

Rex's Speed Shop

Guide H-2: Honda CB400, CB450, CM400, CM450 Hitachi TIA01-20 CDI Ignition System Trouble Shooting Guide



Introduction

This guide covers a family of Honda 400 and 450 cc parallel twins sold worldwide between 1978 and 1986. The CB450DX models were produced as late as 1993. In Europe and Australia CB400 T and N-designated bikes were known as Dream or Superdream bikes while related models in the USA were sold as Hawk or Nighthawk models. Despite differences between models, the CDI ignition and alternator remained fundamentally the same system in all variants. This guide applies to motorcycles fitted with a Hitachi alternator and the TIA01-20 type CDI unit.

- CB400T – Hawk/Dream Models 1978-79 UK/USA
- CB400N, NA, NB, NC, ND – Superdream UK/Europe/Australia
- CB450T – Hawk Models
- CB450SC – Nighthawk in the USA
- CB450DX –1988-93, various markets
- CM400 – Including T, E and C, Custom variants
- CM450 – Including E and Custom variants

If you are unsure whether this guide covers your bike, check the CDI unit fitted to it. You will find it under the fuel tank, on the left side near the steering head. This guide covers systems using the Hitachi CDI unit with nine wires, two mounting holes along its upper edge, and TIA01-20 stamped on the case. The basic generator and CDI combination remained essentially unchanged across many models and a long production run.

It is important to understand that this type of ignition is self generating and does not draw power from the 12V system. Even if the charging system develops a fault, the ignition will not be affected. Therefore changing a regulator rectifier for example cannot affect the ignition operation.



Hondamatic transmission models are not covered by this guide (see guide H-3).

Start with the Basics - Define the fault:

- No spark
- Misfire when hot
- Misfire under load
- Intermittent spark on one cylinder
- Cuts out and will not re-start until cooled down
- Difficult to start, needs excessive cranking
- Is the spark yellow or orange rather than whitish-blue
- Did the ignition stop working after fitting another CDI unit?



Specific issues with this system:

- Not revving past 5,000RPM
- Will Rev out but feels as if engine is held back as revs increase
- Excessive ignition advance/engine over heating

XD05F: Plug cap for all models. This system requires a 5KΩ resistor in the cap.

The symptoms help point you toward the next test, so take careful note of how the bike behaves. The Honda workshop manual offers limited guidance on ignition troubleshooting: its test ranges leave room for uncertainty, often masking common faults. Drawing on years of restoration and design experience, this guide helps you understand those faults and work through the diagnosis with greater confidence.

Let's work through the practical test methods we use in our own workshop, with clearer guidance than the original shop manual provides.

Basic Checks

Before starting, complete the basic troubleshooting checks in your workshop manual and rule out fuel-related problems or other straightforward causes. Fit new spark plugs and plug caps: these are common sources of ignition trouble and should be eliminated before moving on.

This guide focuses on components you can readily check with a good-quality multimeter. CDI units cannot be reliably tested this way. Some workshop manuals include complex resistance tables, but these can be confusing and will not reliably distinguish a serviceable unit from a faulty one. At Rex's, we offer a low-cost, fixed-price CDI testing service using specialist equipment to verify the unit's key functions. This includes Hondamatic versions and associated interlock relay.

WARNING: Never connect a CDI unit or HT ignition coil directly to a DC power source, such as the motorcycle's battery. These components are not designed for direct DC operation, and doing so can cause immediate and serious damage to the CDI unit or HT coil.

No spark - Kill Circuit Check

First, check whether the kill circuit is preventing the ignition from producing a spark. Locate the CDI unit and disconnect its black/white wire at the separate bullet connector. Crank the engine. If the spark returns with this wire disconnected, the fault is in the motorcycle's kill circuit.

To investigate, switch off the ignition and disconnect the battery before making any resistance measurements. Leave the black/white wire disconnected from the CDI unit.

Set your multimeter to resistance and connect it between the black/white wire from the motorcycle's wiring loom -not the CDI unit- and a good earth point, such as the HT ignition coil mounting point or its green earth wire.

With the battery still disconnected, turn the ignition switch to ON and set the kill switch to RUN. The meter should indicate an open circuit: there should be no continuity to earth.

