Land Rover

Discovery 3

Extending the multimedia capabilities of the Discovery III

An installation guide to add a GVIF interface, a rear view camera and a DVD player to your Discovery III.

A www.disco3.co.uk resource

Version 1.2

Disclaimer: this guide is for information and illustration ONLY. Any work you do on your car, either explicitly or implicitly following this guide, is at your own risk and with the understanding the steps followed below have worked for me, in my car, at my own risk and given my own knowledge of the matter and with my own disregard to potential consequences on the vehicle's warranty. Neither the author, the website WWW.DISCO3.CO.UK, Martin Lewis or and other website forum members mentioned in this document will be held liable for any warranty consequences or any damage of any severity caused on your vehicle as a result of you choosing to follow this fictional procedure. Any trademarks, copyright or references to words or actions of individuals other than the author, are hereby acknowledged to be the property of their respective owners. The author is simply an enthusiast, with no training at all in electrical or mechanical engineering and as such some of the methods and procedures used may be far from best practice in each respective field.

N.B. The modifications/additions in this document can be done separately and in varying ways/locations. I have chosen to put everything together as I did most of the work in one go. My vehicle is an HSE model, which means it was already fitted with the factory SatNav screen and the auxiliary audio input in the rear of the centre console, the wires of which I taped into to feed the head unit with the audio output from my AV sources. Other spec cars may have different wiring looms and/or at different locations.

I have no affiliation to any company or brand names I may mention in the course of this document in the context of describing the parts and tools I used on my own vehicle.

Changelog:

v.1.0

– Initial release

v.1.1

– Added cover page
– Added introductory commentary
– Added alternative power options for reversing camera (Ch. I, Part II)
– Added Ch.II – Installing a DVD player

v.1.2

– Added section on wiring the audio output
– Some wording corrections

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Contents

Chapter I - GVIF and rear camera installation

Why have a GVIF Interface? Most people buy the GVIF (**G**igabit **V**ideo **I**nter**F**ace) unit as a solution to the lack of a reversing camera on the Discovery III. While there is evidence Land Rover had thought of the possibility of fitting a reversing camera to the Discovery III, it seems they never got around to doing so. The GVIF allows for a reversing camera feed to be triggered automatically by selecting reverse gear and the output displayed on the SatNav screen. Having an additional three input sources also means you can display pretty much anything you wish which has a composite RCA video output to the SatNav screen. People have used it for TVs, DVDs, Car Computers, iPod videos, the possibilities are endless. You also get the benefit of additional composite video and audio outputs, which you can then feed additional monitors like headrest screens, for example. This chapter covers the installation of the GVIF unit itself and the reversing camera.

How much will it cost? There are a number of suppliers online with varying prices and currencies, but at the time of writing this, you should expect to pay anything between GBP 250 and GBP 350 including delivery and taxes for a basic unit. There is at least one more elaborate unit in the market which goes a step further by adding a button and some menus on the home screen of the Discovery's SatNav display costing around GBP 500 (not covered in this guide). Then depending on what you choose to use it for, approximately GBP 25 to GBP 100 for a reversing camera and whatever the cost of your other input sources is. You should factor in some RCA cabling, a few bits from an electrical shop (about GBP 20-30 including the cables) and the cost of your time, which shouldn't be more than 3-5 hours for the GVIF and camera depending on fitting location and how quick you are with threading wires.

Any other things to know before proceeding? Yes. There are several versions of GVIF interfaces out there at the moment, this guide was written based on a version 6.2 unit. Variations in spec do exist and I would recommend you at least read the manual supplied with your unit or from the site your purchased it from, to at least get an idea of the features your unit supports. You should also know this unit is not Land Rover specific from most suppliers and as such you may need to purchase an additional Land Rover cable from them. The unit used in this guide had such a cable already included in the package.

There are two parts to this mod, installing and setting up the GVIF and fitting the rear view camera. I will describe them in this order, though you could start with the camera instead.

Part I – Installing the GVIF

Tools required: cable stripper, crimping tool, pliers, set of torx screwdrivers (T15, T20 and T30 at least), Phillips screwdriver set, soldering iron, electrical tape, heatshrinking tube and about 1½ hours for this part. It is always good if a multimeter is to hand, at least for continuity testing.
Parts required: GVIF interface, 20cm twin 2mm cable (for extending the units' power cable), 2x Lucar connectors (set of male and female), 5x snaplock connectors (blue which fit 1.1-2.6mm cables), RCA audio male to minijack cable, (length to your requirements, depending on where you fit the GVIF, but for this installation for example, 1.8-2.5m should be plenty), strong double sided tape or Velcro, cable ties. Oh, and a few bandaids for when hands are cut while threading wires!

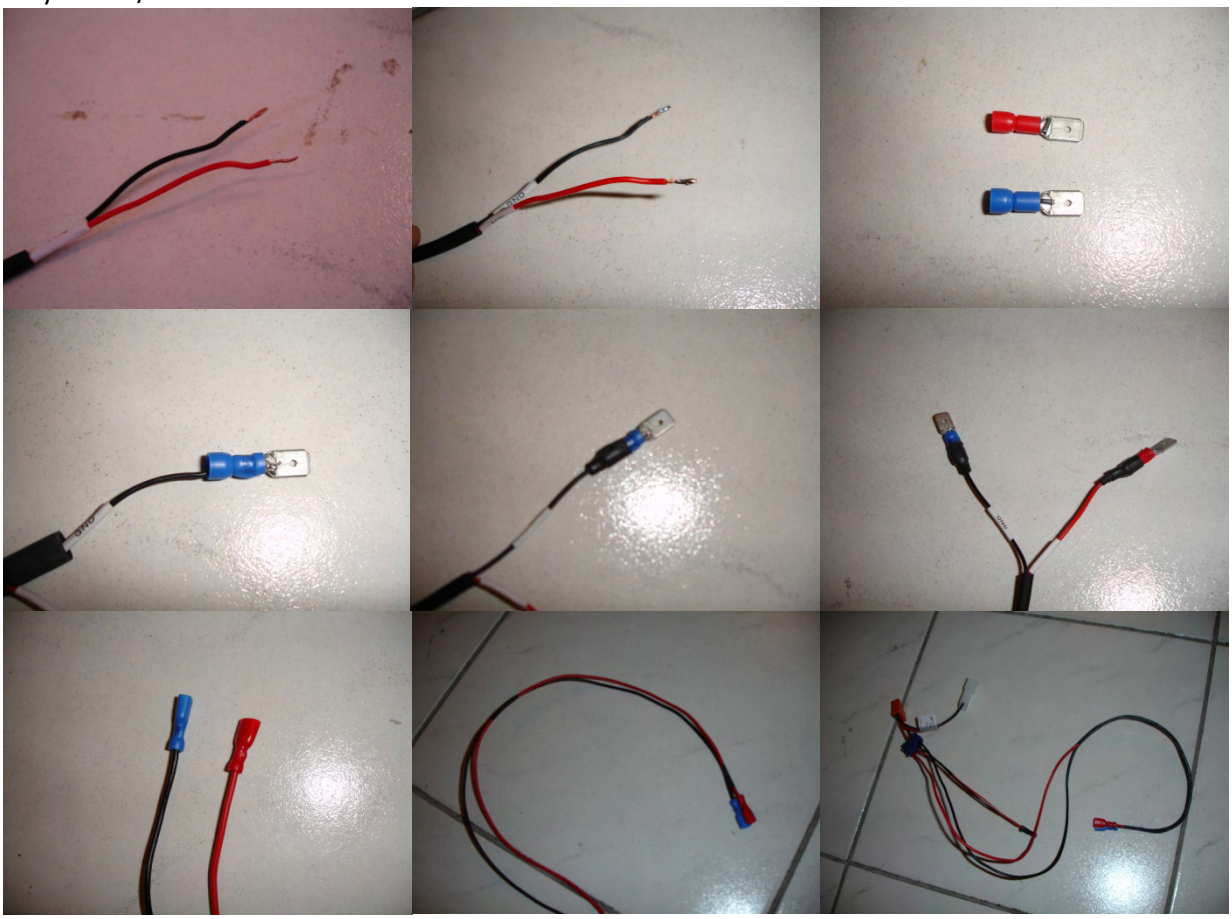
As I mentioned, the contents of the box vary and I didn't take a picture of mine when I opened everything, but broadly this is what you get (picture from the manual):

There's a loom with all the AV inputs and outputs (bottom left on the picture), a loom with the fused power source and CAN bus connections (bare wires, top left, we'll only use the grey reverse gear sensing one), a cable for the RGB input (unused in the D3, bare wires, short white cable middle left), a source switching button and cable (black, middle left), an infrared receiver terminal and cable (top right, you can omit proper fitment if you are only going to set everything up once), an infrared remote control (bottom – used to access the GVIF settings, you can omit full time usage if you are only going to set everything up once), and the GVIF cable itself (bottom right). Everything is clearly labelled, and there are no two same connectors so very little chance of missing what goes where.

The first step is to make an extension for the power cable. Though one could use the loom that provides power to the LR SatNav DVD unit, I have opted to tap into the power sockets the car already has. As I was also installing headrest screens at the time, I opted to tap into the front driver's side power socket,

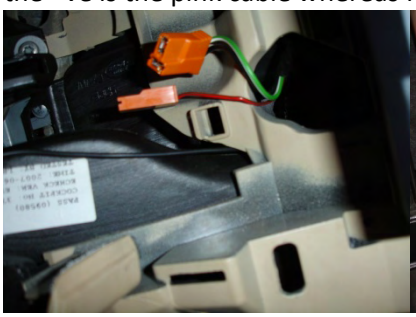
but the method (and extension) can equally be used with the power socket at the rear of the centre console.

I tinned the ends of the GVIF power cable and soldered & crimped a couple of male spade connectors so I could remove the unit later if needed easily. Similarly, I crimped female spade connectors to one end of the extension and left the other end untouched. This will be stripped by the snaplock connector when fully closed/locked.



(from bare wires to part of the loom)

In my installation, I used the extension provided with the headrest screens to snaplock the other end to, but you can use the cables of the connector that supplies power to the car sockets directly. For the rear power socket, lock the +ve to the purple cable and the –ve to the black cable. For the front left socket, the +ve is the pink cable whereas for the right the +ve is the green/white coloured cable.



(front right power connector)

(rear console power connector – GVIF temporarily plugged in for testing)

Before going to the car for fitting, it is recommended to let it go completely to “sleep”, by engaging the EPB (electronic parking brake), removing the key (the doors can be left unlocked, but I always leave the

driver's window fully open as well for good measure) and waiting for the parking indicator in the instrument cluster to go off.

At this point, roll up your sleeves, have a hot drink of your choice, and read through the next paragraphs on how to remove the panels of the consoles in order to reach the car's power sockets.

