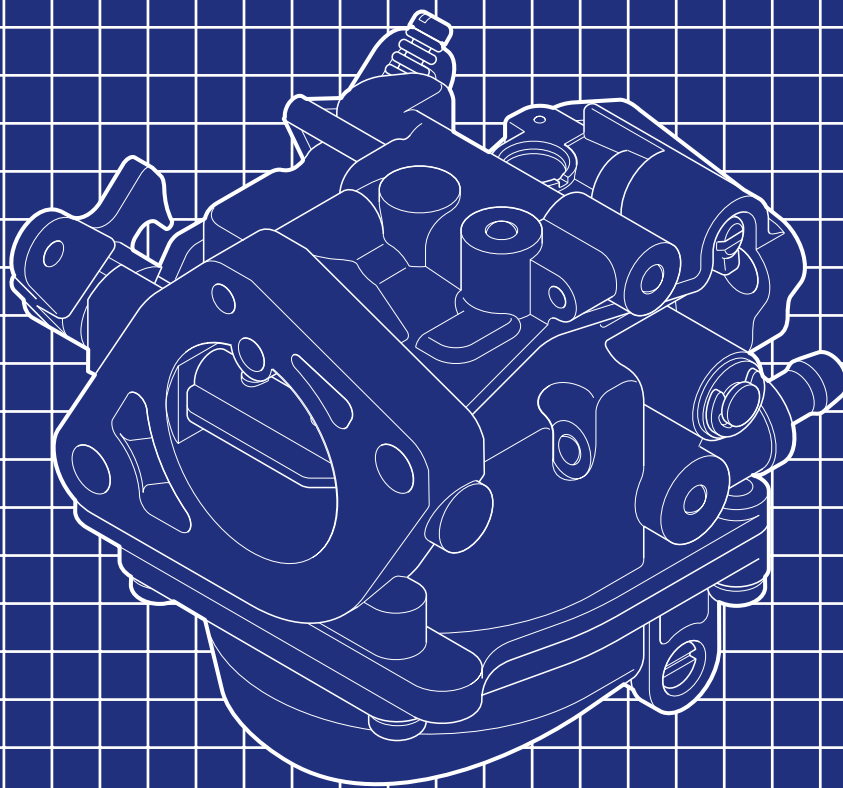


CARBURETION MANUAL



A FEW WORDS ABOUT SAFETY

SERVICE INFORMATION

The service and repair information contained in this manual is intended for use by qualified, professional technicians. Attempting service or repairs without the proper training, tools, and equipment could cause injury to you and others. It could also damage the product or create an unsafe condition.

This manual describes the proper methods and procedures for performing service, maintenance, and repairs. Some procedures require the use of special tools. Any person who intends to use a replacement part, service procedure, or a tool that is not recommended by Honda, must determine the risks to their personal safety and the safe operation of the product.

If you need to replace a part, use genuine Honda parts with the correct part number, or an equivalent part. We strongly recommend that you do not use replacement parts of inferior quality.

For Your Customer's Safety

Proper service and maintenance are essential to the customer's safety and the reliability of the product. Any error or oversight while servicing a product can result in faulty operation, damage to the product, or injury to others.

For Your Safety

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e. g., Hot parts – wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practices, we recommend that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service and repair procedures. Only you can decide whether or not you should perform a given task.

WARNING

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.

WARNING

Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

Important Safety Precautions

- Make sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:
 - ☐ Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.
 - ☐ Protect your eyes by using proper safety glasses, goggles, or face shields any time you hammer, drill, grind, or work around pressurized air or liquids, and springs or other stored-energy components. If there is any doubt, put on eye protection.
 - ☐ Use other protective wear when necessary, for example, gloves or safety shoes. Handling hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards:
 - ☐ Carbon monoxide poisoning from engine exhaust. Be sure there is adequate ventilation whenever you run the engine.
 - ☐ Burns from hot parts. Let the engine and exhaust system cool before working in those areas.
 - ☐ Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers, and clothing are out of the way.
- Gasoline vapors are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline.
 - ☐ Use only a nonflammable solvent, not gasoline, to clean parts.
 - ☐ Never drain or store gasoline in an open container.
 - ☐ Keep all cigarettes, sparks, and flames away from all fuel-related parts.

PREFACE

This manual provides a wide range of information about Honda Marine carburetor systems.

All Honda Marine engines produced since 1998 comply with EPA regulations and all Honda Marine engines produced in 2001 meet CARB regulations. You will find a full explanation of these regulations in the *Honda Marine Emission Regulation Guide*.

All information contained in this manual is based on the latest product information available at the time of printing. We reserve the right to make changes at any time without notice.


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As you read this manual, you will find information that is preceded by a **NOTICE** symbol. The purpose of this message is to help prevent damage to the product, other property, or the environment.

SAFETY MESSAGES

Your safety, and the safety of others, are very important. To help you make informed decisions, we have provided safety messages and other safety information throughout this manual. Of course, it is not practical or possible to warn you about all the hazards associated with servicing these carburetor systems. You must use your own good judgement.

You will find important safety information in a variety of forms, including:

- **Safety Labels**—on the product.
- **Safety Messages**—preceded by a safety alert symbol  and one of three signal words: DANGER, WARNING, or CAUTION.

These signal words mean:

DANGER

You WILL be KILLED or SERIOUSLY HURT if you don't follow instructions.

WARNING

You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.

CAUTION

You CAN be HURT if you don't follow instructions.

- **Instructions**—how to service carburetor systems correctly and safely.

**American Honda Motor Co., Inc.
Marine Technical Support Group**

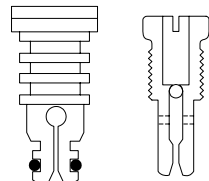


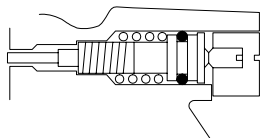

CONTENTS

INTRODUCTION	1
SERVICE RULES	2
FUNCTION	3
SPECIAL/COMMERCIALLY AVAILABLE TOOLS	4
FUEL DELIVERY	5
TROUBLESHOOTING/DISASSEMBLY/CLEANING	6
ASSEMBLY/ADJUSTMENT	7
STORAGE	8
TESTING DYNAMIC/STATIC	9
HIGH ELEVATION OPERATION	10
EMISSION REGULATIONS	11
INDEX	12

ABBREVIATIONS

API	American Petroleum Institute
Approx.	Approximately
Assy.	Assembly
ATDC	After Top Dead Center
BAT	Battery
BDC	Bottom Dead Center
BTDC	Before Top Dead Center
Comp.	Complete
CYL	Cylinder
EX	Exhaust
F	Front or Forward
GND	Ground
H/C	Honda Code
ID	Identification
IG or IGN	Ignition
IN	Intake
L.	Left
OHC	Over Head Cam
OHV	Over Head Valve
OM	Owner's Manual
OP	Optional Part
PCV	Positive Crankcase Ventilation
P/N	Part Number
Qty	Quantity
R.	Right
SV	Side Valve
SM	Shop Manual
STD	Standard
SW	Switch
TDC	Top Dead Center
WOT	Wide Open Throttle
VOM	Volt-Ohm Meter

TERMINOLGY

Term used in this manual	Term used in other Honda publications	Part Illustration
Slow Jet	Pilot Jet	
Slow Jet Tube (BF9.9 and BF15)	Jet Set Pilot Jet Slow Jet Jet Nozzle	
Slow Jet Emulsion Tube (BF20 ~ BF90)		
Idle Mixture Screw	Pilot Screw	
Main Emulsion Tube	Main Nozzle	