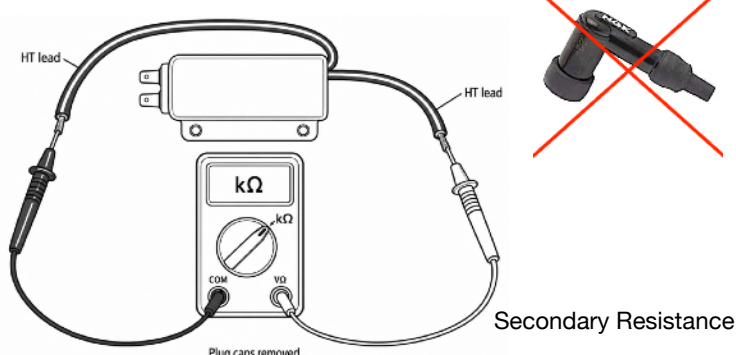
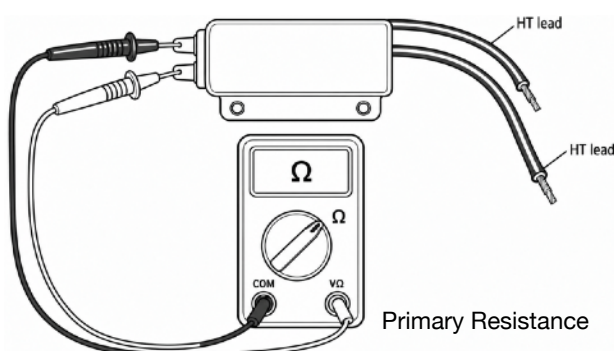
If continuity remains, check the switches and wiring for a fault that is keeping the kill wire connected to earth. Repair the fault, then repeat the test to confirm that the circuit is open with ON and RUN selected. Reconnect the kill wire and battery.



HT Coil Check

The workshop manual describes only a performance test for the ignition coil, requiring another piece of test equipment, but we have located resistance specifications in Honda's technical data. Always remove both HT plug caps before testing. Set your multimeter to k Ω (kilo-ohms) for the secondary winding and Ω (ohms) for the primary. At 20°C, an original Honda coil should measure approximately 0.5 Ω primary and 8 k Ω secondary.

Unlike the CDI generator windings, HT ignition coils are not precision components, so aftermarket coils may give slightly different readings. Both readings should be steady. No reading or a fluctuating reading, once you have confirmed good probe contact, indicates a fault. The primary resistance must be very low. Reject coils measuring around 4 to 5 Ω : these are unsuitable for this CDI system, although they are sometimes incorrectly sold for it.

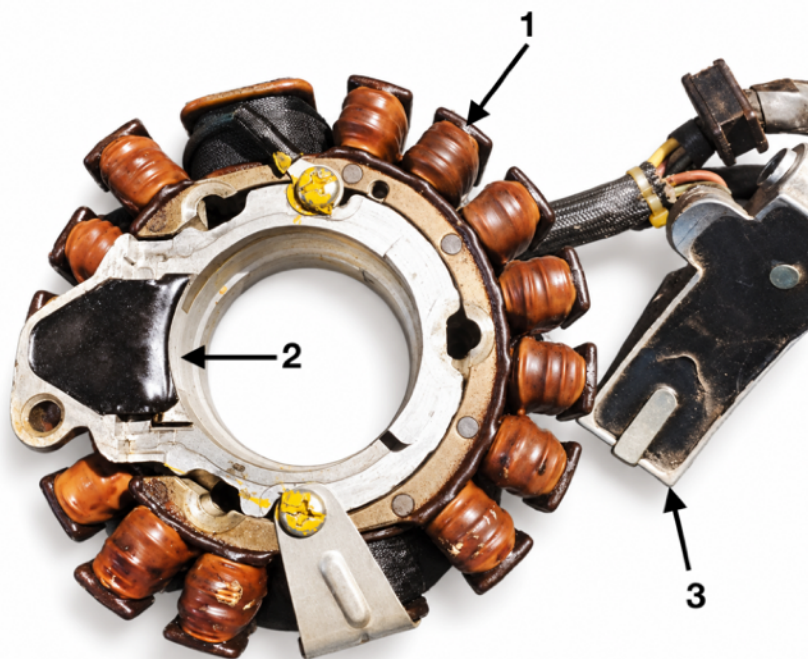


CB400/450 Hitachi Ignition: Stator and Trigger Assemblies (Manual Transmission)

The Hitachi self-generating CDI ignition system was ahead of its time, using three carefully balanced trigger windings to provide stable control of ignition advance. Our technicians have developed replacement components and electronics that allow these features to be fully restored to their original operation.

The complete Hitachi stator comprises three main assemblies: (1) the main stator frame, which carries the alternator and ignition source windings; (2) the high-speed trigger assembly, (3) low speed & advance limiter assembly.

Each assembly is repaired separately and has its own repair price. A repair to one assembly does not include repairs to the other two.



1. Stator frame with AC charging and CDI source windings; The top, black coil is the low speed source. The high speed source is under the metal shroud opposite. The yellow paint on the screws shows us that this is the later version with full power lighting coils.
2. High speed trigger, this begins to work over 2,500RPM and causes the CDi to advance its spark. It has a few degrees of physical adjustment within the stator.
3. Low speed trigger & advance limiter. This dual function unit has two windings inside it that give the start up timing plus signals the CDi unit to prevent any further ignition advance at high engine speed.

