

2-72 MAINTENANCE & TUNE-UP

3. Locate the middle of the neutral position by first moving the lever forward to the limit of free-play and mark this position with a line on the neutral detent cam. Then move the shift lever backward to the other limit of free-play and mark this position with a line as well. Find the physical middle point between the two lines and place a mark at this position.

4. Move the shift lever to the middle mark and tighten the two detent screws to 60-84 inch lbs. (7-9 Nm).

25-70 HP (913cc) 3-Cylinder, 2-Stroke Models

Some of the timing and synchronization procedures for these units require operating the motor at idle rpm under load and at wide-open throttle.

Therefore, the outboard must be placed in a test tank or a body of water with the boat well secured to the dock or in a slip (except for the idle timing setting which must be conducted on an unrestrained boat). Never attempt to make the load adjustments or run the engine at wide open throttle with a flush attachment connected to the lower unit. The powerhead operating at high rpm with such a device, would likely cause a runaway condition from a lack of load on the propeller, causing extensive damage.

The necessity to conduct the idle timing procedure on an unrestrained boat so early in the timing and synchronizing sequence on RS, TTL, WR models and 25SIK makes it impractical to truly tune these motors without having them mounted on a boat. If at all possible, avoid the use of a test tank for these adjustments. Remove the powerhead cowling to gain access to adjustment locations.

■ If a test tank must be used for most of the settings, all settings from the idle timing on should be checked and adjusted again once the motor is finally mounted on a boat.

The following procedures provide detailed instructions to set the timing pointer (if disturbed). Then, adjust the throttle cable (on RS, TTL, WR models and 25SIK), throttle plate synchronization, cam follower pickup, the throttle cam, wide open throttle positioning, idle timing (performed before the throttle cam and wide open throttle adjustments on RS, TTL, WR models and 25SIK) and maximum spark advance. The RS, TTL, WR models and 25SIK also have a neutral detent adjustment. The carburetor low speed mixture adjustment (which is not a periodic adjustment) is also provided here in case this adjustment is necessary due to carburetor replacement, overhaul or otherwise un-resolvable idle problems after certain of the other adjustments are completed. Procedures should be performed exactly as directed and in the order given (or noted) to ensure proper adjustments.

The idle timing portion of the synchronization procedures for these units require that the engine be operated at idle rpm mounted on the boat, under load and unrestrained. For this reason, the adjustments should take place on a low-traffic body of water and only with an assistant to navigate while you make the adjustments.

ADJUSTMENTS



■ For remote control models, remove the throttle cable from the control arm and the anchor pocket prior to beginning these procedures.

Setting the Timing Pointer



◆ See Figures 193, 194 and 195

A timing pointer is mounted to the top of the engine, under the flywheel cover. If the timing pointer or intake manifold has been disturbed use this procedure to check and set the pointer positioning (thereby ensuring the accuracy of the idle timing and maximum spark advance procedures to follow).

■ Most models are equipped with two timing mark grids, be certain to use the correct grid for the motor on which you are working. Remote control models and TTL models all use the **second** grid (flywheel rotates in a clockwise direction). The 65RS models use the grid marked "rope."

1. Remove the 3 spark plugs from the cylinder head using the procedures found under Spark Plugs in this section.

2. Loosen the screw fastening the timing pointer, then center the pointer and retighten the screw to hold it in position.