NECESSARY PARTS

- Intake manifold and carburetor mounting flange gaskets are normal stock items.
- Carburetor packing sets:
Honda does not offer "carburetor kits" as a replacement part. They are seldom needed. You can buy the carburetor O-rings in a kit referred to as a Packing Set. If the wrong cleaner comes in contact with these O-rings, they will swell and you will need new ones. These are normal stock items.
- Float valves (also known as needle-and-seat):
You can't replace Honda "float seats" but the float valves are available separately, as are all the removable components in Honda carburetors. These are normal stock items.
- Slow jet tubes and slow jet emulsion tubes:
If these really get varnished and are too difficult to clean, they should be replaced. It is a good idea to stock an assortment to fit the various BF9.9 ~ BF90 models. This can save time and avoid frustration.
- Idle mixture screw sets for emission-controlled models:
When the mixture screws are removed per SM procedures, you will need new idle mixture screw assemblies.
- Collars 6.5 x 11 x 7.5 mm (P/N 17202-ZV5-300):
These are found in the air silencer covers and carburetor mounting/silencer plates. These are often missing after the carburetors have been serviced, since they easily fall out and become lost.
- Bulk fuel hose:
Bulk hose is shown in section 3 of the *Honda Marine DPPL*. Replacement "formed fuel" hose, such as the hose from the BF50A fuel filter to the fuel pump, is also included in the *DPPL*.

Hoses can be damaged during removal or become hard and difficult to work with.
- Water separator/filters:
Three different sizes are listed in the *Honda Marine Accessory Catalog*.
- Yellow fingernail polish or yellow model paint:
This is used for re-marking the carburetor synchronization adjustment screws.

After finishing the repair job, the engine should look like new and should not look like it has been "worked on" before. Having the correct replacement parts on hand assures you of neat, clean, proper back-to-factory-specification service work.

CARBURETOR SPECIFICATIONS

Always compare to SM for new model information, pertinent revisions, and most current information.

MODEL	hp	SLOW JET	PRIMARY JET	MAIN JET	FLOAT LEVEL	MIXTURE SCREW		IDLE SPEED
						Non-Emission	Emission	
BF20 BF2A	2	#35	*	#70 #60	10.5 - 13.5 mm (0.413 - 0.531")	BF20S: 2 turns (engine serial number 1000001 - 1007046) 1-3/4 turns (engine serial number 1007047 to subsequent) BF20L, BF2A: 2-1/8 turns	*	Standard flywheel: 1,400 ± 100 rpm Trolling flywheel: Standard Idle, 1,300 ± 100 rpm Trolling Idle, 950 ± 50 rpm
BF2D	2	#35	*	#65	12 mm (0.47")	*	2 turns	2,000 ± 100 rpm
BF50 BF5A	5	#35 #40	*	#75	9.0 - 11.0 mm (0.35 - 0.43")	2-3/8 turns	1-3/4 turns	In forward: 1,300 ± 100 rpm In neutral: 1,550 ± 50 rpm
BF75 BF100	7.5 10	#35	*	#88	9.85-10.15 mm (0.388 - 0.40")	Highest rpm	*	In neutral: 1,200 ± 100 rpm
BF8A	8	#35 #42 **	*	#88	9.85-10.15 mm (0.388 - 0.40")	Highest rpm	2-1/2 turns	In neutral: 1,200 ± 100 rpm
BF9.9A BF15A	9.9 15	#48 #52	*	#102 #108	13 - 15 mm (0.51 - 0.59")	2-3/4 turns 1-5/8 turns	3 turns 1-5/8 turns	In neutral: 1,100 ± 50 rpm
BF25A BF30A	25 30	#35 #38†	*	#100 #110	14 mm (0.6") 13 mm (0.5")	2 turns 3 turns	2-3/4 turns 3 turns	In neutral: 900 ± 50 rpm
BF35A BF45A	35 45	#38 #42	*	#102 #125	14 mm (0.6")	2-1/8 turns 2-1/8 turns	* *	In neutral: 950 ± 50 rpm
BF40A BF40A1†† BF50A	40 50	#38 #42	*	#92 #130	14 mm (0.6") 13 mm (0.5")	* * *	2-1/4 turns 1-5/8 turns 1 turn	In neutral: 950 ± 50 rpm
BF75A BF90A	75 90	#42 #40	#38 #100 † #52 #80 †	#128 #132	11.5 mm (0.45")	1-7/8 turns 2-1/4 turns	1-7/8 turns 2-1/4 turns	In neutral: 950 ± 50 rpm

* Not applicable

** With removable jet

† Emission engine

†† Engine serial number BAYE-2007400 to subsequent

Specifications are subject to change without notice.

ASSEMBLY

Check the jet size numbers to ensure the proper size jets are installed, especially if the carburetors had been worked on before and/or the engine had an abnormally rich or lean running condition.

Assembly drawings are shown on the following pages along with some additional assembly notes.

1. Install the jets and on the BF9.9 through BF90 carburetors, lube the slow jet emulsion tube O-ring with silicone spray and insert the slow jet emulsion tube into the main emulsion tube, then install the two tubes at the same time. This makes slow jet emulsion tube alignment much easier.
2. Check the float valve tip. Replace the float valve if it is worn or damaged. Install the float valve onto the float tab, then install the float and float valve assembly into the carburetor. After installing the float and float valve assembly, always check the float level adjustment (P. 7-11).
3. Install the float chamber and tighten the screws in a crisscross pattern.
4. Install the idle mixture screw and set per specifications (P. 7-3).

On emission engines, wait to install the tamper resistant caps or plugs until after the engine has been run and the idle mixture screw adjustment sensitivity has been checked (P. 7-12 step 3).

5. On 3 and 4 cylinder models, scrape the gasket from the intake manifold then assemble the carburetors on the intake manifold using new gaskets.

Make sure the gasket is properly located on the air silencer alignment pins and tighten the carburetor mounting bolts in 2 to 3 steps, back and forth.

Make sure the accelerator device has been inspected (P. 6-47). Grease the throttle and choke linkage and snap them into place.

Scrape the intake manifold gasket off the cylinder head using a carefully sharpened and deburred gasket scraper. The gasket surface must not be scratched or gouged and must retain a machined surface.

NOTICE

Do not use a drill with abrasive pads or a die grinder on the intake manifold or cylinder head surfaces. Metal will be removed and the gasket may leak.

Now is a good time to check for salt, sand, and mineral deposit buildup in the coolant passages. It will show up in the small water jackets in the cylinder head next to the intake ports. Also, check for sacrificial anode deterioration on applicable models.

Install the intake manifold gasket dry without any gasket sealer, then torque the mounting bolts and nuts in 2 to 3 steps from inside to the outside.

Check all hoses and linkage.

6. Before connecting a fuel hose to a fuel pump or carburetor, use the priming bulb and purge a little fuel through the hose into an approved container. This will remove any loose particles from inside the hose before the hoses are connected to their respective fittings. This will also prevent loose particles from getting under the float valve, causing a carburetor to overflow or plug a jet.

If the hoses are sprayed with silicone spray, they will generally slide right onto their fittings. If the fuel condition is questionable, replace the fuel and fuel filters. Don't use worm type hose clamps because they will damage the hose. Use only the original hose clips.

7. Check for full throttle opening whenever the outboard is being serviced and especially anytime the carburetors or rigging have been serviced.

A number of complaints about low power can be traced to throttles not fully opened when the control lever is in the full open throttle position.

