

## BMW F10 USB music playback by Richard Bevan ([bimmerfest riku2](#))

### Introduction

This document explains how the BMW F10 plays music from the USB socket in the centre console. There is an explanation about tag processing and playlist handling. Similar software is fitted in other BMW models and also Mini although exact implementation may vary. The car is model year 2011 with the latest USB firmware installed.

Note: All F10's have a USB socket in the glovebox. This CANNOT be used to directly play music. If you have the professional (widescreen) navigation system then there is approx. 20G space on the hard disk for you to import music onto the hard disk from the glovebox USB socket. This document focusses on playing music directly from the CENTRE CONSOLE USB socket and not from the hard disk.

Once again: **you cannot play music directly from the glovebox USB socket, only directly from the centre console socket.**

Not all cars have the centre console USB socket fitted, only cars with option 6FL (USB audio interface) have the USB socket.

Some old (2008) information about the USB socket:

<http://www.bimmerfest.com/forums/showthread.php?t=258477>

### Summary of findings

Once you put a USB stick into the centre console socket the car indexes the music tracks on the stick to allow you to search by artist, album etc. Once indexed the car displays the artist/album/track information it found from the tags on each music track.

The car can remember music track information from four USB sticks. It identifies the stick by the vendor ID+product ID. So two USB sticks of similar model from the same manufacturer are considered the same USB stick and can confuse the system.

Supposedly there is a 36,000 maximum track limitation but I also found there is a limit of 26,000 tracks for any one USB stick.

If you exceed the limits (more than 26,000 tracks on one stick, more than 36,000 total tracks) then the system can stick and not index your USB stick and not display all tracks or tag information. In this case clear the memory with the steps described later in this document.

## Terminology basics

### Tags

The car will play mp3 and wma files and try to extract the tag information from the tracks to make searching and display of the track information easier. These tags are part of the music file and can be added/changed by software such as itunes, mediamonkey and mp3tag.

I have been using mp3tag (<http://www.mp3tag.de/en/>) to organize and change the tags if needed.

At first the car does not know the tag information in each file and will read it into a database, **while this is happening you can play music but without tag information.**

### Playlist

A playlist is a file with m3u suffix which contains a list of some/all tracks which are on the USB stick. The car will recognize the playlist and play the tracks in the list one after another. At the end of the playlist it will start again with the first track in the playlist.

Many people confuse playlist m3u files with creating a USB stick in itunes or other software **based on a playlist**. This is not the same thing. Creating a USB stick based on a playlist in itunes will just use the playlist to **decide which tracks to copy** to the USB stick. Only if there is a file ending in .m3u on the USB stick is there a playlist which you can then choose through the "playlists" menu in the car's i-drive system.

You can have multiple playlists on the USB stick. You might have one playlist per artist for example, or playlists for different kinds of music. A track can appear in many playlists, this does not waste space on the USB stick since only the name/path of the track is in the playlist. The music track itself is not inside the playlist but somewhere else on the USB stick.

## What the manual has to say about USB playback

Here is an online version of the American F10 manual

<http://www.bavarianmw.com/guide-2870.html>

The important parts are below

After connecting for the first time

Information on all music tracks, e.g. artist or type of music, as well as playback lists are transmitted into the vehicle. This may take some time, depending on the USB device and the number of tracks.

During transmission, the tracks can be called up via the file directory.

Number of tracks

Information from up to four USB devices or for approx. 36,000 tracks can be stored in the vehicle.

If a fifth device is connected or if more than 36,000 tracks are stored, information on existing music tracks may be deleted.

### *What this means in practice:*

The “after connecting for the first time” part means that the car will scan though all the music tracks on the USB stick to a) find the tracks b) extract the tag information c) find the playlists. This process can take several hours.

The manual is rather vague on how this happens and what the car actually does. This document explains this process in more detail. You may need to know this if the car doesn't play all your tracks or some are missing.

**The “36,000 tracks” part of the manual is very important.** There is space in the car's database for FOUR USB sticks and a total of 36,000 tracks (sum of all four USB sticks). This document will explain what happens if you exceed this limit (it is not as simple as explained in the manual).

Note that I found **the car will not recognize more than 26,000 tracks on any USB stick.** If you have more tracks than this then the indexing of tracks stops and the car does not display any tag information at all. There is no error message when this happens.

**If the filenames are long then the limit is less than 26,000 tracks!** Originally my filenames had the artist,album and track name. My USB stick (with 31,000 tracks) was never indexed correctly and only about 21,000 of the tracks were recognized. The tags were never displayed. I renamed all the files to much shorter names (a five digit number) and then found out about the 26,000 track limit.

