Why Check Your Valve Clearance?

Well, if your four cycle marine engine was built subsequent to 1975, has hardened valve seats and hydraulic lifters (most post 1975 engines have these features), you probably don’t need to check the valve clearance. The clearance really is zero and the hydraulic lifter is self-adjusting (within a certain range). The hardened valve seats prevent valve recession, which is the problem with pre-1975 engines running on unleaded gasoline. What really is valve recession and how does it affect us? Following are some snippets I gleaned from the Internet:

"Before we get into the problems and the possible solutions, we should take a look at "leaded" gasoline and see just what the "lead" was supposed to do. In the first place, the "lead" is actually tetraethyl lead, an Organo-metallic additive that has long been used in gasoline for two main reasons. First of all, the "lead" increased the octane rating of the fuel. Secondly, the lead oxides formed during combustion helped lubricate the valves and prevented excessive valve seat wear, especially at the exhaust valve seats. Octane is something we are all familiar with; high octane fuels ignite slowly & more evenly. Higher octane fuels, therefore, will not usually "detonate" from the heat of compression before the spark plugs fire (commonly called "knocking"). The idea of valve lubrication and valve seat recession is a bit harder to visualize. It is easy enough to see that a film of lead oxides deposited on the stem will aid in lubrication, but valve seat recession seems more mysterious. The process of valve recession actually occurs when iron oxides form on the edge of the valve face. When the valve is open, these imperfect lumps become superheated, and when the valve closes, they fuse to the valve seat in the cylinder head. The valve opens again - and a small fragment of the valve seat remains fused to the valve. Repeat this over and over thousands of times a minute and you can visualize the valve slowly burrowing into the head, which is what happens! It can't go forever because, as the seat is eroded, compression is lost, the valves no longer open and close properly because the adjustment changes, and so on. Eventually, the engine will be running so poorly that even the laziest boater will give in and have the head rebuilt, or replaced. The severity of valve seat recession and the rate at which it occurs increases proportionally with engine speed and load."

"WHY VALVES BURN"

"There are several reasons why valves burn. One is normal wear. As an engine accumulates miles, the constant pounding and thermal erosion wears away the metal on the face of the valve and seat. The exhaust valve sheds most of its heat through the seat, so when the face and seat become worn and the area of contact is reduced, the valve starts to run hot. Eventually the buildup of heat weakens the metal and pieces of it start to break or flake away. Once this happens, it forms a hot spot that accelerates the process all the more. The valve begins to leak and compression drops. The result is a weak or dead cylinder and a noticeable drop in engine power, smoothness and performance.

An exhaust valve can also burn if the valve clearance closes up for some reason (improper clearance adjustment, cam or lifter wear, valve recession, a bent push rod, worn rocker arm or cam follower, etc.). The lack of lash (clearance) in the valvetrain prevents the valve from closing fully, which causes it to leak compression and overheat. Valve burning can also be caused by any condition that makes the engine run hot or elevates combustion temperatures. This includes cooling problems, abnormal combustion conditions such as detonation or preignition, retarded ignition timing or lean fuel mixtures.

VALVE RECESSION

A condition known as "valve recession" can allow the valves to recede or sink into the head because of excessive seat wear. This causes the valve clearance to be lost which allows the valves to leak and burn. It occurs primarily in older engines (mostly those built prior to 1975) that were not designed to run on unleaded gasoline. When leaded gasoline was still around, lead acted like a lubricant which reduced
valve seat wear. But when lead was eliminated, it meant engines had to be made with harder seats. These older engines didn’t have hard seats, so many began to experience valve wear problems when switched to unleaded fuel. If you’re driving an antique or classic car, therefore, you should either use some type of lead substitute fuel additive to protect the valves or have the seats replaced with hard seats when the engine is overhauled.”

"Cars, Planes, Trains and Automobiles"

Sadly, TEL’s (tetraethyl lead) demise also dooms millions of passenger cars, trucks, motorcycles, powerboats, tow vehicles, RVs, farm equipment and lawn mowers. Some 40 percent of all gasoline sold was leaded regular. All of the previously mentioned engines, built to burn regular leaded fuel, were also built to burn high octane, and to take advantage of the special lubrication qualities of TEL, where it provides the critical lubrication of the exhaust valve stem as well as cushioning the valves head as it slams shut against its seat. True, the octane gap can be closed somewhat with gasohol and other special additives. But sadly, there is no substitute that equals TEL’s solid film lubrication. The higher the load and rpm, the worse an engines wear. The old style, soft valve seats can wear out in as few as ten hours running time at wide-open-throttle, and the repair bill will pack a wallop that’s likely to send you to your personal loan officer.

