Race-Spec Cam Degree Kit B,H,K - Guide & Information

This is the instructional guide written by the original designer of the Honda Cam Degree Kit for B, H, K and S2k Engines.

Clearancing Honda Race Engines

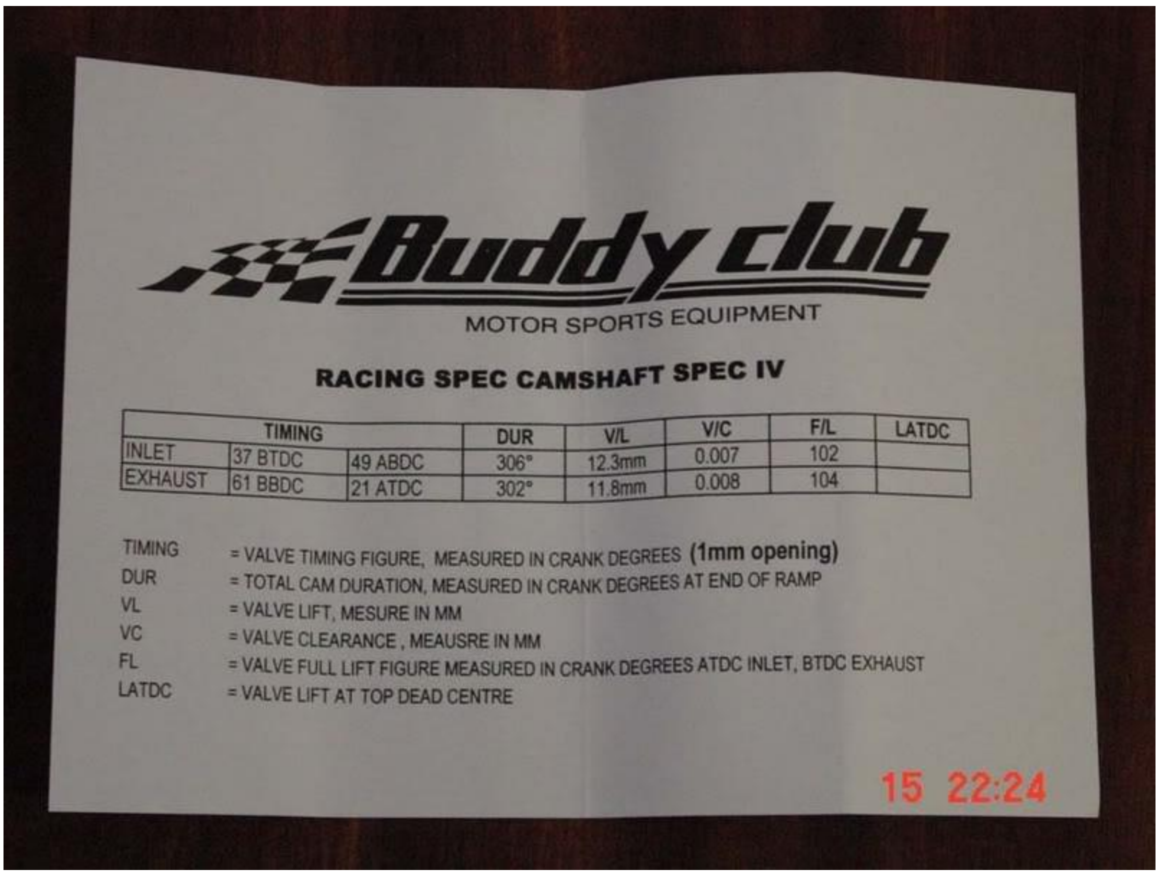
by Mike Belben

Whether I can be considered an expert on the subject is surely up for debate, but I cannot deny that I have degreed a few engines, sold a few fixtures and been asked to write this article numerous times over the years by my good friend and business partner Chris Harris of Xenocron Tuning Solutions, whom I will be forever indebted to. I always chickened out of publishing any form of user manual for fear of liability, and it is for the sake of limiting such liability that I will not offer specific clearances in this article, only how to measure them. Each builder will have to determine for themselves how close high speed parts can pass by each other in their unique combination, and balance that with their own personal willingness to expose themselves to the financial consequences of component collision. **This manual is distributed free of charge to the general public for educational purposes only, and I am not responsible for anything you do to your engine.** Consider yourself warned that the ragged edge brings minimal gains at maximum consequence and the author does not recommend it. I endeavor to help you save engines, not destroy them.

Let's jump right in. What does it mean to degree a cam and why should you care? Degreeing a camshaft, in my opinion, is to assign a numerical value to the phase angle relationship that exists between a crankshaft and the camshaft(s) slaved to it. It's a fairly straightforward concept that is made complicated by an abundance of terms and an excess of variance in how the procedure is performed. Its value to us all is that by degreeing, we can define a specific position to place a camshaft, and have a reference to describe that position to others which can be extremely useful, whether to a manufacturer publishing data on the best position for their cams, a builder trying to sort out some issues he's having amongst peers, or a tuner recording an engine's response to changes in valve event timing. This is important data!

Let's look at some manufacturer cam cards.

Exhaust	Lift	Advertised Duration @ .004"	Duration @ .050"
Primary	.374"	271°	214°
VTEC	.469"	298°	255°
Secondary	.374"	271°	213°



Buddy club

MOTOR SPORTS EQUIPMENT

RACING SPEC CAMSHAFT SPEC IV

TIMING			DUR	V/L	V/C	F/L	LATDC
INLET	37 BTDC	49 ABDC	306°	12.3mm	0.007	102	
EXHAUST	61 BBDC	21 ATDC	302°	11.8mm	0.008	104	

TIMING = VALVE TIMING FIGURE, MEASURED IN CRANK DEGREES **(1mm opening)**
DUR = TOTAL CAM DURATION, MEASURED IN CRANK DEGREES AT END OF RAMP
VL = VALVE LIFT, MESURE IN MM
VC = VALVE CLEARANCE , MEAUSRE IN MM
FL = VALVE FULL LIFT FIGURE MEASURED IN CRANK DEGREES ATDC INLET, BTDC EXHAUST
LATDC = VALVE LIFT AT TOP DEAD CENTRE

15 22:24

CROWER Part Number 61351T

Part Number/ Work Order Number
Engine Application NISSAN
Grind Number KA24 DE 16V

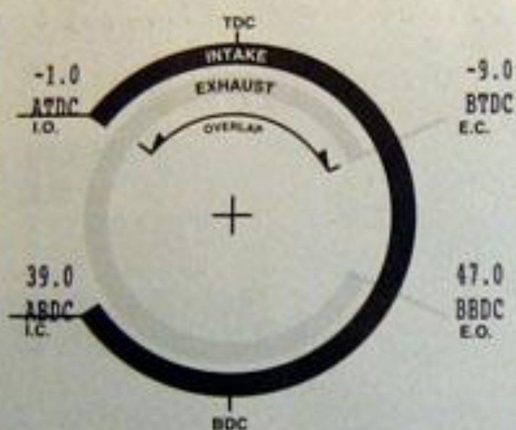
ADVERTISED CAMSHAFT SPECIFICATIONS:

						HOT
INTAKE:	Duration:	264°	Lift:	.375	Clearance:	.008
EXHAUST:	Duration:	264°	Lift:	.375	Clearance:	.010

The specifications listed above are based on a rockerarm ratio of 1.00 IN
1.00 EX

RECOMMENDED VALVE SPRING INFORMATION:

Part Number	Single	Dual	Triple
Approximate spring pressure:	valve closed:		LBS.
	valve open:		LBS.



