

Fitting a reversing Camera to a Ford Transit van.

A reversing camera is a useful, not to say essential accessory on a van and there are many models available on the market and many firms willing to charge high prices to fit them. I describe here a fairly simple way of fitting a cheap camera/screen kit which I purchased from Reverse It Cameras for £35 (<http://www.reverseitcameras.co.uk/>) whose camera replaces one of the number plate lights and which has a screen which clips over the rear view mirror. An alternative kit uses a screen mounted on the dashboard. The advantage of the former is that it doesn't clutter up the dashboard and, in theory at any rate, gives the rear view mirror an extra function or, if your van has no windows in the rear doors, a legitimate use.

I say in theory because, having fitted such a unit I find that there is a problem. The screen is mounted behind a half silvered mirror so that when the unit is switched off, it looks and behaves exactly like an ordinary mirror. This does, however, mean that in daylight, the image on the screen is superimposed on the ordinary reflection and can be quite difficult to see.

Another reason for choosing a mirror mounted screen is so that it could be used when overtaking a vehicle on a motorway to judge when you have safely passed the vehicle. For this reason I wired my unit into the ignition circuit so that it could be switched on at any time, not just when reversing. There are three problems with this idea. The first is the one I have already mentioned – in daylight the screen is very difficult to see at a glance – you need to look at it closely, which is all right when you are reversing slowly but not a lot of good for a quick glance. The second problem is related. The image in a mirror lies a long way behind the mirror but the image on a screen is right in front of you. This means that you have to refocus your eyes to see the image. This may not be a problem for young eyes but may be an issue for anyone over 50. Thirdly, the angle of the camera in the number plate light is not adjustable and is designed to show the ground immediately behind the vehicle. It does not extend up to the horizon and only gives a brief glimpse of vehicles as you pass them.

In choosing an installation, you must therefore make two decisions: a) do you want a mirror mounted or dashboard mounted screen and b) do you want to wire it into the reversing circuits (so that it can only be used when reversing) or do you want to be able to use it at any time. The wiring for the latter option is significantly more complicated so my recommendation would be to wire it into the reversing circuit but I will describe the wiring for both options. Whether you choose a mirror or dashboard mount is up to you.

What you will need in addition to the camera kit

- 8m of 10mm convoluted sleeving
- A selection of insulated male and female crimp connectors
- 2 red snap-lock connectors
- 1 miniature rocker switch (ignition circuit only)
- 2m stiff garden wire
- 10m string
- 6" nail
- Soldering iron
- heat-shrink sleeving

Wiring the camera

Remove the panel in the nearside tail door. Unscrew the two plastic knobs which secure the nearside tail light cluster to the vehicle. (Do not drop them into the chassis as they are very difficult

to find again!) Remove the tail light cluster, disconnect it and put it away safely.

The camera unit has two cables: the video cable with its yellow phono connector is obvious; the other cable with its red and black wires is the number plate light. We need to connect two male, blue crimp connectors to these wires but they are far too thin. Cut a short length of twin core power cable supplied with the kit. Bare all four ends and tin them with solder. Crimp two male connectors onto one end and solder the other ends to the aforementioned cable, insulating both connections with heat shrink sleeving.

Now disconnect and remove the number plate light nearest to the centre of the vehicle. Feed the camera cables through the aperture and click it into place. Connect the two male crimp connectors to the main harness making sure that the positive (red) wire is connected to the Orange/Black cable and the negative (black) wire to the black one.

Threading the video cable

The wires leading to the rear light cluster pass down through a gap in the chassis sealed with some foam. We need to bring the 10mm convoluted sleeving up through this gap. Drill a hole across a diameter half an inch from the end of the sleeving and pass the garden wire through the hole. Double up the wire and poke it through the gap from beneath. Now pull the wire and the sleeving up through the gap. (This is the most difficult job in the whole project!) The sleeving is going to be attached to the underside of the vehicle and end inside the engine compartment behind the dashboard.

Now we need to thread the string through the sleeving. Using a hacksaw, cut the head off the nail. Lay 2 inches of string along the nail and secure it with insulation tape. Drop the nail down into the sleeving and gradually work the nail along the whole length of the sleeving by shaking the sleeving up and down. You will find it useful to have someone else feeding the string into the other end and reporting on progress.

Working from the rear of the vehicle, work out exactly where the sleeving is going to go. Pass it over as many cross members as possible and well over the front suspension arms. Do not tie it in place yet as it will be easier to pull the cable through if there are no sharp kinks in it.

Next we must locate the route which the cable is going to take from the dashboard down into the engine compartment. Open the bonnet and locate the fuse box on the right hand side of the engine compartment. Directly behind this box you will see the painted wall of the back of the engine compartment and in it you will find a circular rubber disc about 4cm in diameter. It is through this disc that the cable will pass. Thread the sleeving up through the engine compartment and cut it off just short of this disc. Using a sharp tool puncture this disc and with the garden wire pull a length of string through it. You will find that you can see the other side of the disc if you crawl underneath the dashboard on the passenger side.

Preparing the video cable

The kit comes with approximately 8m of three core cable which is used to transfer both power and video. Inside the cable there is a yellow wire which is connected to the central pins of the yellow phono connectors; a black wire which is connected to the shroud of the phono connectors and a red wire which is brought outside at each end. We need to attach a power connector to each of these red wires. Cut the plugs off the supplied power leads (which I am assuming are flat twin core red/black cables) leaving about 3 inches of cable attached to the plug. Solder the positive (red) leads in this cable to the red leads which emerge from the yellow phono connectors at both ends of the video cable and insulate the joins with heat shrink sleeving. (The black leads are unused. The camera/screen will pick up their earth connections from the phono connectors)

What we do next depends on whether you intend to wire the camera into the reversing circuit or the

ignition. Go to the relevant section.

