Interface Document

Mobileye C2-270 & ME5

Standard CAN Output Protocol with Traffic Sign Recognition Protocol

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Approved by:	
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Change Control

Version	date	Updated by	Chapter	Essence of the change	Approved By
0.1	June 2009	Shahar Yaron	All	Initial draft	
0.2	July 2009	Guy Mizrahi	All	Secondary draft	
0.3	Nov 2009	Guy Mizrahi	All	Third revision	
0.4	Aug 2010	Guy Mizrahi Yaniv Elimelech	All	Update for C2-270 v2.6	
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0.6	Aug 2011	Guy Mizrahi	All	CAN- A connections	
0.7	June 2012	Guy Mizrahi Yaniv Elimelch	All	TSR Warning Level for v210v1.5	
0.8	Sep 2012	Guy Mizrahi Yaniv Elimelch	All	Tamper Alert	
0.9	Nov 2012	Guy M. Yaniv E.	All	Section 3.4.8	
1.0	Jan 2013	Guy M.	Appendix	Mobileye 5 CAN-A	

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1 Introduction

Integration of Mobileye's systems with Fleet Management Systems and other "Black Box" solutions

Mobileye develops, manufactures and sells Driver Assistance Systems. These Systems are installed in passenger and commercial vehicles (cars, buses and trucks). The systems provide the driver with audio and visual warnings when he is in a dangerous situation. The warnings are as follows:

FCW/PCW: (Forward Collision Warning/Pedestrian Collision Warning)

It is given when the driver is in danger of hitting the vehicle or Pedestrian in front.

UFCW: (Urban Forward Collision Warning)

UFCW is the same as above, but operates in slow-moving traffic, when a crash at low speed is imminent.

LDW: (Lane Departure Warning)

It is given whenever the driver crosses a lane marking without using the turn signal.

HMW: (Headway Monitoring and Warning)

Mobileye's products measure the distance to the car in front in seconds, and warns when the distance is not sufficiently safe.

TSR: (Traffic Sign Recognition)

The Mobileye C2 recognizes Traffic Signs on road and outputs the data in varies ways.

Available as CAN Data Output only

Available only if Protocol is enabled

Fleets of coaches, buses and trucks, as well as some passenger car fleets, often have Fleet Management Systems or other devices for collection of various kinds of data, on board. These systems collect data and/or send information about the vehicle and the driver, to the Fleet Manager.

In many cases, the Fleet Manager wants to integrate Mobileye Systems with these "Black Boxes", in order to receive information about the driver's behavior, which can easily be derived from data about the warnings that Mobileye's systems are giving.

This document describes the stages of such integration. The integration work must be done by Mobileye's partner, i.e. the FMS vendor, with guidance and help from Mobileye.

This document also describes the Mobileye CAN Output protocols that are used to send out information and measurements from the Mobileye C2 system. The Protocols may be used by a third party that wants to integrate our system into their system (such as Fleet Management).

1.1 Purpose

The purpose of this document is to define the Integration process different stages to allow easy and simple integration.

1.2 Scope

This document applies to code residing in the ME.AfterMarket tree for version 2.8.2.8

1.3 Acronyms and Terminology

Term	Description
ME	Mobileye
CAN	Controller Area Network
C2	Mobileye C2 Driver Assistance System
SeeQ	VDU – video unit of C2-270 system. Includes EyeQ chip, camera and peripheral interfaces.
FMS	Fleet Management System
CIPV	close in path vehicle
LDW	Lane Departure Warning
FCW	Forward Collision Warning
PCW	Pedestrian Collision Warning
HMW	Headway Monitor Warning
Peds	Pedestrian (Predestination detection)
DZ	Danger Zone (for Pedestrians detection)
VCU	Visual Control Unit
DA	Destination Address
TSR	Traffic Sign Recognition
TS	Traffic Sign

2 Stages of the Integration Project

Stage 1:

Familiarization with the Mobileye C2-270 Output Data Protocol.

Stage 2:

Mutual decision with Mobileye on the best way to perform the integration.

Stage 3:

Mobileye will provide basic software tools to begin Integration at a laboratory level.

Stage 4:

The FMS integrator will present to Mobileye a complete and comprehensive document describing in detail the integrated CAN Protocol.

Stage 5:

Mobileye and the FMS integrator will exchange system for mutual testing.

Stage 6:

Mobileye will test the final product Offline and On-Road and approve the integration.

Time Frame

The Integration process should take about 3 weeks for one software engineer working on this project at the integrator partner lab.

3 Stages 1: MOBILEYE C2-270 CAN Output Protocols

The below interface document, called "C2-270 Output Protocol", describes in detail the kind of data that can be obtained from the Mobileye system. This should be read by the Mobileye partner who will be doing the integration.

2 Protocols are described in this document:

a) **Standard CAN output Protocol:** The data contained in the Standard CAN output Protocol is basic information about the system warnings (as mentioned in the beginning of this document) and signals status from the vehicle. These messages are called "0x700"; "0x760" messages.

b) **TSR Protocol[1]:** The data contained in the TSR Protocol is information about the Traffic Signs recognized by the Mobileye system. These messages are called "0x720"…"0x727" messages.

