

This note describes the items you need to watch before deciding on an ignition system. The ignition tuning or installation is not explained.

Background

An ignition system consists basically of the following parts:

A pickup (or two)

This is required to signal the crank angle, and sometimes the next cylinder.

An ignition-mapping device (a box). The "black" box. It decides when to trigger a spark, what dwell angle to use, and other items, which influence the ignition.

An ignition amplifier, or trigger box. This device is sometimes built-in to the mapping device, sometimes it is separate. It "amplifies" the trigger signal to a hefty current.

A coil or multiple coils

They come in all shapes:

Single coil (for distributor)

Single coil, but two spark connections (for wasted spark)

Multiple coil packs (multiple of above)

Coil per cylinder

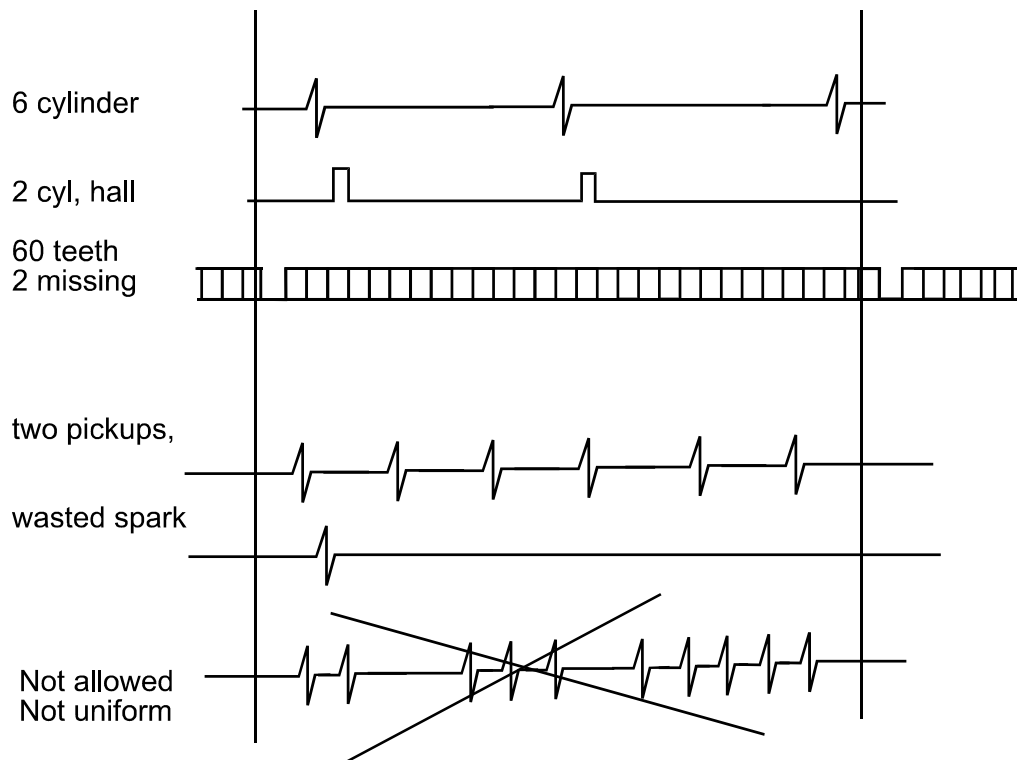
Considerations

This section explains what the PRS range of engine management systems can do. The SMT6 can handle simple ignition solutions, and some of the items relevant to the SMT6 are indicated.

HERE WE GO!

Pickup

All systems require a "UNIFORM" pickup track. That is the amount of teeth (or wholes, or gaps) the pickup is pointing at must be uniform distributed over one crank revolution. The exception is a "MISSING TOOTH" wheel, which all units can accept. The following drawings show the electrical signal resulting from the pickup. For the "blips" shown you can substitute a "square wave", which is the result of an optical or hall sensor. The pickup signal "strength" (amplitude) must be more than 3 volts at cranking.



A second pickup is required if more than one "blip" is present per firing, and if a "wasted spark" method is used. The same applies to direct firing (one coil per cylinder), which is handled the same as wasted spark.

Ignition Mapping Device

That's the box! It must change the ignition according to the following inputs:

- RPM: More advance is required at high RPM
- Manifold pressure: If you have manifold pressure, then use it as vacuum advance.
- Throttle position: If you have no manifold pressure, then you need throttle position. If you have both then you are ok.
- Engine temperature: You need more advance when cold.
- Boost pressure: You may want to retard under extreme boost.

All PERFECT POWER units can handle the above inputs, and adjust the ignition accordingly. Of course, you can adjust everything to suit your installation.

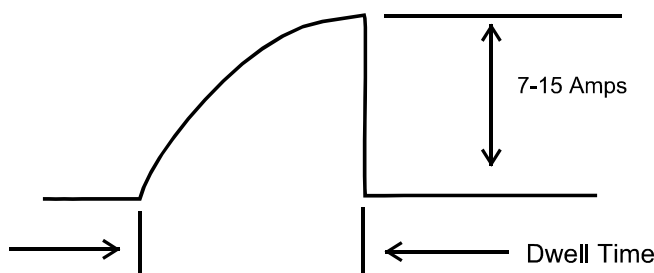
The difference between the unit's stems from the "AMOUNT OF IGNITION DRIVE" wires the units have. That is to say how many coils the units can drive DIRECTLY. You can drive more coils indirectly with the PRS range. This is explained in a different application note.

SMT6	drives ONE coil ONLY
PRS2	drives TWO coils directly
PRS4	drives THREE coils directly
PRS8	drives FOUR coils directly

The amount of current each output drives is about 7 Amps. No harm results when the current limit is exceeded up to 15 Amps.

The Ignition Amplifier or Trigger Box

All PERFECT POWER units have these amplifiers built in. This is very convenient when you have the right coil (7-15 Amps), but is a pain when your coil requires 50 Amps and an external TRIGGER BOX (amplifier). Let's first attend to the current limit. The current is very difficult to measure, because it flows only during the dwell time. This is the way the current looks when monitored with an oscilloscope.



The best is to use a BALAST RESISTOR first, adjust the dwell time, and monitor if the unit gets warm. If it doesn't get warm, remove the ballast resistor.

Some TRIGGER units are built in to the coil pack. These amplifiers can be used, but the drive signal must be INVERTED. This is explained in a different application note. There are CD (Capacitor Discharge) trigger units available, but they are hard to come by for wasted spark or coil per cylinder ignition.

The Coil

The coil must not use more than 7-15 Amps (see above!). It can have any form and shape. Modern coils (double coils!) and coils per cylinder deliver a "healthy" spark with no distributor losses at far less currents than 7-15 Amps. If the engine is boosted, then the spark must "violent" to punch through the extra cylinder pressure. This can be achieved with modern coils!

Conclusion

The SMT6 and PRS range of management systems was made with broad applications in mind. However, the inclusion of the INTERNAL IGNITION drivers, and its limitation of 7-15 Amps, is controversial. If it doesn't suit the coils you have, then external components (inverters, resistors) must be used to make them compatible. On the other hand, you love the system when you connect the right coils.