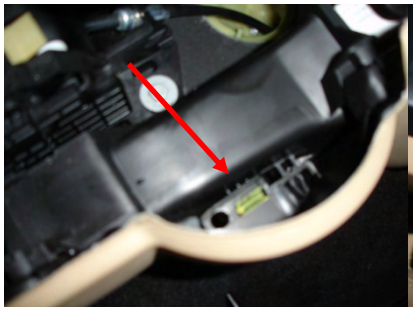
Whether you chose the front or rear power socket, you will definitely need to remove the centre console upper trims. It's not difficult, just take your time. First, grab the gearlever (this is for an auto box) firmly with both hands while in park (P), and pull vertically upwards. It is secured very stiffly and will give way suddenly so do not keep your face over it as injury may occur (a few forum members still have facial bruises from looking straight down at it when removing LOL). Store the lever somewhere for now. Remove the rubber mat from the area under and between the power sockets and the cup holder inserts. Put those to one side as well. Next, remove the sunglasses cubby by pulling it out (it comes off easily) and the plastic cover behind the EPB lever (again, you can easily prise it up with your fingers). Unscrew the T15 screw just in front of the EPB and store the lot somewhere securely. If you can reach at this stage unplug the green EPB connector as well (don't worry if you can't we'll do it later).

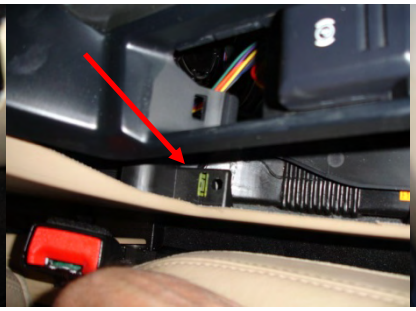
(ready to lift)

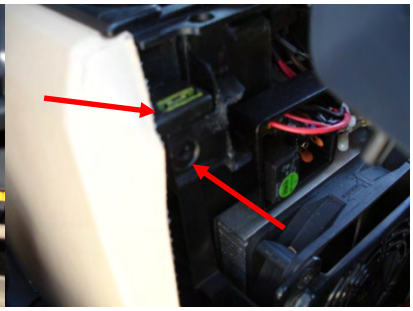
Now move to the back seat and slide both front seats all the way forward. Open the centre console lid and remove the top tray. Close the lid again and locate the two T30 screws at its rear (one each side). Undo these and prise the silver cover outwards (I did mine with my fingers, you may need the assistance of a plastic knife/spoon as they are quite stiff too). If you have the telephone connector installed in the lid, open it all the way back and undo the four screws that secure it to the lid and drop it gently in the centre cubby box (or coolbox if you have one). Lift the lid to 90 degrees until the locating gaps expose the plastic lugs that secure it to the swivel mechanism (this is where the T30 screws we removed attach). Then lift the lid upwards and put it aside.

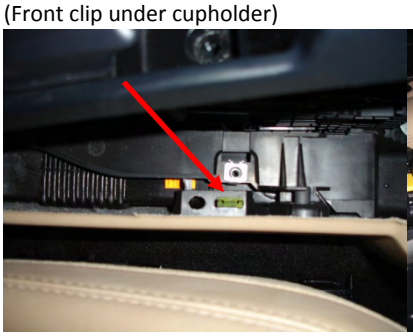
(centre console lid removal)

Back to the front seats, slide it back so you can sit comfortably and grab the black plastic trim from below the cup holders, lifting up until you feel the two front clips that hold it give. Don't pull it any higher yet. Now grab the same trim piece as far back as you can (ideally just as it starts tilting upwards) from underneath and pull upwards until the four rear clips give. Finally, lift the middle section to undo the two middle clips if they've not come loose yet. You can now lift the entire piece about 10-15cm until the connector cables won't allow any more lift. Disconnect the EPB green connector by pinching top and bottom and pulling backwards, disconnect the Terrain Response connector and the Ride Height connector and you can lift the piece completely. Put it to one side as well.


(Front clip under cupholder)

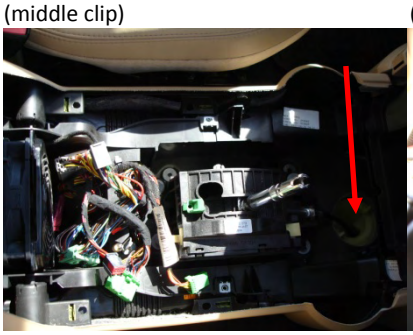

(rear lower clip)

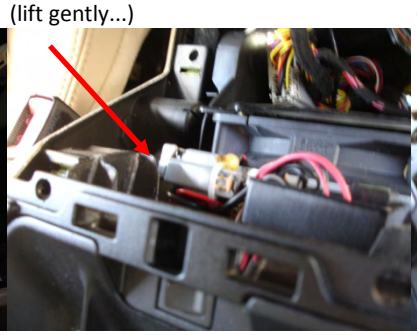

(rear upper clip and screw location)

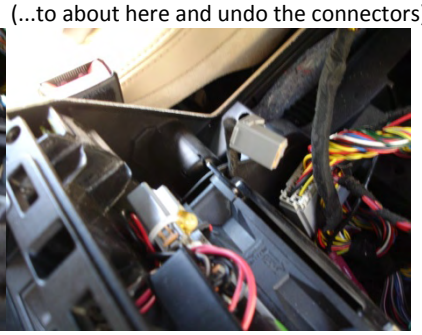

(middle clip)


(lift gently...)


(...to about here and undo the connectors)

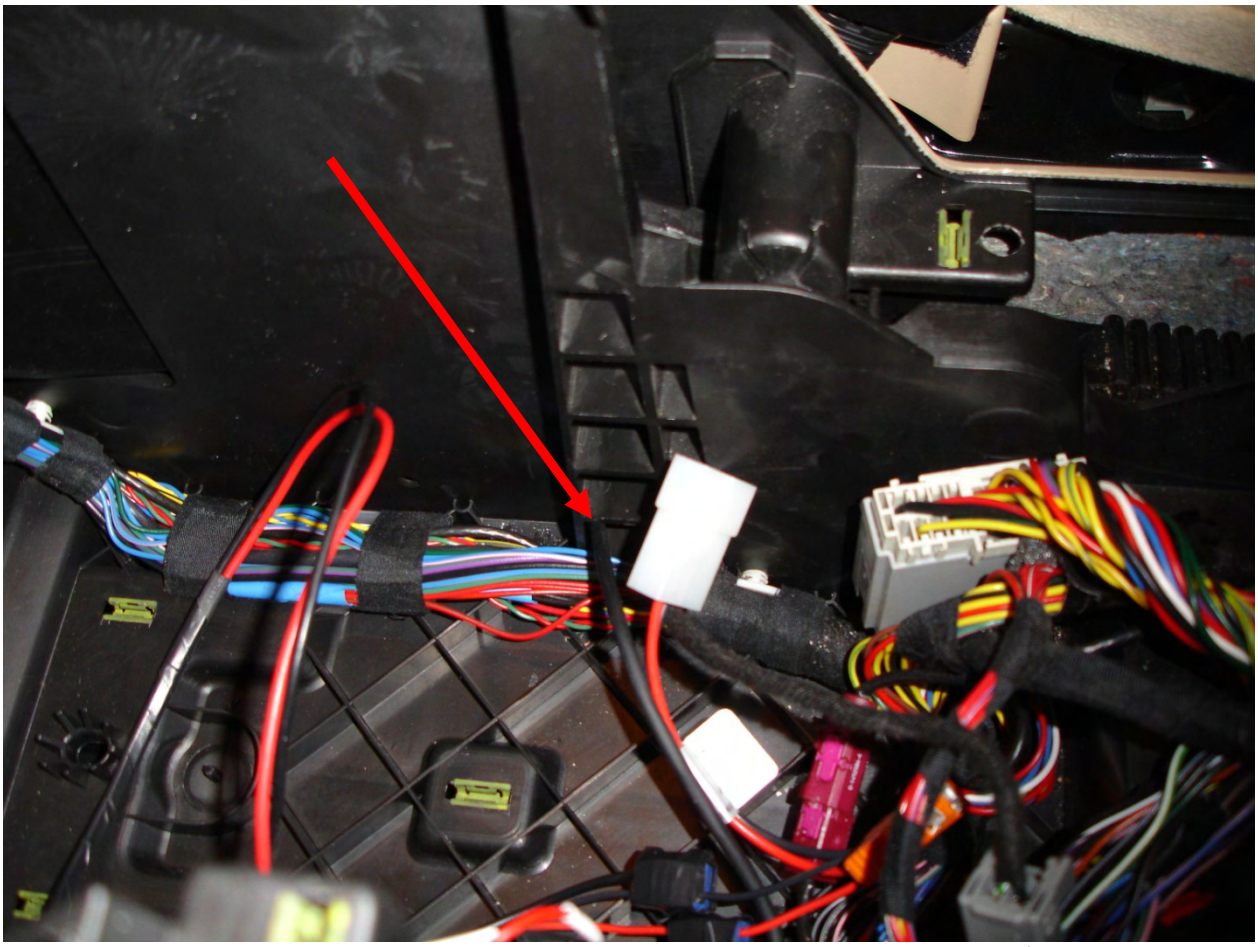

(tip: if you have lost any clips when removing the facia H-panel, it is very likely you will find them here! – I found both mine!)


(coolbox power connector...)


