

IMA Current Hack

Insight G1 and Civic Hch1

IMA current hack system

Owners manual. Version 151216V01

Introduction

If you have had your Insight or Civic for a while, you may have heard of current hacking. It's a method used to increase the output power of the IMA (Integrated Motor Assist) system.

The IMA current hack is designed and built by me, Peter Perkins, a multi Insight and Civic owner and electronics enthusiast from the UK. You can find me at www.thehybridexpert.co.uk



The two stages +30% & +44% current hack ready for installation.

In normal use, the Insight and Civic use the OEM computers and parameters to control how the IMA system operates. It balances assist and regeneration levels with throttle requests, engine load, available battery power and road conditions to give the average owner consistent IMA system operation for normal use.

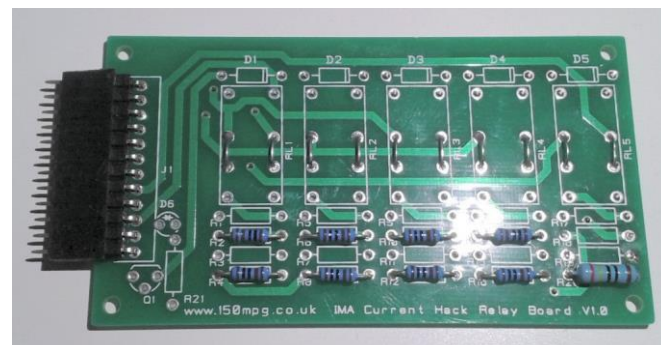
With current hacking the skilled and enthusiastic driver gains benefit by modifying how the IMA operates. This gives better acceleration and deceleration performance by boosting assist and regeneration. It utilises the extra power in a good battery to improve the vehicle flexibility.

How does it work?

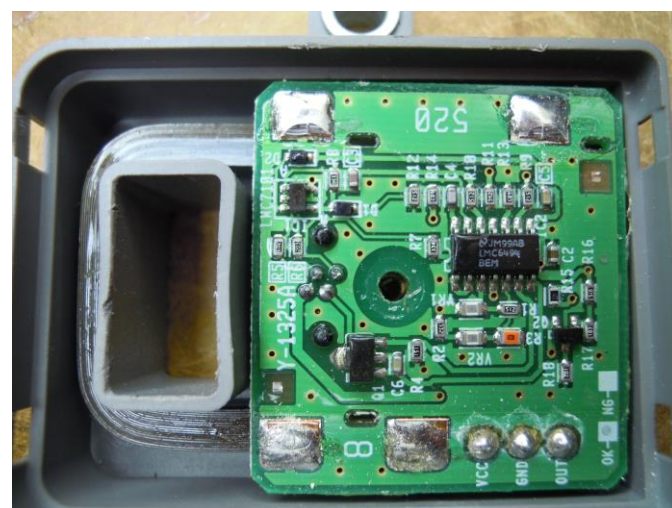
The car controls IMA motor power levels by monitoring battery current, motor current and phase current using five separate sensors. It also monitors battery voltage and is constantly adjusting the current to maintain a maximum power limit of 10kw.

It does this by using the Ohms law related formula $Watts = Volts \times Current$. So a battery voltage of 140V and a current of 72A = 10080W or 10.08kw, near enough for an example. If the battery voltage falls the system will increase the current to maintain the 10kw output, so at 130V it will increase the current to 77A.

If we apply the +30% current hack to the 77A current we get an increase of 23A, bringing it to an actual 100A. Now using the formula $Watts = Volts \times Current$ we can see the IMA output has now increased to $130V \times 100A = 13kw (+3kw)$. This assumes a warm battery (25C+), at a good level of charge, in excellent condition, and which is able to maintain the required voltage under this heavier current drain. If your battery is cold, at a low Soc, or in any other way less than perfect, it may not be able to supply the extra current, or may only supply a small increase.



The single stage +30% fixed current hack.



An IMA motor phase current sensor with cover removed..

In use example

If our IMA battery is well charged, then by simply using more assist power to crest a hill, we may be able to avoid depressing the throttle as far. We gain that few extra mpg, and as we use engine braking down the other side of the hill, our boosted regeneration level replaces that energy used more quickly.

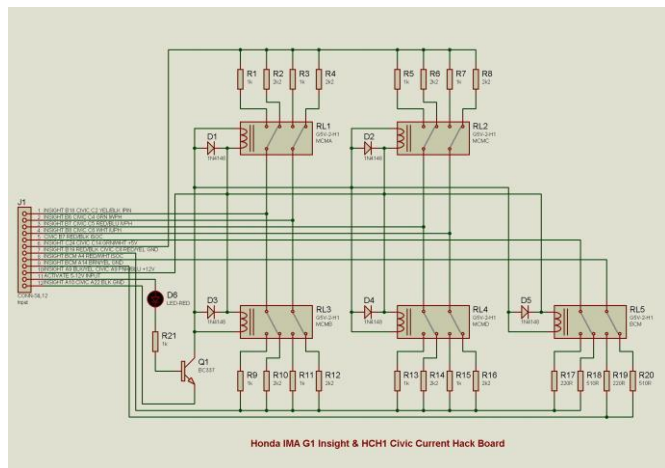
So how is the IMA current hack installed?

