

## 5-0 IGNITE SR20 24+1 CAM TRIGGER V2 [NEO] INSTALLATION GUIDE

This installation guide is applicable to the following engine;

• Nissan SR20 RWD VARIANTS (S13, S14 & S15)

## 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 SR20 cam 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 Cam Trigger Sensor (Pull-Up Resistor Built-In)
- 1x 24+1 Tooth Cam Trigger Wheel
- 3x Trigger Wheel Shims
- 2x M8x1.25 20mm Class 12.9 Socket Head Cap Bolts
- 2x M8 Spring Washers
- 1x M14x1.5 40mm Class 10.9/12.9 Hex Head Bolt
- 1x M14 Heavy Duty Washer
- 1x 4 Pin CAS 'Grey' Connector Set

Replacement O-ring part number: N70-118 (BS118, 0.862"x 0.103") purchasable anywhere.



#### INFORMATION AND LIMITATIONS

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

This kit will require a modern/capable ECU (such as Haltech, Link, Motec, Emtron, HKS FCon Vpro/Gold) that allows you to set the trigger type (24 and 1 multitooth), trigger edge and trigger angle. This guide covers the basic trigger settings for Haltech, Link and HKS FCon ECUs. For all other ECUs, please consult with your ECU manufacturer.

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

## PROCEDURE

2.

1. Remove ignition coils, valve cover and the OEM CAS.



Figure 1 - Remove Valve Cover, CAS and All Upper Components

Set the engine to TDC (guide can be found in google or FSM) and mark a position on the chain relative to the cam sprocket.

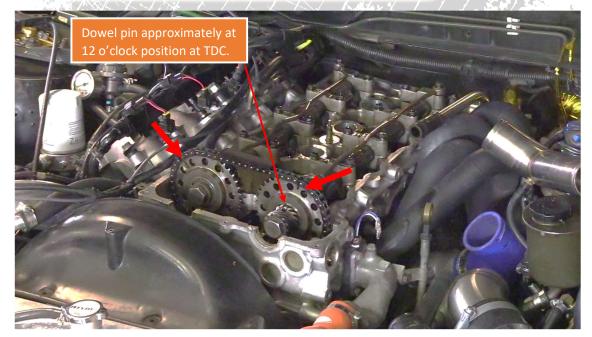


Figure 2 - Set the Engine to TDC

3. Turn the crank counter clockwise by a small amount to <u>release tension on the timing chain</u>.

In this guide, we will be <u>performing the short-cut method</u> in removing the CAS gear with the help of a 2nd person. If you are uncomfortable with this method, proceed with removing the timing chain tensioner and the exhaust cam sprocket as per Nissan's FSM.

4. Using 1" spanner, 24mm socket and a breaker bar, loosen the exhaust cam sprocket bolt. **DO NOT USE an impact wrench**.



Figure 3 - Loosen the Exhaust Cam Sprocket Bolt

5. With the help of 2<sup>nd</sup> person, hold the exhaust cam sprocket in place FIRMLY whilst you remove the cam sprocket bolt.



Figure 4 - Remove the Exhaust Cam Sprocket Bolt

6. With the help of 2<sup>nd</sup> person in place holding the exhaust cam sprocket firmly, use a hammer and gently tap the CAS gear repeatedly at 9, 12 and 3 o'clock positions until it is removed from the cam sprocket.



Figure 6 - CAS Gear Removed, 2nd Person Holding the Sprocket Firmly

 Using an internal micrometre, measure the internal diameter of your exhaust cam gear hub. Dimension should be 20.00mm – 20.02mm. If it is beyond the maximum dimension, please email us.



Figure 7 - Measure the internal diameter of the cam gear hub

8. Using the supplied bolt and washer (flat side of the washer facing trigger wheel side), trial install the trigger wheel <u>WITHOUT</u> any shims. Referring to STEP 11, if the gap is beyond 0.6mm, install the required shims. Once the sensor gap has been confirmed, apply medium strength thread locker to the bolt for final installation. Using 21mm Socket and 1" spanner, torque this bolt to 140Nm. Ensure that your timing mark has not moved!

Note: The trigger wheel should fit snug into the cam gear with minimal side-side play.



Figure 8 - Trigger Wheel Installed



Figure 9 - Install Shim onto Trigger Wheel to reduce the Gap **ONLY IF REQUIRED**.

Ensure that

9. CHECK that there is a gap between the dowel pin and the trigger tooth. Some aftermarket cam did not press the dowel pin deep enough which you will need to tap in or grind shorter.



