5-0 IGNITE 12+1 (24+1) CRANK TRIGGER INSTALLATION GUIDE

This installation guide is applicable to the following engine;

- Nissan RB DOHC (Twin Cam)

*24 tooth terminology is based on the OEM location of the 'crank angle sensor'. RB 'crank angle sensor' are mounted on the camshaft from factory. 12 tooth on crank = 24 tooth on cam.

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

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If in doubt, seek professional help.

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PREFACE

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 12 tooth trigger wheel
- 1x Cam angle sensor housing
- 1x Cam 'home' key
- 1x Crank angle sensor mount
- 1x Cam angle sensor
- 1x Crank angle sensor
- 4x M7x1 grade 8.8 bolt for cam key
- 4x M6x1 socket head cap 'short' bolts for cam angle sensor housing (one installed)
- 3x M6 dress up washers for cam angle sensor housing
- 2x M6x1 socket head cap 'long' bolts for crank angle sensor mount
- 1x Replacement OEM CAS female connector with terminals and seals
- 1x 4 pin male connector with terminals and seals
- 1x 3 pin female connector for cam sensor with terminals and seals
- 4x Barrel crimps
- 3x Cam sensor spacer shim (refer to the supplement section at the end of this installation manual)
- 1x Crank pulley washer shim (refer to the supplement section at the end of this installation manual)

INFORMATION AND LIMITATIONS

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 and etc.) that allows you to set the trigger type, trigger edge and trigger angle.

This kit will require a sound 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.

PROCEDURE

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 behind the pulley 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 (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 front 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 Bolts on Oil Pump

10. Mark the slot to be cut with a die grinder on the oil pump cover by installing 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. Screw 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 damage prior to grinding.

Figure 2 - Grind Slot on Oil Pump Housing

11. Install the crank angle sensor mount (with the sensor on it) back in, this time, apply medium strength 'blue' Loctite to the threads and torque the bolts to 10Nm. **If required, install M6 washer between the crank angle sensor mount and the oil pump to centre the sensor to the trigger teeth.**

12. Screw the sensor in and check the clearance on the oil pump housing. 1mm clearance around the sensor where you have ground is sufficient.

13. Screw the sensor back (retract).

14. Clean the oil pump housing free of dirt/dust/swarf.

15. Ensure the half-moon key is installed on the crank for the sprocket. Apply light amount of anti-seize onto the crank snout.

16. With the OEM backing plate installed (removed on step 7, see figure 3), 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 - Slide your Sprocket In

17. Install your timing belt back onto the cam pulley as per manufacturer's recommendation. Tighten your tensioner pulley as per manufacturer's recommendation.

18. Using feeler gauge, screw the crank sensor in until the gap between the sensor face to the crank trigger teeth is 0.8mm.

Figure 4 - Setting Sensor Gap

19. Rotate the crank and ensure that the air gap between all 12 teeth is at about 0.8mm.

20. Apply medium strength 'blue' Loctite and tighten the sensor nut and the grub screw to lock the sensor into place. The grub screw must be flush to the surface.

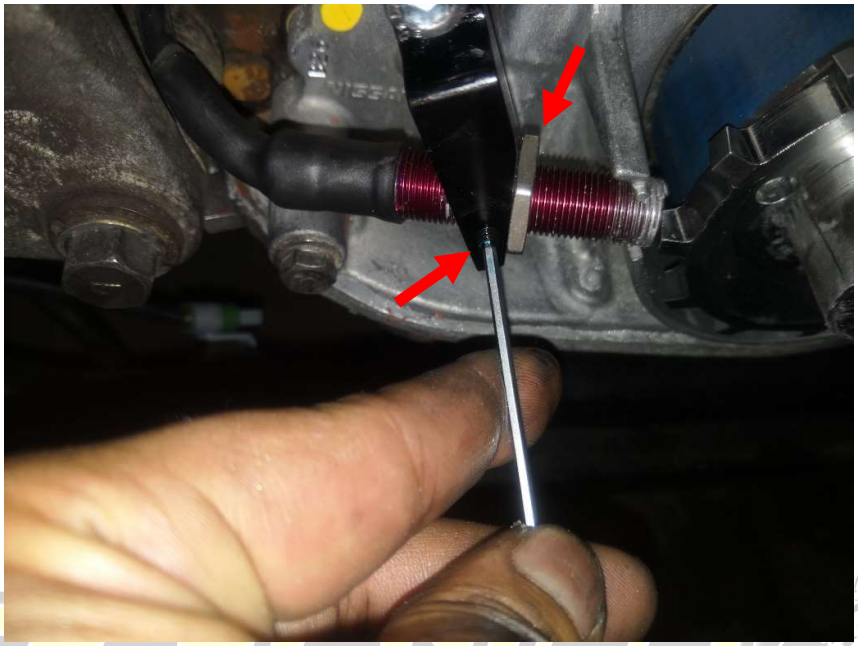

Figure 5 - Locking the Sensor into Place

21. Set the engine back to TDC.

22. Remove the 4 bolts on the exhaust cam pulley. **The square plate washer and OEM exhaust cam pulley bolts are no longer required.**

23. Apply medium strength 'blue' Loctite onto the supplied M7 bolt threads, install the supplied cam key onto the exhaust cam pulley. With the engine to remain at TDC, the key shall be at approximately 8 o'clock position. Torque the 4 bolts to 16Nm.

