

**JH-ACU-8A**

**Diagnostic Communication Specification**

**For S(Special Command)-Mode**



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## 1. Introduction

This document specifies the requirements of communication for Special mode of JH-ACU-8A ACU (Airbag Control Unit). The special mode(S-Mode) is used for test and production line. This document should not be distributed out of our company or others, because it is very confidential.

## 2. System Configuration

### 2.1 Communication Line

It is used to K-line interface. Line K is bi-directional line.

### 2.2 Communication Specification

#### 2.2.1 Transmission rate (Baud Rate)

9600 bps

#### 2.2.2 Bit Format

LSB first

1 start bit - logic '0' for one bit duration

8 data bits - the LSB being sent first

1 stop bit - logic '1' for one bit duration

#### 2.2.3 Message Format

1 byte	2 byte	3 ... N bytes	N+1 byte
Length byte	Function Code	Address & data	Checksum(XOR)

##### 2.2.3.1 Length byte

This byte defines the length of a message from the beginning of the Function Code field to checksum byte. A data length of 1 to 255 bytes is possible.

##### 2.2.3.2 Function Code byte

This byte defines the functional request of a message. This byte is converted to complement at a returned message from ACU.

### 2.2.3.3 Address & data byte

This byte defines the start address of hardware memory map to read or write a data or returned information of a request.

### 2.2.3.4 Checksum byte

The checksum byte (CS) inserted at the end of the message block is defined as the simple 8-bit calculate series of all bytes in the message by XOR, excluding the checksum.



### 3 Communication Services

#### 3.1 Starting S-Mode

This service shall necessary to enter the S-Mode communication. If a current communication mode is C-Mode, the tester shall send the unlock command to connect the S-Mode communication.

##### Initial Process

Step	Parameter Name	Hex value	Bytes	Transfer status
1	Function Code(FC)	53	1	Tester → ACU
2	Length	13	1	ACU → Tester
	Complement Function Code(CFC)	AC	1	
	ACU ID <sup>1</sup>	xx :	17	
	Checksum	xx	1	
3	Checksum returned	xx	1	Tester → ACU
4	OK	4F	1	ACU → Tester
	NOK	4E		

##### 3.1.1 S-Mode unlock command in C-Mode communication

This message format is separated by current C-mode type. If the current C-mode type is KWP2000, this message format follows the requirement of KWP2000 message format.

##### KWP2000 C-mode

Byte	Parameter Name	Hex Value
1	Format byte	80
2	Target address byte	AC
3	Source address byte	F1
4	Additional length byte	03
5	Unlock Request Service Id	FE
6	Key Byte 1	53
7	Key Byte 2	4D
6	Checksum <sup>2</sup>	xx

<sup>1</sup> Refer to following The ECU identification service

<sup>2</sup> It is not used to XOR method. Refer to ACU Diagnostic communication spec., document no is ES-JHA-4A-C01

## ISO9141 C-mode

Byte	Parameter Name	Hex Value
1	Priority byte	68
2	Target address byte	6A
3	Source address byte	F1
4	Test Mode byte	FE
5	Key Byte 1	53
6	Key Byte 2	4D
7	Checksum <sup>3</sup>	xx

## 3.2 S-Mode Functional Services

## 3.2.1 ACU Identification Service

## Request Message

Byte	Parameter Name	Hex Value
1	Length byte	02
2	Function Code byte	71
3	Checksum	xx

## Response Message

Byte	Parameter Name	Hex Value
1	Length byte	13
2	Complement Function Code byte	8E
3 ~ 4	ROM Checksum (2 bytes)	xx xx
5 ~ 8	ROM Version (4 bytes)	Xx xx xx xx
9 ~ 12	ACU Serial No. (4 bytes)	xx xx xx xx
13 ~ 14	Label Version (2 bytes)	xx xx
15 ~ 17	MLFB (3 bytes, ASCII)	xx xx xx
18 ~ 19	Parameter Version (2 bytes)	xx xx
20	Checksum	xx

<sup>3</sup> It is not used to XOR method. Refer to ACU Diagnostic communication spec., document no is ES-JHA-4A-C02

### 3.2.2 Read Memory Service

This service is to read saved data in ACU memory. You can read the specific data of each kind from RAM or FRAM, another memory using this service, fault status and crash recorded information, algorithm parameters, etc. The number of maximum read bytes is 249 during one cycle.