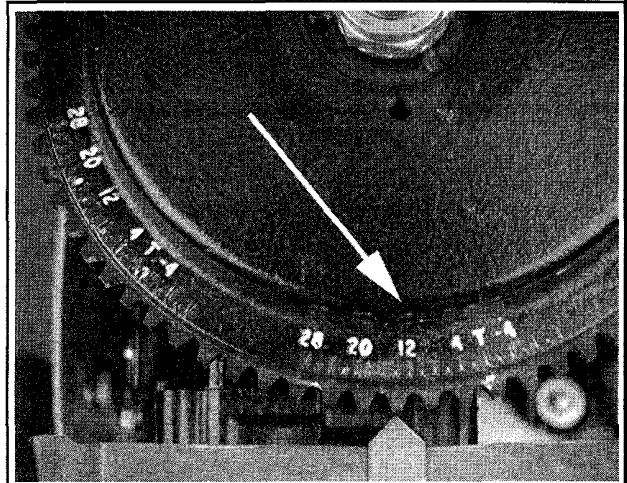


Fig. 195 Most 913cc 3-cylinder motors use the second timing grid

3. Slowly rotate the flywheel clockwise until the cast Top Dead Center (TDC) mark is about 1 1/2 in. (40mm) past the timing pointer.

* * * WARNING

Under NO circumstances should you rotate the flywheel counterclockwise. If you do there is a good chance that the water pump impeller vanes will become damaged or will when the motor is started next time. IF for some reason the flywheel is ever rotated counterclockwise, slowly and carefully rotate it back clockwise, by hand, for a couple of turns. This **SHOULD** reset the impeller vanes protecting them from the possibility of further damage during the next engine start-up.

4. Install the OMC Piston Stop Tool (#384887) or a dial gauge, into the spark plug bore for the top (No.1) cylinder. Adjust the tool using the slider to a point where it makes contact with the piston, then lock the tool in place using the lock ring (or zero the gauge).

5. Hold the piston firmly against the piston stop tool and make a mark on the flywheel inline with the timing pointer. Label this mark "1" to distinguish it from the next mark.

6. Rotate the flywheel in a clockwise direction until the piston contacts the tool again, then make a second mark (label it "2") on the flywheel inline with the timing pointer, then remove the piston stop tool.

7. Using a flexible scale, measure along the flywheel to locate the exact midway point between the first and second marks and place a mark at this location labeled "3". This mark represents TDC to the timing pointer's current setting. If this mark and the cast TDC mark on the flywheel align, then the pointer position is correct.

■ The piston stop tool is basically just an adjustable rod with a locknut, mounted through spark plug threads. A substitute could be fabricated with a little creativity (using the casing of a spark plug or even a plug thread chaser). The key to the tool is that it can be locked in place (using the locknut) at some early point in the piston's downstroke. The first mark you make on the flywheel translates into this random point. Then, the piston is brought the rest of the way down in its travel and back up again (by rotating the flywheel) until it reaches the very same height in the bore (and contacts the tool again, but this time on the way up). A second mark, represents the exact same physical point in the bore, on the exact opposite side of Top Dead Center (TDC) or the very top of the piston travel. By locating the exact point midway between these two marks, you've found the spot on the flywheel that corresponds perfectly to Top Dead Center with regards to the pointer's current position.

8. If adjustment is necessary (the "3" mark and the cast TDC do not align), rotate the flywheel clockwise to align this TDC mark with the timing pointer. Then, holding the flywheel in this position, loosen the timing pointer screw again. Slide the pointer away from the center mark and align it with the cast TDC mark on the flywheel itself. Tighten the timing pointer retaining screw securely as it is now set for accurate readings on the flywheel again.

9. Install the spark plugs.

Throttle Cable Adjustment (RS, TTL, WR Models and 25SIK only)

1. Turn the idle speed adjustment knob on the tiller handle counterclockwise to the full slow position.
2. Check to verify that the throttle cable bracket is secured to the powerhead using the forward mounting hole.
3. Loosen the idle speed and wide open throttle screws (threaded upward against the throttle cam, the idle speed screw is the top of the two screws mounted side-by-side). Back the screws out until they are flush with the anchor block.
4. Turn the twist grip to the full open and then full closed positions. Check the clearance between the throttle cam roller and the end of the throttle cam slot in each position. The roller should have about a 1/16 in. (6mm) gap between itself and the respective end in each position.
5. If adjustment is necessary, loosen the locknut, then rotate the thumbwheel until the correct gaps are achieved. Tighten the locknut after adjustment.