Any truck lumbering up a steep grade, any tow vehicle trailering its load down the highway, or any farm tractor laboring in its furrow is in danger. Of all the victims, boats may be the worst off because when they’re not warming up dockside, they’re revved up to high rpm and held at a constant load.

Well, now that we know what recession is, let’s determine if it really applies to our boat. I have owned five Chris’s built prior to 1970, powered by 283’s, 327’s, & 427’s. All of these engines had solid lifters, valve adjustment features, and soft valve seats. Chris recommends checking valve clearance every 100 hours, and this was when leaded gasoline was the norm. If we are running on unleaded gasoline, and are not sure if our engines have been retrofitted with hardened valve seats by a previous owner, then it is in our best interests to check these clearances often & record the results until a pattern has been established that will give us insight as to what is really going on in our engines. For example, I recently adjusted the valves in a friends 38, powered with 427’s. I last adjusted the valves in these engines about 4 years ago, and set them at .020”. My friend bought this boat used, so we really have no history on these engines. The owner was watching me recently correcting a serious recession problem on my boat & he was getting nervous about his engines, as he understood what happens when valve clearance is reduced to zero because of recession. At this point I should mention this is a low annual hours boat that seldom runs over 3,000 RPM, in other words, a “babied” machine. As I went through the port engine, I found most of the valve clearances right at .020”, right where I had set them four years ago. A few valves were slightly looser, perhaps having clearances up to .025”. I adjusted these valves back to .020”. This slight loosening over time is perfectly normal, indicating normal wear in the system and most likely, the adjusting screws “backing off” or unscrewing slightly. This is their normal tendency; they don’t screw themselves in over time to lessen clearance. OK, what do we now know about this engine? Despite not having the clearances checked in four years, and the owner not using any fuel additive such as Relead, no evidence of recession was found. COOL!! I’ll bet my last Martini the previous owner had this engine converted to hardened valve seats. On to the starboard engine. The very first valve I checked was tight. I was not able to get my feeler gage in and had to loosen the adjustment considerably. This continued with the rest of the valves. I found about 6 valves (mostly exhaust valves) that were tight, with two of them almost to the point of zero clearance. WHOOPS! This boat normally goes on a long cruise right after Labor Day. I am sure had I not adjusted (loosened) these valves he would have absolutely fried one or more of these valves on this trip and had to limp back to a major engine repair. This engine clearly has a case of valve recession going on. We will watch this engine much more closely in the future. I also recommended the owner use Relead gas additive. My Internet research, plus experiences of friends, led me to believe this is the best additive on the market to make up for the loss of lead in gasoline. Have we cured the problem? Absolutely not, but closely monitoring this engine to preclude valve clearance recessing to zero delays
the "day of reckoning". We can choose when we take this engine apart for hardened valve seats. This may be several years down the road if we don't let clearance get to zero. Remember, this engine is not recessing too badly, perhaps .005" per year. Perhaps the Relead will even slow this down.

As a last point, historically valve system noise (clicking or clatter) was a sign the valves needed their clearances adjusted. People thought that if it was quiet, all was well. Now that we understand that recession actually reduces clearance, we know a quiet engine is no longer a "If it ain't broke, don't fix it" scenario.

This article describes a simple technique for a moderately skilled owner to check & adjust valve clearances. It is tailored specifically to the 427, but the principles & technique are applicable to the 283 & 327 as well. All that needs to be done is to consider the different firing orders & cylinder numbering layouts of these other engines.

Other contents are two checklists to use when actually performing this operation. They are named "Port Engine Checklist" and "Starboard Engine Checklist". Again, I recommend printing & using these checklists when actually performing these adjustment procedures.