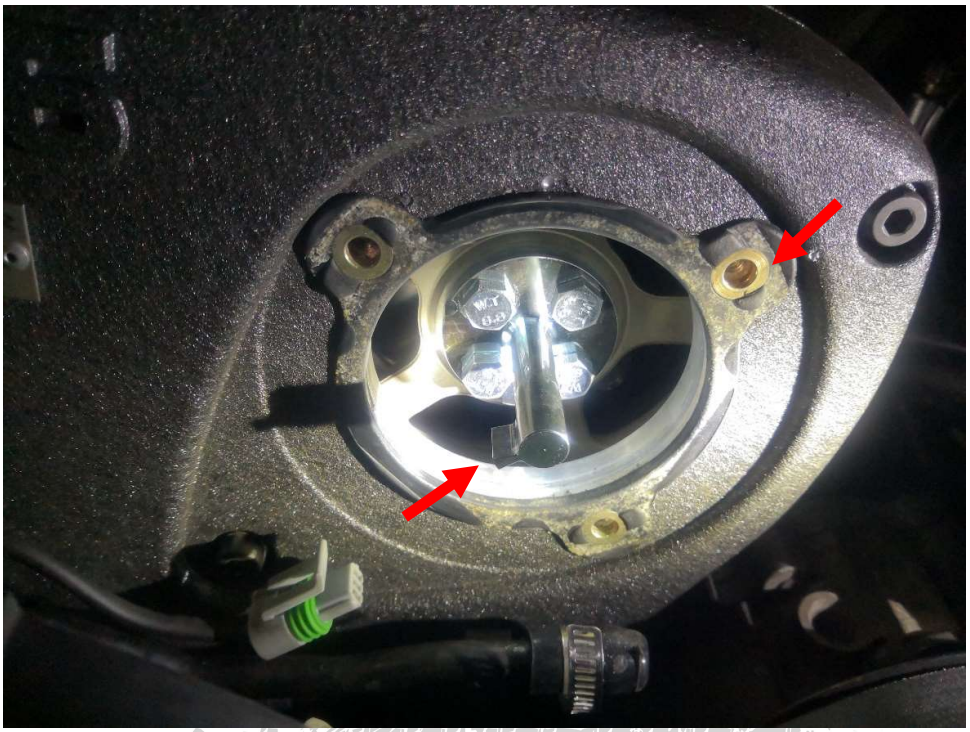

Figure 6 - Position of Cam Key when Engine at TDC

24. Perform the wiring work for the sensors (refer to wiring diagram section of this guide).

WARNING

It is essential to run a new, dedicated shielded wiring loom (including power, signal, and ground) directly to your ECU. The sensors must be powered by a regulated voltage source—such as the ECU's 5V, 8V, or 12V output (not to be confused with the ECU's 12V input supplied via the main relay). The warranty does not cover damaged sensor(s) from incorrect wiring, physical damage or powering the sensor(s) with an unregulated voltage source.

All sensors have undergone bench testing prior to dispatch to ensure full functionality. It is the installer's responsibility to check and verify wiring before powering up the sensors.

25. Install, in reverse order;
    a. Lower timing belt cover
    b. Crank pulley
    c. Upper timing belt cover
    d. Ancillary belts
    e. Radiator and fan

26. Install the cam sensor housing. At TDC, prior to bolting in, rotate the cam sensor housing to ensure that the sensor shall not make contact with the cam key.

    The hole/dimple marker on the cam sensor housing shall point to the CAS bracket hole position at 2 o'clock. Using the 3 'short' M6 socket head cap bolts and the aluminium dress up washers supplied, bolt the housing and torque the bolts to 9.8Nm.