Stator/trigger winding faults fall into two basic categories: wire faults and insulation faults. Wire faults can occur at any time, in both new and old systems, and can generally be detected with a multimeter. Insulation faults are more common in older systems approaching the end of their useful life. These typically become apparent when the ignition is under electrical load, hot, or both, as voltage leaks to ground (earth) through insulation weakened by age.

CDI windings are particularly susceptible because they contain many turns of very fine enamelled copper wire. Source windings operate at high voltage and usually fail first. Trigger windings use even finer, closely packed wire, but generally last longer because they operate at lower voltage.

Electrical components age whether they are used or not, particularly ignition components exposed to high electrical stress. Returning these decades-old ignition systems to service often brings previously hidden deterioration to light.



Hitachi TIA01-20 high and low-speed trigger assemblies stripped for rebuilding. At Rex's, we maintain the precise tolerances needed for consistent, reliable operation. New internal components and our own electronics are designed to reproduce the original system's performance.

Resistance Checks Stator & Trigger Windings

These tests measure the resistance of the high and low-speed source windings that power the CDI unit, the high and low speed trigger windings, and the advance limiter winding.

The Honda workshop manual is not as helpful as it could be here. Its broad acceptable resistance ranges, combined with the way copper resistance changes with temperature, can make it difficult to distinguish a healthy winding from a faulty one.

To give you a clearer picture, we provide temperature-corrected reference readings based on many years of testing these generators. Our table shows the resistance expected from a healthy winding at different temperatures. Select the row closest to the temperature of your generator.



HTC56 Replacement Ignition Coil

Readings within 2% of the reference value are normal, allowing for small temperature differences and variations in meter accuracy. A deviation of 5% or more indicates a faulty winding, particularly in a generator that is now several decades old. Readings between these limits warrant further investigation.

An open circuit, or a reading that will not remain steady once good probe contact has been confirmed, indicates a definite, or “hard” fault.

First disconnect the CDI from the stator, once disconnected take these measurements through the stator wiring connectors without removing the generator from the engine, using a good-quality multimeter with suitable resistance ranges and accuracy. Leave the engine unused for several hours so the generator can cool to ambient temperature. Measure the temperature rather than estimating it, and use the form provided to record the temperature and your readings.

Select the closest ambient temperature to yours and read across for a healthy resistance range for that winding					
Ambient Temp °C (°F)	Green-White Low Speed Source	Blue - White High Speed Source	Green* - Light Blue Low Speed trigger	Green* - Brown Advance Limiter	Green- Pink High Speed trigger
-10 (14)	354.4 - 368.9Ω	73.5 - 76.5Ω	96.8 - 100.7Ω	81.3 - 84.6Ω	116.7 - 121.5Ω
-5 (23)	362.3 - 377.1Ω	75.1 - 78.2Ω	99.0 - 103.0Ω	83.1 - 86.5Ω	119.3 - 124.2Ω
0 (32)	370.2 - 385.3Ω	76.7 - 79.9Ω	101.1 - 105.3Ω	84.9 - 88.4Ω	121.9 - 126.9Ω
5 (41)	378.1 - 393.5Ω	78.4 - 81.6Ω	103.3 - 107.5Ω	86.7 - 90.2Ω	124.5 - 129.6Ω
10 (50)	386.0 - 402.0Ω	80.0 - 83.3Ω	105.5 - 109.7Ω	88.5 - 92.1Ω	127.1 - 132.2Ω
15 (59)	394.0 - 410.0Ω	81.7 - 85.0 Ω	107.6 - 112.0Ω	90.3 - 94.0Ω	129.7 - 135.0Ω
20 (68)	401.8 - 418.2Ω	83.3 - 86.7Ω	109.8 - 114.2Ω	92.1 - 95.9Ω	132.3 - 137.7Ω
25 (77)	409.7 - 426.4Ω	84.9 - 88.4Ω	111.9 - 116.5Ω	93.9 - 97.8Ω	134.9 - 140.4Ω
30 (86)	417.6 - 434.6Ω	86.6 - 90.0Ω	114.1 - 118.7Ω	95.7 - 99.7Ω	137.5 - 143.1Ω
35 (95)	425.5 - 442.9Ω	88.2 - 91.8Ω	116.2 - 121.0Ω	97.5 - 101.5Ω	140.1 - 145.8Ω
40 (104)	433.4 - 451.0Ω	89.8 - 93.5Ω	118.4 - 123.2Ω	99.3 - 103.4Ω	142.7 - 148.5Ω
*If the trigger assembly is removed from the engine, the connection to ground, via green is lost. In this situation measure the trigger's metal case to each wire colour.					