Dick Morland

"Patty Wagon"

8-7-2000
Valve Adjustment

427 Chris Craft Engines

Please consider the opinions & processes described herein as the personal preferences of an individual owner, which certainly do not reflect the official positions of Chris Craft or any other organization. Study & use them at your own risk. This method may be tailored to apply to 283 & 327 engines by considering the differences in firing order & cylinder numbering layout. Before attempting this procedure, you should clearly understand that both distributors on a twin engine 427 boat turn in the same direction (CCW as viewed from the top), that the port engine itself turns CCW when viewed from the stern, and that the starboard engine turns CW when viewed from the stern. Further, you should clearly understand that the two engines have different cylinder firing orders.

See VA 100 for a layout showing the engine’s cylinder firing orders, cylinder numbering, and engine rotations. If you have trouble understanding these concepts, this procedure would be best left to a marine mechanic. OK, if I haven’t already discouraged you, let’s play "WHO WANTS TO ADJUST THEIR OWN VALVES"! (Drum roll, please).
ADJUSTMENT AND ASSEMBLY INFORMATION

(Dimensions given in inches)

Valve Lash - Engine Hot
Intake Valve - .021
Exhaust Valve - .021
Distributor Point Gap
Distributor Cam Dwell
Spark Plug - Auto-Lite BTF-3
(Optiona Champion F-10)
One Set - 26° total 31° - 35°
Gap .030

FIRING ORDER
Right Head Rotation: 1-8-7-6-3-2-4-5
Left Head Rotation: 1-4-3-2-6-7-8

ADJUSTING VALVES WITHOUT RUNNING THE ENGINE

Valve Lash may be set at .021", Intake and Exhaust with engine cold.
Make final adjustment of .021" with engine hot. Engine valve arrangement (front to rear) E-1-E-1-6-1-E-1-E.

VA 100 Adjustment & Assembly Information
The JPG picture files referenced in this dissertation were primarily taken while adjusting the port engine in Patty Wagon, a 38 Commander Sedan. However, there are a couple of pictures taken in another boat, so don’t let this confuse you.

First, let’s warm up the engine for about 15 minutes at a fast idle, approximately 1,000 RPM.

Shut off the engine & locate #1 spark plug wire (See VA 101, my lovely assistant doing just that).
Follow #1 plug wire to the distributor cap (See VA 102 & VA 103).

VA 102 Locating #1 cylinder at the distributor cap
VA 103 Locating #1 cylinder at the distributor cap
After we have identified the #1 cylinder terminal at the cap, mark both the cap and make a reference mark on the water pipe as my lovely assistant is doing in VA 104.
The next step is to remove the distributor cap so we can view the rotor. I generally pull the wires from the spark plugs and remove the entire cap / wire assembly and set them aside. If your plug wires are long enough so that you believe you can later remove the valve covers from under the wires, this total removal is not necessary. If you do remove the whole shebang, you may wish to mark the plug wires as shown in VA 105.
The next step is to loosen & flip up the PCV tube & PCV valve by pulling it out of the Stbd. rocker arm cover. This is shown in VA 106 & VA 107. This allows later removal of the stbd. rocker arm cover.

VA 106 Loosening PCV fitting
VA 107 Flipping PCV pipe out of the way
The next step is to actually observe the distributor rotor position. As seen in VA 108, we are past the point at which #1 cylinder fires, as we can see the reference mark my lovely assistant made on the water pipe, and the rotor pointer is past it (remember, the distributor turns CCW as viewed from the top). Since we really wish to position this engine at it's #1 firing position (top dead center, AKA TDC); we're going to have to turn this engine over.
Prior to turning the engine over with the starter, ground the coil wire as shown in VA 109. Note the wire hooked on the screw that clamps the throttle cables. This will prevent you from getting a shock when we turn the engine with the starter.

VA 109 Grounding the coil wire
Here our lovely assistant comes into play again, see VA 110. After a quick couple of “blips” on the starter, we see the result in VA 111. We want the rotor pointer to be approaching the reference mark we made earlier, but not past it. If you overshoot the reference mark, just “blip” the starter again till you get the approach position you want.