Figure 10 - Check Dowel Pin Gap

10. Smear a small amount of rubber grease onto the trigger sensor O-ring and slide the sensor in carefully. Screw in the bolts using spring washers provided. Spring washer MUST BE USED to provide ground contact to the cylinder head.



Figure 11 - Install the Sensor

11. Using a bent type feeler gauge, CHECK the sensor gap on the rear and front teeth. Add trigger wheel shim if necessary (step 8).



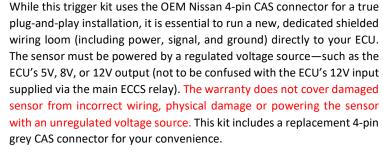
Figure 12 – Checking the Sensor Gap IS MANDATORY!

- Nominal static sensor gap: 0.4mm to 0.6mm for both front tooth and rear teeth.
- If you're getting trigger count error at high rpm, start by adding a shim in.
- Adding one trigger wheel shim will reduce the sensor gap by approximately 0.2mm.
- This checking step is only required to be performed once unless changes has been made that would affect the geometry such as changing cylinder head, changing camshaft, changing cam gear or repair work to the cam journal bore/caps.
- The cam gear hub thickness varies between OEM and aftermarket brands of cam gear. This affects the sensor gap!

12. Hardware installation is now complete. Assemble everything back together and perform the wiring. Wiring pinout on figure 14 of this installation guide.

#### WARNING





The original 12V feed for the crank angle sensor (CAS) on OEM or aftermarket plug and play wiring loom is typically shared with ignition coils, injectors and is <u>NOT</u> a regulated voltage source.

All sensors have undergone a stringent recorded physical operational test prior to dispatch to ensure full functionality. It is the installer's responsibility to check and verify wiring prior to powering up the sensor.

#### FAILURE TO HEED THIS WARNING MAY RESULT IN PERMANENT SENSOR DAMAGE

TRIGGER 1 (PRIMARY 24T)

TRIGGER 2 (HOME 1T) -

VCC - ECU REGULATED +5V, +8V OR +12V OUTPUT -

GROUND (TO ECU SIGNAL GROUND)-

NOTE: FOR CERTAIN ECUS, YOU ARE REQUIRED TO SWAP THE TRIGGER 1 & TRIGGER 2 WIRING AROUND AT THE 4 PIN GREY CAS CONNECTOR. CARE MUST BE TAKEN THAT YOU ARE SWAPPING THE TRIGGER 1 & TRIGGER 2 WIRES AROUND ONLY AND NOT THE VCC/GROUND WIRES. VERIFY THE CONNECTION PRIOR TO PLUGBING IN THE SENSOR.



Figure 13 - 5-0 Ignite SR Cam Trigger V2 Sensor Pinout



DO NOT PERFORM THESE ECU SETTINGS IF YOU ARE NOT EXPERIENCED OR HAVE A GOOD UNDERSTANDING, OTHERWISE, ENGINE DAMAGE MAY OCCUR. If in doubt, seek assistance from your ECU manufacturer or your tuner.

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

13. Connect the ECU to your laptop and configure these settings.

# NOTE: Some ECUs will require you to swap the two trigger wires to output the right signals into the ECU. Refer to the troubleshooting section and figure 20.

#### **General settings for variety of ECUs**

a. Trigger edge: Falling

Note: The sensors pull to ground when a tooth is present, VCC when not near a tooth.

#### b. Pull up resistor: <u>DISABLED</u> (PULL-UP RESISTOR IS BUILT INTO THE SENSOR)

- c. Trigger type: Multi-tooth crank, 1 tooth home
- d. Tooth on cam: 24, or otherwise, tooth on crank: 12
- e. Tooth on cam: 1
- f. Crank sensor type: Hall Effect
- g. Cam sensor type: Hall Effect
- h. Trigger offset angle: Set using the timing light with timing lock on.
- i. Trigger filter: 0 or 1

#### FOR ECU SETTINGS NOT PRESENTED IN THIS GUIDE: PLEASE ASK YOUR ECU MANUFACTURER.

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Ö. Basic	Main Engine Info	Trigger
ivanced introverse introverse inputs inputs inputs inputs inputs	Model:       S13 Type-X         Tuning Method       VE         Fuel Load Source       MAP         Ignition Load Source       MAP         Primary MAP Sensor       Manifold Pressure Sensor 1         Engine Capacity       1998         Cranking RPM       250         VIN:	Trigger Type: Multitooth 24 and 1 Trigger Angle 185.0 • Angle Offset Table Disabled RPM Filter Level 0 RPM Display Max 10000 RPM Throttle Zero Throttle Value: 0.6 % Zero Throttle Value: 0.5 % Full Throttle Value: 80.0 %
		Adjust Trigger Angle with Timing Lock Enabled
d		OK Cancel Apply

Haltech Platinum Pro Plug-In (SR20)

Trigger edge setting is not available on Haltech platinum pro ECUs, therefore, the factory default edge setting is used.