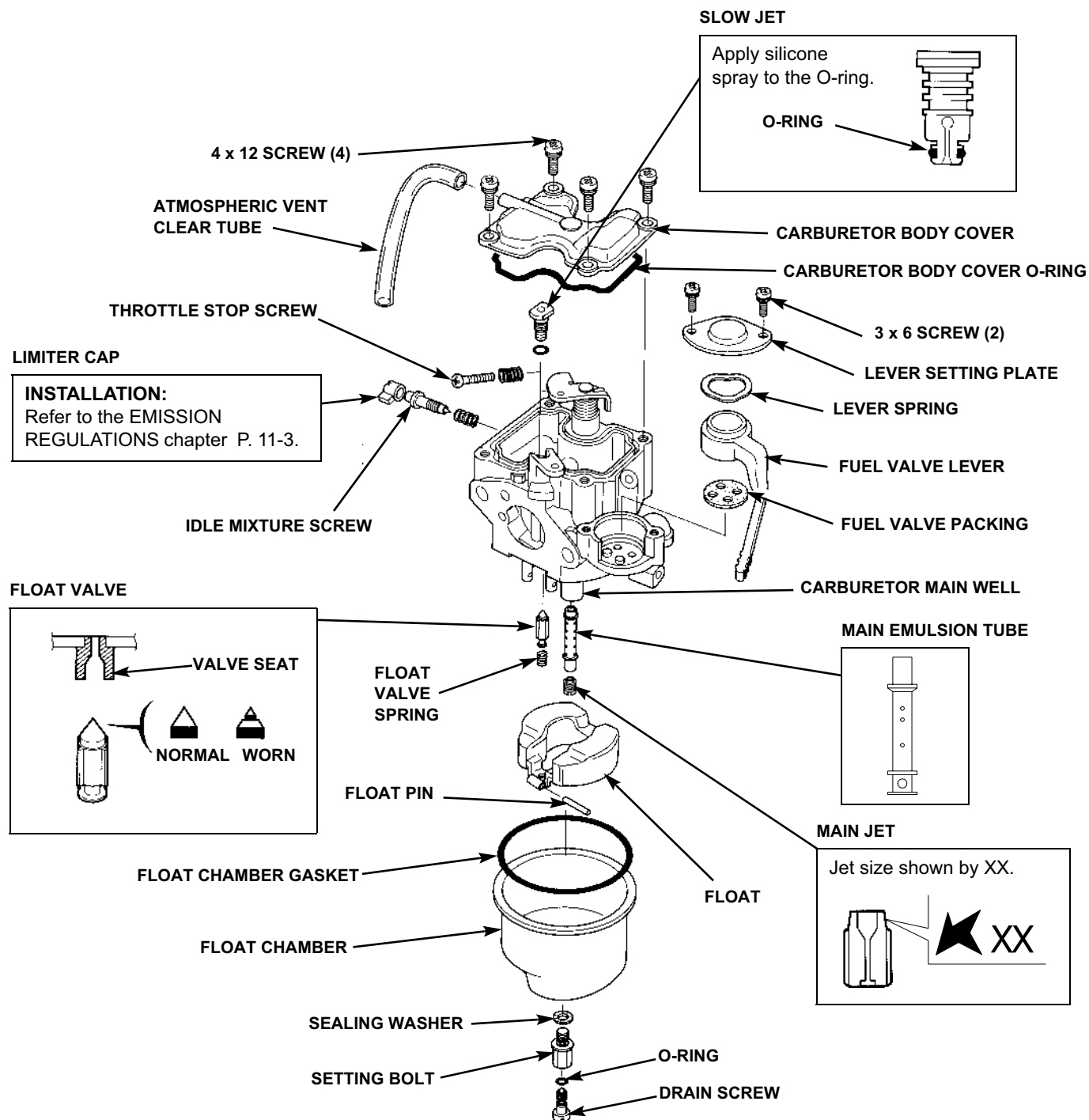
8. Start the engine and warm it up to normal operating temperature.

On today's emission controlled engines, it is critical the engine run at the correct temperature. Make sure the engine is running at the correct temperature, especially if a rich running condition was recorded prior to carburetor disassembly. Remember, proper fuel vaporization is dependent on engine temperature. Refer to the thermostat dynamic test procedure (P. 9-3).

9. Check the idle speed adjustment and on 3 and 4 cylinder models synchronize the carburetors (P. 7-12).

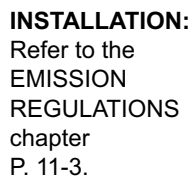
BF2 • BF20 • BF2D (BF CARBURETOR)

Always use a No. 2 Phillips® screwdriver that does not have worn flutes, and a cabinet screwdriver that fits tightly into the main jet slot.



Always use a No. 2 Phillips® screwdriver that does not have worn flutes, and a flat-tip screwdriver that fits tightly into the main jet slot.

Early model BF75 • BF100 carburetors used a slow jet access screw similar to the BF5 • BF50 shown below.

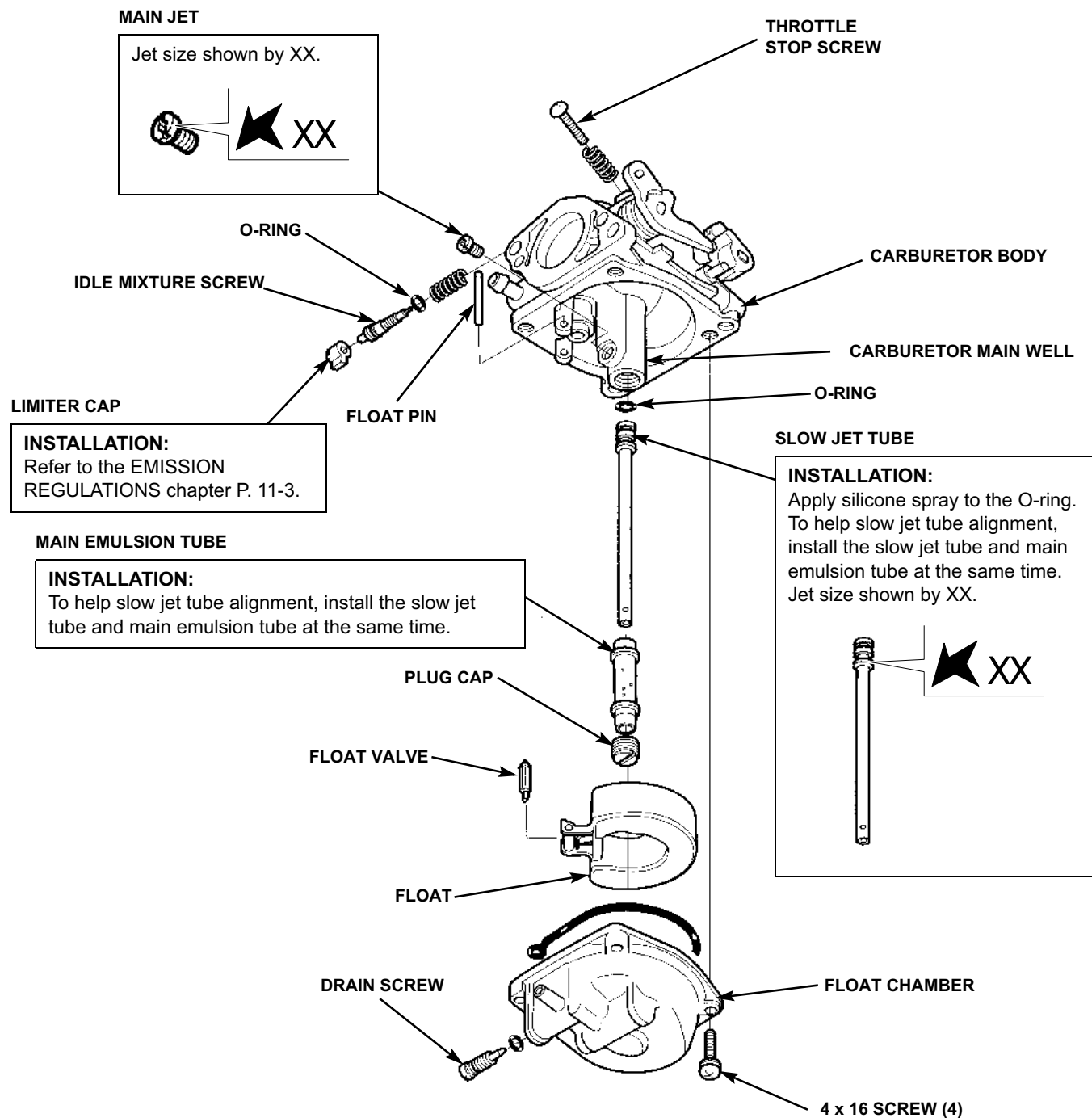


BF5 • BF50 CARBURETOR

Late model BF5 carburetors used a removable slow jet and a mixture screw plug similar to the BF75 • BF8 • BF100 shown above.