Throttle Plate Synchronization

◆ See Figures 196 and 197

1. Loosen the cam follower screw, then push the follower away from the throttle cam. The follower cannot touch the cam during this procedure or the adjustment will be incorrect.
2. Loosen the upper and lower carburetor tab linkage screws, then verify that all throttle plates are closed.

If necessary, remove the air intake for a view down the throttle bore of each carburetor.

3. With all throttle plates closed, apply a light upward pressure to the upper and lower carb linkage tabs while tightening each tab's screw.

For proper results, tighten the lower carburetor's tab screw first, then the upper carburetor's tab screw.

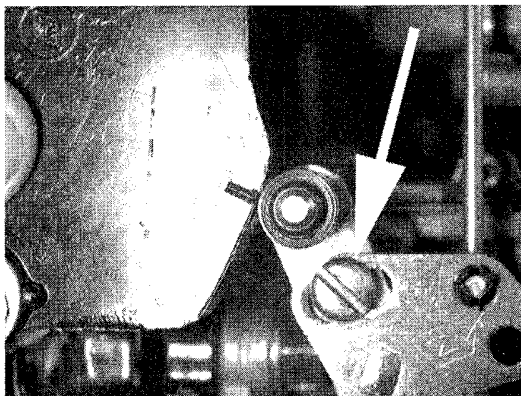


Fig. 196 The cam follower screw is used to adjust the follower in relation to the throttle cam

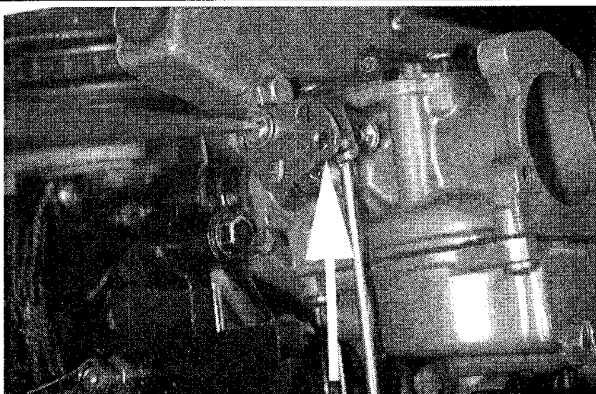


Fig. 197 Apply light pressure upward (arrow) to each carb linkage tab while tightening its screw

Cam Follower Pickup

+ See Figures 196, 198 and 199

1. Carefully snap the throttle link coupler free of the ball on the throttle cam.
2. While holding the cam follower against the throttle cam, move the throttle cam until the embossed mark aligns with the center of the cam follower. Tighten the cam follower screw to hold it in this position.

□ Some 1990 models may be equipped with a throttle cam which has 2 alignment marks. IF SO, use the shorter embossed mark which is normally located lower on the cam than the longer mark. Align the shorter mark with the center of the cam follower.

3. Connect an amplifier tool (as described under Homemade Synchronization Tool in this section) to the linkage tab on the top carburetor.

4. Verify the adjustment by advancing the throttle cam and watching the amplifier tool for movement. The throttle cam mark should align with the roller just as the end of the amplifier tool begins to move.

The throttle cam on some 1990 and 1991 models (like models equipped with a dual marked throttle cam or the 65RS) contain a throttle cam whose link rod is adjusted through a jam nut and thumbwheel. On those models OMC recommended that you also check the pickup timing (Idle Timing) using a timing light at this point in the procedure and adjust it now, as necessary (instead of later during the Idle Timing procedure later in this section). To adjust the Idle or Pickup timing on these models, loosen the jam nut on the spark lever cam-to-throttle cam link rod and use the thumb wheel to change the length of the link. Rotate the TOP of the thumb wheel toward the crankcase to INCREASE pickup timing and away from the crankcase to DECREASE pickup timing. Tighten the jam nut after any adjustment.

