

How To Enable the GFHB Functionality of Adaptive LED Headlights on US F15/F16/F85/F86 Cars

December 14, 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 F15?

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).

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

F15 vehicles produced between September 2013 and June 2015 have different headlights and different ECUs from 2016 F15 vehicles produced since July 2016. Therefore, the coding procedure is different.

The two coding steps required to enable GFHB on pre-2016 F15 vehicles are described in Appendix 1 and the two coding steps required to enable GFHB on 2016 F15 vehicles are described in Appendix 2.² Basically,

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

²Implementing these steps requires basic familiarity with coding BMW cars. There are several excellent introductions to

the combined effect of these steps is to set the coding parameters that are relevant for the operation of GFHB to the same values that would have been set at the factory for a similar car sold in the European market, while at the same time adjusting, in the case of pre-2015 vehicles, for the lack of cornering lights on US vehicles.

If you have had your F15 coded before December 2015 in order to enable GFHB, it is almost certain that only the first of the 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 only the first coding step was implemented.

4 Credits

This note is a result of the investigational work performed by the following Bimmerfest forum members (listed in alphabetical order): delviacv2, dmnc02, waynes1982 and 2014_F15, 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. Shawnsheridan provided the key insight of looking at the ECE VO values.

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*”.

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.

Appendix 1

Below are the steps required to fully enable GFHB on pre-2016 F15 cars.

Step 1:

Remove 5AP and 8S4 from the VO and VO code the following ECUs: BDC_BODY, either 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 [43] and LHM [44], start by selecting init_ECE_F015 and then edit the Werte directly so as to change the 4th byte from 19 to 00: the literal value will automatically appear as “Unknown” the next time you read the coded values in the LHM ECUs.

ECU	Function	US VO Value	Werte	ECE VO Value	Werte
LHM [43]	M1	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA 64 00 00 00 FA 00
LHM [43]	M2	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA 64 00 00 00 FA 00
LHM [43]	M3	init_US_F015	FA FA 00 00 00 C8 00	Unknown	FA 00 00 00 00 FA 00
LHM [43]	M4	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA 00 00 00 00 C8 00
LHM [43]	M14	init_US_F015	FA 4B 7D 00 00 C8 FA	init_ECE_F015	FA 00 FA 00 00 FA 00
LHM [43]	M15	init_US_F015	FA 4B 7D 00 00 C8 FA	init_ECE_F015	FA FA FA 00 00 FA FA
LHM [44]	M1	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M2	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M3	init_US_F015	FA FA 00 00 00 C8 00	Unknown	FA BB 00 00 00 FA 00
LHM [44]	M4	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA 00 00 00 00 C8 00
LHM [44]	M6	init_ECE_F015_RL	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M7	init_ECE_F015_RL	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M8	init_ECE_F015_RL	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M9	init_ECE_F015_RL	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M14	init_US_F015	FA 4B 7D 00 00 C8 E1	init_ECE_F015	FA FA FA 00 00 FA 00
LHM [44]	M15	init_US_F015	FA 4B 7D 00 00 C8 E1	init_ECE_F015	FA FA FA 00 00 FA FA

Appendix 2

Below are the steps required to fully enable GFHB on 2016 F15 cars.

Step 1:

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

Step 2:

In each FLE, change the values of the 5 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.

Function	US VO Value	Werte	ECE VO Value	Werte
Stadt_V_Idx	F015Wert_SA552_SAE	01 01 01 01 02 03 01 01 01 01	F015Wert	04 01 01 01 02 03 01 01 05 01
SAE_Idx	F015Wert_SA552_SAE	01 01 01 01 02 03 01 01 01 01	F015Wert	04 01 01 01 02 03 01 01 01 01
H_plus4_Idx	F015Wert_SA552_SAE	01 01 01 01 02 03 01 01 01 01	F010Wert_SA552_US	04 01 01 01 02 03 01 01 01 01
Blendfreies_Fernlicht_Idx	F015Wert_SA552_SAE	01 01 01 01 02 03 01 01 01 01	F015Wert	01 06 01 01 06 06 01 01 01 01
Volles_Fernlicht_Lichthupe_Idx	F015Wert_SA552_SAE	04 05 01 01 06 04 07 01 01 01	F015Wert	07 07 01 01 07 07 07 01 01 01