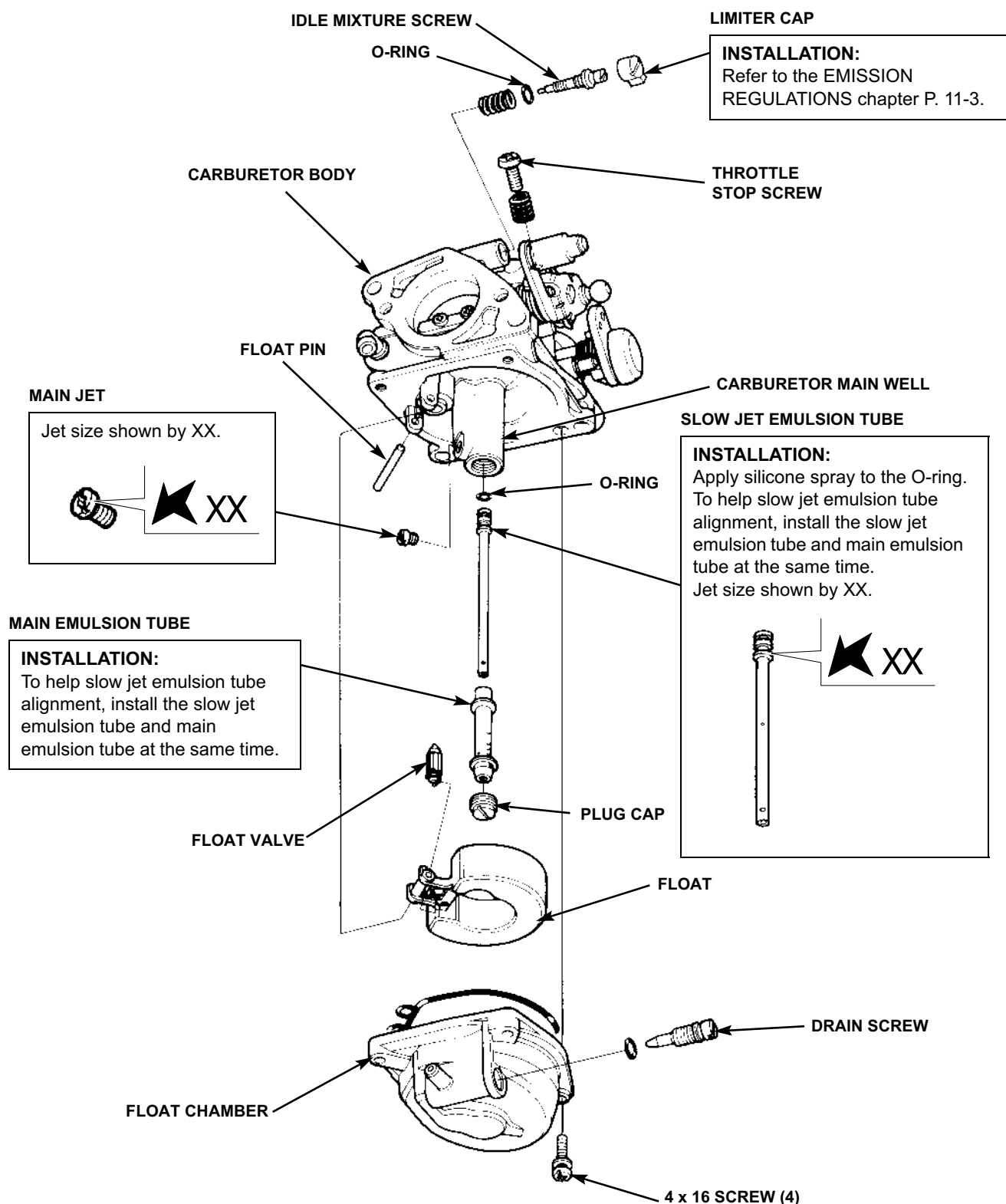
BF9.9 • BF15 (BG CARBURETOR)

Always use a No. 2 Phillips® screwdriver that does not have worn flutes, and a flat-tip screwdriver that fits tightly into the main jet and plug cap slots.



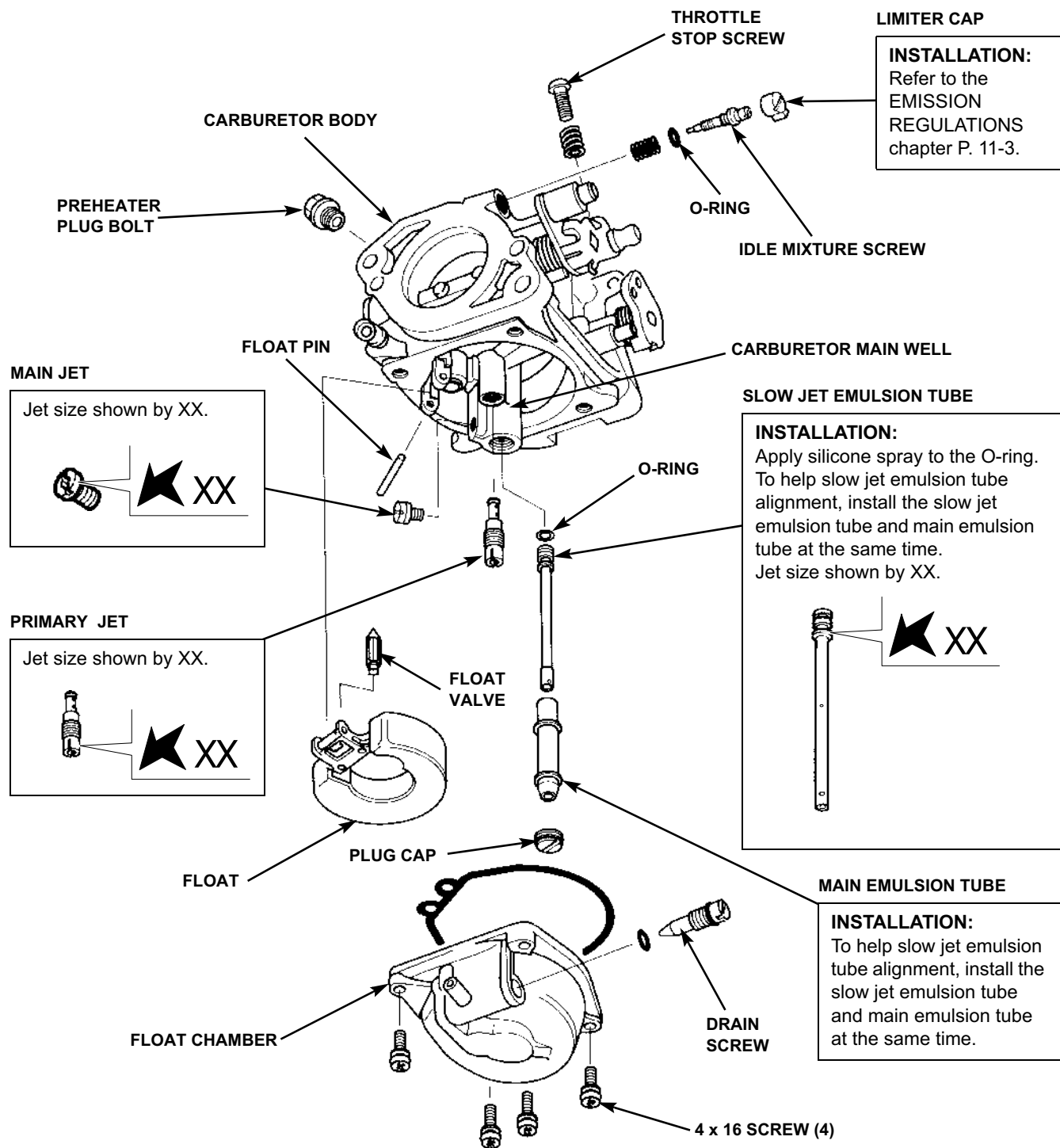
BF20 • BF25 • BF30 • BF35 • BF40 • BF45 • BF50 (BG CARBURETOR)