-> Perform timing lock and adjust trigger angle.

Reference // L

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## Haltech Elite (ESP/NSP)

	ite 1500 ECU 2.36.0 - Release			- 0	
-	Main Trigger Fuel I	Ignition			
*	Trigger Configuration				
Engine	Trigger Type	Generic - Multi-tooth - Singl	e Tooth Home		
🔺	Trigger Signal Location	On Cam			
	Number Of Teeth	24	-		
unctions	Number Of Missing Teeth	2			
_	TDC Offset Angle	15.0 •			
	TDC Offset Angle Table E				
Devices	RPM Filter Level				
197310.008	Quick Start	Disable 🗸	_		
1	1	Disable 10			
atili	Trigger Signal	<u>1</u>	Home Signal		
Datalog	Sensor Type	Hall Effect 🗸 🔶	Sensor Type	Hall Effect 🗸	
	Edge	Falling Edge 🔍 🔶	Edge	Falling Edge 🗸 🔸	
	Filter Level	0 🗸	Filter Level	0 🔛 🗕	
	Pull Up	Disabled 🗸 🔶	Puli Up	Disabled V	
	Ground Reference	Disable 😪	Ground Reference	Disable 😔	
	Digital Reference	Disable 🕺	Digital Reference	Disable	
	Signal Coupling	DC V	Signal Coupling	DC v	
	Edge Rejection Ratio Enable	Disable 🗸 🔶	Minimum RPM	1000 RFM	
	Edge Rejection Ratio	20.0 %	Synchronisation Mode	Always	
			Maximum DDM	2000 DDM	
			1 1 Makerovies D DN	DDM	
ofile: S14			View I/O Report (List of Wiring Allocat	tions) OK Cancel Ap	oly

-> Perform timing lock and adjust trigger angle.

#### Link G4/G4+/G4X (SR20)

ECU Settings	PB Confi	guration	Tuning	Logging	Mixture Map						
⊞ <b>≙</b> ↓	_ <b>.</b>				Trigger Setu	0		x	1		
Configuration	Tri	gger Mode				Multi-Tooth				ing	Fur
Euel Fuel						1 - Default	🚰 S	elect —		× Ing	T UI
Constian Ignition	KP	M Filtering				I - Default	2↓			Se	tu
Engine Protection											1000
Auxiliary Outputs							Mult	i-Tooth			En
Digital Inputs							Mult	iTooth / Mi	ssina	des	s list
Analog Inputs							a provide	ta 1UZFE	5		
Triggers											
🧼 / Trigger Setup							Toyo	ta 1UZFE	/VTi		
🗸 🚞 Trigger 1							Toyo	ta 1JZ VVT	1	rge	
P Trigger 1								aru EZ30/36		ses	sei
🗸 🫅 Trigger 2											
Dirigger 2							the second second	aru V7-10(J	DM)	ode	te
& Calibrate							Suba	aru V1-6			
Math							Chev	LS1 5-10		a dic	
MotorSport										a Cit	Jila
Idle Speed Control								/LS2/LS7		. C	he
Electronic Throttle							Niss	an 360 Opt	0	I tric	
Boost Control							Mits	ubishi EVO	1-6	v gge	
Knock Control									14 10 TA	↓ 990	
VVT Control								Ok	Cance	4	
Chassis and Body			100 N. 100 N.		256814	1000000000000				- 005	cont
/PID Setup			Auxilia	ry	×	Digital	X	4	Analog	5	X
P Torque Management P Table Allocation	Aux In	jector 1 - In	jec Active	Aux Ignition 6	Off	Digital Input 1 - A	C R Inactive	Analog 1 (V)		0	).72
Statistics		jector 2 - In		Aux Ignition 7	Off	Digital Input 2 - St	art Inactive	Analog 2 - T	PS (Main) Se	ource (\ 0	0.37
P Statistics	Aux In	jector 3 - In	jec Active	Aux Ignition 8	Off	Digital Input 3 - Po	owe Inactive	Analog 3 - N		0	151
		jector 4 - In		Aux 1 - Engine		Digital Input 4 - N		Analog 4 (V)			1.95
		jector 5	Off	Aux 2 - Tacho	Active	Digital Input 5 - Re		Analog 5 (V)		0	0.03
		jector 6 - A		Aux 3	Off	Digital Input 6	Off	Analog 6 (V)		0	0.02
				Aux 4 - CE Light		Digital Input 7	Off	Analog 7 (V)			0.01

