TECHNICAL TIPS

No. 10 MAY 1987 Harley-Davidson Motor Co., Milwaukee

Complete Timing Instructions for Harley-Davidson Motors

Working Principles of the Harley-Davidson Motor

The Harley-Davidson motor is of the conventional four-stroke-cycle principle. Each complete power cycle is made up of four events, or strokes; hence the term "four-stroke-cycle". This type of motor is commonly referred as a "four-cycle" motor.

Each 180 degrees of fly-wheel travel is one event or stroke. The flywheel must, therefore, make two revolutions to complete one power cycle of the motor. The four-stroke-cycle principle is briefly: 1—Intake or admission stroke; 2—Compression stroke; 3—Ignition and power stroke; 4—Exhaust or scavenging stroke.

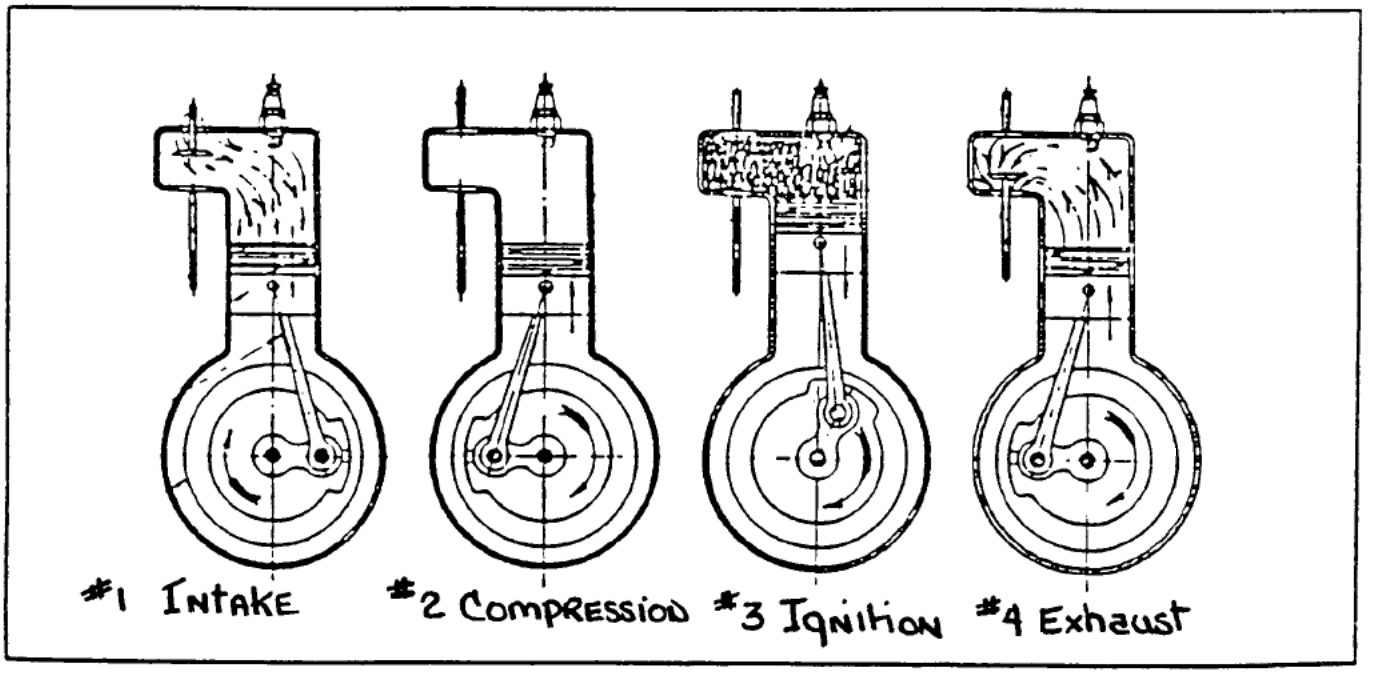


ILLUSTRATION NO. 1

The Accompanying Illustration Graphically Explains the Four-Stroke-Cycle Principle

The VOES of Mr. Hiney

Vacuum Operated Electrical Switch

1) What's it do?

It's a kind'a light switch only this one turns on and off because of changes in intake manifold vacuum.

2) What changes intake manifold vacuum?

Load!

(Note to new fathers) - No, not the kind of surprise found in babies' diapers.

