Erik

Joined: 10 May 2005
Posts: 410
Location: Moerdijk, The Netherlands
Posted: Thu Mar 13, 2008 9:41 am Post subject: Ignitiontiming.. late/early... I am puzzled

---

Hi guys,

I am a bit puzzled because of what I read on a scooter forum. There was a thread about fitting a automatic advance/retard unit to a Vespa scooter (two stroke). The more the engine revs, the later the ignitionpoint was.

However, when I read this text in the Book of the Scott it states just the opposite (or am I reading wrong?):

I have also read somewhere the following:

"...the faster an engine revs the less time the spark has to ignite the mixture. That is why the ingnition should be earlier at high revs...

Somehow that seems to make sense. But it contradics the scooter thread.

It must be a bug in my brain but could someone enlighten me?

Back to top

efr215

Joined: 06 Nov 2004
Posts: 216
Location: Leigh-on-sea, Essex
Posted: Thu Mar 13, 2008 12:40 pm Post subject:

The aim of the ignition point is to get the maximum pressure from the burning fuel/air charge to occur at top dead centre in order to apply maximum thrust on the piston. The speed at which the fuel burns can be considered to be constant, (it's all a lot more complicated than that but good enough for now). However as engine revolutions increase the time for the crank to rotate by one degree decreases therefore to give the mixture enough time to achieve maximum pressure the spark has to occur earlier and earlier as engine revolutions increase.

So the "Book of the Scott" is correct and the scooter forum is wrong.

If you wanted to get really technical the book "Fuel Economy of the Gasoline Engine" (ISBN 0 333 22022 6) by D.R. Blackmore & A. Thomas is a good read. But if you get a migraine trying to understand it all don't blame me!

Back to top

Erik

Joined: 10 May 2005
Posts: 410
Location: Moerdijk, The Netherlands
Posted: Thu Mar 13, 2008 12:55 pm Post subject:

Thanks for your input David! Makes sense to me.

But..

I posted the same question on the scooterforum and got a 180 degree different answer! So BOS wrong and forum right...

And to make it complete here a small quote from the book "Two-stroke performance tuning" by A. Graham-Bell:

Now you see why I am puzzled.... Maybe there is a difference between the primitive low revving engines like Scott and those modern high revving engines like the Rotax kart engine this quote is about?

Back to top

efr215

Joined: 06 Nov 2004
Posts: 216
Location: Leigh-on-sea, Essex
Posted: Thu Mar 13, 2008 11:10 pm Post subject:

Like I said what goes on in detail inside an engine gets very complicated! The designer is faced with lots of conflicting requirements, the main aim being a setting that gives maximum power, or more correctly the minimum advance for best torque for all operating conditions. There are many constraints; the need to avoid knock, startability, driveability, emissions, the list goes on.

The above applies to “normal” engines but as things get more specialised and exotic, as in racing engines, such constraints become less significant in the search for power. When taken to the limit as in Formula I then it takes a team of twenty or so and several computers just to get the darned thing started!

Which is just what some owners might feel they need on the odd occasion!

On the face of it the quotation makes no sense to me either! But then again it is hard to think it is some sort of typo. I can offer no informed explanation, could it be peculiar to this particular engine? Something to do with cylinder filling at high revs or exotic porting maybe?

In a perfect world we would put a carefully prepared standard engine on a brake and produce a map. It is boring, noisy, tedious and time consuming work. On balance I think I'll just stick with the book settings!

Back to top

Erik

Joined: 10 May 2005
Posts: 410
Location: Moerdijk, The Netherlands
Posted: Fri Mar 14, 2008 7:08 am Post subject:

---

efr215 wrote:
On balance I think I'll just stick with the book settings!

I totally agree on that! But sometimes this sort of thing just gets me puzzled...

I run my Scott with the BOS settings and it runs fine. I run my Vespa with the scooter settings and this runs fine too...

Bottomline is: they both run fine!

Cheers.

Erik

-off topic- Will you be at Abbotsholme?

Back to top

Folkert

Joined: 19 Jun 2006
Posts: 6
Location: Northern Germany
Posted: Wed Mar 26, 2008 12:51 pm Post subject:

---

maybe this is an explanation for different advanced/retarded timing:

slow engines like the SCOTT are working like a piston pump - the piston sucks and presses the gases through the engine like in an air compressor.
Therefore more advanced timing for the spark at "high" revs is correct in the view that there is less time for burning the mixture.

In very high revving modern engines the cylinder porting and piston position acts like a trigger for the timing and direction of pressure waves in the induction and exhaust system. These engines are only "pumping" at low (starting) revs and will work at higher revs only because the piston and ports trigger the pressure waves in a much more efficient way than a pump could do. In these engines the actual compression rate is more and more independent from the geometrical compression rate and the direction of pressure waves is independent from the moving direction of the gases: for example there is a pressure wave running back through the exhaust to press fresh mixture near the exhaust port back into the combustion chamber for the next working cycle but the burnt gases are still flowing out of the exhaust´s end. It is obvious that such a "wave machine" will need different ignition settings than a pump at least to limit this effect before the engine desintegrates because of mechanical overload and over-revving.The phase in which both (inlet- and exhaust-)valves in 4 stroke engines are open is caused by the same "wave"-effect.

Back to top

Folkert

Joined: 19 Jun 2006
Posts: 6
Location: Northern Germany
Posted: Wed Mar 26, 2008 12:53 pm Post subject:

---

maybe this is an explanation for different advanced/retarded timing:

slow engines like the SCOTT are working like a piston pump - the piston sucks and presses the gases through the engine like in an air compressor.
Therefore more advanced timing for the spark at "high" revs is correct in the view that there is less time for burning the mixture.

In very high revving modern engines the cylinder porting and piston position acts like a trigger for the timing and direction of pressure waves in the induction and exhaust system. These engines are only "pumping" at low (starting) revs and will work at higher revs only because the piston and ports trigger the pressure waves in a much more efficient way than a pump could do. In these engines the actual compression rate is more and more independent from the geometrical compression rate and the direction of pressure waves is independent from the moving direction of the gases: for example there is a pressure wave running back through the exhaust to press fresh mixture near the exhaust port back into the combustion chamber for the next working cycle but the burnt gases are still flowing out of the exhaust´s end. It is obvious that such a "wave machine" will need different ignition settings than a pump at least to limit this effect before the engine desintegrates because of mechanical overload and over-revving.The phase in which both (inlet- and exhaust-)valves in 4 stroke engines are open is caused by the same "wave"-effect.

Back to top

Erik

Joined: 10 May 2005
Posts: 410
Location: Moerdijk, The Netherlands
Posted: Wed Mar 26, 2008 6:47 pm Post subject:

Thanks Folkert, that is a very clear explanation!