The Honda manual distinguishes between early and later systems, with a tightened set of figures on later models. The low speed source is quoted as a slightly lower value on these models also, however, in 15 years of testing these stators, we have yet to encounter one whose readings differ from the data shown above. Although we have examined many examples from the USA and European markets, we recognise that our experience may not cover every market or production variant. We remain open to further evidence and will refine this guidance as our knowledge develops.

Table to record your results:

Ambient Temperature:	C or F (please circle)	
ITEM UNDER TEST	YOUR RESULTS	
HT Coil - Caps REMOVED Primary 0.5Ω Secondary 8K	Primary - Ω	
	Secondary - K Ω	
Kill Circuit - Between ground & Black/white wire. Continuity YES/NO?	Ign ON + Kill set to RUN	
	Either Ign or Kill Set to OFF	
Low speed source	Green to White	
High Speed Source	White to Blue	
Low speed trigger	Green to Light Blue	
Advance limiter	Green to Brown	
High speed trigger	Green to Pink	

If you'd like us to interpret this data for you please e-mail: tech@rexs-speedshop.com.

A good clear photo from a phone is a great way to send us your readings. Ensure you include a very brief description of the fault from the list at the start of this guide, your name and the bike's year and exact model.

If you are working for a customer please state this to avoid confusion of different people talking about the same bike.

Advance Limiter Faults

The high-speed trigger begins to influence ignition timing at around 2,500 RPM. Its output increases with engine speed, advancing the timing until the advance limiter holds it at the intended maximum. If the limiter circuit is disconnected or fails completely, the timing remains at the idle setting.

A less common fault allows the timing to advance without a limit, risking engine damage. Stop using the motorcycle if you suspect this fault.

More commonly, a partial failure of a winding or a component inside the CDI restricts the advance. The engine may feel held back or, in severe cases, refuse to rev beyond 5,000 RPM.

A failing trigger winding can damage the CDI's delicate timing circuit, although a failing CDI does not usually damage a winding. Measure the trigger winding resistances carefully and compare them with the temperature-corrected values in the table. Investigate any suspect readings before fitting a replacement CDI, as a defective trigger winding could damage the new unit.

Faults Caused By Electrical Load and Heat

If the stator gives correct, stable resistance readings but the motorcycle still runs poorly, consider the symptoms:

- Does the fault worsen as the engine warms up?
- Does it misfire or struggle only under load?
- Is starting difficult, requiring excessive cranking?
- Does one cylinder lose spark intermittently?
- Does it stop running once warmed up, only re-starting when cool?
- Did it stop running altogether after a new CDI was fitted?

The above can indicate that the stator's insulation is failing. As the engine heats up the electrical power finds an easier route to ground than presented by the CDI unit. Once cool the insulation temporarily regains some strength. Often this condition will show as reduced winding resistance, where the insulation has failed sufficiently to short together sections of the winding. However, where the short is between the winding and ground, the resistance may appear normal, so a good resistance does not always mean a good winding. The random way electrical insulation fails is the reason for these seemingly random symptoms.

A new CDI places the intended electrical load on the windings, charging faster and to a higher voltage than an ageing unit with tired capacitors may achieve. This can expose weaknesses in the winding insulation as it places them under the full, intended load. Problems that appear with heat or load strongly suggest insulation breakdown which a multimeter resistance test may not reveal.

Inspecting the stator

A careful visual inspection of the stator often reveals more clues as to its serviceability. Pay particular attention to the wiring leaving the stator. Electrical stress and temperature in this area are high, so the generator wiring must be in first class condition, with no joins, repairs or hard, brittle insulation. Corroded, loose or unsuitable connectors are unacceptable in this high stress area of the wiring.

Look carefully for mechanical damage to the windings and deterioration or missing areas of the insulation. Discolouration or flaking of the coating on the windings is a warning sign. If the insulation appears burnt, brittle or readily comes away, this shows us that the stator has deteriorated substantially and should not be considered serviceable.

Conclusion

If resistance readings are outside specification or insulation failure is suspected, the usual remedy is to overhaul the generator to its original specification. After decades of service, ignition and charging systems will almost certainly need the electrical equivalent of a full engine overhaul. Replacing a single component often exposes weakness elsewhere, so the underlying faults must be addressed to ensure reliable operation and protect new parts.

Our workshops are fully equipped to overhaul stators and trigger windings, and to test these CDI units accurately on the bench. We are happy to advise via e-mail before you send parts to us.

This guide will help you identify common faults and decide where to investigate next. Accurate diagnosis depends on careful testing of the complete system. If a newly supplied part is returned for testing because a fault remains unresolved, our standard test fee applies.

Our replacement CDI unit for these models comes in two options, to match the white and blue pair. P/N CM4-413 is for early T models with individual terminals, while CM4-MC9 replaces all later versions using a 2-way push in connector.



Rex's CDI unit number:
CM4-MC9



Rex's CDI unit number:
CM4-413