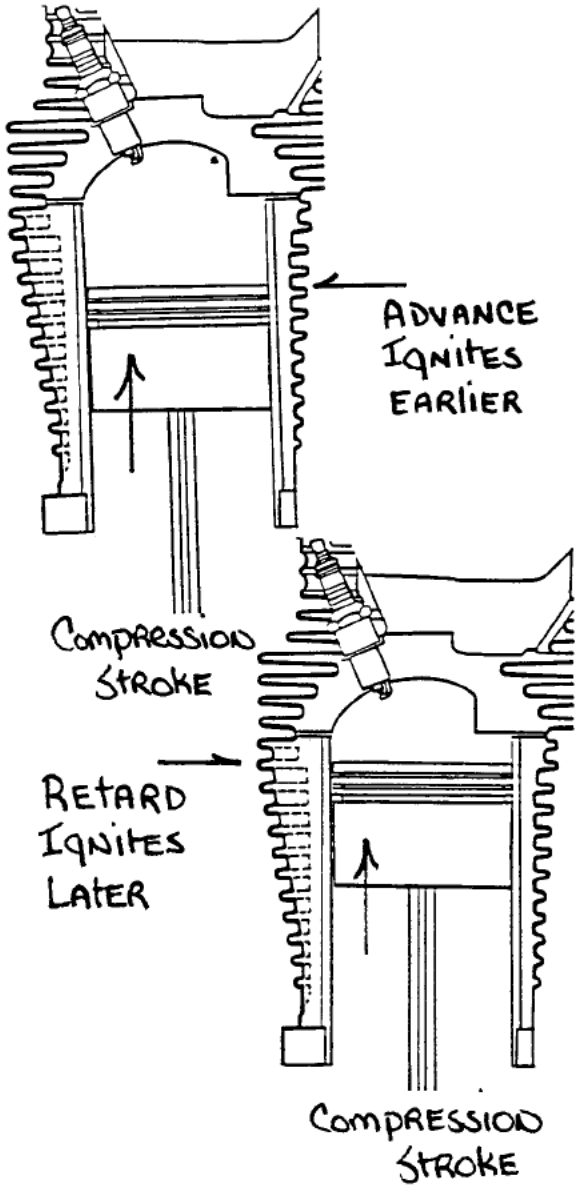
Load! - like driving up a hill and trying to maintain 55 mph. You're making the motor work. This will cause the intake manifold vacuum to be low. Low intake manifold vacuum will cause the VOES to turn off - not completing ground. This will retard the timing (Power Curve) through the module.

When the motor's not working hard, the intake manifold vacuum will be high and the module will advance the timing. This is the Economy Curve.

STORY TIME

You're driving down the highway on your way to Red's house. The sky's blue, there's no wind and the road's as flat as a pancake. You're in a hurry but ya just got a speeding ticket so you're minding your P's and Q's holding a steady 55. You've got time so you ponder your intake manifold vacuum. You figure it to be 12 inches of mercury vacuum as you are gifted with second sight.

Just then you realize you're coming to a hill. You begin to climb; you can hear the motor labor and speed's dropping off. You respond with a twist of the throttle but you're being followed by the entire State Police garrison so you'll maintain 55. You think to yourself, "my intake manifold vacuum is dropping, 10-9-8-7-6-5." Bingo! Your VOES switches off and the module retards the timing to the Power Curve. You smile to yourself and think of what's happening in your combustion chamber.



Words fly into your mind. Advance, retard Economy and Power Curve. How will you explain to Red this revelation? Why advance for Economy and retard for Power? It comes to ya. It's like a book of matches.

Economy is a lean mixture, so if ya'd fold out every other match and light one of the end matches one after another, they'd ignite. That takes more time so it can be ignited earlier, advanced. It's efficient and creates a smooth burn and Economy.

