

# Refitting a Toyota Hiace

## ***Step 1 – Purchase a short wheelbase Toyota Hiace campervan.***

These are imported from Japan and make an ideal base for a campervan because the engine is positioned underneath the passenger seat. This means that you have 2.8 m of uninterrupted floor space to play with – and you can actually squeeze a little bit more usable length by utilising the extra space behind the passenger and drivers seats. I bought mine (a 1994 model with 90,000 miles) for less than £7000. It had already been used as a 7-seat campervan and was a bog-standard Yokohama Motors conversion with a fridge and a sink.



## ***Step 2 – Rip out the insides***

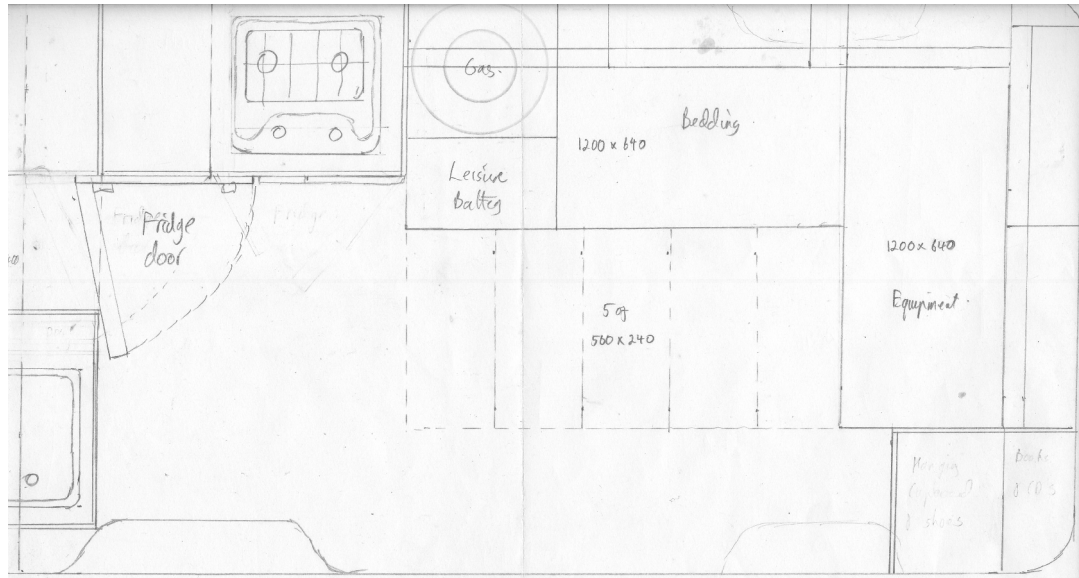
Take out the seats and all fitted units at floor level. (I retained the useful lockers at eye level.) Underneath the seats you will probably find a heater/air-con unit. Have this removed by a specialist as the air conditioning will need to be re-gassed. Getting the seat belts out is quite a job as the mounting bolts will all be rusted up underneath!

Remove the side panels and check out the wiring to the fridge etc. You will probably find a couple of relays under the seats – one for the fridge and the other for the heater fan. Keep the former but disconnect the latter.

You will also find the leisure battery installed in a battery box set into the floor. Remove the battery. (It will almost certainly be dud so buy a new one and get your supplier to dispose of the old one for you.)

As you can see from the plan, the fridge is going to be positioned right over this battery box. This is quite convenient because, by drilling a few extra holes in the box, it can serve as the lower vent for the fridge. This saves a lot of cutting into the side walls of your new van! In fact, by cutting some more judicious slots into the kitchen unit above, you can safely vent the hot air into the van, thus saving even more metal cutting. Of course, you will have to punch a hole in the side of the van to take the gas flue. Get someone with a proper sawhole cutter to do it for you.

## The basic plan



This plan was inspired by the layout often used in Australia and New Zealand where the sink unit is positioned just inside the sliding door, the kitchen unit opposite and the bed at the rear end of the van. In the Australian arrangement, there are two bench seats and the bed is made up by using the table and a couple of boards to bridge the gap between them. In my plan, there is an L-shaped bench seat which pulls out like a sofa bed to make a 6' x 4' bed with a small bedside unit in the rear corner. The advantage of this layout is that there is an enormous amount of living space created during the day and (limited) access to the side of the bed at night. Also the bedside unit is a very convenient place to put books, a laptop, mobile phone etc. etc.

