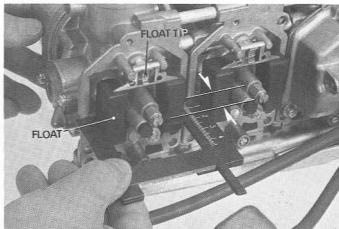
FLOAT LEVEL ADJUSTMENT

Adjust the float level by bending the float arm carefully until the float tip just contacts the float valve.

FLOAT LEVEL: 15.5 mm (0.61 in)

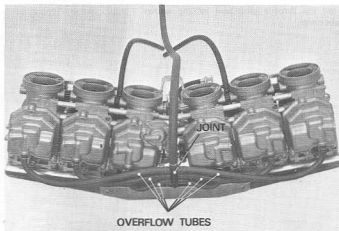
NOTE

Before adjusting, remove the adjacent chambers.

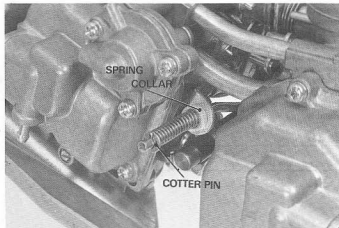


CARBURETOR SEPARATION

Disconnect the overflow tubes from the float chambers.

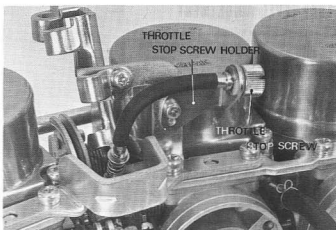


Remove the cotter pin from the accelerator pump rod.
Remove the plain washer, spring and spring collar.

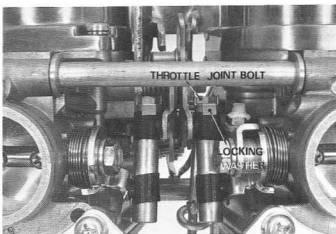




Remove the throttle stop screw holder.
Turn the throttle stop screw out.



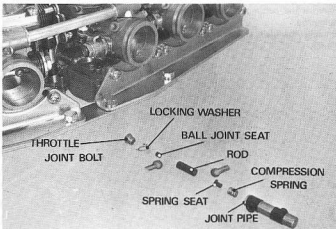
Fold the throttle joint bolt locking washer tabs down.



Loosen the throttle joint bolt.
Remove the locking washer and ball joint seat.
Disconnect the ball joint of the throttle link from the throttle joint pipe.
Remove the rod.
Disconnect the throttle joint pipe from the No. 3 carburetor throttle linkage.
Note each parts location to insure original assembly.

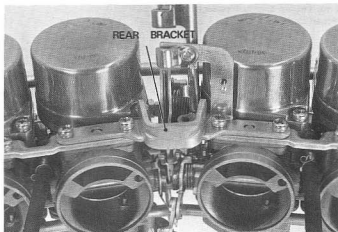
NOTE

For easy removal, hold the joint pipe and turn the throttle link.

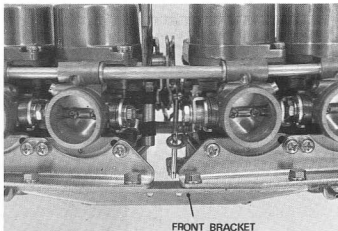




Remove the rear bracket.



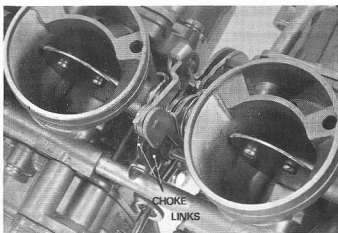
Remove the front bracket.



Carefully separate the carburetors.

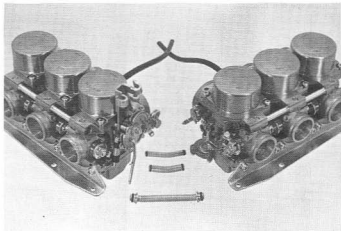
CAUTION

- Separate the carburetor horizontally to prevent damage to the fuel and air joint pipes and choke link. Then, tilt the right carburetor assembly to clear the accelerator pump rod.
- Do not bend the accelerator pump rod.





Blow the air and fuel passages with compressed air.

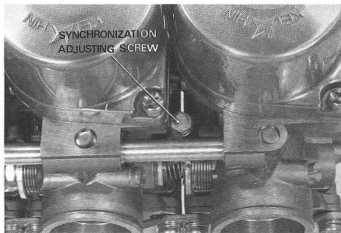
**NOTE**

The separation of the No. 1, 2 and 3 carburetors is given here. The procedure is similar for No. 4, 5 and 6 carburetors.

Loosen the synchronization adjusting screw lock nuts and adjusting screw with the carburetor throttle wrench until there is no tension.

NOTE

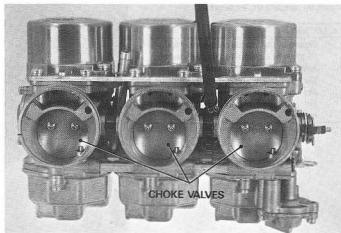
Turn the synchronization screws in until they seat and note the number of turns to ensure original positioning.



Cut off the staked ends of the choke valve screws.
Remove the choke valves.

NOTE

Do not allow filings to enter the carburetors.

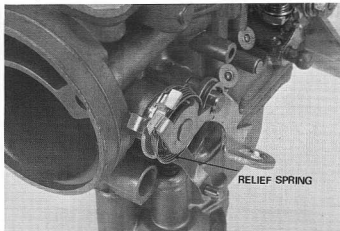




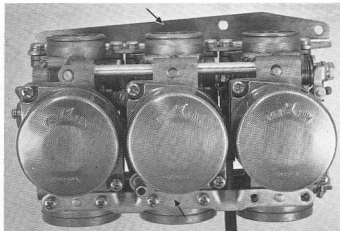
Remove the choke relief spring from the choke link and pull the choke shaft out.

CAUTION

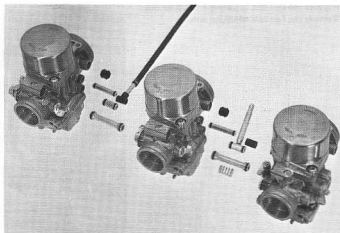
Do not reuse the choke shaft, choke valves and screws.



Remove the rear and front brackets.



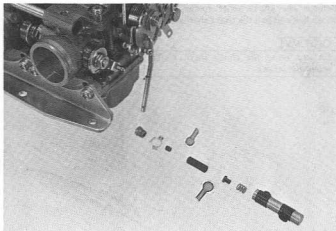
Carefully separate the carburetors.
Blow the air and fuel joint pipes with compressed air.



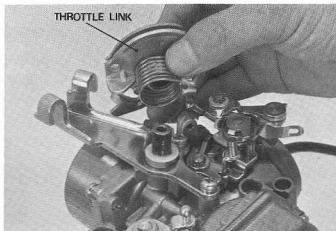


LINKAGE DISASSEMBLY

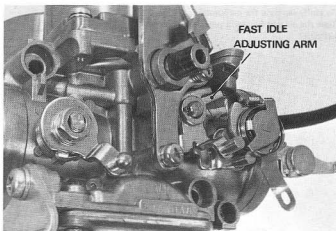
Remove the right throttle joint, using the same procedure as for the left throttle joint.



Remove the throttle link bolt.
Remove the throttle link.



Remove the fast idle adjusting arm cotter pin.
Remove the fast idle adjusting arm.





CARBURETOR ASSEMBLY

NOTE

- Assemble one set of three carburetors at a time.
- No. 1, 2 and 3 carburetor assembly is shown here. The procedure is similar for the No. 4, 5 and 6 carburetors.

Install new O-rings on the air and fuel joint pipes securely.

Install the air cutoff valve joint, fuel joint, accelerator pump joint and air vent pipes on the No. 3 carburetor.

Install the choke dust tube.

NOTE

Apply a thin coating of oil to the O-rings.

Loosen the synchronization adjusting screw until there is no tension when assembling new carburetors.

Insert the No. 3 carburetor throttle link between the plain washers slightly.

Assemble the No. 2 and No. 3 carburetors, pressing them together carefully.

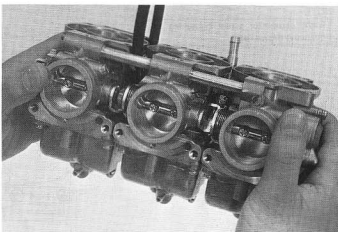
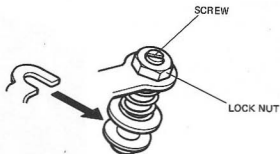
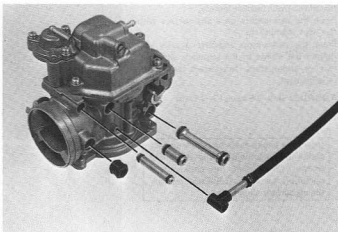
NOTE

The large washer should be positioned on the spring side.

Attach the No. 1 carburetor to the No. 2 carburetor, pressing them together carefully.

NOTE

Check the condition of the O-rings and choke dust tubes.





Install the front bracket loosely.

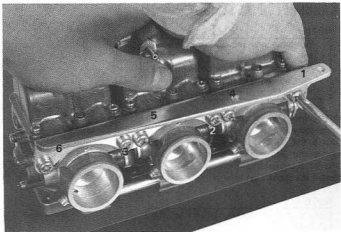
Place the carburetors on a flat surface with the float chamber up.

