How To Enable the GFHB Functionality of Adaptive LED Headlights on US F3x/F8x Cars

*****Note: F3x = 3-/ 4-series & F8x = M3/ M4s. See F15 for Crossovers (F15/F16/F85/F86)*****

Revised: Setember 12, 2015

1 Glare-Free High Beam: What Is It?[1]

Glare-free high beam [GFHB] is a camera-driven dynamic lighting control strategy that selectively shades spots and slices out of the high beam pattern to protect other road users from glare, while always providing the driver with maximum seeing range. The area surrounding other road users is constantly illuminated at high beam intensity, but without the glare that would result from using uncontrolled high beams in traffic. This constantly changing beam pattern requires complex sensors, microprocessors and actuators, because the vehicles which must be shadowed out of the beam are constantly moving. The dynamic shadowing can be achieved with movable shadow masks shifted within the light path inside the headlamp, or the effect can be achieved by selectively darkening addressable LED emitters or reflector elements, a technique known as *pixel light*.

The first mechanically-controlled (non-LED) GFHB was the *Dynamic Light Assist* package introduced in 2010 on the Volkswagen Touareg, Phaeton and Passat. In 2012, the facelift Lexus LS (XF40) introduced an identical Bi-Xenon system: the *Adaptive High-Beam System*.

The first mechanically-controlled LED GFHB was introduced in 2012 on the BMW 7 Series: the *Selective Beam* (or *Anti-Dazzle High-Beam Assistant*). In 2013 Mercedes-Benz introduced the same LED system: the *Adaptive Highbeam Assist Plus*.

The first digitally-controlled LED GFHB was introduced in 2013 on the Audi A8.

2 Cool: Do I have It On My US F3x/F8x?

Due to archaic regulations, all North American (NA) cars have GFHB disabled at the factory, even if this feature is available on similar cars delivered to other markets. The High-Beam Assistant (HBA) functionality that is available on NA cars simply turns the high beams on/off automatically, but does not include GFHB.

Nevertheless, GFHB can be re-enabled through coding on NA BMW cars that are equipped with both Adaptive LED Headlights (option code 552) and HBA (option code 5AC).[2]

3 I Am All Ears: What Do I Need To Code?

The three coding steps that are required to enable GFHB on F3x/F8x cars are described in the Appendix.[3] Basically, the combined effect of these three steps is to set the coding parameters that are relevant for the

[1] This Section is sourced from the Wikipedia article titled *Headlamp*.

[2] Unfortunately, adaptive Xenon headlights fitted by BMW on US cars lack the required movable mask (or *walze* in German) needed for the dynamic shadowing and thus are physically incapable of supporting GFHB. By contrast, BMW adaptive LED headlights achieve the dynamic shadowing by *pixel light* and thus do not require the presence of the *walze*.

[3] Implementing these two steps requires basic familiarity with coding BMW cars. There are several excellent introductions to this on the Internet and the required software is freely available if you want to do it yourself: if you own a BMW, it is a skill well worth learning. Otherwise, just ask for the help of a BMW coder.

operation of GFHB to the same values that would have been set at the factory for a similar car sold in the European market.[4]

If you have had your car coded before July 2015 in order to enable GFHB, it is almost certain that only the first of the three required steps was implemented. While this results in the light beams moving around in response to other traffic, the dynamic shadowing is not enabled and thus the feature is not operating correctly, glaring other traffic. If you are in doubt, ask for the help of somebody with a car with a non-dimming rear view mirror: drive behind that car with GFHB active and then ask the driver if he or she was glared by your car. If the answer is affirmative, most likely Steps 2 and 3 were not implemented.

4 A Caveat

BMW has modified the LED control units on the recently-introduced F30 and F31 LCI models. The procedure to enable GFHB on these models has not yet been confirmed.

5 Credits

This note is a result of the investigational work performed by the following Bimmerfest forum members (listed in alphabetical order): dmnc02, larrylam646, Motorboat646, MarkoM3, shadowyman and shawnsheridan, as well by the members of both Bimmerfest and Bimmerpost that continued to maintain a healthy dose of skepticism that the GFHB functionality they had coded on their cars was working as designed.

A lot of additional information on GFHB can found in the Bimmerfest thread titled "*F30/F31/F32/F33 RE-coding no-dazzle high-beam assistance?*" and in the Bimmerpost thread titled "*Adaptive LED lighting turned on–wow*".

