How to Build a 1980 Honda CX500C CDI Module

By George in NC

Introduction

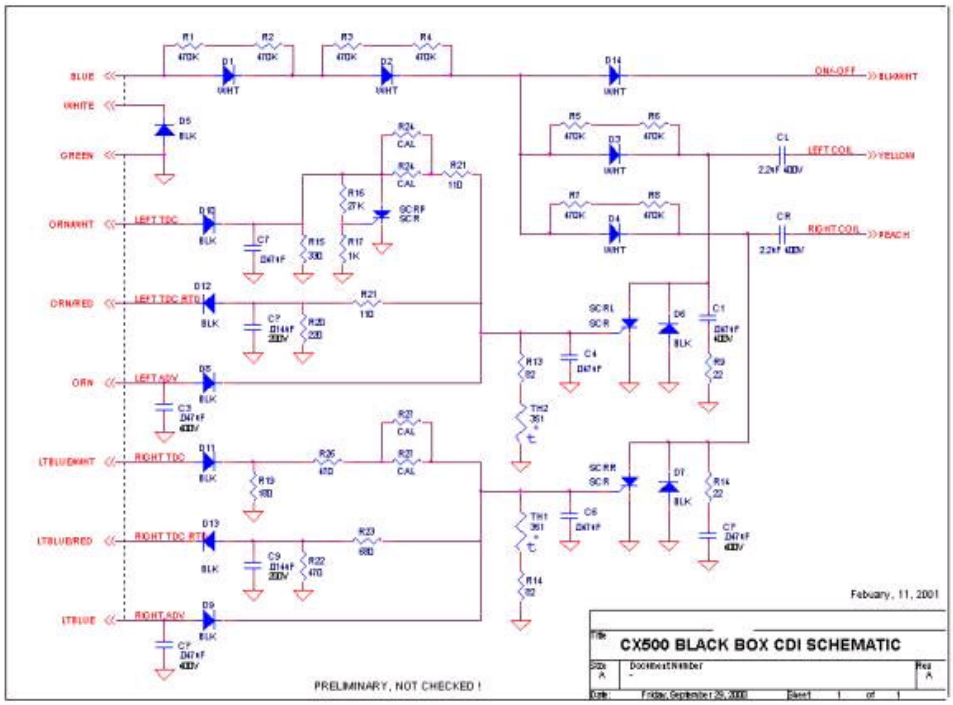
The CX/GL500 series bikes are sturdy and durable and often referred to as bulletproof. The bikes came with two types of ignitions. The first was called a capacitive discharge ignition (CDI) and the second was the transistorized ignition most commonly found in the GL/Silverwing series.

The page is dealing with the most commonly failed CDI/ignition module. In an attempt to keep my bike running, I have had the pleasure of running across many other individuals who have had and still have the same concerns. A good place to start gathering information is the very popular and thorough ***HONDA CX & GL 500*** **OWNERS CLUB SWEDEN** (http://cx500.gobinet.se/).

Lets get to the reason for this page…

Section 1: The Actual Honda CDI Circuit Schematic….

This schematic was given to me by someone in NC who had removed the resin on a non-working CDI and diagramed it. I had also taken the resin off some boards and have found that this diagram is right on the money so it is the basis for the prototypes. There is no difference in the schematic for either the black or gold box (at least none that I've found). The only thing to note below is that the ORN and ORN/WHT leads are swapped. The ORN is the left TDC lead and the ORN/WHT is the ADV lead (this also holds true for the LTBLUE leads).



Schematic summary:

The 3 leads (Ex…ORN/WHT + ORN/RED + ORN or LTBLUE/WHT + LTBLUE/RED + LTBLUE…you get the idea) trigger the SCR (Ex…SCRR or SCRL), with a pulse, to discharge the capacitors (Ex…CR or CL) through the ignition coils (which are step-up transformers/increase the voltage) thus creating a spark at the spark plugs. The power used to charge the capacitors is supplied by the Blue and White wire and the ignition is turned off by the BLK/WHT wire going to ground.

Lead Descriptions: On the above schematic there is an error and the listings below are correct….