Press the carburetors together equally and tighten the screws in the sequence shown in two or more steps to prevent carburetor misalignment.

TORQUE: 0.4–0.6 kg-m (3–4 ft-lb)

NOTE

Insert the choke shaft to ensure correct carburetor alignment before tightening screws. Check that the choke shaft operation is smooth. If it is not, recheck the carburetor alignment.

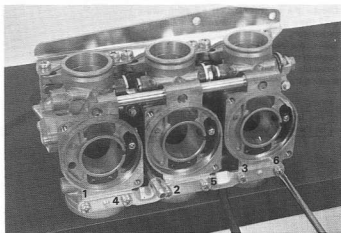


Install the rear bracket using the same procedure as for the front bracket.

TORQUE: 0.28–0.42 kg-m (2–3 ft-lb)

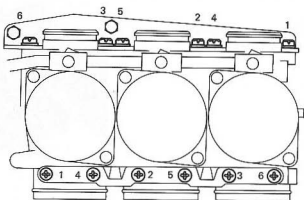
NOTE

No. 3 and No. 4 carburetors require 5 x 16 mm screws. The other carburetors require 5 x 12 mm screws.



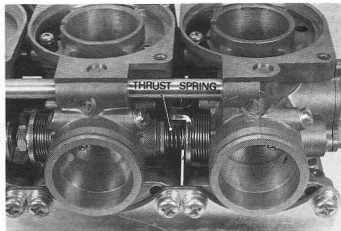
NOTE

Right carburetor screw tightening sequence is shown here.





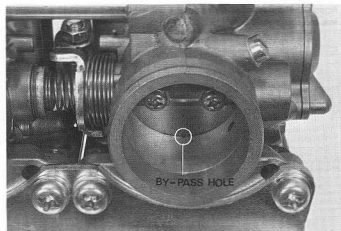
Install the thrust spring between the No. 1 and No. 2 carburetor throttle valve links.



Turn each synchronization adjusting screw to its original position as noted during disassembly.

NOTE

Make each distance between the by-pass hole in the carburetor body and throttle valve equal when assembling new carburetors.

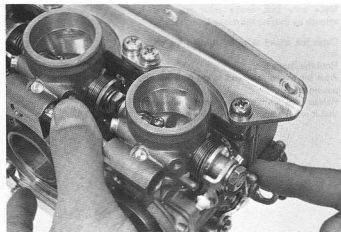


Inspect throttle operation as described below:

- Open the throttle slightly by pressing the No. 3 carburetor ball joint. Then release the throttle.
- Make sure that it returns smoothly.
- Make sure that there is no drag when opening and closing the throttle.

Install a new choke shaft.

Check that choke shaft operation is smooth and it does not bind during installation. If it binds, the carburetors may not be properly aligned or the shaft may be bent.



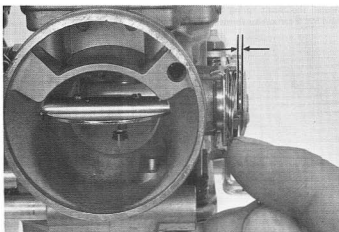


Slide the choke relief spring over the choke shaft.

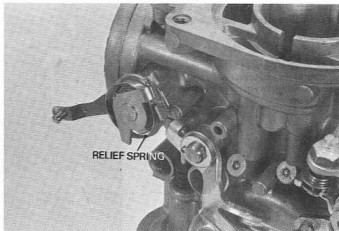
Install the choke shaft.

Install the choke valve, but do not tighten the bolts.

Make sure that the clearance between the choke shaft lever and carburetor body is approximately 1 mm (0.04 in).



Attach the choke relief spring to the choke link and choke shaft lever.



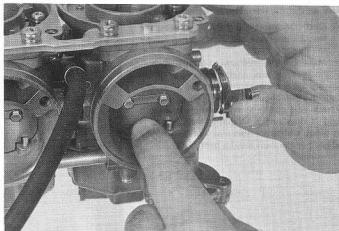
Make sure that choke valve operation is smooth by moving the choke link.

Close the choke valve by turning the choke link.

Hold the choke link.

Press the choke valve end to the fully opened position.

Release the choke valve, then make sure that it returns smoothly.

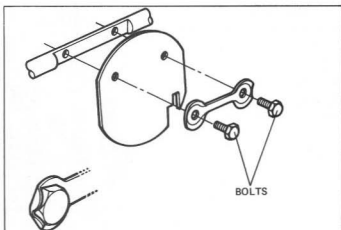




Tighten the choke valve bolts.

TORQUE: 0.06–0.12 kg-m
(5–11 in-lb, 0.4–0.9 ft-lb)

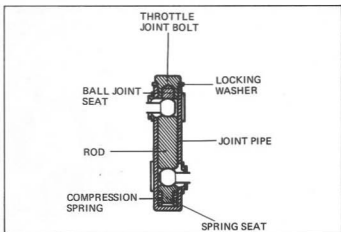
Fold the tabs of the lock washer up.
Recheck the throttle and choke operation.



Loosen the No. 3 and No. 4 carburetor rear bracket screws.
Connect the throttle joint to the throttle link.

CAUTION

- Do not damage the ball joints and rubber grommets.
- Do not allow dust in the throttle joint pipe.
- Use a new locking washer.



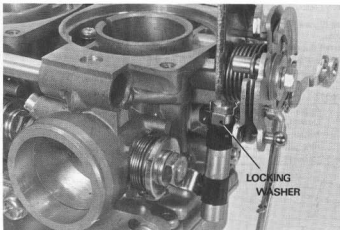
Tighten the throttle joint bolt.

TORQUE: 0.28–0.42 kg-m (2–3 ft-lb)

Secure the bolt by bending the tabs of the locking washer.

NOTE

- Bend the two small tabs up against the bolt head.
- Bend the center tab over the throttle joint flat.



**FAST IDLE ADJUSTMENT**

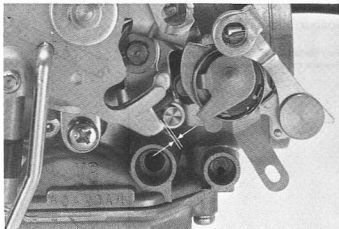
FAST IDLE: 2000 ± 500 rpm (after break-in)

Close the throttle valve and open the choke valve.

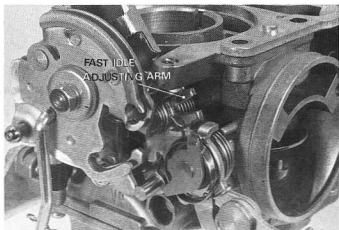
Measure the clearance between the throttle link and fast idle adjusting arm pin.

SPECIFIED CLEARANCE:

0.7–1.0 mm (0.03–0.04 in)



Adjust by opening and closing the fork end of the fast idle adjusting arm.

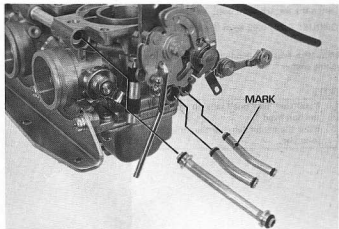
**INSTALLATION**

Install new O-rings on the air and fuel joint pipes.

Install the air cutoff valve joint pipe, fuel joint pipe and accelerator pump joint pipe on the No. 4 carburetor.

NOTE

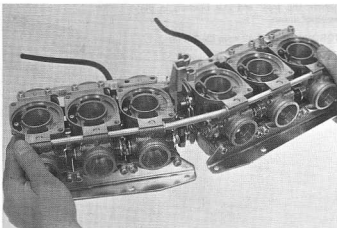
- Apply a thin coating of oil to the O-rings.
- Install the accelerator pump joint pipe with the mark toward the No. 4 carburetor.



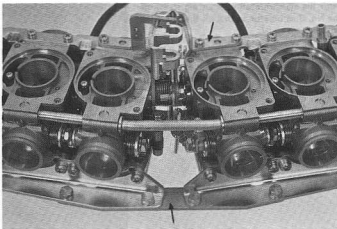


Insert the accelerator pump rod.
Position the right and left carburetor assemblies properly, aligning the pipes and choke link.

Press the assemblies together carefully.

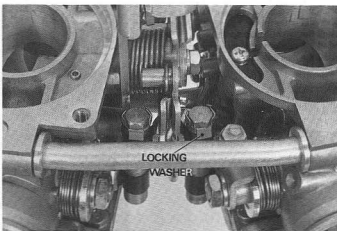


Install the front and rear brackets loosely.



Connect the other throttle joint to the throttle link.
Tighten the throttle joint bolt.
Secure the bolt by bending the tabs of the locking washer as for the previous throttle joint.

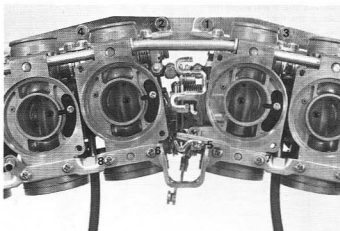
TORQUE: 0.28–0.42 kg-m (2–3 ft-lb)





Tighten the front and rear brackets in the sequence shown.

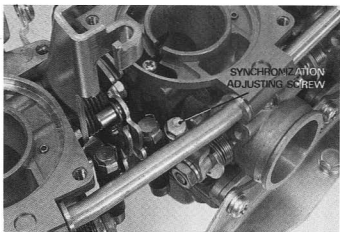
TORQUE: 0.28–0.42 kg-m (2–3 ft-lb)



Turn the synchronization adjusting screw on the No. 3 carburetor so that all throttle valve positions are equal.

