Installing Real Cruise Control on a BMW K1100LT for about $100

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UNIVERSAL DISCLAIMER: I am sharing this as an account of how I installed a real cruise control on my 1993 BMW K1100LT motorcycle. If you decide to use this document to help you a install a cruise control unit on your motorcycle, I take no responsibility for your actions. Only do this if you feel you have the skill and knowledge required to do it safely. It is important to remember that you are modifying how the throttle works on a large, powerful motorcycle. It was not designed for cruise control. Therefore, doing this is inherently dangerous. I strongly suggest that you do some research to understand how cruise controls work before attempting something like this. It should also be noted that I doubt AudioVox condones the use of the CCS-100 on a motorcycle or would assume any liability since the unit was designed for installation on automobiles. If you do this, you do it at your own risk.

IMPORTANT WARNINGS!!!!!!!: When installing the wiring and mounting the servo unit and vacuum canister, make absolutely sure that they do not interfere with the full range of steering. Also make sure that the cruise control installation does not interfere with normal throttle operation through it's full range.

Now that that's out of the way, I can tell you that after 800 miles I'm very happy with how this project worked out. The cruise control works exactly as you'd want it to work and does it smoothly. It is not jerky and does a great job on long hills. (It works better than the factory cruise control in my car.) I've had throttle locks before and they're great but this is the cat's meow and for about $100, I think it's a great mod.

Since the main fairing body of the K1100LT is identical to K75RTs and K100RTs, I'm 99% sure that this would also work on those bikes. It might also be possible to install it on Ks with a more limited fairing if you put it in the tail cowl.

Here is the cruise control panel mounted on my K1100LT

INTRODUCTION:

I ran into this unit when surfing the Internet for a throttle lock for my K1100. I found that it has been installed on numerous other motorcycles and figured I could make it work on a K1100. I've now got about 800 miles of using it under my belt and it works better then I'd expected. Aside from functioning like a normal cruise control in a car, some of the nicer features of it are:

- Tap-up/Tap-down: Once the cruise speed is set, you can fine tune it by tapping the set/resume button either up or down to increase or decrease the set cruising speed by roughly 1 MPH.
- Passing: When I'm traveling at say, 65 MPH, and need to pass a car, I can run the bike up to 95-100 MPH for the pass and then simply let go of the throttle. When the bike slows back down to around 80 MPH, the cruise control gently kicks in and smoothly drops me back down to my previously set cruising speed.
- Control Pad: The control pad for this cruise control is small, simple and unobtrusive. It also comes apart easily so that you can effectively waterproof it with some clear silicone/RTV sealant.
- The servo is small enough to install inside the fairing of a K-bike LT or RT fairing.

WHAT I NEEDED TO DO THE INSTALL

1. AudioVox CCS-100 Cruise Control (The cheapest price I found was at http://www.brandsplace.com/ $80.95 - about $90 shipped.)
2. A couple extra feet of vacuum hose. (Available at your local auto parts store. About 69 cents per foot.)
3. A vacuum check valve (Also available at your local auto parts store for a couple bucks.)
4. 8" of 2" diameter PVC tubing and two end caps. This is used to make your own vacuum reserve canister. Unless you have it laying around, you'll probably have to buy 10 feet of it at the local

hardware store but it's cheap stuff. 10 feet costs about $5 and the end caps are about $1 each.
5. Clear silicone/RTV sealant. (To waterproof the control pad. I already had some. It costs a few bucks for a tube of this generally handy stuff.)
6. No special tools are required but a multimeter is handy as it is anytime you're playing with the wiring.

The remainder of this document gives a component by component description of how I did my install in no particular order. I left out some of the little details like how I made the mounting bracket for the control pad and how I routed the wiring around the bike but if you can't figure stuff like that out for yourself, then you shouldn't be doing this anyhow.

READ THE MANUAL

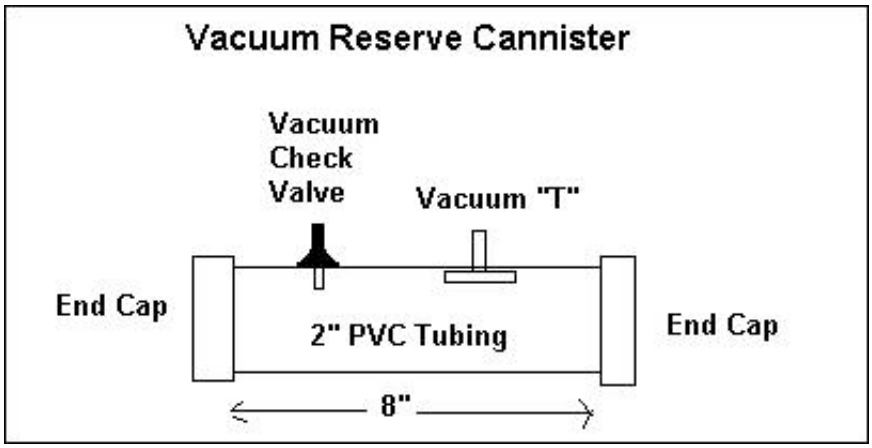
Before doing ANYTHING, read through the manual(s) that comes with the cruise control. Crosscheck what it says with what I have documented. You never know if the unit you have is identical to mine and there's always the possibly that the switch settings or wiring may be different.