Wire	Description
LTBLUE/WHT	pulse lead for SCRR advance
LTBLUE/RED	pulse lead for SCRR gate cutoff
LTBLUE	pulse lead for SCRR TDC/idle gate trigger
ORN/WHT	pulse lead for SCRL 'full' advance
ORN/RED	pulse lead for SCRL gate cutoff

Wire	Description
ORN	pulse lead for SCRL TDC/idle gate trigger
BLUE	positive pulsing power for discharge capacitor
WHITE	not totally sure, but it is used as the negative half of the alternating current flowing through the positive BLUE.
GREEN	ground to bike frame/engine.
BLK/WHT	goes to ground when kill switch is tripped or ignition is turned off
PEACH/PINK	goes to Right coil
YELLOW	goes to Left coil

Notes:
The first thing to note is the extra SCR (SCRP). I think that this SCRP uses a voltage divider to trigger the gate, so that when the pulse coming from ORN/WHT reaches a certain voltage it sends the trigger pulse to ground. This would basically make it a rev limiter…cute….On the prototypes I've put together, I haven't used this part of the original module yet. Will I? Don't know…

There is an important note I would like to add about the electrical characteristics of a SCR. An SCR is basically a diode that can be turned on/off like a light switch. The trick is that a SCR cannot be turned "off" until the voltage across it is either zero or a negative value. So how does the SCR in this ignition turn off?? I won't know for a fact until I get a oscilliscope and do alittle testing.

Basic Component Descriptions:

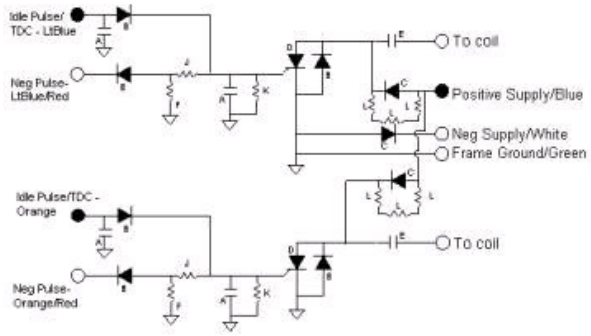
Item	Description
D8-11	creates positive pulse
D12 & 13	creates negative pulse
R19, R26 & 27	voltage divider
R22, R23	voltage divider
Capacitors	in general, the capacitors (not including CL & CR) are used for filtering out unwanted 'noise'. An exception could be C4 & C6, which may be used to smooth out the pulse triggering the SCR (SCRR & SCRL).
CL & CR	used to store the charge that is dissipated through the coils to create the spark
SCRL & SCRR	used to ground CL & CR so that charge can be dissipated through the coils
D6 & D7	used to allow negative pulses allowed by the Blue wire resistor/diode network to goto ground?
SCRP	possibly used to send the triggering pulse to ground so as to keep the rpms below a certain point (rev limiter)

Section II: The Prototypes

Prototype 1:

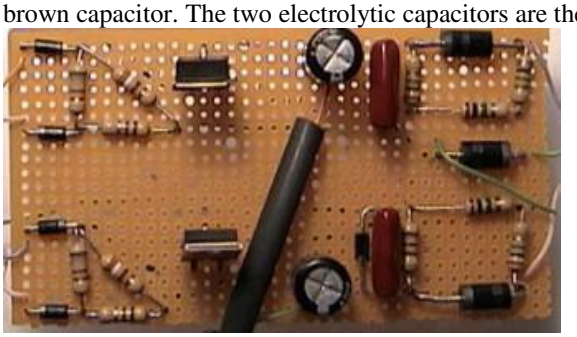
Properties:
- it works
- it's the simpler of the two
- no timing advance
- max revs are roughly 6500-7000rpms
- bike runs rich when this iginition is used

This one will get you home or make a good test unit, but I wouldn't want to use it as a permenent solution...



A - 473 400V = .047mFD 400V
B - diode - misc small amperage
C - diode - 1A or above
D - SCR - NTE5347 8A 400V
E - 2.2mFD 450V Electrolytic
F - 470 ohm 1/2 or 1/4 watt
G - ~300 ohm
H - 180 ohm
J - 680 ohm
K - ~390 ohm
L - 1Mohm

This is a good example of Prototype 1. The input leads (LtBlue/Orange) are coming in from the left and the Blue and White leads are coming in from the right. You can see that there are two SCR's (one for each side). You can also see that the two capacitors/sides have thier own power input from the Blue wire lead. There is a diode that you cannot see located under the top brown capacitor. The two electrolytic capacitors are the 2.2mFD 450V capacitors. To the right are the 'C' diodes....

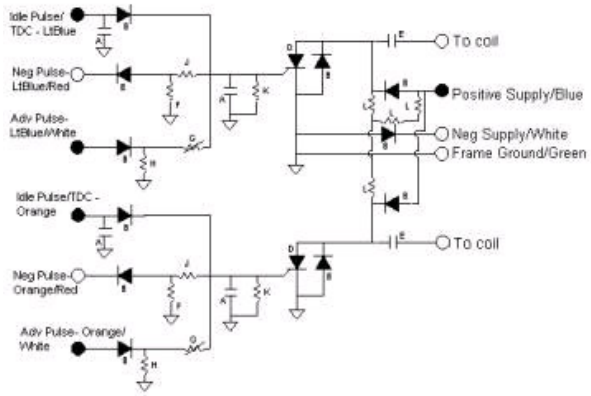


Prototype 2:

Properties:

- it works
- it's the better of the two
- timing advance
- max revs are same as original
- bike runs well when this igintion is used
- this ignition requires tunning of varistor 'G' to work correctly

This igintion is alittle tricky because of the tuning required for it to work correctly. My best suggestion is to use a varistor that is about 2000 ohms and start the bike with it set to 2000 ohms. Once the bike is started, slowly reduce the ohms until the bike starts to falter...then turn the varistor back half the distance. This needs to be done for each side. I have had the varistor at both 0 ohms and 2000 ohms and have had no ill effects to the engine so don't be afraid to play around.
There is one thing I would like to change on this schematic when possible. The 'Positive Supply/Blue' should be the same as in Prototype 1. Each capacitor should have it's own diode resistor set without the connection between the two 'L' connectors.



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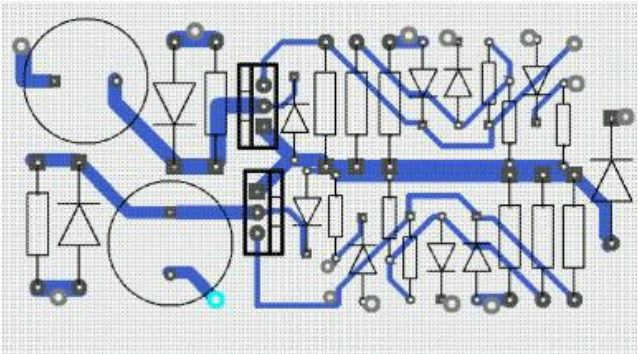
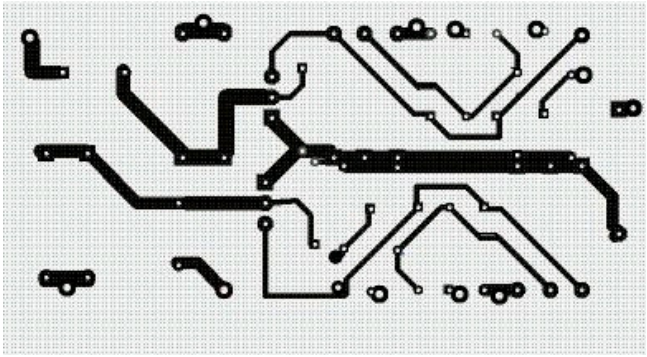
Here is a pcb board for the whole layout...the one on the left is the whole pcb, the one on the right is just the silkscreen for the actual copper layout (so you can print it off and use it as an overlay).





For those wanting to get a general idea of what to expect price wise, here is a list of components I bought to build the CDI boxes...
These prices are from the end of Feburary from www.digikey.com and may have changed. You can check all of that out on their online catalog...

Part #	#	Description	Price $US	Totals
P5873-ND	2	2.2microF Radial Caps	$0.87	$1.74
E4473-ND	6	.047microF Metal Poly Caps	$0.50	$3.00
E4153-ND	2	.015microF Metal Poly Caps	$0.43	$0.86
470QBK-ND	10	Resistor 470Ohm 1/4Watt Carbon Film	$0.06	$0.56
680QBK-ND	10	Resistor 680Ohm 1/4Watt Carbon Film	$0.06	$0.56
390QBK-ND	10	Resistor 390Ohm 1/4Watt Carbon Film	$0.06	$0.56
2.7MH-ND	5	Resistor 2.7MOhm 1/2Watt Carbon	$0.06	$0.27
1N4004GICT-ND	20	Rectifier 1A 400V DO-41	$0.04	$0.80
S4008V-ND	2	SCR Non-Sensitive Gate 400V 8A TO-251AA	$0.77	$1.54
3306P-103-ND	2	10kOhm 6mm RD CERM ST POT	$0.57	$1.14
			Total	$11.03
			Handling Charges	$5.00
			Shipping	$4.00
			Total Invoice	$20.03

I eventually swapped the 10kOhm ceramic pot for a 2kOhm variable resistor. The 10kOhm worked fine, but I wanted to use something smaller.

The wires I used for the prototypes was either 20 or 22gauge solid wire. In fact that is the wire I have been using through this whole process and it seems to work fine. The connectors I use are the standard automotive type and they work as well.

A PCB kit from your local Radio Shack is about 15.00$US and it has most of what you need. The only other thing you might want to get is a set of Radio Shack's stencils for making the diagram/layout on the PCB. They're realitively cheap and make a MUCH better/cleaner board.

There is also the cost of the soldering iron and solder. If you've never soldered before then you need to search on the internet for some sort of tutorial. There are some out there, that's how I learned...that and practice.

Enjoy and Good Luck...
If you have any questions then don't hesitate to email me at
irlydia@earthlink.net