Move the throttle link to check throttle operation.

Move the choke link to check choke operation and synchronization.

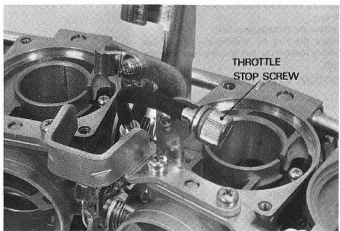


Install the accelerator pump rod spring, washer, collar and cotter pin.

Install the throttle stop screw.

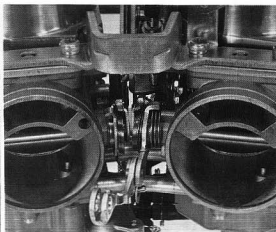
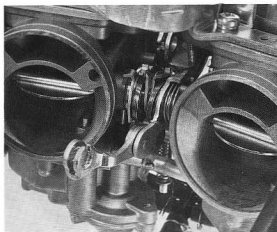
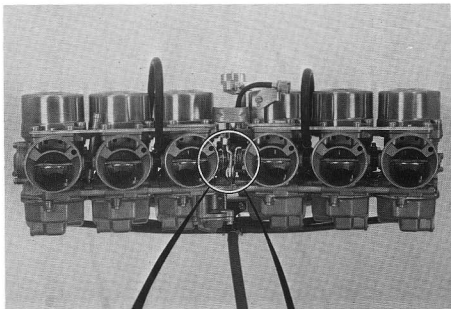
Install the vacuum cylinder components.

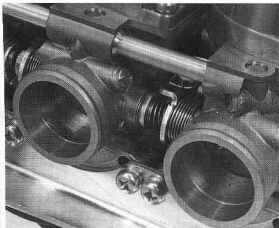
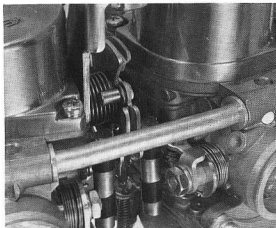
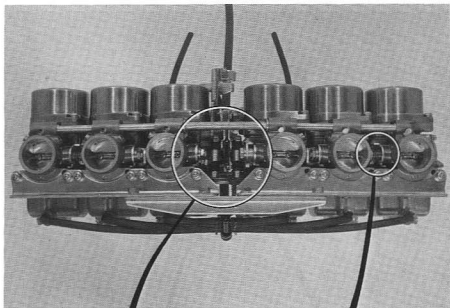
Install the overflow tubes.





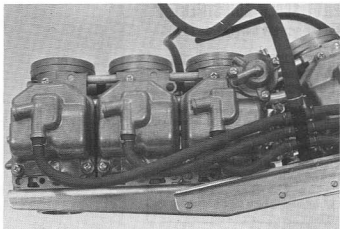
SPRING INSTALLATION







TUBE ROUTING



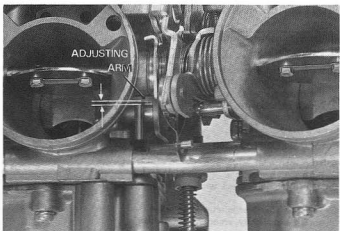
ACCELERATOR PUMP ADJUSTMENT

Measure the clearance between the accelerator pump rod and adjusting arm with the throttle valve closed.

SPECIFIED CLEARANCE:

0–0.04 mm (0–0.0016 in)

Adjust by bending the adjusting arm.

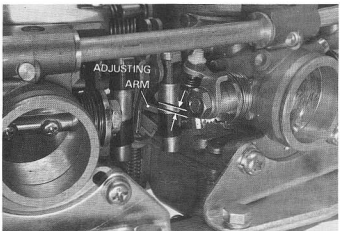


Measure the clearance between the adjusting arm and stopper on the carburetor body.

SPECIFIED CLEARANCE:

3.1–3.3 mm (0.12–0.13 in)

Adjust by bending the adjusting arm.





PILOT SCREW ADJUSTMENT

PILOT SCREW INITIAL SETTING

NOTE

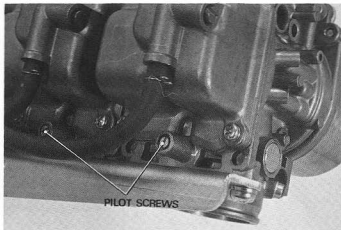
The pilot screw is factory pre-set and no adjustment is necessary unless the carburetor is overhauled.

Turn the pilot screw clockwise until it seats lightly and back it out to the specification. This is a preliminary setting prior to the final pilot screw adjustment.

PILOT SCREW OPENING: 1-1/4

CAUTION

Damage to the pilot screw seat will occur if the pilot screw is tightened against the seat.



PILOT SCREW ADJUSTMENT

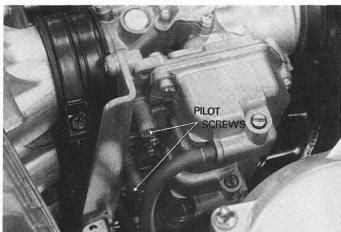
NOTE

Use a tachometer with graduations of 50 rpm.

1. Warm up the engine to operating temperature. Stop and go driving for 10 minutes is sufficient.
2. Attach a tachometer.
3. Adjust the idle speed with the throttle stop screw.

IDLE SPEED: 900 ± 100 rpm

4. Turn each pilot screw in or out to obtain the highest engine rpm.
5. Adjust the idle speed with the throttle stop screw.
6. Turn the No. 1 carburetor pilot screw in until it seats lightly, recording the number of turns.
7. Turn the No. 2 carburetor pilot screw in until the engine speed drops 50 rpm.
8. Turn the No. 2 carburetor pilot screw 1/2 turn out from the position obtained in Step 7.
9. Perform Steps 7 and 8 for the No. 3, 4, 5 and 6 carburetor pilot screws.
10. Turn the No. 1 pilot screw out to its original opening.
11. Turn the No. 6 pilot screw in until it seats lightly, recording the number of turns.
12. Perform Steps 7 and 8 for the No. 5, 4, 3, 2 and 1 carburetor pilot screws.
13. Turn the No. 6 pilot screw out to its original opening.
14. Adjust the idle speed with the throttle stop screw.





FUEL TANK

WARNING

Do not allow flames or sparks near gasoline. Wipe up spilled gasoline at once.

Check the vent hole of the filler cap for blockage.

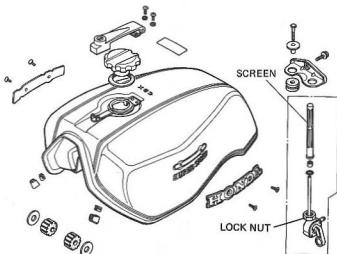
Check that fuel is flowing out of the fuel valve freely.

If the fuel flow is restricted, clean the fuel strainer.

NOTE

Do not overtighten the fuel valve lock nut.

Make sure there are no fuel leaks.



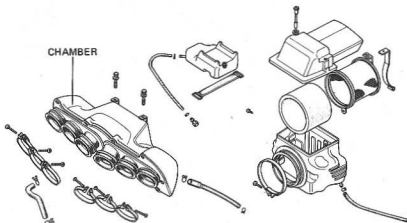
AIR CLEANER CASE

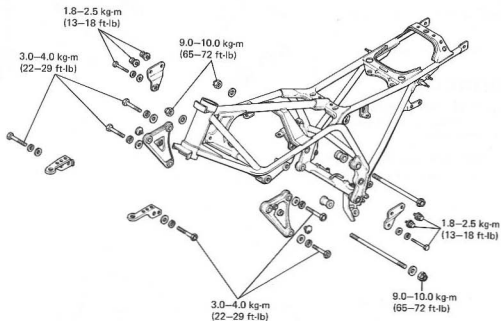
AIR CLEANER CASE/CHAMBER

Check the air cleaner case and chamber for cracking or deterioration.

CRANKCASE VENTILATION SYSTEM

Check that the breather tube is not restricted.







SERVICE INFORMATION	5-1
TILTING ENGINE	5-2
ENGINE REMOVAL	5-5
ENGINE INSTALLATION	5-6

SERVICE INFORMATION

WORKING PRACTICE

- The following parts or components can be serviced with the engine installed in the frame:

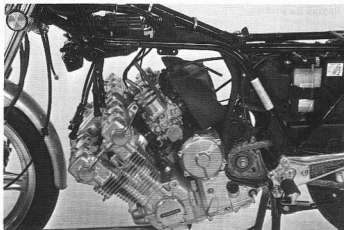
- Clutch
- A. C. generator
- Shift linkage
- Starter motor
- Camshaft

- The following parts or components can be serviced with the engine tilted forward in the frame:

NOTE

The engine can be pivoted on the rear lower hanger bolt after removing the three hanger bolts.