VACUUM RESERVE CANISTER

The vacuum reserve canister (VRC) is used to provide adequate vacuum for the cruise control servo unit. It uses the throttle body as a vacuum source and, via the vacuum check valve, stores up vacuum for the servo to use to pull the throttle cable.

You can also buy one of these at an auto parts store for about $10-15 but I decided to build my own so I could make one that would fit inside the left front of the main fairing body. If you decide to buy one, make sure you can return it if it doesn't fit inside the fairing or be prepared to mount it somewhere else like inside the tail cowl.

I used 8" of 2" diameter PVC tubing because that is the length that would easily fit inside the fairing It is mounted inside the fairing in front of the left "bucket." I used white PVC tubing but, in hindsight, would use black if possible since it is visible to the rider when mounted in the fairing. I suspect that the cruise control may actually work without the use of the vacuum canister so you might want to try the cruise without a VRC. If you do install the cruise control without a VRC, you'll want to put a vacuum check valve in the vacuum hose that goes from the throttle body to the cruise control servo unit.



I used epoxy for assembling the VRC as it's my permanent adhesive of choice. Cut an 8" length of 2" diameter PVC tubing. Sand the edges. Drill two holes as shown for the check valve and vacuum tee. There's a vacuum tee in the bags of installation miscellany that come with the cruise control. File the webbing from the right angles before gluing it and the check valve in place. Remember to glue the tee into place before gluing the end caps on. Make sure everything has an airtight seal. I used zip-ties to hold it in place inside the main fairing body in front of the left bucket.

Remove the little rubber cap from the #2 throttle body and run a length of vacuum hose from the throttle body to the check valve on the VRC. Route the vacuum hose so it doesn't get pinched when you put the gas tank back on. (You need to remove the tank to install the cruise control's throttle cable and power supply. If you don't know how to remove the gas tank, check your Clymer or Haynes manual.)

The vacuum hose from the "T" will go to the servo unit.

CONTROL PAD WIRING

The CCS-100 comes with an assortment of scotchlock connectors for tapping into the wiring but I prefer using T-tap connectors because they're easier to install reliably and can be disconnected if needed since T-taps use a blade connector.

YELLOW, GREEN and BROWN: These wires connect the control pad to the servo unit. They're color coded so it doesn't matter what they do. (Resume, set and power if you're interested.)

GRAY: This wire provides 12V power to the LEDs illuminating the control pad buttons. I didn't want them lit up so I didn't use this. If you do want them lit, others have put a 400 ohm resistor on the gray wire so they're not obnoxiously bright. Note that the little power light in the middle of the control pad still works even if you don't hook up the gray wire. (If you are going to hook this up, I recommend splicing it into the brown wire - that way the buttons only light up when the cruise control is turned on.)

BLACK: Ground. I grounded this to the main ground along the top of the frame under the tank.

RED/ORANGE: Switched 12V power. I used my multimeter to find a switched (has power only when the ignition is turned on) power source on an unused wiring harness (I don't know what it's for) located in the relay box under the tank. I also replaced the AudioVox fuse holder with a waterproof fuse holder and located it on the rear outside of the relay box so I could access the fuse without having to remove the gas tank.

SERVO UNIT WIRING

BROWN, GREEN and YELLOW: Connect to the control pad wiring of the same color.

GRAY and BLACK pair: Cut these off. These connect to the speedometer sensor but since I tapped into the ignition coil for monitoring the cruise speed, these aren't necessary.

RED and PURPLE: These two wires monitor the brake light for disengaging the cruise when you apply the brakes. Note that when the cruise control is turned on, these wires put about 8-9 volts through the brake light bulb so don't worry if you test these wires and notice this. The purpose of this is to monitor the brake

light bulb. If your bake light bulb is out, the cruise control will not work. This is a safety feature of the cruise control. It doesn't seem to interfere at all with the BMW brake system monitoring or the Hyperlights I have installed from what I can tell. (Note for future reference that if your cruise control isn't working, it may be because your brake light bulb is out.)

Locate the connector near the rear brake fluid reservoir. One side of the connector has a yellow wire and a green wire with a black trace. The other side of the connector has a green wire with a black trace and one gray wire with a green trace. Tap the purple wire into the yellow wire and the red wire into the green wire with a black trace.