Always use a No. 2 Phillips® screwdriver that does not have worn flutes, and a flat-tip screwdriver that fits tightly into the main jet and plug cap slots.



BF75 • BF90 (BG CARBURETOR)

Always use a No. 2 Phillips® screwdriver that does not have worn flutes, and a flat-tip screwdriver that fits tightly into the main jet, primary jet, and plug cap slots.



ADJUSTMENTS

Float Level

On the BF and BC type carburetors which use spring loaded float valves, do not depress the spring when checking the float adjustment (P. 3-4).

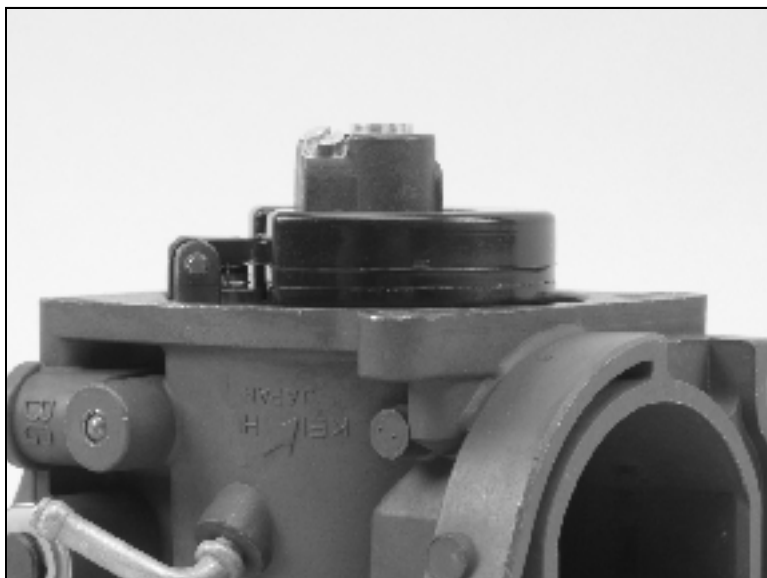
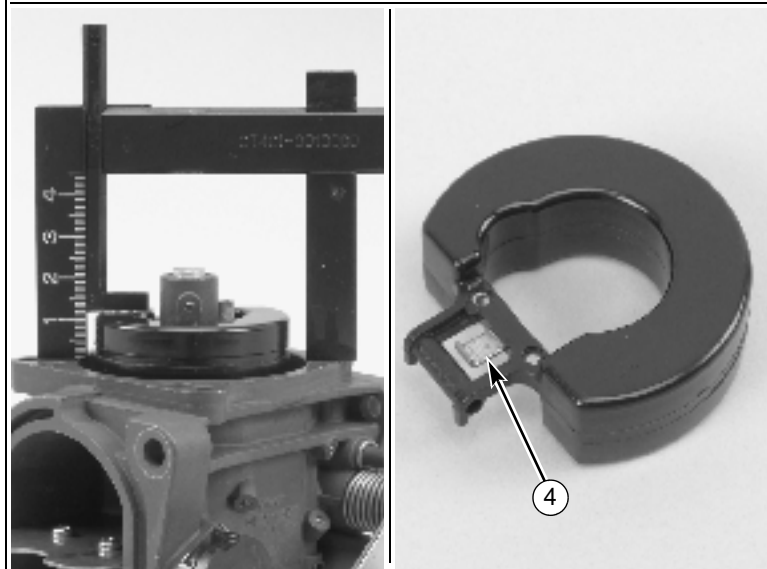
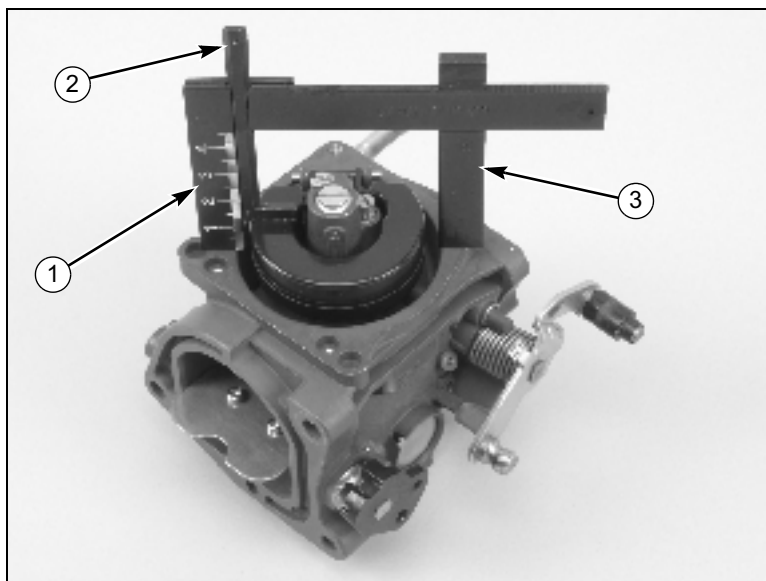
1. Position the carburetor on the workbench as shown. Raise the float, and slowly lower it until the float valve just contacts the seat.
2. Adjust the float gauge to the desired specification shown on the graduated scale (1) by sliding the float level indicator (2) up or down as needed.
3. Adjust the legs by sliding the support arm (3) until the legs clear the float and rest on the float chamber mating surface. The gauge should go over the main jet at 90° to the carburetor body, and be parallel to the float pin.
4. Slowly lower the gauge to the float chamber mating surface as you look at the gap between the gauge and the float. The gap should disappear just as the legs contact both sides of the float chamber mating surface.
5. If the level is outside the specification, gently bend the brass float tab (4) to adjust the float level. All carburetors have adjustable brass float tabs except the BF2.

As a general rule, the float should be parallel to the float chamber mating surface when viewed from the side as shown. Always measure the float level and set to specifications.

Because all three float valves have a synthetic rubber tip, they generally do not require replacement.

Possible reasons for float valve replacement:

- Varnish contamination on the tip
- Varnish contamination along the side ribs
- A sticky spring on BF or BC carburetor
- Damage to rubber float tip



Carburetor Synchronization

Calibrate the gauges before use (P. 4-3).

