

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.

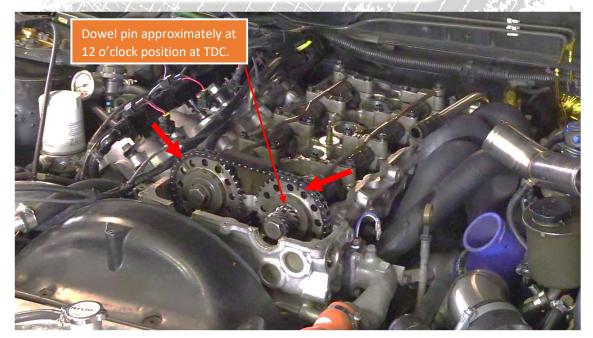


Figure 2 - Set the Engine to TDC

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 2nd 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 2nd 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

. C. A	1.1 5/\$14s2 ECU 1.13		num Pro Plug-		3.7."
Avanced Ava	Main Engine Info Model: Tuning Method Fuel Load Source Ignition Load Source Ignition Load Source Primary MAP Sensor Engine Capacity Cranking RPM VIN: Fuel Injectors Injectors Injector Current Limit Fuel Pressure Type Base Fuel Pressure Ignition Ignition Mode Lock Timing	S13 Type-X V VE V MAP V MAP V Manifold Pressure Sensor 1 1998 cc 250 RPM Enabled V 3 - 14 ohm V MAP Reference V 43.5 psi Direct Fire V 15.0 °	Trigger Trigger Angle Angle Offset Table RPM Filter Level RPM Display Max Throttle Zero Throttle Value: Full Throttle Value:	Multitooth 24 and 1 185.0 • Disabled • 0 10000 RPM 0.6 % 0.5 % 80.0 %	
			Adjust Trigger Timing Lock E		

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			
N .	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		uning Logging	Mixture Map					
Ⅲ ≙↓	a ∢►		Trigger Setur	3		x	T	
Configuration	Trigger Mode		33	Multi-Tooth				× ing F
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Ignition	KPM Filtening			- Delault	2↓			Set
Engine Protection								
Auxiliary Outputs					Mult	i-Tooth	11 - 11 - 11 - 11 - 11 - 11 - 11 - 11	1 the E
Digital Inputs					Mult	iTooth / Mi	ssing	des I
Analog Inputs						ta 1UZFE	3	1000
Triggers								
Trigger Setup	- 1				loyc	ota 1UZFE	VVII	and the second se
🗸 🚞 Trigger 1					Toyo	ota 1JZ VV	Ti .	rge ni
🧼 🤌 Trigger 1					Suba	aru EZ30/3	5 AVCS	ses se
🗸 🚞 Trigger 2								
P Trigger 2					Sector Street	aru V7-10(J	DM)	ode te
Calibrate					Suba	aru V1-6		
Math					Chev	/LS1 5-10		e digit
MotorSport					Cha	/LS2/LS7		e uign
Idle Speed Control					1000			e: Che
Electronic Throttle					Niss	an 360 Opt	0	I trigo
Boost Control					Mits	ubishi EVO	1-6	v ggeri
Knock Control						1	1	
Chassis and Body						Ok	Cance	
PID Setup		Auxiliary	X	Digital	×		Analog	X
Torque Management	120					Statement of the local division of the local		
Table Allocation		Active Aux Ignition 6	Off	Digital Input 1 - AC Re		Analog 1 (V		0.7
Statistics	Aux Injector 2 - Injec /		Off	Digital Input 2 - Start				ource (\ 0.3
	Aux Injector 3 - Injec /		Off	Digital Input 3 - Powe		Analog 3 - N		0.5
	Aux Injector 4 - Injec /			Digital Input 4 - Neutr		Analog 4 (V		4.9
	Aux Injector 5	Off Aux 2 - Tacho	Active	Digital Input 5 - Rear	Inactive	Analog 5 (V)	0.0
	Aux Injector 6 - AC In		Off	Digital Input 6	Off	Analog 6 (V		0.0
	Aux Injector 7 - ISC 5 /	Aux 4 - CE Ligh	t Inactive	Digital Input 7	Off	Analog 7 (V		0.0

Figure 14 - Link ECU Main Trigger Setup

ECU Settings	(₽) 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 1 - 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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5.00