Wiring the camera into the reversing light circuit

To wire the camera into the reversing light circuit we need to pick up power at the rear end of the vehicle. Cut the supplied video cable 1m from one end. Bare the ends of the red, yellow and black wires inside and (temporarily) solder them all together.

Tie the string which you have threaded through the rubber disc to the long section of cable and pull it through the disc from inside the vehicle into the engine compartment. Then tie it to the other string and gently pull it through the sleeving from front to back. You will need someone at the front to feed the cable into the sleeving smoothly.

The cables to the number plate lights pass into the door through a plastic conduit which has two channels, the upper one of which is, fortunately, empty. Poke the doubled garden wire through this channel; fasten a piece of string to the end and pull it through, then use the string to pull the short section of video cable through the channel from inside the door.

Make sure now that the ignition is off. Cut a foot or so of power cable and without baring the ends, use a pair of snap-lock connectors to connect the red lead to the Green/Black wire which connects to terminal 1 of the tail light block connector and the black lead to the Black wire which connects to terminal 5 of the block connector. (When you squeeze the metal blade using a pair of jaw locking pliers, the blade cuts through the insulation without cutting the wires.)

Now using solder and heat shrink sleeving connect a) the 2 yellow wires in the two sections of the video cable, b) all three red wires and c) all three black wires. Tape the whole joint securely.

Wiring the camera into the ignition circuit

To wire the camera into the ignition circuit we need to pick up power at the front of the vehicle. Cut the supplied video cable 2m from one end. Bare the ends of the red, yellow and black wires inside and (temporarily) solder them all together.

The cables to the number plate lights pass into the door through a plastic conduit which has two channels, the upper one of which is, fortunately, empty. Poke the doubled garden wire through this channel; fasten a piece of string to the end and pull it through, then use the string to pull the long section of video cable through the channel from inside the door into the tail light compartment.

Now tie the string which you have threaded through the sleeving to the long section of cable at the back of the vehicle and gently pull it through the sleeving from back to front. You will need someone at the back end to feed the cable into the sleeving smoothly. Then tie it to the other string and pull it through the rubber disc and into the passenger foot well.

Make sure that the ignition is off. Now remove the radio. (You may need to acquire a couple of special tools to do this.) There is no need to disconnect the radio connectors but be aware that even with the ignition off, some of these wires have 12V power to them.

On one end of one of the power cables supplied crimp a *male* spade connector to the black lead and a *female* spade connector to the red lead. Assuming that one of the four switches on the fascia is a blank, remove it and feed the other end of this wire through the hole and out through the radio aperture. Without baring the ends, use a pair of snap-lock connectors to connect the red lead of the power cable to the Yellow/Blue wire which connects to terminal 3 of the block connector and the black lead to the Black/Green wire which connects to terminal 6 of the block connector. (When you squeeze the metal blade using a pair of jaw locking pliers, the blade cuts through the insulation without cutting the wires.)

On one end of the other supplied power cable crimp two *female* connectors. Poke the other end of this wire through the switch hole and draw it up into the fuse box compartment which is accessed

by removing the tray in front of the passenger seat. Connect the male and female connectors on the black wires together. Drill a suitable hole in the switch blank for the miniature rocker switch, fasten the two female crimp connectors on the red wires to the spades on the back and push the switch back into the fascia panel.

Now using solder and heat shrink sleeving connect a) the 2 yellow wires in the two sections of the video cable, b) all three red wires and c) all three black wires. Tape the whole joint securely.

Testing the cables

Make sure that the ignition is off and, if you have wired the cables into the ignition circuit, that the rocker switch is in the off position. Disconnect the video and power connections of both the screen and the camera from the video lead. Using a multimeter on the 'ohms' setting, check that there is infinite resistance between a) the central pin and the shroud of the phono connectors at both ends; b) there is infinite resistance between the central connector on the power leads and both the pin and the shroud of the phono connectors at both ends.

Now check that there is no more than a few ohms resistance between the shroud of the phono connectors and a nearby earth point.

Do not proceed any further until these checks are satisfactory.

Now turn the multimeter to the 20V DC range. Hold the red lead of the multimeter to the central connector of the power lead and the black lead to the shroud of the phono connector. Get a friend to turn on the ignition and either put the vehicle into reverse or to switch the rocker switch. Check that you are getting 12V power to both ends of the video cable.

Assuming this test succeeds, plug in the camera and screen and make sure everything works. (The screen has two video inputs, one with a yellow connector and one with a white connector. The former is for use with things like a GPS device. Use the second – the one with the white connector – as this reverses the image as if in a mirror.)

Tidying up

Now crawl under the vehicle and tie the convoluted sleeving to the chassis using as many nylon cable ties as you can find holding points for them. Replace the tail light cluster and fasten the panel on the inside of the back door again.

If you have chosen a mirror mounted screen, remove the plastic cover on the front pillar by pulling it smartly away – it is held by two plastic clips. Unscrew the passenger sun visor and any other screws that are fastening the roof panel up. Clip the screen to the existing rear view mirror. Pass the video lead up from the fuse compartment, up the pillar and tuck it and the (rather bulky) connectors behind the interior roof panel. Replace the sun visor and pillar trim.