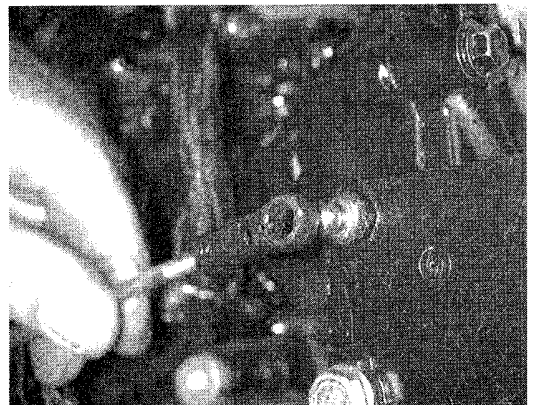


Fig. 198 View of the throttle link coupler and throttle cam ball

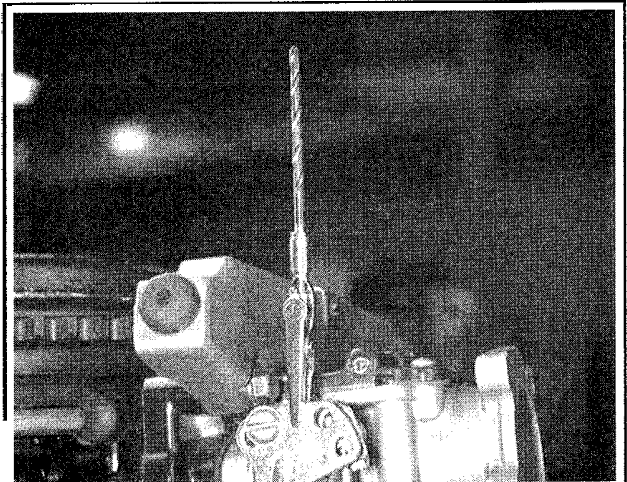


Fig. 199 Attach a homemade amplifier tool to the top carb linkage tab

2-74 MAINTENANCE & TUNE-UP

Throttle Cam

◆ See Figure 198

The manufacturer recommends performing the Idle Timing procedure BEFORE the Throttle Cam and Wide Open Throttle Stop adjustments on all RS, TTL, WR and 25SIK motors. It is unclear whether that has something to do with the necessity of reconnecting the throttle cable on remote models that forces the Throttle Cam procedure to come first or if there is another benefit to performing the procedures in that order. Suffice it to say that you will not go wrong on the RS, TTL, WR and 25SIK if you skip ahead to the Idle Timing procedure and come back to Throttle Cam and Wide Open Throttle Stop afterwards.

□ This procedure does not apply to models equipped with a dual marked throttle cam or the 65RS through 1991.

1. For remote control models, reconnect the throttle cable as follows:
 - a. Verify that the fast idle lever is down in the run position.
 - b. Have an assistant slowly rotate the propshaft by hand while you shift the remote handle from neutral to forward and then 1/2 the distance back to neutral. This positions the control as necessary to obtain proper adjustment.
 - c. Move the engine throttle lever tightly against the throttle stop screw. Then, attach the throttle cable casing guide to the throttle lever pin using the washer and locknut, tighten the locknut securely.
 - d. Pull firmly on the throttle cable to remove backlash, then install the trunnion nut in the anchor pocket.
 - e. Install the cable retainer and screw to hold everything in position, then check cable adjustment to ensure proper idle speed (that it is not too high) and shifting (to prevent excessive effort). Move the remote control all the way forward and then back into neutral. Verify that the idle stop screw is against the stop. If not, remove backlash by adjusting the trunnion nut.
 - f. Once adjustment is correct, securely tighten the cable retainer screw.
2. For all models, verify that the throttle arm is firmly against the idle stop.
3. Lightly hold the throttle link coupler against the throttle cam ball using light pressure. Rotate the cam follower and check clearance between the follower and the throttle cam. The adjustment is correct if the follower does not touch the cam and the clearance between the two components is 0.010 in. (0.25mm).
4. If adjustment is necessary, turn the shell of the throttle link coupler further onto the link in order to increase clearance, or further off the link to decrease clearance. Once the proper gap is achieved, carefully snap the shell back onto the ball.
5. Test the adjustment by slowly raising the remote or tiller control to fast idle or run, then returning the control to low idle and check that the throttle arm is against the idle stop while the same 0.010 in. (0.25mm) of clearance exists between the roller and throttle cam.

