

Land Rover

Discovery 3

Inexpensive AV Modification

An installation guide to
inexpensively add any AV
source to the Discovery III

A www.disco3.co.uk resource

Version 1.0

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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.

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Introduction

This has been discussed on a number of threads and I'm not trying to re-invent the wheel here, just thought I'd put everything in one place for future reference. I acknowledge the majority of the procedures are not my own invention and credit is due to the forum members who have posted contributions in a number of threads. The pictures are all from my installation (unless otherwise acknowledged) on a UK spec MY 08 HSE, but item locations and or fixings may vary depending on spec.

Please note that I am simply an enthusiast, with no training at all in electrical or mechanical engineering and some of the methods and processes I have used may not be best practice by a long shot.

Why have an auxiliary AV input: well, for me it was a combination of simply being able to have it relatively cheaply, future-proofing in case I ever get my longing wish come true of getting to tow my own RIB (a wide-angle reversing camera on the rear windscreen) and a handy way to show stuff to your passenger on a large enough screen - while stationary of course ;-)

How much will it cost: well, I couldn't tell you exactly how much as I happened to have quite a few of the parts (and tools) required, but I would hazard a guess of around GBP 20-30 on parts alone if you buy everything from scratch and already have the tools to do the job.

There are two distinct parts to this mod: tapping into the unused video inputs of the factory screen in the dashboard and tapping into the auxiliary audio feed which exists in most Discovery 3 HSE and ends up in the rear of the centre console in the form of a female AUX 3.5mm jack.

Part I – video feed:

Tools required: patience, time (total of about two-three hours including fishing out retaining clips :shock: and coffee/tea breaks – more if you decide to have a beer as well), Phillips screw driver, soldering gun, thick pliers, needle-nose pliers, cable stripper and heatshrink (optional) – oh and did I mention patience?
 Parts required: SMB female plug, RCA female plug, length to your requirements of RG174 (or RG316) coaxial cable (length depends on where your video source will be located, for glovebox installations for example, 0.5-0.8m should be plenty no matter how it's routed there).

I managed to get hold of the female SMB locally, but if you do a search for “fakra” or “SMB” there's at least one thread that goes in detail with supplier suggestions. I believe there has also been at least two group buys of a ready-made version of what I ended up fabricating.

Here's the SMB plug bits:



Assembling this connector is a real pain due to its small size and the thickness of the cable involved. My fingers are not too fat, but after I finished I swore it would be worth a few extra coins to buy one partly ready-made (which I did for the second and third video input). Forum member hensoni was particularly helpful in guiding me through how to go about crimping and fitting the plug, his post is on this page: <http://www.disco3.co.uk/forum/topic6915.html?start=60>

If you have printed this off, here's a quote of that post, but if you're not in the electrical business (as I am not), I recommend you read the entire conversation on that page (as I have several times !!!).

“These connectors are designed to be crimped using two reasonably specialist tools but you can make a good job of it with solder. Under no circumstances use a 'conventional' crimper because you will crush the dielectric (the insulation bit between the core and the screen).

In time honoured tradition - read all below before trying! These connectors do not give you a second chance!

Rather than a blunt pair of pliers, use a nice sharp craft knife for your trimming

To assemble correctly, you need to push the tail ferrule over the outer covering, then strip the jacket back 10mm - you should now have 10mm of screen visible (and hopefully, no loose strands...). Gently tease out the cross-braiding so that it looks like a chimney brush (sorry, can't think of a better analogy).

Now trim the loose braid back 5mm (so that it would stop 5mm short of the cut end).

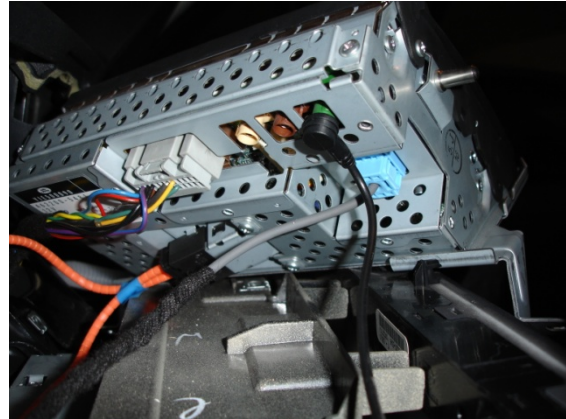
You now need to trim the dielectric to fit in the central contact. When crimping, you only need 3mm but for soldering, you just need to be certain that you don't melt the dielectric and cause a resistance change in the dielectric. The central conductor will be made from very thin cable cores, so real care is required.