- Carburetor
- Cylinder head
- Cylinder
- Piston



SPECIFICATIONS

Engine dry weight	106 kg (234 lb) approx.
Oil capacity	5.5 lit (5.8 US qt) at engine assembly
	5.0 lit (5.3 US qt) at change

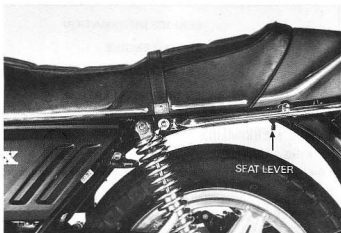
TORQUE VALUES

8 mm bolt	1.8-2.5 kg-m (13-18 ft-lb)
10 mm bolt	3.0-4.0 kg-m (22-29 ft-lb)
14 mm bolt	9.0-10.0 kg-m (65-72 ft-lb)
Rear axle nut	8.0-10.0 kg-m (58-72 ft-lb)
Drive sprocket	3.3-3.8 kg-m (24-27 ft-lb)
Spark plug	1.2-1.6 kg-m (9.0-12 ft-lb)

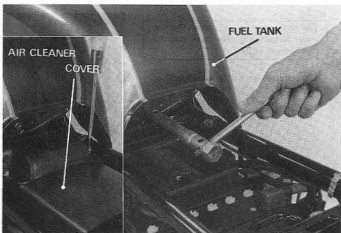


TILTING ENGINE

Remove the seat nuts.
Pull back on the seat levers and remove the seat.



Remove the air cleaner cover and fuel tank.
Remove the air cleaner.



Remove the exhaust system.
Remove the right and left side covers.



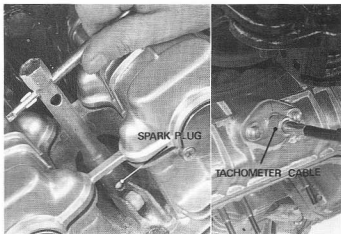


Remove the tachometer cable from the cylinder head cover.

Remove all spark plug caps, and remove the No. 1 and No. 6 spark plugs.

NOTE

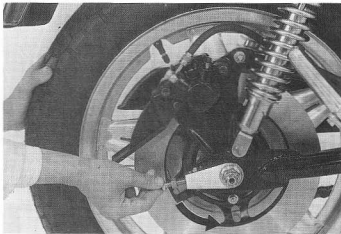
Do not allow screws and nuts to fall into the cylinders through the spark plug holes.



Remove the choke cable from the choke lever.

Remove the throttle cable from the right handlebar switch.

Loosen the rear axle nut and drive chain adjusting bolts. Push the rear wheel forward.



Remove the clutch cable at the clutch arm.

Place a jack under the engine.

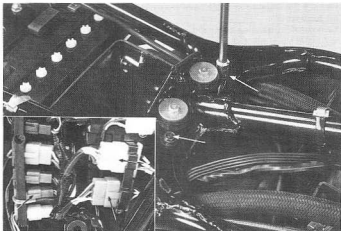
Remove the right and left engine hanger brackets and plates.

Loosen the screw securing the air cleaner-to-air funnel connecting tube band.

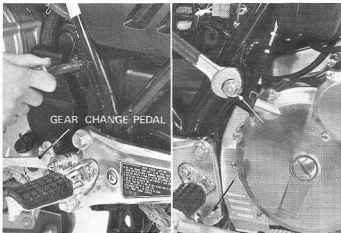




Remove the two bolts holding the air funnel.
Disconnect three couplers.

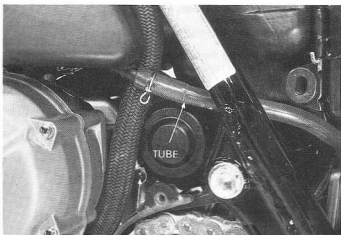


Remove the upper engine hanger bolt.
Remove the gear change pedal.



Remove the drive sprocket cover.
Disconnect the battery negative terminal at
the starter motor.
Disconnect the tube.

Tilt the engine forward on the lower rear
hanger bolt by lowering the jack.

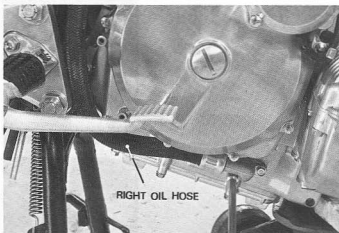
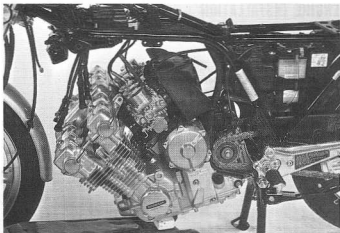




ENGINE REMOVAL

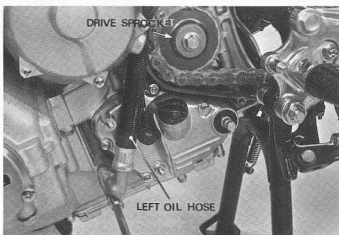
Drain oil from the engine.
Perform tilting engine procedures (page 5-2).
Disconnect the wires from the starter magnetic switch.

Remove the right oil hose cover and remove the oil hose.
Remove the brake pedal.



Remove the left oil hose cover and remove the oil hose.

Remove the drive sprocket.
Remove the rear engine mounting bolt.
Lower the jack and remove the engine.



NOTE

Jack height must be continuously adjusted during engine removal and installation to prevent damage to mounting bolt threads, wire harnesses and cables.

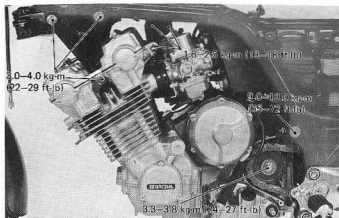
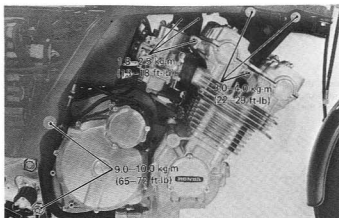


ENGINE INSTALLATION

The installation sequence is essentially the reverse of removal.

NOTE

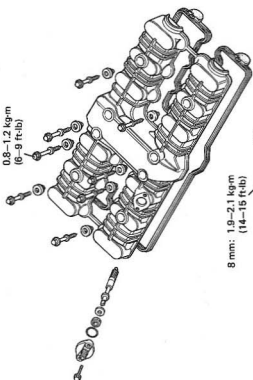
- Do not damage parts during installation.
- Route the wires and cables properly (Page 1-8).
- Fill the crankcase to the proper level (Page 2-1).
- Perform the following inspection and adjustments:
Throttle cable free play (Page 3-19).
Clutch lever free play (Page 3-6).
Drive chain tension (Page 3-15).
Choke cable free play (Page 3-9).



- 8 mm bolt 1.8– 2.5 kg-m (13–18 ft-lb)
- 10 mm bolt 3.0– 4.0 kg-m (22–29 ft-lb)
- 14 mm bolt 9.0–10.0 kg-m (65–72 ft-lb)



0.8–1.2 kg-m
(6–9 ft.-lb.)



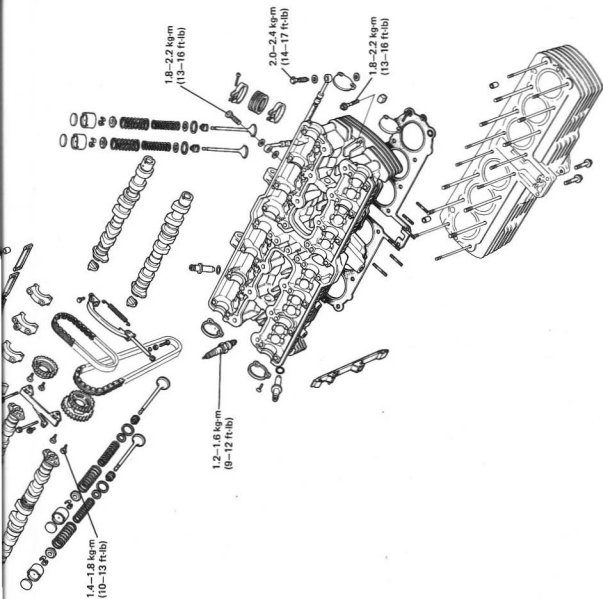
8 mm: 1.9–2.1 kg-m
(14–15 ft.-lb.)

10 mm: 3.2–3.4 kg-m
(23–25 ft.-lb.)

1.2–1.4 kg-m
(9–10 ft.-lb.)

1.4–1.8 kg-m
(10–13 ft.-lb.)

1.8–2.2 kg-m
(13–16 ft.-lb.)




HONDA
CB X

6. CYLINDER HEAD/VALVE


SERVICE INFORMATION	6-1 VALVE GUIDE REPLACEMENT	6-15
TROUBLESHOOTING	6-2 VALVE SEAT INSPECTION/REFACING	6-16
CAMSHAFT REMOVAL	6-3 CYLINDER HEAD ASSEMBLY	6-18
CYLINDER HEAD REMOVAL	6-10 CYLINDER HEAD INSTALLATION	6-19
CYLINDER HEAD DISASSEMBLY	6-11 CAMSHAFT INSTALLATION	6-21

SERVICE INFORMATION

WORKING PRACTICE

All cylinder head maintenance and inspection can be accomplished with the engine installed. Camshaft lubricating oil is fed through the oil hose. Be sure the holes in the oil hose bolt are not clogged. During assembly, apply molybdenum disulfide to the camshaft bearings to provide initial lubrication. Pour clean engine oil into the oil pockets in the cylinder head to lubricate the camshafts.

To remove the cylinder head, the engine should be tilted. The camshafts and valve lifters can be serviced without engine tilting.

Marks 1 thru 16 on the camshaft holders mean position of holders to be installed; 1 to 8 are for EXHAUST side and 9 to 16 for INTAKE side from left to right respectively. When installing, be sure the mark  faces forward.