Wide Open Throttle Stop

◆ See Figure 200

1. With the engine not running manually advance the throttle lever to the Wide Open Throttle (WOT) position.
2. With the throttle lever at WOT, check each of the roll pins in the carburetor shafts (located under a spring, on the shafts behind each of the

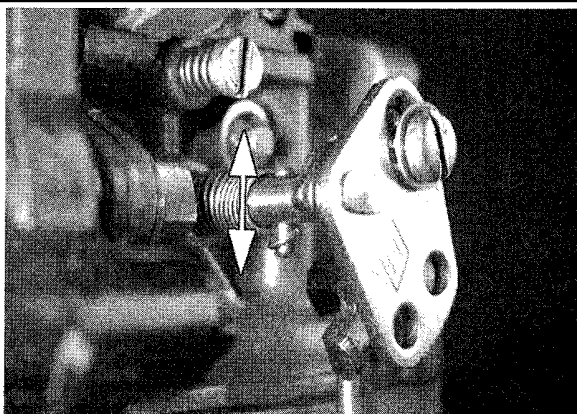


Fig. 200 When properly adjusted, the roll pins in the carburetor shafts will be vertical at WOT

linkage tabs. The roll pins should be fully vertical, but NOT over-rotated past vertical.

3. If adjustment is necessary, turn the WOT screw to achieve the proper setting.

Idle Timing

◆ See Figure 201

□ This procedure applies to all models OTHER than those equipped with a dual marked throttle cam or the 65RS through 1991, on which the Idle or Pickup timing should have been adjusted earlier, during the Cam Follower Pickup adjustment.

Here's your excuse, show this page to your better half in case she (or he) doesn't believe you. It's time to take the boat out because that's how the manufacturer wants you to adjust the idle speed. Not in a test tank, not on a trailer or even attached to a dock, but with the motor mounted on a boat, underway. For safety, use an assistant to navigate while you make the adjustment.

□ Always adjust the idle speed with the correct propeller installed.

Refer to the Tune-Up Specifications chart for idle speed specs. If not done already, reconnect the spark plug leads.

1. Connect an accurate shop tachometer, then connect a timing light to the No. 1 (top) cylinder spark plug lead.
2. Start the engine and allow it to reach normal operating temperature.

*** CAUTION

Water must circulate through the lower unit to the engine any time the engine is run to prevent damage to the water pump in the lower unit. Just a few seconds without water will damage the water pump.

3. Once the engine has fully warmed, operate the engine at idle with the gearcase in the forward position.
4. Make sure the throttle arm is against the idle stop, then aim the timing light at the pointer and check the result against the idle timing spec in the Tune-Up Specifications chart in this section.
5. If adjustment is necessary, either stop the engine for safety or use extreme caution around moving parts. Adjust the idle timing by turning the idle timing screw found under the flywheel (as shown in the accompanying photo). Turning the screw inward (clockwise) advances timing, while backing the screw out (counterclockwise) retards idle timing. Restart the engine and recheck idle timing with the gearcase in the forward setting. Repeat this cycle until the proper setting is obtained.

