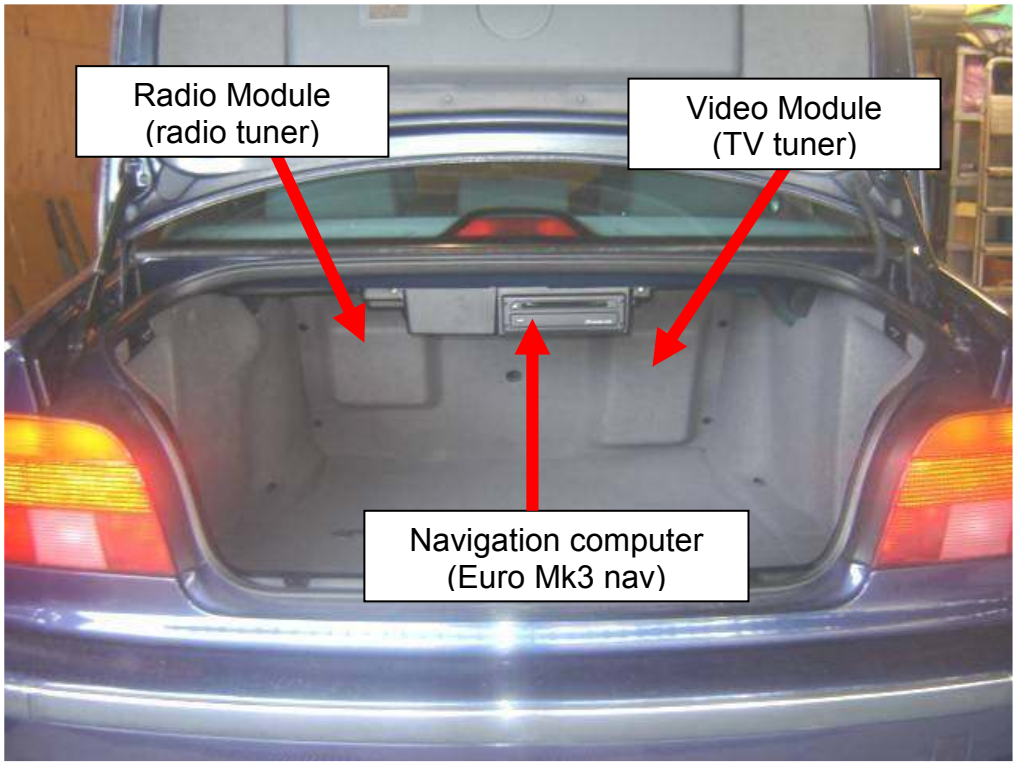
Converting BMW E39 Japanese Nav system to Euro Nav System

Making the nav work in NZ (or Australia/Malaysia/UK etc)

NOTE:
These instructions work equally well for the E38 7-series, as the vehicle is electrically identical to the E39 as far as the audio/nav system goes.

LOCATION OF MODULES

Here's the author's 1997 E39 540i boot:
In this photo the nav unit has already been replaced. The vehicle currently has a Mk3 Euro nav unit fitted.