BLUE: Ignition coil monitor. This monitors the frequency of the ignition coil to set and maintain your cruising speed. DO NOT CUT THIS WIRE. It has an in-line noise filter. You'll notice the big red warning label to remind you not to cut/shorten the wire. I tapped this into the negative side of the rear ignition coil. It is a red wire with a black trace coming out of the bottom of the rear coil. (The brain in the servo unit also uses this connection to detect RPM surges. This is a safety feature. If you pull in the clutch without hitting the brakes, the cruise control will sense the sudden RPM increase and disengage. When I tested this feature, I pulled the clutch in while cruising at around 4000 rpm. The cruise control disengaged before the RPMs hit 4500.)

SERVO SETTINGS

Under the rectangular black plastic plate on the back of the servo is a set of DIP switches. Remove the cover.

REMOVE THE SMALL BLACK JUMPER next to the DIP switches. This lets the servo's brain know that it should use the ignition coil frequency, not the speedometer sensor.

Switch	Setting	Comments
1 and 2	1-OFF, 2-ON	PPM-Pulses per minute
3	OFF	Tells the unit you're using the ignition frequency only, not the speedometer.
4 and 5	4-ON, 5-OFF	Tells it you have a high horsepower engine.
6	OFF	This tells it what kind of control panel you have.
7	ON	This tells the unit to monitor RPMs from the coil.

THROTTLE CONNECTION

IMPORTANT WARNING: Make sure that the cruise control throttle cable does not interfere with normal throttle operation in any way.

Remove the left lower fairing. (If you don't know how, instructions can be found on IBMWR at http://www.ibmwr.org/ktech/k11valve.shtml)

I experimented with different ways of hooking up the throttle cable and this one seems like the best one to me. It does not interfere with normal throttle operation, is easy to install and works well. You can try another approach if you think you have a better way to do but this one seems to work just fine.

In the bags of assorted installation parts that come with the cruise control, find the two throttle connectors that look like a hangman's noose. There's a short one and a long one. I wrapped the short one around the throttle bar by the #1 throttle body as pictured. I also put a small zip-tie around it to keep it in position. (I'm not sure if the zip tie is necessary but it doesn't hurt.)

Next, find the short cable holder bracket as pictured.

I put the top bolt through the existing hole in the frame below the front left of the gas tank. I added another bolt below that by drilling through the bracket and the plate in the frame. The purpose of this is to make sure it stays at the same angle and the cable does not saw through the radiator hose. I really don't think it's necessary but prefer to err on the better safe than sorry side. (I did not fully remove the gas tank when drilling the hole in the frame. In hindsight, this was probably not an intelligent thing to do as there may be a risk of the drilling creating a spark which could ignite the gas.)

Since the cable coming out of the servo unit (in front of the right fairing "bucket") is rather long, I looped it once inside the fairing and then ran it down to the bracket. Do not overtighten the adjusting nuts on the end of the cable. The metal is soft and will break. (Doh!)

Now you're ready to connect the cable form the servo to the throttle. The bead connectors are very stiff so you'll need to open them up with a screwdriver before you can get the beads in. I used a string of 4 beads as pictured. Once you've got the beads connected, use pliers to scrunch the bead connectors closed again.

Using the nuts on the end of the cable casing, adjust the cable so it has a little bit of slack in it. Before putting the fairing lower back on, double-check that the throttle still works normally through it's full range.

Make sure that when you install the servo unit in front of the right bucket that it will not interfere with your full range of steering.

CONTROL PAD

You're on your own on coming up with a way to mount the control pad. There's a million ways and places to do it. Some people put it on the left and some on the right. I used a piece of thick right-angled aluminum for the mounting bracket and secured it by putting a bolt through the empty mirror hole behind the choke lever on the left side. (See first picture.) Think about things like safety and ease of use when deciding where and how to mount it.

I also waterproofed the control pad. It just pops apart with a small screwdriver. First, I used some clear RTV sealant to seal the rubber button pad to the inside of the front panel. Then I placed RTV around the outside edge before putting the control pad back together. I also used some black RTV to seal the hole in the back of the control pad where the wires come out.

I also painted the control pad black because I think the light gray color looks cheesy. This, of course, is optional. I also painted the bracket black so it doesn't have that prototype look.

TESTING THE CRUISE CONTROL

Once you've got everything installed and put your bike back together (don't forget the vent hoses under the gas tank), it's time to go for a ride.

SAFETY CHECKS:

Check that you still have normal throttle operation through the full range.

Check that nothing is interfering with the steering through it's full range.

If your cruise control malfunctions, you have the clutch and kill switch to deal with the problem. If your steering gets obstructed, you're toast.

Find a nice long stretch of road with no cars to test the cruise control. Get the bike up to about 40 MPH, turn the cruise control on and then run it through it's paces.

Note: If you're used to using a throttle lock device, you will need to unlearn a habit which will tend to make you tailgate. When following a car with a throttle lock device, I had become accustomed to just letting a little throttle off to lower my speed and not tailgate the vehicle in front of me. For obvious reasons, this does not work with a cruise control. This only bugged me for the first few times I rode with the cruise control but it's something to be aware of on your first few rides if you're used to using a throttle lock.

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