Figure 16 - Link ECU Main Trigger Setup

ECU Settings	Tuni Configuration	ing Logging M	Mixture Map			
■ ⊉↓			Trigger 1			x
Configuration	Trigger 1 Type		NAME OF BRIDE	Optical/Hall		
Fuel	Trigger 1 Pull-up			OFF		
Engine Protection	Trig 1 Edge			Falling		
Auxiliary Outputs	Multi-Tooth Position			Cam		
Digital Inputs	Tooth Count			24		
Triggers	Sync Tooth			1		
Electronic Throttle Soost Control Control VVT Control Chassis and Body PD Setup	Au	ixiliary	x	Digital	×	A
Torque Management Table Allocation	Aux Injector 1 - Injec Act		Off	Digital Input 1 - AC		Analog 1 (V)
Statistics	Aux Injector 2 - Injec Act		Off	Digital Input 2 - Sta		Analog 2 - TI
	Aux Injector 3 - Injec Act Aux Injector 4 - Injec Act		Off	Digital Input 3 - Pow Digital Input 4 - Net		Analog 3 - M Analog 4 (V)
		Off Aux 2 - Tacho	Active	Digital Input 5 - Rea		Analog 5 (V)
	Aux Injector 6 - AC Inact		Off	Digital Input 6	Off	Analog 6 (V)
		tive Aux 4 - CE Light	Inactive	Digital Input 7	Off	Analog 7 (V)

Figure 17 - Link ECU Trigger 1 Setup

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ECU Settings	Configuration Tuning	Logging Mixture Ma	p			
	a∢)-	Trigger 2		X		
Configuration	Trigger 2 Type		Optical/Hall			
Fuel	Trigger 2 Pull-up		OFF			
Ignition Engine Protection	Trig 2 Edge		Falling			
Auxiliary Outputs	and the second se		raining			
Digital Inputs	Sync Mode		Cam Pulse 1x			
Analog Inputs						
Triggers						
🦰 🤌 Trigger Setup						
Y D Trigger 1						
A Trigger 1						
Y D Trigger 2						
Calibrate						
Math						
MotorSport						
Idle Speed Control						
Electronic Throttle						
Boost Control						
Control						
VVT Control						
Chassis and Body	L			_		
PID Setup	Auxilia	ary 🛛 🕅	Digital 🛛 💥	<i>4</i>		
Torque Management Table Allocation	Aux Injector 1 - Injec Active	Aux Ignition 6 Off	Digital Input 1 - AC R Inactive	Analog 1 (V)		
Statistics	Aux Injector 2 - Injec Active	Aux Ignition 7 Off	Digital Input 2 - Start Inactive	Analog 2 - T		
2 Statistics	Aux Injector 3 - Injec Active	Aux Ignition 8 Off	Digital Input 3 - Powe Inactive	Analog 3 - N		
	Aux Injector 4 - Injec Active	Aux 1 - Engine Fan ' Inactive	Digital Input 4 - Neutra Active	Analog 4 (V		
	Aux Injector 5 Off	Aux 2 - Tacho Active	Digital Input 5 - Rear Inactive	Analog 5 (V)		
	Aux Injector 6 - AC Inactive	Aux 3 Off	Digital Input 6 Off	Analog 6 (V)		
	Aux Injector 7 - ISC 5 Active	Aux 4 - CE Light Inactive	Digital Input 7 Off	Analog 7 (V)		
	Aux Injector 8 - Boy Inactive	Aux 5 - Fuel Pump Active	Digital Input 8 Off	Applog 8 AA		

Figure 18 - Link ECU Trigger 2 Setup

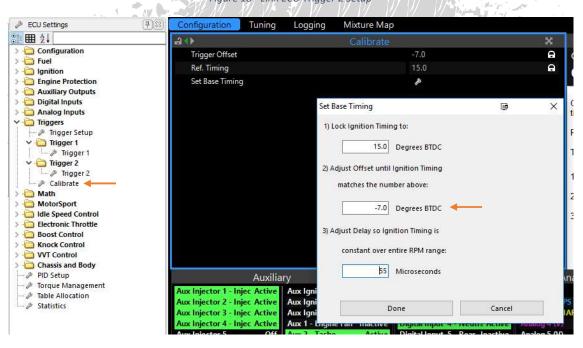


Figure 19 - Link ECU Trigger Offset Angle, Lock Timing Menu

-> Perform timing lock and adjust trigger angle.