*** CAUTION

We realize that most people probably don't shut the engine off before playing with the idle speed screw, but the manufacturer does not recommend attempting to adjust the idle speed with the engine running for safety reasons and we cannot disagree. If you choose to ignore this caution, make sure that you take all possible precautions to prevent injury by making sure someone else is navigating. Also, keep your hands and clothing away from any hot or moving parts on the outboard.

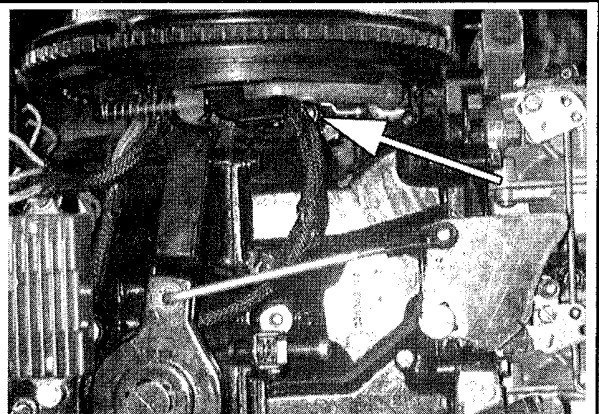


Fig. 201 Idle timing is adjusted using this screw found under the flywheel

6. Once the proper idle timing setting is confirmed, use the tachometer to check idle rpm. This procedure should result in an idle speed within spec (as listed in the Tune-Up Specifications chart in this section), depending on propeller selection and condition. If the speed is incorrect, check the following:

- If the speed is too high, check the induction system for air leaks.
- If the speed is too low, and engine components and systems are operating properly, decrease the idle timing by one or two degrees (say from 4 ATDC to 3 or 2 ATDC) to achieve the desired rpm.
- If idle speed is inconsistent or the engine runs rough or spits, and no problems can be found, suspect an incorrect carburetor mixture problem, refer to Carburetor Initial Low Speed Setting adjustment in this section.

■ **If this procedure was followed before Throttle Cam and Wide Open Throttle Stop adjustments on RS, TTL, WR and 25SiK models, perform those adjustments now.**

Carburetor Initial Low Speed Setting

On these models the low speed mixture for each carburetor is controlled by an adjustable needle.

Although not a periodic adjustment, periodic inspections could reveal the need for this adjustment to correct for otherwise unresolved performance issues. Generally speaking however, this adjustment should not be necessary unless the carburetor has been replaced or overhauled.

■ **Before disturbing the factory setting, make an alignment mark on the carburetor body. This mark is used as a point of reference during the adjustment procedure.**

The engine must be run under load for this procedure (either in a test tank or on a boat).

- Start the engine and allow it to reach normal operating temperature.

*** CAUTION

Water must circulate through the lower unit to the engine any time the engine is run to prevent damage to the water pump in the lower unit. Just a few seconds without water will damage the water pump.

- If servicing a tiller model, rotate the idle adjustment knob on the tiller grip counterclockwise (when facing the steering handle) to the full slow position.
- Shift the engine into forward gear and allow it to run at idle for at least 3 minutes.
- With the engine running at idle in forward gear, observe the running conditions as follows:
 - If the engine is running rich, it will show a rough or unsteady idle.
 - If the engine is running lean, it will sneeze or backfire.
- If necessary, adjust the low speed mixture screw as follows to obtain a smooth idle:
 - For rich mixtures, noting the reference mark made earlier, turn the needle 1/8th turn clockwise, allowing about 15 seconds between adjustments, until the highest consistent rpm is reached.
 - For lean mixtures, noting the reference mark made earlier, turn the needle 1/8th turn counterclockwise, allowing about 15 seconds between adjustments, until the highest consistent rpm is reached.
- Repeat this procedure for each of the remaining carburetors.
- With the engine still running at normal operating temperature and in forward gear, adjust the idle speed screw to the center range of the Idle Speed (RPM) in Gear listed for your motor under the Tune-Up Specifications chart.
- Operate the outboard in forward at or near full throttle for a full minute. Reduce speed suddenly to a low idle and shift into neutral. The powerhead should continue to operate smoothly. If the powerhead pops or stalls, the air/fuel mixture is probably too lean. Rotate the low speed needle 1/8th turn counterclockwise, allowing about 15 seconds between adjustments, until the powerhead responds as expected. Repeat the full throttle test and sudden deceleration with the shift into neutral to check each adjustment.