VA 110"Blipping" the engine with the starter
VA 111 After "blips", rotor in approach position
The next step is to turn the engine over by hand until the firing mark on the flywheel comes up, indicating that #1 cylinder is at TDC (top dead center). I use a flat blade screwdriver to remove the two screws holding the timing pointer on the rear of the engine. Then I use this screwdriver in the teeth of the flywheel to gently pry & turn the engine in the direction it normally rotates. In this case, it’s the port engine & it rotates CCW as viewed from the stern. This procedure is shown in VA 112.
If you are turning the engine in the correct direction, the rotor will begin moving toward the reference mark, and soon the firing mark on the flywheel will come into view. This mark on the flywheel usually is a small hole drilled in the flywheel, marked with paint. See VA 113 for a view of my ugly timing mark in the correct position. This mark, along with the rotor pointing to the position that the #1 plug wire occupied in your distributor cap (your reference mark), is proof that #1 cylinder is truly in it’s firing position. At this point, both #1 cylinder valves are closed & on the heel of the camshaft (technical jargon), and these two valves could be adjusted.

VA 113 Flywheel timing mark in correct position
Next comes a cute trick. We’re going to mark the crankshaft pulley in 90-degree increments. You can use chalk, thin strips of masking tape, or anything that makes a highly visible mark. This isn’t rocket science gang, close is good enough. Mark the pulley at the 12, 6, 3 & 9 o’clock positions. Remember that the engine MUST be in the #1 cylinder’s firing position when you do this. See VA 114.
I told you close was good enough! OK, now let’s remove both rocker arm covers. See VA 115 & VA 116. You may wish to gently pry the covers up with a screwdriver and hope the gasket comes with the cover. Also, no BS’ing with dockmates at this point as our engine is cooling off. We wish to complete our check & adjustments while the engine is still warm.

VA 115- Removal of rocker arm covers
VA 116 Removal of rocker arm covers
Because we know #1 is in the firing position and both valves are closed & on the heel of the cam, we can now check & adjust the clearances for this cylinder. #1 is the first cylinder on the stbd. head, valves 1&2 from the front of the head. Grab each rocker arm & try to shake it up & down to ascertain that you have clearance. If you feel a slight amount of up & down movement, this is a good sign all is well and you have correctly performed the previously mentioned operations. Let’s try to insert a .020” - .022” feeler gage between the rocker arm & the valve stem itself. See VA 118 & VA117.

VA 117 Trying a feeler gage on #1 cylinder
VA 118 Close up view of feeler gage in position
Let’s assume we find the feeler gage slides between the rocker arm & valve stem quite easily. This is normal & good. We need to reduce the clearance by screwing the adjustment nut in, CW as viewed from the top. See VA 120 & VA 119.

VA 119 Making an adjustment on #1 cylinder
VA 120 Close up view of adjustment tools
After you have tightened the adjuster correctly, you should feel a moderate drag on the feeler gage when you try to pull it out. A word of caution; if you find the valve clearance is less than the thickness of the feeler gage; this may be a sign of recession. I recommend you try various thickness feeler gages until you find one that slides in with a slight drag. The difference in thickness between this gage & .020” is the amount this valve MAY have recessed. Record this abnormality on a separate sheet of paper for future reference. If you can not determine if the valve is an exhaust or an intake, refer to VA 100 where the valve layout is described. Another word of caution; the adjusters are what is known in the fastener industry as "prevailing torque". In plain English, this means that the adjuster requires quite a bit of pressure to turn it. This is why you may have noticed that I use a quite long box end wrench, allowing me to turn this type of adjuster and to make fine adjustments. You’ll feel this pressure required and soon know what is normal. If you find an adjuster that turns easier than normal, this means that the threads on either the adjuster or the internal threads in the rocker arm are worn & need to be replaced. This condition invariably leads to the adjuster loosening up, increasing the clearance and valve noise. Replacing the adjuster is simple & easy; replacing the rocker arm is much more difficult. Should you replace the adjuster and still have a very "soft" feel on your wrench, certain grades of LOCTITE may preclude rocker arm replacement. I suggest you contact the author for further advice before removing the rocker arm shaft & replacing the rocker arm itself.

OK, we have finished adjusting #1 cylinder valves. Now we will turn the engine over 90 degrees by HAND, using a wrench like shown in VA 121 & VA 122.
VA 122 Close up view of wrench

This is a long arm ½” drive ratchet with a flex joint & 6 point 15/16” socket.
You turn the engine over by placing the socket on the crankshaft pulley bolt, shown in VA 114.