[1] TSR Protocol is available only if enabled during system Installation/Configuration by authorized users only. In current Mobileye C2-270 models the TSR is available only as CAN Data Output.

3.1 Standard CAN Output Data Protocol

3.2 CAN Parameters

- The message is transmitted in an 11bit CAN header format.
- The default baud rate is 500Kbps
- The CAN message is transmitted approximately every 66-100 ms.

3.3 Messages overview

Message	Code	Description
C2 Display and warnings	0x700	Provides data about: • Display sound type • Lane Departure Warning left and right • Low Speed detection off • Headway in seconds • FCW • Pedestrian detection and warning • Hi/Low beam decision • HMW level • Failsafe events: Low visibility, Maintenance • TSR Warning Level • Tamper Alert
Car signals	0x760	Provides the signals status from the vehicle: • Left blink • Right Blink • Speed • Brakes • High beam • Wipers

To download “Standard CAN Output Protocol” .dbc files click here: Download

3.4 Standard CAN Output Interface Description

3.4.1 CAN Message 0x700

Bit	7(msb)	6	5	4	3	2	1	0(lsb)
Byte 0	Undocumented			Time indicator		Sound type (0-7) *		
Byte 1	Reserved		Zero Speed	Reserved				0x0
Byte 2	Headway measurement							Headway valid
Byte 3	Error code							0x0: error 0x1: no error
Byte 4	Failsafe	Maintenance (error)	Undocumented		FCW on	Right LDW ON	Left LDW ON	LDW OFF
Byte 5	TSR enabled	Reserved	Tamper Alert	Reserved		Peds in DZ	Peds FCW	0x0
Byte 6	Reserved					TSR Warning Level		
Byte 7	Reserved					HW repeatable enabled	Headway Warning Level	

3.4.2 Sound type

- Type: unsigned char

0	silent
1	LDW Left
2	LDW Right
3	HW1
4	TSR (if enabled via EyeWatch in C2-270 only)
5	UFCW
6	FCW+PCW

3.4.3 Peds in DZ and Peds FCW and FCW On

- Type: bool, unsigned int
- Meaning: Peds in DZ (Danger Zone)
- 1= Pedestrian in DZ/warning on pedestrian/waning (FCW) on vehicle
- 0= Pedestrian not in DZ/no warning

3.4.4 Time Indicator

- Meaning:

  When value is “00” Day is indicated.

  When value is “01” Dusk is indicated

  When value is “10” Night is indicated

3.4.5 Error Valid & Error Code

- Type: bool, unsigned int
- Meaning: When Error Valid bit is on, the Error Code filed will contain an error code, as indicated in the User Manual.

3.4.6 Zero speed

- Type: bool
- Meaning: Host vehicle is stopped

3.4.7 Headway Valid

- Type: bool
- Meaning: When CIPV is detected Headway Valid is ON (bit=1)

3.4.8 Headway measurement

- Type: unsigned char
- Unit: 0.1 s (unit value is presented in Hex – ex: 1.0 = 0A)
- Range: 0 … 9.9

3.4.9 LDW Off

- Type: bool
- Meaning: Lane Departure Warnings are disabled when the value is equal 1 (due to low speed or configuration).

3.4.10 Left/Right LDW On

- Type: bool
- Meaning: Indicator of Left/Right LDW event.
- Note: The LDW will be ON for 5 consecutive frames, no matter how long the event really is

3.4.11 Maintenance

- Type: bool
- Meaning: Indicator of internal error. See User Manual.

3.4.12 FailSafe

- Type: bool
- Meaning: Indicator of one of the internal FailSafe modes (blur image, saturated image, low sun, partial blockage, partial transparent)

3.4.13 FCW On

- Type: bool
- Meaning: Indicator of FCW event.
- Note: The FCW will be ON for the entire warning length.

3.4.14 TSR Enabled

- Type: bool
- Meaning: TSR feature is ON.
- Note: TSR is always ON (bit=1).

3.4.15 HW Repeatable enabled

- Type: bool
- Meaning: HW Repeatable feature is ON if configured (1=ON)
- Note: HW Repeatable configuration is possible only during system Configuration/Installation process (via Mobileye Setup Wizard).

3.4.16 Headway Warning Level

- Type: unsigned char
- Unit: HW Level (0-2).
- Note: changes according to warning scheme setup. Default values:
    - When no CIPV is present, HW Level = 0

      (When NO vehicle is detected “0” is indicated).
    - When a CIPV is present with HW > HW Config, HW Level = 1

      (When HW Distance is > then the configured HW “1” is indicated. This indicates a Green Car Icon on the Display unit).
    - When a CIPV is present with HW ≤ HW Config, HW Level = 2

      (When HW Distance is ≤ then the configured HW “2” is indicated. This indicates a Red Car Icon on the Display unit).
    - When a CIPV is present with HW < 0.6, HW Level = 2 ()

      When HW Distance is < 0.6 HW seconds “2” is indicated. This indicates a Red Car Icon on the Display unit (regardless of your HW configuration).

3.4.17 TSR Warning Level

- Every time the vehicle speed is greater than the Legal Speed limit Sign by 5 (km/h or mph) then a BIT will turn On and will grow by +1 with every 5 (km/h or mph) growth. This is limited up to 35 (km/h or mph)

  When Speed <= road speed , TSR Warning level= 0
  When Speed > road speed +[0-5kmh], TSR Warning level= 1
  When Speed > road speed +[5-10kmh], TSR Warning level= 2
  When Speed > road speed +[10-15kmh], TSR Warning level= 3
  When Speed > road speed +[15-20kmh], TSR Warning level= 4
  When Speed > road speed +[20-25kmh], TSR Warning level= 5
  When Speed > road speed +[25-30kmh], TSR Warning level= 6
  When Speed > road speed +[30-35kmh], TSR Warning level= 7
  When Speed > road speed +35, TSR Warning level= 7

3.4.18 Tamper Alert

- Type: bool
- Meaning:

  When 0 = No Tamper Alert

  When 1 = Tamper Alert is ON
- Note: Tamper Alert will be activated if there is no vehicle or lane detection for duration of 10 minutes. Tamper Alert is active above 15 km/h (9 mph).

  Details:

  Tamper Alert will function when:

  - If speed >= 55 km/h, and there is No Lane and Vehicle detection for a duration of 10 minutes.

    If a Lane or Vehicle are detected in any Frame during the 10 minutes duration, the 10 minutes duration will be prolonged by a factor of the "Time past until the detected Frame divided by 2.

    For example, if there was no detection for 9 minutes and then a Lane was detected in 1 frame, the 10 minutes duration will resume from 4.5 minutes, meaning the time left for receiving the Tamper alert is now 5.5 minutes.
  - If speed >= 15 km/h, and there is No Vehicle detection of any kind for a duration of 10 minutes.

  From the moment Wipers are active, the 10 minutes duration will be multiplied by 2 to 20 minutes.

3.5 Car Info Message 0x760

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	Reserve	Reserve	High Beam	Low Beam	Wipers	Right Signal	Left Signal	Brakes
Byte 1	Speed Available	Reserve	High Beam Available	Low Beam Available	Wipers Available	Reserved		
Byte 2	Speed (Km/h)							
Byte 3	*Reserved*							
Byte 4	*Reserved*							
Byte 5	*Reserved*							
Byte 6	*Reserved*							
Byte 7	*Reserved*							

3.5.1 High Beam

- Type: bit
- Unit and range: 1 if High Beam on, 0 if off.

3.5.2 Low Beam

- Type: bit
- Unit and range: 1 if Low Beam on, 0 if off.

3.5.3 Wipers

- Type: bit
- Unit and range: 1 when a Wiper passes the windshield, 0 if a wiper is static.

3.5.4 Right signal

- Type: bit
- Unit and range: 1 if right turn signal is on, 0 if off.

3.5.5 Left signal

- Type: bit
- Unit and range: 1 if left turn signal is on, 0 if off.

3.5.6 Brake signal

- Type: bit
- Unit and range: 1 if right turn signal is on, 0 if off.

3.5.7 Wipers available

- Type: bit
- Unit and Range: 1 if Wipers available

3.5.8 Low Beam available

- Type: bit
- Unit and range: 1 if Low Beam available

3.5.9 High Beam Available

- Type: bit
- Unit and range: 1 if High Beam available

3.5.10 Speed Available

- Type: bit
- Unit and range: 1 if Speed available

3.5.11 Speed (Km/h)

- Type: Unsigned byte
- Unit: km/h
- Range: 0-255 Km/h

3.6 TSR Protocol - (Traffic Signs Recognition)

3.6.1 CAN Parameters

- The message is transmitted in an 11bit CAN header format.
- The default baud rate is 500Kbps
- The CAN message is transmitted approximately every 66-100 ms.

3.6.2 Messages overview

Message	Code	Description
TSR message - Sign Type and Position	0x720… 0x726	Provides data about: • Sign Type • Supplementary Sign Type • Sign Position X • Sign Position Y • Sign Position Z • Filter Type
Sign Type	0x727	Provides data about • Sign Type – Display 1 • Supplementary Sign Type – Display 1 • Sign Type – Display 2 • Supplementary Sign Type – Display 2 • Sign Type – Display 3 • Supplementary Sign Type – Display 3 • Sign Type – Display 4 • Supplementary Sign Type – Display 4

To download TSR .dbc files click here: Download

3.6.3 TSR message 0x720…0x726

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	*Vision only Sign Type*							
Byte 1	*Vision only Supplementary Sign Type*							
Byte 2	*Sign Position X*							
Byte 3	*N/A*	*Sign Position Y*						
Byte 4	*N/A*		*Sign Position Z*					
Byte 5	*Filter Type*							
Byte 6	*N/A*							
Byte 7	*N/A*							

CAN Messages 0x720…0x726 contain details about the TSR Type and Position.

7 messages are sent to support up to 7 signs in a specific frame.

Message 0x720…0x726 output is for each Traffic Sign recognized (1 frame per TS recognized)

Message output will occur only after a recognized Traffic Sign has exited the frame

The number of reported messages will be the number of detected signs in this frame + one additional message with "Vision only Sign Type" = "No sign detected" = message 0x727 (unless 7 signs were detected).

3.6.3.1 Vision only Sign Type

Type: Enum

Values:

Note: The values in the "Meaning" are the Traffic Sign (speed sign) Numerical Values. There is no reference to Speed Format (km/h or mph).

Enum	Meaning
0	standard regular 10
1	standard regular 20
2	standard regular 30
3	standard regular 40
4	standard regular 50
5	standard regular 60
6	standard regular 70
7	standard regular 80
8	standard regular 90
9	standard regular 100
10	standard regular 110
11	standard regular 120
12	standard regular 130
13	standard regular 140
20	Standard regular end restriction of number e.g 60 end of restriction.
28	standard electronic 10
29	standard electronic 20
30	standard electronic 30
31	standard electronic 40
32	standard electronic 50
33	standard electronic 60
34	standard electronic 70
35	standard electronic 80
36	standard electronic 90
37	standard electronic 100
38	standard electronic 110

39	standard electronic 120
40	standard electronic 130
41	standard electronic 140
50	standard electronic end restriction of number e.g 60 end of restriction.
64	standard regular general end all restriction.
65	standard electronic general end all restriction.
100	standard regular 5
101	standard regular 15
102	standard regular 25
103	standard regular 35
104	standard regular 45
105	standard regular 55
106	standard regular 65
107	standard regular 75
108	standard regular 85
109	standard regular 95
110	standard regular 105
111	standard regular 115
112	standard regular 125
113	standard regular 135
114	standard regular 145
115	standard electronic 5
116	standard electronic 15
117	standard electronic 25
118	standard electronic 35
119	standard electronic 45
120	standard electronic 55
121	standard electronic 65
122	standard electronic 75
123	standard electronic 85
124	standard electronic 95
125	standard electronic 105

126	standard electronic 115
127	standard electronic 125
128	standard electronic 135
129	standard electronic 145
171	standard regular motorWay begin
172	standard regular end of MotorWay
173	standard regular expressWay begin
174	standard regular end of ExpressWay
175	standard regular Playground area begin
176	standard regular End of playground area
200	standard regular no passing start
201	standard regular end of no passing
220	standard electronic no passing start
221	standard electronic end of no passing
254	No sign detected
255	e_invalid_sign

3.6.3.2 Supplementary Signs Types

Type: Enum

Values description:

1- Rain

2-Snow

3-Trailer

4-Time

5-Arrow left

6-Arrow right

7-Bend arrow left

8-Bend arrow right

9-Truck

10-Distance arrow

11-Weight

12-Distance in

13-Tractor

14-Snow rain

15-School

16-Rain cloud

17-Fog

18-Hazardous material

19-Night

255-Not in use

3.6.3.3 Sign Position X

Type: unsigned Int

Range: 0…122

Resolution: 0.5 meter

Meaning: The longitude position of the sign in the real world in meters.

3.6.3.4 Sign Position Y

Type: Signed Int

Range: -32… 31

Resolution: 0.5 meter

Meaning : The lateral position of the sign in the real world in meters.
Negative refers to left and positive to right.

3.6.3.5 Sign Position Z

Type: signed Int

Range: -16… 16

Resolution: 0.5 meter

Meaning : The height of the sign in the real world in meters, relative to the camera location. Positive value refers to above the camera. Negative is below the camera.

3.6.3.6 Filter Type

Type: Enum

Meaning: The reason for filtering the sign. External filter, filtering visible signs to due irrelevance.

Values:

1 = Irrelevant to the host

2 = TS on vehicle (truck or bus …)

3 = Embedded

3.6.4 TSR CAN Message 0x727

This message contains the TSR Vision only decision – continues value based on real decision.
This message will be reported as long as the sign is relevant (until different TS is recognized or disabled by Turn, Timer, etc.…)

3.6.5 Message overview (0x727)

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
Byte 0	*Vision only Sign Type – Display 1*							
Byte 1	*Vision only Supplementary Sign Type – Display 1*							
Byte 2	*Vision only Sign Type – Display 2*							
Byte 3	*Vision only Supplementary Sign Type – Display 2*							
Byte 4	*Vision only Sign Type – Display 3*							
Byte 5	*Vision only Supplementary Sign Type – Display 3*							
Byte 6	*Vision only Sign Type – Display 4*							
Byte 7	*Vision only Supplementary Sign Type – Display 4*							

3.6.5.1 Vision only Sign Type – Display 1 - 4

Type: Enum

Range: 0-255

Invalid value = 0xFF = 255 – No speed limit sign was detected.

Note: The values are the Traffic Sign (speed sign) Numerical Values. There is no reference to Speed Format (kmh or mph).

Value description:

0	standard regular 10
1	standard regular 20
2	standard regular 30
3	standard regular 40
4	standard regular 50
5	standard regular 60
6	standard regular 70
7	standard regular 80
8	standard regular 90
9	standard regular 100
10	standard regular 110
11	standard regular 120
12	standard regular 130
13	standard regular 140
20	Standard regular end restriction of number e.g 60 end of restriction.
28	standard electronic 10
29	standard electronic 20
30	standard electronic 30
31	standard electronic 40
32	standard electronic 50
33	standard electronic 60
34	standard electronic 70
35	standard electronic 80
36	standard electronic 90
37	standard electronic 100
38	standard electronic 110
39	standard electronic 120

40 standard electronic 130

41 standard electronic 140

50 standard electronic end restriction of number e.g 60 end of restriction.

64 standard regular general end all restriction.

65 standard electronic general end all restriction.

100 standard regular 5

101 standard regular 15

102 standard regular 25

103 standard regular 35

104 standard regular 45

105 standard regular 55

106 standard regular 65

107 standard regular 75

108 standard regular 85

109 standard regular 95

110 standard regular 105

111 standard regular 115

112 standard regular 125

113 standard regular 135

114 standard regular 145

115 standard electronic 5

116 standard electronic 15

117 standard electronic 25

118 standard electronic 35

119 standard electronic 45

120 standard electronic 55

121 standard electronic 65

122 standard electronic 75

123 standard electronic 85

124 standard electronic 95

125 standard electronic 105

126 standard electronic 115

127 standard electronic 125

128 standard electronic 135
129 standard electronic 145
171 standard regular motorWay begin
172 standard regular end of fMotorWay
173 standard regular expressWay begin
174 standard regular end of ExpressWay
175 standard regular Playground area begin
176 standard regular End of playground area
200 standard regular no passing start
201 standard regular end of no passing
220 standard electronic no passing start
221 standard electronic end of no passing
254 No sign detected
255 e_invalid_sign

3.6.5.2 Vision only Supplementary Sign Type – Display 1-4

Type: Enum

Range: 0-255

Invalid value = 0xFF = 255 – No speed limit sign was detected.

Values description:

1- Rain
2-Snow
3-Trailer
4-Time
5-Arrow left
6-Arrow right
7-Bend arrow left
8-Bend arrow right
9-Truck
10-Distance arrow
11-Weight
12-Distance in
13-Tractor

14-Snow rain

15-School

16-Rain cloud

17-Fog

18-Hazardous material

19-Night

255-Not in use

4 Stage 2: Decision on Integration Path

After reviewing the Mobileye C2-270 CAN Output Data Protocol detailed above, the Integrator should take in to account the purpose of the C2-270 /FMS Integration and thus decide which level of data is sufficient for his integration purposes.

Example of possible C2-270 /FMS report type:

Report Type	Report Start Date & Time	Report End Date & Time	Device ID	Driver ID	
Mobileye Alerts	01/07/09 14:00:00	10/07/09 14:00:00	ABC11110000	John Smith	
Date & Time	Event Type	Brake During Event	Event Duration	Start Speed	Speed End
01/07/09 14:15:30	LDW	NO		80km	
01/07/09 14:20:30	HW	yes	2 sec	50 km/h	45 km/h
01/07/09 14:23:30	FCW	yes	1 sec	75 km/h	50 km/h
01/07/09 14:35:30	Low Visibility		320 sec		

Taking in to account the level of data delivered from the Mobileye C2-27 and the integration purpose, the integrator and Mobileye need to decide on the way the data will be collected, analyzed and displayed by the FMS.

The Integrator and Mobileye need to decide if the FMS systems will act as a logger that saves C2-270 events and sends them by cellular network to a server (real time on-line), save the events and only allow “on-board” access to the information or any other method of data collection and retrieval. All technical aspects regarding size, variety and duration of data collection should also be decided on in this stage.

This stage will be completed with an official Road Map document defining all the action items and it needs to be approved by both parties.

5 Stage 3: Delivery of basic Software by Mobileye

At this stage Mobileye will supply the Integrator Basic software tools to begin the integration process at a laboratory level. These tools will include files which will simulate the operation of the Mobileye EyeQ processor (CAN messages for each event) and the ReadCAN and SendCAN applications.

The Integrator will require to have his own CAN Interface solution (Kvaser Leaf Light HS cable or Kvaser LAPcan or any other suitable solution).

CAN Message simulation files include (in DBC format):

1) CAN Message “0x700” (all available events)
2) Message “0x760” (all available events)
3) TSR CAN messages

6 Stage 4: Integrated CAN Protocol Submission

The FMS integrator will present to Mobileye a complete and comprehensive document describing in detail the integrated CAN Protocol (interface).

This document should include an Overview of the FMS system (description of Components, Functionality, CAN Interface, etc…), the Physical Connection to the Mobileye system and a detailed review of the Mobileye/FMS CAN Protocol (Interface).

The Integrated Mobileye/FMS CAN Protocol (Interface) should include the following details as a minimum requirement:

1. Mobileye C2-270 CAN Messages used
2. CAN Parameters of integrated protocol
    a. CAN Bus Type
    b. CAN Bus baud rate
    c. CAN Bus message transmission rate
    d. CAN header format bit value (transmitted)
    e. CAN message parameter byte length
3. Each message (event) used in the Integrated CAN Protocol should include:
    a. The message name
    b. The message code (ID)
    c. The message description
    d. The message Type
    e. The message meaning
    f. The message Unit and Range (value)

7 Stage 5: Exchange of Systems for Mutual Testing

When the Integrator finishes development on the new Integrated CAN Protocol and submits his report, Mobileye and the Integrator Company will exchange systems for QA testing (all PO and shipments should be efficient so to allow quick integration).

The Integrator should supply Mobileye with a “Plug and Play” system that is already configured with the Integrated Software. The Integrator needs to supply all other software tools and files required for testing. Mobileye will also supply a system configured with the C2-270 CAN Protocol decided on and any other supporting software. With the delivery of systems a connection scheme and user manual should be provided on both sides (see Appendix for details).

The Integrator should also provide Mobileye with the means to retrieve the transmitted date from the FMS if it is based on a web access infrastructure or any other means of data collection.

8 Stage 6: Final Testing and Approval of Integration by Mobileye

When all tests have been approved by both Mobileye and Integrator Mobileye will conduct final “On-road tests.

If all final test parameters are successful Mobileye will approve the Integration.

If the Integrator also wishes to test the systems “0n-road” he will require the arrival of a Mobileye engineer for C2-270 Installation or Installation training.

Appendix A.

C2-270 Technical Specifications

1.0 Physical Connection to Mobileye C2-270 CAN-A port

The Mobileye C2-270 CAN interface (CAN Bus) is located in the SeeQ unit.

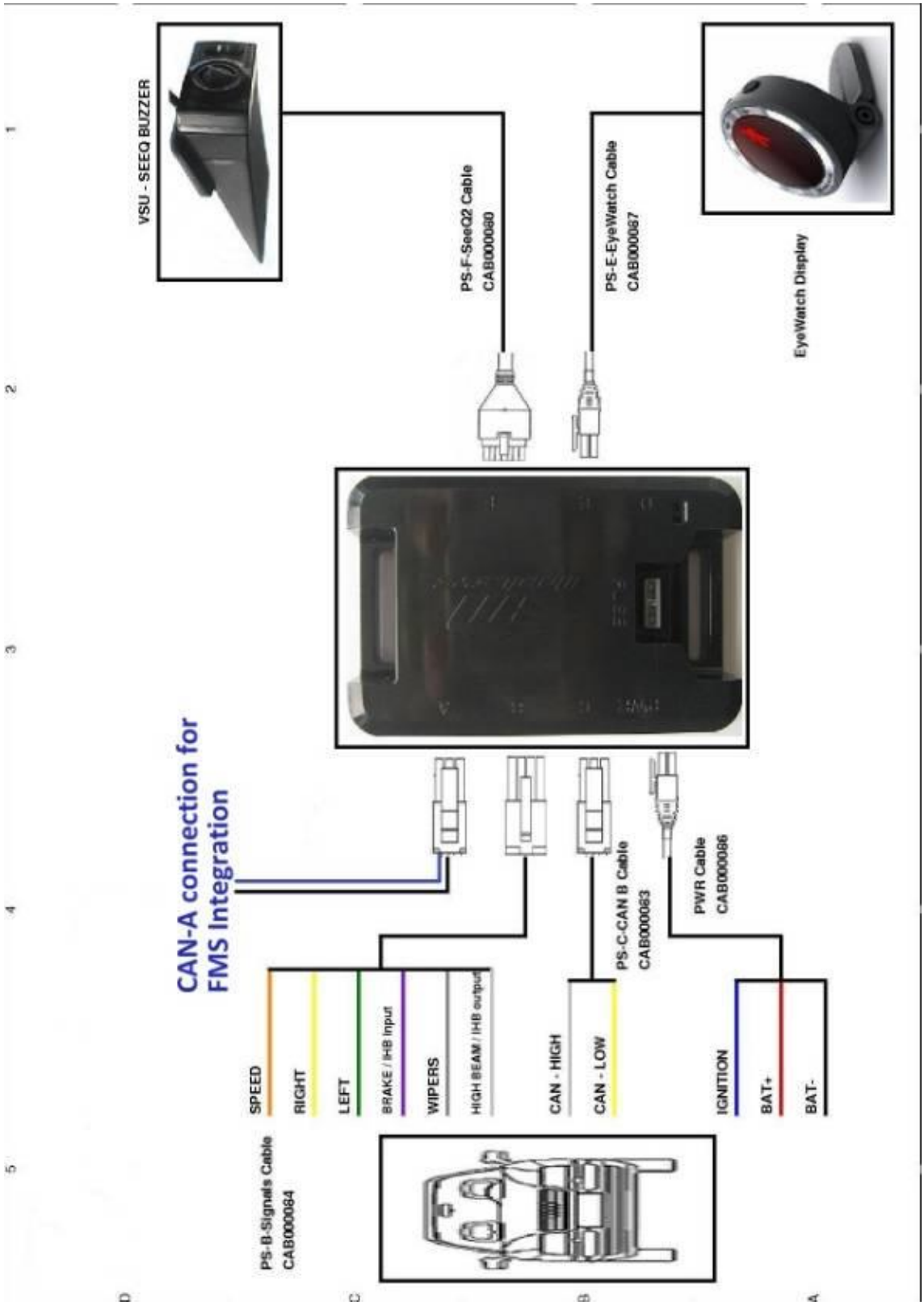
The Typical SeeQ CAN Channel dedicated for FMS Integrations and similar communication is CAN-A channel.

In Mobileye C2-270 the **CAN-A** Channel is accessible for physical connection using the CAN-A female connector (marked as A) on the PS3 unit.

Note: CAN-A connectors and other connections methods are not supplied by Mobileye.

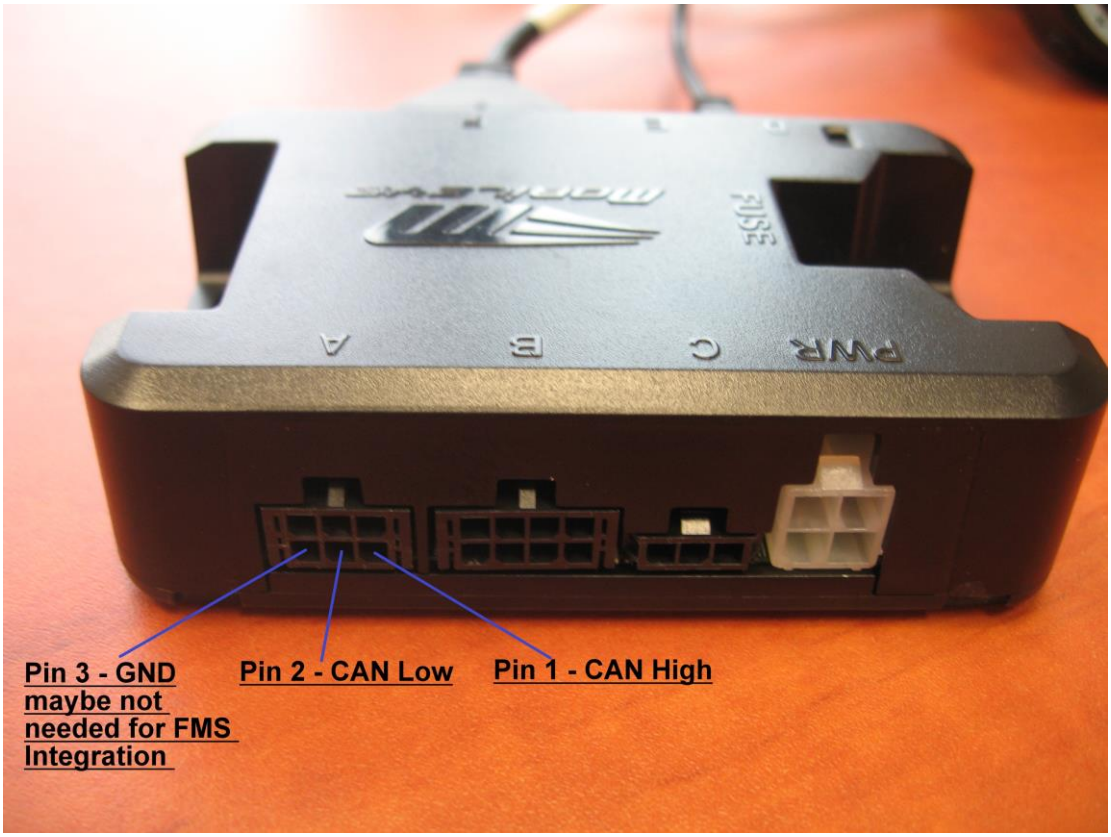
Mobileye C2-270 (PS3 Model) Connection Scheme and Possible CAN-A physical connection methods can be found below:

Mobileye C2-270 (PS3 Model) CAN-A Connection scheme:



- **PS3 CAN-A 6 Pin Female Connector PIN Layout:**

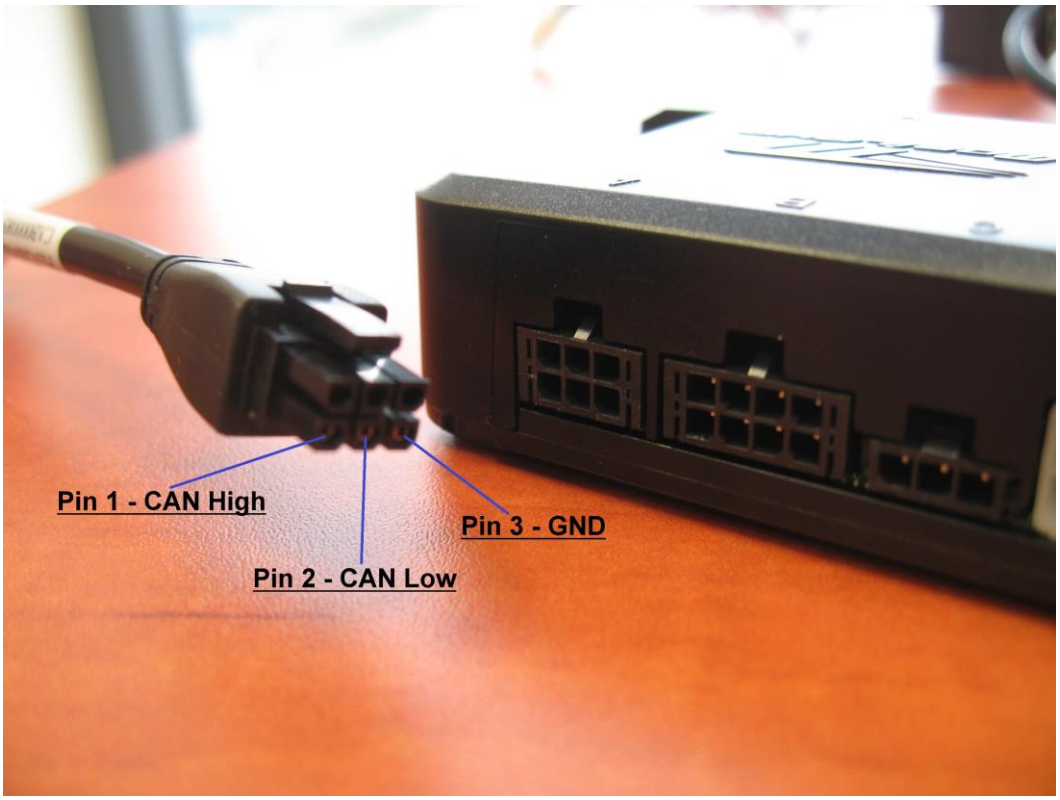
Pin Number	Function
Pin 1	CAN High
Pin 2	CAN Low
Pin 3	GND



- **PS3 CAN-A 6 Pin Male Connector PIN Layout:**

  FMS Integrator should produce a cable for connection with Mobileye PS3 CAN-A port by the Specifications below:

Pin Number	Function
Pin 1	CAN High
Pin 2	CAN Low
Pin 3	GND



Physical Connection to Mobileye 5 CAN-A port

The Mobileye 5 CAN interface (CAN Bus) is located in the Main unit (SeeQ/camera).

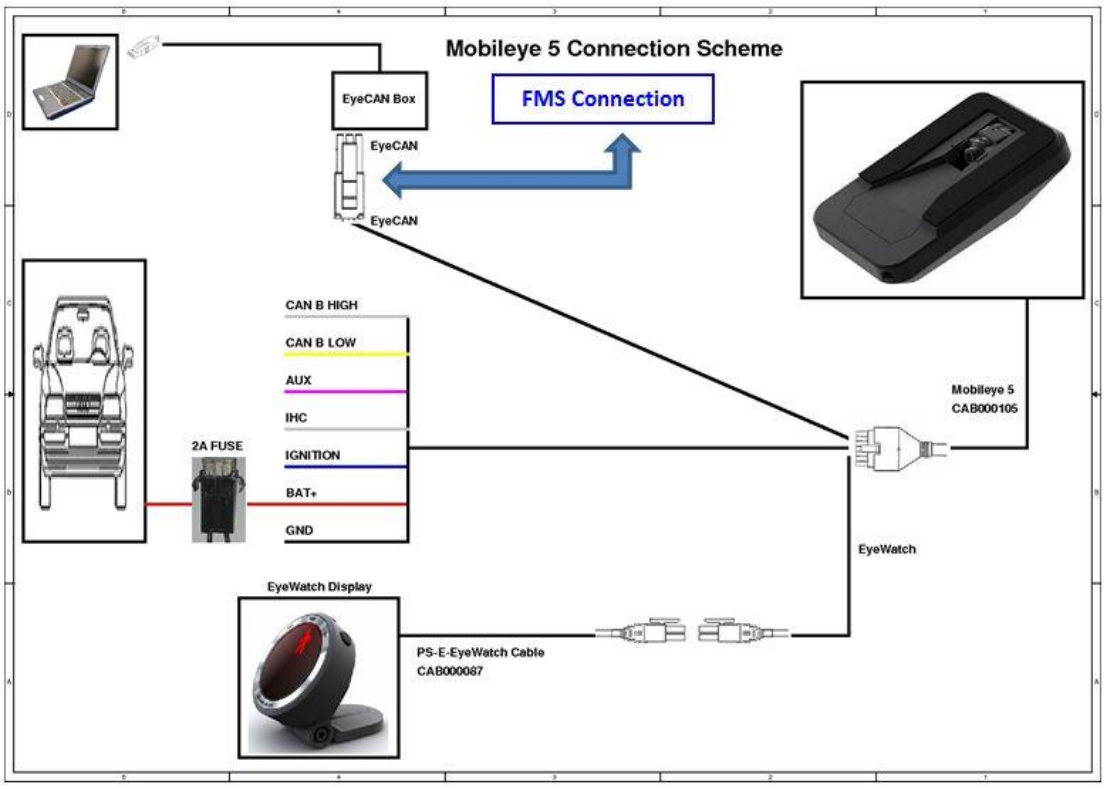
The Typical SeeQ CAN Channel dedicated for FMS Integrations and similar communication is CAN-A channel.

In Mobileye 5 the **CAN-A** Channel is accessible for physical connection using the CAN-A Male connector (6 Pins connector labeled “EyeCAN”) in the Mobileye 5 main harness.

Note: Compatible connectors and other connections methods to the CAN-A connector are not supplied by Mobileye.

Mobileye 5 Connection Scheme and Possible CAN-A physical connection methods can be found below:

Mobileye 5 CAN-A Connection scheme:



- **<u>Mobileye 5 CAN-A 6 Pin Male Connector PIN Layout:</u>**

  FMS Integrator should produce a cable for connection with Mobileye 5 CAN-A port by the Specifications below:

Pin Number	Function
Pin 1	CAN High
Pin 2	CAN Low