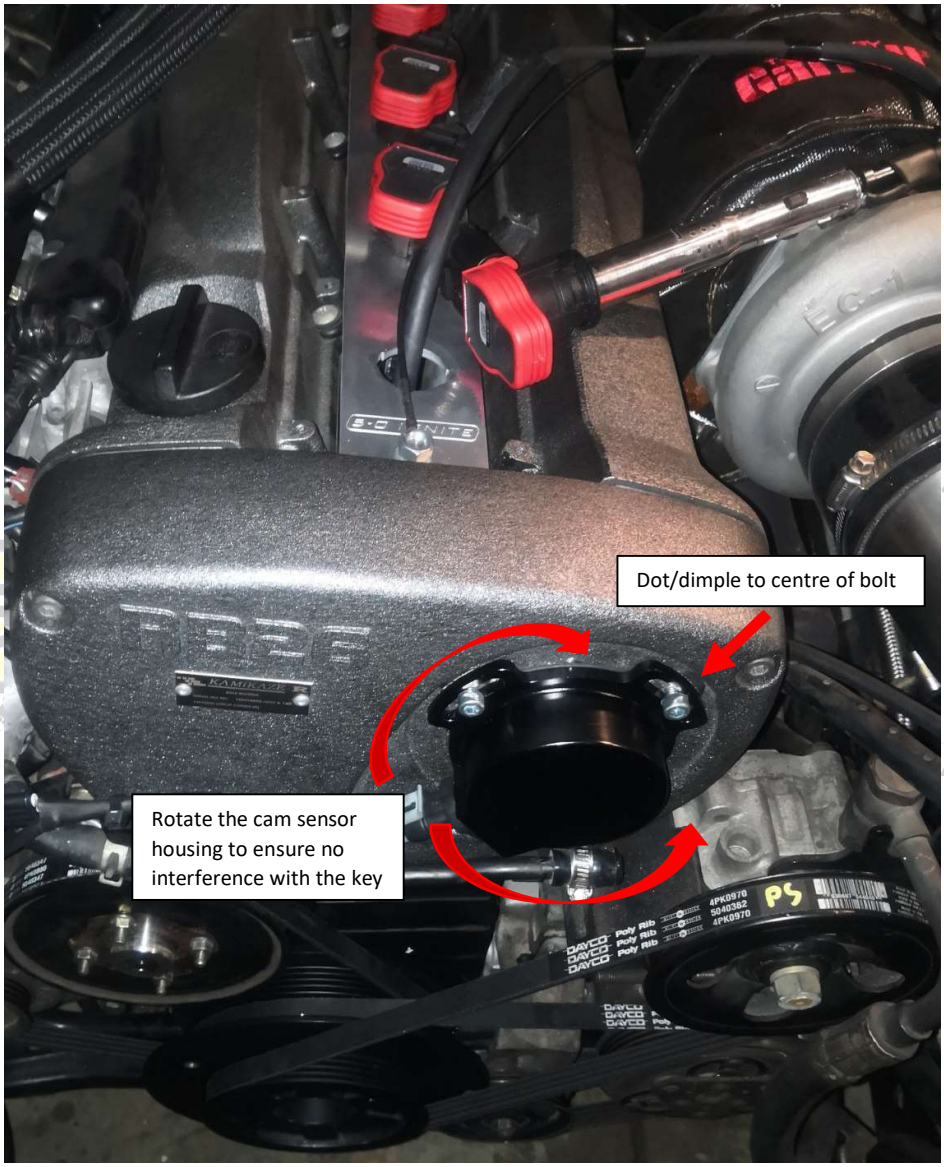

Figure 7 - Cam Sensor Housing Position

27. Plug the wiring in.

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

28. Connect the ECU to your laptop and configure these settings;
    a. Trigger edge: Falling (this is not selectable on Haltech platinum pro)
    b. Pull up resistor: Enabled (Haltech platinum pro has this enabled by default)
    c. Tooth on crank: 12 (set this to 24 and 1 multitooth on Haltech platinum pro)
    d. Tooth on cam: 1
    e. Crank sensor type: Hall Effect (default on Haltech platinum pro)
    f. Cam sensor type: Hall Effect (default on Haltech platinum pro)
    g. Trigger 'TDC' angle: Adjust this figure with timing light with ignition lock enabled.

