Introduction

This guide can be useful to understand process of simple texture modding (replacing of textures). I myself have done only texture replacements mods and don't know specific details about models, animations.

CREDITS for other modders, who shared their knowledge and for authors of tools, as without their soft nothing could be possible: hypermorphic , Makacha, tholwin, Fuse00, pineapples721/theawesomecoder61

Tools

Links actual on 2022-09-17

ACViewer (assets browser) https://discord.gg/rEGFmc2g

forgeNames.bin - filenames for ACV 1.4 https://drive.google.com/file/d/1-YPK5YDCMc7JW6XNQqvEfNsAoJBKA3sf/view?usp=sharing

oo2core_7_win64.dll – search or look at ACViewer discord channel.

Blacksmith (AC Resources explorer/extractor) http://t-poses.com/bs/

Blacksmith Discord server https://discord.gg/tjyCvcP

HxD (Hex editor) https://mh-nexus.de/en/hxd/

Notepad++ (text editor) https://notepad-plus-plus.org/downloads/

Forger (patch manager) https://www.nexusmods.com/assassinscreedodyssey/mods/42

Raw texture previewer/converter https://zenhax.com/viewtopic.php?t=7099

NVIDIA Texture Tools https://developer.nvidia.com/nvidia-texture-tools-exporter

Standalone or Adobe Photoshop Plugin

OR you can use Intel® Texture Works Plugin for Photoshop https://gametechdev.github.io/Intel-Texture-Works-Plugin/

Texconv - I cannot recommend it for bugs/artefacts, but it can be useful in some cases

https://github.com/Microsoft/DirectXTex/wiki/Texconv

DirectXTex texture processing library https://github.com/microsoft/DirectXTex

Texture editor – on your choice Photoshop / Krita / GIMP / etc.

Preparation

Paths (my paths are for example):

path_to_game = c:\Games\Assassin's Creed Valhalla\

path_to_patches = c:\Games\Assassin's Creed Valhalla\ForgerPatches\

STEP ACViewer

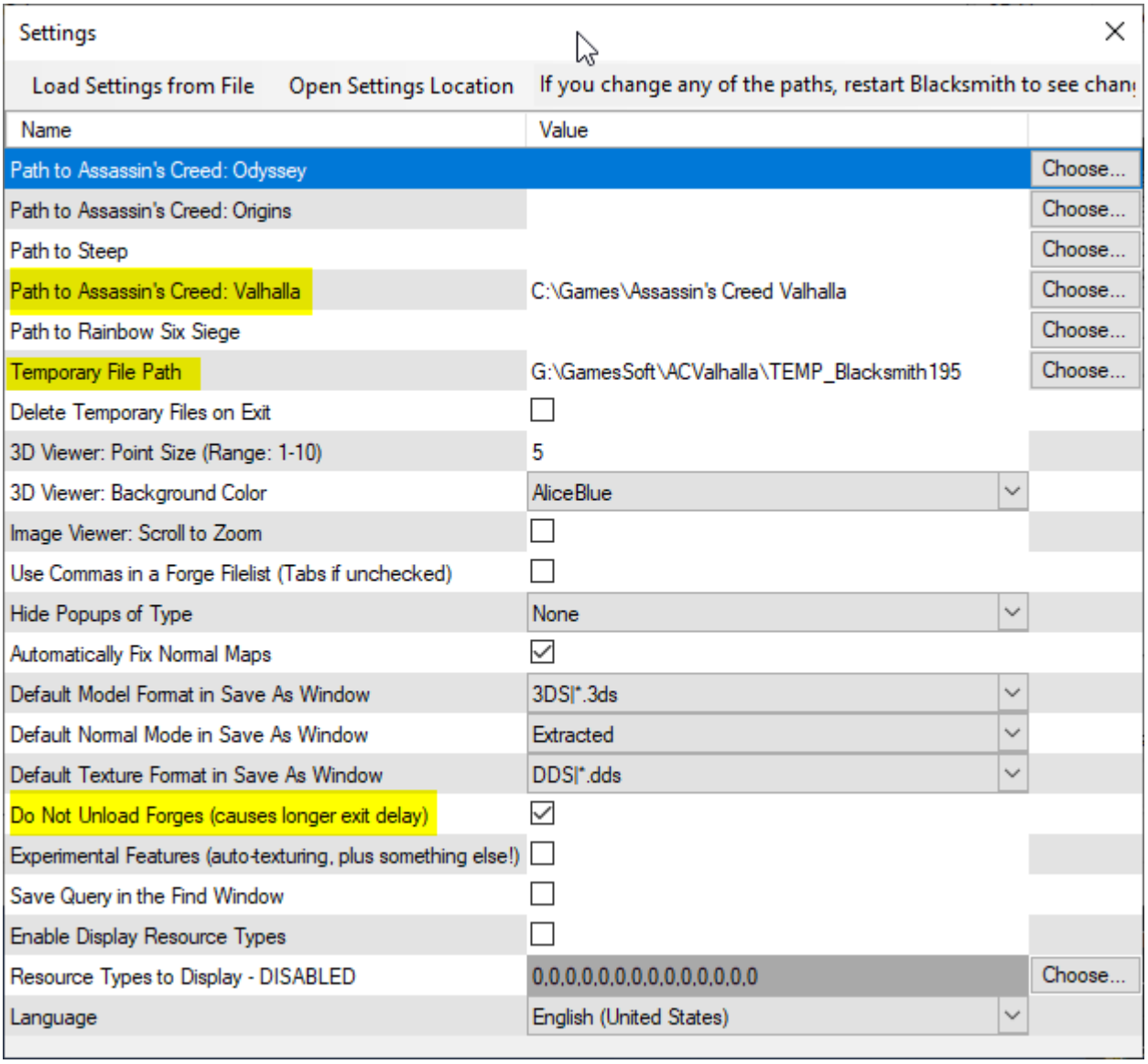
Copy ACViewer.exe, oo2core_7_win64.dll, forgeNames.bin to *path_to_game*

Run ACViewer.exe first time and wait while it creates index files (text format) with all file IDs and names.

The difference in creating index files without forgeNames.bin you can see in line with non-readable filename:

```
Search "0x0000014AF610E5FC" (1 hit in 1 file of 156 searched)
  C:\Games\Assassin's Creed Valhalla\DataPC_SharedGroup_00.forge.index (1 hit)
    Line 61955: 0x0000014AF610E5FC: CE_P_Bayek_Ezio_BodyTop_DiffuseMap_TopMip_1.CompiledMip
Search "0x0000014AF610E5FC" (1 hit in 1 file of 156 searched)
  C:\Games\Assassin's Creed Valhalla\DataPC_SharedGroup_00.forge.index (1 hit)
    Line 61955: 0x0000014AF610E5FC: BCF0DCAB7018570A2F577A40901EC7F6E3460610B1AC3D90253C5096C509352DF5920B6BD2D57704551309.CompiledMip
```