Note the location of the various modules

PREPARATION

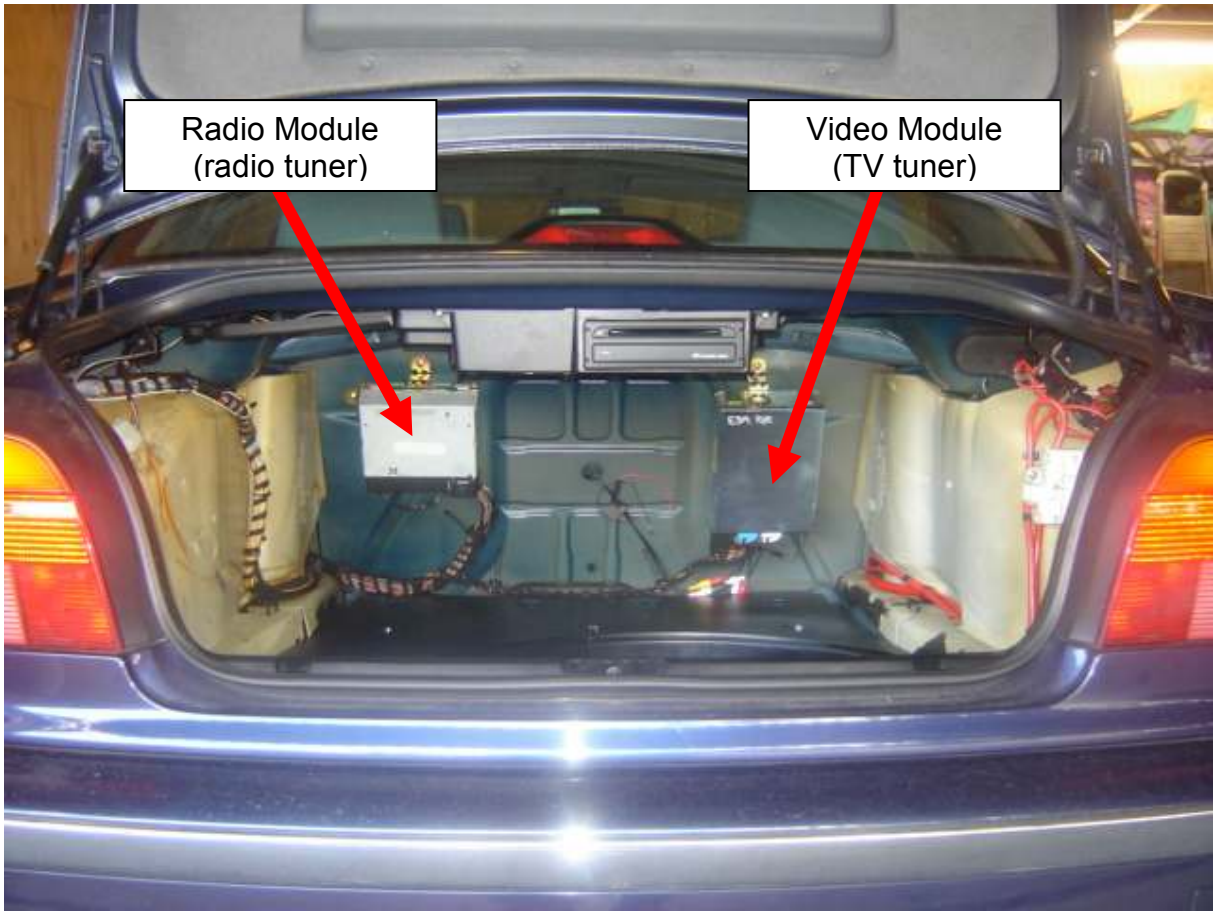
Make sure you have the following parts available:

1. Mk3 or Mk4 Euro nav unit
2. Purple and Blue connectors for nav unit
3. NavCoder software + interface to program the nav unit
4. Replacement post Sep-98 video module if your car was manufactured prior to Sep-98
5. Replacement radio module (if desired)
6. NZ map disc

To prepare to work on the car:

1. Disconnect the vehicle battery
2. Remove boot floor by lifting and removing
3. Remove battery access panel by removing 3 x plastic rivets (lift up with 2 x flat-head screwdrivers or use a proper plastic rivet extraction tool)
4. Remove CD changer access panel by removing 3 x plastic rivets
5. Remove 1 x plastic rivet on the top rear of each side trim panel
6. Remove centre plug in trim behind rear seat. Open armrest, remove leather cover, lift up sound dampener and pop out the plastic plug
7. Lift the whole liner out as one single piece (in a U shape). It can be angled under the navigation unit.

Here's what you should see:



If you look carefully you will see the author has a (temporary) AV-in connection plugged in to the video module. This is my iPod connection to play movies on the AV in of the TV. After I took this photo I ran permanent AV cables to above the glove box.

The above picture shows a car that has had the Jap radio module removed, and a Euro BM24 Professional RDS tuner fitted. The BM24 is the best tuner you can get.

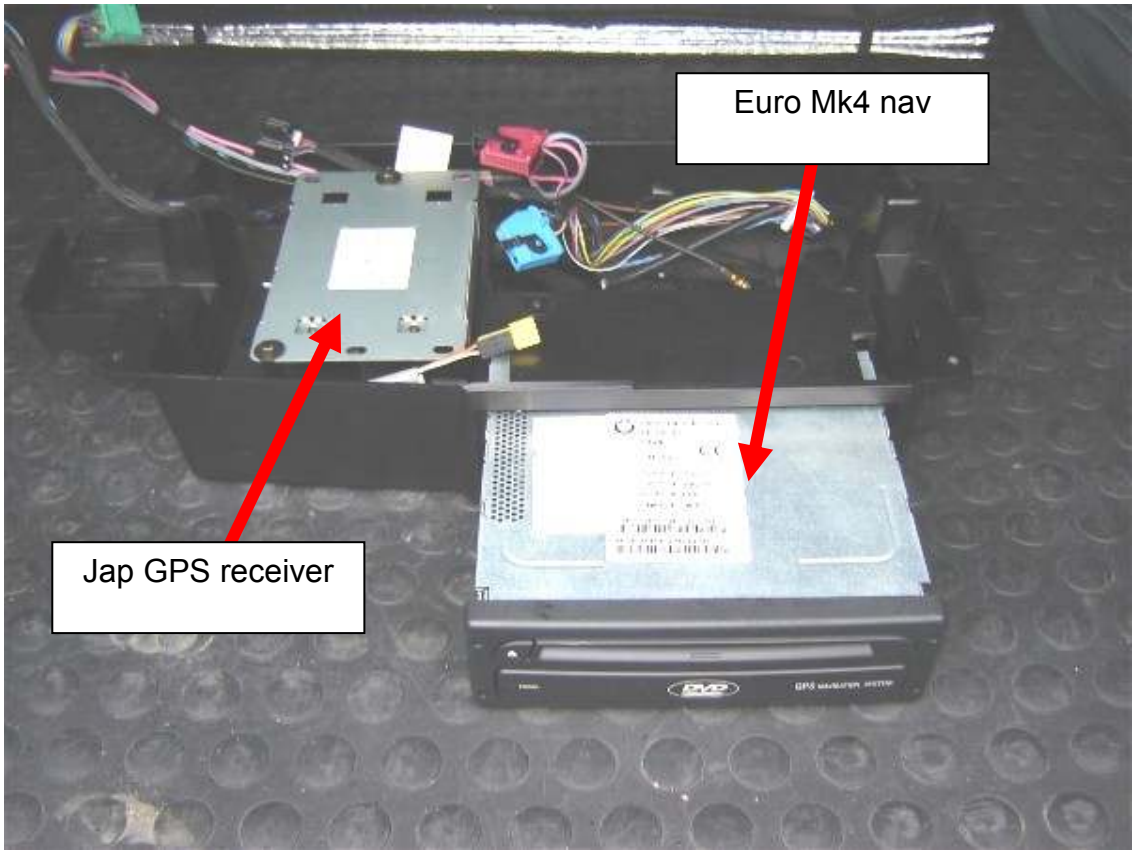
The above picture also shows the video module has been replaced. This was necessary as the car pictured was built in March 1997, and had the old Mk1 video module. The old Mk1 video module is not compatible with the Mk3 or Mk4 nav units, so had to be replaced with a newer video module made after Sep 1998.