The “**four USB devices**” sounds simple but is implemented in a very complicated way by the car. It identifies the make and product code of the USB stick (so called Vendor ID and Product ID). These are overseen by the organization that licences the USB standard. **Devices with the same vendor and product code are considered to be the same USB stick from the car's point of view.** This is an extremely important point. If you have two Sandisk blade USB sticks the car sees them as the same stick. If you have a Sandisk blade and Sandisk cruzer, these are two different USB sticks (different product ID). If you have a Kingston USB stick and Sandisk USB stick they are two different sticks (different vendor ID).

Because of this product/vendor concept the car can seem to behave in a strange way. It might happily recognize tracks on one USB stick but not fully recognize the tracks on another. This can be because they are the same make/model of USB stick and the car is going over the 36,000 track limit and thinks you have one USB stick with a huge number of tracks on it.

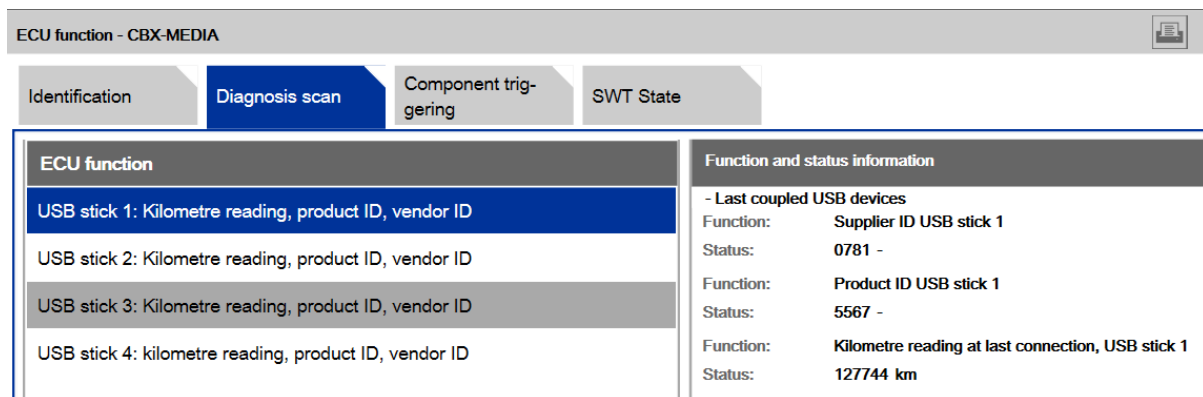
All USB devices have this vendor/product code, not just USB sticks but also devices such as ipods and iphones. Probably the product code is different between different kinds of ipods but if you have two ipods of the same model then the car will consider them the same device.

It's unclear how well the car copes when you change between two USB sticks of the same make/model since they share the same database of tracks even though they might have totally different files. It's best to avoid this situation. I had lots of problems because of this.

## The car's four USB memories

The picture below is from the Rheingold diagnostic software and shows the four memories in the Combox. You can see that the car memorises the product ID and vendor ID (called "supplier ID" in the screenshot) of the USB stick together with the km reading when the stick was last used.

When you plug in a new USB stick the oldest used stick is forgotten (based on km reading when that stick was used) and track data is deleted for that stick. Beware though **if this new USB stick has the same product/vendor code as one in the existing four memories then it's not considered a new USB stick.**



The screenshot shows the 'ECU function - CBX-MEDIA' interface. It has four tabs: 'Identification', 'Diagnosis scan' (selected), 'Component triggering', and 'SWT State'. Below the tabs is a table with two columns: 'ECU function' and 'Function and status information'. The 'ECU function' column lists four USB sticks, each with 'Kilometre reading, product ID, vendor ID'. The 'Function and status information' column shows details for the last coupled USB devices, including 'Supplier ID USB stick 1' (Status: 0781 -), 'Product ID USB stick 1' (Status: 5567 -), and 'Kilometre reading at last connection, USB stick 1' (Status: 127744 km).

| ECU function  | Function and status information                             |
|---|---|
| USB stick 1: Kilometre reading, product ID, vendor ID | - Last coupled USB devices                                  |
| USB stick 2: Kilometre reading, product ID, vendor ID | Function: Supplier ID USB stick 1                           |
| USB stick 3: Kilometre reading, product ID, vendor ID | Status: 0781 -  |
| USB stick 4: kilometre reading, product ID, vendor ID | Function: Product ID USB stick 1                            |
|   | Status: 5567 -  |
|   | Function: Kilometre reading at last connection, USB stick 1 |
|   | Status: 127744 km   |

## Organizing tracks on the USB stick

There is no fixed method of organizing tracks on the USB stick. You can choose which ever method you like although some have advantages compared to others.

