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## 5-0 IGNITE 36-2+1 RACE SERIES (VR) TRIGGER INSTALLATION GUIDE

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This installation guide is applicable to the following engine;

- Nissan RB20 RB25 RB26 RB30 DOHC

**Option A** Kit - To suit oil pumps without external adjustable oil pressure regulator port on intake side (i.e. OEM oil pump housings, Nitto cast pump, Jun oil pump, Dry sump oil pump blanking cover).

**Option B** Kit - To suit oil pumps with external adjustable oil pressure regulator port on intake side (i.e. Nitto billet pump, HSE oil pump, Tomei oil pump, HKS oil pump)



**Please read this installation guide carefully prior to installing the product.**

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5-0 Ignite will only respond to queries with its direct customers that have purchased the product(s) in regard to all matters unless otherwise agreed, such as involving 3rd party queries in such situations where technical assistance is required. All ECU-related settings must be addressed to your tuner or ECU manufacturer representative/ technical support.

If in doubt, seek professional help.

For further information, visit [www.50ignite.com/terms-and-conditions/](http://www.50ignite.com/terms-and-conditions/)

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## INTRODUCTION

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Thank you for purchasing 5-0 Ignite crank trigger kit. We have done all the hard work to ensure that your installation is a breeze and clean. Your kit should include the following items;

- 1x Crank sprocket with machined 36-2 tooth trigger wheel
- 1x Cam angle sensor housing
- 1x Cam 'home' key
- 1x Crank angle sensor mount
- 1x Cam angle sensor (hall effect)
- 1x Crank angle sensor (VR)
- 4x M7x1 grade 8.8 bolt for cam key
- 1x 3 pin female connector for cam sensor with terminals and seals
- 1x 2 pin female connector for crank sensor with terminals and seals
- 1x 90 degree wiring boot for the crank sensor
- 6x Cam sensor spacer shims
- 5x Crank sensor spacer shims
- 1x 4mm thick cam sensor spacer (when top timing cover is not used only)
- Assorted fasteners

This kit is intended for professional installation to suit your custom engine wiring harness. Connectors to make sub-harness are not provided.

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## INFORMATION AND LIMITATIONS

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Installation of this kit requires moderate to advance level of mechanical skills and experience due to the requirement of timing belt removal/installation and calibration of the vehicle's ECU.

This kit will require a modern/capable ECU (Haltech, Link, Motec, Emtron, MaxEcu, ECUmater etc) that allows you to set the trigger type (missing tooth + home), trigger edge and trigger angle.

This kit will require a qualified knowledge of automotive electrical wiring systems (sheathing, splicing, crimping and terminations).

Fastening of bolts (i.e timing belt tensioner, cam pulley bolt, crank pulley etc.) shall follow manufacturer's recommended specifications.

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## PROCEDURE

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1. Drain coolant.
2. Set the engine to TDC.
3. Disconnect/remove;
  - a. Radiator and fan
  - b. Ancillary belts
  - c. OEM crank angle sensor
  - d. Upper timing belt cover
  - e. Crank pulley. **The cup washer between the timing belt sprocket and crank pulley is no longer required.**
  - f. Lower timing belt cover
4. Ensure the engine is on TDC by aligning the mark of the crank timing sprocket to the oil pump.
5. Remove timing belt.
6. Remove crank timing sprocket.
7. Remove the crank timing sprocket backing plate washer (the one between the sprocket and front main seal). Caution, prying against the oil pump may crack the casting!
8. Ensure that the both half-moon key and key slot on the crank snout is in good condition.

**At this stage, replacing the timing belt along with oil pump and cam seals are recommended. We also recommend inspecting your crank pulley (balancer) from deterioration. Replace, if necessary, when visible cracks/chips/splits or other defects are present.**

9. Remove the two oil pump bolts indicated.



*Figure 1 - Remove indicated bolts on the oil pump*

10. Mark the slot to be cut with a die grinder on the oil pump cover by trial install the crank angle sensor mount (with the sensor on it). Due to OEM casting variations, if your bolt does not fasten fully onto the mount, grind a small amount on the end of the bolt to shorten the bolt. Push the sensor in until it touches the oil pump housing and mark the outline with a sharpie. This slot is for the crank sensor to go through. Place a tape over the crank snout to prevent accidental damage prior to grinding.



