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

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[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*".

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[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.

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

January 8, 2016

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*.

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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 F15 vehicles produced starting July 2015. Therefore, the coding procedure is different.

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

The two coding steps required to enable GFHB on pre-July 2015 F15 vehicles are described in Appendix 1 and the two coding steps required to enable GFHB on post-July 2015 F15 vehicles are described in Appendix 2.[2] Basically, 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 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, PlayTookies, 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 initial 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*".

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[2]Implementing these 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.

Appendix 1

Below are the steps required to fully enable GFHB on F15 vehicles produced before July 1, 2015.

Step 1:

Remove 5AP and 8S4 from the FA/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_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M7	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M8	init_US_F015	FA FA 00 00 00 C8 00	init_ECE_F015	FA FA 00 00 00 FA 00
LHM [44]	M9	init_US_F015	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 F15 vehicles produced after July 1, 2015.

Step 1:

Remove 5AP and 8S4 from the FA/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 22 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. Note that `Volles_Fernlicht_[...]_Idx` stands for `Volles_Fernlicht__Lichthupe_Idx`.

For the function `SIDEMRKLGT_Idx`, edit the Werte directly so as to change the 4th byte from 0C to 0F: the literal value will automatically appear as `Unknown` the next time you read the coded values in the FLE ECUs.

Do not change `CORNL_Idx`.

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	F015Wert	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_[...]_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
DRL_Idx	F015Wert_SA552_SAE	01 01 09 01 01 01 01 01 01 08	F015Wert	01 01 0A 01 01 01 01 01 01 0B
POLI1_Idx	F015Wert_SA552_SAE	01 01 0A 01 01 01 01 01 01 08	F015Wert	01 01 0C 01 01 01 01 01 01 0B
POLI2_Idx	F015Wert_SA552_SAE	01 01 0A 01 01 01 01 01 01 08	F015Wert	01 01 0C 01 01 01 01 01 01 0B
POLI3_Idx	F015Wert_SA552_SAE	01 01 0A 01 01 01 01 01 01 08	F015Wert	01 01 0C 01 01 01 01 01 01 0B
PLI_Idx	F015Wert_SA552_SAE	01 01 0A 01 01 01 01 01 01 08	F015Wert	01 01 0C 01 01 01 01 01 01 0B
WELL1_Idx	F015Wert_SA552_SAE	01 01 0B 08 01 01 01 01 01 08	F015Wert	01 01 0E 01 01 01 01 01 01 0B
WELL2_Idx	F015Wert_SA552_SAE	01 01 0B 08 01 01 01 01 01 08	F015Wert	01 01 0E 01 01 01 01 01 01 0B
WELL3_Idx	F015Wert_SA552_SAE	01 0C 01 08 01 01 01 01 01 08	F015Wert	01 0F 01 01 01 01 01 01 01 0B
WELL4_Idx	F015Wert_SA552_SAE	01 0C 01 08 01 01 0C 01 01 08	F015Wert	01 0F 01 01 01 01 0F 01 01 0B
FMH_Idx	F015Wert_SA552_SAE	0D 01 0B 08 0E 0D 01 01 01 08	F015Wert	10 01 0E 01 10 10 01 01 01 0B
REMLI_Idx	F015Wert_SA552_SAE	0D 01 0B 08 0E 0D 01 01 01 08	F015Wert	10 01 0E 01 10 10 01 01 01 0B
HBBLINK_Idx	F015Wert_SA552_SAE	01 01 01 01 01 01 01 01 01 01	F015Wert	0F 08 0F 01 0F 0F 08 01 01 0B
DWABLINK_Idx	F015Wert_SA552_SAE	01 01 0C 01 01 01 01 0C 01 08	F015Wert	01 01 01 01 01 01 01 0F 01 01
PANICMODE_Idx	F015Wert_SA552_SAE	01 01 0C 01 01 01 01 0C 01 08	F015Wert	01 01 01 01 01 01 01 01 01 01
RAIDALARM_Idx	F015Wert_SA552_SAE	01 01 01 01 01 01 01 01 01 01	F015Wert	01 08 0F 01 01 01 08 0F 01 11
BLINKEN_Idx	F015Wert_SA552_SAE	01 01 01 01 01 01 01 0C 01 0F	F015Wert	01 01 01 01 01 01 01 0F 01 11
SIDEMRKLGT_Idx	F015Wert_SA552_SAE	01 01 01 0C 01 01 01 01 01 01	Unknown	01 01 01 0F 01 01 01 01 01 01