STEP Blacksmith

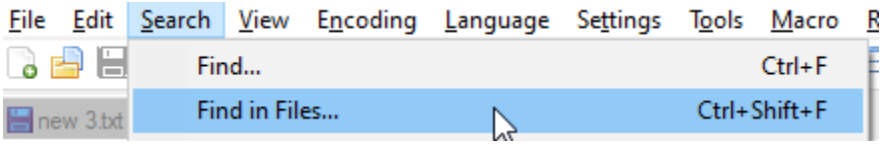


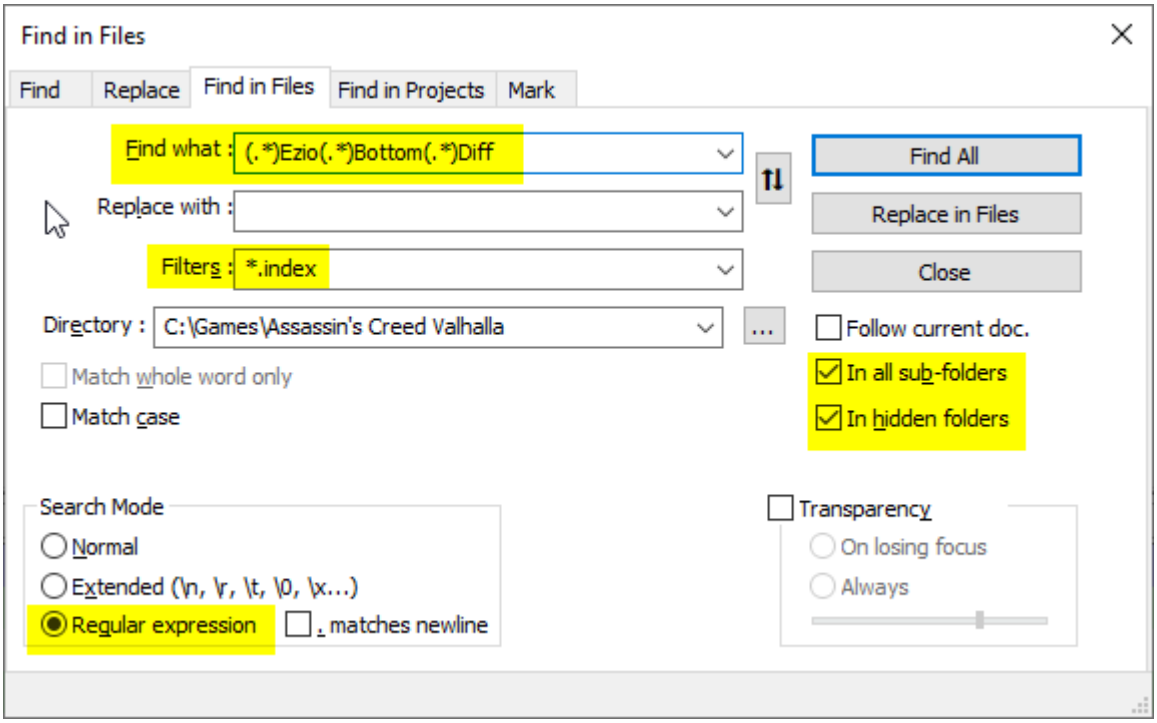
Temporary File Path – here goes extracted acv files.

Do Not Unload Forges – you will need many forger files open at the same time for comfort work.

How to find game files IDs

Notepad++ Menu – OR Ctrl+Shift+F





Find what – regex

The result:

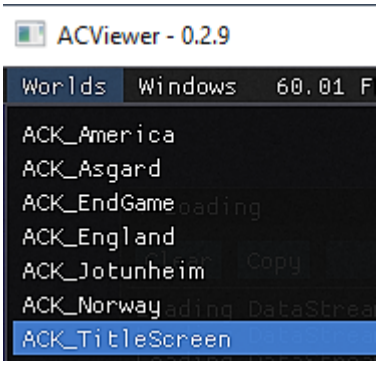
Search "(.*)Ezio(.*)Bottom(.*)Diff" (29 hits in 13 files of 156 searched)
C:\Games\Assassin's Creed Valhalla\DataPC_211_dlc_patch_01.forge.index (1 hit)
Line 17061: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
C:\Games\Assassin's Creed Valhalla\DataPC_211_dlc_SharedGroup_00_patch_01.forge.index (1 hit)
Line 2622: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
C:\Games\Assassin's Creed Valhalla\DataPC_ACK_DLC_Francia_patch_01.forge.index (1 hit)
Line 149876: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
C:\Games\Assassin's Creed Valhalla\DataPC_ACK_DLC_Ireland_patch_01.forge.index (1 hit)
Line 101349: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
C:\Games\Assassin's Creed Valhalla\DataPC_SharedGroup_00.forge.index (3 hits)
Line 61928: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 61932: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 61934: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\DataPC_SharedGroup_00_patch_01.forge.index (1 hit)
Line 3358: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
C:\Games\Assassin's Creed Valhalla\dlc_20\DataPC_ACK_DLC_Ireland.forge.index (3 hits)
Line 951157: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 951161: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 951163: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\dlc_207\DataPC_ACK_DLC_Francia.forge.index (3 hits)
Line 667879: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 667883: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 667885: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\dlc_211\DataPC_211_dlc.forge.index (3 hits)
Line 77439: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 77443: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 77445: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\dlc_211\DataPC_211_dlc_SharedGroup_00.forge.index (3 hits)
Line 55649: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 55653: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 55655: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\dlc_232\DataPC_232_dlc.forge.index (3 hits)
Line 45298: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 45302: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip

Line 45304: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\dlc_35\DataPC_35_dlc.forge.index (3 hits)
Line 42165: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 42169: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 42171: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip
C:\Games\Assassin's Creed Valhalla\dlc_35\DataPC_35_dlc_SharedGroup_00.forge.index (3 hits)
Line 37830: 0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap
Line 37834: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip
Line 37836: 0x0000014AF610E5DF: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip

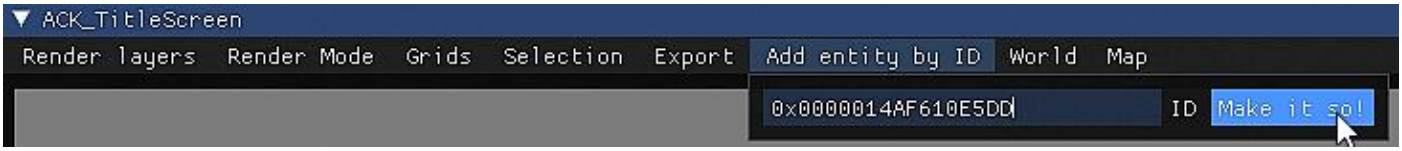
The best quality texture is TopMip_0.
As we see, it is included in few forger files. Later we must patch all instances to exclude bugs.

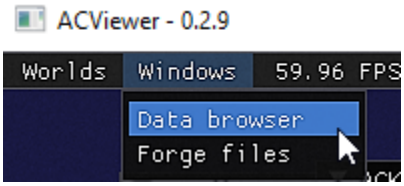
View in ACViewer

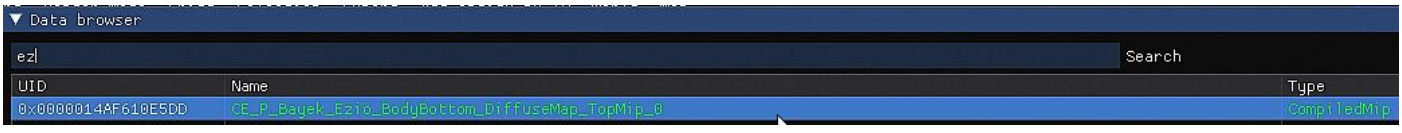
Open TitleScreen world (min records).