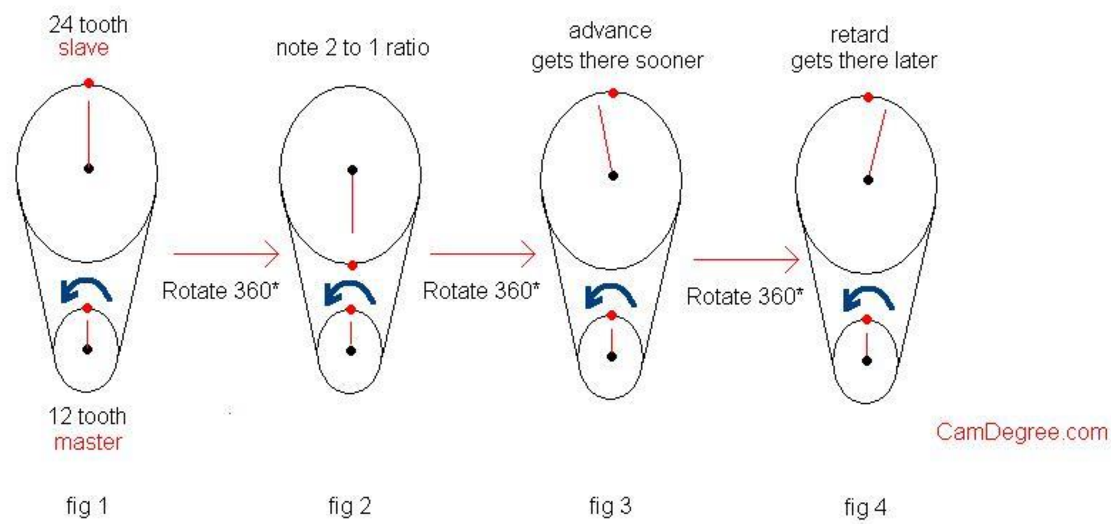
The information below is for degreeing cam only. Correct only at .050" tappet lift.

INTAKE	Opens	-1.0ATDC
	Closes	39.0ABDC
EXHAUST	Opens	47.0BBDC
	Closes	-9.0BTDC
LOBE SEPARATION		114°
DURATION	Intake	218°
at .050"	Exhaust	218°
LOBE LIFT	Intake	.375
	Exhaust	.375

If using "Lobe Center" method of degreeing, cam should be installed on an intake centerline of: 110°

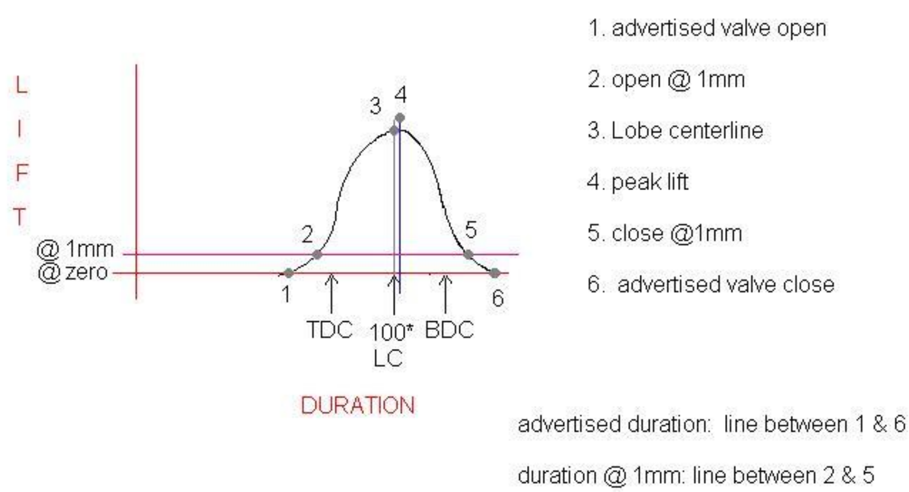
Notes:

Cams damaged by excessive spring pressure, over shimming, valve train bind or retainers contacting the guides are void from warranty. Refer to the "Important Camshaft and Lifter Information" booklet included with each new Crower camshaft to avoid any break-in problems.



simple illustration to help understand the 2:1 ratio between crank and cam, as well as the difference between advancing and retarding the camshaft timing. note the red dots that always stay in sync, only the camshaft itself changes position relative to the crank, never the cam gear.

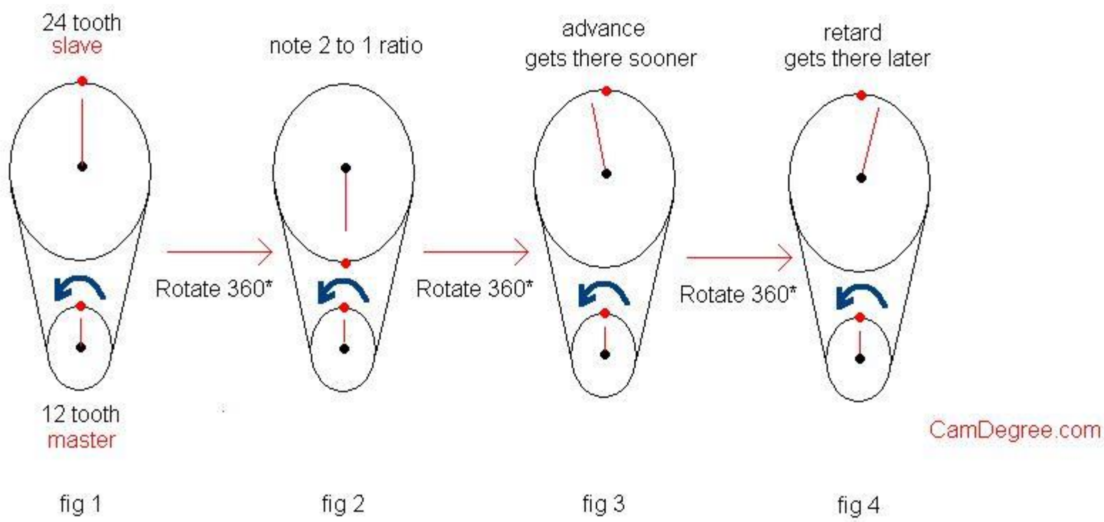
Looking them over, you'll notice the variety. Some are vague, some are loaded with specs, and none of them are standardized because a single standard does not exist. Domestic guys like using inches and import guys love metric. One guy likes valve open because he comes to it first, another likes peak lift because it's hard to get wrong. Someone else loves lobe centerline because combined with a duration figure, it gives you the most information. None of them are wrong and each has their attributes. I drew this up to help give a graphical representation of them all at once. Take a look and forgive my lack of MSpaint skills.