### Step 3 – Preparing the insides

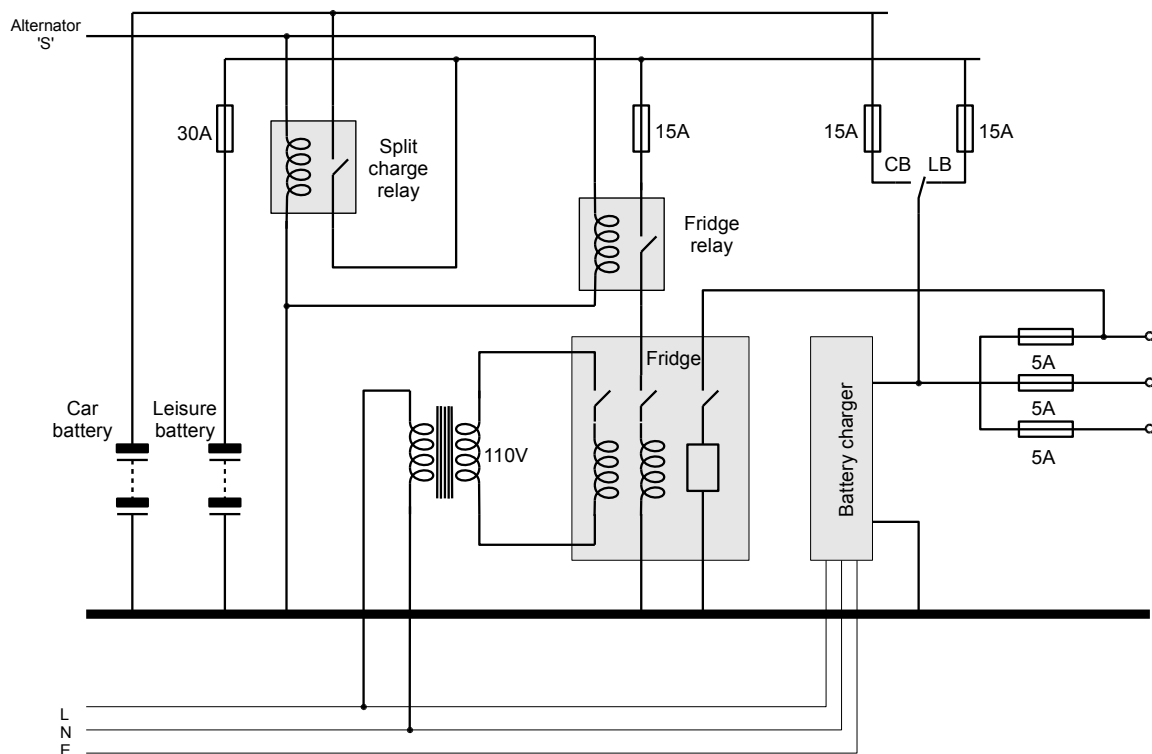
Remove the existing floor coverings. Plug all the holes in the floor. (I used a saw hole cutter to cut slightly oversize plugs, then sanded them down to fit snugly like a cork.) If you are going to use a thin floor covering like kitchen lino or felt carpet, you can fit it now. If, on the other hand you are going to use a thick pile carpet, I think it is best to screw the units directly to the floor and cut the carpet to fit later. If you wish to use lino for the kitchen area and carpet for the living space, just fit the former at this stage.

Determine exactly where the gas cylinder is going to be located and cut a suitable hole in the floor nearby to vent any leaking gas.

Now do all the rewiring (see below) and refit the side panels. The only one which will actually be visible is the one behind the sliding door so you will probably want to re-cover this one in some suitable material. I actually reused the plastic covering on the panel behind the driver's seat.

## Step 4 – Rewiring

This is the circuit which I used



You will probably find the Split Charge Relay is already installed underneath the vehicle and it will already be connected to the correct wire from the alternator. This wire only becomes live when the alternator is generating charge – ie after the engine has started. Its purpose is to connect the leisure battery and the car battery together in parallel. This means that the alternator will charge both batteries at the same time.

The Fridge Relay is energised at the same time. This ensures that the fridge will only work on 12V DC when the engine is running. (A fridge will run your leisure battery down completely in one night!)