Prepare the car further by

1. Refit the boot floor to act as a work surface. Place newspapers on the floor to keep it clean.
2. Remove the Jap nav unit. Insert standard DIN radio removal tools or 4 x drillbits/welding rod/ screwdrivers etc into the 4 x holes to release the retaining clips. Slide the Jap nav unit out, unplug, and discard.
3. Lower the nav unit mount by loosening the two rear bolts and removing the two front bolts. Slide the nav bracket towards you and lower onto work surface. You'll need to unplug the boot light – you'll see this when the unit is lowered.

NAV UNIT AND GPS RECEIVER IN NAV BRACKET

Here's a pic of the nav bracket lowered onto the boot floor. In this photo you can see a Euro Mk4 (DVD) nav being fitted:



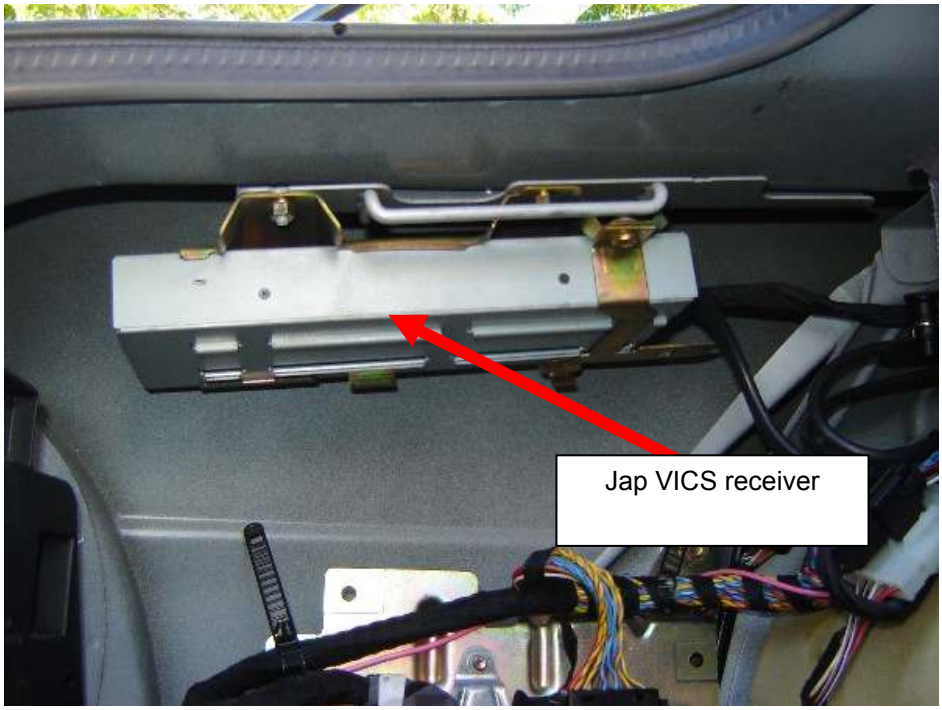
Remove the GPS receiver and place to one side. You may need it (details later).
You'll also end up with 2 x spare black bolts. Keep these – they may come in handy in the future.

Note that sometimes the Euro nav will be tight inside the plastic nav bracket. I've had to get a sharp knife and a file out occasionally to cut/file down the plastic ridges on the bracket to allow the nav to slide in nicely. Do a trial fit before you are ready to re-assemble.