51 51	G1入力 の光学式 の電磁式	-G2入力- に 光学式		-NE入力- の 光学式 の 電磁式	5	
6t 7(	-G1周期	-G2周期- © 720		-NE周期	4	
8( 8t	C 360 C 180	C 360 C 180		C 30 C 10	9	
9; 9(	インシュンタ制御 で電圧	で電流×1		面清x2	9 5 1 5 1	E C
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	C 7*N777*	[	·	•		
			100	inese Market)		

#### HKS FCon Vpro/Gold

The TDC (offset) angle above are for a starting reference point only as it may be affected by head or block machining, head gasket thickness, camshafts or any other variable that may alter camshaft position. For some brand of ECU such as Haltech platinum sport, TDC angle must be set higher than the maximum ignition timing that you intend to run i.e. if your TDC angle is 30 degrees, your engine will not run an ignition timing greater than 30 degrees even if you set it at 40 degrees on the timing table. In that circumstance, you need to adjust the trigger tooth offset and reset the trigger TDC angle to match.

- 14. Enable timing lock (i.e. at 0 or 15°) and disable the injectors.
- 15. With a timing light connected to Cyl 1 COP extension lead, crank the engine. Adjust the 'TDC' angle until the crank timing matches the timing lock figure. Note that the TDC angle is set at compression stroke.
- 16. Once all parameters are satisfactorily configured, enable the injectors and start the engine.
- 17. With the engine idling and timing lock still enabled, double check that the timing is still synchronised with the timing lock. Re-adjustment is usually required, where the previously set TDC angle, was set at lower cranking speed where the timing light may not perform accurately.
- 18. Once all set, disable the timing lock.

   18. Once all set, disable the timing lock.

   19. [Je-Pin the wiring terminals from the grey CAS connector, swap Trigger 1 (primary) and Trigger 2 (home) wire around.

   19. [Trigger 2 (home) wire around.

   19. [Trigger 1 [Trigger 1

Figure 21 - Swapping Trigger Wires Around (Required on Some ECUs)

## TROUBLESHOOTING

PROBLEM	APPROACH
No signal output from the sensors.	<ul> <li>Check if wiring is correct.</li> <li>Ensure trigger sensor gap is set as per step 11.</li> <li>Check the 12V and ground connection to the sensor.</li> <li>From figure 20, check resistance between the positive pin to trigger 1 pin. Value should be ~2200 Ω.</li> <li>From figure 20, check resistance between the positive pin to trigger 2 pin. Value should be ~2200 Ω.</li> </ul>
Sensors are outputting signal but engine does not start. Continuous miss counts.	• Swap the 120° and the 1° sensor wiring (trigger 1 and trigger 2) on the 4-pin grey CAS connector, <b>refer to figure 21.</b>
Engine misfires intermittently/trigger error	<ul> <li>Check trigger signal using ECU's in-built or external oscilloscope to verify trigger pattern and tooth count.</li> <li>Check for excessive exhaust camshaft axial play, if beyond factory allowance, using a dial indicator.</li> <li>Some aftermarket cam gear has the cam gear hub internal diameter (refer to figure 7) larger than OEM causing run out. Check for out of round/eccentricity on all 24 primary teeth using a dial indicator (email us for a guide).</li> <li>Check for excessive exhaust camshaft radial play, if beyond factory allowance. This is normally achieved by measuring the 1<sup>st</sup> cam journal to cam cap/bore clearance.</li> <li>Ensure trigger sensor gap is set as per step 11.</li> <li>Check for noisy signal using oscilloscope, shielded wiring ground strap to only be grounded on one end.</li> <li>Note: If using an unregulated power supply, faulty charging circuit and extreme voltage spikes will damage the sensor!</li> </ul>

As with all other 24+1 trigger setup, it does require a full cranking cycle of the engine for the ECU to synchronise and start the engine. If using Haltech ECU with NSP software, under the main trigger settings, set the 'Tooth Count Til Start' to 25. This allows for full cranking cycle to occur and synchronise without throwing a DTC code.

## CONCLUSION

Installation is now complete. Cam trigger kit on SR20 reduces ignition timing drift by significant amount in comparison to OEM CAS or any trigger disc replacement. Benefits includes tuner's confidence in maximising ignition timing whilst keeping consistent safety margin.