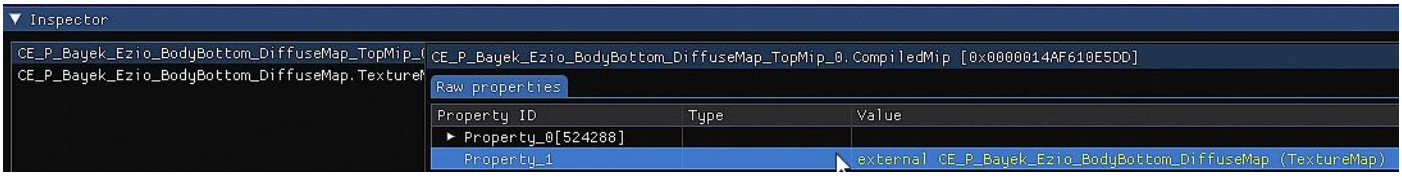


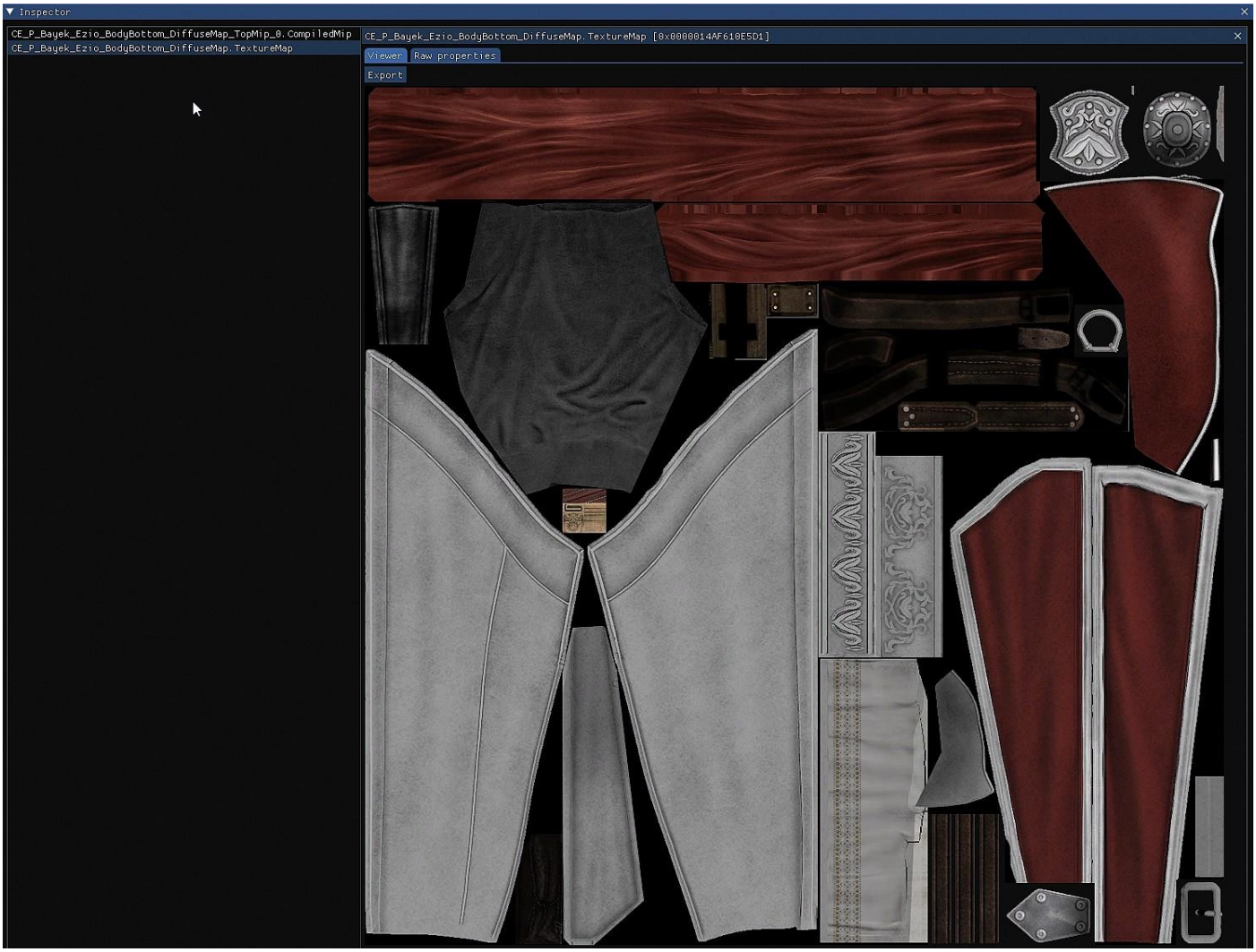
Add hex file ID and data browser will be able to open it.