VICS RECEIVER

Now you can remove and discard the VICS receiver. The VICS receiver is a Japanese traffic information receiver, not used in New Zealand, as only Japan uses the VICS system. And it only can interact with the Jap Alpine nav unit. So it is a waste of space in NZ.

The VICS receiver is mounted above the CD changer and Amplifier, underneath the body panel, on the left-hand side of the boot.



The VICS receiver is powered and connected to the Japanese nav unit directly – so when you remove the Jap nav unit, you will see the cable loom that goes from the nav to the VICS receiver. Remove and discard this loom at the same time you remove the VICS receiver.

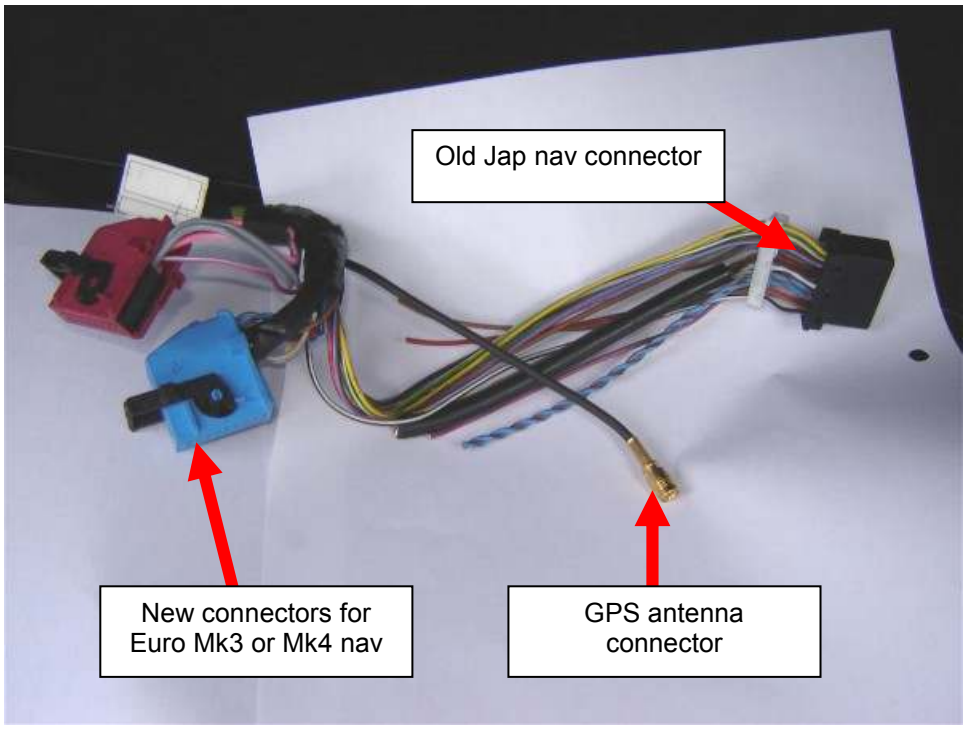
The VICS is also connected in series with the radio's antenna cable. The VICS receiver can be unplugged, and the radio antenna cable plugged together (otherwise the radio has no antenna connection)

Keep the VICS bracket in place; it can be used for a future telephone addition, if desired.

Here's what you should have left:

WIRING THE EURO NAV UNIT

Now you are ready to commence wiring.



You will be fitting the purple and blue connectors pictured above.

In the above picture – which was from the very first car – we cut the cables about 6 inches back from the Jap nav connector.

This was the first car converted. We left some wire attached to the old connector 'just in case'. That is not necessary, and I never did this on other cars. Just cut the wires individually where they enter the Japanese connector to make the new connector fitting nice and neat.

NEW WIRES REQUIRED

You will need to run at least one, maybe two new wires.

Reverse Signal RFL
Run a wire from the nav unit, along the wiring loom, behind the amplifier and CD changer (remove them for easy running of the cable) to the left-hand taillight wiring. Connect to the reverse light wire – see wiring table for colour.

Wheel Pulse DFAVL
Check to see if the car has EDC – it will have an EDC button under the climate control unit if it does. If the car has EDC, run a second wire from the nav unit, along the wiring loom behind the amplifier, across the rear of the car (remove the rear plastic trim panel), past the battery, to the wiring loom on the wheel arch above the battery. Here you can connect to the DFAVL signal (which goes to the EDC control unit). DFAVL is the instantaneous wheel speed pulse signal, output from the ABS/DSC unit.

If the car does not have EDC, you can decide whether you want maximum GPS accuracy, or whether you'll try the averaged speedo output TAA signal (good accuracy, but RFAVL is best). If you have no EDC, you need to run a new wire to the ABS unit (either behind the glove box or in the engine bay) to access the DFAVL signal. This is a pain.

Otherwise, use the TAA – which is already present in the Jap wiring loom at the nav unit. Much easier.