With the engine at normal operating temperature, connect a digital tachometer capable of measuring in increments of 50 rpm or less.

1. Set the idle mixture screws to the initial setting.
2. Set the idle speed to specifications. The three cylinders like the high side of the rpm range, while the four cylinders prefer around 900 rpm.
3. Turn the mixture screw in (leaner) until the engine rpm begins to drop, then turn it out. The engine will recover some speed, then the rpm will drop again. Count the number of turns between the lean rpm drop and the rich rpm drop and set the screws right in the middle.

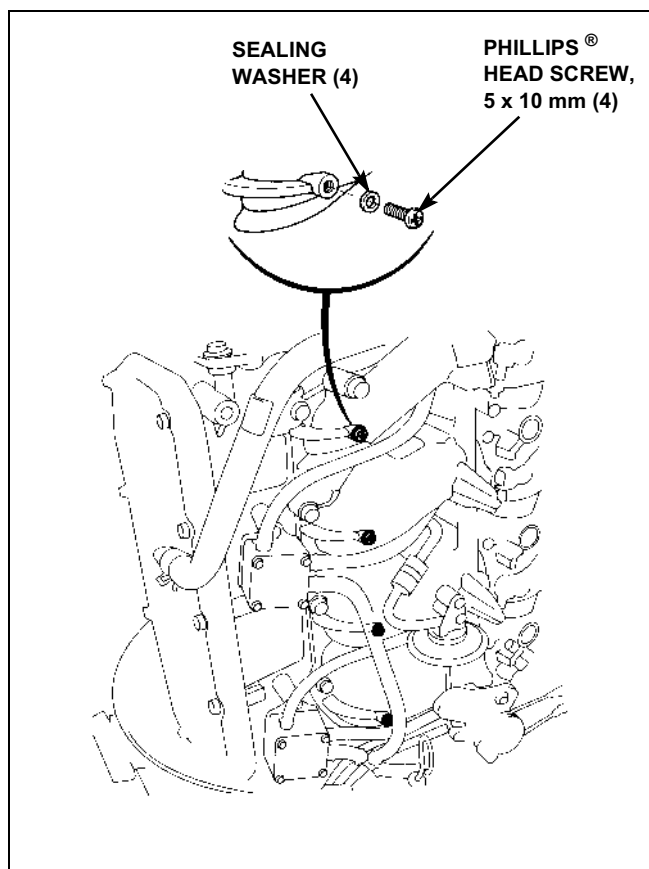
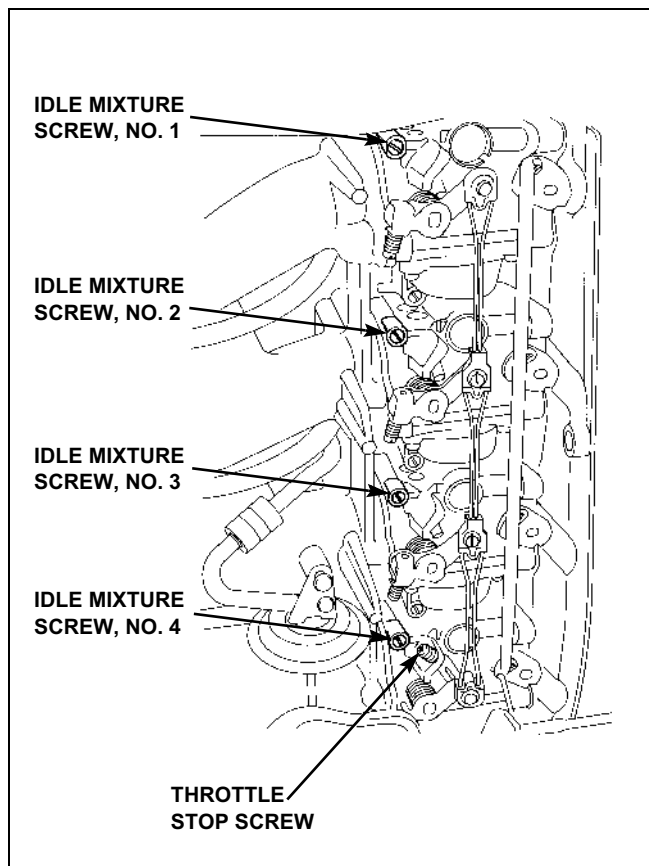
Each cylinder should respond to the idle mixture screw adjustment.

4. Adjust the idle speed to the original setting.
5. On non-emission engines, adjust the mixture screw in until the rpm just starts to drop, then back it out just enough to regain any speed that was lost.

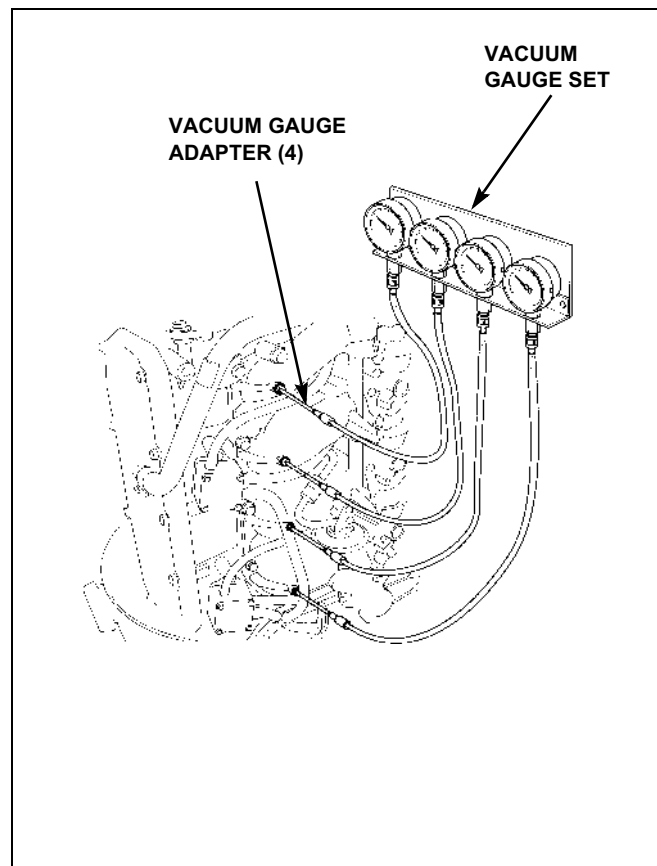
On emission controlled engines, turn the mixture screws out the required number of turns (P. 7-3).

If additional information is necessary, refer to the corresponding SM as necessary.

6. Remove the Phillips® head screws and sealing washers. Attach the vacuum adapters to the intake manifolds and connect the vacuum gauges.



7. The bottom carburetor is the base carburetor. Make all the other carburetors match its readings. Adjust the carburetor closest to the base carburetor first, then work your way up. Every time you touch the linkage with your screwdriver, your readings will fluctuate, so make adjustments in 1/8 turn increments. After each adjustment, snap the throttle several times and take a reading after the idle stabilizes.
8. Continue this routine until all of the gauge readings are even. The SM specifies the vacuum difference between all cylinders should be .75 inHg or less, but you should be able to get the carburetor synchronization to within .5 inHg or less.



9. Reset the idle speed after each carburetor is synchronized. Carburetor synchronization must be done with the engine at the same idle rpm.
10. Recheck the mixture by repeating steps 3 through 5. Emission controlled engines see below.