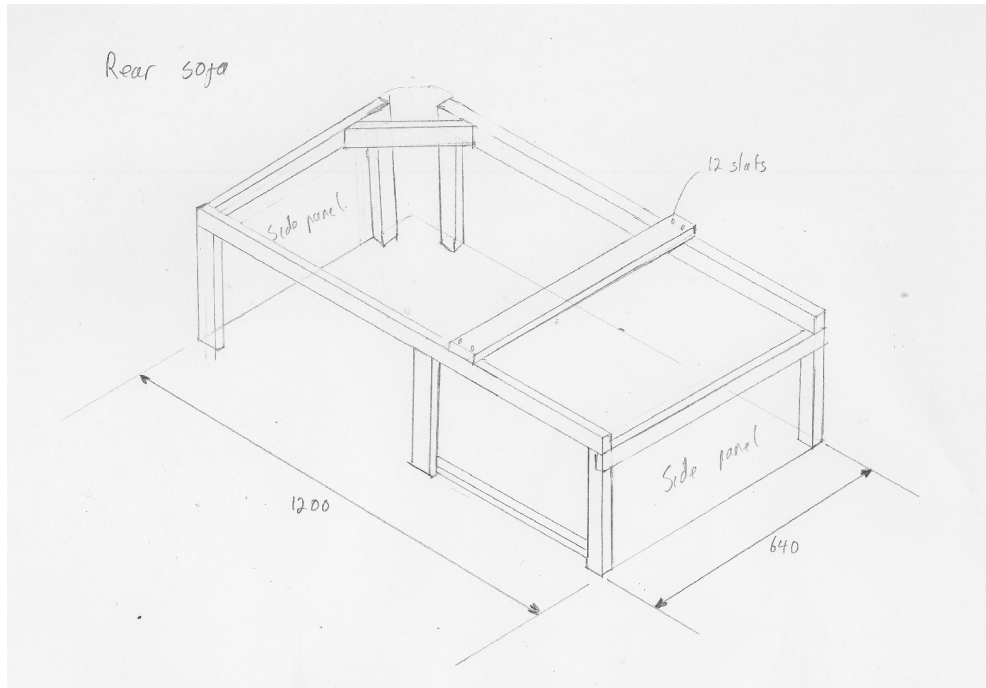
The CB/LB switch enables you to switch the 12V circuits from car battery to leisure battery, as you wish. Normally you would leave this switched to leisure battery the whole time as, presumably, you want to use the leisure battery when you are stationary. (When you are moving the two batteries are connected together so there is no need to switch the switch to car battery when moving.) But if your leisure battery goes defunct, you may want to use the car battery instead.

The battery charger is optional as the system should work perfectly well without it. But if you are static for a long time, you can include it. I purchased a CTEK XS7000 which I thoroughly recommend. There is no need to purchase an expensive and outdated ZIG unit.

If your van is imported from Japan, the fridge will need a 110V transformer. A typical fridge draws about 85W. I recommend using a 200W transformer which is readily available on ebay for about £25.

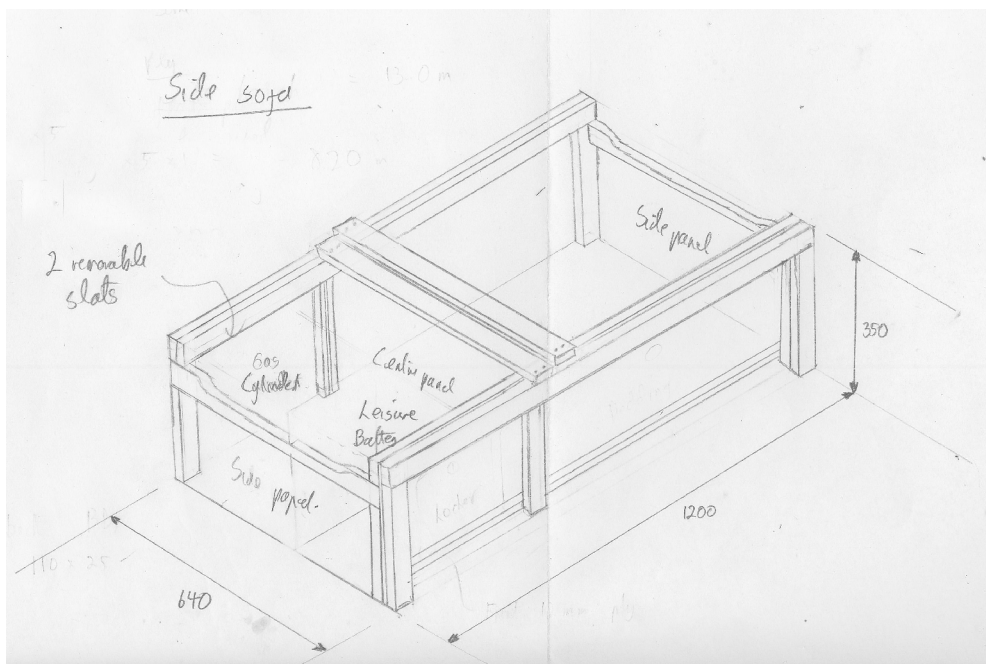
The 240V circuits need to be supplied through a 30mA RCB. I included a 5A circuit breaker for the fridge and a 30A circuit breaker for the sockets.

