

J2 TECHNICAL ARTICLE

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From Octagon Heaven

Source: Mac Reynolds

Thanks Larry Lee

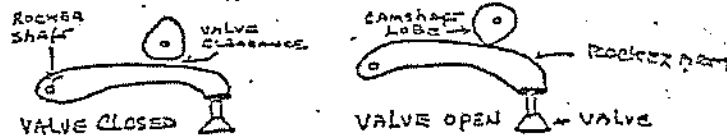
VALVES, VALVE TIMING, SHAPE AND DIMENSIONS:

The Club Sages and a recent Tech Talk got me thinking about Valves, Valve timing, and the shape and dimensions of the cam lobes. You see, my fresh "J" engine was a bust, and it took first gear to climb my driveway.

Below is a chart of 3 "J" camshafts, all dimensioned by measuring. What follows is as applicable to a TD or a Ford as it is to a J2.

Lift: The Manual says the "J" cam lobe should lift the Rocker 0.22". This produces an actual valve opening of 0.27" due to the leverage effect of the rocker arm. Because the "J" valve clearances are .006", this must be added to the 0.22" rocker lift to give the needed cam lobe lift.....0.226" in this case. This lift must also be pretty much constant for all lobes, otherwise each cylinder will fire with different power and destroy the overall engine balance. The difference in vibration using good and bad cam shafts is dramatic.

The drawing below shows the lift mechanics:

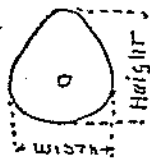


Dimension chart: The total amount that the cam will lift the rocker arm is the difference between the height and width of the lobe, less the valve clearance.

CAMSHAFT #1

Here are three different J2 camshafts:

LOBE	1	2	3	4	5	6	7	8	
HEIGHT	1.013	1.019	1.019	1.015	1.012	1.017	1.010	1.010	MAX HEIGHT VARIANCE - .009
WIDTH	.783	.790	.788	.788	.786	.791	.780	.783	MAX WIDTH VAR. - .008
TOTAL LIFT	.230	.229	.231	.227	.230	.226	.230	.227	MAX LIFT VAR. - .005
									AV Rocker Lift of .006 setting - .222



This is Marty Reilly's new camshaft; an excellent one. Max variance in lift is .005". It's now on loan in my J2. Average rocker lift of .222" is actually .002" above specs.

(continued Back Side)

CAMSHAFT # 2									
PBE	1	2	3	4	5	6	7	8	MAX HT VARIANCE
Height	1.005	.991	.999	.997	.998	.995	1.001	.990	-.015
Width	.795	.790	.785	.790	.793	.790	.793	.789	-.005
Valve Lift	.215	.201	.211	.197	.195	.195	.208	.201	-.020
									AVERAGE ROCKER LIFT
									AT .000 SETTING
									.199

This is a used one (Reilly's). Lift variance of .020" is 4 times the .005" we should seek. Average rocker lift is .021" short and two lobes lift .031" less than they should. The cam is no good, and is so badly worn that a regrinding probably would so reduce the width as to throw the valve timing way off the mark.

CAMSHAFT # 3									
LOBE	1	2	3	4	5	6	7	8	MAX HEIGHT VARIANCE
Height	1.000	.988	.991	.987	.988	.993	.991	.985	-.015
Width	.787	.785	.790	.788	.787	.790	.787	.790	-.005
Valve Lift	.213	.200	.201	.201	.201	.203	.212	.195	-.018
									AVERAGE ROCKER LIFT
									AT .000 SETTING
									.198

This shaft is my old one and it just about destroyed my sweet nature.

With it the car would barely get to 3,000 RPM, would not take full gas pedal without choking, and wouldn't go uphill. The engine shook madly and the exhaust pulse was very uneven.

I replaced it with camshaft #1; it runs like a Green Hornet, has great power, little vibration, and the exhaust is quite as even as the passionate breath of a large angular German girl I knew in younger years.

Problem: There is one stinky problem concomitant to the overhead camshaft engines. There is available a bare minimum of valve clearance adjustment. If you regrind the camshaft or fit a new one, you may find yourself out of the adjustment range. If so, call me; there is a tedious solution.

XPAG/XPEG engines do not have this problem.

Timing The valve clearances quoted in the manual will, using a cam of correct contour and size, open and close the valves in proper sequence, at the right instant of rotation, with proper overlap, and to the proper amount of opening.

A peek at the drawing and it is apparent that with too small a valve clearance the valve opens too far too soon, closes too late, and is open too long a time. The exact opposite conditions occur with too large a valve setting. You can see that using smaller valve clearances to quiet an engine is decidedly contrary to design parameters.

An easy adjustment with overhead cam engines, but on pushrod engines of the XPAG/XPEG type, two things may happen to make valve clearance setting nearly impossible.

- a) The rocker arm face, where it meets the valve stem, may become concave dished due to wear, and there is then no way in the world to measure the clearance.
- b) There is a tendency for the upper tip of the pushrod to become loose in the hollow pushrod. Your .019" setting may be more like 1/4"!