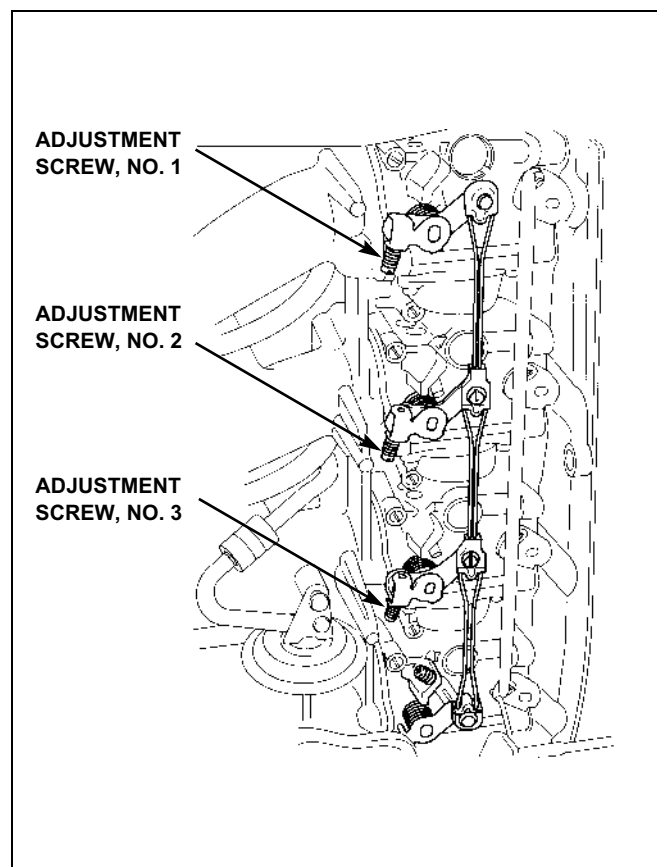
On emission controlled engines:

Turn the screws in until they are lightly seated, then turn the mixture screws out the required number of turns. Refer to P. 7-3 and the corresponding shop manual as necessary.

Apply Loctite® 638 to the inside of the new limiter cap, then install the cap so its stop prevents the idle mixture screw from being turned counterclockwise.

Be careful to avoid turning the idle mixture screw while installing the limiter cap. The idle mixture screw must stay at its required setting.

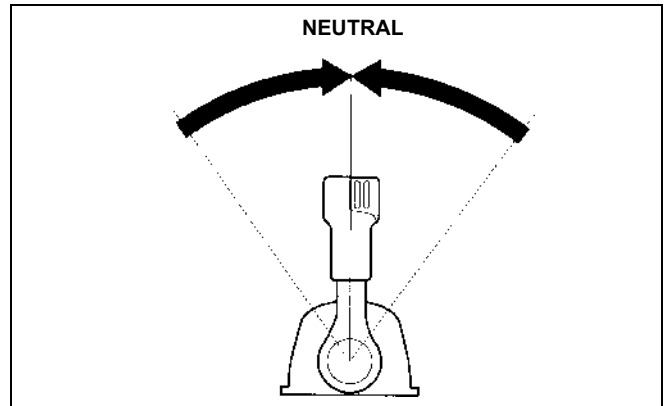
11. After carburetor synchronization and anytime the idle speed is adjusted, you must check the acceleration device adjustment which is shown on the following page.



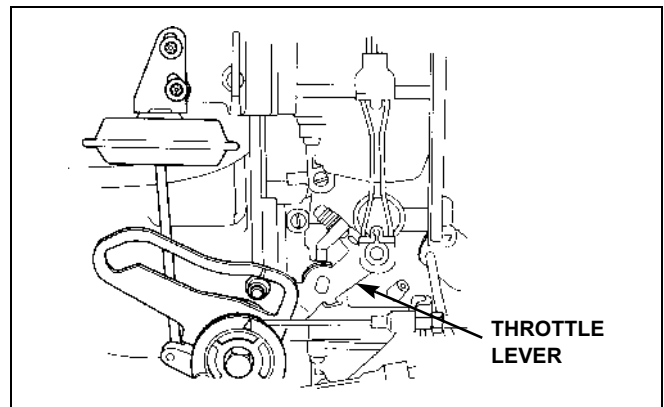
Accel/Decel Diaphragm

Adjust the diaphragm after setting the idle speed.

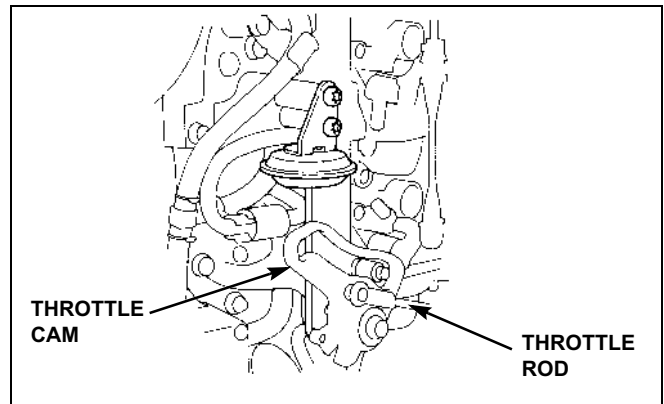
1. On BF75 • BF90—put the remote control or gearshift lever in the "N" (neutral) position.



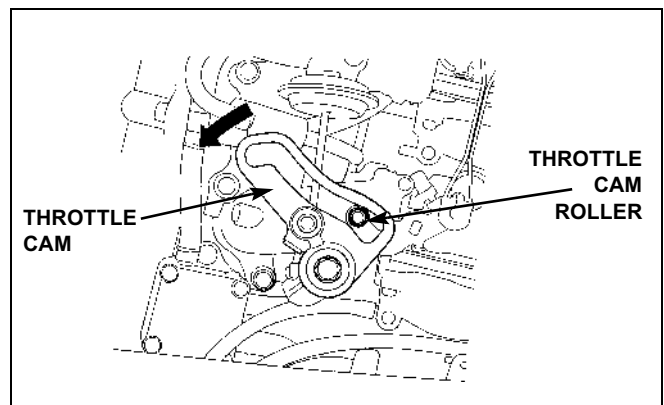
Make sure the throttle lever is fully closed.