When assembling the plug, the central contact should locate in the barrel, the dielectric should slot into the back (thereby preventing a short circuit) and the screen should butt nicely against the shoulder. The ferrule then slides down over the screen and would normally be crimped into position to provide an electrical connection and provide a strain relief.

As long as you are careful, you can solder the screen to the knurled barrel and then slide the ferrule over the top and solder again. Don't get it too hot as you will ruin the dielectric."

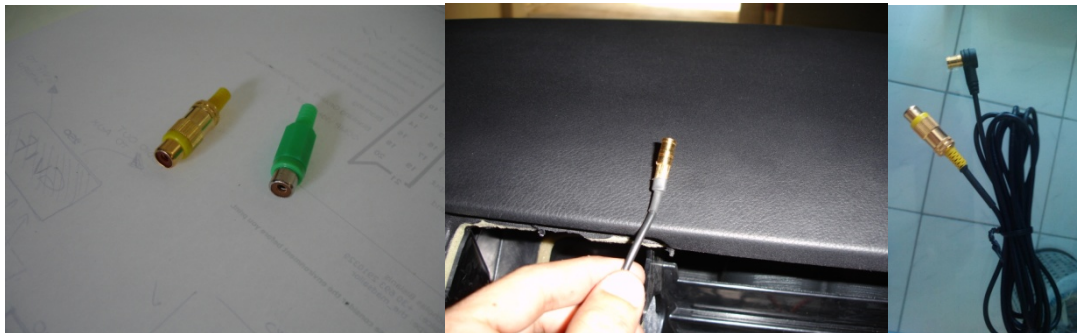
As I did not have the special hexagonal crimping tool I soldered the cross braided screen and used a pair of thick pliers to gently "crimp" the outer jacket.

This plug is a perfect fit for any of the three unused video inputs on the back of the factory SatNav screen which are: **Green**: TV/DVD, **Brown**: Companion Cam (aka Venture Cam, an option only available on FFRR) and **Tan**: Reversing Cam:



(cable fed through the lower glove box opening and rear view of the SatNav screen removed from the dashboard with the TV/DVD cable already plugged in)

The other end of the cable is fitted with a standard female RCA plug to accept the video source. (I've used the Green one for my fabricated cable, the gold & yellow for the ready-made male-female SMB cable I bought (having chopped off the male end).



(RCA jacks, completed home made SMB plug and partly ready-made version)

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.

To access the rear of the SatNav screen, you first need to take the H-panel off, 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.

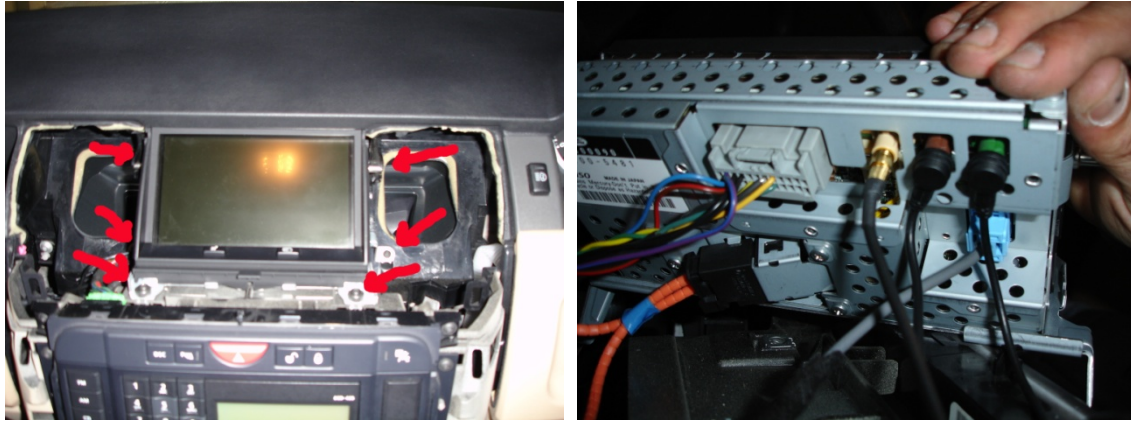


(this is where the clips should be, they're on now)



(this is the clip in question)

Now the dash panel is off, you will need to unscrew the four Philips screws (four lower arrows in the picture) retaining the screen to the dashboard (be careful not to drop them inside the dashboard, they're almost impossible to retrieve if you do!) and gently pull it toward the cabin to release the two horizontal clipped studs (two upper arrows in the picture). Then tilt the top of the screen backwards a little and wiggle it out of place by pulling gently towards the cabin. You don't need to pull it out completely, just enough to reach, feel the male connectors and plug the female SMB connector in your chosen input. Be gentle as there's also fibre optics attached in the back which don't react too well to tension!