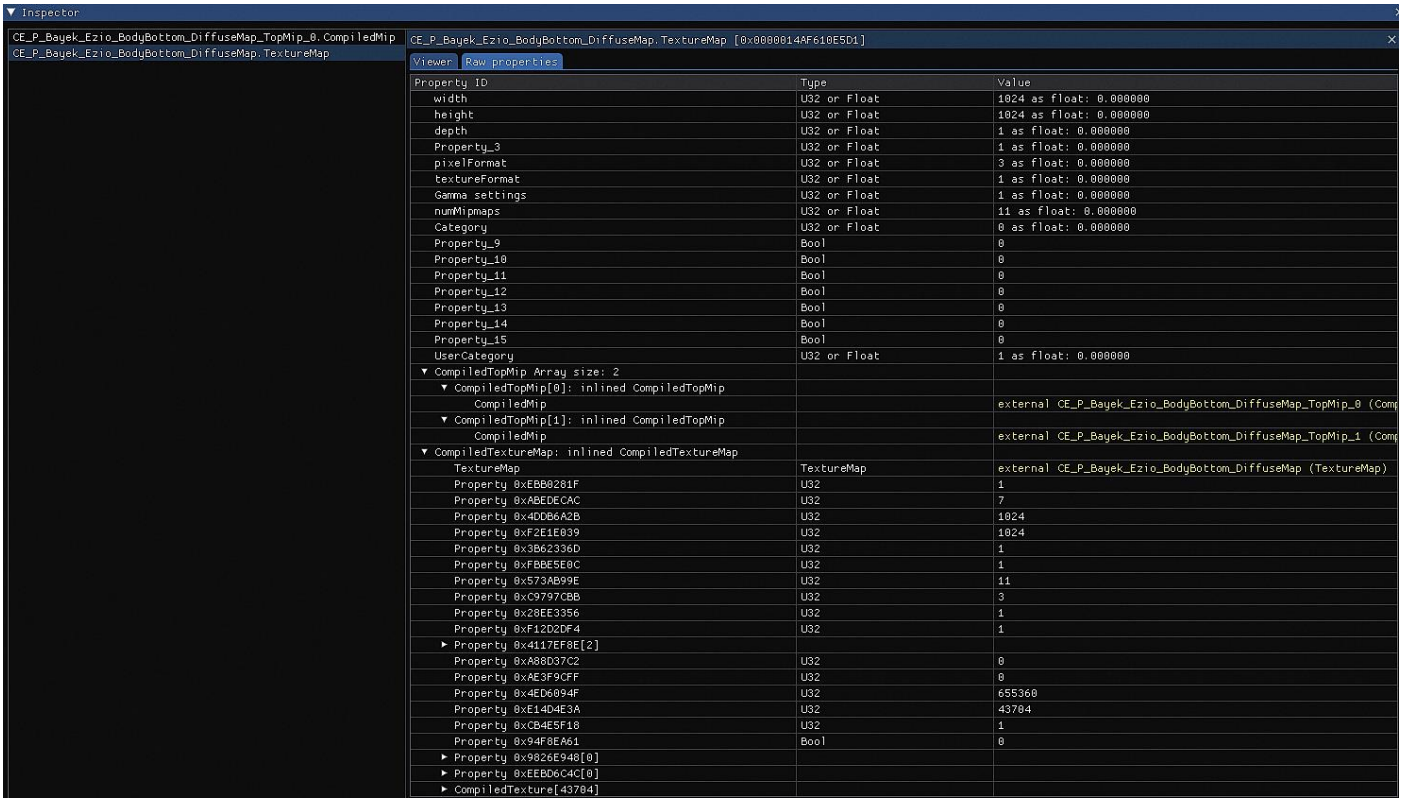












Property ID	Type	Value
width	U32 or Float	1024 as float: 0.000000
height	U32 or Float	1024 as float: 0.000000
depth	U32 or Float	1 as float: 0.000000
Property_3	U32 or Float	1 as float: 0.000000
pixelFormat	U32 or Float	3 as float: 0.000000
textureFormat	U32 or Float	1 as float: 0.000000
Gamma settings	U32 or Float	1 as float: 0.000000
numMipmaps	U32 or Float	11 as float: 0.000000
Category	U32 or Float	0 as float: 0.000000
Property_9	Bool	0
Property_10	Bool	0
Property_11	Bool	0
Property_12	Bool	0
Property_13	Bool	0
Property_14	Bool	0
Property_15	Bool	0
UserCategory	U32 or Float	1 as float: 0.000000
▼ CompiledTopMip Array size: 2		
▼ CompiledTopMip[0]: inlined CompiledTopMip		
CompiledMip		external CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0 (Comp
▼ CompiledTopMip[1]: inlined CompiledTopMip		
CompiledMip		external CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1 (Comp
▼ CompiledTextureMap: inlined CompiledTextureMap		
TextureMap	TextureMap	external CE_P_Bayek_Ezio_BodyBottom_DiffuseMap (TextureMap)
Property 0xEBB0281F	U32	1
Property 0xABEDECAC	U32	7
Property 0x4DDB6A2B	U32	1024
Property 0xF2E1E039	U32	1024
Property 0x3B62336D	U32	1
Property 0xFBBE5E0C	U32	1
Property 0x573AB99E	U32	11
Property 0xC9797CBB	U32	3
Property 0x28EE3356	U32	1
Property 0xF12D2DF4	U32	1
▶ Property 0x4117EF8E[2]		
Property 0xA88D37C2	U32	0
Property 0xAE3F9CFF	U32	0
Property 0x4ED6094F	U32	655360
Property 0xE14D4E3A	U32	43704
Property 0xCB4E5F18	U32	1
Property 0x94F8EA61	Bool	0
▶ Property 0x9826E948[0]		
▶ Property 0xEEBD6C4C[0]		
▶ CompiledTexture[43704]		

```
external CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0 (CompiledMip)

external CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1 (CompiledMip)

external CE_P_Bayek_Ezio_BodyBottom_DiffuseMap (TextureMap)
```

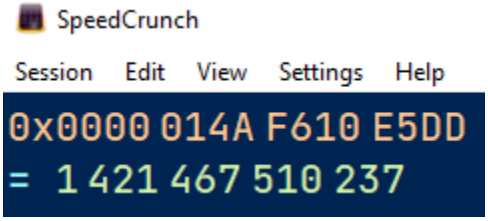
Textures in ACValhalla usually have 3 files – TopMip_0 (no mipmaps) – best quality, TopMip_1 (no mipmaps) and all other mipmaps. You can save your texture as 3 files to match originals or as one with mipmaps – the difference is in how you define offsets for forger manager.

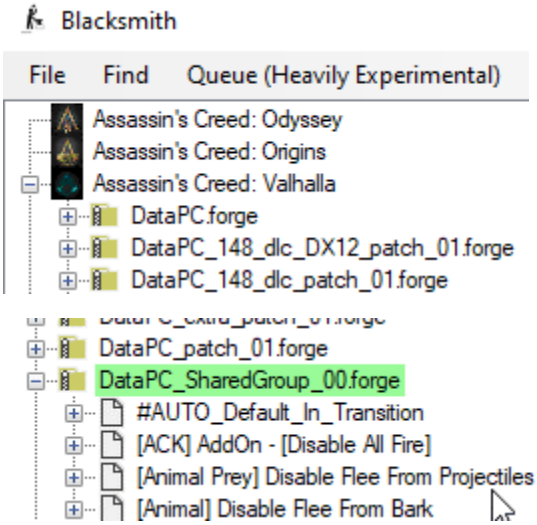
How to extract files from forger archive

Open Blacksmith and then open forger file, that was show in search result

Search "0x0000014AF610E5DD" (9 hits in 9 files of 156 searched)
C:\Games\Assassin's Creed Valhalla\DataPC_SharedGroup_00.forge.index (1 hit)
Line 61932: 0x0000014AF610E5DD: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip

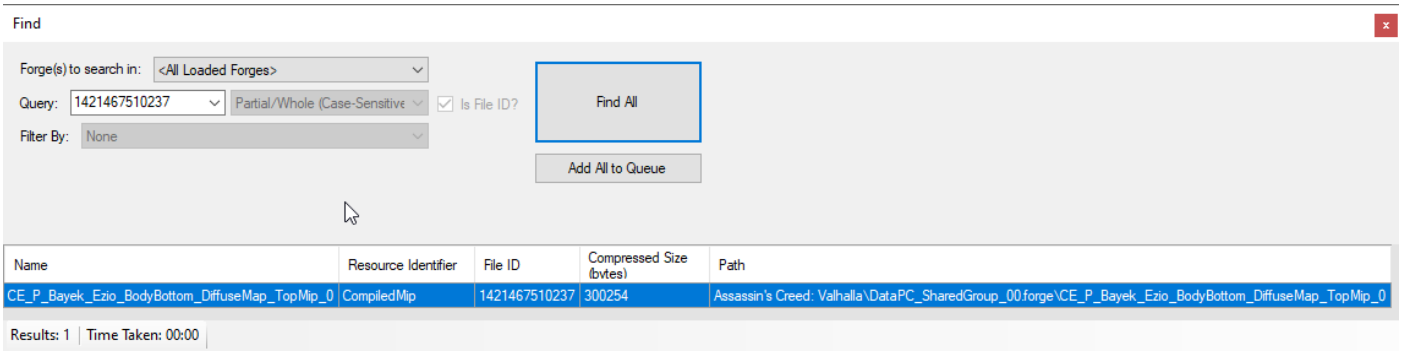
0x0000014AF610E5DD – is file ID in 16 base system. To use it in Blacksmith you must convert it to decimal value 1421467510237. For example in calculator SpeedCrunch.



