Making your own locker control for the Toyota Electric Locker

By Dick Foster, NorCal TTORA

The control box that is used by Toyota has inputs that limit the speed and conditions under which the Toyota electric locker can be engaged. You have to be under a certain speed and in 4WD and in low range. The control is so complex that it is typically the source of many problems that result in the locker not engaging or disengaging when the user needs it most as typified in the dreaded blinking lock light problem. Many have also source a locking axle and have swapped it into their vehicle but do not have the Toyota control box and wiring to go with it. This brought about the need of a simpler control that can be built and hooked up to the electric actuator to give the user control over the locker under any condition. This control should be used with caution as engaging or disengaging the locker under the wrong conditions will likely result in damage to the differential. Do not engage or disengage under the following circumstances while traveling at high speed on the street, while turning a sharp corner or any other time that the axles are under high differential loads. The lock mechanism is a female splined sleeve that connects splined axle part resulting in locking the side gear in the differential. Activating the locker under the wrong condition could result in broken splines, stripped parts etc. The user of this device is takes the use of the device under his own responsibility. The author in no way assumes any responsibility for the correct building of or use of this control device.

You will need the following tools and materials. Most if not all of it can be found at Radio Shack.

A Double Pole Double Throw Switch

The switch should be of the On-None-On type. That is the switch should have only two positions where the center two common poles are connected to one pair of switch contacts in one position and the other pair of switch contacts in the other position. Do not get a center off style switch. You can get this kind of switch in many sizes and styles, rocker, toggle, push button etc. Get the switch that is most suitable for the intended mounting location and the style that you most like. The locker actuator motor pulls about 5 amps maximum so be sure that the switch is rated for at least 5 amps DC. Note: most switches are rated for AC current which loads switch contacts much less than DC current does so be sure to get a switch rated for DC current.

Wire

You will need to get some stranded wire suitable for carrying a 5 amp peak load. You want to use stranded wire so that it can be easily routed. I suggest 16 gauge stranded wire or larger in ever how many and what colors you need to keep things straight.

Lock Light

If you want to wire up a light to indicate that the locker is indeed engaged and locked the you will need to get a bulb rated for 12VDC. Get what ever color and style you like. Sometimes you can find a switch with a lamp or lamps built in. If you use an LED then be sure to observe proper polarity or it will not light and to be sure to limit the LED current to about 20 milliamps with a series resistor. The series resistor works out to be about 600 ohms or so. A quarter watt rating on the resistor will more than suffice and that size is easy to work with.

Miscellaneous

A Soldering Iron or Soldering Gun, solder, some heat shrink tubing

You can use crimp on wire splices and terminals but the job always comes out much better if you solder the connections and then apply heat shrink tubing over splices etc. Be sure to use electronic grade solder. It will have a rosin flux core. If you use acid flux solder, as used for plumbing, the acid will corrode your connections and splices resulting in problems later on and we don't want that to happen.