(...disconnected)

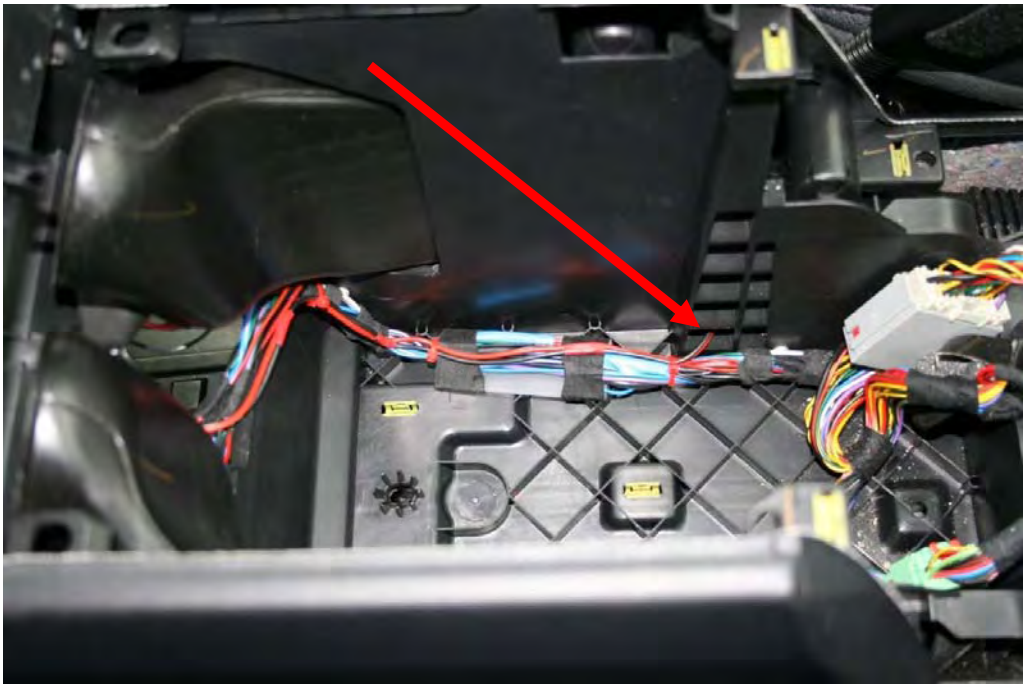
At the back of the area you have exposed up just below the rear upper clip (see pic above), locate the two screws (one each side) that secure the coolbox/cubby box and undo them. Disconnect the power connector to the coolbox (if fitted). Then grab the cubby box/ coolbox and pull upwards HARD. Like the gearlever, it will give suddenly due to stiff clips at the bottom, don't keep your head directly above it!!! Be careful not to pull it all the way out yet if you have the phone cradle, there's one more connector that needs to be undone but it's only accessible when the coolbox is half way out. No pictures from that, sorry, but if you follow the phone cradle cable you will find it half way down the coolbox.
Whether you're using the front or rear power sockets, you will now have access to both. If you go for the rear one, you may find it easier to pull the panel with the power socket out by gently prising it (see bottom picture on page 3) and disconnect the power connector before proceeding.

Next, lift the passenger seat (or driver seat for LHD cars) all the way up and slide it fully forward. This will provide good access to the area where the GVIF will be installed. We first need to thread the GVIF's power cable under the seat rails and up through the only available opening in the centre console. I found it easier to thread my extension from inside the – now empty – centre console area, fish it with my fingers from underneath the external side of the console and plug in the GVIF connectors I made. I then gently pulled the excess back in the centre console, feeding the cable with my other hand from the outside. The opening you need to use is the bottom left of two columns of square "vents" on the passenger side of the console:

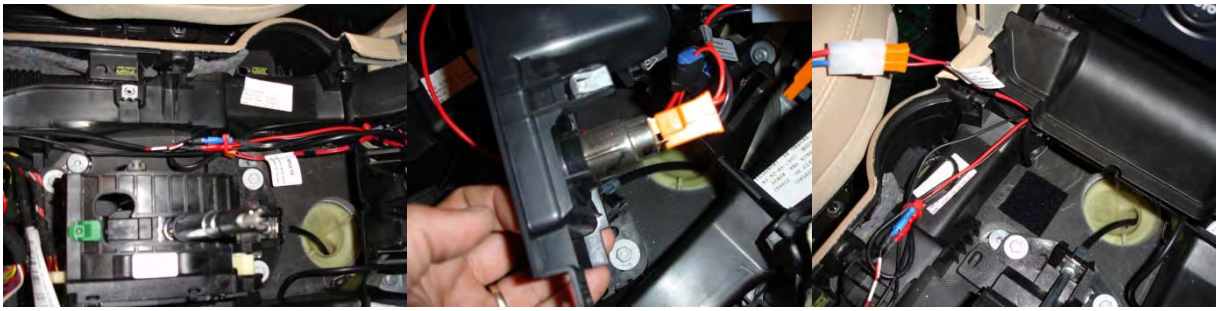


(pic showing the GVIF power cable threaded through the hole, ignore the white connector and loose red/black cable...)

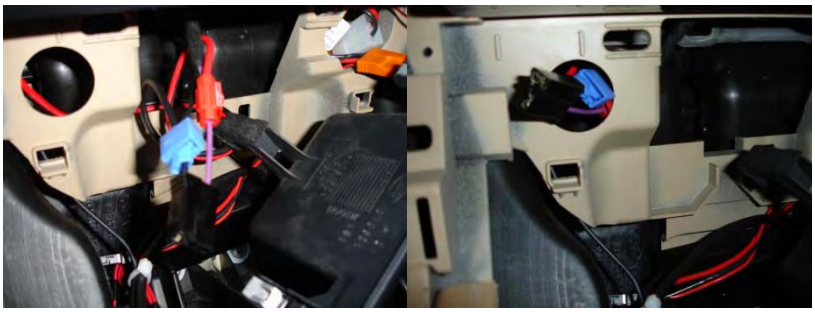
As I mentioned, I chose to tap into the front power sockets and threaded the wiring accordingly. For reference, here's what **AlanG**'s looks like who went with the rear power socket:



I threaded the wiring behind the big grey connector through to the front area, left of the gearbox selector and to the left of the left locating slats for the plastic tray at the front end of the console. Remember I tapped into the driver's side power socket using the headrest screens connector but you can use snaplocks instead:



(my use of the power connector in the front right socket, wiring coming out from the left...)



(...or use snaplocks straight on the connector wires – pics from my DVD installation)

If you want to access the front power sockets, you will need to remove the H-panel by pulling firmly at its lower end (lower red arrows). Then pull the upper end towards the cabin as well and it should pop off. If your fingers don't fit or can't grab the back of the panel, you can (at your own risk!!!) use an aid (in the form of a plastic wedge or flat screwdriver with the business end wrapped in electrical tape).

(H-panel in place...)

(...and removed)

It is almost certain one or more of the metal retaining clips will spring off, hopefully somewhere you can retrieve them. If for some reason you cannot (and I would advise to have some spare if you tinker with the Disco anyway), the Land Rover part number for them is FYC500040.

(this is where the clips should be, they're on now)

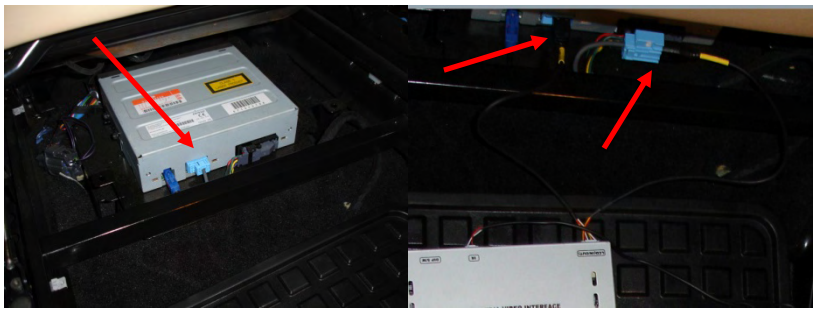
(this is the clip in question)

You will then need to unscrew the two torx screws that hold the sockets panel to the dash and pull back very strongly as again the clips holding it back are very firm (this is assuming you have already removed the trim around the gearlever – if not the power socket panel will not come off).

At this point it is strongly advisable to check that everything works before re-assembling the centre console and trim, hence we are going straight for the next step leaving everything as is.

- Video connection -

Back under the passenger seat from the behind it, you should be able to clearly see the factory SatNav DVD unit with three connectors to the back: dark blue, light blue and grey. The one to disconnect is the middle light blue one:



Plug all the cables in the package described on page 2 into the GVIF connectors (including the IR sensor, you will need this to calibrate the unit) and observe the GVIF cable carefully: there is a male and female

connector, one goes in the DVD the other in the connector you have just unplugged (see second pic above). Once you've secured the GVIF cable, get a video source for testing ready and set the DIP switches on the GVIF unit as follows:

DOWN: disabled, UP: enabled

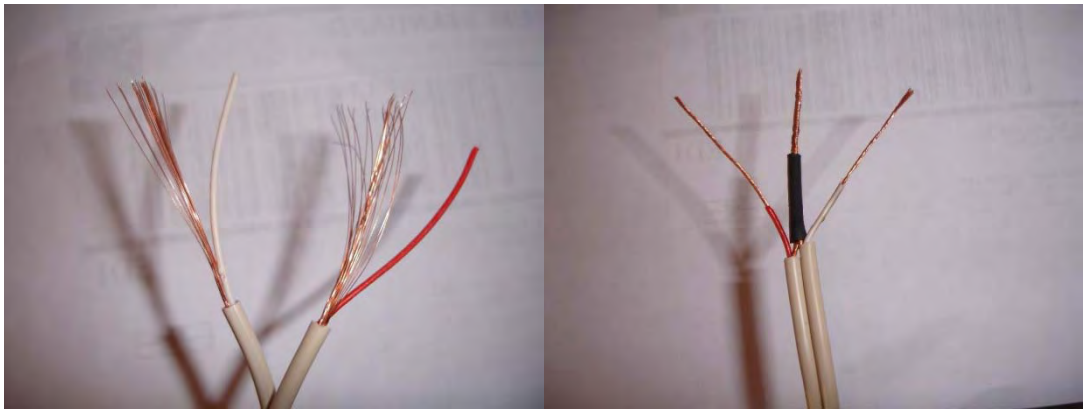
1. RGB input Mode: ON : Skipping RGB Mode, OFF : RGB Display.....**DOWN**
2. A/V1 mute: ON : Skipping A/V 1, OFF : A/V1 Display.....**UP**
3. A/V2 mute: ON : Skipping A/V 2, OFF : A/V2 Display.....**UP**
4: A/V3 mute: ON : Skipping A/V 3, OFF : A/V3 Display.....**UP**
5: To select car model: ON: Lexus, OFF: Landrover.....**UP**
6: To select original NAVI: ON : For using original NAVI, OFF : Not use original NAVI.....**DOWN**
7: Rear Mode: ON : External Rear Camera, OFF : OEM Rear Camera.....**UP**
8: N.C.....**n/a**

These settings have worked for my unit. I am aware other units have different settings with regards to switches 5-7, so please try changing these if the table above does not work for you. I am using all three AV inputs, for those that don't require some or all, simply switch to DOWN.