SPECIAL TOOLS

Special Tools

Valve Guide Reamer	07984-2000000
Valve Lifter Hole Protector	07999-4220000

Common Tools

Valve Guide Remover (5.5 mm)	07742-0010100
Valve Spring Compressor	07757-0010000

TORQUE VALUES

Cylinder head cover	0.8-1.2 kg-m (6- 9 ft-lb)
Camshaft holder	1.2-1.4 kg-m (9-10 ft-lb)
Cylinder head-8mm cap nut	1.9-2.1 kg-m (14-15 ft-lb)
Cylinder head-10mm cap nut	3.2-3.4 kg-m (23-25 ft-lb)
Cylinder head-8mm flange bolt	1.8-2.2 kg-m (13-16 ft-lb)
Cam sprocket	1.4-1.8 kg-m (10-13 ft-lb)
Spark plug	1.2-1.6 kg-m (9-12 ft-lb)

SPECIFICATIONS

			STANDARD	SERVICE LIMIT
Compression ratio			12±1 kg/cm ² (171±14 psi)	—————
Camshaft	Cam height	IN.	37.300-37.460 mm (1.4685-1.4748 in)	37.2 mm (1.46 in)
		EX.	37.500-37.660 mm (1.4763-1.4827 in)	37.4 mm (1.47 in)
	Oil clearance	No. 1 and 9	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
		No. 2 and 10	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 3 and 11	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 4 and 12	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
		No. 5 and 13	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
		No. 6 and 14	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 7 and 15	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 8 and 16	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
	Run out		—————	0.03 mm (0.001 in)



			STANDARD	SERVICE LIMIT
Valve lifter	Valve lifter O.D.		27.972–27.993 mm (1.1013–1.1021 in)	27.96 mm (1.101 in)
	Cylinder head I.D.		28.000–28.021 mm (1.1024–1.1032 in)	28.03 mm (1.104 in)
	Lifter to cylinder head clearance		—	0.07 mm (0.003 in)
Valve spring	Free length	IN. Outer	43.9 mm (1.73 in)	42.5 mm (1.67 in)
		IN. Inner	40.7 mm (1.60 in)	39.8 mm (1.57 in)
		EX. Outer	43.9 mm (1.73 in)	42.5 mm (1.67 in)
		EX. Inner	40.7 mm (1.60 in)	39.8 mm (1.57 in)
	Preload/length	IN. Outer	12.6–14.6 kg/37.5 mm (27.78–32.19 lbs/1.48 in)	12.0 kg/37.5 mm (26.46 lbs/1.48 in)
		IN. Inner	6.39–7.81 kg/34.5 mm (14.087–17.218 lbs/1.36 in)	6.0 kg/34.5 mm (13.23 lbs/1.36 in)
		EX. Outer	12.6–14.6 kg/37.5 mm (27.78–32.19 lbs/1.48 in)	12.0 kg/37.5 mm (26.46 lbs/1.48 in)
		EX. Inner	6.39–7.81 kg/34.5 mm (14.087–17.218 lbs/1.36 in)	6.0 kg/34.5 mm (13.23 lbs/1.36 in)
Valve guide	Valve stem O.D.	IN	5.475–5.490 mm (0.2156–0.2161 in)	5.47 mm (0.215 in)
		EX.	5.455–5.470 mm (0.2148–0.2154 in)	5.45 mm (0.215 in)
	Valve guide I.D.	IN.	5.500–5.512 mm (0.2165–0.2170 in)	5.54 mm (0.218 in)
		EX.	5.500–5.512 mm (0.2165–0.2170 in)	5.54 mm (0.218 in)
	Stem-to-guide clearance	IN.	—	0.07 mm (0.003 in)
		EX.	—	0.09 mm (0.004 in)
	Valve seat width		0.90–1.10 mm (0.035–0.043 in)	1.5 mm (0.06 in)
Cylinder head	Warpage		—	0.10 mm (0.004 in)
Cam chain	Length		169.70–169.92 mm (6.681–6.690 in)	170.7 mm (6.72 in)

TROUBLESHOOTING

Engine top-end problems are usually performance-related and can be diagnosed by a compression test, or are engine noises which can be traced to the top-end with a sounding rod or stethoscope.

Low Compression or Uneven Compression

- Valves
 - Incorrect valve adjustment
 - Burned or bent valves
 - Incorrect valve timing
 - Broken valve spring
- Cylinder head
 - Leaking or damaged head gasket
 - Warped or cracked cylinder head
- Cylinder and piston (Refer to Section 7)

Compression too High

- Excessive carbon build-up on piston head or combustion chamber

Excessive Noise

- Incorrect valve adjustment
- Sticking valve or broken valve spring
- Damaged or worn camshaft
- Loose or worn cam chain
- Worn or damaged cam chain tensioner
- Worn cam sprocket teeth



CAMSHAFT REMOVAL

Place the motorcycle on its side stand for 2-3 minutes to allow oil to drain from the cylinder head to the sump.

Then, place the motorcycle on its center stand.

Disconnect the tachometer cable and remove the tachometer drive gear.

CAUTION

The tachometer driven gear must be removed to prevent No. 4 camshaft holder breakage when the camshafts are rotated. Camshaft holder breakage necessitates cylinder head assembly replacement.

Remove the four cylinder head side covers. Remove the cylinder head cover bolts and the cylinder head cover.

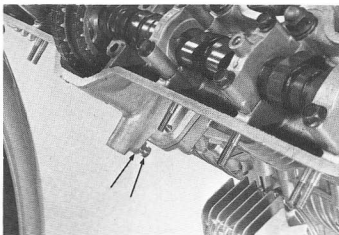
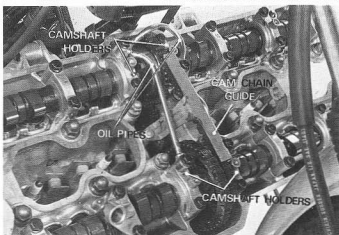
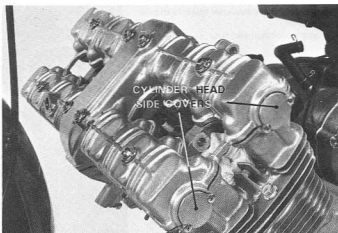
Remove the oil pool plates.

Remove the oil pipes and cam chain guide.

Remove the No. 4, No. 5, No. 12 and No. 13 camshaft holders.

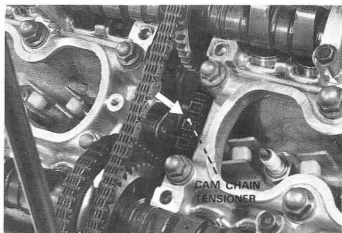
Remove the dowel pins.

Loosen the front cam chain tensioner lock nut and bolt.

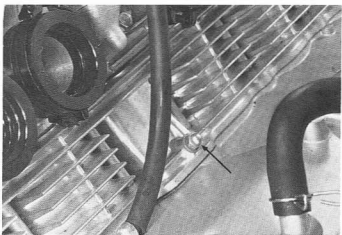




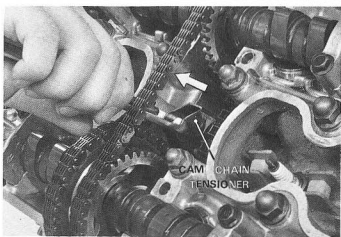
Press the cam chain tensioner down to reduce chain tension.
Tighten the lock bolt and nut.



Loosen the rear cam chain tensioner lock nut.

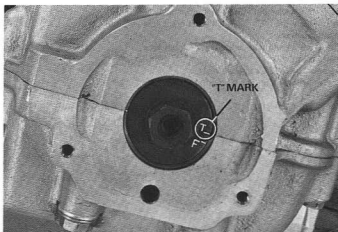


Pull the cam chain tensioner up to reduce chain tension and tighten the bolt and lock nut.

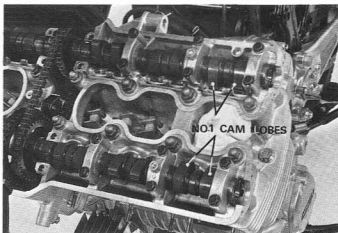




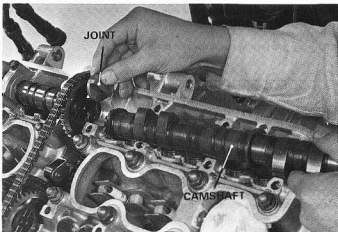
Remove the right crankshaft side cover.
Turn the crankshaft clockwise until "T"
mark on the crankshaft end aligns with the
forward crankcase mating surface.



Make sure the No. 1 cylinder intake and
exhaust cam lobes face the spark plug.
If they do not, turn the crankshaft 360
degrees clockwise and realign the "T" mark.
Remove the No. 2 and 10 camshaft holders.
Remove the No. 1, 9, 3 and 11 holders.
Remove the dowel pins.



Remove the left camshafts and joints.





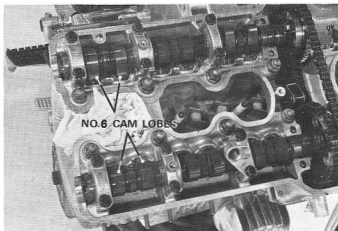
Turn the crankshaft 360 degrees clockwise and realign the "T" mark with the crankcase mating surfaces.

The No.6 intake and exhaust cam lobes face the spark plug.

Remove the No.15 camshaft holder.

