

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

This installation manual is applicable to the following engine;

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

## Please read this installation manual carefully prior to installing the product.



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If in doubt, seek professional help.

For further information, visit www.50ignite.com/terms-and-conditions/

## 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
- 2x 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

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, AEM, HKS FCon Vpro/Gold) that allows you to set the trigger type (24 and 1 multitooth), trigger edge and trigger angle.

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.

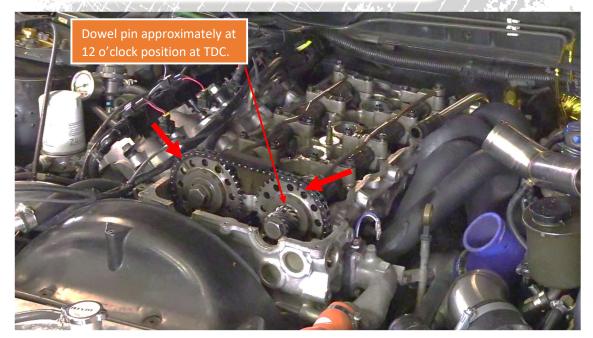


Figure 2 - Set the Engine to TDC

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

7. 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 10, if the gap is beyond 0.8mm, 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!



Figure 7 - Trigger Wheel Installed



8. <u>CHECK</u> 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 9 - Check Dowel Pin Gap

 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 <u>MUST BE USED</u> to provide ground contact to the cylinder head.

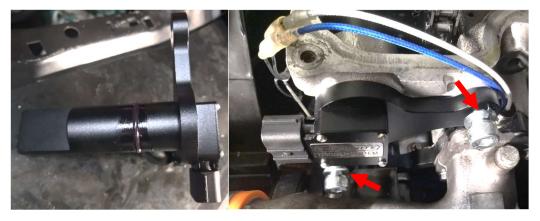


Figure 10 - Install the Sensor

10. Using a bent type feeler gauge, CHECK the sensor gap on the rear and front teeth. Add trigger wheel shim if necessary (step 7).



Figure 11 – Checking the Sensor Gap IS MANDATORY!

- Nominal sensor gap: 0.45mm to 0.8mm
- Adding one trigger wheel shim will reduce the sensor gap by approximately 0.2mm.
- Too close or too far of sensor gap will affect sensor read performance detrimentally.
- 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!
- 11. Hardware installation is now complete. Assemble everything back together.

NOTE: It is highly recommended to run a regulated power source to the cam trigger sensor. The +5V/8V/12V power output from the ECU is normally used. Making a new harness for the trigger sensor to ECU using shielded wires is also recommended to replace the crusty 30-year-old wiring.

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

12. Connect the ECU to your laptop and configure these settings (DO NOT PERFORM THESE SETTINGS IF YOU ARE NOT EXPERIENCED OR ENGINE DAMAGE MAY OCCUR);

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 19.

#### **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: DISABLED (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.

n Setup - S15	11 /S14s2 ECU 1.13	, ·			5.7."
dvanced dvanced Dutputs Devices a Logging	Main  Engine Info Model: Tuning Method Fuel Load Source Ignition Load Source Primary MAP Sensor Engine Capacity Cranking RPM V3N:  Fuel Injectors Injector Current Limit Fuel Pressure Type Base Fuel Pressure	S13 Type-X     Y       VE     Y       MAP     Y       Manifold Pressure Sensor 1     1998       250     RPM       Enabled     Y       3 - 14 ohm     Y       43.5     psi	Trigger         Trigger Type:         Trigger Angle         Angle Offset Table         RPM Filter Level         RPM Display Max         Throttle         Zero Throttle Value:         Zero Throttle Hyst:         Full Throttle Value:	Multitooth 24 and 1	
	Ignition Ignition Mode	Direct Fire	Adjust Trigger	· Anglo with	

Figure 12 - Haltech Platinum Pro Plug-In Configuration

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.

1ain Setup - El	lite 1500 ECU 2.36.0 - Release				<u></u>	×
	Main Trigger Fuel 1	Ignition				
-						~
Engine	Trigger Configuration	-				
4	Trigger Type	Generic - Multi-tooth - Single	e Tooth Home			
<b>N</b> .	Trigger Signal Location	On Cam 🗸 🔶	-			
Functions	Number Of Teeth	24				
Functions	Number Of Missing Teeth	2				
	TDC Offset Angle	15.0 °				
	TDC Offset Angle Table E	inable				
Devices	RPM Filter Level	1 🗸				
~	Quick Start	Disable 🗸	•			
iilil	Trigger Signal		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 🗸 🔶	Pull Up	Disabled 🗸 🔶		
	Ground Reference	Disable 🔍	Ground Reference	Disable 😔		
	Digital Reference	Disable Sec	Digital Reference	Disable		
	Signal Coupling	DC v	Signal Coupling	DC V		
	Edge Rejection Ratio Enable	Disable 🗸 🔶	Minimum RPM	1000 RPM		
	Edge Rejection Ratio	20.0 %	Synchronisation Mode	Always 🗸 🔶		
			Maximum DDM	2000 DDM		¥

### Haltech Elite (ESP/NSP)

Figure 13 - Haltech Elite Configuration on ESP (NSP similar)

-> 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							Sector States	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 14 - Link ECU Main Trigger Setup