- Audio connection -

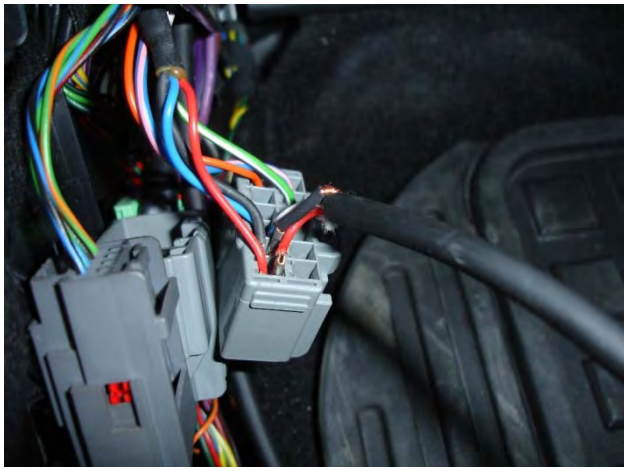
Discovery 3 HSEs and some SEs I believe, already have an auxiliary audio input next to the power socket under a lid in the rear of the centre console. This auxiliary audio input cabling runs through the car and at several points you can tap into it where connectors are used. The easiest location for me was the passenger footwell kickpanel: to access, you need to unscrew the bonnet release lever (T20 torx) just enough to pull out the lever (the screw stays in it) and then gently unclip the panel. You may need to lift the floor plastic trim a little and pull back the rubber seal around the door (don't pull the felt as it may tear, grip the whole rubber instead). This is what you'll find behind it (I've disconnected the plug to be used for clarity):

The plug in question has two sections to it, we need the one with the red, blue and black wires. These are : **RED:** right channel, **BLUE:** left channel, **BLACK:** ground. Get your RCA-minijack cable, chop of the minijack (keep this it will be needed later!) and strip the insulation. You'll end up with something like this (red cable is right channel, white is left and each is screened in its own grounding mesh):



Strip both the white and red cables and twist both grounding cables into one and you'll end up with something like the second picture (I've gone an extra step and insulated part of the ground with some heatshrink). At this point I considered using some snaplock connectors but found that the cables were too thin, even for the smallest snaplocks I had:

So I reverted to using some leftover spade connectors I had left from another project and crimped those to the ends. You can of course simply use one snaplock per channel and connect as above. That's all the modification required to the cable, you now need to feed it down to the connector behind the kickpanel (I chose to have the inputs in the lower glovebox which makes it relatively easy to feed through) and connect it by pushing firmly into the existing plug:



I've also used cable ties to secure the newly made cable to the existing one for added stability.
At this point even if you connect something to the audio input just made no sound will come from the speakers. This is because there is a shorting switch built into the AUX connector in the rear of the centre

console, which is there to safeguard the system from unwanted hissing if the AUX input is selected on the head unit with no input plugged in. To overcome this, find the 3.5mm minijack we chopped off the cable earlier, cut the plastic stalk about half way through with a hacksaw and then file/grind the rest until you have about 4mm of the stalk left – this will allow the flip cover to close properly. Mine was white so I painted it black with a permanent marker:

You now need to plug this in the auxiliary input and this will enable the sound from the connector we just tapped to:

Now you need to thread the remaining cable (with the RCA ends) to where the GVIF will live. In this installation, given the GVIF unit lives under the passenger seat, there were two options: either along the lower end of the door, under the plastic trim, or around the footwell and under the centre console and

under the inner seat rail to the GVIF. I chose the latter, using cable ties to hold the audio cable behind the lower glovebox then simply tucket the cable under the centre console and finally pushed it in the seam of the carpet and under the inner passenger seat rail, to the GVIF.

- Testing -

We are only going to test the AV inputs at this stage (not the reversing camera), so plug your video source (YELLOW male RCA connector usually) to the yellow female RCA connector of AV1 and the audio RCA connectors (RED and WHITE) and switch it on. Turn the key in the ignition to position II (or start the engine if you have concerns over draining the battery) and set the screen to SatNav (you don't need to accept the disclaimer). The GVIF by nature only works when SatNav is selected; it will not work if you are in the 4x4 Info screen or the Settings screen.

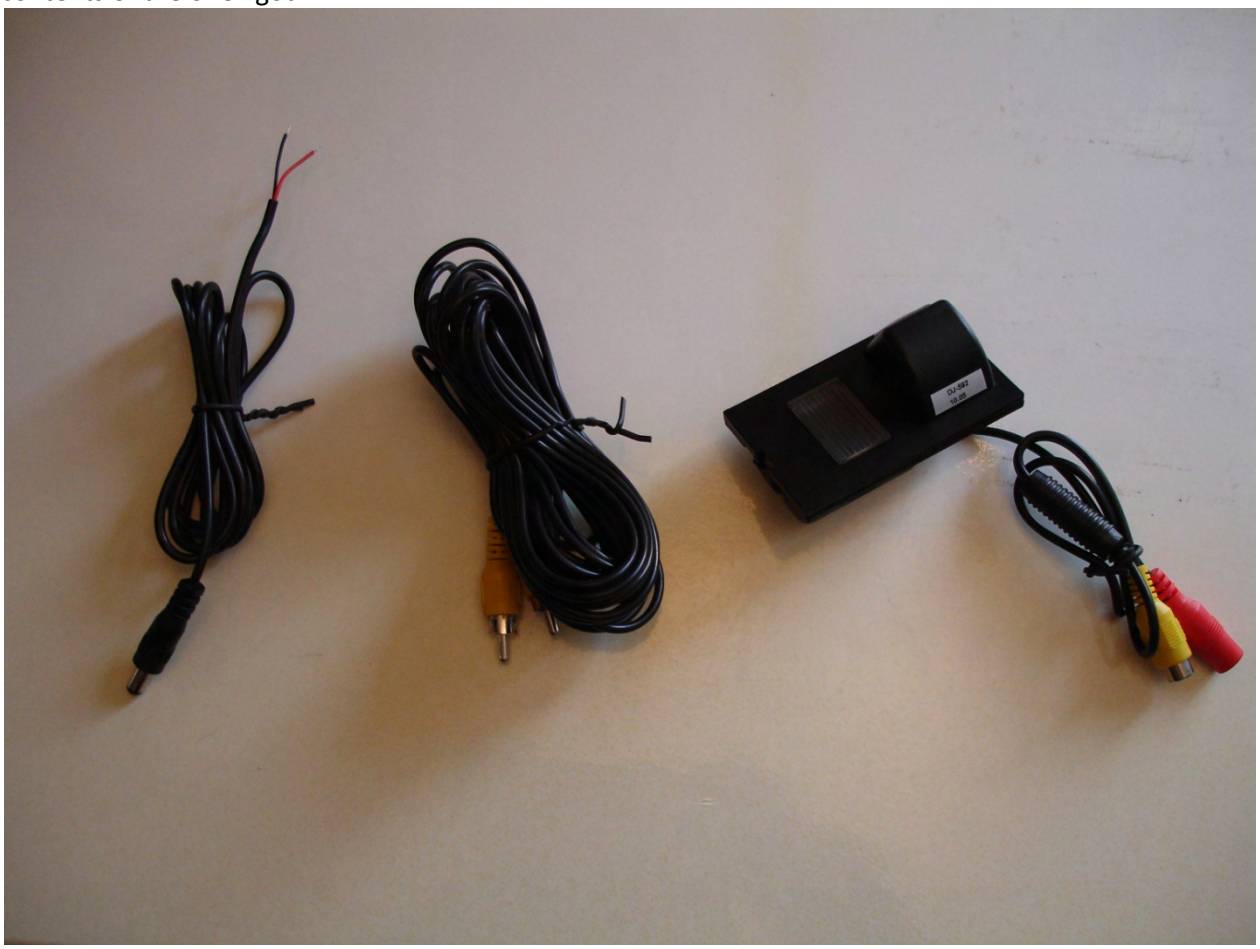
Using either the IR remote (put the battery in!) or the hardwired selector (also see "Part III" section below), select AV1 and ensure the image is displayed on the car's screen. Assuming it is, go back to the unit, unplug the yellow, red and white connectors and repeat the procedure for AV2 and AV3. I used my old Zen Vision for testing:

The AV loom also has two video and one audio output, you may also want to test these while you are at it (I used the main unit from a Dogcam camera I have). Assuming all works ok, switch the engine/ignition off, open the tailgate for Part II and let the car go back to "sleep"...

Part II – Installing the Reversing Camera

Tools required: cable stripper, crimping tool, pliers, set of torx screwdrivers, Phillips screwdriver set, 10mm socket, electrical tape, heatshrinking tube and about 2 hours for this part. It is always good if a multimeter is to hand, at least for continuity testing.
Parts required: 5m twin 2mm cable (for extending the camera's and GVIF power cable), 4x snaplock connectors (red which fit 1.1-2.6mm cables), cable ties, WD40 or similar lubricant. Oh, and more than a few bandaids for when hands are cut while threading wires!

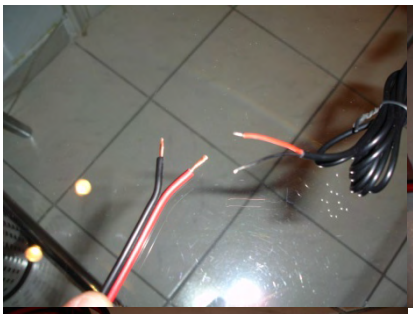
There are obviously a number of cameras one can use for this application, whether bumper mounted, tailgate handle mounted, suction cup mounted or anything that fits your purpose. I have opted for a tailgate handle camera, as this is in my view the neatest looking one and as close to OEM as can get (the D4 has its reversing camera in the same location). As such, I have had to dismantle the tailgate trim to thread the wiring to the GVIF under the passenger seat.
There are a couple of suppliers who sell D3 specific units, which replace one of the numberplate lights with a new moulding, housing the camera and the light (no illumination is lost). Here are the box contents of the one I got:



From left to right, power cable (only 150cm of it!), composite video cable (about 500cm) and camera unit itself (there's no light bulb holder, the existing one fits in the aperture provided).

From having measured the tailgate and broadly thought of the routing the cables would take, it was obvious the power cable needed to be extended. The additional restriction is that the rubber tubing it will thread through at the top of the tailgate is fairly narrow, so I couldn't have used connectors or snaplocks to do the job. So I went the less elegant way of twisting the supplied power cable's bare wires

in with the strands of my extension, tinning the connection and using electrical tape and heatshrink to secure everything better. You need about 130cm of extension:

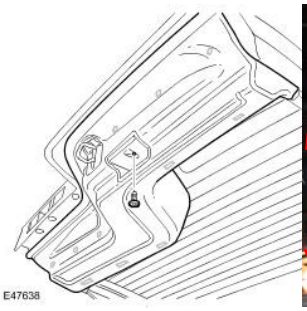



By using thicker cable you also increase the diameter used by the snaplock we'll use to tap into the reversing light +ve. If you go this route, it is advisable to check your connections by doing a continuity test: put one end of the multimeter (set at continuity) inside the hole of black connector at the end of the supplied wire (+ve) making sure there's contact with the inner walls and with the other end of the multimeter touch the end of the red strand of the extension. Do the same with the black end, but using the outer visible metal section of the connector. If there's no continuity (check your meter's manual for how to set it up), the joint is faulty and needs re-doing.

With the upper section of the tailgate open, unscrew the only Philips screw securing the lower trim first:

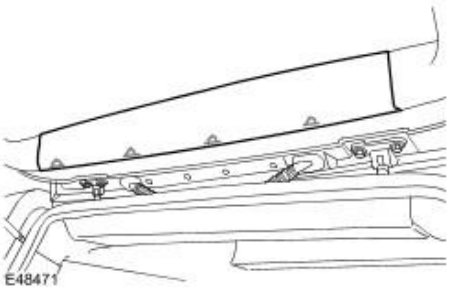


There are 11 clips all around holding the trim; pull out the weather seal carefully from both corners only (three rubber studs on each corner – see above) to give you leverage for removing the clips and gently prise them with your fingers or a plastic tool; remove the plastic surround around the latch to release the panel completely.