Figure 2 - Grind slot on oil pump housing

11. Clean the oil pump housing to be free of dirt/dust/swarf. Re-install the backing plate washer.
12. Ensure the half-moon key is installed on the crank for the sprocket. Apply light amount of anti-seize onto the crank snout.
13. Mount your timing belt onto the supplied crank sprocket with the trigger wheel then slide it into position onto the crank snout. Trigger teeth towards the front of the car.



Figure 3 - Install your timing belt prior to sliding your sprocket in



14. Install your timing belt back onto the cam pulleys as per manufacturer's recommendation. Tighten your tensioner pulley as per manufacturer's recommendation. Verify engine timing.
15. Apply Loctite to the sensor mount bolts and install the crank sensor onto the oil pump. Using a feeler gauge, install the required shims until the gap between the sensor face to the crank trigger teeth is 0.9mm as a starting point. This gap may be increased or decreased based on the trigger input voltage requirement during the ECU tuning.



Figure 4 - Setting sensor gap

16. Turn the crank around and check that the gap between all teeth is consistent.
17. Set the engine back to TDC.
18. Trial fit the crank pulley back on and ensure that there is a gap between the tip of the crank sensor to the back of the crank pulley. Once verified, you can take the crank pulley off.
19. Remove the 4 bolts on the exhaust cam pulley. **The square plate washer and OEM exhaust cam pulley bolts are no longer required.** 2<sup>nd</sup> person assistance to keep the cam gear in place would be helpful whilst the bolts are removed.
20. Apply medium strength 'blue' Loctite onto the supplied M7 bolt threads, install the supplied cam key onto the exhaust cam pulley. **At TDC, the tall key is at approximately 12 o'clock position.** Torque the 4 bolts to 16Nm.

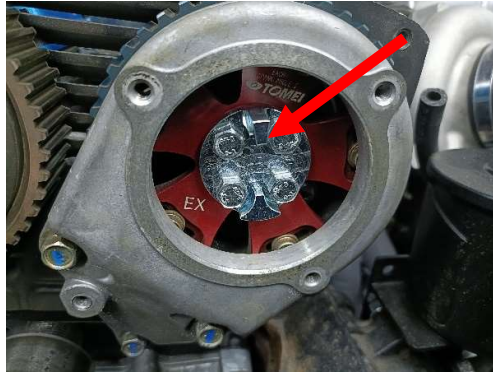


Figure 5 - Position of cam key when engine at TDC



**If you are not using the top timing cover. You must install the provided 4mm thick cam sensor spacer + the required shims. This is to take up the difference for when the CAS gasket/spacer is not present.**



**Failure to check the sensor gap properly will cause the cam key to swipe the sensor resulting in damage to the sensor and other components. Be sure the sensor gap is thoroughly checked before rotating the engine.**

21. Install the cam sensor housing without the cam sensor and bolt it down with the dress up washer. Rotate the engine so that the tall key is in line with the sensor hole on the cam sensor housing.
22. Ideal sensor gap is approximately 0.8mm;
  - a. Measure the depth of the sensor with a calliper (from the mating flange to the tip of the cam sensor).
  - b. Measure the depth between the cam sensor housing front face to the cam key.

$$\rightarrow \text{Sensor air gap} = b - a$$

Install the required shims between the sensor and the housing to achieve approximately 0.8mm. If  $b - a$  resulted a negative number, the sensor protrudes past the key. You will need to add this number onto the desired gap.

**Example:**

$$A = 18\text{mm}$$

$$\rightarrow B - A = -0.5\text{mm.}$$

$$B = 17.5\text{mm}$$

You need 1.3mm (0.5+0.8) total thickness of shims for 0.8mm air gap.