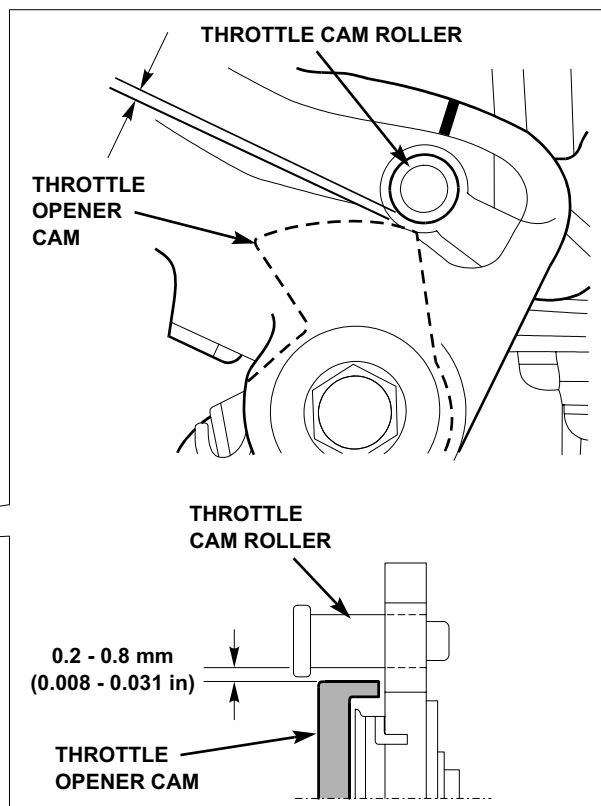
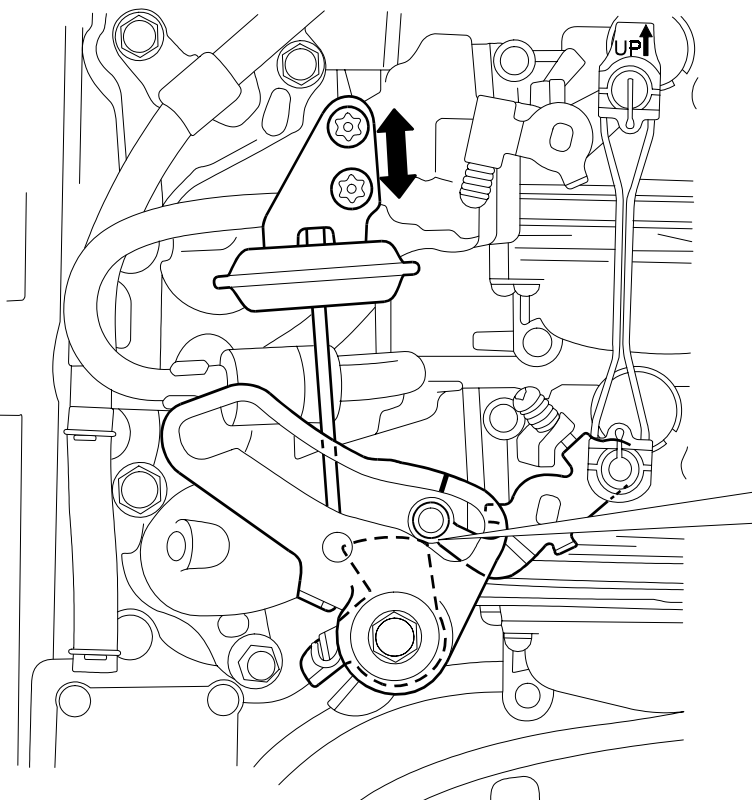
On BF20, 25, 30, 35, 40, 45, 50—remove the throttle rod from the throttle cam.



Rotate the throttle cam so it does not contact the throttle cam roller.



2. Use a feeler gauge and measure the clearance between the throttle opener cam and the throttle cam roller.



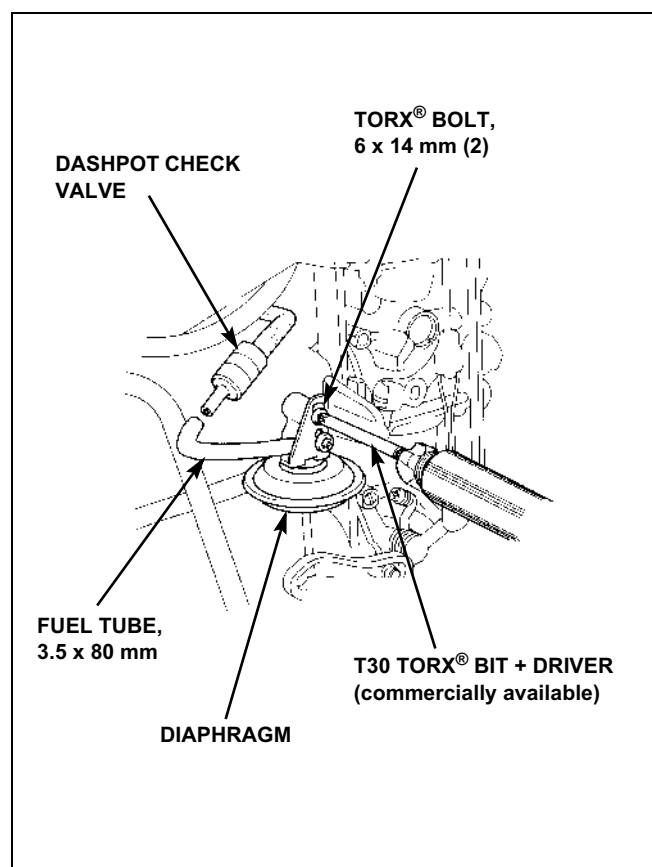
3. If adjustment is necessary:
 - a. Disconnect the 3.5 x 80 mm fuel tube from the dashpot check valve.
 - b. Use a commercially available T30 Torx[®] bit and driver and loosen the two 6 x 14 mm Torx[®] bolts.
 - c. Use a feeler gauge and adjust the clearance between the throttle opener cam and throttle cam roller by moving the diaphragm up or down as needed.

CLEARANCE:

0.2 - 0.8 mm (0.008 - 0.031 in)

- d. After adjustment tighten the 6 x 14 mm Torx[®] bolts to the specified torque using a commercially available T30 Torx[®] bit driver.

TORQUE: 9 N•m (6.5 ft-lb)



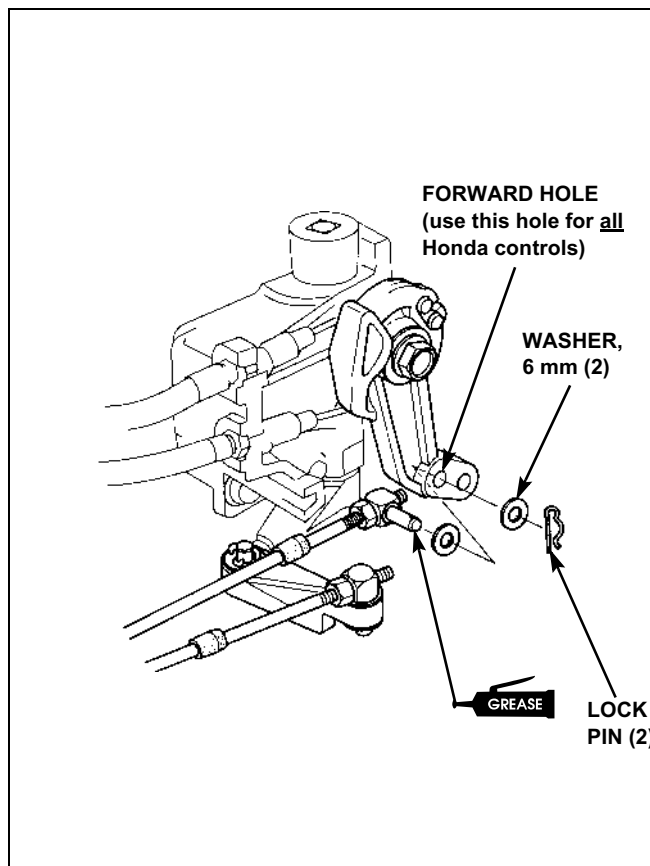
Control Linkage

Honda outboards use a variety of ways to transfer motion from the operator's hand to the carburetor's throttle: bell cranks, rods, single-cable, dual-cables; all are used on one model or another.

When the throttle control is returned to the idle position, the carburetor must be on the throttle stop screw. Take off the hood and look at the carburetor linkage.

Another linkage issue to be aware of is the way remote-control cables connect to the engine.

Typically, Honda uses a pivot pin that is secured by a lock pin. Sometimes—because they are hard to hold in place—the washers are missing, and that is a sure way to introduce play into the system and even cause the lock pin to dislodge and disconnect the control cable. Be sure there is a washer on either side of the lever. You can hold the washers in place with heavy grease until you insert the lock pin.



Check for full throttle opening whenever the outboard is being serviced and especially anytime the carburetors or rigging have been serviced.

A number of complaints about low power can be traced to throttles not fully opened when the control lever is in the full open throttle position.

When the control is fully open, the carburetor must be on the throttle arm stop. Usually you can feel this in the control with a slight "cushion" at the end of the control movement—but to be sure, take off the hood and look at the carburetor linkage.