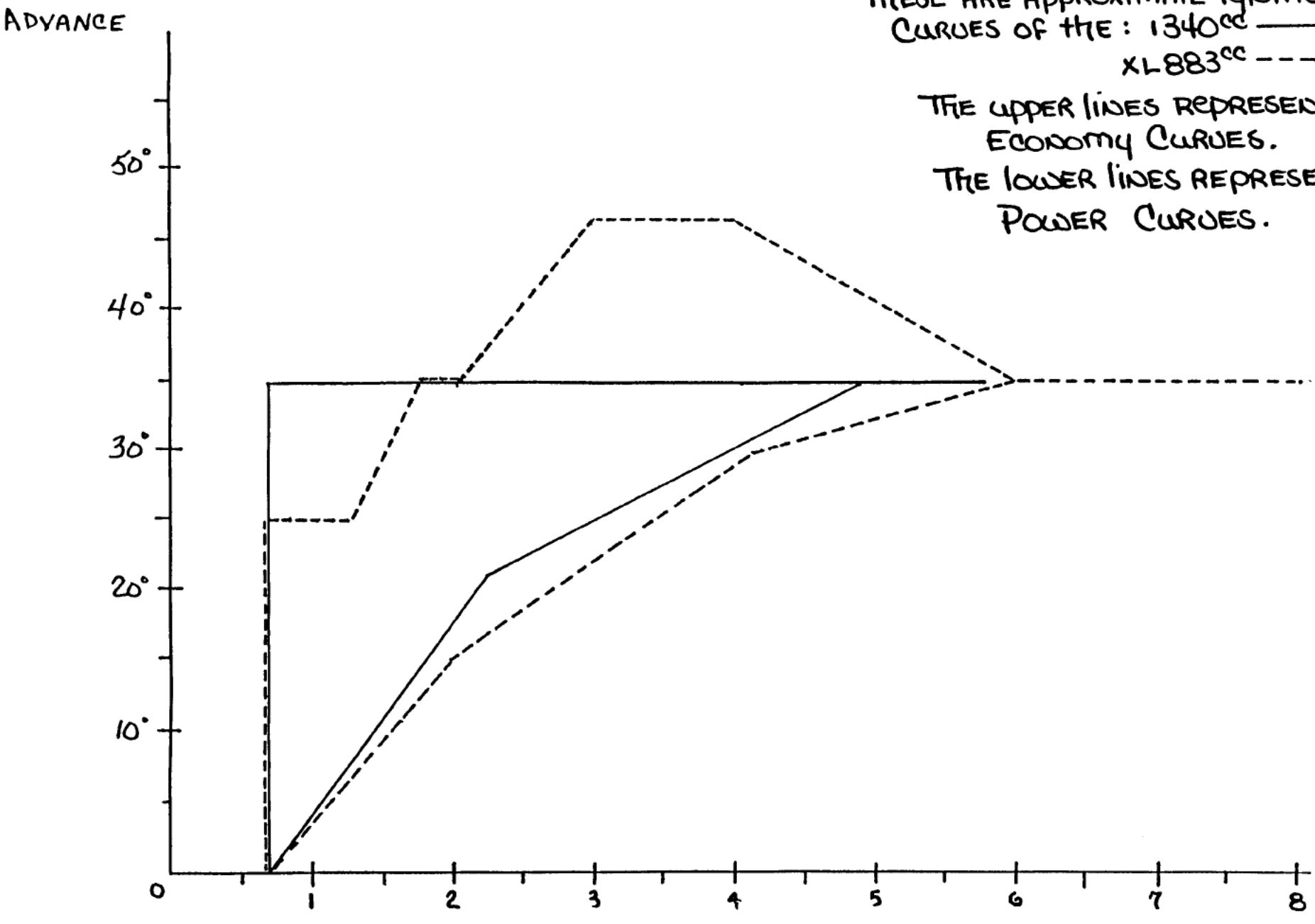
But the Power Curve - that's like folding all the matches out and lighting them. It doesn't require as much time. It's a rich mixture. It might burn unevenly if it had too much time. An uneven or fast burn could cause ping.

You thank your lucky stars you've got that VOES and 2 stage module but realize you've driven past Red's house. You hope Mr. Hiney won't be sore but what the heck. It's a nice day. Why not keep on goin'.

REMEMBER

Light or no load = high intake manifold vacuum. The VOES is on or completing the ground. The module is on the advanced or Economy Curve.

Load or heavy load = low intake manifold vacuum. The VOES is off or not completing ground. The module is on the retard or Power Curve.



THESE ARE APPROXIMATE IGNITION CURVES OF THE: 1340cc ——
XL883cc - - - - -

THE UPPER LINES REPRESENT THE ECONOMY CURVES.
THE LOWER LINES REPRESENT THE POWER CURVES.

Parts and Accessory Bulletin - They are yellow in color, hard to miss but almost always overlooked. Please take time to review the following P & A Bulletins:

P & A #339 Connecting Rod Set #24281-74A
P & A #337 Unique Parts Mid 87 FLTC/FLHTC
P & A #336 87½ Hayes Rear Brake Master Cylinder Interference With High Performance Exhaust System
P & A #333 Screaming Eagle Carb. "Tech Tips"
P & A #329 Cast Wheel Assembly #43299-87
P & A #328 87½ FLHS Unique Parts List
P & A #324 87½ FXRC Unique Parts List
P & A #307 Screaming Eagle Cam Specs.

Please read the following excerpt from the Service Manual.

Boring and Honing Cylinder

1. The cylinder must be bored with gaskets and torque plates attached. Bore the cylinder to 0.003 in. under the desired finished size.

2. Hone the cylinder to its finished size using 280 grit rigid hone. To break a glaze, use a 240 grit flexible ball hone. Honing must be done with the torque plates attached. All honing must be done from the bottom (crankcase) end of the cylinder. Work for a 60° crosshatch pattern.

NOTE

Improper crosshatch pattern or too fine a hone will result in insufficient oil retention and possible piston seizure and/or oil consumption.

3. Final cylinder bore sizes, after honing are as follows:

Standard bore .....3.4980 in. ± 0.0002 in.
0.005 Oversize (O.S.) bore . . .3.5030 in. ± 0.0002 in.
0.010 O.S. bore.....3.5080 in. ± 0.0002 in.
0.020 O.S. bore.....3.5180 in. ± 0.0002 in.
0.030 O.S. bore .....3.5280 in ± 0.0002 in.

Fitting Cylinder to Piston

Since pistons cannot be accurately measured with standard measuring instruments, the bore sizes given in step 3 under Boring and Honing Cylinder must be observed. Example: a 0.005 in. oversize piston will have the proper clearance with a bore size of 3.5030 in. ± 0.0002 in.