Figure 6 – Hardware installation complete

**23. Perform the wiring work for the sensors (refer to the sensor pinout section of this installation guide).**

**24. Install, in reverse order;**

- a. Lower timing belt cover
- b. Crank pulley
- c. Upper timing belt cover
- d. Ancillary belts
- e. Radiator and fan

**At this stage, you are now ready to configure your ECU.**

**25. Connect the ECU to your laptop and configure these settings;**

- a. Crank sensor trigger edge: Falling
- b. Crank sensor type: VR (Reluctor)
- c. Crank sensor pull-up: Off
- d. Crank sensor filtering: 2 (as a starting point, adjust during tuning for clean signal)
- e. Crank sensor pattern: Missing tooth
- f. Tooth on crank: 36
- g. Missing tooth on crank: 2
- h. Cam sensor trigger edge: Falling
- i. Crank sensor type: Hall effect
- j. Crank sensor pull-up: On
- k. Crank sensor filtering: 1
- l. Single home tooth/cam pulse 1x

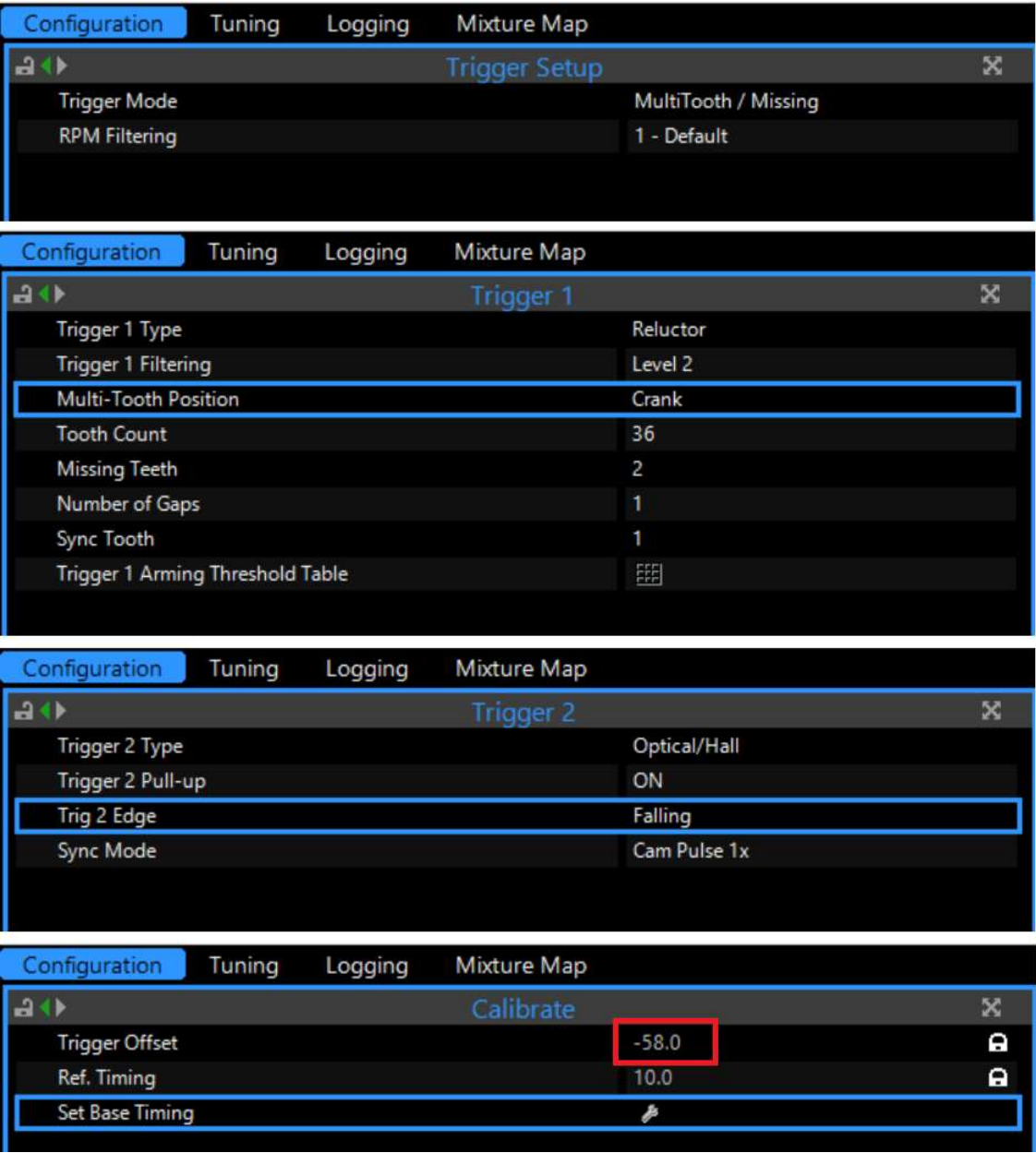


Figure 7 – Link ECU Configuration Example



Trigger Configuration

Trigger Type

Generic - Missing Tooth - Single Tooth Home

Trigger Signal Location

On Crank

Number Of Teeth

36

Number Of Missing Teeth

2

TDC Angle (0 - 719.9 degrees)

58.0

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☐ TDC Offset Angle Table Enable

RPM Filter

1

ms

Quick Start

Disable

Trigger Signal

Sensor Type

Reluctor

Automatic Reluctor Threshold

Enable

Edge

Falling Edge

Pull Up

Ground Reference

Disable

Home Signal

Sensor Type

Hall Effect

Automatic Reluctor Threshold

Enable

Edge

Falling Edge

Pull Up

Enable

Ground Reference

Disable

Minimum RPM

RPM

Synchronisation Mode

Always