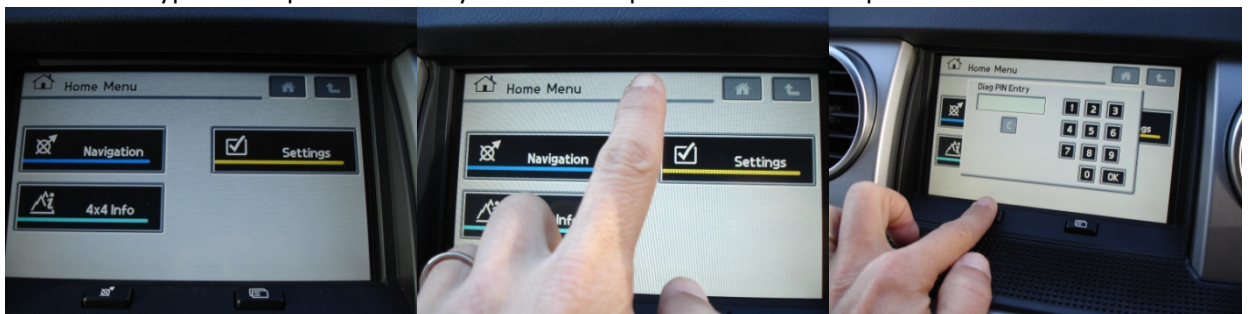
(location of the screws to be removed and studs to be unclipped and view of all inputs occupied)

I have threaded the cables down to the left of the left air vent and through to the lower glovebox; the opening left even when it's closed leaves plenty of room for the cables. In time, I may find the courage to thread them to the upper glovebox, drilling it's inner lining and have them there for access.

That's about it for the video part, before reassembling completely, it may be a good idea to test the connections by attaching your chosen video source to all the video inputs you have used and confirm you can see the picture. To do that, put the screen loosely back in it's place, making sure all connections are intact, insert the key in the ignition a turn it to position II.

This process is what you will have to do every time you want to watch any of your video feeds.

On your screen, press the home button (right hand side) and once the menu "Navigation", "4x4 Info" and "Settings" appears press the top middle of the screen for about 5 seconds (there is a invisible button there). Nothing will happen at this point, immediately upon releasing the screen press the left hand hard button for another 5 seconds or so, until a dialog "Diag PIN Entry" appears on the screen with a numerical keypad for input. The code you want to input is **753** and then press OK.



(from this screen, press the top middle for 5-6 seconds, then the left hard button until the keypad appears)

You will now be presented with the built in diagnostics screen menu, one of which is “Video Inputs Test”. Press that. Now each of the three inputs on the back of your screen is available to “test” (or view in our case) by pressing the corresponding icon.



Note that depending on your input source, you may need to press the PAL and/or WIDE1/WIDE2 option at the bottom left of the screen to view the picture properly. In my car, the system defaults to NTSC in 4:3 format, but I've set my Zen to PAL (and its video output is widescreen). I simply tap the “PAL” icon (bottom left) and the “WIDE 1” next to it.