example intake profile

If you're scratching your head when you look at this, think of a buoy in a harbor collecting swell data. It can only rise and fall in a linear fashion, the same way a valve travels in a valve guide, only up and down. The parabolic curve generated by the rise and fall of the buoy and plotted on a 2 dimensional graph shows us how large a swell, and for how long. Note that the curve is not symmetrical! Peak lift does not have to occur at lobe centerline because manufacturers have substantial leeway in generating a variety of "ramp rates" for their lobe profile.   Ramp rates have profound effects on port flow that are beyond the scope of this article, but don't let that stop you from exploring deeper!

I'm writing the article for those who are new to the concept of camshaft position, so let's start with some real simple mechanics. Take a look at the sketch below and imagine two clocks, one above the other and each with a sprocket that lashes them together. The bottom clock represents our crank, which is the master, it has a 12tooth sprocket. The upper clock represents our camshaft -the slave- and it has a 24 tooth sprocket. The tooth count is significant in establishing that there is a 2:1 ratio between the two clocks so that the upper will spin at half the speed of the lower, exactly how camshafts in 4 stroke engines do.



simple illustration to help understand the 2:1 ratio between crank and cam, as well as the difference between advancing and retarding the camshaft timing. note the red dots that always stay in sync, only the camshaft itself changes position relative to the crank, never the cam gear.

Similar to B and D series Honda engines, the clocks in my sketch spin counterclockwise. The red dots you see in the circumference of the circles represent the drive sprocket teeth, and you'll notice they are always synced. Never does a sprocket go out of phase unless there is a mechanical failure of the timing belt or chain. The red lines represent the keyways of our crank and cam which are out of phase in figures 3 and 4 to illustrate the concepts of advancing and retarding the phase angle relationship of rotating shafts in a master and slave arrangement. In figure 3, the cam key is leading ahead of the sprocket tooth that it was previously aligned with. We call this advanced, and the inverse is retarding, which you can see in figure 4, that's when the keyway gets there later than the tooth it was previously matched up with.

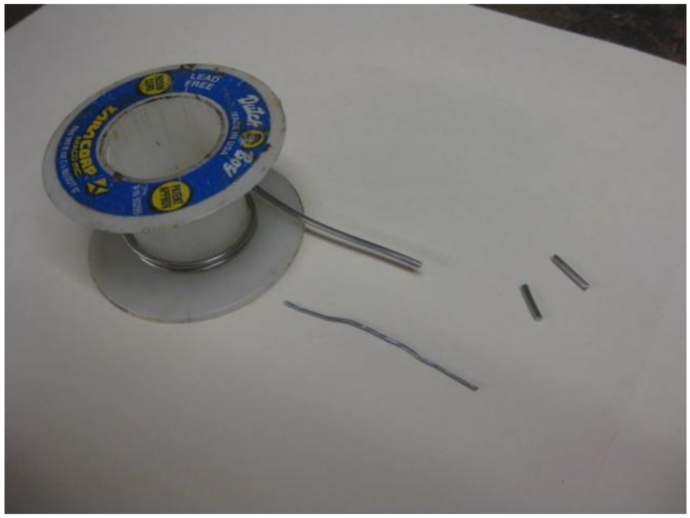
"Advance" and "retard" are the only two terms that you should ever use to describe changes to cam position. The amount is called degrees and only degrees. We do not ever refer to cam position as marks on your cam gears, ever. Those marks are reference points for you to know how far the gears have been rotated from a starting position, and the only way to know where you actually started, is to degree your cam. Zero/zero on your cam gears doesn't mean anything to anyone but you, and that's only if you degreed them to begin with. Posting online that you put your cams in at +3 -2 lets everyone know you're a shmuck so don't do it. The terms you will use henceforth are before and after top dead center, or before and after bottom dead center. These are abbreviated BTDC, ATDC, BBDC and ABDC respectively though the last one is an oddball that's never used.

It's not uncommon for a cam card to reference multiples valve positions, for instance open, close, lobe center and duration. It's also not uncommon to find a few degrees of variance from the card when taking actual measurements on your engine. My suggestion is to avoid getting too worried about camshaft position, and instead focus your attention on component clearances. After all, it won't matter how perfect your cams are dialed to the manufacturer's spec if you crunch 16 valves priming the oil pump. Sounds funny, but I've seen it happen. If you intend to build some wild motor and haven't got plans to know for certain that each component will clear the other at the RPM it will be run, you're a fool. Have you heard the one about fools and their money? Look it up.

PISTON TO HEAD CLEARANCE

Keep in mind the images here are just mocked up parts I had laying around for reference. Start with a block and crank, with at least one piston/ring set installed. I prefer to use only one intake and one exhaust valve for all clearancing work. It's tedious, but a race motor is assembled, torn down, modified and reassembled numerous times before final building.