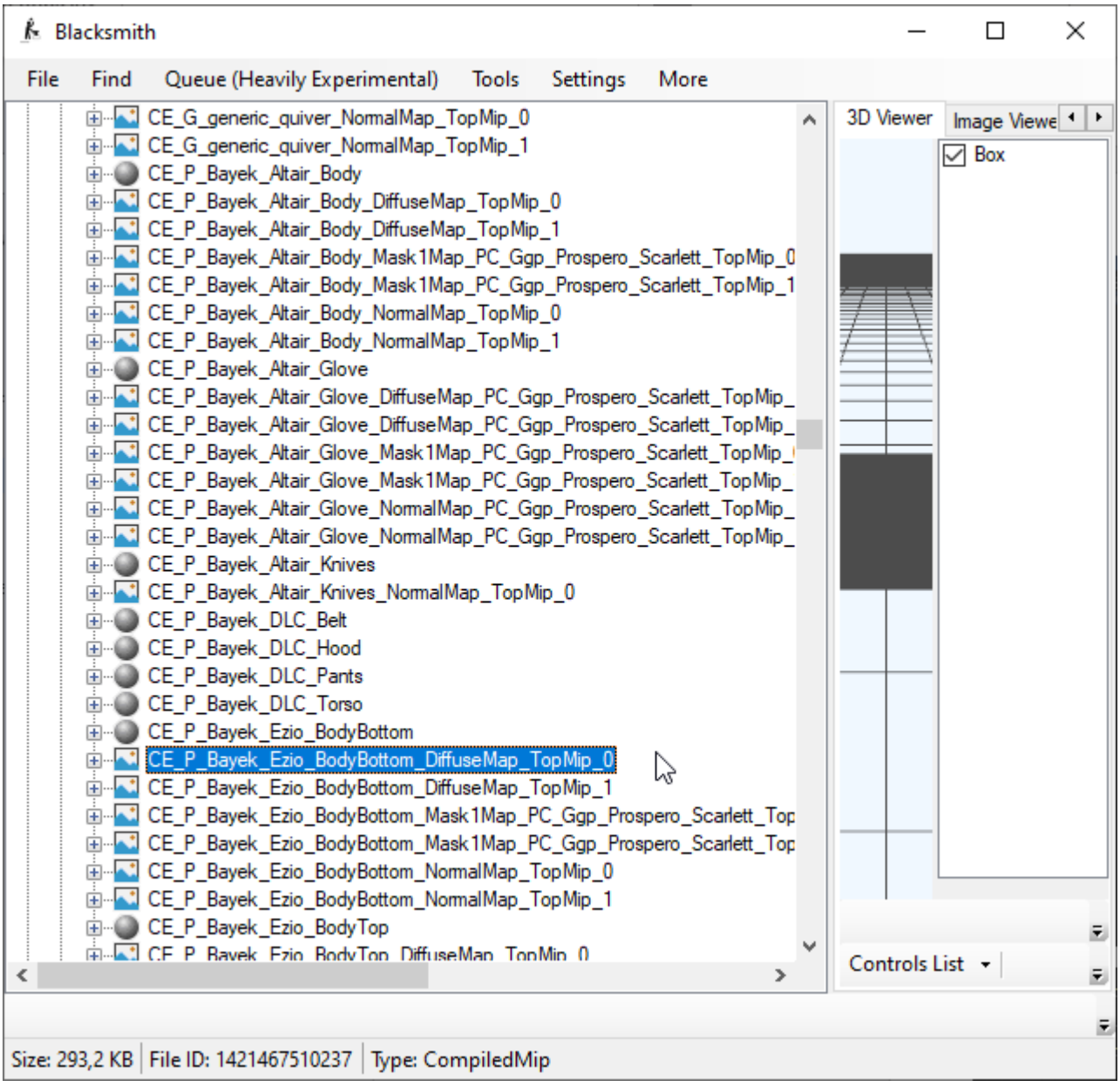


Now open search form and enter decimal file ID.

Before last game updates, ACViewer was not must have tool, as Blacksmith can be able to find by names, but for now, many files are shown without their names and we need to use ACViewer index files to find something.



Double click on result entry will position browser to file.



Clicking on file will auto save acv file in *Temporary File Path* in subfolder with forger name.

Extracting dds texture from acv file

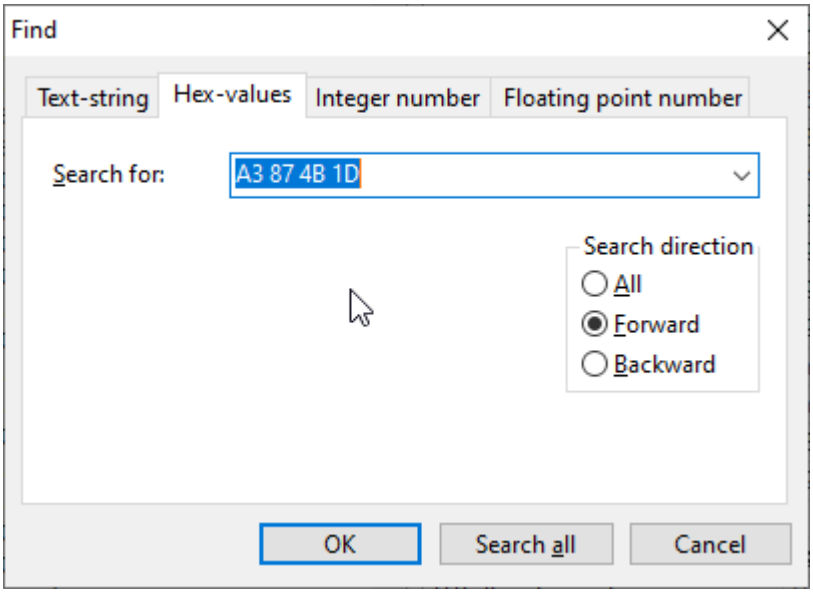
Viewing and saving textures with Blacksmith worked with Origins and Odyssey, early versions of Valhalla, but now it is broken.

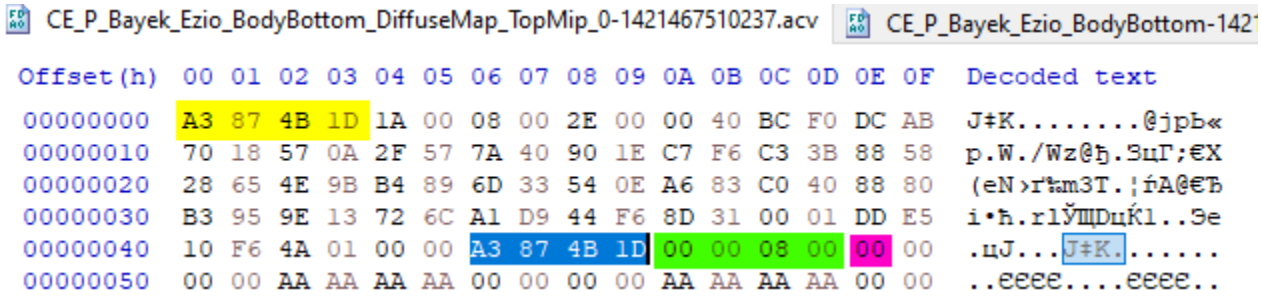
CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0-1421467510237.acv

Open acv in hex file editor.