HALTECH PLATINUM PRO CONFIGURATION

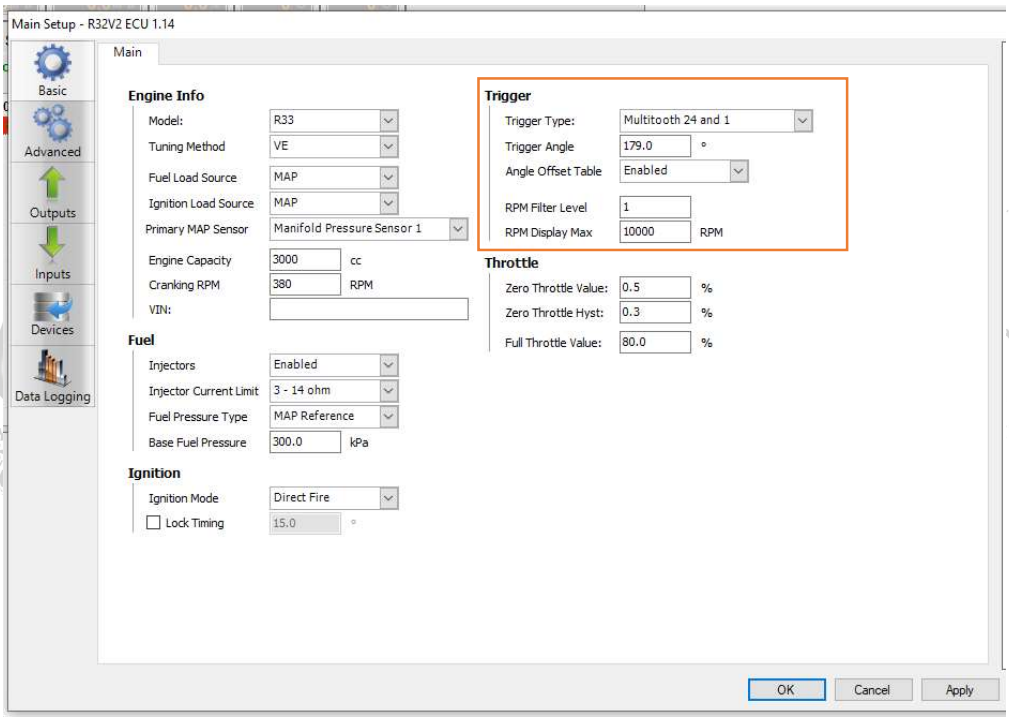

Figure 8 - Haltech Platinum Pro Trigger Configuration

HALTECH ELITE CONFIGURATION (ESP/NSP)

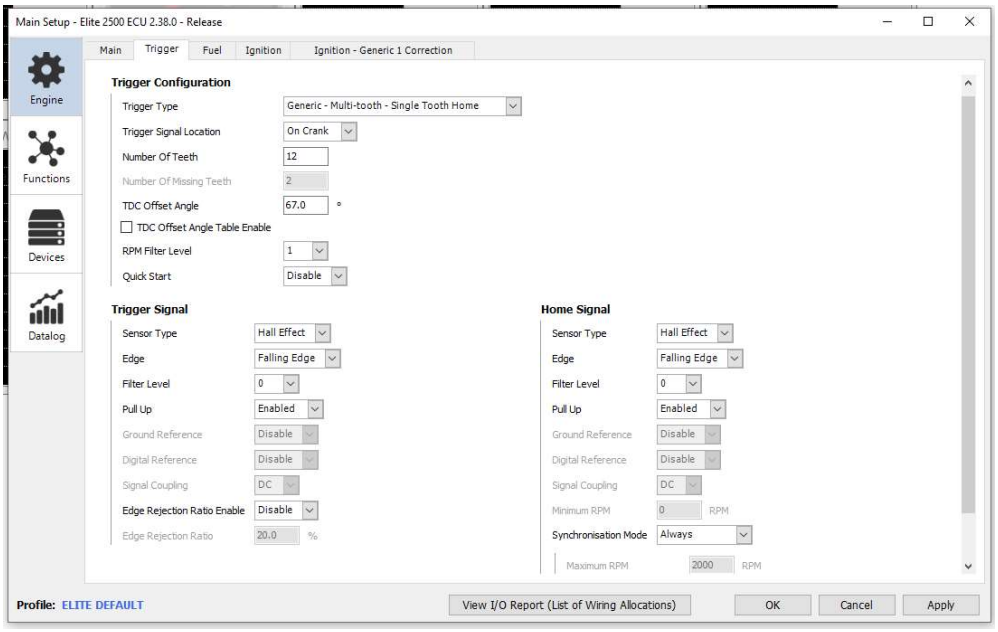

Figure 9 - Haltech Elite Trigger Configuration

The trigger angle above is for starting point only as it may be affected by head or block machining, head gasket thickness, camshafts or any other variable that may alter base timing. On certain ECUs (such as Haltech Platinum Sport), **the TDC angle must also be set higher than the maximum ignition timing that you intend to run, this can be achieved by altering the trigger tooth offset.**

29. Enable timing lock (i.e. at 10°) and disable the injectors.

30. With a timing light and coil on plug extension lead installed to mount your timing light inductive clamp onto (visible in figure 7), crank the engine and adjust the trigger angle until the timing on the crank pulley matches the timing lock figure on the ECU.