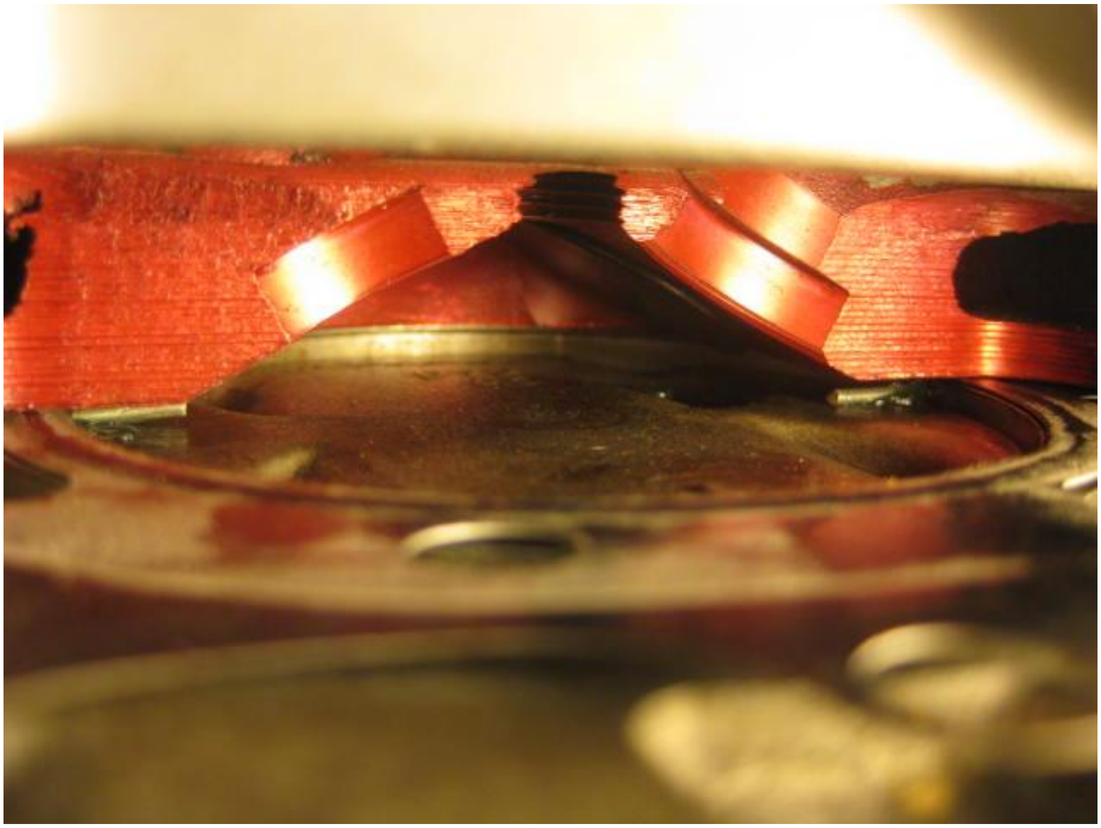
Solder is the most ideal tool for checking piston to head clearance and it's available everywhere in several thicknesses. Get some and cut a few small strips.



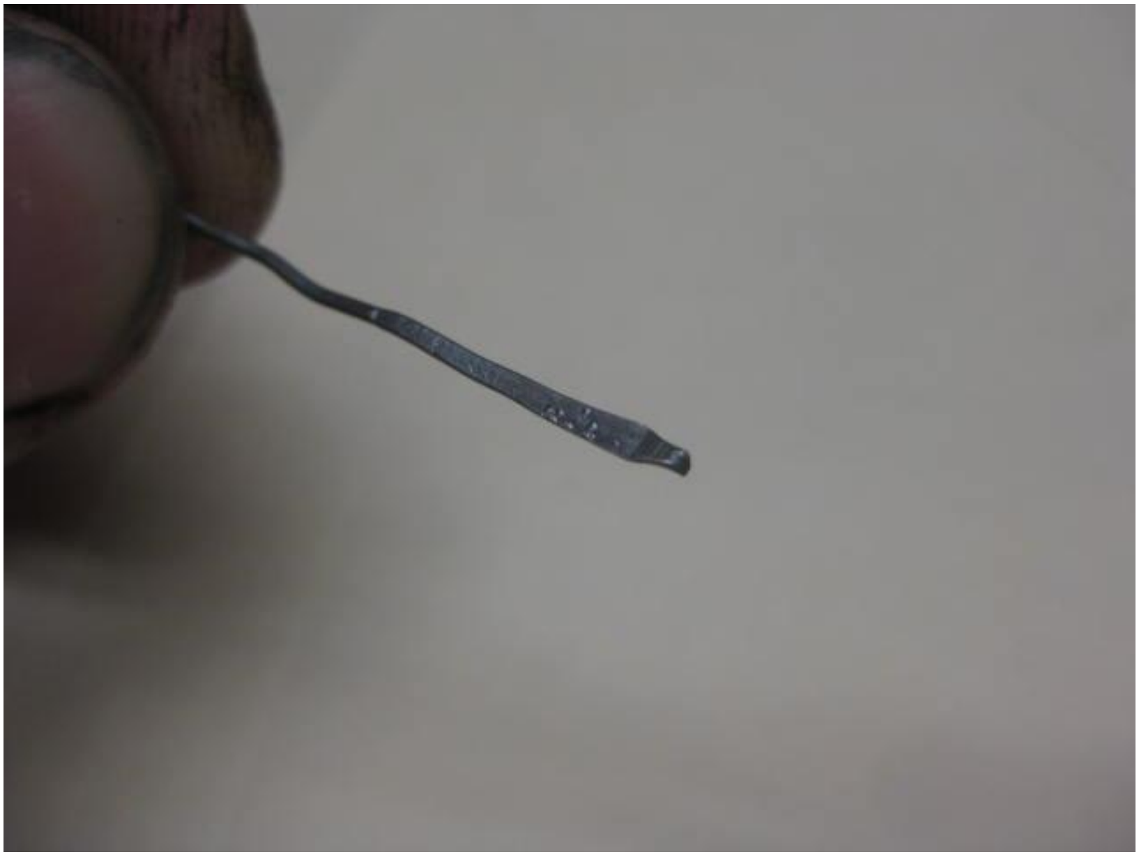
Clay and playdough are a messy waste of time because you can’t measure it accurately and it often sticks to valves and tears. It is handy for making impressions of shapes inside the chamber that we can never see, but solder definitely does a better job on P2H clearance in my opinion.

So, insert your head dowels and lay on the gasket that you will actually run. Don’t use any sealant or copper spray at this time. And don’t freak out about myths that an OEM Honda MLS gasket can only be torqued down once.   Now dab grease on the intake and exhaust sides of the piston and lay the solder strips into the grease. This will hold them in place.

Install your head studs and torque a bare or loaded cylinder head to spec. Turn the crank over till you feel resistance and gently turn passed it. That's the solder squishing. If you chose solder that's much too thick, you may not be able to complete the revolution without causing senseless damage. Start over with thinner solder. Here is an image into the combustion chamber of a B series engine, through a window that I milled into the side of a junk head. The red is dykem, and you can see where the first two exhaust seats used to be.



Remove cylinder head and measure solder at the thinnest point. If there is no definite flattening of the solder, you chose a solder that was too thin. Pull the head back off and start over with thicker solder. Is this getting tedious yet?