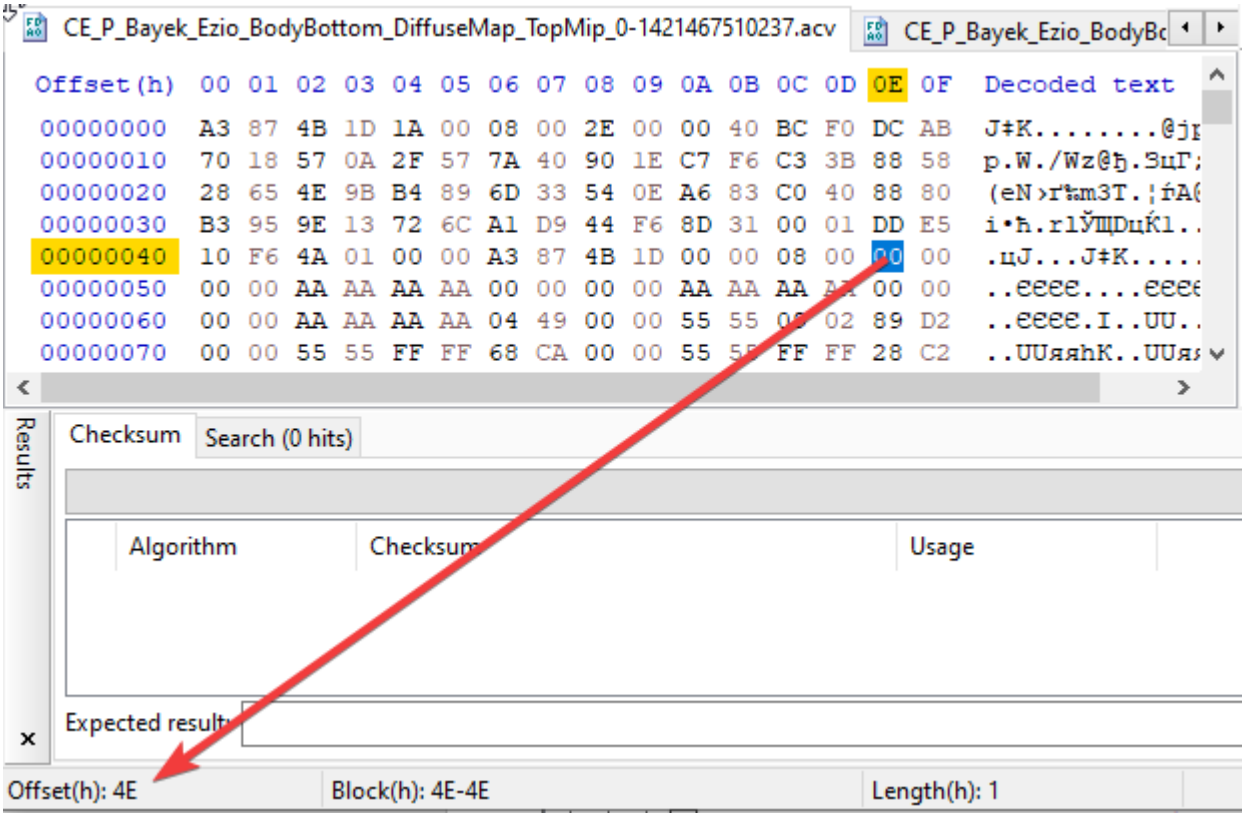
How to find hex offsets for Mip 0 and Mip 1 (they are the same so you have to find only one of them):

Find the second occurrence of this values - "A3 87 4B 1D"



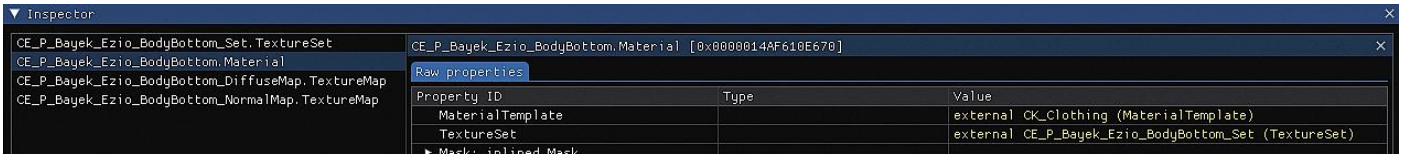


Skip 4 bytes after second occurrence – 4E is offset, from here starts dds data.



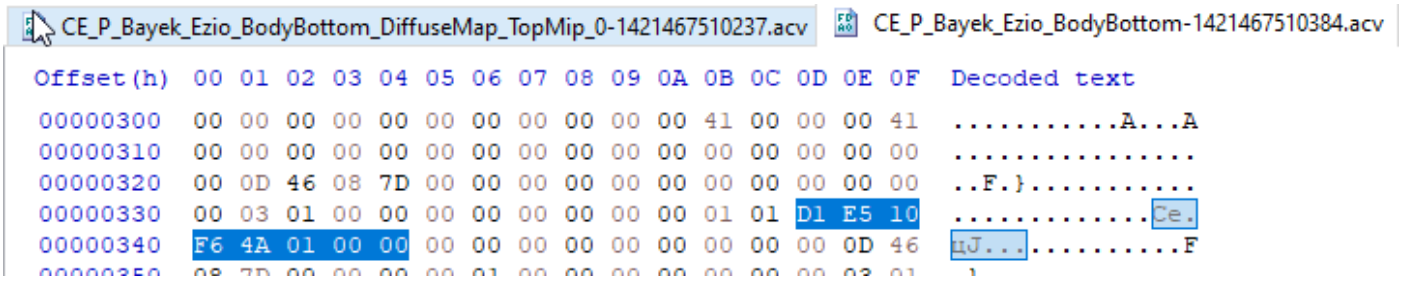
Now we also must find file CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap, which contain default texture. It name can be like *Set or *TextureSet or *TextureMap.

The possible problem is that it is embedded into another file of material type, as in this case. We can investigate this with ACViewer:

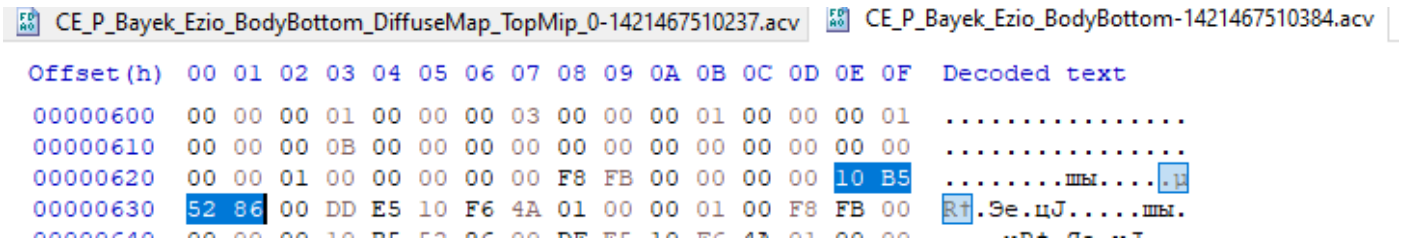


In this case file is CE_P_Bayek_Ezio_BodyBottom-1421467510384.acv (Material).

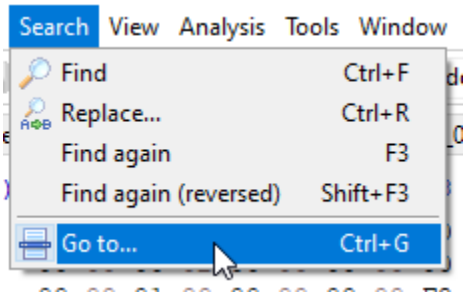
To be sure find value **0x0000014AF610E5D1**: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap in CE_P_Bayek_Ezio_BodyBottom-1421467510384.acv. 0000014AF610E5D1 = big endian D1E510F64A010000