31. Once all parameters are satisfactorily configured, enable the injectors, fill coolant and start the engine.

32. With the engine idling and timing lock still enabled, double check that the timing is still synchronised with the timing lock. Re-adjustment is normal, where the TDC angle is previously set, was set at lower cranking speed. **Re-adjustment is also normal after couple of heat cycles from a brand-new timing belt replacement due to stretch.**

33. Using a digital oscilloscope or the diagnosis function in your ECU software, analyse the crank and cam home signal simultaneously when the engine is running at operating temperature. **The falling edges between the crank and cam signal must be separated by rotating your cam sensor housing, otherwise, overlapping signal edges will cause edge swap where misfire/synchronisation error will occur. This is applicable for all ECUs.**

For Haltech Elite, rotate the cam sensor housing until ‘home%travel’ channel reads approximately 50% on the ESP software. Re-adjust the trigger angle until the ignition timing matches the ‘locked’ value. Alternatively, if using the NSP software, analyse the signal using the on-board oscilloscope. For link ECUs, analyse the signal using the on-board oscilloscope.

Haltech platinum pro does not have the ‘home%travel’ feature nor an on-board oscilloscope. Separate the signal by trial and error (moving a degree at a time) or by using external oscilloscope.

Note: Every white line marker on the cam sensor housing represents 1 camshaft degrees. Every red line marker on the cam sensor housing represents 5 camshaft degrees.

34. For future timing belt removal, use the two provided M6x1 tapped holes on the crank timing sprocket with a puller.

TROUBLESHOOTING

PROBLEM	APPROACH
No signal output from the sensors.	• Check if wiring is correct. • Ensure crank trigger sensor gap is set as per step 18, 19 and 20. • Make sure pull up resistor is enabled. • Check the crank and cam sensor gap.
Sensors are outputting signal but engine does not start. Continuous miss counts.	• Swap the 120° and the 1° sensor wiring on the 4 pin CAS connector. **
Engine misfires at operating temperature or under load. *	• Analyse the signal output, adjust as recommended in step 33.
Engine misfires when clutch is pressed in.	• Your engine has a worn thrust bearing causing excessive crankshaft axial movement, placing trigger teeth outside the sensor's range.

*When the cam sensor housing is set incorrectly, belt stretch at high load or even at operating temp may shift the falling edge of the cam home to overlap with the crank signal's falling edge. This produces misfire condition as a result of synchronisation error. Refer to step 33.

****This may be required on ECUs other than Haltech Platinum Pro.**

As with all other 24+1 trigger setup, it does require the engine to go through full cranking cycle for the ECU to sync and engine to start.

CONCLUSION

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.

