Garage Door Opener Integration into R11xx
By Jason Dunham
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This was performed on an R1150GS, but the method should work on other BMW R11xx models.

Disclaimer
You, not me, are responsible for making sure this procedure does not ruin your motorcycle.

Concept
When the Turn Signal Cancel switch (TSC) is pressed, a lead is shorted to ground. By connecting the garage door opener remote's ground to this lead, you can cause the remote to activate whenever the TSC is pressed, if you connect the positive lead to the motorcycle's 12V system. The motorcycle will power the remote, so you will never have to change batteries.

The concept is similar to the Autoswitch operation, but that product has a toggle action, changing state once each time the TSC is switched. For the opener, you want a momentary action, so that the circuit is active only when the switch is depressed and returning to normal when you let go. The Autoswitch has a nice delay feature. There is a potential to add a similar delay to this design, but I'm still working on it.

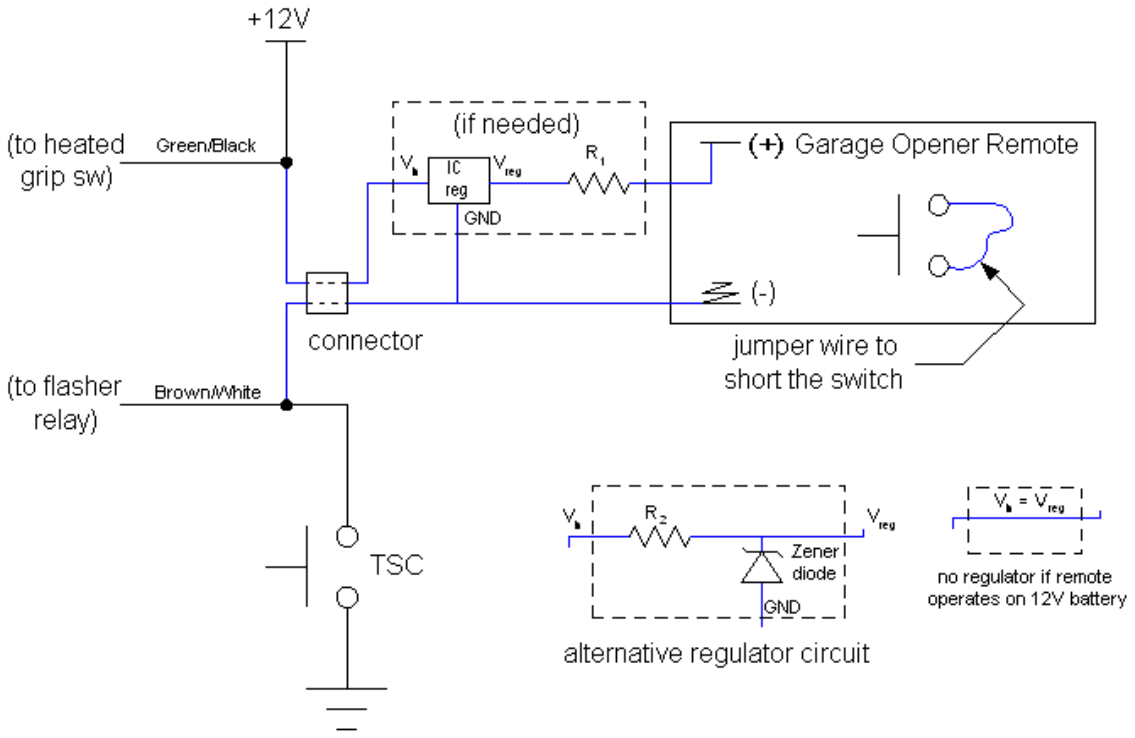


Figure 1: Circuit Diagram

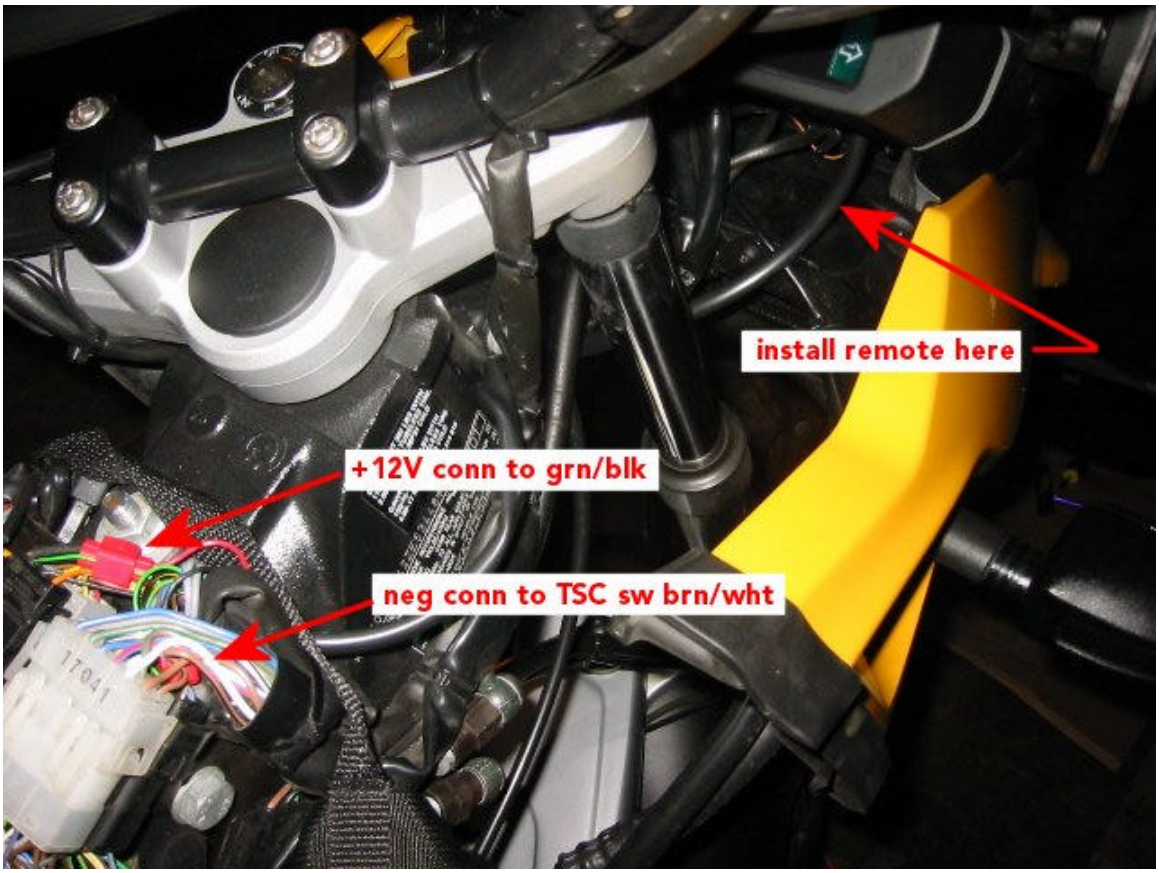
Design
First, determine the power source for your garage door opener. Mine had a 12V camera-style battery, which was lucky. Other common batteries would be 9V, 3V (2 AA or AAA), or 1.5V (one AA or AAA). If some other battery than 12V, you will need a regulator and/or resistor to drop the voltage to the right level. See Appendix A for the design method.

Next, figure out how to bypass the momentary switch on your opener. Underneath the button you press, there will probably be some kind of membrane switch attached to the opener's circuit board. Remove the battery, and use your multimeter in continuity mode to figure out which terminals of the switch are shorted when the button is pressed. I really wouldn't advise doing this kind of installation unless you have a multimeter and know how to use it.

Installation
Solder a jumper wire across the remote's button switch terminals so that the switch is bypassed. From now on, whenever there is power to your remote, the unit will be sending the signal to your opener.

Solder a pair of wires to the battery terminals in your remote. If you've designed a voltage converter, you need to solder that in too. You can probably put your converter parts where the battery used to be. I used 24ga wire, but just about anything will do. I put a connector on it to make installation and removal a bit easier.