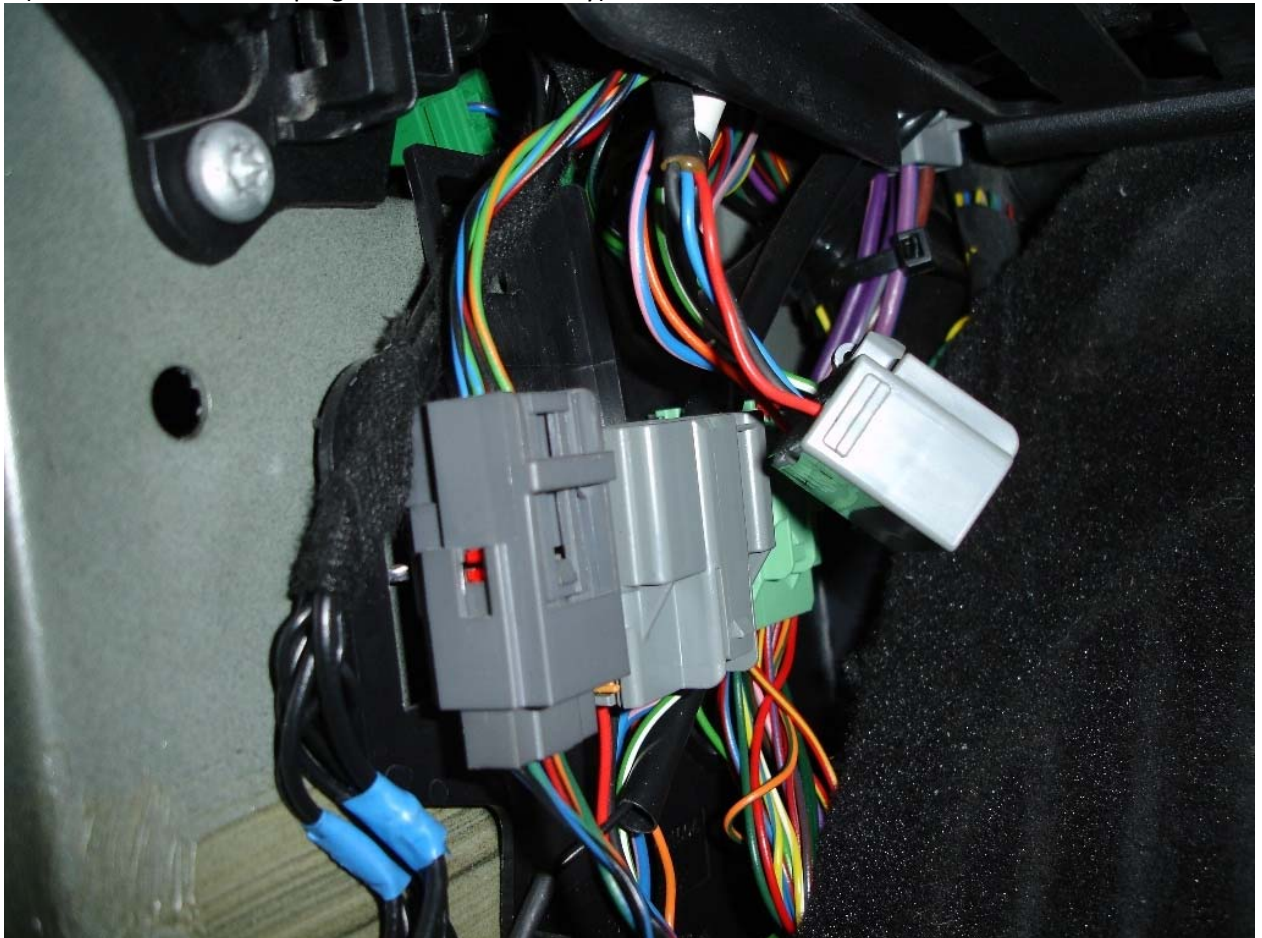
Once you are happy you get the picture on your chosen input(s), you can now re-assemble the dashboard by following the reverse order you dismantled it.

Part II – audio feed:

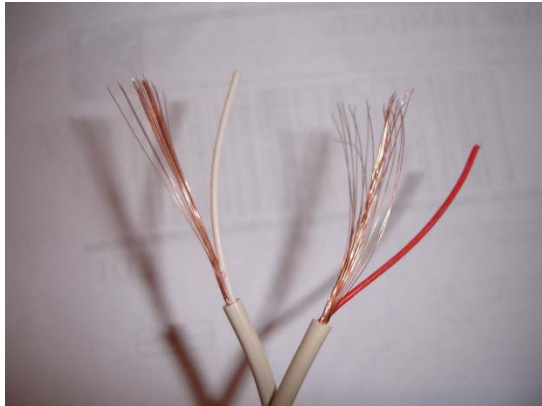
Tools required: patience, time (total of about an hour including coffee/tea breaks – more if you decide to have a beer as well :lol:), T20 Torx screw driver, soldering gun, thick pliers, needle-nose pliers, hacksaw, metal file (or a Dremel tool instead of the latter two), cable stripper and heatshrink (optional).

Parts required: RCA male to minijack cable, length to your requirements, depending on where your audio source will be located, but for glovebox installations for example, 0.5-0.8m should be plenty no matter how it's routed there. I have been unable to find a RCA female to minijack version but if you can source one use that, alternatively you will also need two female-female RCA adaptors. I also used some small spade connectors I had left over from the FBH timer mod but you could do away with those if you are confident with your tinning or choose to tap into the wires directly (as opposed to the connector like I did).