Now fit the purple and blue Euro nav connectors as per the following wiring table:

NAVIGATION UNIT CONNECTIONS

Jap Navigation Computer		Jap Wire Colour	Signal Name & description	Euro Navigation Computer	
Connector	**Pin**			**Connector**	**Pin**
			Dead-reckoning input signals		
New wire required, connect to white/yellow wire on left-hand taillight cable			RFL – reverse light (+12V in reverse, 0V in any other gear)	Violet	1
Black 20p	9	Violet/red (sometimes violet/white)	R – terminal R, Pos1 ignition (+12V when key in pos1)	Violet	3
Black 20p	20	Black/white (TAA) or run new wire to DFAVL wire	TAA – averaged speedo speed pulse DFAVL – instantaneous wheel pulse, left front wheel Note: see comment regarding use of TAA or DFAVL signals	Violet	10
			Power and ibus signals		
Black 20p	10	Red/green	30 – terminal 30, permanent +12V	Blue	1
Black 20p	19	Brown	31 – terminal 31, ground	Blue	10
Black 20p	8	White/grey/yellow	I-BUS – ibus data bus	Blue	3
			Video signals		
Black 20p	5	Red	R75 – red video	Blue	4
Black 20p	6	Grey (sometimes brown)	G75 – green video	Blue	8
Black 20p	7	Black	B75 – blue video	Blue	13
Black 20p	16	White (sometimes orange)	SYNC – video sync	Blue	17
Black 20p	15	Shield	RGBGND – video cable shield (ground)	Blue	15
			Audio signal		
Black 20p	17	Blue/red	VOICE – voice signal	Blue	9
Black 20p	18	Blue/brown	VOICEGND – voice ground	Blue	18

Note:
RFL – reverse signal: this wire does not exist in the Jap system wiring loom. A new wire must be run from nav unit to taillights. Join new wire (solder) to white/yellow wire on left-hand taillight assembly cable loom. White/yellow is the reverse light wire.

All other Japanese wires in the old Japanese nav connector go to the Japanese GPS receiver. The GPS receiver can be removed and discarded (not needed). The unused Japanese wires can be tied back, or removed from the loom.

Wheel Speed Pulse Signal – TAA or DFAVL?
The nav will be more accurate if it uses the instantaneous DFAVL front left wheel speed pulse signal rather than the averaged TAA signal present in the Jap wiring loom. DFAVL presents a higher pulse-per-revolution than the TAA signal, and responds much faster to actual changes in vehicle speed.

The original European wiring loom uses the DFAVL signal for the nav.

If the vehicle has EDC (electronic damper control) then the DFAVL signal is readily available in the boot.

To connect to the DFAVL run a new wire from the nav unit, across the rear of the car to the EDC unit wiring loom. The EDC unit is bolted to a bracket beside and above the battery.

DFAVL is a **yellow/red** wire (yellow with red stripe). You'll find this wire in the main wiring loom above the right-hand wheel arch; this is the easiest location to join to the DFAVL signal.

If no EDC is fitted, then the wire must be run to the ASC/DSC unit under the glovebox or in the engine bay (depending on age of car). As this is quite involved, it is simpler in a car with no EDC to use the TAA signal (black wire with white stripe, in the Jap nav wiring loom).

GPS ANTENNA CONNECTION

Most E39s will have the same GPS antenna connector on the Jap GPS antenna cable, and it will connect directly to the nav unit.
The GPS antenna connector is a SMB coax connector.

Sometimes, the GPS antenna lead is too short to reach the Euro nav unit, and you need an SMB to SMB extension cable, about 400mm long.

And sometimes, some early pre Sep-98 vehicles had a different GPS connector, which does not fit to the nav unit SMB socket. Here's what you do in this instance:

1. Dismantle the Jap GPS receiver, and remove the GPS antenna socket, complete with as much coax cable fitted as possible.
2. Obtain an SMB connector fitted to approx 6 inches (or as much as you need to reach) of 50-ohm LMR100 coax.
3. Make a coax cable join between the Jap GPS antenna socket, and the new LMR100 cable. Be careful that the inner and the outer of the coax do not short, and that the connection is properly soldered.
   Tip: you may wish to send this cable to AC Technologies and get them to make the cable join professionally.
4. Voila! You have made an adapter lead

Custom made GPS antenna extension cables using quality SMB connectors and proper LMR100 50-ohm coax cable can be ordered from:

AC Technologies Ltd
377 New North Rd, Kingsland, Auckland
Ph 09-846 6633 or 0800-870 001
www.actechnologies.co.nz

AC Technologies will professionally make the coax cables and fit the connectors for you for a very reasonable fee. A great service.

AC Technologies part numbers:
SMB plug: J01160A0401 Cable: LMR100
SMB socket: J01161A0349

POST INSTALLATION CHECKS

After install, reconnect the battery, and perform a brief check that the nav is powering up and working.