Some people like to have one folder per artist and even subfolders in there per album.

Or you can have one folder per artist and all tracks for all albums in that directory. This approach is nice if you do not use playlists but still want to pay all tracks from one artist in a row (in search by folder the car plays all tracks in that folder one after another).

Beware of putting too many tracks in one folder. Some file systems like fat32 have a limit of about 15,000 files in one directory. Even in Windows you will get an error if you exceed this limit.

## Naming of files

Theoretically the names of the music files does not matter since the car will (after reading all the tracks) show the tag data (album, artist, track name) instead of the filename. However if you name your files with some delimiters then it can make organizing and re-tagging your files easier.

For example my files (at home on the PC and on the USB stick) are named with back ticks between the fields

```
artist`album`track#`track name.wma
```

This lets me recreate the tags by parsing the filename. To make things easier still the track name always starts with the track number, so that when displaying the track name only I can also see the track number (the car and my media player at home only display the track name, not the track number)

Example: Beatles`67 Sgt. Pepper's Lonely Hearts Club Band`10`10 Lovely Rita.wma

For some artists I enhance the naming even more so the album name starts with the year. This means that when I play the albums in name order they are played in date order rather than alphabetical order (This Beatles album being released in 1967). This is very nice with some artists like the Beatles where there is a definite progression in their musical style.

Note that all the information above assumes you don't have too many tracks on your USB stick. The car would only recognize about 21,000 tracks with the long names above. It then got stuck and would not process any more tracks or display any tags at all.

If you have a large number of tracks then do not use long names as above but use shorter ones. I renamed all the tracks to be a five digit number and then the car would recognize up to 26,000 tracks and it did complete the indexing and did display tag information.

## USB size limitations

I have used 128G USB sticks without any problem. Bigger USB sticks with the same file system will probably work although larger sticks will be more likely to encounter the 26,000 track maximum limit per USB stick. The 25,000 tracks on my USB stick take up about 55G so larger sticks are only of use if you use less compression since otherwise you will run into the 26,000 track limit.

## USB Format

You can use various formats for the USB stick although some will not work and some have limitations on number of files.

**NTFS:** Probably the best method. A large number of files are allowed. Beware of pulling out the USB stick from your computer without properly ejecting it or shutting the computer down. Tracks may not appear in the car if you do this with NTFS (more so than with Fat filesystems). Shutdown the computer or safely eject the USB stick.

One strange feature of NTFS is that removable disks have their own trash folder (recycle bin). This means that if you delete something from the USB stick it doesn't really get deleted but moved to a

hidden folder called recycle bin. This causes a problem in the car since it doesn't ignore files in this folder and those deleted tracks will appear in the i-drive. If this happens then empty the recycle bin before you eject the USB stick from your PC.

**Fat32:** The car will read this format although there is a limit on the maximum number of files in one directory. Windows 7 will not **format** a USB stick in this format. It will read/write an existing Fat32 USB stick though. There are some software utilities available to format a USB stick in Fat32 for windows 7. Normally USB sticks come already formatted in Fat32.

**Fat:** This file system has a maximum size of 4G so probably not big enough for most USB sticks now.

**exFAT:** This format is not recognized by the car. Windows 7 will give a choice of exFAT or NTFS to format a USB stick. So either choose NTFS or pick another utility to format the stick.

## Too many files? Clearing the memory with four spare USB sticks

The car has space in its database for four USB sticks and a total of 36,000 tracks. Eg if you have three USB sticks already read with 10k tracks on each, then there is space for a fourth USB stick holding 6000 tracks.

When you go over the limit (eg the fourth USB stick has 8000 tracks) then the car DOES NOT seem to clear other data as the manual might suggest. The car seems to stick at the 6000 track point in this example and never complete reading the USB stick no matter how long you wait !!

There is no simple way to display what the car has memorized (eg how many tracks in each of the four memories).

In this situation of too many tracks you can clear out some of the other USB memories. Make four USB sticks with one wma track on each. **The sticks must all be of different makes/models** since the car will consider two sticks with the same product/vendor code to be the same USB stick. Put the stick in and let the car start to play that one track. Then move to the next USB stick, repeating the process for all four USB sticks. This clears the memory (since now instead of 3x 10k tracks you only have 3 tracks in total in the system). Now there should be space for your USB stick of 8000 tracks.