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 is very handy for plugging in your MP3 player or any audio source you care to listen to in the cabin. The drawback is there's a cable showing and most importantly it's more for the rear passengers to use given its location. Thankfully, the 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):

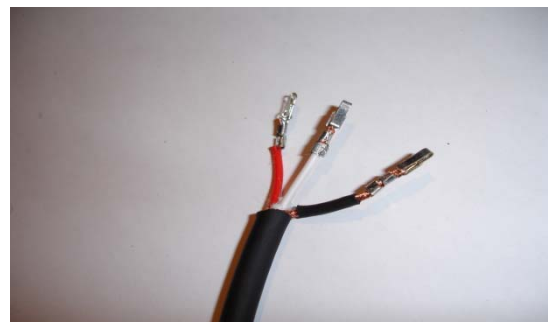


The plug in question has two sections to it, we need the one with the red, blue and black wires. These are : **RED:** right channel, **BLUE:** left channel, **BLACK:** ground. Get your RCA-minijack cable, chop of the minijack (keep this it will be needed later!) and strip the insulation. You'll end up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

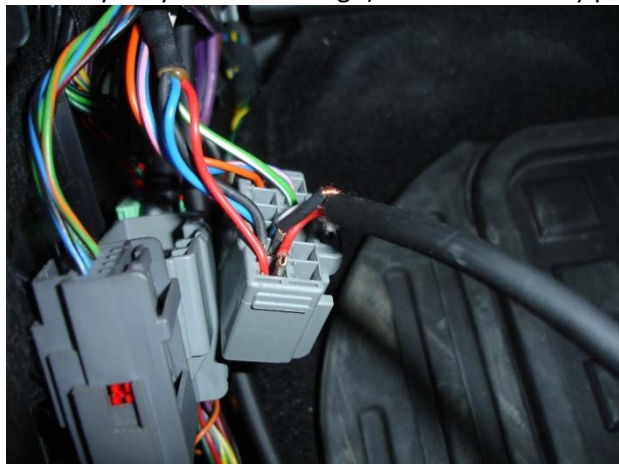


Strip both the white and red cables and twist both grounding cables into one and you'll end up with something like the second picture (I've gone an extra step and insulated part of the ground with some heatshrink).

At this point I considered using some snaplock connectors but found that the cables were too thin, even for the smallest connectors I found locally:



So I reverted to using some leftover spade connectors I had left from another project and crimped those to the ends. 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:



That's about it, you can refit the kickpanel, screw in the bonnet release handle and tidy up the cables wherever you have chosen to keep them.

Further refinements:

I was pretty happy with the end result, bar the fact I didn't like having the cables loose in the glovebox. Inspired by how the Land Rover Audio Connectivity Module looks, I set about to try to replicate the looks. Initially, I thought of gluing the existing input connectors I had into a box and leave it at that. I occurred to me however it may be simpler to use an old Scart-composite adaptor I had, which it was!!!

I used one of my SMB-RCA cables, removed the RCA end and bought some new twin channel audio cable. Got a general construction box 8x5x3cm and cut it to size of the Scart connector:

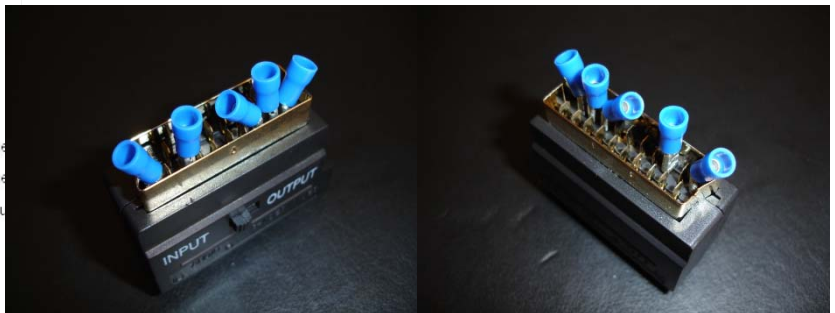


I then ground down the lip on the lid, the input/output selector on the scart adaptor (so that it fits flush in the box) and drilled a hole for the cables in the back of the box (and put a grommet to protect them from rubbing):