Program the nav using NavCoder (see separate section below)

Check all nav inputs are working by going into the navigation computer's **Service Mode:**

To Enter Service Mode:

- Press **MENU**, then select and click **Set**
- Press and hold **MENU** until service mode appears.
- To exit service mode, simply press **MENU** again.

Telematics Settings
Enter your vehicles registration number (**Reg. number**) and colour here.
This is for information only, but can be useful for identification in case of theft of vehicle.

Sensor Check
Check all following sensors for the nav system after installation:

- **Wheel sensor** should show a positive number of speed pulses when going forward, negative when backwards, and should increase with speed. This is the TAA or DFAVL wheel speed pulse signal.
- **GPS satellites** will show number of satellites being received. You need minimum 3 for a fix, often you will receive 6 or 7, max is 8.
- **GPS status** will show status of GPS reception. You want to see **Position known**.
- **Gyro** will show the magnetic gyro sensor in the nav unit. This will be around 2500 (2500mV) going straight, and go down as you turn left, and up as you turn right. Check around a roundabout or on street corners.
- **Direct. of travel** will be **Forward** in all gears other than reverse, where it will be **Reverse**. This is from the reverse light wire which you connected to the taillight.

Calibration After Install
After the first install of a nav unit, you must do 3 key actions to calibrate the nav.

Download Almanac
If the GPS almanac is not loaded, the nav is using default orbital data to determine what satellites should be visible. It can take longer to acquire a satellite fix when the almanac is not loaded. Almanac is lost when battery disconnected, and loaded automatically as follows:

- Park the car outside, with the boot closed so the GPS antenna is not obstructed. Wait around 10 to 15min for the GPS almanac to be updated. You can observe the almanac status in the service mode by selecting **GPS**, then **Functions** then **GPS-Tracking info**.

Calibrate Gyro Compass
The ignition should be in position 0 (off) during removal and replacement of the nav unit. After installing, close all doors, sunroof, bonnet and boot. A bus line reset will be carried out within two minutes. Resetting allows the gyro to perform a calibration run. Do not move or bump the car during this reset / calibration period. After a few minutes the calibration will be complete.

Calibrate Speed Pulse
If the speed is not calibrated, you will notice the nav is inaccurate and doesn't always track the roads correctly.
Speed is constantly checked and calibrated, but it's best to do a special calibration run after fitting the nav to ensure it works well for you straight away, as follows:

- Take the car for a drive where you can travel over 50kmph, preferred is around 100kmph, for at least 5min steady speed. This will help the nav system calibrate the vehicle speed pulses against the calculated GPS vehicle speed.

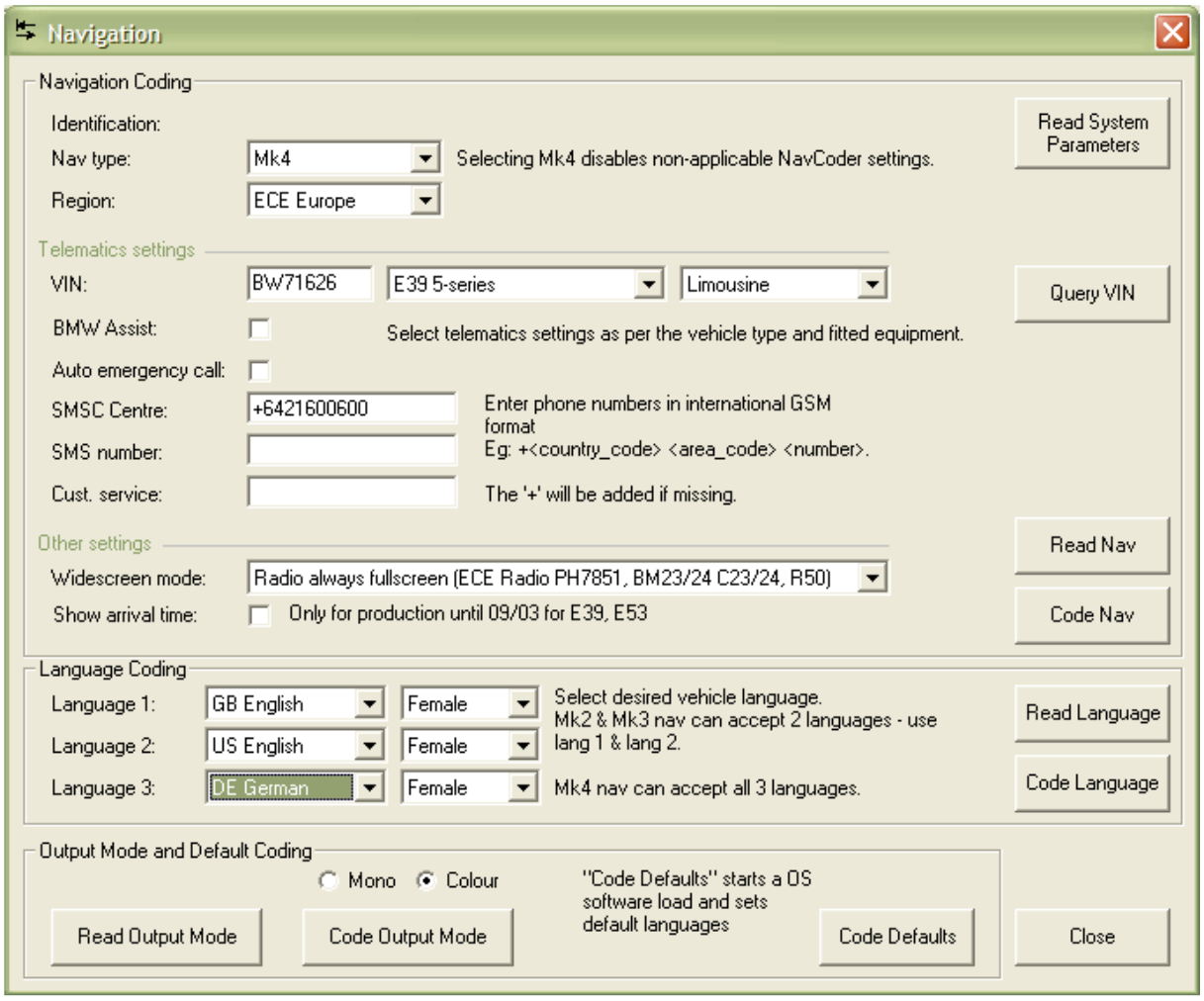
- Perform as many right-angle turns from street to street as possible. The nav adapts the calculated position to the map position by using logical determination of when you have turned a street corner. This helps with accuracy.