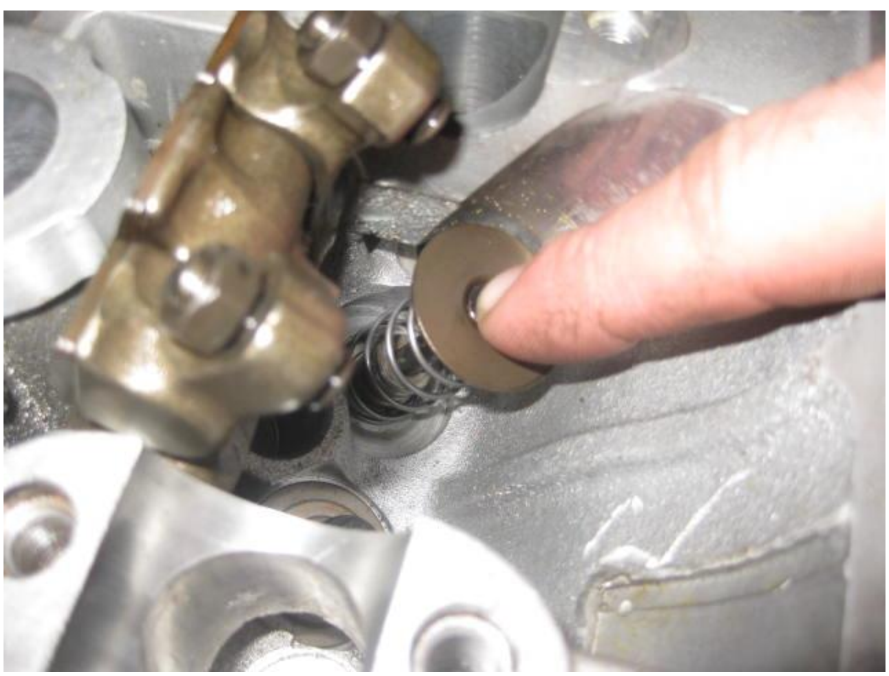
If lacking clearance, add OEM metal gasket layers to build it up (remove rivets first!) and recheck. If the clearance is too large you can remove gasket layers, mill the deck or head, alter bottom end combo, etc. Recheck with fresh solder until you achieve desired piston to head clearance. Do not neglect to consider the effects of excess piston to wall clearance on piston rock at TDC. The looser the bore and shorter the piston skirt, the more they will rock. This will not show up when checking by hand but will cause the pistons to hit the head at high rpm. It sounds like a very harsh ticking lifter. Tear down immediately if you suspect contact.

VALVE TO VALVE CLEARANCE

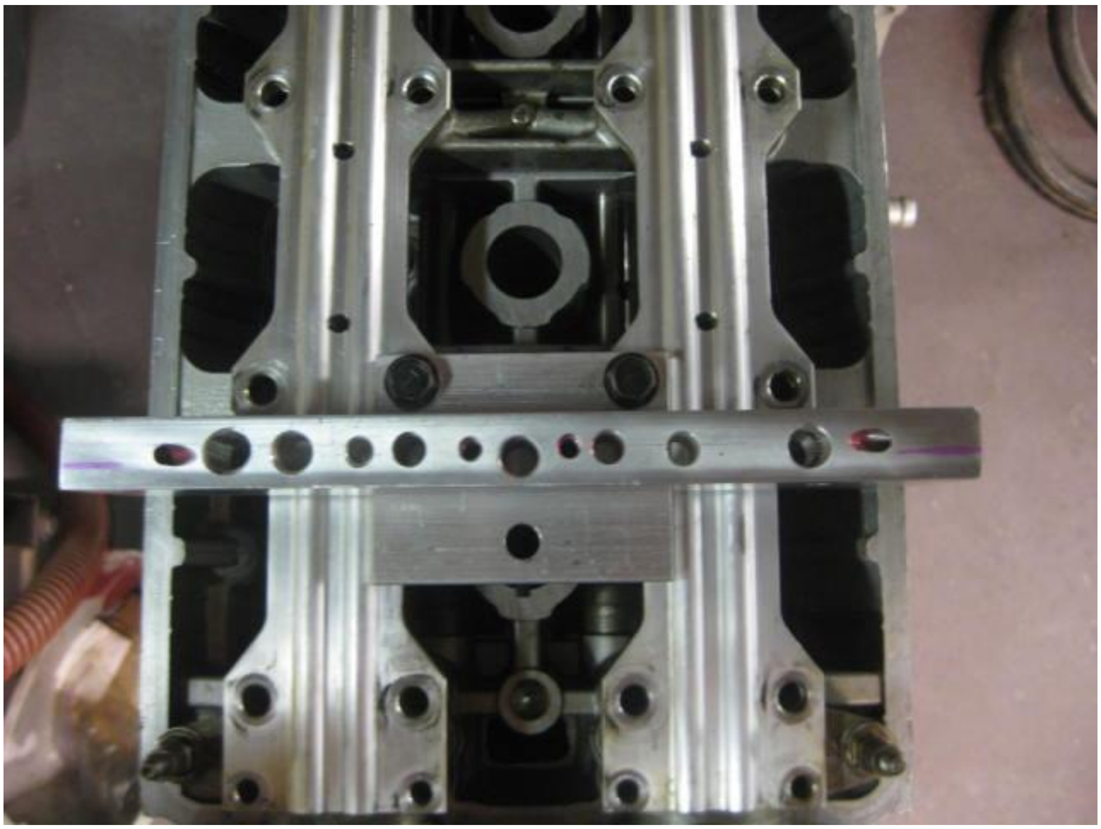
This is performed with the head removed from the block and sitting on a bench, with a T-shirt, foam or cardboard underneath to protect the surface finish of the freshly milled deck. First we need to install at least one intake valve and one exhaust valve into cylinder number one using the soft check springs supplied with the cam degree kit. Spring seats and valve seals are not required. The point is that you can actuate a valve with your fingertip, very important. Also important is that all valve seat work has been performed and we are testing with the actual valves that we will run.

Next, lock the rocker arms in VTEC! Since the cam profiles are larger and clearance will be reduced on the high lobe, if you fail to do this, chances are there will be a collision when you actually run the engine. Take your short rocker pin out of the rocker arm with a magnet and insert one of the steel BB's behind it. This creates a conveniently sized protrusion to lock the pins together. It also rolls well and easily clings to a magnet or flows out the drain plug hole via compressed air blasting in the event that you drop it inside of your assembled engine. Try not to.

Now the cams must be installed and cam caps and rails fastened down for this. Snug will do, so put away the torque wrench**. Ensure that you set the valve lash adjusters to ZERO LASH** by backing off the jam nut and turning the lash adjuster till it just touches the valve stem. You'll feel a sudden yet slight resistance. Turning past this will actually open the valve and skew your entire result. Stop at the first resistance.