VA 114 Marking crankshaft pulley
This is what I use, but I have used a 12 point socket with a ½" drive breaker bar. It's just not as convenient as the ratchet. Because this is the port engine, which turns CCW viewed from the stern, put the socket wrench on the crankshaft bolt with the handle pointing about straight up & gently push on the wrench toward the port side of the boat (or outward) and the engine will begin to turn (see VA 123).

VA 123 Turning the engine over

As you do this, observe the marks you made on the crankshaft pulley. You want to turn the engine over approximately 90 degrees (to the next mark on the crankshaft pulley. Turn the engine slowly & let the compression pressure bleed off. You’ll hear it leak down, at which point the engine will turn fairly easily. If you attempt to turn the engine too vigorously, you’ll be fighting compression pressure & your wrench may slip off. If you bang your knuckles, this most assuredly is going to hurt! As soon as the next mark on the crankshaft pulley comes up, you have roughly positioned the next cylinder in the firing order at TDC and may adjust the valve for this cylinder. In our case, a port 427, the next cylinder to fire after #1 is #5. Referring again to VA 100, this is the first cylinder on the port or left bank. The correct valves to adjust are the first two from the front. Check & adjust these two valves per the previous step.
OK, now we’re going to turn the engine another 90 degrees so we can adjust the next cylinder in the firing order. In our case this is #4, the last cylinder on the stbd. or right bank. VA 124 shows me turning the engine & approaching the firing position for #4 cylinder.

VA 124 Approaching correct position for #4 cylinder

How do I know this from a picture? Simple. The engine must turn over two complete revolutions to complete the firing cycle for all cylinders (90 x 8 = 720 degrees or two complete revolutions). The distributor, however, turns ½ the speed of the crankshaft, requiring only one complete revolution to complete the firing sequence for all cylinders. In other words, turn the crankshaft 90 degrees; the distributor turns 45 degrees. If you look closely at VA 124, you can clearly see the reference mark my wife made on the water pipe. You can also see the distributor rotor has turned almost 90 degrees from that point. Notice the distributor is turning CCW viewed from the top, which is the correct rotation. This confirms I am indeed turning the engine in the correct direction, and the almost 90 degree change in rotor position indicates I have turned the engine almost 180 degrees (or two 90 degree turns). If I have turned the engine 90 degrees twice, I have now positioned the engine to adjust the third cylinder in the firing order, #4.
VA 125 shows me checking & adjusting #4 cylinders valves. This is the fourth cylinder from the front on the right bank, & the correct valves are the seventh & eighth valves from the front.

VA 125 Checking & adjusting #4 cylinder valves

OK, you should have the idea now. You adjust both valves of a given cylinder, then turn the engine roughly 90 degrees to position the engine so that you may adjust the next cylinder in the firing order. You do this till you have completed all eight cylinders, in our case the last cylinder to adjust would be #8. After you complete the adjustment of the last cylinder, rotate the engine 90 degrees again. If you have not gotten "out of sync" between turning & adjusting, the distributor rotor will be back at your reference mark and the timing mark on the flywheel should be showing. You have actually put #1 cylinder back in firing position. Just for the hell of it (and as a final double check); slide the feeler gage into #1’s valves. If all is as you adjusted it a few minutes ago, COOL! You’re almost done with this engine. NOW you can stop for a beer or some BS with your dock mate or friend.
We’re almost done. Next we inspect the rocker arm cover gaskets for reusability. As we see in VA 126, my gaskets stuck to the cover & are in good shape. I’ll just reinstall as is. If your gaskets are ripped with some sticking to the cylinder head and some on the cover, you’ll have to scrape the entire old gasket away & install new ones. When cleaning old gasket from the cylinder head, be careful to not let any gasket remnants fall into the engine. A shop vacuum is handy for this. I use a product called Hi-Tack gasket cement to glue new gaskets to the cover prior to installation. You can see the results in VA 126. The gasket came off with the cover & I can reuse it.
When tightening down the covers, I use a ½" nut driver, VA 127 & VA 128. I tighten the bolts as tight as I can with this tool. Because you can only exert limited torque with a handle like this, valve cover over tightening and distortion is prevented.
Reinstall the distributor cap, coil wire, plug wires (if you removed them), PCV valve, and tighten the PCV valve fitting on the back of the carb and we’re done!
Fire up this mighty 427 and listen to it purr (VA 129). After about 10 minutes of run time, check for rocker arm cover oil leaks.