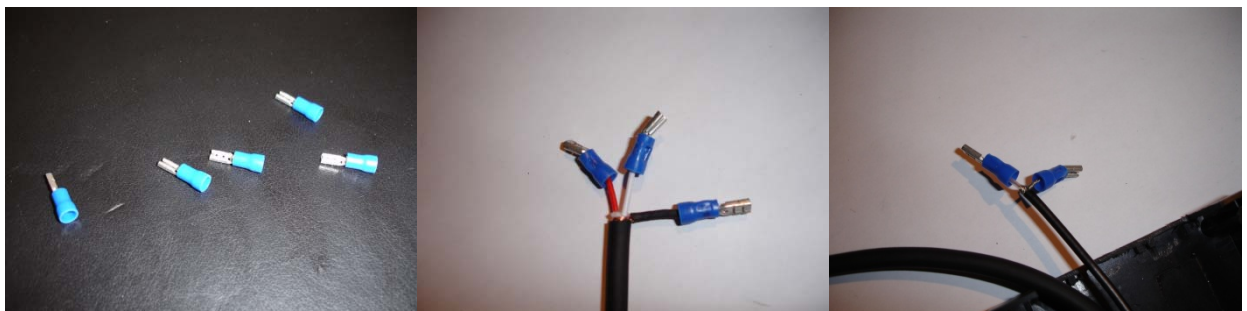


Having found the pinout of the scart connector protocol, I simply had to choose whether to use the input or output pins: I opted for input, which are pins 2, 4, 6, 17 and 20 (though some, like my first test connector have composite video ground on pin 18).

Audio Output B	1	2	Audio Input B
Audio Output A	3	4	Audio Ground
Blue Ground	5	6	Audio Input A
Blue	7	8	Function Switching
Green Ground	9	10	Communication data line
Green	11	12	Communication data line
Red Ground	13	14	Communication data Ground
Red	15	16	Blanking
CCMP Video Ground	17	18	Blanking Ground
CCMP Video Output	19	20	CCMP Video Input
Common Ground	21		



As the picture above shows, the connection was made with Lucar type female crimp connectors, in which I crimped the corresponding wires from both the twin channel audio and RG174 cable:



When I fitted them to the scart pins, I heatshrunk around the metal connector part to avoid contact from vibrations as they are spaced quite tightly:



The last bit is to hot-glove or epoxy-glove the connector in the aperture of the box we cut earlier and the "loom" is now finished:

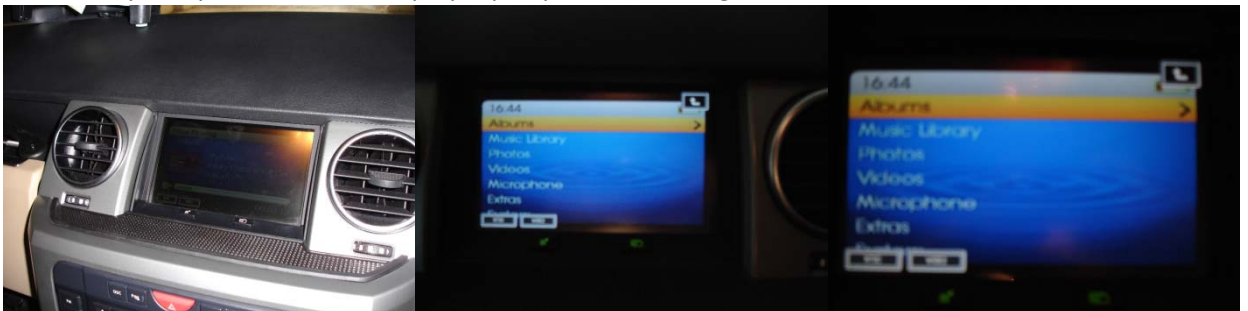


Connections are as described above and I think the overall result looks quite good:



I used industrial Velcro to stick it to the glovebox, male stuck on the connector, female stuck on the glovebox, as the felt lining of the glovebox won't hold the male Velcro directly.

The end result is I can now attach any AV source easily and all tucked away neatly. And I can always remove the whole modification without any signs it was ever there. The cable in the second picture above is from an old Nokia N95 (part of the boxed contents), which has an AV output built in but I discovered it can also be used on the AV output from a Creative Vision:M! (some manufacturers swap the poles of left audio, right audio and video on the 3.5mm jack to force you buying their own cables). Of course, any composite source will play equally well, including iPod/iPhone etc.



(pics a little fuzzy!)

I was really pleased in the end, more so because I made most of the components myself and the outcome looks neat. Keying in the code every time to watch takes only a few seconds and the audio works really well.

I hope you enjoyed reading!