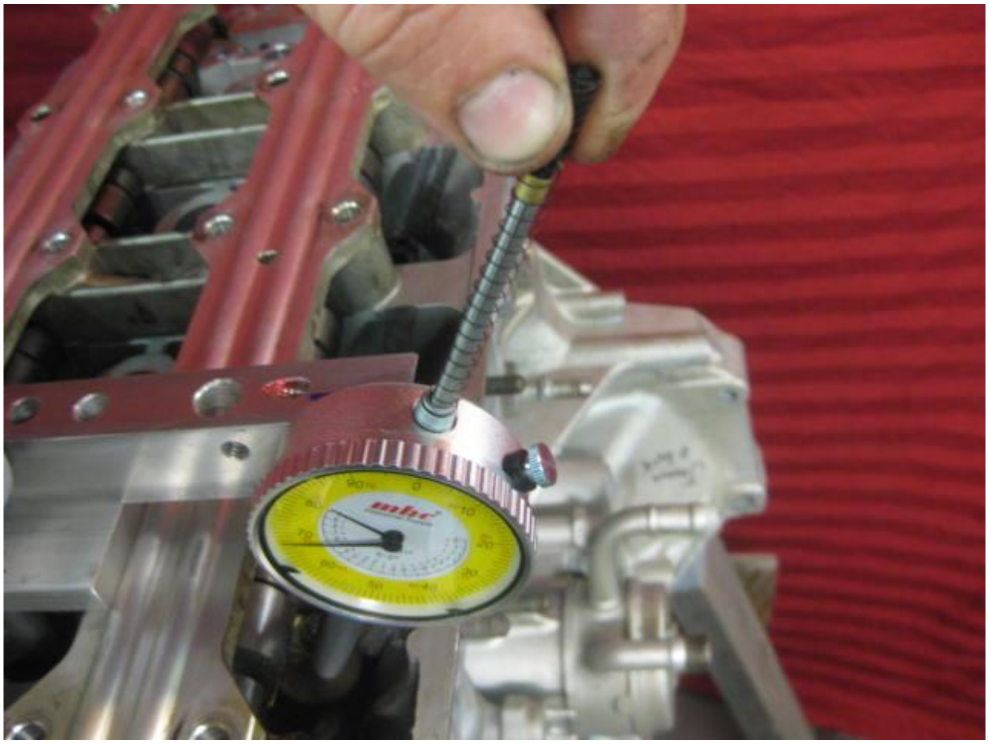


Now we've got to bolt the degree kit onto the head. Here is my old Swiss cheese prototype mocked up on the windowed dummy head without indicators, because it's easier to install without them mounted to the beam.



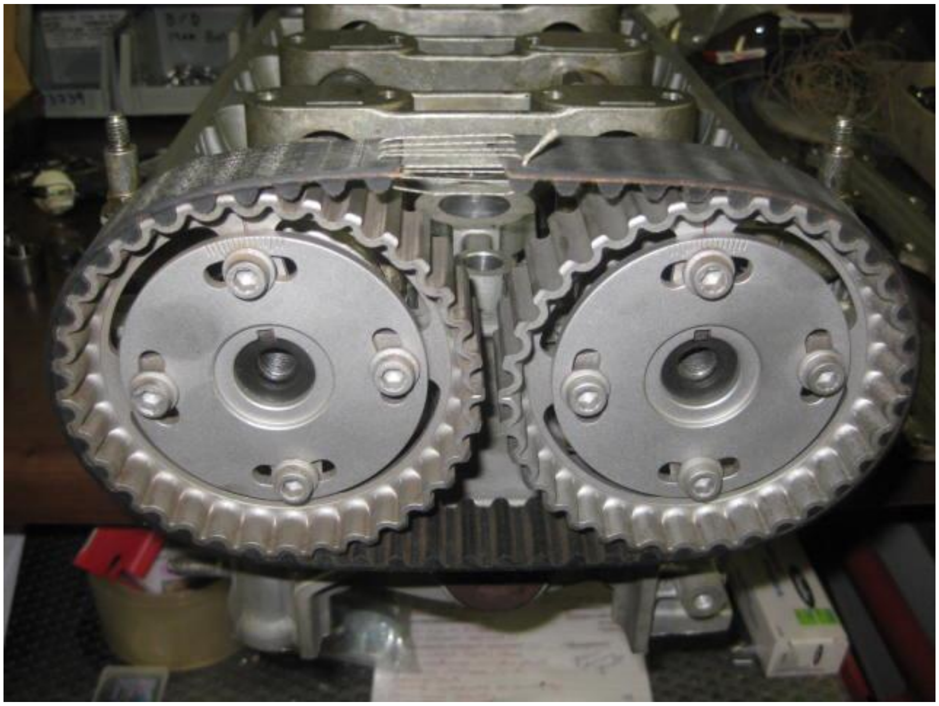
Note the orientation of this kit. The magic marker lines represent the offset holes that all current kits have. They are to be oriented closest to the cam gears, and are to offer the dial indicators some extra clearance for swinging over to either valve.

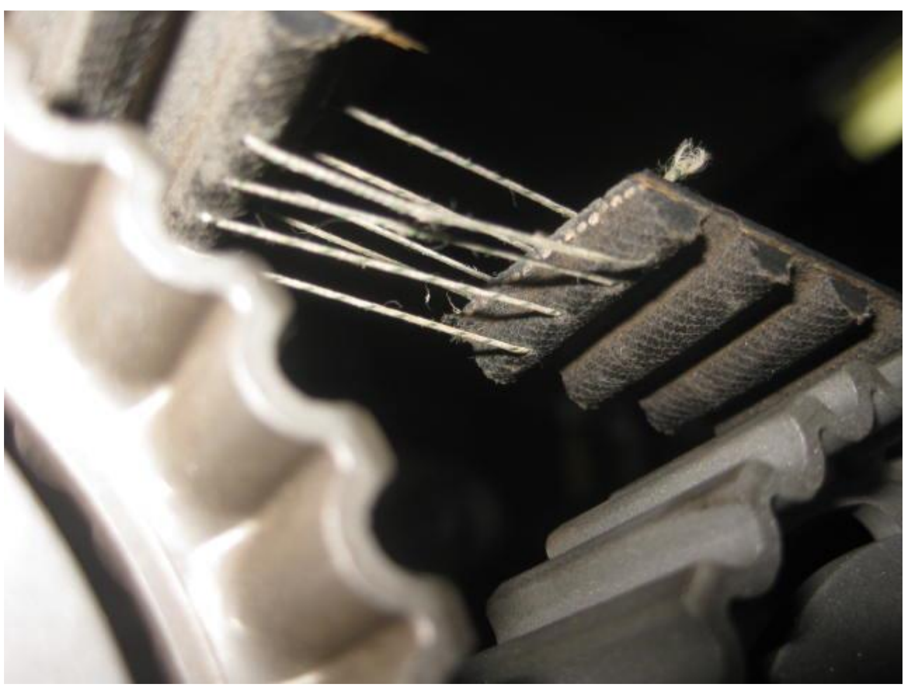
I recommend removing the top tube on the dial indicators supplied in the kit so that you can manually pull the stems up for positioning. The RH threaded caps unscrew. Be gentle, and watch out the spring doesn't pop off when you lift the stem.