How this Locker Hook Up Works

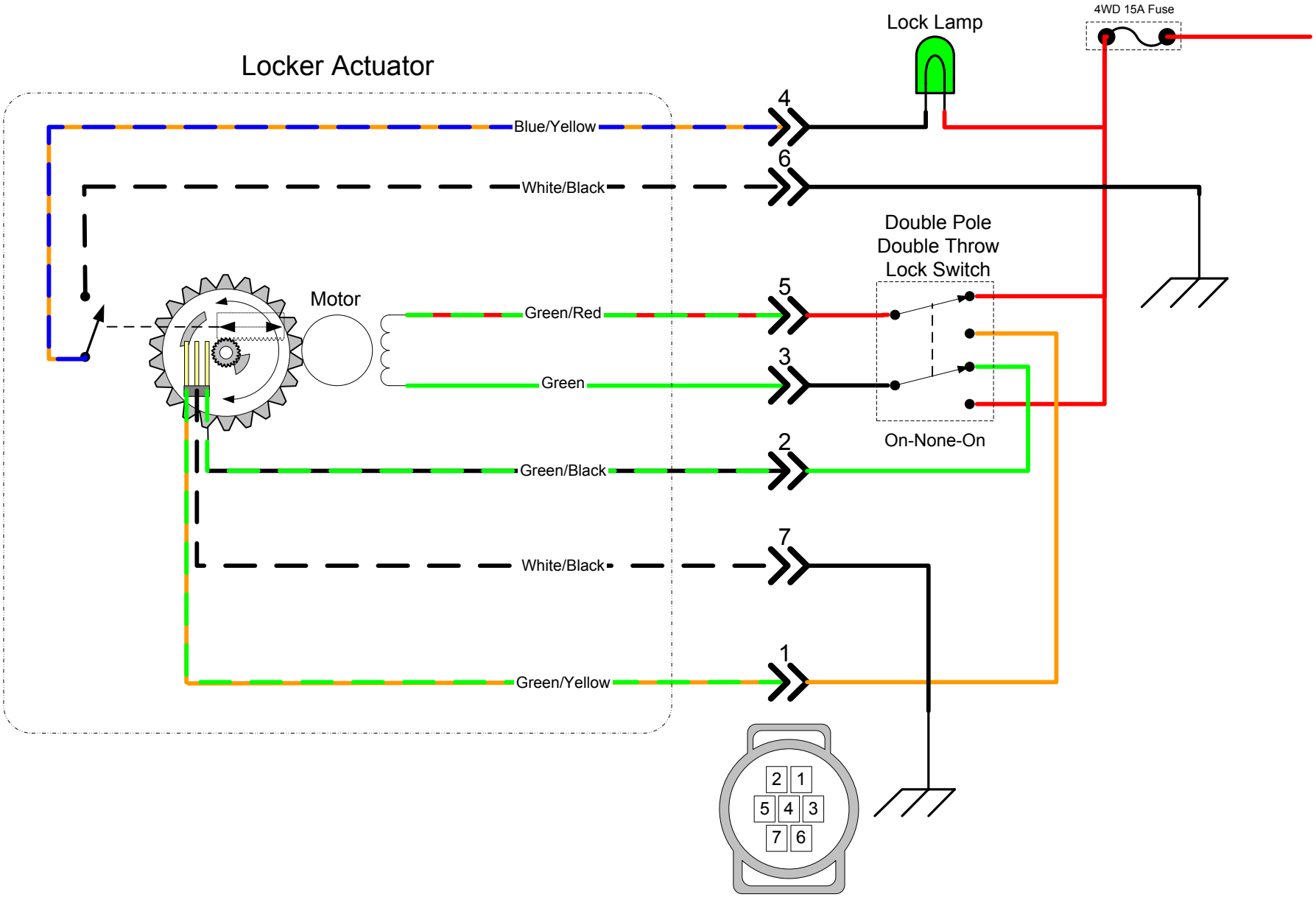
See the attached drawing.

When the locker is unlocked and the locker is engaged, positive current is applied to one side of the motor in the actuator. The other motor lead is connected to ground though a gear switch, described below, in the actuator and the other side of your lock switch so the motor turns. The motor turns a worm gear that in turn rotates a larger plastic gear. The larger gear has on one face of it a conductive surface, steel, that is contacted by three switch wiper type contacts, so this gear is also a switch. This gear switch is the heart of the actuator control because if it is wired correctly it will only allow the motor to turn in the proper direction and for only for the required amount of rotation. On the conductive face of the gear are two insulated spots each of which will come under one of the two other switch contacts depending on where in rotation the gear is. The third and center contact contacts the conductive surface continuously regardless of gear position and is connected to ground or battery negative. The ground connection is applied to one of the switch contacts via the center contact and the conductive surface. No connection is made to the other contact because it was at rest on one of the insulated spots on the face of the gear. The switch gear rotates which drives a smaller pinion gear. The pinion gear then runs a rack gear that is attached to the shift fork for the splined lock sleeve that locks the side gear to the carrier. The switch gear rotates until it eventually drives the switch gear to the point where one of the insulated spots on the face of it comes under the active ground wiper contact. This then disconnects the ground path for the motor and the motor stops rotating. The differential should be locked. Note, at this point the other switch contact is now connected to ground but the motor cannot run because you have wired this ground contact to the other side of your locker switch. A truly locked condition is indicated by an additional position switch in the actuator that closes when the shift fork is in the locked position. This creates a circuit path for a lock light to illuminate. When you disengage the locker by selecting the other switch position, the ground path through the gear switch and locker switch is made to the motor but in the opposite polarity. The locker switch also reverses the positive connection so the motor rotates in the opposite direction. It rotates until the insulated spot on the switch gear comes under the active ground contact and the motor again stops running. As the shift fork is no longer holding the position switch closed the lock light goes out.

I have indicated the colors of the factory wires in the locker harness that you will need to splice into and also the main connector that is located along side the driver side frame rail toward the rear and close to the axle. If you have any questions, let me know on the national TTORA message board.

Good luck with your project.

Dick Foster



Toyota Electric Locker Control			
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