[4]Specifically, Step 2 enables dynamic shadowing, while Step 3 tweaks the aim of the headlights when GFHB is active.

Appendix

Below are the steps required to correctly enable GFHB on F3x/F8x cars.

Step 1:

Remove 5AP and 8S4 from the VO and VO code the following ECUs: FEM_BODY, FLA or KAFAS (whichever is present), both TMS and both LHM.

Step 2:

Change the values of the 16 functions in the following table from the "US VO Value" (which is what you should have after performing Step 1 above) to the corresponding "ECE VO Value" and confirm that the Werte matches the value in the last column of the table.

Make sure you pay attention to which ECU (LHM [43] or LHM [44]) you are editing.

For the function M3 in LHM [44], if you do not see a preset option labeled "Unknown" which gives you the correct Werte, just select any preset option and edit the Werte directly: the option name will change to "Unknown" automatically.

ECU	Function	US VO Value	Werte	ECE VO Value	Werte
LHM [43]	M1	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F030	FA 64 00 00 FA FA 00
LHM [43]	M2	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F030	FA 64 00 00 FA FA 00
LHM [43]	M3	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F030	FA 00 00 19 FA FA 00
LHM [43]	M4	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F030	FA 00 00 00 C8 C8 00
LHM [43]	M14	init_US_F030	FA 4B 7D 00 C8 C8 FA	init_ECE_F030	FA 00 FA 00 FA FA 00
LHM [43]	M15	init_US_F030	FA 4B 7D 00 C8 C8 FA	init_ECE_F030	FA FA FA 00 FA FA FA
LHM [44]	M1	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M2	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M3	init_US_F025	FA FA 00 00 C8 C8 00	Unknown	FA FA 00 19 FA FA 00
LHM [44]	M4	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F030	FA 00 00 00 C8 C8 00
LHM [44]	M6	init_ECE_F030_RL	FA FA 00 00 C8 C8 00	init_ECE_F030	FA FA 00 00 FA FA 00
LHM [44]	M7	init_ECE_F030_RL	FA FA 00 00 C8 C8 00	init_ECE_F030	FA FA 00 00 FA FA 00
LHM [44]	M8	init_ECE_F030_RL	FA FA 00 00 C8 C8 00	init_ECE_F030	FA FA 00 00 FA FA 00
LHM [44]	M9	init_ECE_F030_RL	FA FA 00 00 C8 C8 00	init_ECE_F030	FA FA 00 00 FA FA 00
LHM [44]	M14	Unknown	FA FA 7D 00 C8 C8 FA	init_ECE_F030	FA FA FA 00 FA FA 00
LHM [44]	M15	Unknown	FA FA 7D 00 C8 C8 FA	init_ECE_F030	FA FA FA 00 FA FA FA

Step 3:

Change the values of the 5 functions in the following table (all located in FEM_BODY) from the "US VO Value" (which is what you should have after performing Step 1 above) to the corresponding "ECE VO Value" and confirm that the Werte matches the value in the last column of the table.

For the first three functions, if you do not see a preset option labeled "Unknown" which gives you the correct Werte, just select any preset option and edit the Werte directly: the option name will change to "Unknown" automatically.

The functions denoted by an asterisk have ECE VO values that have been revised by BMW since the previous version of this document.

	Function	US VO Value	Werte	ECE VO Value	Werte
*	LUT_AFS_CODRV_VERT	F030_[...]_LED	00 00 EB 15 00 00 0A 15 1F	Unknown	00 00 00 15 00 00 0A 15 1F
*	LUT_HBA_DRV_VERT	F030_[...]_LED_US	00 00 00 00 00 00	Unknown	2E 3B 00 00 00 00
*	LUT_HBA_CODRV_VERT	F030_[...]_LED_US	00 00 00 00 00 00	Unknown	2E 3B 00 00 00 00
	LUT_HBA_DRV_HOR	F030_[...]_LED_US	00 00 00 00 00 0A	F030_[...]_LED_ECE	00 00 00 00 00 00
	LUT_HBA_CODRV_HOR	F030_[...]_LED_US	00 00 00 00 00 F6	F030_[...]_LED_ECE	00 00 00 00 00 00

Note that the following abbreviations are used in the table above:

- F030_[...]_LED stands for F030_F32/33/36/80/82/83_LED,
- F030_[...]_LED_US stands for F030_F32/F33/F36/F80/F82/F83_LED_US
- F030_[...]_LED_ECE stands for F030_F32/F33/F36/F80/F82/F83_LED_ECE.