



# HOW TO:



## Removing Engine Spark Knock or Pinging via Timing vs. Engine Temp Map

There are many aftermarket engine configurations, fuel quality and payload variations associated with proper ignition timing. For this reason, it is impossible for the ThunderMax Base Map library to be a perfect match for every engine combination. However, the ThunderMax library of base maps will cover most popular engine combinations.

For those engines which require custom settings, adjusting the ThunderMax timing maps is a simple and effective process. This will allow tuners and users to set the ignition timing for their individual engine requirements, and remove any pinging present while operating the engine.

*Note: All ThunderMax base maps have been developed for use with premium octane fuel. Use of boutique fuel additives, stabilizers or special rare earth spark plugs, which could affect the combustion flash point, is **not** recommended.*

## ThunderMax Ignition Timing Myths

### Myth # 1

ThunderMax does not make automatic adjustments or timing corrections.

**False** - ThunderMax automatically adjusts timing tables for the following changing conditions: Changes in Engine Temperature, Barometer, Intake Air Temperature plus a Separate Scale for Boost Applications.

### Myth #2

ThunderMax does not allow access to adjust small, moderate, or large changes in specific areas of timing related to RPM or specific Throttle Positions.

**False** - Easy access exists for making changes in timing relative to any RPM and Throttle Position. Additional changes can be made by Engine Temperature, Engine Speed, and a separate Rear Cylinder Adjustment.



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## Getting Started

First, establish if the spark knock is a new problem. *If the answer is “yes”, a timing adjustment is not likely required to remedy the problem.*

- 1) Check Fuel Pressure:** Degrading rail pressure is the # 1 problem with new or sudden spark knock problems.
- 2) Check Fuel:** To establish a good timing map, make sure premium octane fuel is present; avoid use of boutique fuel additives and stabilizers.
- 3) Avoid Special Rare Earth Spark Plugs:** These can be a source of new unwarranted spark knock which can alter the flash point of combustion.
- 4) Check for Damaged Wiring:** Faulty or damaged o2 sensor or wiring

Second, if none of the above issues are present or the spark knock problem has been present since installation, determine the following:

- 1) Has an incorrect base map been selected? You can determine if the Base Map selected is correct in the ThunderMax software. Select, sort and load another base map. Use the map notes to aid in locating the proper map (Compression Recommendation). If you need further assistance selecting a map, *contact ThunderMax Support with the details of the engine combination at [support@thunder-max.com](mailto:support@thunder-max.com).*
- 2) If you have determined the best matching map has been selected, timing adjustments need to be made to the base map. The next step is to quickly identify the severity of the problem.
  - Is the pinging issue “Light”, “Moderate”, or “Severe”?
  - Does the pinging happen occasionally, or at certain engine temperatures?
  - What is the specific RPM range in which the ping is present?

## Typical Adjustment Range

**Slight or Occasional Ping:** Retard 1 to 2 degrees

**Moderate Ping:** Retard Timing 2 to 3 degrees

**Severe Ping:** Retard at least 3 to 4 degrees

Perform the timing adjustments globally on the new **Timing Vs Engine Temperature** page. This is the go to page for making a quick adjustment based on the analyses. Once completed, perform a road test to confirm the issue has been resolved.



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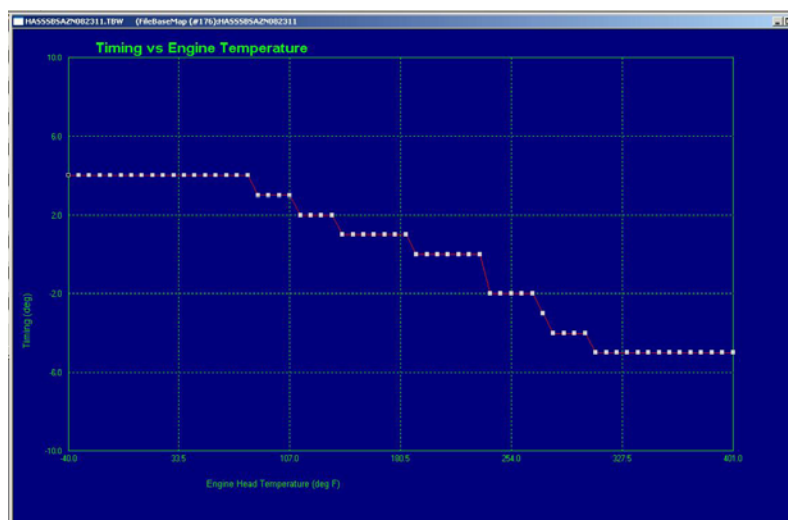




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## Unmodified Base Map (example)



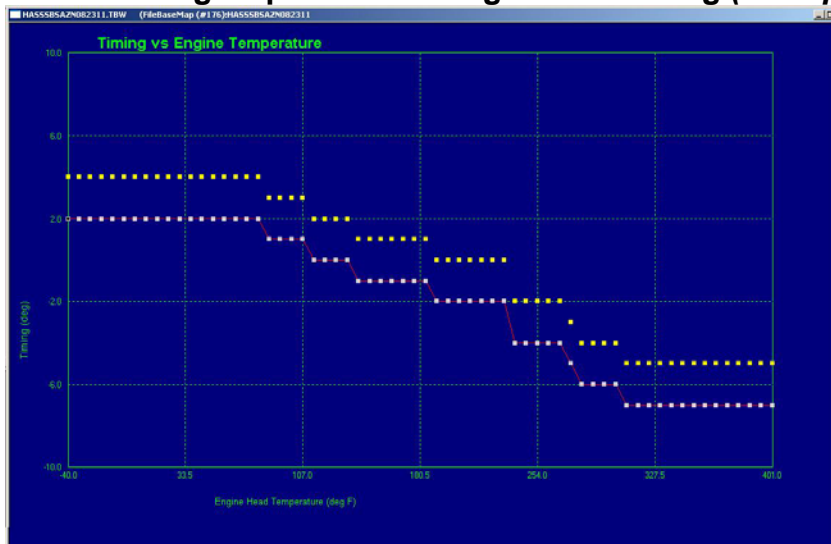
Global adjustments can now be quickly made to a single map page by using the following steps:

**Step 1: Read the Map:** Go to [Map Editing](#) > [Read Module Maps and Settings](#)

**Step 2: Open the Timing vs Engine Temperature Page:** Go to [Tuning Maps](#) > [Ignition Timing Maps](#) > [Timing vs Engine Temperature](#)

**Step 3: Arrow Keys:** Use the mouse to select the first key you want to adjust. Use the down arrow keys (lowers timing) or up arrow keys (raises timing) keys on your keyboard. Use left or right arrow keys to move to the next point of adjustment.

## Modified Tuning Map - Minus 2 Degrees of Timing (example)



**Step 4:** After adjustments, perform a quick road test. Determine if further adjustments are required to remove remaining spark knock or pinging.



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