## Step 5 – Building the rear sofa.



Build the frame out of 2" × 1" timber (actually 45 × 20 mm). Use mortise and tenon joints for the front and rear members. (Remember to make these 6 mm short so as to allow for the thickness of the side panels.) You will have to insert a 45 degree member to cope with the rear corner. Screw 3 mm ply panels to the sides for rigidity. Screw a 20 × 15 mm stringer (with the wider side horizontal) to the 'floating' leg at the front. Using a piano hinge, fasten a sheet of 12 mm ply to this stringer to make a drop-down door so that you can get access to the storage space beneath the sofa. (Actually you will find it more convenient to get access to this space by lifting the tailgate.) This is an ideal space for putting a table and chairs, golf clubs, hiking boots and other outdoor gear. Screw slats to the frame. The frame should be 350 mm high (without the slats).

## Step 6 – Building the side sofa



This one is a little bit more complicated. Start by making the front and rear frames of the main

bench. These will be 1194 mm long to allow for the side panels. Rout a groove down the 'floating' legs and position them so that there is plenty of room to lift the leisure battery in and out.

Now shape the two side rails. These have a dip in the middle so that when you pull the bed out, you can lift the front slightly over the carpet. These rails will be 620 mm long. Screw two 3 mm ply panels to the sides and fit a ply sheet, strengthened at the top with a stringer, into the grooves of the 'floating' legs. Screw a 20 × 15 mm stringer to the base of the front legs.

Now make the 'pull-out' frame. This one will be 1200 mm long. If you are going to fit a carpet after screwing the bed to the floor, these legs will be a little shorter.

Clamp the pull-out frame to the front of the bench and a second piece of 2" × 1" to the rear. Position 15 slats, each 75 mm wide onto the frame and screw them alternately to the fixed and movable frames. The movable section should have 8 slats and the fixed one 7. The first two slats on the fixed bench should be removable so that you can get access to the gas cylinder and the leisure battery. Use a couple of dowels instead of screws. When you have finished you should find that you can pull the movable frame out and that it will be 1200 mm wide when fully extended.

Finally, fit two drop-down doors to the stringer using piano hinges. You can fit all the fuses and the LB/CB switch to the inside of the smaller door.

### ***Step 7 – Building the seat backs***

Screw a pine wood batten along the side of the vehicle just below the windows behind the side sofa and another batten on the tailgate behind the rear sofa. This latter batten will have to be fastened to suitably thick spacing blocks so that the batten is directly above the back of the sofa.

Using piano hinges, fasten the seat backs to the battens. These are lengths of 12 mm varnished plywood approximately 15 cm wide. During the day, they are pulled forward so that they rest on the cushions at a comfortable angle. At night, the cushions are moved so that they hang vertically behind the cushions.

### ***Step 8 – Building the kitchen unit***

The problem with the kitchen unit is that, because of all its plumbing, the fridge basically has to be put in place first. This means that the unit must be built round it. It also means that it will be impossible to remove the fridge without dismantling the whole unit so make sure that it works before committing yourself! I wanted to include storage for a Porta-Potti to the right of the fridge so this determined its position exactly. This left about 15cm on the left hand side which I used as hanging space. The left hand wall of the unit stands on top of the step behind the drivers seat. Once the vertical members are screwed to the floor, a plywood back can be fitted in front of the window and the fridge can be screwed to the two central uprights. I routed grooves in the uprights to hold the shelves in place but you can use screwblocks if you prefer.

Next the worktop is screwed in place from underneath and finally, the front panel is fitted and screwed in place through the cupboard openings.