WIRING DIAGRAM

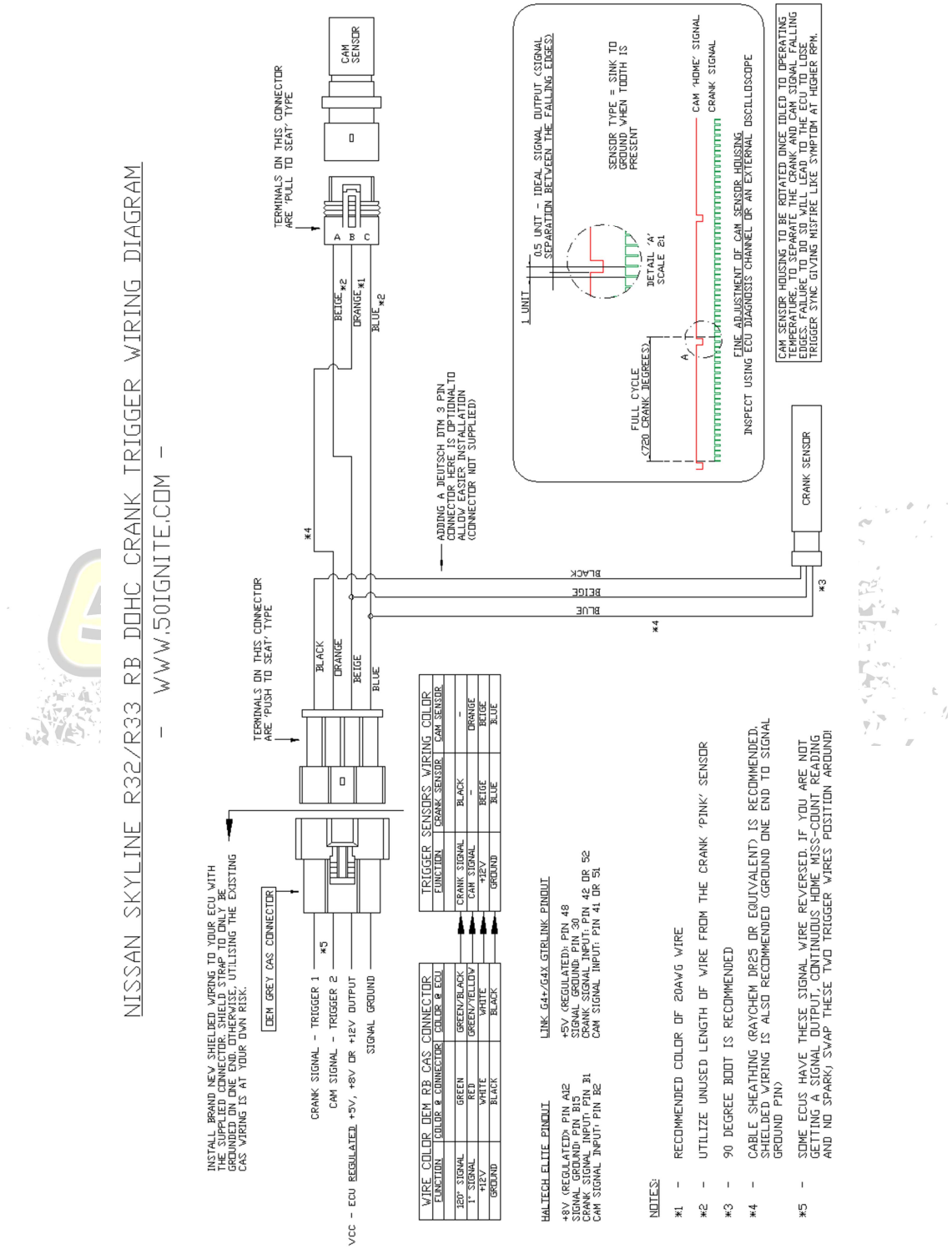

Figure 10 - R32/R33 Wiring Diagram

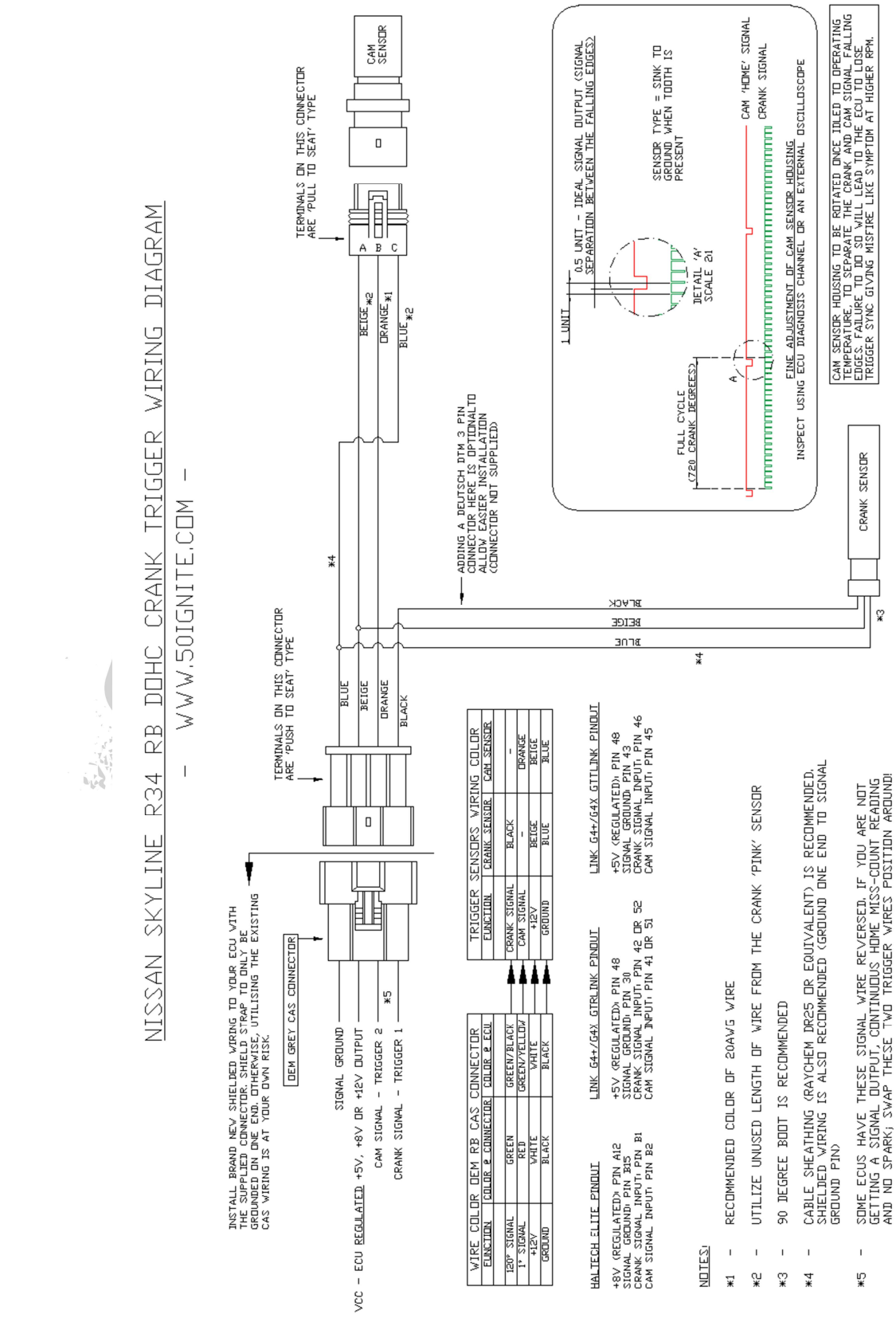

Figure 11 - R34 Wiring Diagram

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- Due to possible variance in OEM CAS bracket casting or when RB26 cam cover is used on RB25, it may be possible that the cam key touches the inside face of the sensor. As outlined in step 26 above, **shall the cam key touch the sensor, install the supplied shim(s) between the cam sensor housing and the sensor for clearance**. Each shim adds 0.2mm clearance, use only the necessary amount. Ideal sensor gap is 0.5mm – 0.8mm.

Figure 12 - Cam Sensor Clearance Check

Figure 13 – Supplied Cam Sensor Shim

- Due to possible variance in machining of the OEM crank pulley hub, **some RB crank pulley hub seating face (mainly found in R32s)** has insufficient chamfer on the outer edge diameter. Insufficient