In addition, in each FLE, change the values of the 79 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
HlPrjLabel_HlType	F015Wert_SA552_SAE	0B	F015Wert	0A
LmmIdx00_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx02_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx03_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx04_Intensity	F015Wert_SA552_SAE	64	F015Wert	00
LmmIdx04_TimeOn	F015Wert_SA552_SAE	01	F015Wert	04
LmmIdx04_TimeOff	F015Wert_SA552_SAE	01	F015Wert	04
LmmIdx04_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx05_Intensity	F015Wert_SA552_SAE	4F	F015Wert	2E
LmmIdx05_TimeOn	F015Wert_SA552_SAE	01	F015Wert	04
LmmIdx05_TimeOff	F015Wert_SA552_SAE	01	F015Wert	04
LmmIdx05_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx06_Intensity	F015Wert_SA552_SAE	5D	F015Wert	64
LmmIdx06_TimeOn	F015Wert_SA552_SAE	01	F015Wert	04
LmmIdx06_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx07_Priority	F015Wert_SA552_SAE	02	F015Wert	01
LmmIdx07_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx09_Intensity	F015Wert_SA552_SAE	64	F015Wert	2E
LmmIdx09_Priority	F015Wert_SA552_SAE	02	F015Wert	03
LmmIdx09_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx10_Intensity	F015Wert_SA552_SAE	29	F015Wert	64
LmmIdx10_Priority	F015Wert_SA552_SAE	03	F015Wert	02
LmmIdx11_Intensity	F015Wert_SA552_SAE	29	F015Wert	64
LmmIdx11_Priority	F015Wert_SA552_SAE	04	F015Wert	03
LmmIdx11_ErrorImpact	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx12_Intensity	F015Wert_SA552_SAE	64	F015Wert	29
LmmIdx12_Priority	F015Wert_SA552_SAE	01	F015Wert	03
LmmIdx12_ErrorImpact	F015Wert_SA552_SAE	00	F015Wert	01
LmmIdx13_TimeOn	F015Wert_SA552_SAE	04	F015Wert	08
LmmIdx13_TimeOff	F015Wert_SA552_SAE	04	F015Wert	19
LmmIdx13_Priority	F015Wert_SA552_SAE	0A	F015Wert	01
LmmIdx14_Intensity	F015Wert_SA552_SAE	5D	F015Wert	29
LmmIdx14_TimeOn	F015Wert_SA552_SAE	04	F015Wert	00
LmmIdx14_TimeOff	F015Wert_SA552_SAE	04	F015Wert	00
LmmIdx14_Priority	F015Wert_SA552_SAE	0A	F015Wert	04
LmmIdx14_ErrorImpact	F015Wert_SA552_SAE	00	F015Wert	01
LmmIdx15_Intensity	F015Wert_SA552_SAE	00	F015Wert	64
LmmIdx15_Active	F015Wert_SA552_SAE	01	F015Wert	00
LmmIdx16_Intensity	F015Wert_SA552_SAE	00	F015Wert	64
LmmIdx16_TimeOn	F015Wert_SA552_SAE	00	F015Wert	04
LmmIdx16_TimeOff	F015Wert_SA552_SAE	00	F015Wert	04
LmmIdx16_Priority	F015Wert_SA552_SAE	0F	F015Wert	0A
LmmIdx17_Priority	F015Wert_SA552_SAE	0F	F015Wert	01
LmmIdx17_Active	F015Wert_SA552_SAE	00	F015Wert	01
LmmIdx18_Intensity	F015Wert_SA552_SAE	00	F015Wert	5B
LmmIdx18_TimeOn	F015Wert_SA552_SAE	00	F015Wert	04
LmmIdx18_TimeOff	F015Wert_SA552_SAE	00	F015Wert	04
LmmIdx18_Priority	F015Wert_SA552_SAE	0F	F015Wert	01
LmmReLut_LgtFct0	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_LogLmpLow0	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx0	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LgtFct1	F015Wert_SA552_SAE	00	F015Wert	02
LmmReLut_LogLmpLow1	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx1	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LgtFct2	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LogLmpLow2	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx2	F015Wert_SA552_SAE	00	F015Wert	12
LmmReLut_LgtFct3	F015Wert_SA552_SAE	00	F015Wert	0D
LmmReLut_LogLmpLow3	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx3	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LgtFct4	F015Wert_SA552_SAE	00	F015Wert	0E
LmmReLut_LogLmpLow4	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx4	F015Wert_SA552_SAE	00	F015Wert	0F
LmmReLut_LgtFct5	F015Wert_SA552_SAE	00	F015Wert	06
LmmReLut_LogLmpLow5	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_LogLmpHigh5	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx5	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LgtFct6	F015Wert_SA552_SAE	00	F015Wert	07
LmmReLut_LogLmpLow6	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_LogLmpHigh6	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx6	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LgtFct7	F015Wert_SA552_SAE	00	F015Wert	08
LmmReLut_LogLmpLow7	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_LogLmpHigh7	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx7	F015Wert_SA552_SAE	00	F015Wert	03
LmmReLut_LgtFct8	F015Wert_SA552_SAE	00	F015Wert	09
LmmReLut_LogLmpLow8	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_LogLmpHigh8	F015Wert_SA552_SAE	00	F015Wert	01
LmmReLut_Idx8	F015Wert_SA552_SAE	00	F015Wert	03