For the fixed % current hack seven (Civic) or eight (Insight) connections to the vehicle wiring harness are required inside the IPU compartment.

For the two stage current hack ten (Civic) or eleven (Insight) connections to the vehicle wiring harness are required inside the IPU compartment.

Fitting is simply a matter of:

1. Disconnecting the 12v battery under the bonnet
2. Turning off the main IMA switch. Undoing the rear IPU compartment and unplugging the required MCM and BCM connectors to make working on the wiring easier
3. Making the connections to the wiring loom.
4. Re-plugging the connectors and turning the main IMA switch back on.
5. Reconnecting the 12v battery



IMA current hack circuit board schematic.

The connections in detail

The current hack pcb connector J1 should be fitted with Sil 0.1" male right angle pins, and you should wire your connections to a sil female 0.1" connector strip which you can push onto the pins. The connector J1 is labelled with a small 1 at the top. The connections into the vehicle wiring loom are all splices. Wires should not be cut. Make sure they are all soldered and well insulated with tape or heat shrink afterwards. To disable the current hack simply unplug the wiring harness connector from the current hack board.

In connection order, from the top of J1 downwards.

J1 Pin 1. Insight MCM connector B pin 18 or Civic HCH1 connector C pin 2. (Yellow/Black wire) IPIN.

J1 Pin 2. Insight MCM connector B pin 6 or Civic HCH1 connector C pin 4. (Green wire) IWPH.

J1 Pin 3. Insight MCM connector B pin 7 or Civic HCH1 connector C pin 5. (Red/Blue wire) IVPH.

J1 Pin 4. Insight MCM connector B pin 8 or Civic HCH1 connector C pin 6. (Green wire) IUPH.

J1 Pin 5. Civic HCH1 connector B pin 7. (Red/Black wire) ISOC. (Not used in Insight)

J1 Pin 6. Insight MCM connector C pin 24 or Civic HCH1 connector C pin 14. (Green/White wire) +5V.

J1 Pin 7. Insight MCM connector B pin 19 (Red/Black wire) or Civic HCH1 connector C pin 8 (Red/Yellow wire) Ground.

J1 Pin 8. Insight BCM connector A pin 4. (Red/White wire) ISOC. Not used in Civic.

J1 Pin 9. Insight BCM connector A pin 14. (Brown/Yellow wire) Ground. Not used in Civic.

Controlling the two stage current hack uses connections J1 Pins 10, 11 & 12. These power and operate the relays on the board in response to a simple 5-12v low current signal on J1 Pin 11. If you don't have a two stage hack setup just ignore them.

J1 Pin 10. Insight MCM connector A pin 9 (Black/Yellow wire) or Civic HCH1 connector A pin 9. (Pink/Blue wire) +12v.

J1 Pin 11. This is the signal (operating wire) when it is connected to a +5v or +12v feed the relays will operate, engaging the second level of the current hack. You could use a switch to do this or connect to the OBDII&C expansion port to enable automatic engagement.

J1 Pin 12. Insight MCM connector A pin 10 or Civic HCH1 connector A pin 22. (Black wire) Ground.

The main IMA fuse



The original OEM 100A and upgraded 175A fuse comparison.

The OEM system is provided with a 100A special DC fuse to provide protection. This is likely to fail due to excess current if you use a current hack. I strongly recommend upgrading it to a 150A minimum unit to prevent premature failure. A higher rated fuse will be

slightly bigger physically and does require slight filing of the fuse area on the switchboard to accommodate it.

Current hacking limitations

The Insight and Civic IMA systems have some differences, and so the same % level of current hacking is not achievable on both cars. For the Insight fixed level hacking works well up to a maximum of about +30%. Beyond that the system can trigger IMA short circuit fail errors especially when regenerating at high levels i.e. 75A+

It is possible to defeat the short circuit errors, but that could lead to IGBT power module failure. Read the current hacking thread in depth for details on how I did this.

It is possible to utilise a two stage hack for the insight to operate at +30% for normal use and +44% for assist only. For the Civic Hch1 the hacking headroom is rather lower. I suggest a maximum of +10-15% fixed hack for the car.

Getting a current hack

If you want a hand-built IMA current hack for your car, contact Peter at 150mpg@gmail.com

The price depends on the options selected:

- 1) Fully built tested IMA fixed +30% current hack device. \$119 Inc p&p & paypal fees.
- 2) Fully built tested IMA two stage +30% & +44% current hack device. \$199 Inc p&p & paypal fees.
- 3) IMA current hack bare printed circuit board. \$49 Inc p&p and paypal fees.

To see some videos of the system and its installation check my You Tube channel videos.

My channel also contains many other videos detailing my devices and installation instructions.

[UK CVT Insight Rally car in action.](#)

Finally

I hope you enjoy using the IMA current hack as much as I do. It took hours to research, design and build. It is a product specifically built for our fascinating cars, and I hope it helps you get the best out of yours.

Comments and feedback on it, these instructions, or any of my devices are always welcome. Please use the www.insightcentral.net forum IMA current hack thread for all general questions, feature requests or problems.

There are lots of users of my devices in the hybrid community, and they are always willing to help on the forum with their experience and knowledge. Several forum members including the UK Gen 1 CVT rally car team use the device to boost performance for competition work. I use the fixed +30% current hack in my own car on a daily basis.

Peter Perkins 15/12/2016