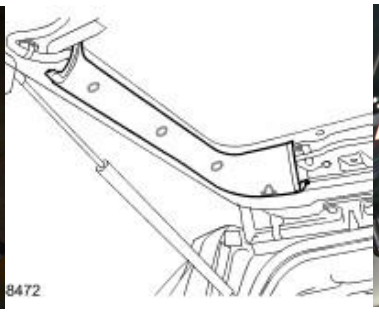
(plastic latch cover, clips location and panel removed)

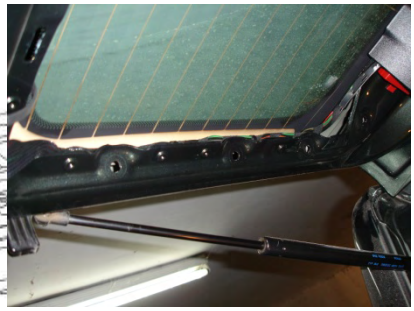
Put it to one side (not in the boot, you'll need room to move in there soon!). Next remove the upper trim panel of the tailgate by again gently prising the 4 clips that hold it in place:



(panel revoved, clips shown and space underneath)

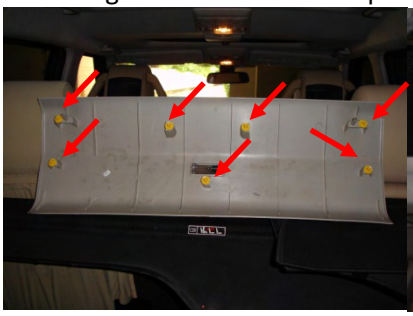
Last, remove the left side trim panel once again held in place by 4 clips (no need to remove the right hand side one):

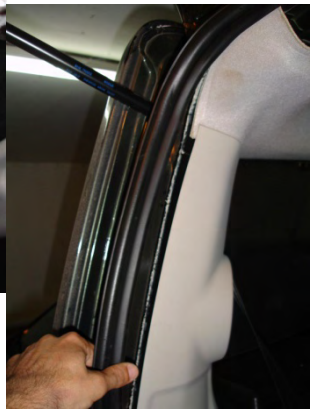




(panel revoved, clips shown and space underneath)

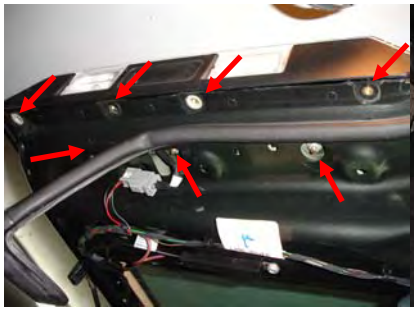
Sitting in the boot, it is now time to remove the ceiling panel that holds the rear light. Again, this is only clipped in place, pull it down to release the seven clips holding it and disconnect (just pull out) the connector to the light. Finally, pull some of the weatherstrip back from the left D-pillar to facilitate cable threading as shown in the last picture:



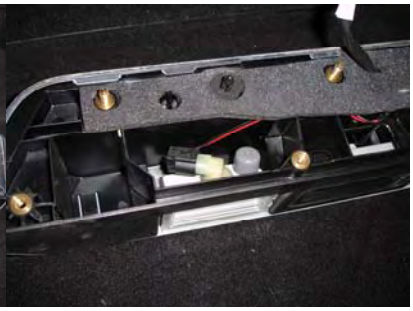


(clips location) (light connector disconnected) (pull from as far forward as you can)

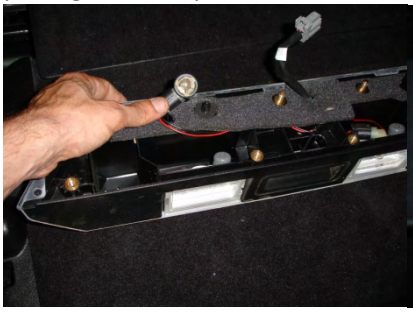
Now to remove the tailgate handle; this is held in place by four T25 torx screws at the lower end and three 10mm bolts recessed in the tailgate itself. There's a single grey connector catering for both the numberplate lights and the upper tailgate opening button/handle. Disconnect this before proceeding by pinching the retaining latch and pulling apart.

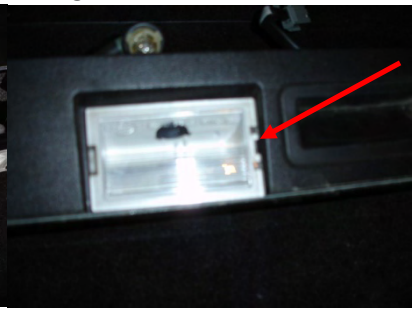

(4 torx at the top and 3 bolts bottom)


(handle and connector removed)


(from this view, it's the left light to remove)

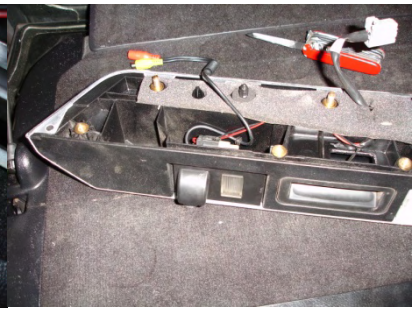
The camera I chose has an aperture to refit the existing bulb holder from the right light (when the handle is fitted to the car, left as you look at the picture above having the handle facing down). To remove the bulb holder, twist counterclockwise holding the holder and connector together and pull up. Once free, you need to prise out the existing white light enclosure, either by pushing it from the inside or, like I did, prising it with a plastic knife from the right:


(bulb holder out)


(prise this end if you chose to do so)

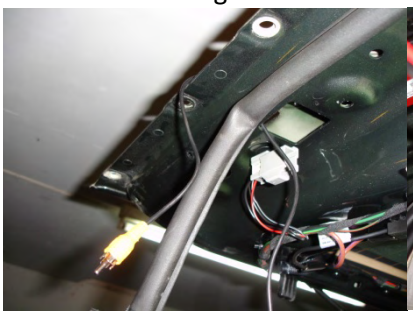
The camera moulding has cuts that will only accept the existing bulb holder in one (correct) position, but I found the cut were slightly smaller than the corresponding notches on the bulb holder. A little gentle filing of the cuts and the job was done! Thread the camera wires and connectors through the opening and fit the enclosure, left side first.

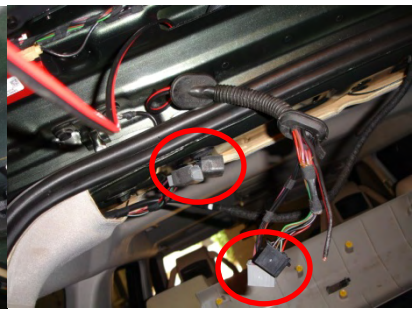

(some filing was needed here)


(and then it's a perfect fit)

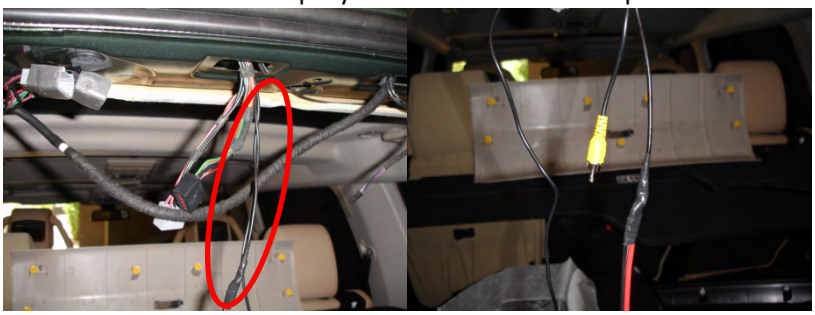
Put the handle to one side for now, the trickiest part is next: we need to thread both the RCA signal cable (yellow connectors) and the camera's –now extended – power cable from the handle location, around the left side of the rear window, through the rubber tube at the top of the tailgate opening, down to the rear light panel we removed, left through the ceiling lining, down behind the D-pillar and behind the jack compartment! Here, the two cables will go their own way, the power through an opening to the rear left light cluster, the RCA cable towards the front of the car, behind the left boot panel, to the GVIF. It's also a good idea at this point to thread through the extension of the GVIF reverse sensing wire (grey), as the cable provided (attached to the connector described earlier) is only about 100cm. You'll need an extension of around 180cm for this.

Take one end of either cable (the procedure is the same for both broadly), and pull about 15-20cm out to where the handle will be refitted. Then go to the top of the tailgate and unhook the rubber grommets at the end of the tube from both the top of the tailgate and the bodywork to give you some more room to work. I also found it useful to disconnect the black and grey connectors that are there, in the body side of the existing harness.

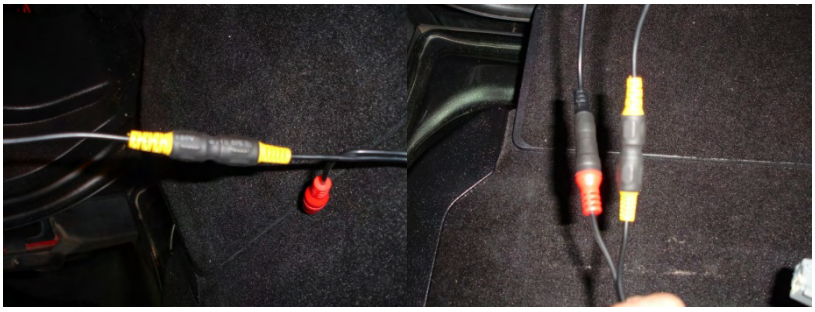

(RCA cable out to handle...)


(...rubber and connectors removed)

I wrapped the other end of the RCA cable with some electrical tape as the outer spades would probably catch the rubber and twisted the tape to created an extended “cone” on which I then sprayed some WD40 to make edging through the TIGHT rubber tube a little easier. Make sure you have the cable where it should be and you start threading correctly before you go at it, won’t be funny if you have to remove and start over! Sprayed some WD40 on the power extension as well and repeated the process.