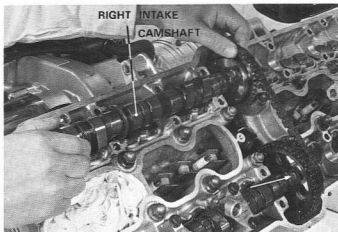
Then remove the No.16 and 14 camshaft holders.

Remove the dowel pins.



Remove the right intake camshaft.

Loosen the cam sprocket bolt.



Turn the crankshaft clockwise until cam lift is minimal and the other cam sprocket bolt can be removed.

Remove the cam sprocket with the cam chain.

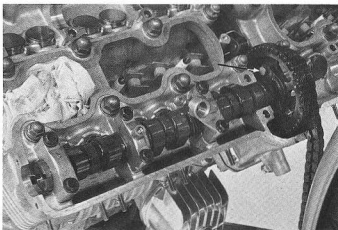
NOTE

Suspend the cam chain with a piece of wire to keep it from falling into the cylinder.

Remove the No. 7 camshaft holder, then remove the No. 8 and 6 camshaft holders. Remove the right exhaust camshaft.

NOTE

After removing the camshaft, the valve clearance adjusting shims and valve lifters can be removed.

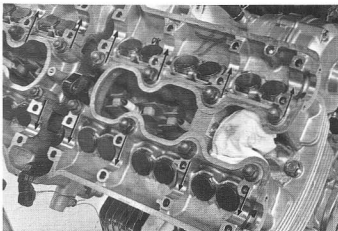




CAM BEARING SURFACE INSPECTION

Inspect the cam bearing surfaces for scoring, scratches, or evidence of insufficient lubrication.

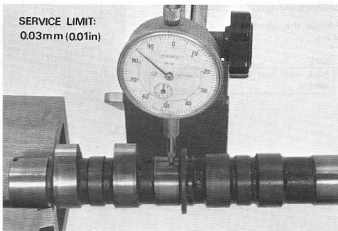
Inspect the bearing surface of the camshaft holders.



CAMSHAFT RUNOUT

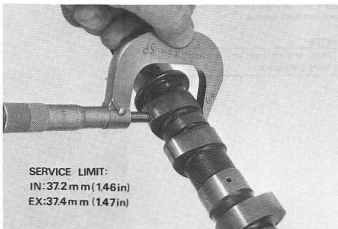
Check the camshaft runout with a dial gauge. Support both ends of the camshaft with V-blocks.

SERVICE LIMIT:
0.03mm (0.01in)



CAM LOBE INSPECTION

Measure the height of each cam lobe. Inspect the cam lobes for wear or damage.



SERVICE LIMIT:
IN: 37.2 mm (1.46in)
EX: 37.4 mm (1.47in)



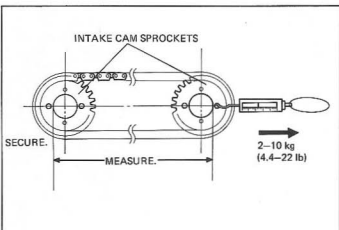
CAM CHAIN LENGTH MEASUREMENT

Place the cam chain over the intake camshaft sprockets. Secure one sprocket and apply 2–10 kg (4.4–22 lb) of tension with a spring scale. Measure the distance between the points as shown.

SERVICE LIMIT: 170.7 mm (6.72 in)

CAM CHAIN GUIDE INSPECTION

Inspect the cam chain guide for damage or local or excessive wear.

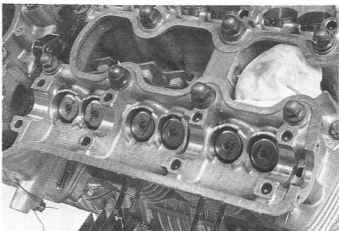


CAMSHAFT OIL CLEARANCE

Remove the adjusting shims and the valve lifters.

NOTE

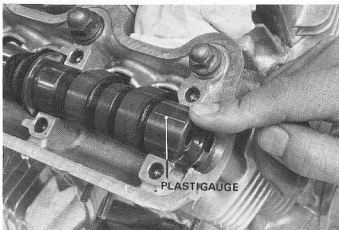
Mark each part to ensure original assembly.



Lay a strip of plastigauge lengthwise on top of each camshaft journal.

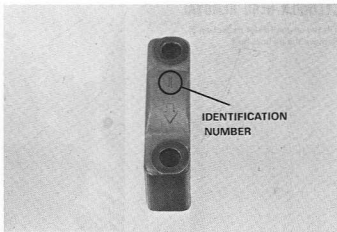
NOTE

Wipe any oil from the journals before using plastigauge.





Determine the camshaft holder identification number before installing.

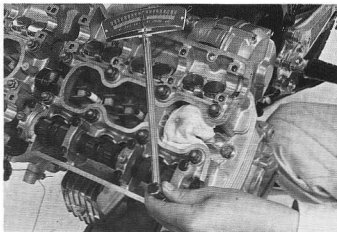


Install the camshaft holders and tighten to the specified torque in a crisscross pattern.

NOTE

Do not rotate the camshaft when using plastigauge.

TORQUE: 1.2–1.4 kg·m (9–10 ft·lb)



Remove the camshaft holders and measure the width of each Plastigauge. The widest thickness determines the oil clearance.

SERVICE LIMITS:

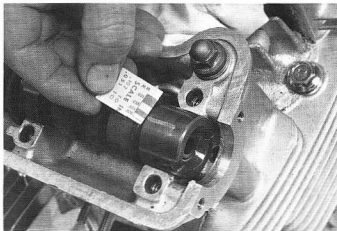
No. 1, 4, 5, 8, 9, 12, 13 and 16:

0.12 mm (0.005 in)

No. 2, 3, 6, 7, 10, 11, 14 and 15:

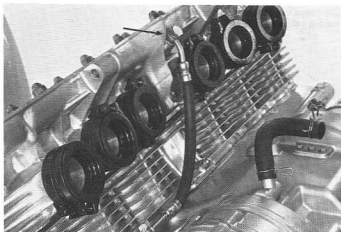
0.14 mm (0.006 in)

When the service limits are exceeded, replace the camshaft and recheck the oil clearance. Replace the cylinder head and camshaft holders if the clearance still exceeds service limits.

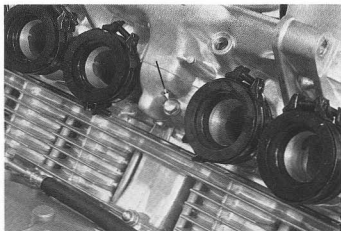


**CYLINDER HEAD REMOVAL**

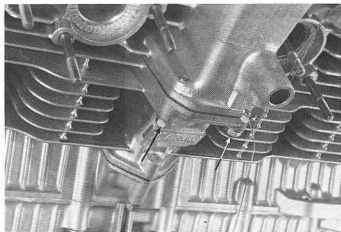
Tilt the engine (Refer to Section 5).
Remove the oil hose bolt.



Remove the rear cam chain tensioner bolt.



Remove the two cam chain housing bolts.



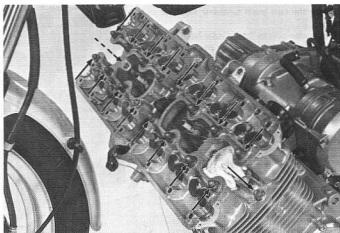


Remove the 16 cap nuts and two bolts.

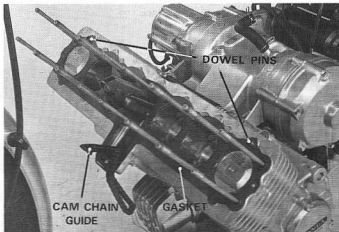
NOTE

Remove the nuts and bolts in 2-3 steps
and in a crisscross pattern to prevent
warpage.

Remove the cylinder head.



Remove the cylinder head gasket, dowel pins,
and cam chain guide.



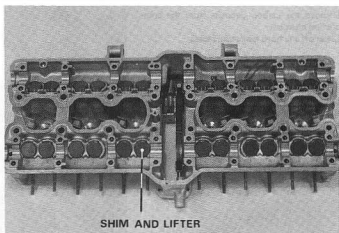
CYLINDER HEAD DISASSEMBLY

Remove the valve shims.

Remove the valve lifters.

NOTE

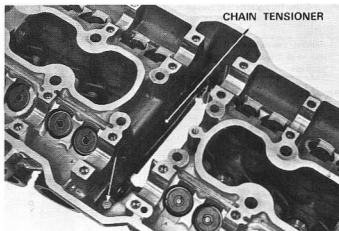
Mark all disassembled parts to ensure
original assembly.





Loosen the cam chain tensioner lock nut and bolts.

Remove the bolt in the cylinder head.
Pull the chain tensioner back and remove.



Remove the valve spring keepers, retainers, springs and valves.

CAUTION

To prevent loss of tension, do not compress the valve springs more than necessary to remove the keepers.

NOTE

Avoid damaging the lifter sliding surface.

NOTE

Mark all disassembled parts to ensure original assembly.

Remove the valve stem seals.

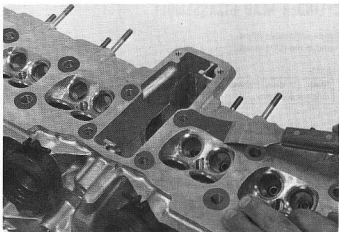


Remove the carbon deposits from the combustion chamber.

Clean off the head gasket surfaces.

NOTE

- Avoid damaging the gasket surfaces.
- Gasket will come off easier if soaked in solvent.