Set your clock (for info only)
You can observe the GPS atomic-clock based time – this is very accurate. In the service mode, select **GPS** then **Functions** then **GPS status**. **Date/time (UTC)** shows the time in Universal Time Coordinated format (similar to GMT) – compare to your car's clock, and adjust the cars clock if required so that the minutes match.

NAVCODER

To properly finish the nav upgrade, the new Euro Mk3 or Mk4 nav computer must be programmed to match the type of vehicle, type of radio, and varios other options.

The author wrote a very useful utility called NavCoder, which has the ability to program the nav unit, and change the languages, and looks like this:



NavCoder can be obtained from:

http://www.siegenthaler.co.nz/NavCoder/downloads/NavCoder.zip

This program is shareware, and can be registered for a very small fee.

Full details on how to construct the very simple ibus interface are included in the NavCoder zip file.

To load the languages, you will need a copy of the BMW navigation operating system (OS) CD.
At time of writing (March 2009) the current OS CD version is V32. V31 contains the same as V32, V31 which can be located here:
http://www.x5world.com/navigation-system/44556-v31-has-been-released-now-available.html

Direct download is here: http://www.megaupload.com/?d=O8YINIDZ

V32 contains the following nav software versions:

- Mk3 3-1/63
- Mk4 4-1/00 (which means 4-1/100 but the leading 1 cannot be displayed)

VIDEO MODULE CONNECTIONS

Vehicles manufactured prior to September 1998 are fitted with the Japanese equivalent of the Mk1 (first generation) nav system and video module.

To make a pre Sept-98 car work with a Mk3 or Mk4 nav computer, the video module must be replaced with a post Sep-98 video module, and the Japanese 10-pin black video module connector must be changed to the Euro 18-pin white connector.

The video module is the TV tuner, and switches the video signal between navigation (TV off) or TV (TV on).

Mk1 Japanese Video Module
This unit has no connector fitted to the white plug on the video module chassis. Instead, the Japanese nav unit is connected to a 10-pin (10p) black plug on a flying lead.

Changes
The wires in the vehicle looms' flying lead must be disconnected from the 10p black connector, and fitted to the 18-pin (18p) white connector to fit the Mk2 and later video modules.

You will need to obtain a 18-pin white connector from either BMW or a wreckers. A wrecker can be easiest, especially if you are purchasing the video module from them. Then you can chop the white connector off the wiring loom and take it with you. Tip: whilst there, take the blue connector as well. You can use it for the nav.

The pins in the Jap 10p connector on the flying lead are the same type as fitted to the 18p white connector, so no cutting of wires or soldering is required.

Simply remove the Japanese 10p black connector housing, then extract the pins by depressing each pin's locking tab, and sliding the pin out of the housing.

