

Project Prado Electric Locker retrofit

I was always interested in having some form of locker in the rear of my Toyota Landcruiser Prado.

I knew there was a factory option for an Electric Locker, then there is also the ARB Air Locker and various kinds of Auto Lockers (unlockers).

About 12 months ago I was poking around Active 4x4 Dismantlers looking for some 60 Series front Hubs and literally tripped over a diff. What caught my eye was the chassis number written on it by the wrecker. KZJ78GW in fact.... Hmmm that's my chassis number. I wasn't in a financial position to even ask the price so made a mental note and went on my way.

Over the next year it played on my mind. I did a search of the net and found various articles on fitting Electric Lockers into Tachoma's and 4Runners (Yankee Toyota Utes similar to our Hilux and Surf)

I had finally save some money towards for a new set of tyres when I dropped in to Active 4x4 on the off chance the diff was still there. After a 30 minute search I found it, nestled in amongst the Pajero diffs (some of them Electric Lockers also hint hint and a Hilux Diff with an Air Locker in it)



Diff gasket template

The rest is history, haggled with Warren a bit and settled on a price.

Warren also told me to come back and get the wiring harness from the diff, this should make the wire up easier.

That night I had a poke around my truck, I managed to locate the plug hanging from the rear chassis rail for the diff harness and traced it back into the truck. This is good I thought, perhaps all the wiring is already there.

Well after having a play over few nights after work I proved my hunch was right, well 99% correct.

With the wiring harness from Active 4x4, the trucks harness already installed from factory and also the fuse live and ready to go.

I traced where the locker ECU was located (passenger kick panel) and found the plug.

Luckily for me the factory ECU for the locker fell into my lap from a friend, this plugged straight in.

Next was an email to Paul D in Chch who incidentally had a factory setup in his Prado asking

him where the Locker switch was located and what colour of the wires were.

Armed with this information I was able to do a test run. With the diff plugged into the harness the ECU plugged in and Ignition on I connected the switch wires together. Nothing...After much testing of circuits and bypassing the 4WD link to the Locker ECU it turned out the connection at the diff was playing up, pays to clean the connectors well.

After a clean it was working. Connect wires, diff locked, break wires, diff unlocked.

The factory Locker ECU works basically like a winch relay with a limit switch in the diff stopping the motor from overrunning and jamming the diff (something to watch if you plan on playing with it on the bench)

There is also a timer in the circuit that cuts power if the limit switch is not activated.

There was also a Lock light location on my dash with all the other lights. So I took out the instrument cluster and pulled it apart. This was when I found that the wiring was only 99% there. The wire for the light was missing. The bulb holder was there. So I put in a new wire to the Locker ECU. Great I thought, tested the bulb and it worked when I looked in from the back but the light wasn't coming thru the dash. Hmmm so I pulled the instrument / speedo panel apart and discovered the plastic panel blank. After a bit of sanding with wet and dry I ended up with a clear panel with which I covered with a Blue tape. Now when it was activated the bulb could shine thru. Next was locate and install the switch. And assemble it all back together.

Now that I have the electrical circuit all running fine its time for actually installing the diff head into the housing. But that's for next months edition of the club Mag.

Locker Install Part two

After getting it to operate electrically now its time to fit it in the truck.

Firstly I went on a shopping spree and purchased some parts from Toyota, namely a gasket and o-rings for the diff.

I wanted some studs also but they were out of stock. Solution was to get some long bolts and cut the heads off and tap a thread (M8x1.25).

After getting a garage pass from the good lady of the house, Friday after work I slid under the back of the truck and started the removal of the rear beam axle assy.

Loosened all the bolts that held it in and disconnected the brake lines, handbrake and diff breather.

Next was to lift the rear of the truck up high enough to roll out the beam axle assy.

Its good to have great neighbours with big trolley jacks and axle stands.

It wasn't long before the truck was up high and secured.

Next was the final removal of the axle assembly which rolled nicely into my garage for the next phase.

Saturday I woke the birds with the sound of my rattle gun and in 30 mins the axles were removed and the diff head off.

Now comes the fun bit.