### ***Step 9 – Building the sink unit***

Because the passenger seat is not adjustable, there is a bit more room behind it which we can usefully use. The only thing to remember is that the passenger seat must be able to be lifted to get access to the engine and the battery compartment. I designed this unit with a sink, a 17 litre microwave and a 12 litre water tank. The latter is filled from a filler nozzle positioned on the side of the unit. This saves having to lug around heavy cans of water. The waste pipe from the sink is simply fed through the floor. If you need to dispose of large quantities of dirty water, you can always put a bucket under the outlet. Normally, I would prefer to use the campsite facilities for personal hygiene and dishwashing anyway.

This unit is constructed in a slightly different order from the kitchen unit. Build the front, back and sides first and screw in place including the microwave. Fit blocks of wood or screwblocks to the underside of the worktop in appropriate places and screw into these from the outside using 4 dome topped screws like the ones used for mirrors. These look perfectly acceptable and give easy access to the plumbing under the sink in case of mishaps. Protect the top of the microwave with a sheet of thick plastic (making sure that the ventilation holes are kept clear) to make sure that no drips get into the electrics!

### ***Step 9 – Building the bedside unit***

This is perfectly straightforward. It consists of a front wall (next to the bed), a back wall (next to the side of the vehicle) with a single shelf between them and an end wall (towards the front of the vehicle). I chose to cut a large opening in the front wall, big enough to insert a decent size book and to block off the rear end. The lower space and the other end of this shelf are therefore only accessible by opening the tailgate. The former space makes a good place to store the hookup lead and other emergency gear while the upper space is a good place to lock away valuables.

The unit is finished on top with a matching work surface.

I found a convenient 12V supply nearby and installed a 240V inverter in the unit so that you can charge a camera, computer or mobile phone from a mains supply without having to have a hook up. Note that the inverter must be fitted with a switch and an obvious indicator lamp. If you do not do this, you are bound to forget to switch it off one day and it will flatten your battery in a couple of days – even if you are not using it!

### ***Step 10 – Building the table***

The standard way to install a table is to fit a socket into the floor of the van into which a tapered table leg is placed with a similar socket screwed under the table top. The problem with this is that the standard length of the leg is 700 mm and with a seat height of only 450 mm (necessitated by the relatively low windows in this vehicle) this is a little bit high. It is not possible simply to cut a bit off the end of the table leg because both ends are tapered. The problem can, however, be turned to our advantage in the following way. Get your local garage mechanic to cut the leg about 10 cm from one end and to weld them back together side by side using a bit of 6 mm mild steel sheet. The result should be a cranked leg whose overall length is about 650 mm with an offset of about 10 cm.

The advantage of this is that the table can effectively be moved around a bit, making it easier to negotiate during the day.

The table top is made of a piece of Vohringer board with a special edge trim.

When the table is not being used (eg when driving) it can be stowed behind the passenger seat.

### ***Step 11 – Soft furnishings***

The bed has been designed to use 7 rectangular cushions with the following dimensions.

- 2 @ 120 cm × 64 cm × 10 cm (one with a corner cut off)
- 5 @ 56 cm × 24 cm × 10 cm

During the day, the 5 small cushions form the seat backs and, at night, fill in the extra space needed to make the bed.

Glue a 1” topping layer to all the foam cushions for extra comfort.

To sew the large covers, cut a piece of cloth exactly 122 cm × 150 cm. Machine a 125 cm nylon zipper (cut from a roll) to the short ends (leaving a hem 1 cm wide) to make a cylinder that will eventually fit snugly round the cushion. Cut two end pieces 12 cm wide and at least 70 cm long.

Beginning at the zipper end, machine the panel to the cylinder making sure that the zipper is exactly in the middle of the short side of the panel. When you get close to the other end of the panel, stop the machine and start again at the zipper, sewing the other side. The reason for doing it this way is so that you can determine exactly where to turn the two right angle corners which form the front of the cushion. Make up the smaller cushions in the same way, always allowing 1 cm for the hem. Sew a short length of 1" Velcro to the back of each of these cushions. Glue a similar length of 2" Velcro to the seat backs. This will stop the cushions falling over during the day. (NB do not try to sew glue backed Velcro with a sewing machine. The glue will mess up the delicate balance of the machine!)

Make up 5 curtains as required. A new length of curtain rail will probably be required.

## **Costs**

In 2010, my base vehicle cost £6800 and I spent £1500 on tools and materials making a total cost on the road of £8300. I estimate that the finished vehicle would sell for at least £8900.

## **Picture Gallery**

The interior fittings removed



Electrics in place and floor coverings fitted



The finished interior – day use



The kitchen area



The bed