How To Enable the GFHB Functionality of Adaptive LED Headlights on US F25/F26 Cars

December 22, 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 F25?

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?

The three coding steps required to fully enable GFHB on F25 vehicles are described in the Appendix.[2] Basically, the combined effect of these steps is to set the coding parameters that are relevant for the operation

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

[2]Implementing these 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.

of GFHB to the same values that would have been set at the factory for a similar car sold in the European markets.

If you have had your F25 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/Bimmerpost forum members (listed in alphabetical order): anubus12, dmnc02 and jponline77, 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*".

Appendix

Below are the steps required to fully enable GFHB on F25 cars.

Step 1:

Remove 5AP and 8S4 from the FA/VO and VO code the following ECUs: FRM, 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.

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_F025	FA 64 00 00 FA FA 00
LHM [43]	M2	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA 64 00 00 FA FA 00
LHM [43]	M3	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA 00 00 00 FA FA 00
LHM [43]	M4	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA 00 00 00 C8 C8 00
LHM [43]	M14	init_US_F025	FA 4B 00 7D C8 C8 FA	init_ECE_F025	FA 00 00 FA FA FA 00
LHM [43]	M15	init_US_F025	FA 4B 00 7D C8 C8 FA	init_ECE_F025	FA FA 00 FA 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	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M4	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA 00 00 00 C8 C8 00
LHM [44]	M6	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M7	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M8	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M9	init_US_F025	FA FA 00 00 C8 C8 00	init_ECE_F025	FA FA 00 00 FA FA 00
LHM [44]	M14	init_US_F025	FA FA 00 7D C8 C8 FA	init_ECE_F025	FA FA 00 FA FA FA 00
LHM [44]	M15	init_US_F025	FA FA 00 7D C8 C8 FA	init_ECE_F025	FA FA 00 FA FA FA FA

Step 3:

In FRM, change the values of the 2 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
LAMP_MAP_PARA_SATZ_09	BV_F025_wert_01_BFD_US	0D 12 0B A0	BV_F025_wert_99	00 00 00 00
LAMP_MAP_PARA_SATZ_10	BV_F025_wert_01_BFD_US	0E 05 0B A0	BV_F025_wert_99	00 00 00 00