The axle housing needs modifying to accommodate the new electric locker. I could have got the whole unit from Active 4x4 but I had the tools to mod my one. (and it was cheaper)

After cleaning out the old diff oil, the gasket is used to mark out where I needed to do some grinding and also show me where I need to build up the flange area to allow the fitting and moving of some stud locations.



**Above: Unlocked
Below: locked**



Again borrowing the neighbours Mig welder, I set forth and took to the diff with sparks flying. No going back now.

What a dirty job. But after an hour or so I had the welding done and all cut / ground out.

Trial fit if the diff was in order and popping the axles in. Phew it all fits. O.k. while it's in I did a trial run of the electrics again. Phew it works sweet.

Strip it all down again and time to drill off the holes and tap them for the studs.

This is a tricky part. If you just eyeball it from the gasket you can stuff it up.

Some people have gone to the trouble of setting in up in a drill press.

I took another approach and made some drilling bushes which I slipped into the diff head holes then fitted the diff back up to the housing. Using this approach I was able to drill in the exact spot and keep it pretty straight. I drilled it off to the size I needed for tapping later. This worked fine and after a good clean out I was soon assembling the beam axle.



Locker ECU exposed

Sunday was assembly day, after a few hours I soon had it all back together and wheeled it outside to give it a water blast ready for a re paint with that POR 15.

Being on afternoon shift I had Monday morning to paint it all up nice and get all the bolts cleaned up for the install.

Unfortunately I had to wait until Tuesday to put it all back together and give it a run as one of my trailing arm buses was flogged out.

Tuesday rolled around and soon I had it in and gave it test run. Phew it still worked. Keen to see how it worked while driving I shot off down to a local gravel road and had a test run.

Lock on...slight click from the rear and gave it the boot...both wheels spinning Cool.

Lock off. .again a slight click and it was disengaged.

The factory controller has a few safeguards which stop it from being activated when travelling over 5MPH and also only being active when in 4WD. Previously I had disabled the 4WD safety feature to do some testing. Now with it in and working fine I set it back again to the factory default and now it wont activate unless you are in 4WD. Stop those little fingers getting my all Locked Up when I least expect it.

I would like to thank Active 4X4 and Warren for all his help, the authors of the web pages I used and my Neighbour and naturally my wife Janine for giving me the garage pass.

Here is a list of web pages I used to get the info I needed.

<http://home.off-road.com/~kemanuel/elocker/elocker.html> or http://www.4x4wire.com/toyota/tech/electric_locker/
<http://67.122.16.97/carterman/4runner/mods/locker/> (this is the best one)

Parts list.

Locker w/4.30 gears –	Toyota P/N 41110-3D080
Diff gasket	Toyota P/N 4218-60080
O-ring for axle	Toyota P/N 90301-78001
Diff controller	Toyota P/N 89553-60060
Studs x2	Toyota P/N 90116-08330
Harness from diff to Chassis	From donor vehicle
75-90W synthetic diff oil	

Other bits and bobs.

Drill (letter H in my case)