You want the indicator tip to land on the valve retainer like so.

Now sacrifice an old timing belt to lash the cam gears together. I use fishing line through the "teeth" and cinch it like boot laces with needle nose pliers. Tie a knot if it wont stay tight.





Make certain that your cam gears fit snug on the woodruff keys and that the keyway cuts in the camshaft aren't damaged or worn. On very close tolerance builds I would hand file oversized keys to a light press fit so the gears never slop around in the event the cam gear bolts were to back off. Everyone makes mistakes, let's endeavor to minimize their consequences. Torque your cam gear bolts, slip on your makeshift timing belt and ensure that the timing marks are all aligned on one plane with a straight edge, ruler or sheet of paper.

You should have the fixture bolted to the head like this, though the center dial indicator is not necessary at this time.

Now grab your trusty feeler gauge, and pull out the combination of feelers that add up to the desired minimum clearance that you've determined will be safe for your combination. This is going to be our minimum valve to valve "clicking" clearance and we will not be forcing them to slide between the valves because they will just bend over momentarily even though they do not have the adequate clearance.

Print a copy of this table I made up, fill it out and store for your own file or your customer. This card must remain with this engine so that any future owner will have a record of what's safe and what isn't. If you think dyno time is expensive, try blowing up an engine to save $100. This card will save you thousands of dollars, so don't take it lightly and remember that it's void if you change cams or cam gears. Do over.

So what we do is use a ratchet to slowly rotate the cam that is on the tension side of the belt, in the direction of its natural rotation. For B and D series engines, the direction is CCW and the exhaust cam leads. Intake camshaft position has the most pronounced effect on where the torque peak will land, so you should be most concerned with the ability to move your intake where you want, and tolerate a range of positions that the exhaust can acceptably clear. I will always argue that the "best" position to install your cams is the degree where they provide the type of power you desire and the clearance you are comfortable with. Power where you want it is trial and error, but clearance should be something we are absolutely certain of every time!

The trick here is a light touch with the gauge between the valves. If it fits, we call that a GO, if it doesn't fit, it's a NO-GO. Do not confuse yourself by taking measurements of the specific clearance at each setting, its unnecessary information.

If you remember one thing about cams it should be this. The intake valve chases the piston down and exhaust valve is chased up by the piston. Therefore if the intake valve opens later, it's safer. The opposite holds true of the exhaust. If it runs back to its' seat later, the piston will catch it. **The direction of safety is to retard your intake and advance your exhaust**.

Therefore the fastest way through this chart is to start at intake -6 and exhaust +6. rotate and check clearance, you'll probably have a mile. Mark the intersection box a GO. Leave the intake on -6 and jump the exhaust ahead a few marks to +3 and rotate again. If you get a GO then everything you skipped is also a GO. As soon as you get a NO-GO everything after it is also a NO-GO. When you've gone through all of the possible exhaust cam gear positions for the -6 intake row, adjust the intake cam gear to -5 and start again. This is very time consuming but very important if you are one who likes to play around with different cam gear settings to try squeezing out a few extra horsepower. When you're done, you'll have a chart that looks very similar to a fuel table. I suggest you color code it and make a copy or laminate for future use.

VALVE TO VALVE CLEARANCE

By now you're tired of snugging allen cap fasteners and have a chart with a centralized cluster of GOs surrounded by a minefield of NO-GOs. Point at the center of the GO zone and pick the intake and exhaust cam gear setting that is right in the middle. Set your Gears there and install the head with 1 intake valve, 1 exhaust valve located opposite each other in a pair, both running check springs and VTEC locked on each side. Use the intended head gasket and studs, and torque to spec. **BACK OFF YOUR LASH ADJUSTERS TO PREVENT CONTACT DURING INITIAL SETUP**. Install the cams, caps and rails, put on your real timing belt and ensure all of the TDC marks line up as they should. Set belt tension as normal.

Bolt on your center dial indicator with the supplied extension rod. You'll notice there's a tip threaded into the dial indicator stem, back it off with pliers and unscrew by hand. Thread in your extension rod till snug and insert through the empty spark plug hole. It helps if the piston is down the bore and out of your way. **Cinch the center indicators set screw down snugly so that the TDC indicator does not move. If it slips, your data will all be wrong.**

Now take the supplied stepped bushing and place it behind the supplied degree wheel, then bolt it to the face of the crank snout in place of a crank pulley and snug it on somewhere near approximate TDC**. If the wheel slips, TDC is lost and your measurements will also be skewed.**

Fashion a pointer. I think a piece of stripped solid copper wire works best. You can attach it to any of the water pump bolts and bend to position. I prefer to sharpen them to a point.

Now slowly and gently rotate the crank in its natural direction and watch the TDC indicator to suddenly jump into motion. This means the piston has just contacted and begun lifting the indicator stem. As you rotate the dial will sweep clockwise numerous times, then slow, dwell, and reverse directions. The dwell was exactly Top Dead Center and you'll want to go around a few times until you're absolutely certain you've found it. When you are able to land exactly on the indicator's dwell, STOP! Bend the pointer over to the TDC line on the degree wheel and rotate the indicator dial face so that the zero mark is aligned with the pointer. This way you'll be more likely to notice if the TDC position deviates from the dwell position throughout this process.

Adjust your rocker arms to zero lash again as previously described. Give your engine a gentle practice spin while paying attention for even the slightest resistance. You are checking for physical contact, and you never ever want to overcome any resistance. If all is well, leave the TDC indicator in position and focus now on only one cam at a time. Adjust the dial indicator backing ring so that the small hand points to zero when resting on the back of the valve retainer and the valve is fully seated at zero lash. Study the image below and notice that the small hand is indicating that the dial has already swept approximately 2.5 times, yet the large hand is on zero. That's because I have rotated the backing by loosing the thumbscrew that you can barely see in the top right back ground.

Using a ratchet or breaker bar, turn the crank bolt slowly in the natural direction of rotation, and watch for the dial indicator to begin its sweep. Make a tiny mark where you pointer is pointing that very instant If you wish, but initial opening is rarely used. If you want specs at .050 turn the dial till it has passed the first 50 small lines that each represent .001 or "one thousandth of an inch." If you prefer 1mm lift like most Honda builders, that's equivalent to .039" or the first 39 marks, "thirty nine thousandths of an inch."

Whichever you choose, when the indicator dial points to that mark, you mark the degree wheel with pencil where your copper wire pointer is pointing. Stick to whole lines for simplicity, don't mark half lines. WD40 will wipe pencil off pretty easily so feel free to draw and write all over the degree wheel.