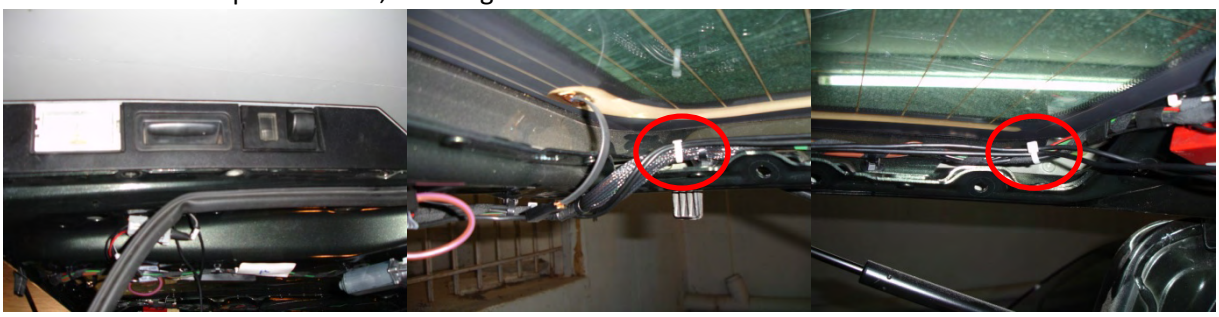

(this is the newly threaded cabling, gently pull most into the boot area – the power cable connection will eventually end up almost inside the rubber tube)

Gently pull most of the excess cabling into the boot area through the rubber tubing, leaving broadly enough to go around the rear window to the tailgate handle. Connect the yellow male RCA end to the female yellow RCA connector of the camera and the black power connector to the red connector of the camera. I used some heatshrink to secure those connections for good measure:



I chose to test at this stage, just to be sure. If you chose to as well, temporarily refit the handle (the outer two 10mm bolts will do), refit the grey connector, refit the black and grey connectors in the roof lining panel if you disconnected them and then throw the cables over the second row seats to reach the GVIF under the passenger seat. I used the power socket at the rear of the centre console to temporarily power the camera and one of the AV inputs to test the image.

Happy it all worked, some tidying of the cables is now in order, so go back to the tailgate, make sure the cables at the handle are all clear of the bodywork (I used a cable tie to secure a length including the heatshrunk connectors inside the handle), and refit the handle fully (4 torx and 3 10mm bolts). Now route the two (video and power) cables to the lower left corner of the window, secure with a cable tie, and move to the top left corner, securing with another cable tie there too.



(cables and gasket clear of bodywork...) (...cable routed to lower left corner...) (...and upper left corner)

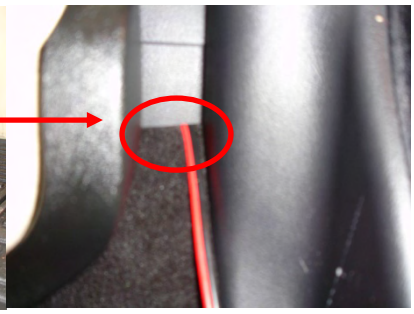
I wrapped some electrical tape where the cable could rub on the antenna and the bodywork to avoid chaffing from vibrations (though in retrospect this looks rather unlikely). Note I tend to use white cable ties when hidden to differentiate from OEM ones for easy removal if needed:

(highlight of potential chaffing spots – add thickness by means of electrical tape)

Then it's just a case of refitting the rubber grommets on the tube (it is IMPORTANT to be sure the grommets have sat properly to avoid water or moisture from accumulating between the roof and headlining) and refitting the tailgate trim in the reverse order of removal. Make sure however you fit the rubber weatherstrip BEFORE refitting the large tailgate trim panel (the one with the 11 clips and screw) to ensure the latter sits properly on the rubber. Your car should now look something like this:

It's now time to thread the remaining cabling through to under the passenger seat. Start by feeding the cables through the headlining to the left and pull out through the opening you made by pulling the weatherstrip off the D-pillar; then pull out the boot trim, enough to allow your hand through (one clip should pop) and feed through there, pulling all the excess out through the rear left cubby:

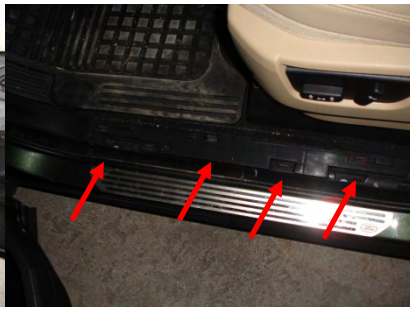
Tuck the cable inside the D-pillar and behind the boot trim, being careful not to catch the clips and refit the boot trim, wetherstrip and light panel in the roof. Then feed the video cable only (leave the power in the cubby hole for now) through to behind the boot trim (my arms are not too long, but could reach to half way at least), and feed/push the end under it where the wheelarch is, then under again at the corner behind the seat and pull the excess through the panel just at the rear of the door, tucking the cable under the boot trim along the way:

The pictures above are showing how I threaded the power cable extension for the GVIF reverse sensing switch, but the process is the same for the camera RCA video cable. It's a good idea to feed this cable from the rear as well as it's easier than doing it the other way around. Leave the end of the reverse sensing power extension in the cubby for now, we will join it up shortly.

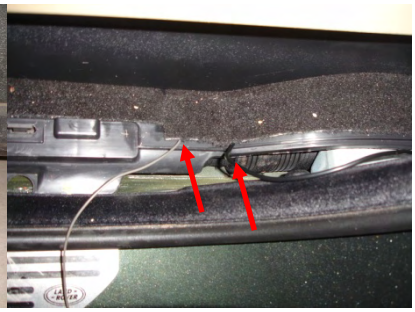
You now need to remove some trim from the kickpanel of the doors, both front and rear passenger side (this is unavoidable as the plastic trim is in one piece but also desirable as we'll work under the front passenger seat as well). Start with the lower trim of the pillar next to the front passnger side under the seatbelt; 4 clips hold it in place, just pull towards the seat and it's out. Next, lift the plastic trim with the LR logo on it until the clips give way. There are from memory 7 clips all together, all of which will give way but remain in the floor panel end (where the OEM wiring harness goes under). It is important you CARFULLY lift those out with some pliers or tweezers, if they fall through it's a real pain to retrieve them. Push them back to the plastic trim for refitting later.


(rear section clips location)

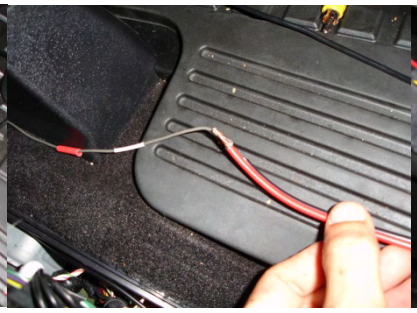

(front section clips location)

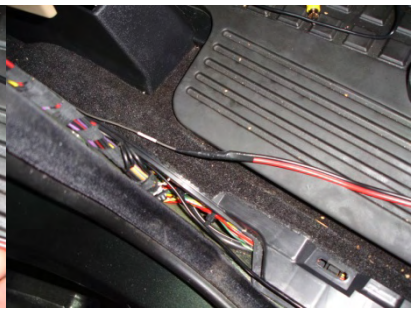
Next, we need to gain access under the front passenger seat trim to thread the video cable and reverse power sensing cable to the GVIF. I found that simply unclipping (1 clip) the black side trim of the seat base front gave me enough clearance to slide my fingers and cables underneath. I fed the GVIF reverse power (grey) cable from under the seat, under the rails and under the carpet (there is a seam under the seat) and the video cable from the outside to under the seat.


(side seat panel trim pulled back)

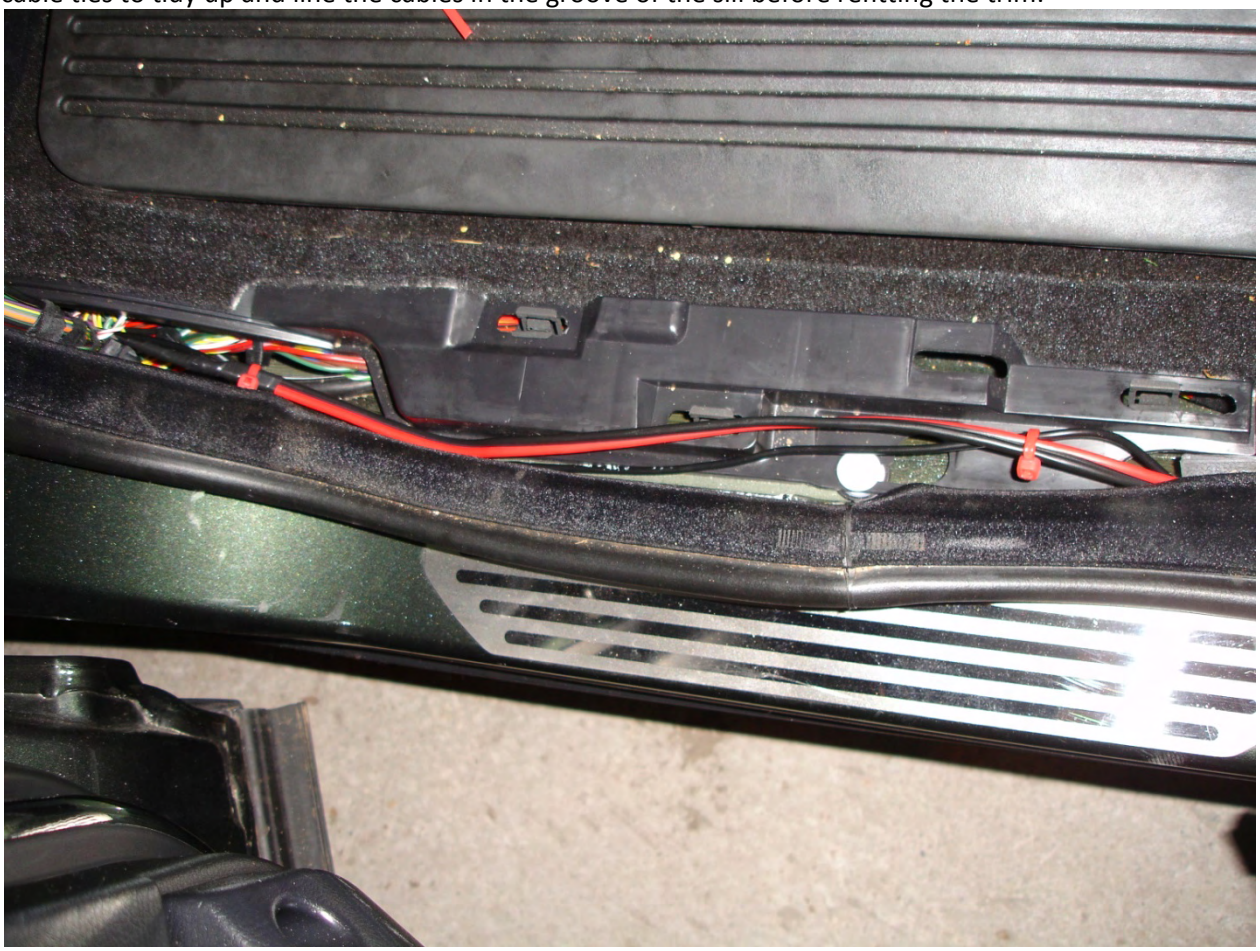

(GVIF reverse power cable and video signal)