Maximum RPM

2000

RPM

Maximum Throttle Position

0.5

%

Figure 8 - Haltech ECU Configuration Example

Trigger arming threshold at 0.9mm crank sensor air gap. This table needs adjustment to suit other crank sensor air gap. **Warning: setting the sensor gap is too big, you'll be below the minimum allowable threshold during cranking and signal would not be registered.**

Trigger 1 Arming Threshold (V)					Engine Speed (RPM)		
500	1000	2000	3000	4000	5000	6000	7000
0.3	0.8	1.6	2.3	2.9	3.5	4.0	4.5

Figure 9 - Trigger arming threshold at 0.9mm crank sensor air gap

The correct waveform for falling edge crank trigger. If opposite is displayed, the engine will not fire. Swap the wires around for the crank sensor:

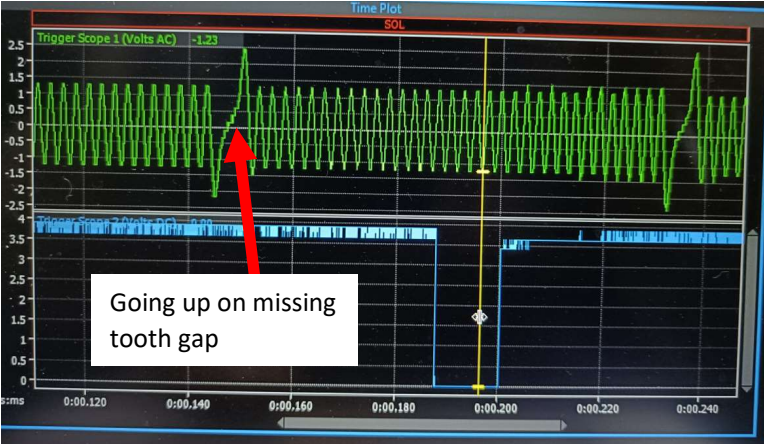


Figure 10 - Correct trigger waveform

26. Enable timing lock (i.e. at 0°) and disable the injectors.
27. With a timing light and coil on plug extension lead installed to mount your timing light inductive clamp onto, crank the engine and adjust the trigger angle until the timing on the crank pulley matches the timing lock figure on the ECU.
28. Once all parameters are satisfactorily configured, enable the injectors, fill coolant and start the engine.
29. With the engine idling and timing lock still enabled, double check that the timing is still synchronised with the timing lock. Slight re-adjustment is normal, where the TDC angle is previously set, was set at lower cranking speed.
30. For future timing belt removal, use the two provided M6x1 tapped holes on the crank timing sprocket with a puller.
31. To adjust the crank sensor gap, rotate or remove the alternator out of the way for access.