Continue rotating and watching the indicator sweep CW till it also dwells and reverses rotation. The dwell spot that time represents peak lift, not lobe center. You cannot measure lobe center, you must calculate it. Mark your peak lift and travel onward, watching the indicator wind down as the valve approaches the seat. Your final mark will be done at the valve close point, whether you chose .050, 1mm or actual close. Find that spot and mark the wheel. If you miss your mark, never back up, only travel in one direction to prevent inaccuracy from timing belt slack.

Now you've got a degree wheel with at least two marks. Valve open and close are what we care about. I will refrain from giving you any math assignments here. I designed the degree wheel for simplicity so that we could simply make two marks, count the degree marks between them and find the center by dividing the total number in half and counting our way to the middle.

Look at where I've scribbled on this wheel. The total duration was 250 @1mm. Half of 250 is 125, So 125 degrees after valve open @1mm and 125 degrees before valve close @1mm = the midway point of our duration or total valve open time. That midway is called lobe center. Again, it does not have to coincide with peak lift. In our example above, the intake valve opened at 25*BTDC and closed 225* ATDC. Count them up manually and you'll get 250 degrees of duration.

If the card says nothing more than “intake 110* LC” then you’ve got to do some thinking. An intake of 110* lobe center is assumed to mean ATDC even though the cam card wasn’t courteous enough to specify. Rotate, measure and mark your open and close points on the wheel. Manually count the space between, divide by two and mark your lobe center. Say lobe center lands on 108* ATDC. So it’s two degrees off. When speaking in “after TDC terms, the larger the number the later (retarded) the cam will arrive at its destination. Since the lobe center fell on 108*ATDC, a smaller number, the cam is advanced 2 degrees. You must retard the cam core 2 degrees within the cam gear. I wont use the terms plus or minus incase of one manufacturer marking the signs different than another manufacturer or like my home made ones, no numbers at all.

Lets return again to the clock schematic.

In order to retard the intake cam 2 degrees on an engine that rotates counterclockwise, you would want the core to arrive later than the keyway, so you would have to turn the core against the direction of rotation. Turn the cam two marks clockwise within the stationary cam gear and retighten the fasteners. Now recheck with the dial indicator and degree wheel to ensure that the scale of the cam gear markings coincides with how many actual degrees the camshaft moved relative to the crank.

The terms are slightly different but you handle the exhaust cam in the exact same manner as the intake. Torque will be most affected by how late you close the intake valve (later moves torque peak upward) and how soon you open the exhaust valve (simple version is that the sooner you open the exhaust the greater the blow down pressure will be which promotes better evacuation of exhaust gasses.) Make special note of these two positions and remember the safe directions I outlined previously.

PISTON TO VALVE CLEARANCE

It isn’t over yet. We need to know that the camshaft lift will not open the intake valves into our piston or leave the exhaust valves hanging open for the piston to close them. This is the CamDegree.com kit’s strongest feature.

While you are set up as described above for degreeing the camshaft, at any time you chose, you may stop rotation and open either valve with your finger until it reaches the maximum physical range of the rocker arm, or stops against the piston. I like to place the butt end of a wooden hammer handle atop the vacant rocker arm position to push the cluster of valves open so that my fingertip doesn't get sore. When checking this clearance, you must first zero the dial indicator on the chosen valve retainer before manually opening the valve. Read the amount that the indicator travels from this new zero till the end of travel is reached. **This amount is your piston to valve clearance AT THAT CRANK POSITION ONLY. Clearance must be checked at the crank position where minimum piston to valve clearance exists**. Most people think this occurs at TDC but I have never seen that be the case. Remember that the intake valve begins opening while this piston is travelling toward TDC and the two are racing at each other. This is the point that needs to be checked and it usually occurs around 7-12* before TDC if I remember correctly. It's been almost ten years since I degreed a motor, so go easy on me. The position of minimal piston to exhaust valve clearance is similar, but on the other side of TDC. The only way I know of to find this point is to rotate the crank in small increments, re-zero the dial indicator on the retainer, plunge the valve open and measure many positions to see which spot allowed the least travel of the valve before contacting the piston. Think of it like trying to find a safe at the bottom of a murky lake while in a boat by dipping the anchor line and measuring over and over how far it goes in. The shortest length of rope you lower down means the anchor is resting on top your safe full of sunken treasure. Yar!

VALVE POCKET RADIAL CLEARANCE

Last one, I promise the punishment is almost over! We need to be certain that the valve head is centered over the reliefs that have been machined into the piston crown. Forged pistons are manufactured on CNC equipment and CNC operators are human too. One extra Zero punched into a tool offset can spell disaster for you. Don't forget that aggressively milled heads and oversized valves will likely require relocation of the valve pockets in order to clear. It's your responsibility to be certain this is not the case.

You need to make a fairly precise staking tool for this task. The best thing is a cut off valve stem with a little extra rod welded to it. You can turn the point on a lathe or perhaps rig up a V-block for your bench grinder or belt sander and get pretty close with some patience. The point needs to be located very close to the axis of the rod which will be going down your valve stem bore and staking the piston in a fairly precise location. Here is what it looks like:

And here is what it does:

Note the very minor divot we placed in the piston that will be buffed out after we are done using it. You are to stake this divot when the crankshaft is located at the exact position of minimal valve to piston clearance that I described above, and remember that this means two separate crank positions, one for minimum intake clearance, one for minimal exhaust clearance, both near TDC, one on either side.

Once you've staked your mark you are free to tear it all back down again. Grab your favorite calipers and measure the OD of each valve that you'll be running like so

Now divide the valve OD in half and open your calipers that amount, plus whatever amount you feel comfortable adding for minimum clearance between the edge of the valve relief pocket and the margin of your valve head. Use the back of the calipers to scribe a faint arc onto your piston crown that originates at the divot we just staked.

I scribed two lines to illustrate that settling for a quick stake mark at TDC rather than investing the time to find the previously described closest point between piston and valve can have dire consequences.

There you have it folks, everything I know about preventing an engine from slamming into itself, I give to you for free. If you're tired of reading it, imagine how tired I am of writing it. Even worse is the drudgery of pro engine building as a profession. The monotony of repeating this procedure over and over with machine work in between each time so that a customer's ragged edge engine can survive 20 passes before he asks you to do it all over again next season is not nearly the glamorous life that most outsiders think it is. You want to make easy money in the race business? Build transmissions!

Thanks for your business and continued support, it has made my life and my children's lives immeasurably better and I thank you for that. Especially I thank Chris Harris, Larry Widmer, Tom 'Tbone' Cote, Brad Z, the late and crazy greats Randy Monroe and Don Flores. Last but not least Robert 'Rocket' Martin for bickering with me on HT so much that I actually had to learn what I was talking about to go blow for blow with him.

Mike Belben