This situation can also arise if you have two USB sticks of the same model. For example you have 20,000 tracks on the first stick and a second stick of the same model with 30,000 tracks. Since they are the same model of USB stick the car considers them the same stick and from its point of view you have one USB stick with 50,000 tracks which is well over the 36,000 track limit.

## What happens when you plug in a USB stick

When you insert a USB stick that the car does not already know about the car will start to read the USB stick and go through **three phases** to build up its database about the USB stick. This only happens when the entertainment system is switched on, either while driving or when parked (although beware that it switches itself off after about 8 minutes).

The three phases and they can take a while to full read the USB stick. A USB stick with 15,000 tracks may take 6-7 hours to read all the information, although the important track and tag information will take only about 30 minutes.

**The example times below refer to a 15,000 track USB stick.** It will be quicker with fewer tracks on the USB stick.

### Phase 1: track discovery (5 mins)

In this phase the car finds the music tracks on the stick and works through directories (alphabetically). While this phase is happening you can only navigate the stick by directory. All other options in search are grayed out. While playing a track only the filename is shown, nothing from the track's tags is shown.

You can tell if the car is in this phase by the screen below. **All search options other than by folder are grayed out.**



While playing in this phase the filename is displayed instead of tag information. You can see this in the screenshot below (my filenames are of the format artist`album`track#`track name). The car confusingly uses "Various Artists Various Albums" to mean it has not yet got tag information for this track





### Phase 2: tag retrieval (30mins)

Once the car has found the names of all the tracks and their directories it will start to read each track and extract the tag (artist, album, genre etc) information and store it in the car's database. This process happens alphabetically for the directories on the USB stick although the tracks currently being played receive extra priority (eg you are playing tracks from a folder zzt0p: the car will extract tag information for those tracks even though alphabetically that folder should be the last to be done).

Important note about phase 2: **should the car reach the maximum track limit (36,000 for all USB sticks) during this phase then it can stick at this phase and only read some of the tags.** Not all of the artists will appear in the artist search list and playlists will never be read (since they are done in phase 3). See the section above (too many files) about clearing the USB memory for details on what to do if this happens.

In this phase the search display looks like below



When you are playing a track the information looks like below. Compare this to the display in phase 1. Now the artist and album are shown correctly and the track name alone appears where the filename used to be.



While phase 2 is happening you will notice some strange behavior in the system:

**In phase 2 the search functions will only retrieve tracks where the track information has been read.** In the example below you can see the search by artist has only found artists A..P. After that comes "various artists" which is the car's way of saying "tracks with no tag information/tag has not been read yet". On my stick there are many more artists after P still to be processed by the car and I don't have any tracks tagged with artist = "Various Artists".

If the car sticks like this for a long time (and never gets to the last artist) then check the section of this document about too many tracks.



If your filenames are long and you exceed the memory limit for one USB stick then the car will stick in the tag retrieval phase and not get any tag information at all. In my case it stuck at around 21,000 tracks due to long filenames. I renamed all the files to be a five digit number and cleared the memory and then the car read the tracks and tags (total number of tracks was the same, the difference was the filenames). You can tell if the car has stuck like this because A) the search screen has all options available (search folder, all genres, all artists) B) When playing a track the car does not display the tags but instead the filename + "various albums"/"various artists".

### Phase 3: Playlist processing (6 hours)

Once all the tracks have their tags read the car will process any m3u playlist files on the usb stick. I found it's best to put the m3u files all in one directory which I call "Playlists". It's not mandatory to do this (the car will find them anywhere) but the car did seem to have trouble if the playlists were scattered about in each artist directory.

It's not mandatory to name your playlists folder "playlists", any name should work.

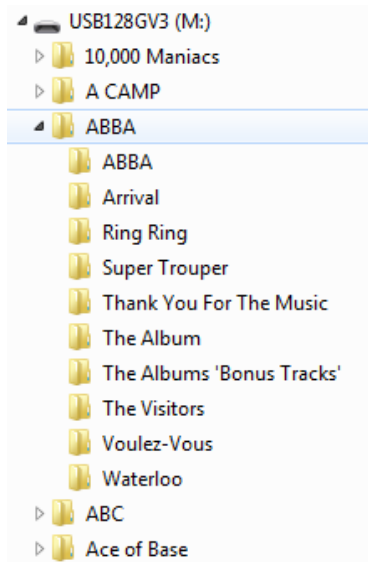
Important note about playlists: **there is a limit of about 1500 – 2000 tracks in any one playlist.** If you exceed this limit then playlist processing stops and the car doesn't find any more playlists. It does not just reject the big playlist and carry on. It is best to break up your playlist files so they do not reach this limit.