chamfer leads to incorrect seating of the crank pulley when mated to the supplied crank trigger sprocket. **This is also applicable to some aftermarket brand crank pulleys for all RB**. Use the supplied washer shim only if necessary.

Figure 14 - R32 GTR OEM Crank Pulley 'A' (Insufficient Chamfer)

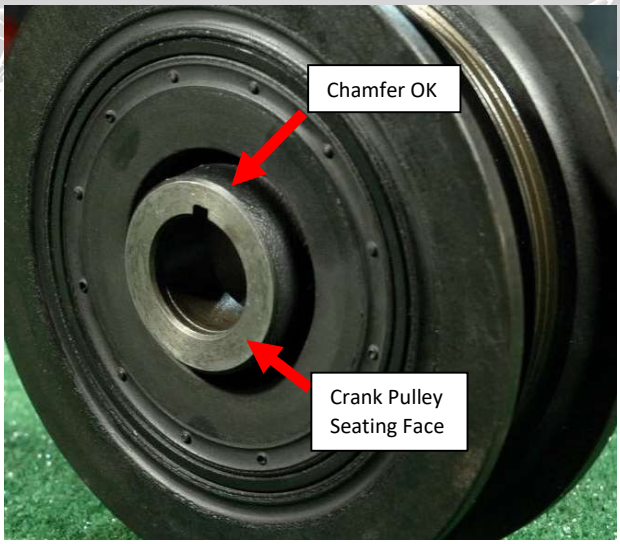

Figure 15 - R32 GTR OEM Crank Pulley 'B' (Chamfer OK)

The installer must verify whether the seating face of the crank pulley hub sits flush with the supplied crank sprocket's trigger face (refer to figure 16) by trial placement prior to installation. **If a gap is present, install the supplied washer shim between the crank sprocket and the crank pulley (refer to figure 17) or chamfer the edge of the pulley hub where it makes contact.** Installation of this washer moves the crank pulley forward by negligible amount (~0.6mm). Alternatively, chamfer the edge of the hub.