To join the GVIF reverse power cable with the extension we fed earlier, I used the same non-elegant way as before of twisting, tinning, heatshrinking and taping to maintain a low profile of the joint for when the trim is refitted:



(GVIF end –grey- and extension from rear twisted and joined)


(heatshrunk and taped)

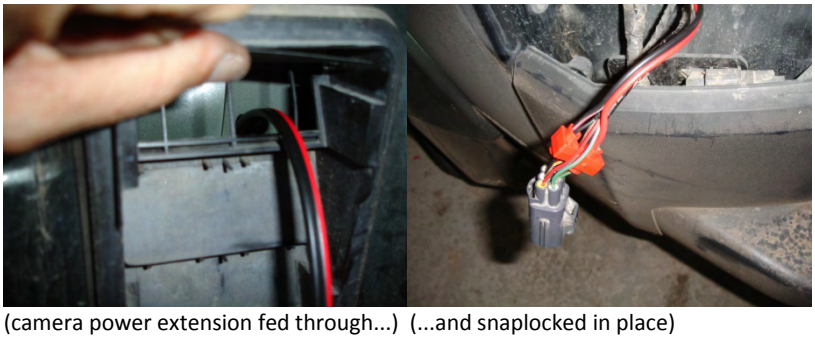
You may notice I threaded a twin power extension here as well, this was done simply because that's what I had to hand but also gives an additional single core line to the boot if needed in the future. The video cable simply plugs into the corresponding input of the GVIF. Once everything is complete, use cable ties to tidy up and line the cables in the groove of the sill before refitting the trim:



Make sure the felt sits properly over the plastic trim all around and refit the seat base black panel and tidy up the cabin, the remaining work is at the boot area.

The last bit to do is to wire up both the camera power and the GVIF reverse power to the reversing light so they can both be triggered automatically when in reverse. We need to remove the rear left light cluster for this, it's primarily clipped on, held by two screws on the bodywork towards the tailgate.

Once you have undone the screws, pull the light cluster backwards to release the holding pins and undo the connector. Put the light to one side and in the wiring that ends in the connector locate the **GREEN** with **BROWN** wire (that's the reverse +ve) and the **ALL BLACK** wire (-ve).
Locate the camera power cable we left in the rear left cubby and thread it through the opening behind the light cluster, under the top flap. To locate this from the inside, I just felt me way with my hand, but be careful not to know anything else out of place! Then using snaplocks, join the red (+ve) wire to the **GREEN** and **BROWN** wire and the black (-ve) to the **ALL BLACK** wire:



(camera power extension fed through...) (...and snaplocked in place)

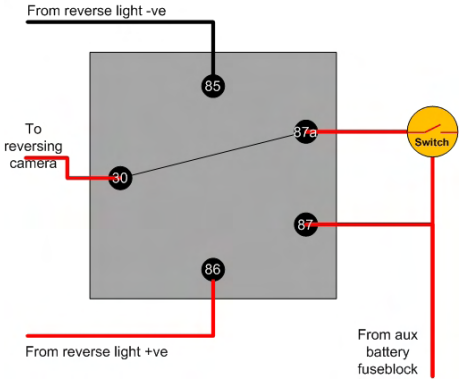
Now locate the power extension cable of the GVIF, thread it through the same hole and snaplock that to the red cable of the camera power cable (you could also join this to the same snaplock used before, but I chose to have them separate for ease of troubleshooting if needed.

Note I shortened and taped the unused black wire from the GVIF power extension for good measure . Tuck the cables as far back as possible, refit the connector to the light cluster and re-assemble everything (the light cluster, boot panels, roof panel, weatherstrips....).

For me, that was it as far as installation goes, I fitted the GVIF with strong double Velcro next to the factory Nav DVD unit (there's a metal plate with enough room to the right), tidied up all cables under the seat with cable ties and connected the RCA cables from my AV inputs to the GVIF. I also connected the audio output from the GVIF to my pre-existing cabling (audio only) from the "inexpensive AV modification" (see "Maintenance & Mods (D3)" on the forum), which I relocated t behind the lower glovebox as I no longer have need to have access to it.

In hindsight, and given I now want to have the ability to see the camera image without putting the car in reverse, I have considered rewiring the power to the camera to be fed by the power socket in the boot. To do this, the process is similar to what is described above, but use only one snaplock to the rear light cluster for the GVIF reverse sensing cable. Feed the camera power cable as described, but instead of threading it through the flat to behind the light cluster, feed it upwards to the aux power socket. Then use snaplocks to tap both +ve and –ve from there. The socket cable and plug is reasonably accessible simply by pulling out the left boot trim as described above. If you (like me) undo the snaplocks, remember to tape over the wires they were attached to, to avoid short-circuits or re-fit the GVIF's cable snaplock where you had joined the camera.

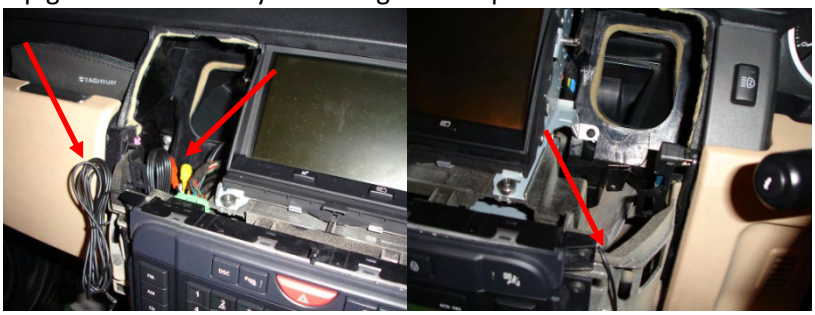
In the end however, I decided to have a slightly more complicated power setup for the camera: as part of another mod I am in the process of making, I wanted the camera to take power either by a switch fitted in the front so I can feed a multiplexer which goes to AV3 of the GVIF, or automatically power up when in reverse. To achieve this, I fitted a 5-blade changeover relay with connections as follows (more on this mod in a different guide):



Part III – Putting everything together and operating

The way we have set up the GVIF, it will power up and operate when the key is in position I. There are a number of settings the user can change by use of the supplied IR remote control, the receiver of which as mentioned above you can either permanently fix as I have done, or plug in temporarily to make all your adjustments and then remove. This is how my dashboard looks when all cables have been tidied away:

Highlighted are the IR receiver and the source switch. I have threaded the IR receiver cable under the passenger seat runners, under the carpet joint and then under the left side of the centre console, simply by tucking it under, then threaded it up the left side of the head unit and HVAC controls (while the H-trim was off). In a similar way I also threaded the RCA AV cable for the DVD, though that went behind the top glovebox. Similarly on the right side I put the switch button cable:



(IR receiver and RCA AV cable) (AV selector switch cable)

Chapter II – DVD player installation

Why have a DVD player? (as opposed to a hard disk/USB media player). I chose the VEBA AV-2705 unit as it features the most versatile options for playing media in my view: conventional DVDs, CDs, almost every type of audio file, almost every type of video file, most common picture files, has enough inputs/outputs for feeding both the GVIF and rear screens while also being able to be used as a pass-through for say an extra TV tuner, and to top, all the above can be done from either of three media: disks (CD/DVD, any FAT and FAT 32 formatted USB drive or any FAT or FAT 32 formatted SD card – though this unit only supports low speed SD cards). Accepting disks is also convenient on the move, in case someone in the car buys say a new DVD that you just have to watch there and then ☺. There are of course many other alternatives including other players supporting a variety of formats.

How much will it cost? The unit in question cost just shy of GBP 90 including delivery, brand new. Given the wealth of choices and form factors, the price range will vary greatly with what you choose to fit...

Any other things to know before proceeding? Nothing too important I think. The connections are quite straight forward, this unit has two +ve power cables (as do most car-specific players I understand), the second being to keep a low draw from a permanent live source for resuming to last position played. Location is another consideration, I chose the upper glovebox at the expense of storage space as I wanted to have access to the slot-loading opening of the unit on the move. This unit comes with approximately 4m worth of cable for the remote receiver, so if you need the space and don't want constant access to the loading slot, then you can place the unit pretty much anywhere (just keep in mind cabling to the GVIF and power sources).

Part I – Removing the upper glovebox.

Tools required: Your hands mostly, you may have use for a plastic blade or flat screwdriver with electrical tape around the business end.
Parts required: None really; you may also want to have a few spare metal clips (part no FYC500040) just in case you lose any and can't find them.

This is relatively simple: remove the left airvent by pulling it out (three of the usual metal clips hold it in place), remove the CD rack from the glovebox by pinching the plastic clips that hold it in place (if you have it), remove the H-trim if it's on and then pull out the glovebox– HARD (there are a number of metal clips holding it in place, eventually they will give way). I found that pulling top and bottom was easier than left and right. Put it to one side for the moment.

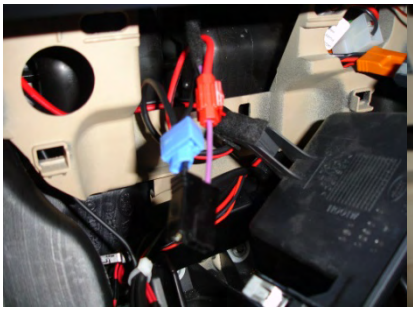
Part II – Preparing the cabling

Tools required: cable stripper, crimping tool, pliers, long reach Phillips screwdriver, drill with 8mm metal drill bit, 20mm hole cutter, soldering iron, electrical tape, heatshrinking tube and about ½ hour for this part. It is always good if a multimeter is to hand, at least for continuity testing.
Parts required: DVD player box contents, 50cm twin 2mm cable (for extending the units' power cable), 3x Lucar connectors (set of male and female), 2x snaplock connectors (blue which fit 1.1-2.6mm cables), cable ties.

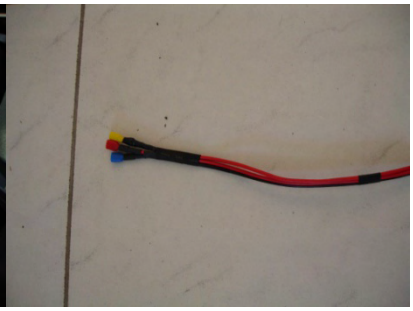
Here's the box contents of my DVD, from left to right: user manual, male-male RCA A/V cable, female RCA to 3.5mm jack A/V cable (for the units' front A/V input which is a minijack – I later found out that the jack connectors are not standard: the video and right (red) poles are swapped, so you need this cable if you plan to plug in a conventional RCA input), IR receiver with cable, DVD player, remote, power cables, mounting brackets, screws and adhesive foam for the IR receiver.