The car did not seem to like updates being done to the playlist files once it had read them. It would refuse to recognize the new files and in this situation it was better to clear the memories and make the car start the whole indexing process again.

## What does an m3u playlist file look like?

Inside the playlist is a list of tracks with their directory. The directory should be relative to where the playlist is

You can see the directory structure of my USB stick below. Each artist has folder with one folder per album inside there. The playlists are stored in a folder called playlists at the same level as the artists.



Below is part of a playlist file called ABBA.m3u. The name of this playlist file (ABBA) will appear in the car display when searching for playlists.

Notice the “..” to mean go up one directory, then down into the ABBA directory and then the Arrival album directory to find the wma track. The filenames themselves are of the format artist`album`track#`track, this format isn't necessary but helps when processing and sorting my music library (I can re-generate tags based on the full filename or vv).

```
..\ABBA\Arrival\ABBA`Arrival`1`01 When I kissed the teacher.wma  
..\ABBA\Arrival\ABBA`Arrival`2`02 Dancing queen.wma  
..\ABBA\Arrival\ABBA`Arrival`3`03 My love, my life.wma
```

Entries in the playlist are CASE SPECIFIC, so directory and filenames must exactly match between the entry in the playlist and how the directory/filename is on the USB stick itself.

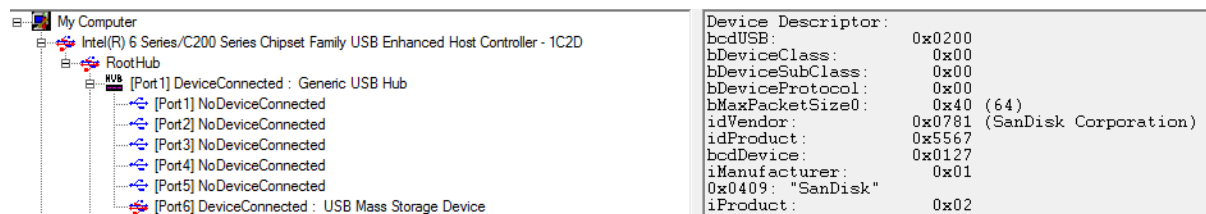
## More about vendor ID's and product ID's.

Here is a table of some USB sticks I had lying around showing the vendor and product code. You can see all the SanDisk sticks share the same vendor ID but have different product codes. To clear the four USB memories I have to use four different sticks. Using three cruiser blade sticks would not work (the car sees them as one stick and clear only one position not three).

|                   | vendor | product |
|-------------------|--------|---------|
| cruzer blade      | 0781   | 5567    |
| cruzer micro U3   | 0781   | 5406    |
| cruzer micro      | 0781   | 5151    |
| easy disk         | 13FE   | 1D00    |
| promotional stick | 058F   | 6387    |

If you want to see these codes in windows then download a piece of software called USBview.exe (<http://k0lee.com/dc3000/usbt.htm>). Plug in a USB stick and you can see the details about your stick. Vendor and Product codes are shown on the right.

Unless you have Rheingold software you will not be able to know what sticks your car has memorized but you can at least confirm your sticks have different codes.



The screenshot shows the Windows Device Manager interface. On the left, the tree view is expanded to 'My Computer' > 'Intel(R) 6 Series/C200 Series Chipset Family USB Enhanced Host Controller - 1C2D' > 'RootHub' > 'USB'. Under 'USB', there are six ports listed: [Port1] DeviceConnected : Generic USB Hub, [Port2] NoDeviceConnected, [Port3] NoDeviceConnected, [Port4] NoDeviceConnected, [Port5] NoDeviceConnected, and [Port6] DeviceConnected : USB Mass Storage Device. On the right, the 'Device Descriptor' for the selected device is displayed:

```
Device Descriptor:
bcdUSB:           0x0200
bDeviceClass:     0x00
bDeviceSubClass:  0x00
bDeviceProtocol:  0x00
bMaxPacketSize0: 0x40 (64)
idVendor:         0x0781 (SanDisk Corporation)
idProduct:        0x5567
bcdDevice:        0x0127
iManufacturer:   0x01
0x0409: "SanDisk"
iProduct:         0x02
```