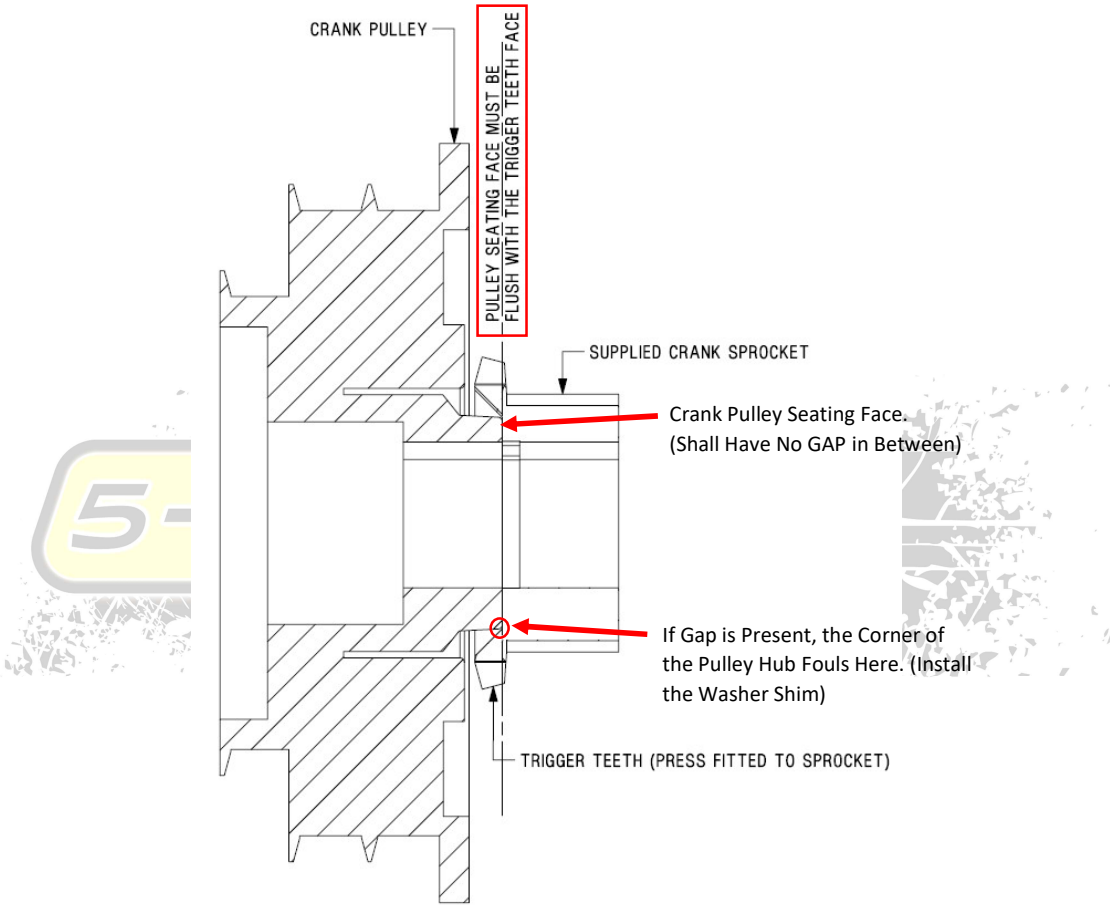

Figure 16 - Pulley Hub Seating Face Shall be Flush with Trigger Teeth Face

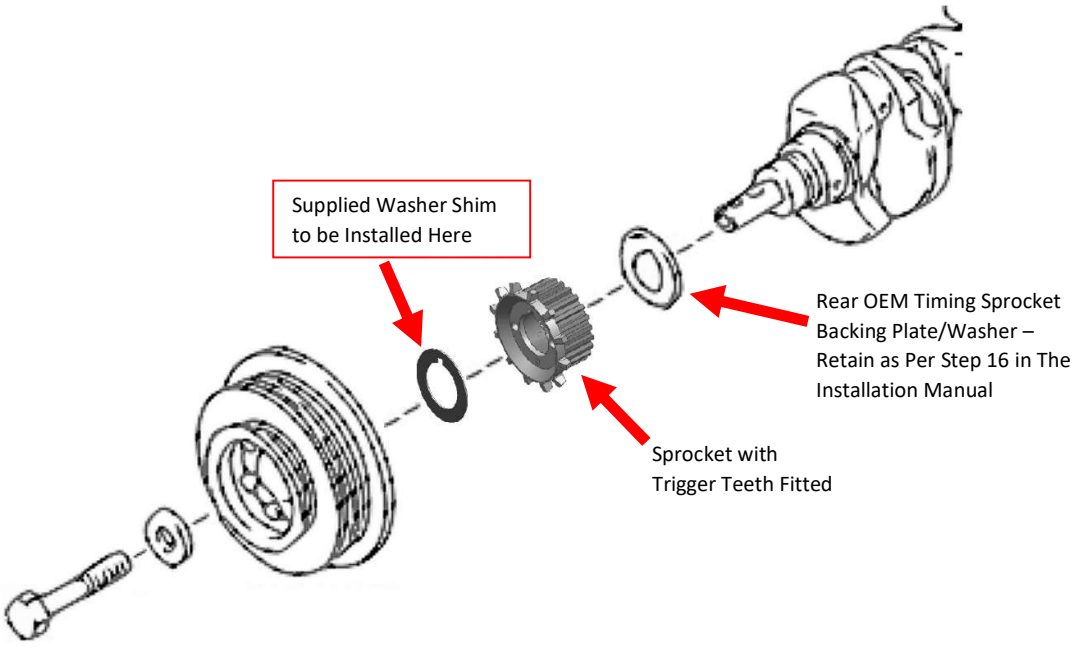

Figure 17 - Supplied Washer Shim Location