Taps and dies M8x1.25

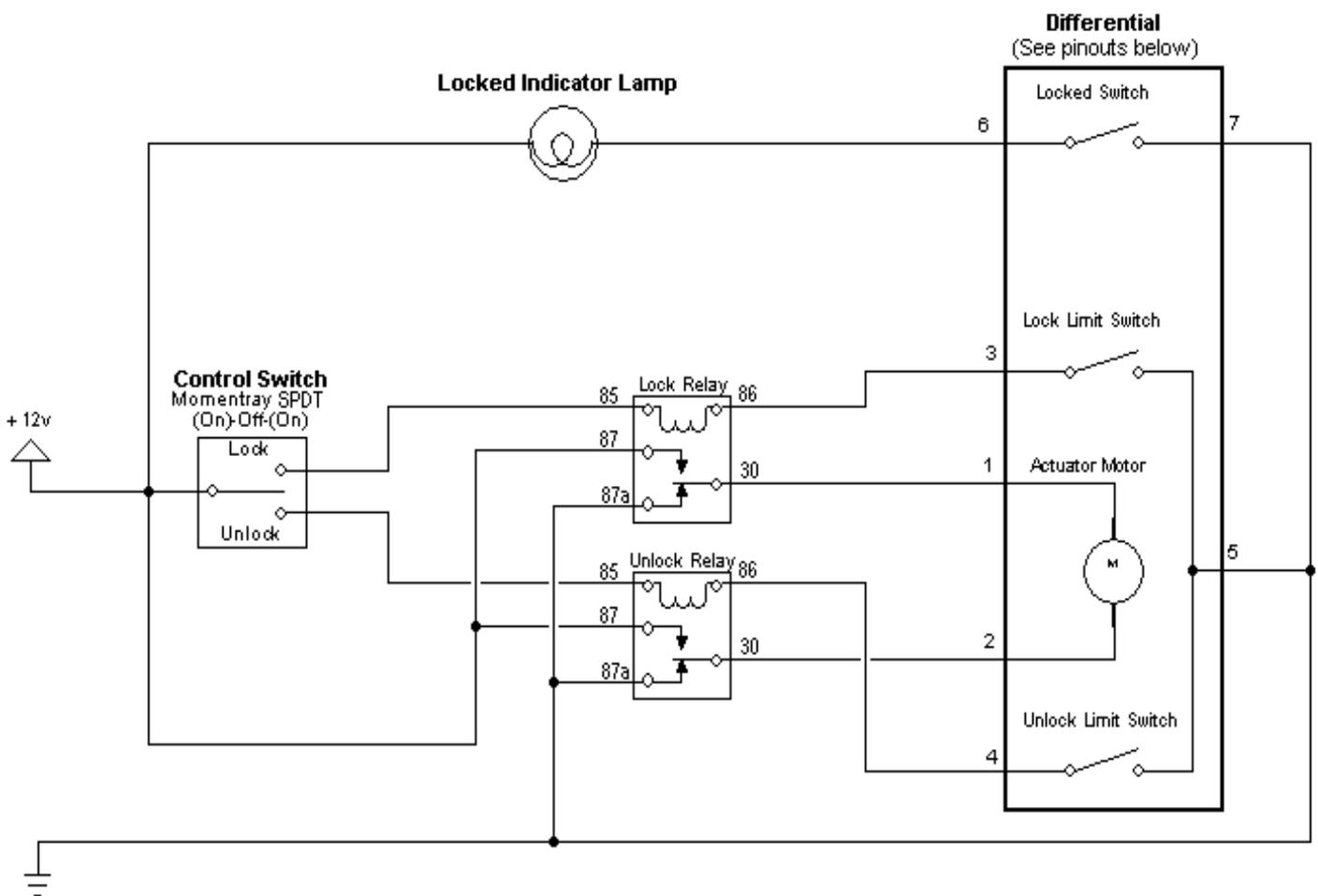
Grinder and Welder

Sense of humour and patience

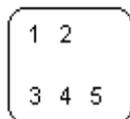
Calvin Tyler

Email kbush@ihug.co.nz

Home Made Diff Lock Controller



Differential Pinouts:



Plug #1

- 1 = Motor 1 (+12v To Lock)
- 2 = Motor 2 (+12v to Unlock)
- 3 = Lock Limit Switch (Closed unless actuator has fully moved to the locked position)
- 4 = Unlock Limit Switch (Closed unless actuator has fully moved to the unlocked position)
- 5 = Lock/Unlock Limit Switch Common

Plug #2

- 6 = Locked Switch (Closed when unit is actually locked)
- 7 = Locked Switch Common

Notes:

- Relays must be double-throw, break before make (ex. BOSCH Product # 0 332 209 150)
- Control switch must be double throw, and should be momentary-contact and normally open. This will help prevent damage to the circuit/locker should there be a problem with the limit switches not working properly.

Mike Carter, 2003

Instructions to simulate diff lock controller

- So to lock the unit, put the alligator clip across pin 3 and pin 1. Apply +12v to pin 5 and ground pin 2. While the unit is transitioning from the unlocked to the locked state, pin 3 is connected to pin 5, and so pin 1 receives +12v. Once the unit determines that it has moved far enough to be locked, pin 3 becomes disconnected from pin 5, pin 1 no longer receives +12v and so the motor stops.
- Likewise, to unlock the unit, simply put the alligator clip across pins 2 & 4 and apply +12v to pin 5 and ground pin 1. Once the unit is unlocked, the connection between pins 4 & 5 is broken, and pin 2 no longer receives +12v.