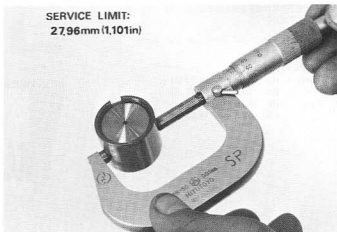




**VALVE LIFTER O.D.
MEASUREMENT**

Measure the valve lifter O. D..

SERVICE LIMIT:
27.96mm (1.101in)



**CYLINDER HEAD I.D.
MEASUREMENT**

Measure the cylinder head I. D..

SERVICE LIMIT:
28.03mm (1.104in)

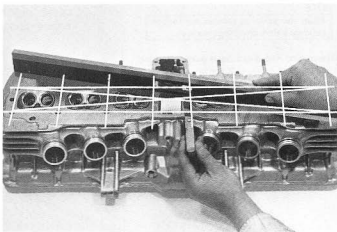


CYLINDER HEAD INSPECTION

Inspect the sliding surfaces for scoring, scratches, or evidence of insufficient lubrication.

Check the spark plug hole and valve areas for cracks.

Check the cylinder head for warpage with a straight edge and a feeler gauge.



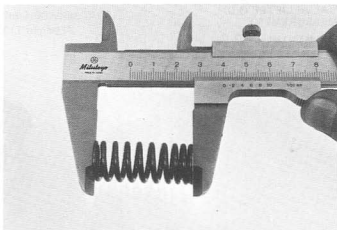


VALVE SPRING FREE LENGTH INSPECTION

Measure the length of the inner and outer valve springs.

SERVICE LIMITS:

Inner:	IN. 39.8 mm (1.57 in)
	EX. 39.8 mm (1.57 in)
Outer:	IN. 42.5 mm (1.67 in)
	EX. 42.5 mm (1.67 in)



VALVE STEM-TO-GUIDE CLEARANCE

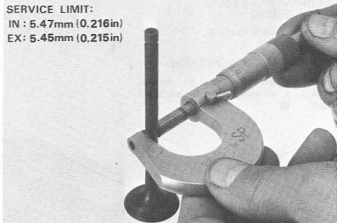
Inspect each valve for bending, burning, scratches or abnormal stem wear.

Check the valve movement in the guide.

Measure and record each valve stem O.D.

SERVICE LIMIT:

IN : 5.47mm (0.216in)
EX: 5.45mm (0.215in)



NOTE

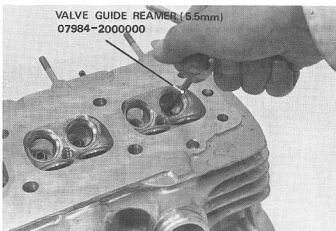
Ream the guides to remove any carbon build-up before checking clearance.

Measure and record each valve guide I.D. using a ball gauge or inside micrometer.

SERVICE LIMITS: IN. 5.54 mm (0.215 in)
EX. 5.54 mm (0.215 in)

Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem to guide clearance.

SERVICE LIMITS: IN. 0.07 mm (0.003 in)
EX. 0.09 mm (0.004 in)



VALVE GUIDE REAMER (5.5mm)
07984-200000



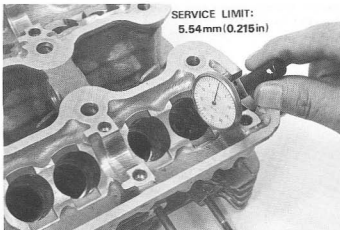
NOTE

If the stem-to-guide clearance exceeds the service limits, determine if a new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guides as necessary and ream to fit.

If stem-to-guide clearance exceeds the service limits with new guides, replace the valves and guides.

NOTE

Reface the valve seats whenever the valve guides are replaced.



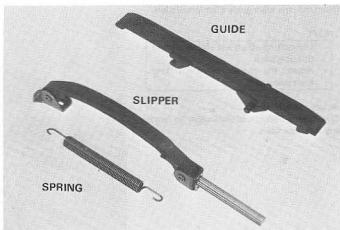
SERVICE LIMIT:
5.54 mm (0.215 in)

CAM CHAIN GUIDE AND CAM CHAIN TENSIONER INSPECTION

Inspect the cam chain guide for damage or excessive wear.

Inspect the cam chain tensioner slipper for damage or excessive wear.

Inspect the tension spring for weakness.



GUIDE

SLIPPER

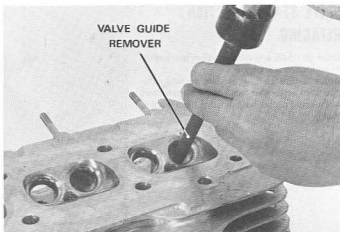
SPRING

VALVE GUIDE REPLACEMENT

Support the cylinder head and drive out the guide from the valve port.

NOTE

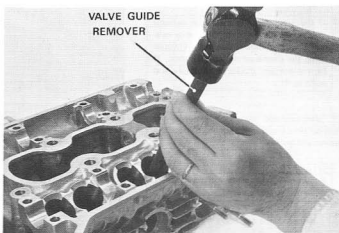
When driving out the valve guide, do not damage the head.



VALVE GUIDE
REMOVER



Install a new oversize valve guide from the top of the head.



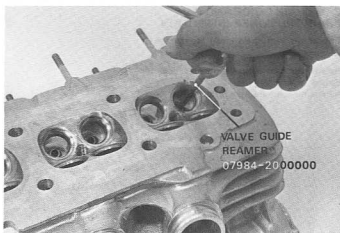
Ream the new valve guide after installation.

NOTE

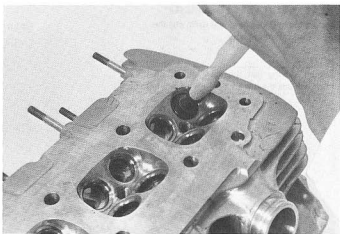
- Use cutting oil on the reamer during this operation.
- Rotate the reamer when inserting and removing it.

Reface the valve seat.

Clean the cylinder head thoroughly to remove any metal particles.

**VALVE SEAT INSPECTION/
REFACING**

Clean all intake and exhaust valves thoroughly to remove carbon deposits. Apply a light coating of valve lapping compound to each valve face. Lap each valve and seat using a rubber hose or other hand-lapping tool.





Remove the valve and inspect the face.

CAUTION

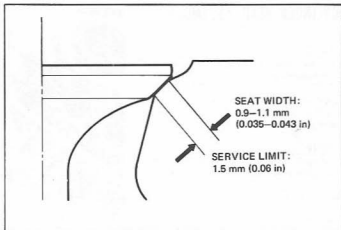
The valves cannot be ground. If the valve face is rough, worn unevenly, or contacts the seat improperly, the valve must be replaced.

Inspect the valve seat.

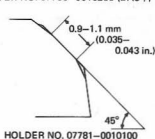
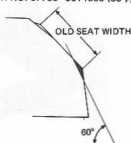
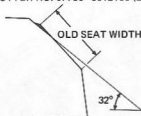
If the seat is too wide, too narrow, or has low spots, the seat must be ground.

NOTE

Follow the refacer manufacturer's operating instructions.



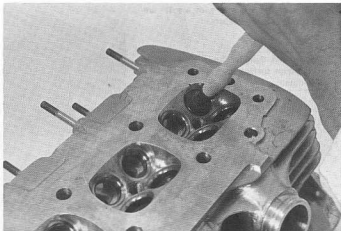
CUTTER NO. 07780-0012100 (28 ϕ) CUTTER NO. 07780-0014000 (30 ϕ) CUTTER NO. 07780-0010200 (27.5 ϕ)



HOLDER NO. 07781-0010100

After cutting the seat, apply lapping compound to valve face, and lap the valve using light pressure.

After lapping, wash any residual compound off the cylinder head and valve.





CYLINDER HEAD ASSEMBLY

NOTE

Install new valve stem seals when reassembling.

Lubricate each valve stem with molybdenum disulfide grease and insert the valve into the valve guide.

NOTE

To avoid damage to the stem seal, turn the valve slowly when inserting.

Install the valve springs and retainers.

NOTE

Install the valve springs with the tightly wound coils facing the cylinder head.

Install the valve keepers.

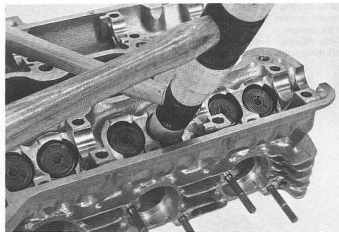
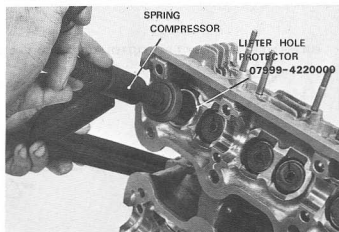
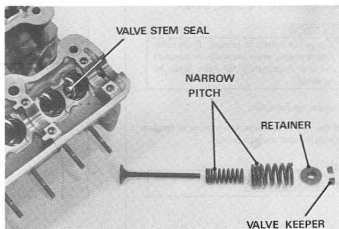
CAUTION

To prevent loss of tension, do not compress the valve spring more than necessary to install the valve keepers.

Tap the valve stems gently with a soft hammer to firmly seat the keepers.

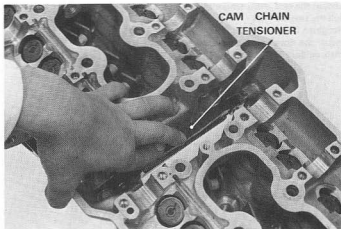
NOTE

Support the cylinder head above the work bench surface to prevent possible valve damage.