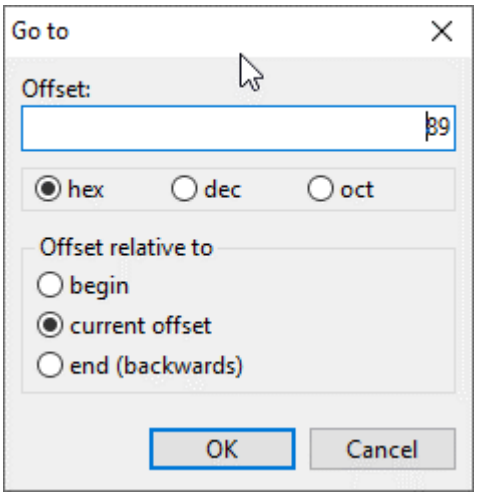


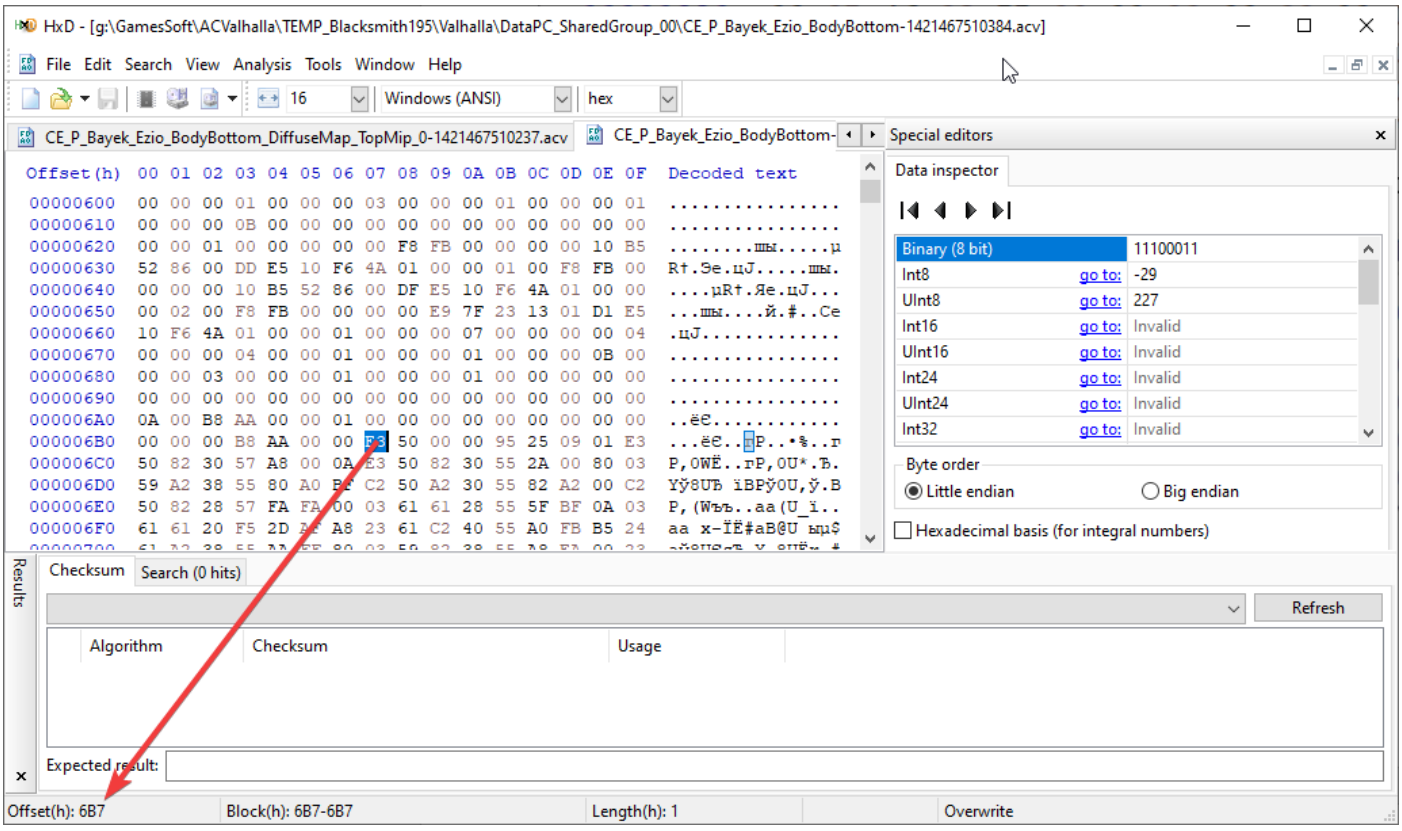
From 33D begin our TextureMap file. Find "10 B5 52 86" - it must be after 33D.



Click on the first byte ("10"). You need to move forward for 137 bytes (89 bytes in hex value).



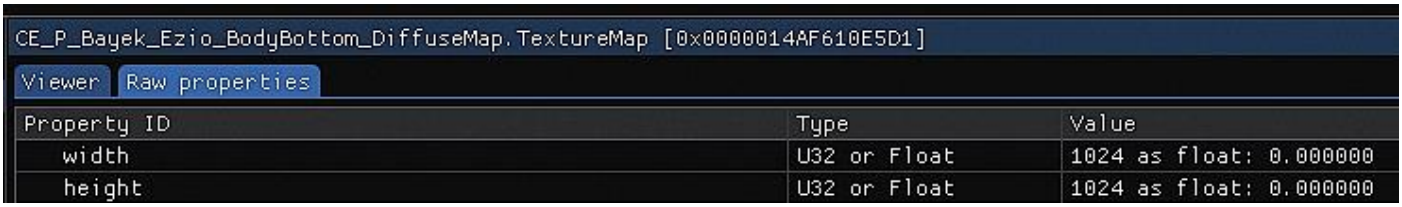




6B7 – is our offset from which all mipmaps must be written.

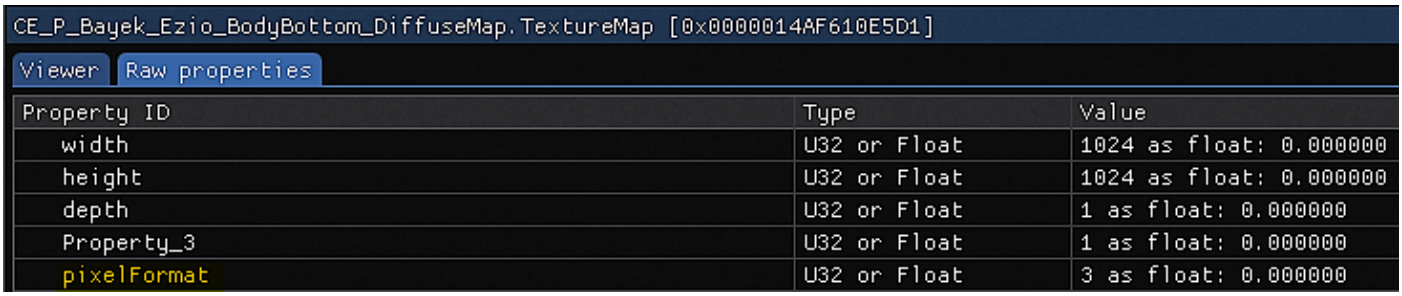
Save texture

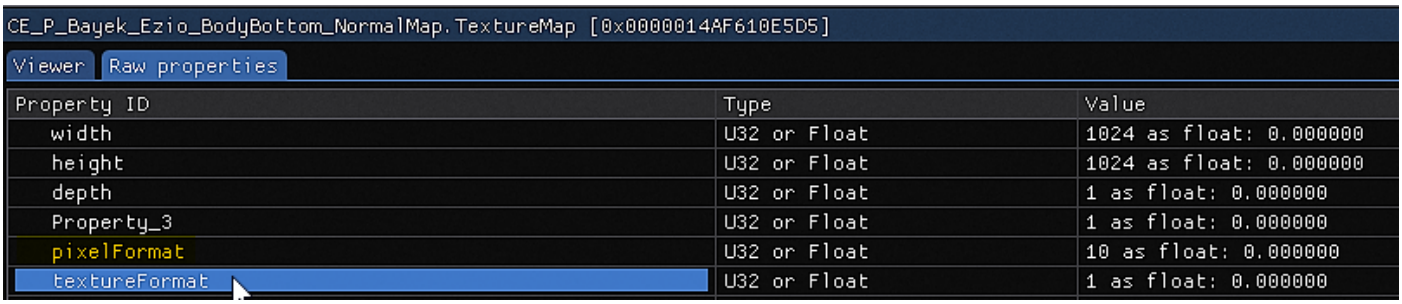
As we always need only the best quality top_0 texture, and this acv file don't contain another data after texture data, I save dds with the tool **Raw texture previewer/converter.** Enter offset 4E that we find. This tool sometimes can not define right dimensions, so we can find them in ACViewer (recommended) or just experimental way.