■ **If the engine does not respond properly to these adjustments, check for other problems including:**

- Improper engine temperatures
- Incorrect linkage adjustments
- Insufficient exhaust backpressure
- A problem with the pulse equalization hose

- Other problems with the fuel or ignition systems
- Quality and mixture of fuel and oil

If this procedure was followed before Throttle Cam and Wide Open Throttle Stop adjustments on RS, TTL, WR and 25SiK models, perform those adjustments now.

Maximum Spark Advance

◆ **See Figure 202**

■ **For the ignition timing maximum spark advance specifications, please refer to the Tune-Up Specifications chart.**

To check the maximum spark advance, the outboard must be operated with the proper test wheel. Do not operate the powerhead with a propeller, or flush adapter while performing this adjustment.

*** CAUTION

Water must circulate through the lower unit to the engine any time the engine is run to prevent damage to the water pump in the lower unit. Just a few seconds without water will damage the water pump.

- Connect a timing light to the top cylinder.
- Start the engine and run it at idle until it reaches operating temperature.
- Once the motor is fully warmed, run it at a minimum of 5000 rpm with the outboard in forward gear. Aim the timing light at the timing marks on the flywheel perimeter. The mark on the timing pointer should align at the correct degree mark on the flywheel (refer to the Tune-Up Specifications chart in this section).
- If the timing requires adjustment, shut down the powerhead for safety and adjust as follows:
 - For all models, except the RS, TTL, WR and 25SiK, loosen the locknut on the max timing adjustment screw (found under the flywheel, just behind the starter), then turn the screw to adjust the timing. Turning the screw 1 turn counterclockwise will advance the timing approximately 1°. Likewise, turning the screw clockwise 1 turn will retard timing approximately 1°. Tighten the nut and recheck the max timing setting.
 - For RS, TTL, WR and 25SiK models, timing is adjusted by repositioning the nut in the slotted cam roller. Loosen the roller screw and rotate the nut until the specified timing is reached. Secure the cam, then recheck the max timing setting.

Shift Lever Detent Adjustment (RS, TTL, WR Models and 25SiK only)

- Rotate the propeller shaft slowly by hand while moving the shift lever into the neutral position.
- The lower detent spring should be fully engaged in the notch on the shift lever detent. If not, loosen the detent spring screw and move the lower spring to fully engage the notch, then tighten the screw securely.

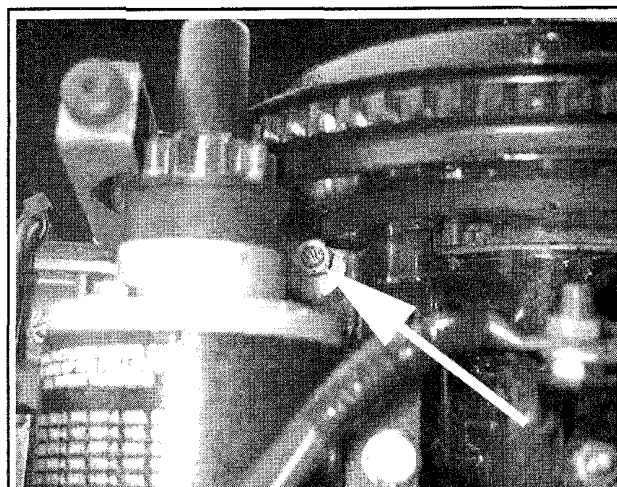


Fig. 202 The maximum spark advance is adjusted using a slotted head screw and locknut