ECU Settings	(7) 🕄 Configuration Tun	ing Logging	Mixture Map			
∎ ĝ↓			Trigger 1			X
Configuration	Trigger 1 Type			Optical/Hall		
Difference 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		
P Trigger Setup						
🗸 🧰 Trigger 1						
Trigger 1 🔶						
✓ ☐ Trigger 2						
P Trigger 2						
- P Calibrate						
🗀 Math						
MotorSport						
Idle Speed Control						
Electronic Throttle						
Boost Control						
Control Knock Control						
DVVT Control						
Chassis and Body						
PID Setup	Au	ixiliary	×	Digital	×	A
Torque Management	Aux Injector 1 - Injec Ac		Off	Digital Input 1 - AC	R. Inactive	Analog 1 (V)
Table Allocation	Aux Injector 2 - Injec Ac		Off	Digital Input 2 - Star		Analog 2 - T
Statistics	Aux Injector 2 - Injec Ac		Off	Digital Input 3 - Pow		Analog 3 - N
	Aux Injector 4 - Injec Ac			Digital Input 4 - Neu		Analog 4 (V)
		Off Aux 2 - Tacho	Active	Digital Input 5 - Rea		Analog 5 (V)
	Aux Injector 6 - AC Inac		Off	Digital Input 6	Off	Analog 6 (V)
	Aux Injector 7 - ISC 5 Ac	tive Aux 4 - CE Light	Inactive	Digital Input 7	Off	Analog 7 (V)

Figure 15 - Link ECU Trigger 1 Setup

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ECU Settings	Configuration Tuning Lo	ogging Mixture Map		
⊞ 2↓	a.↔	Trigger 2		X
Configuration	Trigger 2 Type		Optical/Hall	
Fuel	Trigger 2 Pull-up		OFF	
Dignition	Trig 2 Edge		Falling	
Auxiliary Outputs	and the second		Com Di la di	
Digital Inputs	Sync Mode		Cam Pulse 1x	
Analog Inputs				
🚞 Triggers				
- A Trigger Setup				
Y D Trigger 1				
A Trigger 1				
Trigger 2				
P Ingger 2				
Math				
MotorSport				
ldle Speed Control				
Electronic Throttle				
Boost Control				
Knock Control				
VVT Control				
Chassis and Body				-
PID Setup Torque Management	Auxiliary	X	Digital 🏻 🤉	
Table Allocation	Aux Injector 1 - Injec Active Aux	Ignition 6 Off	Digital Input 1 - AC R Inact	ive Analog 1 (V)
P Statistics	Aux Injector 2 - Injec Active Aux	Ignition 7 Off	Digital Input 2 - Start Inact	ive Analog 2 - T
- Statistics	Aux Injector 3 - Injec Active Aux	Ignition 8 Off	Digital Input 3 - Powe Inact	ive Analog 3 - M
	Aux Injector 4 - Injec Active Aux	1 - Engine Fan ' Inactive	Digital Input 4 - Neutra Act	ive Analog 4 (V
		2 - Tacho Active	Digital Input 5 - Rear Inact	
	Aux Injector 6 - AC Inactive Aux	3 Off	Digital Input 6	Off Analog 6 (V)
		4 - CE Light Inactive	Digital Input 7	Off Analog 7 (V)

Figure 16 - Link ECU Trigger 2 Setup

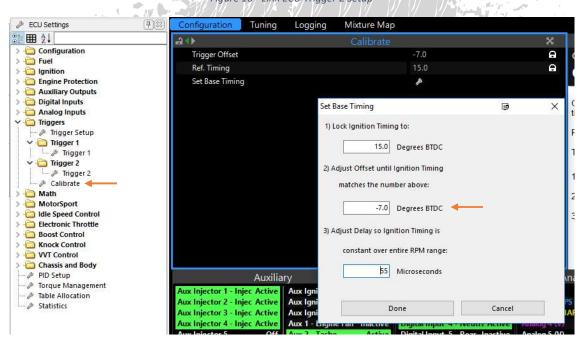


Figure 17 - Link ECU Trigger Offset Angle, Lock Timing Menu

-> Perform timing lock and adjust trigger angle.

56 58 85	G1入力 の 光学式 の 電磁式	G2入力 の光学式 の電磁式		5
7(	G1周期 © 720	G2周期 で 720		
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	·通常 · ブルアップ	(° )	·并2入力————————————————————————————————————	4147
5				
attracted does	Seneral and the seneral sector of the sector	Figure 18 - HKS Fcon C	Configuration	

### 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 plug-in or 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.

- 13. Enable timing lock (i.e. at 0 or 15°) and disable the injectors.
- 14. With a timing light connected at Cyl 1, 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 (engine will not run if it is set at exhaust stroke even though the timing marker matches the timing lock figure, if so, you are 360 degrees out).
- 15. Once all parameters are satisfactorily configured, enable the injectors and start the engine.
- 16. 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.
- 17. Once all set, disable the timing lock.

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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 10.</li> <li>Check the 12V and ground connection to the sensor.</li> </ul>
Sensors are outputting signal but engine does not start. Continuous miss counts.	<ul> <li>Swap the 120° and the 1° sensor wiring on the 4-pin grey CAS connector (refer to figure 19).</li> </ul>
Engine misfires intermittently/trigger error	<ul> <li>Check for excessive exhaust camshaft axial play, if beyond factory allowance.</li> <li>Ensure trigger sensor gap is set as per step 10.</li> <li>Check for noisy signal using oscilloscope, run new shielded wiring to ECU</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.



Revision 1

# 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.