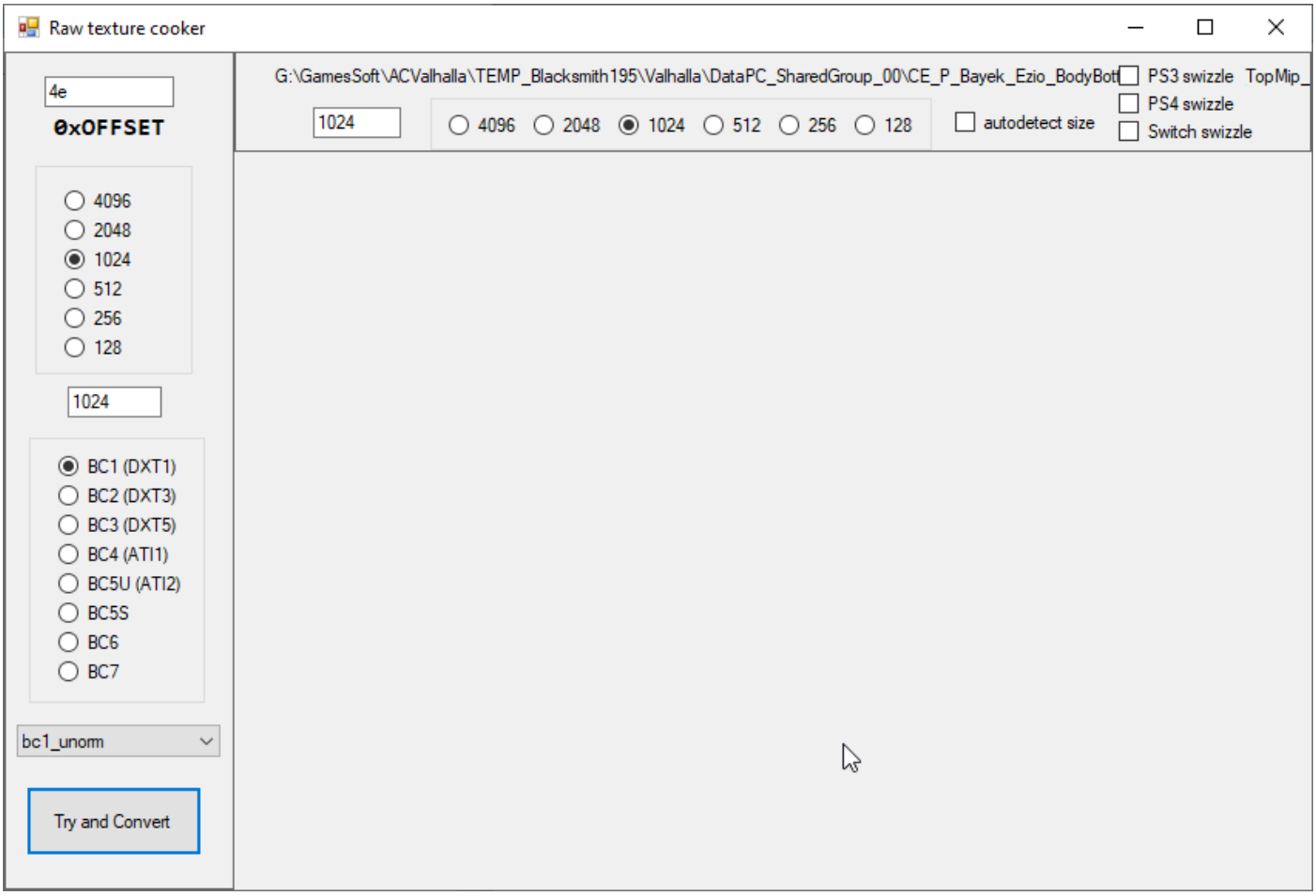


DDS format is also in properties:

Value 3 – BC1, 10 – BC7, etc. BC2 and BC3 also used in AC games.







Result - CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0-1421467510237.dds

Now we can convert it and edit as we want. To convert dds to tga/png and vice versa I use NVIDIA Texture Tools.

I prefer to save one dds file with mipmaps.

For this example, **CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.dds** is our edited texture with all mipmaps levels.

Making forger file

To understand parameters read all articles: Forger patch manager - articles by hypermorphic

Take as template file from another similar mod.

In this example we must patch tree files:

0x0000014AF610E5D1: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.TextureMap

We must patch file **1421467510384** CE_P_Bayek_Ezio_BodyBottom

256 256 DataFileOffsetHex = A0080 Size = 43704 (sum of all mips from 256 to 1) Offset = 6B7

0x0000014AF610E5DD = 1421467510237: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_0.CompiledMip

1024 1024 DataFileOffsetHex = 80 Size = 524288 (it's 1024x1024 / 2) Offset = 4E

0x0000014AF610E5DF = 1421467510239: CE_P_Bayek_Ezio_BodyBottom_DiffuseMap_TopMip_1.CompiledMip

512 512 DataFileOffsetHex = 80080 Size = 131072 (it's 512x512 / 2) Offset = 4E

DataFileOffsetHex is 80 for BC1,BC2, BC3 and 94 for BC7 (DXT10).

All occurrences of these files in all forger files must be patched. I know, that it was not necessary in Odyssey it was possible to patch only newest forger file, but in Valhalla it not clear, as I was informed of side effect of Ireland forger on England. So I recommend to patch all.

The lines in forger for DataPC_SharedGroup_00.forge will be:

{"File":"DataPC_SharedGroup_00.forge","FileID":1421467510237,"Edits":[{"OffsetHex":"4E","DataFile":"
CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.dds ","DataFileOffsetHex":"80","DataFileSize":524288}]},

{"File":"DataPC_SharedGroup_00.forge","FileID":1421467510239,"Edits":[{"OffsetHex":"4E","DataFile":"
CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.dds ","DataFileOffsetHex":"80080","DataFileSize":131072}]},

{"File":"DataPC_SharedGroup_00.forge","FileID":1421467510384,"Edits":[{"OffsetHex":"6B7","DataFile":"
CE_P_Bayek_Ezio_BodyBottom_DiffuseMap.dds ","DataFileOffsetHex":"A0080","DataFileSize":43704}]},

Few words about game updates

It must be clear, that Ubisoft don't support modding in any way. One of the obvious reasons – their online in-game store. So new game versions can contain files with new formats or encryption that will break work of tools and mods. I recommend making backup of all game files before running game update and never turn on autoupdate.

Useful links

Mesh swapping (How to) by tholwin

How to find hex offsets for DiffuseMap files by tholwin

Modder's pack by Makacha (pdf manual)

Forger patch manager - articles by hypermorphic