The two looms on the unit itself are the two A/V outputs (one even has an SPDIF digital audio out!!), and one A/V input with the IR sensor plug on it as well. The power loom has three cables: permanent positive (yellow), switched positive (red) and ground (black). I chose to feed power, as mentioned above in the GVIF section, from the left power socket by snaplocking to the purple (switched positive) and the black (negative) wires. This was actually an extension with female spade connectors soldered and crimped at

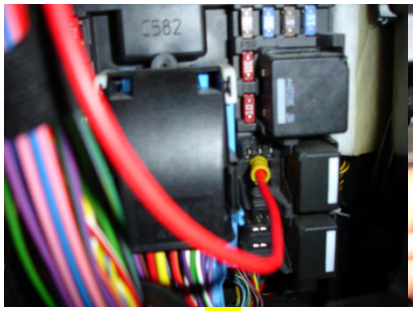
the other end, as I wanted to be able to remove the unit without having to go all the way down to the power socket.


(snaplocks to power socket)


(back behind the panel)


(other end with female spade connectors)

Note the extension also has the yellow permanent connection attached to it, the other end was fitted with a male spade connector to fit into the permanent live empty fuse slot (number F60) on the fuseblock behind the lower glovebox. I then threaded the newly made extension up next to the IHU and HVAC (for the red and black wires) and behind the lower glovebox into the fuseblock (for the wire with the yellow connector).


(permanent positive F60)


(power from the left socket)


(all cables and the RCA to the GVIF)

While I was at it, I threaded the A/V cable down the side of the IHU and HVAC, then pinched it under the lower end of the trim and tucked it under the centre console to the carpet joining, then carefully under the passenger seat rail and connected to the AV1 input of the GVIF (this went to the second A/V output of the DVD unit). I also threaded the headrest screens' RCA input behind the SatNav screen and through to the same area (this went to the first A/V output of the DVD unit).


(headrest screens input panel)

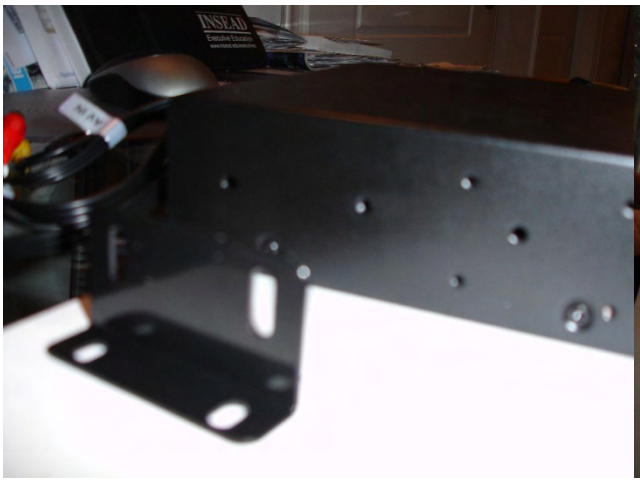

(routing carefully behind the SatNav)


(out the other end for the DVD player)

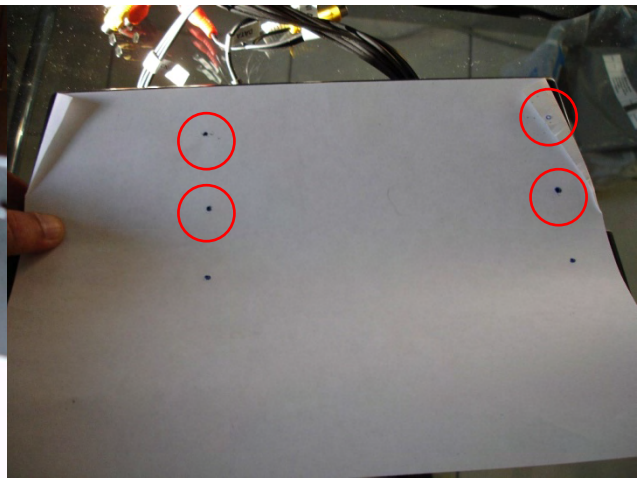
That's the car prepared. Tidy up the cables with cable ties, being particularly careful not to let anything catch on the curved slider mechanism of the lower glovebox on the RHS.

Part III – Fitting the unit to the glovebox

With the glovebox out of the car, I started by making a paper template of the tapered shape (depth-wise), to properly locate the screws that would hold the bracket down (circled, looking from the opening inwards):



(detail of the mounting bracket)



(template for the fixing screws – from the underside of the glovebox)

Then I drilled two holes where the cables would come out from inside the glovebox (I measured exactly the location by placing the unit upside-down from the outside):

(back view of drilled holes)

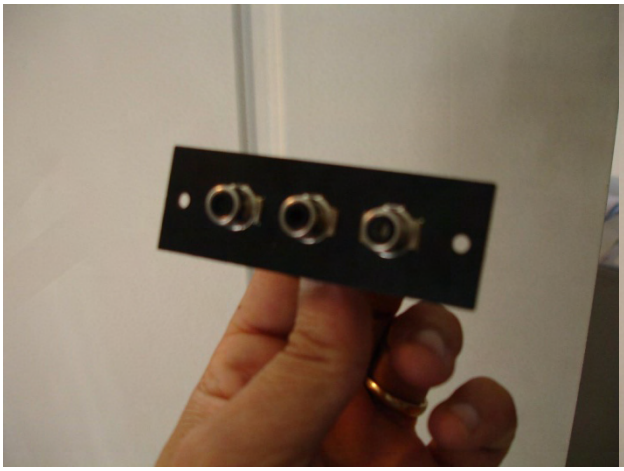
(view from the inside)

The next thing is to fit the brackets to the unit with the supplied screws and fit the unit in the glovebox. I found however there was no way that I could tighten the screws to the glovebox even with an angled screwdriver, so I ended up using the template to drill four little holes at the top of the glovebox, directly over where the bracket screws would be to give a long reach screwdriver room to do its thing. By visual inspection, I figured they wouldn't be visible from even the shortest passenger and it seems I was right!

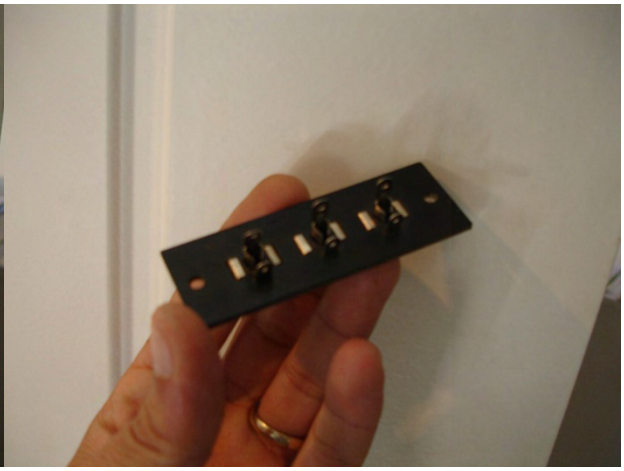
(holes on the top side)

(test fitted – no probs)

While I was at it, I thought of replacing some loose wires I had from a previous mod with a nice panel (these are the SMB-RCA cables used directly on the back of the LR SatNav screen). I got a little panel and drilled holes for the plugs. I also got some single RCA plugs to bring one of the GVIF inputs in the glovebox at a later stage, which I fitted now but not yet wired:



(front view)

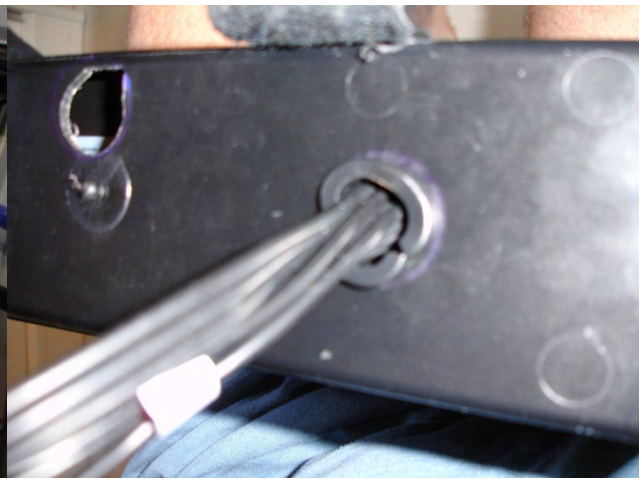


(rear view)

(RCA video panel...)

(...and RCA plugs fitted)


(back side of the glovebox)

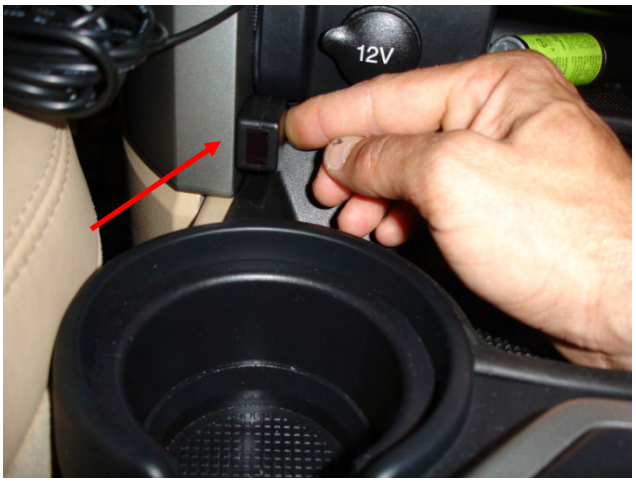

(main loom of the unit – note rubber grommet)

Once all holes are drilled, just push the unit's cabling through and take to the car. I used rubber grommets for both sets of wires (one shown above is the main AV and remote control plugs, the other is the power cables on my unit). I also soldered male spade connectors to the power cables to match the cabling waiting in the car and covered the protruding screw tips with LOTS of tape to avoid them catching on anything they shouldn't (though in hindsight that's not necessary):


(male spade connectors to unit's power cables)


(screw tips covered with tape – underside of glovebox)

At this stage I realised I had not threaded the cable for the IR remote supplied, which I wanted to fit next to the left power socket. As it's quite chunky, I had to thread its cable upwards to the left of the HVAC and IHU (with the H-Trim removed) and route to the same spot the AV cables from the GVIF were waiting – this was a real PITA to complete as there are other LR cables in the way – be prepared for lots of swearing and cuts! I also used a jumbo paperclip bent as a hook to help with "fishing" it from the top side.



(IR remote receiver – sticks with adhesive pad)

Now that everything is in place, it's simply a question of connecting to the unit, tidying the cables so they're not in the way and refitting the glovebox – this involves making sure all metal clips are in their place and simply pushing back in until it locks securely. I found it easier to have the lower glovebox fully open (pinch the two plastic runners that hold it open to fully lower it down), so I could reach from below and pull back the cables as the upper glovebox was being put in place. The last thing is to put the left airvent cover back on as well and that's it. Here's how mine looks with all the other paraphernalia that lives in there ☺: