GENESIS – BCM Simulink-External Lightning

LTTS
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L&T Technology Services

Details

Ver. Rel. No.	Release Date	Prepared. By	Reviewed By	To be Approved	Remarks/Revision Details
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BCM-External lightning

Requirements

Low Level Requirements:

- Head Lights and Indicators of the car should be turn off when the power is enabled.
- For Head Lights there are three modes:
  1) High Beam
  2) Low Beam
  3) Medium\Default

For all these modes the power should be Turn ON based on the Head Light Mode, one of the mode is selected

- For Indicator Power should be Enabled, when indicator mode to select whether Left, Right Indicator or Medium.
- When the car is turned off, head lights and indicators are turned off.

Research

Visibility on the road is crucial, and sometimes your headlights just won't cut it. Get everything you need for your car's external lighting at AutoZone. From headlight enclosures to light bars, from LED fog lights to side marker LEDs, we carry any car lights you need to see the road clearly.

Few things are more important than visibility on the road. This applies to more than just your car's headlights. In bad weather it can mean fog lights. Off-road it could mean an LED light bar. It could even mean making sure that there's enough license plate light to make sure your plate is easy to read. Visibility is crucial to the safety of drivers everywhere, but different lights are needed depending on where you drive. No matter where your drive takes you, AutoZone has the lights you need to get there.

If you've ever driven outside of the city, you know just how dark it can get on the highway. And it only gets darker on rural roads or off-road. Your lights should be on whenever it's dark outside, but sometimes you car's stock lighting just isn't good enough. Brighten up your ride today with top-notch exterior lighting products from AutoZone. We have the right parts for your vehicle to shine brightly in any situation.

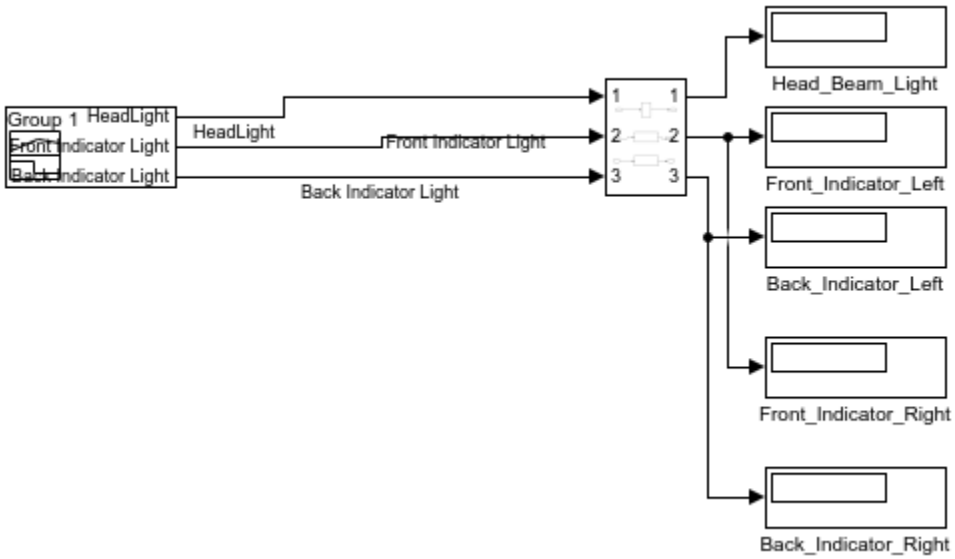
https://www.researchgate.net/publication/267706513_Development_of_Vehicle_Lighting_System_Using_LED_Application

Test plan:

SL.NO	TEST ID	DESCRIPTION	Expected input	Expected output	Actual ouput
1.	TC1	we can select the Headlight mode whether it should be in the High Beam, Low Beam High Beam Low Beam Medium Beam	 5(High Beam) 4(Low Beam) 6(Medium /Default)	 5 4 6	
2.	TC2	We can select the Front Indicator whether it should be Right or Left Indicator. In this again three modes are there High Beam Low Beam Medium Beam	 5(High Beam) 4(Low Beam) 6(Medium /Default)	 5 4 6	
3.	TC3	We can select the Back Indicator whether it should be Right or Left Indicator. In this again three modes are there High Beam Low Beam Medium Beam	 5(High Beam) 4(Low Beam) 6(Medium /Default)	 5 4 6	

MIL

ExternalLight



training

18-Dec-2020 14:12:42

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Model - ExternalLight
System - ExternalLight
System - ExternalLight/Subsystem
System - ExternalLight/Subsystem/Back_Indicator_Light
System - ExternalLight/Subsystem/Back_Indicator_Light/Back_Indicator_Right
System - ExternalLight/Subsystem/Back_Indicator_Light/Back_Indicator_Right/Subsystem

System - ExternalLight/Subsystem/Back_Indicator_Light/Back_Indicator_Right/Subsystem1
System - ExternalLight/Subsystem/Front_Indicator_Light
System - ExternalLight/Subsystem/Front_Indicator_Light/Front_Indicator_Right
System - ExternalLight/Subsystem/Front_Indicator_Light/Front_Indicator_Right/Subsystem
System - ExternalLight/Subsystem/Front_Indicator_Light/Front_Indicator_Right/Subsystem1
System - ExternalLight/Subsystem/headBeam
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Model - ExternalLight

Full Model Hierarchy

1. ExternalLight
    1. Subsystem
        1. headBeam
            1. Subsystem
            2. Subsystem1
        2. Back_Indicator_Light
            1. Back_Indicator_Right
                1. Subsystem
                2. Subsystem1
        3. Front_Indicator_Light
            1. Front_Indicator_Right
                1. Subsystem
                2. Subsystem1

Simulation Parameter	Value
Solver	VariableStepAuto
RelTol	1e-3
Refine	1
MaxOrder	5

Simulation Parameter	Value
ZeroCross	on

[more info]

System - ExternalLight

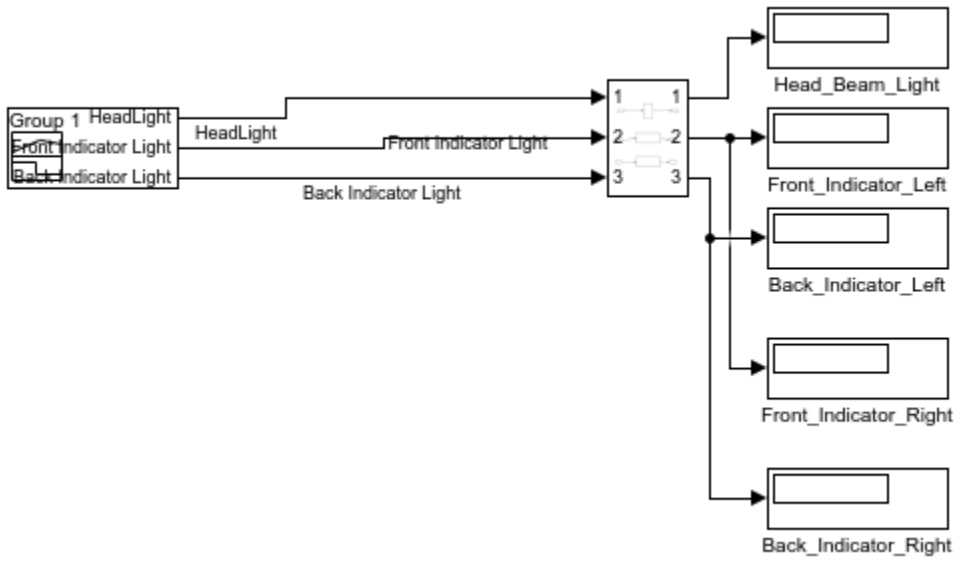

Table 1. Constant Block Properties

Name	Value	Out Data Type Str	Lock Scale	Sample Time	Frame Period
Back_Indicator_Light	2	Inherit: Inherit from 'Constant value'	off	inf	inf
Constant	1	Inherit: Inherit from 'Constant value'	off	inf	inf
Front_Indicator_Light	3	Inherit: Inherit from 'Constant value'	off	inf	inf

Table 2. Display Block Properties

Name	Format	Decimation	Floating
Back_Indicator_Left	short	1	off
Back_Indicator_Right	short	1	off
Front_Indicator_Left	short	1	off
Front_Indicator_Right	short	1	off
Head_Beam_Light	short	1	off

System - ExternalLight/Subsystem

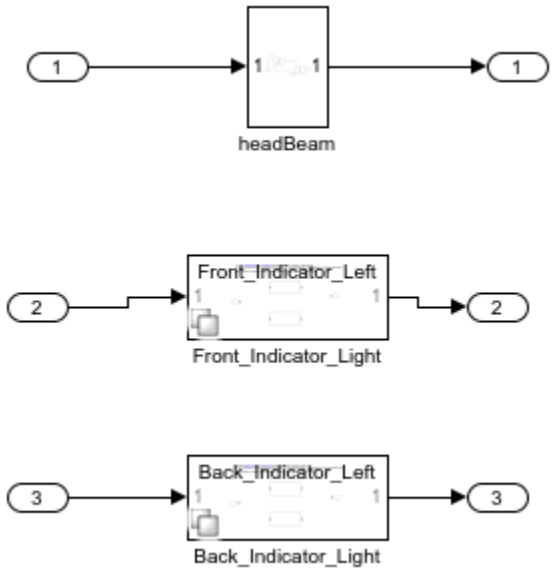

Table 3. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Constant
In2	2	Front_Indicator_Light
In3	3	Back_Indicator_Light

Table 4. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	VarSize Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Unconnected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out1	1	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Head_Beam_Light
Out2	2	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Front_Indicator_Right, Front_Indicator_Left
Out	3	Auto	Port	off	inh	Inh	aut	off	Dial	held	off	off	0	on	Back_Indicator_Right,

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
3			number		erit	erit	o		og						Back_Indicator_Left

System - ExternalLight/Subsystem/Back_Indicator_Light

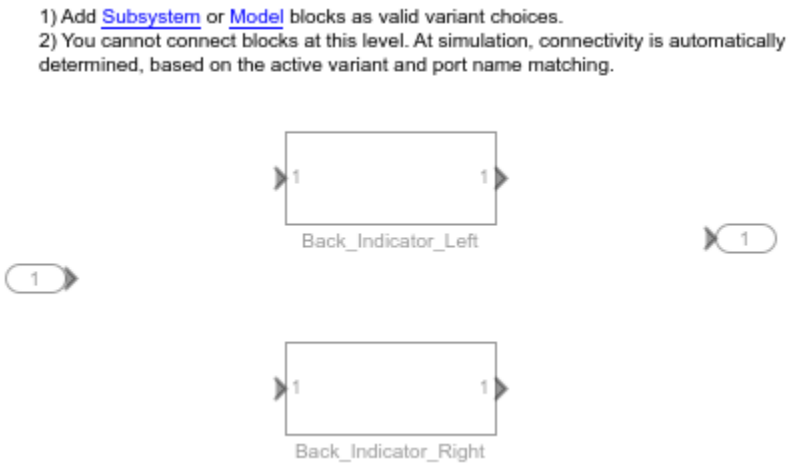

Table 5. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Unconnected

Table 6. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Unconnected

System - ExternalLight/Subsystem/Back_Indicator_Light/Back_Indicator_Right

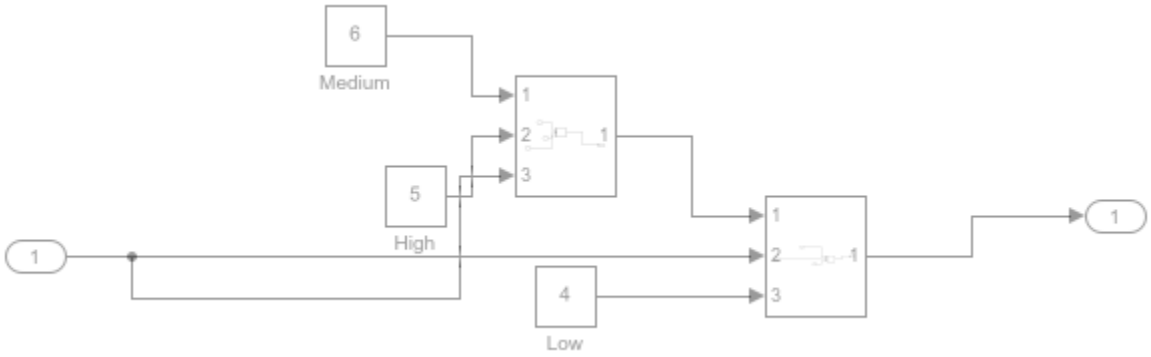

Table 7. Constant Block Properties

Name	Value	Out Data Type Str	Lock Scale	Sample Time	Frame Period
High	5	Inherit: Inherit from 'Constant value'	off	inf	inf
Low	4	Inherit: Inherit from 'Constant value'	off	inf	inf
Medium	6	Inherit: Inherit from 'Constant value'	off	inf	inf

Table 8. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Back_Indicator_Light

Table 9. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	Off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Back_Indicator_Right, Back_Indicator_Left

System - ExternalLight/Subsystem/Back_Indicator_Light/Back_Indicator_Right/Subsystem

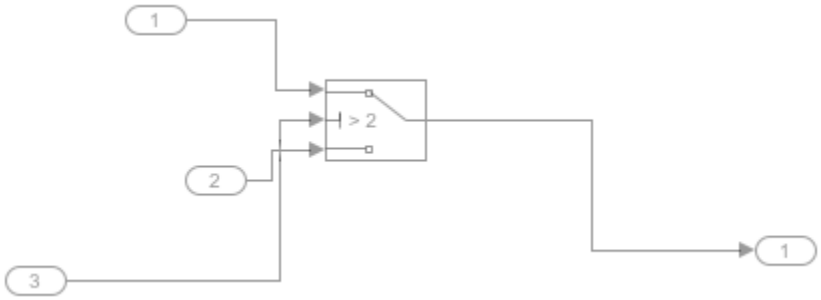

Table 10. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Medium
In2	2	High
In3	3	Back_Indicator_Light

Table 11. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Switch1

Table 12. Switch Block Properties

Name	Criteria	Threshold	Input Same DT	Out Data Type Str	Lock Scale	Rnd Meth	Saturate On Integer Overflow	Zero Cross	Allow Diff Input Sizes
Switch	u2 > Threshold	2	off	Inherit: Inherit via internal rule	off	Floor	off	on	off

System - ExternalLight/Subsystem/Back_Indicator_Light/Back_Indicator_Right/Subsystem1

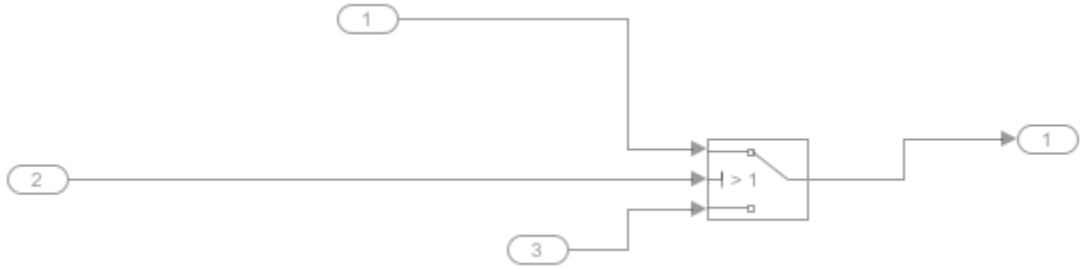

Table 13. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Switch
In2	2	Back_Indicator_Light
In3	3	Low

Table 14. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Unconnected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out1	1	Auto	Port number	off	inherit	Inherit	uto	off	Dialog	held	off	off	0	on	Back_Indicator_Right, Back_Indicator_Left

Table 15. Switch Block Properties

Name	Criteria	Threshold	Input Same DT	Out Data Type Str	Lock Scale	Rnd Meth	Saturate On Integer Overflow	Zero Cross	Allow Diff Input Sizes
Switch1	u2 > Threshold	1	off	Inherit: Inherit via internal rule	off	Flor	off	on	off

System - ExternalLight/Subsystem/Front_Indicator_Light

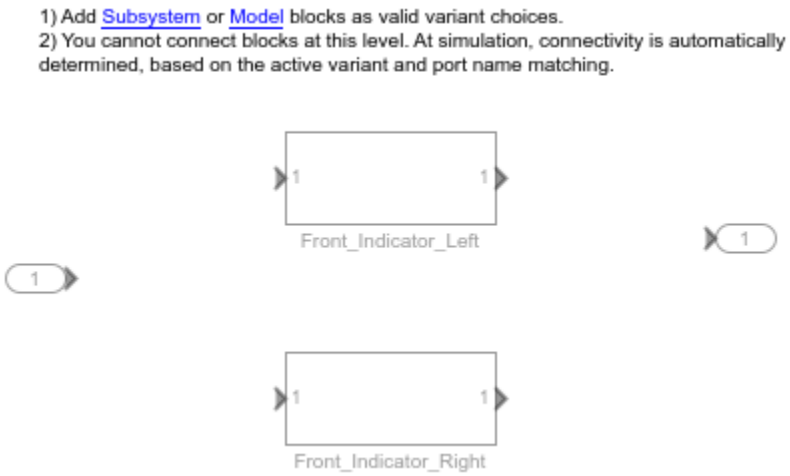

Table 16. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Unconnected

Table 17. Outport Block Properties

Name	port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Unconnected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Unconnected

System - ExternalLight/Subsystem/Front_Indicator_Light/Front_Indicator_Right

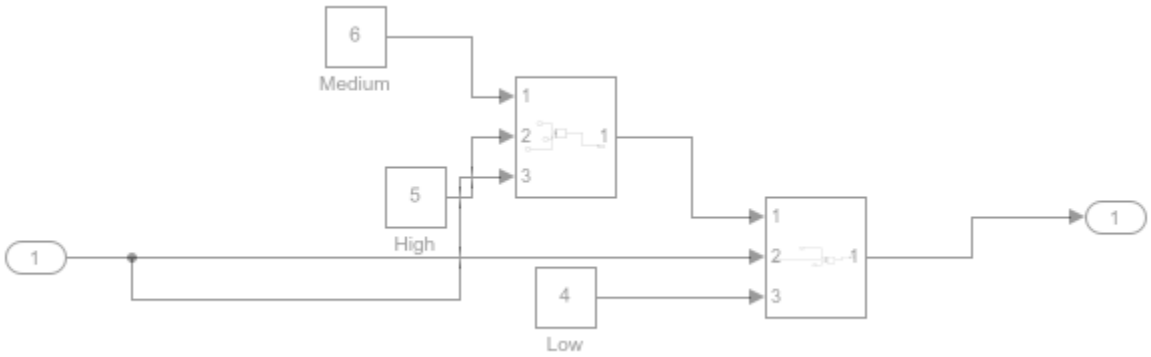

Table 18. Constant Block Properties

Name	Value	Out Data Type Str	Lock Scale	Sample Time	Frame Period
High	5	Inherit: Inherit from 'Constant value'	off	inf	inf
Low	4	Inherit: Inherit from 'Constant value'	off	inf	inf
Medium	6	Inherit: Inherit from 'Constant value'	off	inf	inf

Table 19. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Front_Indicator_Light

Table 20. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Unconnected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	Off	inherit	inherit	auto	off	Dialog	held	off	off	0	on	Front_Indicator_Right, Front_Indicator_Left

System - ExternalLight/Subsystem/Front_Indicator_Light/Front_Indicator_Right/Subsystem

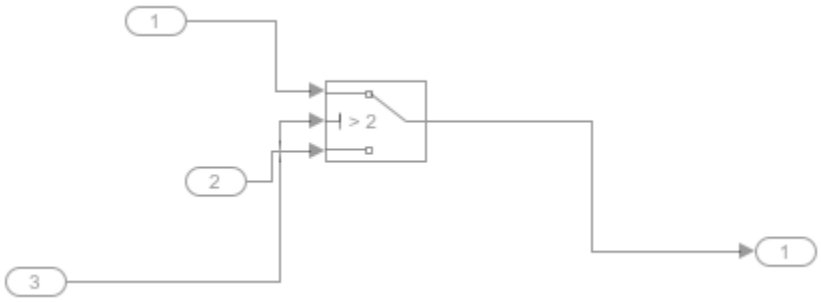

Table 21. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Medium
In2	2	High
In3	3	Front_Indicator_Light

Table 22. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Unconnected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Switch 1

Table 23. Switch Block Properties

Name	Criteria	Threshold	Input Same DT	Out Data Type Str	Lock Scale	Rnd Meth	Saturate On Integer Overflow	Zero Cross	Allow Diff Input Sizes
Switch	u2 > Threshold	2	off	Inherit: Inherit via internal rule	off	Floor	off	on	off

System - ExternalLight/Subsystem/Front_Indicator_Light/Front_Indicator_Right/Subsystem1

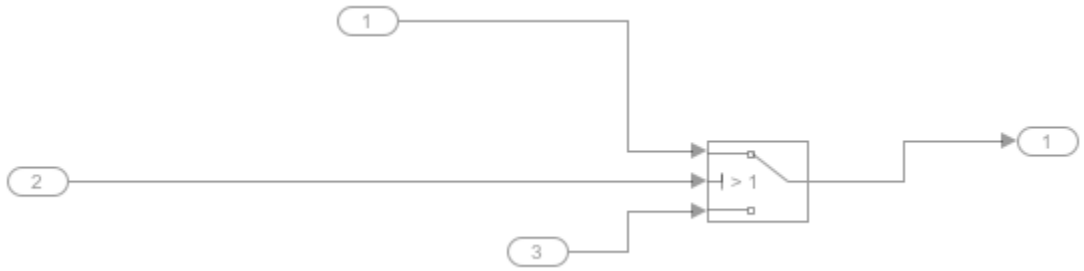

Table 24. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Switch
In2	2	Front_Indicator_Light
In3	3	Low

Table 25. Outport Block Properties

Name	port	storage Class	Icon Display	Lock Scale	nit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out1	1	uto	port number	off	inherit	inherit	auto	off	Dialog	held	off	off	0	on	Front_Indicator_Right, Front_Indicator_Left

Table 26. Switch Block Properties

Name	Criteria	Threshold	Input Same DT	Out Data Type Str	Lock Scale	Rnd Meth	Saturate On Integer Overflow	Zero Cross	Allow Diff Input Sizes
Switch1	u2 > Threshold	1	off	Inherit: Inherit via internal rule	off	Floor	off	on	off

System - ExternalLight/Subsystem/headBeam

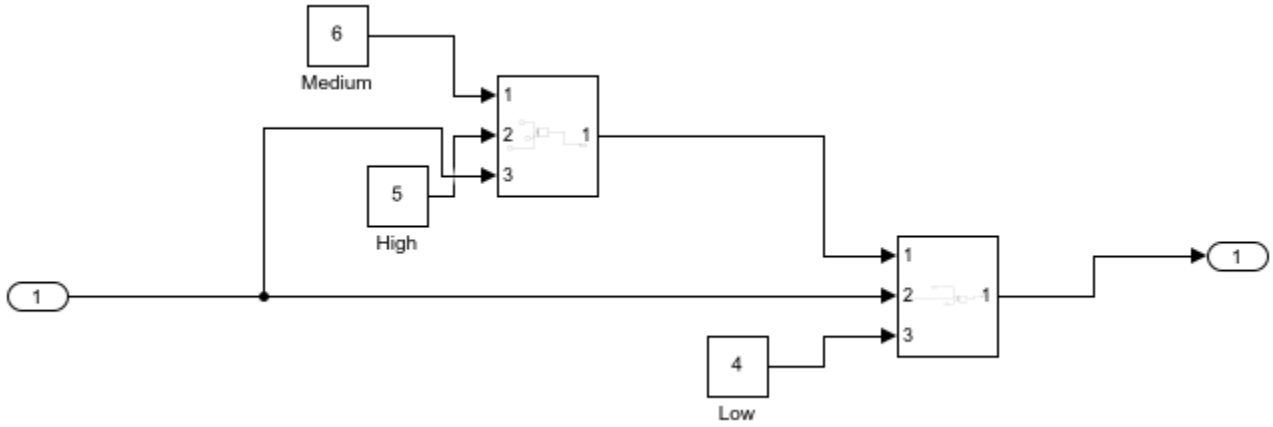

Table 27. Constant Block Properties

Name	Value	Out Data Type Str	Lock Scale	Sample Time	Frame Period
High	5	Inherit: Inherit from 'Constant value'	off	inf	inf
Low	4	Inherit: Inherit from 'Constant value'	off	inf	inf
Medium	6	Inherit: Inherit from 'Constant value'	off	inf	inf

Table 28. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Constant

Table 29. Outport Block Properties

Name	ort	Storage Class	Icon Display	Lock Scale	unit	varSize Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Blk	Used By
Out1		Auto	Port number	off	inherit	inherit	auto	off	Dialog	held	off	off	0	on	Head_Beam_Light	

System - ExternalLight/Subsystem/headBeam/Subsystem

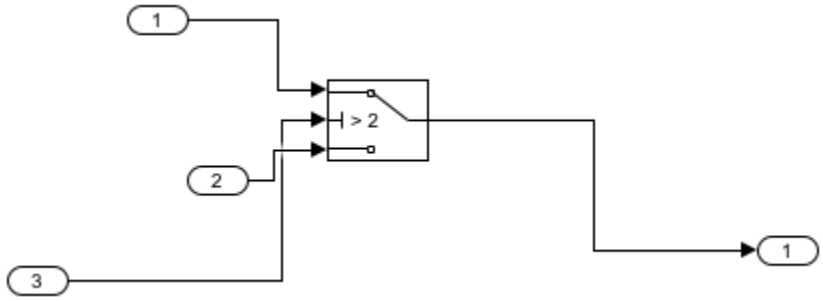

Table 30. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Medium
In2	2	High
In3	3	Constant

Table 31. Outport Block Properties

Name	Port	Storage Class	Icon Display	Lock Scale	Unit	Var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Un Connected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out 1	1	Auto	Port number	off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Switch1

Table 32. Switch Block Properties

Name	Criteria	Threshold	Input Same DT	Out Data Type Str	Lock Scale	Rnd Meth	Saturate On Integer Overflow	Zero Cross	Allow Diff Input Sizes
Switch	u2 > Threshold	2	off	Inherit: Inherit via internal rule	off	Floor	off	on	off

System - ExternalLight/Subsystem/headBeam/Subsystem1

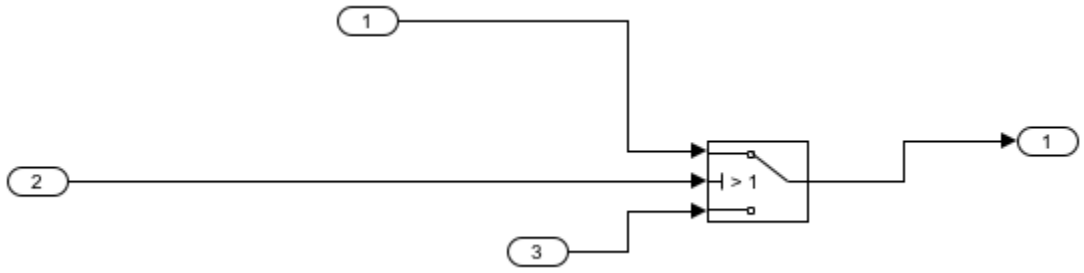

Table 33. Inport Block Properties

Name	Port	Defined In Blk
In1	1	Switch
In2	2	Constant
In3	3	Low

Table 34. Outport Block Properties

Name	port	Storage Class	Icon Display	Lock Scale	Unit	var Size Sig	Signal Type	Ensure Outport Is Virtual	Source Of Initial Output Value	Output When Disabled	Must Resolve To Signal Object	Output When Unconnected	Output When Unconnected Value	Vector Params As 1DFor Out When Unconnected	Used By Blk
Out1	1	Auto	Port number	Off	inherit	Inherit	auto	off	Dialog	held	off	off	0	on	Head_Beam_Light

Table 35. Switch Block Properties

Name	Criteria	Threshold	Input Same DT	Out Data Type Str	Lock Scale	Rnd Meth	Saturate On Integer Overflow	Zero Cross	Allow Diff Input Sizes
Switch1	u2 > Threshold	1	off	Inherit: Inherit via internal rule	off	Floor	off	on	off

Appendix

Table 36. Block Type Count

Block Type	count	Block Names
Inport	6	In1, In1, In2, In3, In1, In2, In3, In1, In1, In1, In2, In3, In1, In2, In3, In1, In1, In2, In3, In1, In1, In2, In3, In1, In2, In3
Outport	4	Out1, Out1, Out1, Out1, Out1, Out1, Out1, Out1, Out1, Out2, Out3, Out1, Out1, Out1
SubSystem	2	Subsystem, Back_Indicator_Light, Back_Indicator_Right, Subsystem, Subsystem1, Front_Indicator_Light, Front_Indicator_Right, Subsystem, Subsystem1, headBeam, Subsystem, Subsystem1
Constant	2	Back_Indicator_Light, Constant, Front_Indicator_Light, High, Low, Medium, High, Low, Medium, High, Low, Medium
Switch		Switch, Switch1, Switch, Switch1, Switch, Switch1
Display		Back_Indicator_Left, Back_Indicator_Right, Front_Indicator_Left, Front_Indicator_Right, Head_Beam_Light