VA 129 Finished!

The procedure for the starboard engine is the same, except the engine rotates in the opposite direction and the firing order is different.

Dick Morland

"Patty Wagon"

8-7-2000
Valve Adjustment Checklist

427 Port Engine

Warm up engine prior to beginning procedure.
Check box after each step is complete!

1. Position #1 cylinder at TDC (firing position) per VA 101 – VA 106
2. Remove valve covers.
3. Check clearance on #1 cylinder valves (first & second valves from front, stbd. head). Adjust to .020” if necessary.
4. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
5. Check & adjust #5 cylinder valves (first & second valves from front, port head). Adjust to .020” if necessary.
6. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
7. Check & adjust #4 cylinder valves (seventh & eighth valves from front, stbd. head). Adjust to .020” if necessary.
8. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
9. Check & adjust #2 cylinder valves (third & fourth valves from front, stbd. head). Adjust to .020” if necessary.
10. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
11. Check & adjust #6 cylinder valves (third & fourth valves from front, port head). Adjust to .020” if necessary.
12. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
13. Check & adjust #3 cylinder valves (fifth & sixth valves from front, stbd. head). Adjust to .020” if necessary.
14. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
15. Check & adjust #7 cylinder valves (fifth & sixth valves from front, port head). Adjust to .020” if necessary.
16. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
17. Check & adjust #8 cylinder valves (seventh & eighth valves from front, port head). Adjust to .020” if necessary.
18. Using socket wrench, turn engine over 90 degrees CW when viewed from front of engine.
This should position #1 cylinder back in its firing position where we began. The timing mark on the flywheel should be showing, and the rotor tip should be pointing at our reference mark. If all is as described, recheck clearances on #1 cylinder. If they are where you set them, you are finished except for reassembly of rocker arm covers & distributor cap and/or wires.

General Notes: If you encounter one or more valves that have to be loosened more than ½ turn of the adjuster, something may be wrong. You may have missed a 90-degree turn, or you may be on the wrong cylinder and/or valves. Go back to step #1 and start over. Under no normal circumstances should you ever have to tighten an adjuster more than ½ turn. If you encounter this scenario, recheck everything. I recommend you make a written, dated record of any abnormalities you encounter, especially tight valves, and how tight they were. This may help in the future to determine if your engine is encountering valve recession.
Valve Adjustment Checklist
427 Starboard Engine

Warm up engine prior to beginning procedure.
Check box after each step is complete!

- Position #1 cylinder at TDC (firing position) per VA 101 – VA 106. This engine rotates opposite the engine shown in the pictures. Turn this engine CCW viewed from the front.
- Check clearance on #1 cylinder valves (first & second valves from front, stbd. head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #8 cylinder valves (seventh & eighth valves from front, port head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #7 cylinder valves (fifth & sixth valves from front, port head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #3 cylinder valves (fifth & sixth valves from front, stbd. head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #6 cylinder valves (third & fourth valves from front, port head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #2 cylinder valves (third & fourth valves from front, stbd. head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #4 cylinder valves (seventh & eighth valves from front, stbd. head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine.
- Check & adjust #5 cylinder valves (first & second valves from front, port head). Adjust to .020” if necessary.
- Using socket wrench, turn engine over 90 degrees CCW when viewed from front of engine. This should position #1 cylinder back in its firing position where we began. The timing mark on the flywheel should be showing, and the rotor tip should be pointing at our reference mark. If all is as described, recheck clearances on #1 cylinder. If they are where you set them, you are finished except for reassembly of rocker arm covers & distributor cap and/or wires.

**General Notes:** If you encounter one or more valves that have to be loosened more than ½ turn of the adjuster, something may be wrong. You may have missed a 90-degree turn, or you may be on the wrong cylinder and/or valves. Go back to step #1 and start over. Under no normal circumstances should you ever have to tighten an adjuster more than ½ turn. If you encounter this scenario, recheck everything. I recommend you make a written, dated record of any abnormalities you encounter, especially tight valves, and how tight they were. This may help in the future to determine if your engine is encountering valve recession.

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“Patty Wagon”
8-03-2000