ECU Settings	Configuration Tuning	Logging Mixture	Map	
■ === 2↓	a∢⊳	Trigge	# 2	X
Configuration	Trigger 2 Type	Mada	Optical/Hall	
Fuel	Trigger 2 Pull-up		OFF	
Ignition			Fallian	
Engine Protection	Trig 2 Edge		raiing	
Auxiliary Outputs Digital Inputs	Sync Mode		Cam Pulse 1x	
Analog Inputs				
Triggers				
- A Trigger Setup				
V C Trigger 1				
D Trigger 1				
✓ ☐ Trigger 2				
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- Alibrate				
Math				
MotorSport				
Idle Speed Control				
Electronic Throttle				
Boost Control				
Control				
VVT Control				
Chassis and Body PID Setup			at ()	**
& Torque Management	Auxil	, , , , , , , , , , , , , , , , , , ,	- Exigitat	X A
- A Table Allocation	Aux Injector 1 - Injec Activ	Aux Ignition 6	Off Digital Input 1 - AC R Ina	ctive Analog 1 (V)
Statistics	Aux Injector 2 - Injec Active	e Aux Ignition 7	Off Digital Input 2 - Start Ina	ctive Analog 2 - TP
6 Statistics	Aux Injector 3 - Injec Activ	Aux Ignition 8	Off Digital Input 3 - Powe Ina	ctive Analog 3 - M.
	Aux Injector 4 - Injec Activ	Aux 1 - Engine Fan ' Inact	ive Digital Input 4 - Neutra A	ctive Analog 4 (V)
	Aux Injector 5 Of	f Aux 2 - Tacho Act	ive Digital Input 5 - Rear Ina	ctive Analog 5 (V)
	Aux Injector 6 - AC Inactive	e Aux 3	Off Digital Input 6	Off Analog 6 (V)
	Aux Injector 7 - ISC 5 Activ	Aux 4 - CE Light Inact	ive Digital Input 7	Off Analog 7 (V)
	Aux Injector 8 - Roy Inactiv	Aux 5 - Fuel Pump Act	Digital Input 8	Off Analog 8 00

Figure 16 - Link ECU Trigger 2 Setup

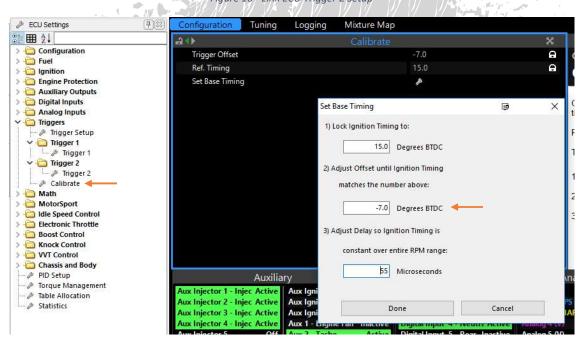


Figure 17 - Link ECU Trigger Offset Angle, Lock Timing Menu

-> Perform timing lock and adjust trigger angle.

56 56 68	G1入力 で 光学式 で 電磁式	G2入力 の 光学式 の 電磁式		
7(8(8!	G1周期 G 720 C 360 C 180	G2周期 G 720 C 360 C 180	NE問期 C 60 で 30 C 10	4 7 3 5 9 9
9: 9(10	インジェクタ制御 で電圧	C 電流x1	○ 電流×2	5 10
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13	A STATE OF A STAT	217	***797* \$2入力 \$** ***797*	4143
8				+++
		Figure 18 - HKS Fcon Co	onfiguration	

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 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.
- 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.



Figure 19 - Swapping Trigger Wires Around (Required on Some ECUs)

TROUBLESHOOTING

PROBLEM	APPROACH
No signal output from the sensors.	 Check if wiring is correct. Ensure trigger sensor gap is set as per step 10. Check the 12V and ground connection to the sensor. From figure 19, check resistance between the positive pin to trigger 1 pin. Value should be ~2200 Ω. From figure 19, check resistance between the positive pin to trigger 2 pin. Value should be ~2200 Ω.
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, refer to figure 19.
Engine misfires intermittently/trigger error	 Check trigger signal using ECU's in-built or external oscilloscope to verify trigger pattern and tooth count. Check for excessive exhaust camshaft axial play, if beyond factory allowance, using a dial indicator. Check for out of round/eccentricity on the cam gear and camshaft snout using dial indicator.** Check for excessive exhaust camshaft radial play, if beyond factory allowance. This is normally achieved by measuring the 1st cam journal to cam cap/bore clearance. Ensure trigger sensor gap is set as per step 10. Check for noisy signal using oscilloscope, run new shielded wiring to ECU. Note: If using an unregulated power supply, faulty charging circuit and extreme voltage spikes will damage the sensor!

**** Problems with Tomei USA cam / cam gear:** It was brought to our attention that Tomei USA branded cam and cam gear exhibits excessive out-of-roundness on the cam snout. The result of the eccentricity during rotation will cause intermittent sensor read problem. If you're using Tomei USA cam / cam gear, please ensure that you check the cam roundness with a dial indicator.

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.

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.