These wires need to be connected to the motorcycle's power and TSC leads. You'll probably want to connect everything under the gas tank because all the wires are fairly accessible. Connect the positive lead to a switched 12V source. I used the Green/Black wire which supplies power to the heated grips. Connect the negative lead to the TSC wire, which is Brown/White. With the bike off, you should use your multimeter to verify that this wire is shorted to ground when you press the TSC. Use cable ties to secure the wires to the frame up to the instrument cluster shelf.



You could also mount the remote (especially if it is small) under the seat. This will provide the best protection from moisture as you wash the bike. I doubt this would affect the transmitter range. I wanted to mount mine on the shelf under the instrument cluster, so I needed some waterproofing. If you're careful when washing, and you don't ride in the rain you might not need the waterproofing, but one day you will probably ruin it. At least the Green/Black wire is fused, so you probably wouldn't hurt the rest of the electrical system.

I have a vaccum food sealer, so I took a bag, cut off a corner, and led the wires out. Then I filled that hole with silicone sealant, let it cure, and sealed up the bag with the opener inside. I wrapped the whole thing in electrical tape in an attempt to make it invisible. I taped the whole package to the shelf with double-stick tape. Voila!

I would like to add a ¾-second delay circuit to this design. Most of the time you use your TSC for canceling the signals, and you hold the button for less time. There's little harm in firing the remote every time you use TSC, but you might re-open your garage door as you're leaving home, or when you are checking your turn signal functionality in the garage, you might inadvertently close the door on yourself. With some older less-secure remotes, you might also open random garages and gates as you drive around, but those people should get more secure systems (and so should you).

Appendix: Voltage Regulator.
If your remote does not use a 12V battery, you will need to include a voltage regulator in your circuit. This does require some engineering, but it's not terribly difficult. Feel free to contact me if you have questions (or corrections), but remember I'm just a hobbyist, not an expert.

Regulators:
The easiest way to go is to find a solid-state (IC) voltage regulator chip with the same output voltage as your batteries. Digikey.com or a good electronics store will have a good selection, but with Digikey, you'll need to buy other things to fill up your $25 minimum order, because the regulator should be less than $2. Radio shack sells a 7805 regulator which is 5V, but you'll need a resistor to drop the voltage down to your 3V or 1.5V battery level. I've used a 9V regulator in another project, but you could probably get by with a resistor directly from the 12V bike power using the method below.

You can build a very simple regulator with a Zener diode, but you'll still have to find a good source of electronic parts. Radio Shack's selection is too limited. This web page has a very simple calculator for picking the right parts. You still need to determine the current drawn by your remote. You can estimate it, but you might end up with a conservative design for which you'll have more trouble finding the resistor.
http://www.csgnetwork.com/zenerdiodecalc.html
or
http://www.vwlowen.demon.co.uk/java/zener.htm

Regulators have a specification for amount of current they can handle and/or the power rating (they are related), but a remote is designed to use very little current so that the batteries will last. Therefore you can use the smallest IC regulator you can find

Resistors:
To get more voltage drop, you can add a resistor in series between your opener and the voltage source or regulator. This isn't really the best way, but for this application it should work fine. First you must find out how much current your remote draws when it is active. Set your multimeter to measure current, then clip your meter in series with the battery. Press and hold the remote's button until the current reading stabilizes. (Your garage door will activate if you are nearby.) My opener draws I_{opener} = 2.1mA.

I don't recommend using only a resistor if your remote runs on less than 9V, but it might work. The problem is that the bike's 12V varies quite a bit, and your remote might work intermittently or it might burn out prematurely if the dropped voltage varies too much from the intended battery voltage.

The resistor you need is
$R = (V_{reg} - V_{bat}) \times 1000 / I_{opener}$
where
V_{reg} is your regulator output, or 12 if are not using any regulator chip.

V_{bat} is the remote's battery voltage. If you have more than one battery, they are probably in series, so you need to add up the voltages.
I_{opener} is the value you measured, in milliamps. (the factor of 1000 essentially converts this into amps.)

Battery voltage changes as the battery is used, so the resistor does not need to be very accurate. If you get within 20%, you will probably be OK, but you are better off supplying extra voltage than not enough, so a slightly lower-value resistor is better than one that's too high.

Send comments or suggestions to dunham@sfis.com