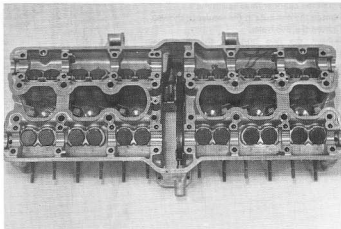
Install the cam chain tensioner.
Push the chain tensioner and tighten the lock nut.



Install the valve lifters and adjustment shims.

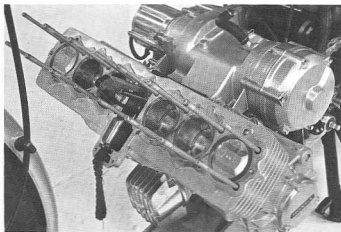
NOTE

Make sure that the valve lifters and shims are in their original position.



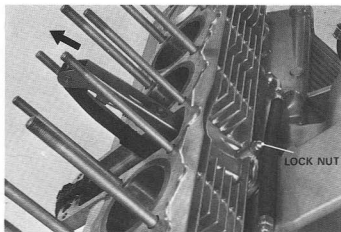
CYLINDER HEAD INSTALLATION

Clean the cylinder head gasket surfaces of any gasket material.





Loosen the cam chain tensioner lock nut and pull the tensioner up.
Retighten the lock nut.
Install the dowel pins, a new gasket and cam chain guide.



Install the cylinder head assembly.
Tighten the cap nuts in the sequence shown.
Tighten the two bolts.
Tighten the two bolts at the cam chain housing.

NOTE

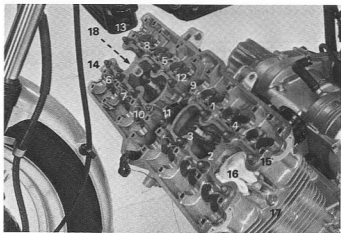
Apply molybdenum disulfide grease to the thread of the cylinder bolts and washers.

TORQUE:

10 mm cap nut: 3.2–3.4 kg-m (23–25 ft-lb)

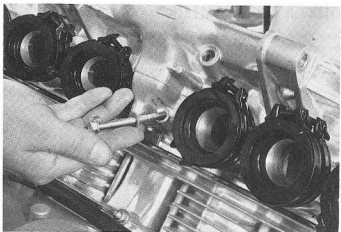
8 mm cap nut: 1.9–2.1 kg-m (14–15 ft-lb)

8 mm bolt: 1.8–2.2 kg-m (13–16 ft-lb)



Tighten the cam chain tensioner bolt.

TORQUE: 1.0–1.4 kg-m (7-10 ft-lb)



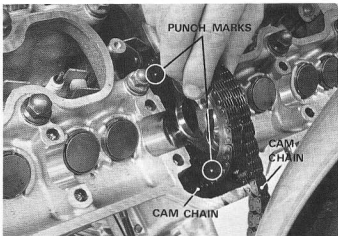
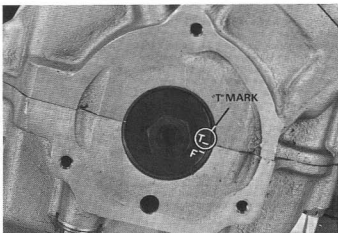
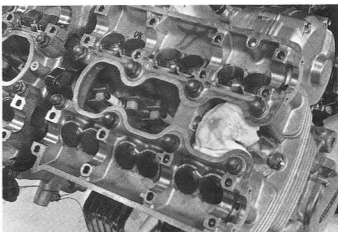


CAMSHAFT INSTALLATION

Lubricate the camshaft bearings with molybdenum disulfide grease.

Turn the crankshaft clockwise until the "T" mark is toward the front of the engine and is aligned with the crankcase mating surfaces as shown.

Place the cam chains over the exhaust camshaft sprocket, aligning the sprocket punch marks with the cylinder head surface. Install the right exhaust camshaft, positioning the cam lobes for the No. 6 cylinder toward the spark plug. Install a camshaft sprocket bolt, but do not tighten yet.





Loosely install the No. 6 and No. 8 camshaft holders. Install the No. 7 holder, positioning the camshaft so its flange fits into the slot in the No. 7 holder.

NOTE

Install camshaft holders with directional arrows pointing toward the front of the engine.

Tighten the camshaft holder bolts in a criss-cross pattern.

TORQUE: 1.2–1.4 kg-m (9–10 ft-lb)

Turn the crankshaft clockwise 360° to obtain access for installing the other camshaft sprocket bolt. Install the sprocket bolt and tighten to the specified torque.

TORQUE: 1.4–1.8 kg-m (10–13 ft-lb)

Turn the crankshaft another 360° and tighten the sprocket bolt which was installed earlier. Adjust the cam chain (page 3-14).

Position the crankshaft so the "T" mark is again aligned with the crankshaft mating surfaces as shown on page 6-21. Recheck the position of the exhaust camshaft sprocket; the punch marks must align with the cylinder head surface. Place the cam chain over the intake camshaft sprocket, aligning the sprocket punch marks with the cylinder head surface.

Install the right intake camshaft, positioning the cam lobes for the No. 6 cylinder toward the spark plugs. Install a camshaft sprocket bolt, but do not tighten yet.

NOTE

If the sprocket was not removed from the camshaft during disassembly, then reinstall as an assembled set.

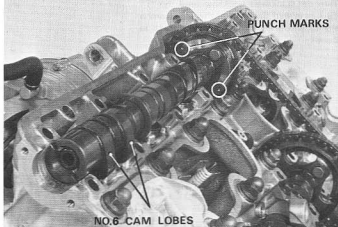
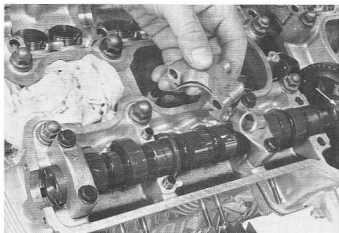
Loosely install the No. 14 and No. 16 camshaft holders. Install the No. 15 holder, positioning the camshaft so its flange fits into the slot in the No. 15 holder.

Tighten the camshaft holder bolts, then tighten the camshaft sprocket bolt, following the same procedure described for exhaust camshaft installation.

Turn the crankshaft clockwise 360° until the "T" mark is aligned with the crankcase mating surface. Make sure the cam lobes for the No. 6 cylinder are toward outside.

Install and tighten the camshaft sprocket bolt. Adjust the cam chain tensioner (page 3-14). Recheck the crankshaft and camshaft sprocket alignment.

Insert the camshaft joints into the camshaft ends.

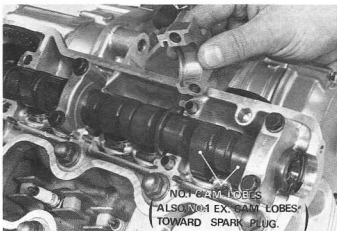




Connect the left camshafts to the joints with No. 1 cam lobes toward the spark plug. Install No. 1, No. 3 and No. 9 and 11 holders loosely.

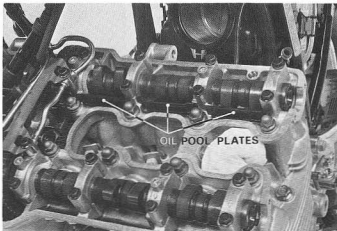
Install the No. 2 and No. 10 holders.

Tighten the bolts to the specified torque in a crisscross pattern.



Install the oil pipes and cam chain guide with the No. 4, 5, 12 and 13 holders.

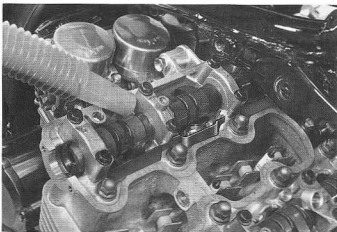
Tighten in a crisscross pattern to the specified torque.



Install the engine.

Fill the oil pockets in the head with oil so that the cam lobes are submerged.

Adjust valve tappet clearance (Section 3).



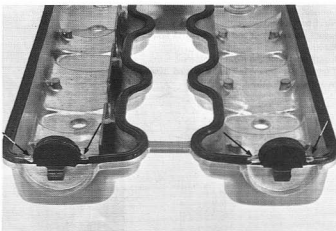


Inspect the cylinder head cover gasket for damage or deterioration.

Apply a sealant on the cylinder gasket as shown, adjacent to each side cover.

NOTE

Before applying sealant, clean the gasket.

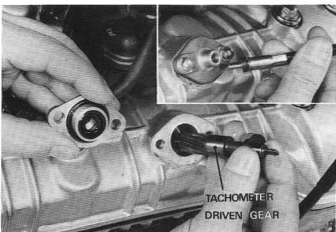


Install the cylinder head cover and cylinder head side covers.

Insert the tachometer drive gear.

Install the tachometer gear cover.

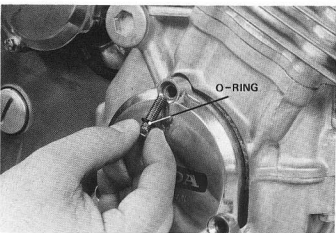
Connect the tachometer cable.



Install the right crankshaft side cover and gasket with bead printed surface toward the crankcase.

Install a new O-ring on the upper screw only.

Adjust the cam chain (page 3-14).





HONDA
CB X

MEMO