## TROUBLESHOOTING

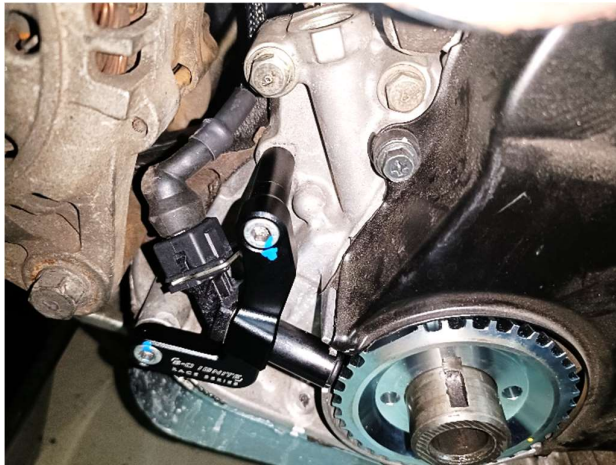
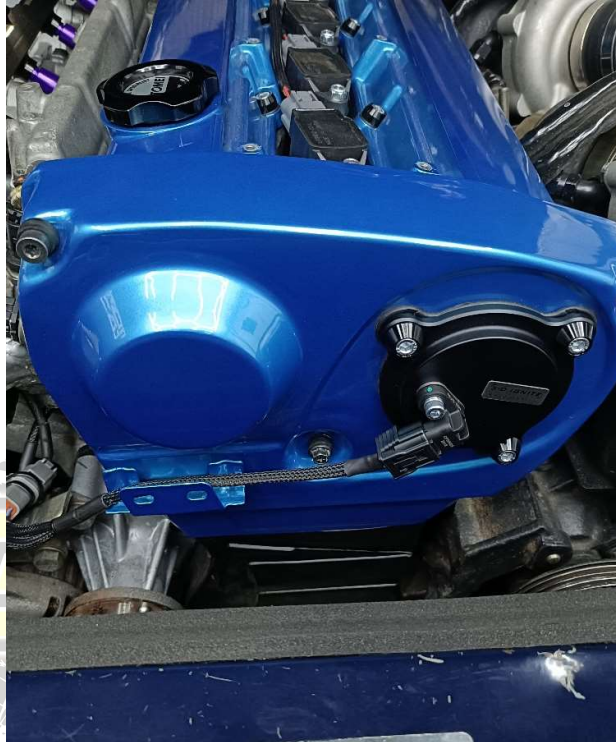
PROBLEM	APPROACH
No signal output from the cam sensor.	<ul style="list-style-type: none"> <li>• Check if wiring is correct.</li> <li>• Check power and ground connection.</li> <li>• Make sure pull up resistor is enabled.</li> <li>• Check the cam sensor gap.</li> </ul>
Sensors are outputting signal but engine does not start. Continuous miss counts.	<ul style="list-style-type: none"> <li>• Analyse the signal output using oscilloscope.</li> <li>• Check if you have RPM read out.</li> <li>• Crank sensor positive to go to 'trigger 1' or 'primary' on the ECU pin.</li> <li>• Cam sensor signal to go to 'trigger 2' or 'home' on the ECU pin.</li> <li>• Ensure the crank sensor is wired correctly for falling edge reference. If not, swap the wires around.</li> </ul>
Trigger over voltage at high RPM	<ul style="list-style-type: none"> <li>• Increase the sensor air gap</li> </ul>
Crank sensor signal noise	<ul style="list-style-type: none"> <li>• Ensure that you use shielded wiring for your crank sensor from the sensor all the way to the ECU. The shield strap should only be connected to ground on one end of the harness only.</li> </ul>

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## CONCLUSION

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Installation is now complete. Crank trigger kit on RBs eliminates ignition timing drift in comparison to the inferior OEM CAS or any systems reliant on the camshaft based only. Benefits includes tuner's confidence in maximising ignition timing whilst keeping consistent safety margin.



SENSOR PINOUT



Figure 11 – 5-0 Ignite Race Series RB Trigger Sensor Pinout

*Use of proper shielded wires and professional wiring work is mandatory!*