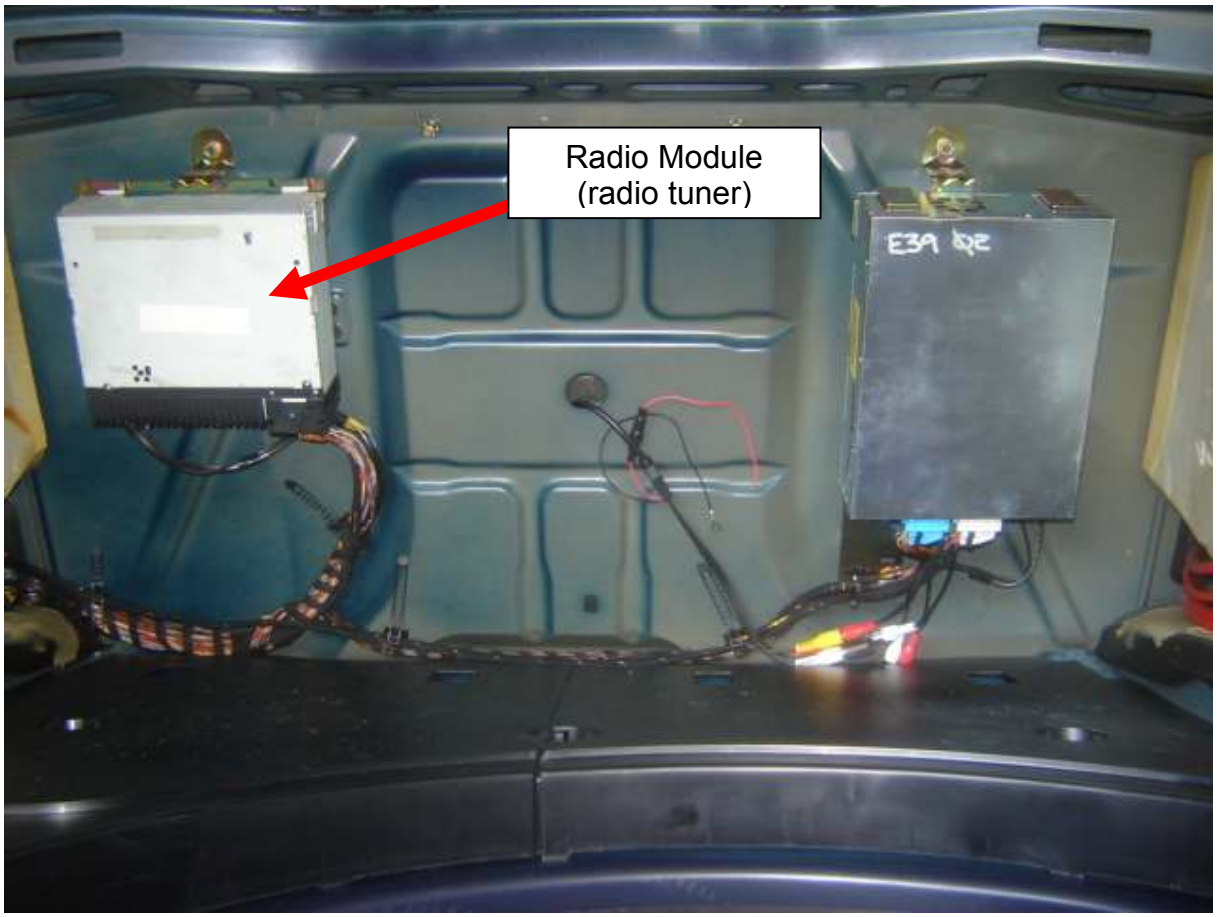
The pins will click into the new 18p connector body. Use the table below to locate the correct pins numbers

Euro Navigation Computer		**Jap Wire Colour**	**Signal Name & description**	**Mk2 or later Video Module**	
Connector	**Pin**			**Connector**	**Pin**
			Video signals		
Blue	4	Red	R75 – red video	White	18
Blue	8	Grey (sometimes brown)	G75 – green video	White	16
Blue	13	Black	B75 – blue video	White	17
Blue	17	White (sometimes orange)	SYNC – video sync	White	8
Blue	15	Shield	RGBGND – video cable shield (ground)	White	7
			Audio signal		
Blue	9	Blue/red	VOICE – voice signal	White	3
Blue	18	Blue/brown	VOICEGND – voice ground	White	12

The white 18p connector housing then slips over the 18p connector body.

RADIO REPLACEMENT

You could replace your Japanese radio (radio module) at the same time as the nav upgrade:



Unbolt the radio – 1 x nut, at bottom of radio module – and slide out of bracket

Unplug antenna connector (large coax), antenna diversity control (thin coax) and main connector (lever the retaining clip up to remove).

Fit the new Euro radio module. No programming of the radio is required when changing the radio module, however you need to check with NavCoder that the nav unit knows what radio is fitted to the car. This ensures that the right menu options are shown in the nav.

NOTE:
When obtaining a replacement radio module note the following:

1. Do NOT purchase a radio from the USA – the USA radio modules tune in 0.2MHz steps and are not suitable for use in New Zealand

2. Purchase ONLY a European or NZ-new radio module

3. Note that radio modules come as two types: Business RDS, made by Philips; and Professional RDS, made by Becker. The Professional RDS is the better of the two

4. If getting a Professional RDS, get one with software version 9.0 or greater for proper operation with the Mk3 and Mk4 nav units. Earlier software versions cause nuisance switching from nav to radio from time to time. Radios with version 9.0 and 10.0 are readily available on eBay.de