#### Request Message

Byte	Parameter Name	Hex Value
1	Length byte	05
2	Function Code byte <sup>4</sup>	72
3	Start Address High byte	xx
4	Start Address Low byte	xx
5	Read bytes number (n)	xx
6	Checksum	xx

#### Response Message

Byte	Parameter Name	Hex Value
1	Length byte	n+05
2	Complement Function Code byte <sup>5</sup>	8D
3	Start Address High byte	xx
4	Start Address Low byte	xx
5	Read bytes number (n)	xx
6	n Read data	xx
:		:
n+6		xx
n+7	Checksum	xx

<sup>4</sup> FRAM access hex code is 7A

<sup>5</sup> FRAM access hex code is 85



### 3.2.3 Write Memory Service

This service is to write OR change specific data to memory in ACU. You can write or change the specific data in any place of memory address. The number of maximum write bytes is 249 during one cycle.

#### Request Message

Byte	Parameter Name	Hex Value
1	Length byte	<b>n+05</b>
2	Function Code byte <sup>6</sup>	<b>73</b>
3	Start Address High byte	<b>xx</b>
4	Start Address Low byte	<b>xx</b>
5	Write bytes number (n)	<b>xx</b>
6	n Write data	<b>xx</b>
:		<b>:</b>
n+6		<b>xx</b>
n+7	Checksum	<b>xx</b>

#### Response Message

Byte	Parameter Name	Hex Value
1	Length byte	<b>n+05</b>
2	Complement Function Code byte <sup>7</sup>	<b>8C</b>
3	Start Address High byte	<b>xx</b>
4	Start Address Low byte	<b>xx</b>
5	Write bytes number (n)	<b>xx</b>
6	n returned Write data	<b>xx</b>
:		<b>:</b>
n+6		<b>xx</b>
n+7	Checksum	<b>xx</b>

※ IF Length Byte == 6 (only one Write Data Byte offered), then the address space

<sup>6</sup> FRAM access hex code is 7B

<sup>7</sup> FRAM access hex code is 84

will be filled with the Write Data byte.

### 3.2.4 Real Time Fault & Status Service

This service is to receive continuously some data which are fault code and device status from ACU. Its data is sent every 400ms to Tester. It shall be sent break signal from Tester to stop communication.

#### Request Message

Byte	Parameter Name	Hex Value
1	Length byte	02
2	Function Code byte	75
3	Checksum	xx

#### Response Message

Byte	Parameter Name	Hex Value
1	Fault and status code	xx

### 3.2.5 Real Time Value Check Service

This service is to check periodically some values which are battery voltage and another device voltage or resistance from ACU. It shall be sent break signal from Tester to stop communication.

#### Request Message

Byte	Parameter Name	Hex Value
1	Length byte	03
2	Function Code byte	77
3	Check value code byte	xx
4	Checksum	xx

#### Response Message

Byte	Parameter Name	Hex Value
1	Measurement Result Value	xx

## Measurement Value Codes

Code	Measurement Value	Code	Measurement Value
0	AccX	45	PAB STG Value
1	AccY	46	DBPT STG Value
2	AccX_Zero	47	PBPT STG Value
3	AccY_Zero	48	DSAB STG Value
4	Acc SIS1	49	PSAB STG Value
5	Acc SIS2	50	DCAB STG Value
6	Acc SIS3	51	PCAB STG Value
7	Acc SIS4	52	RDSAB STG Value
8	SIS1 Data	53	RPSAB STG Value
9	SIS2 Data	54	DAB SQ Value
10	SIS3 Data	55	PAB SQ Value
11	SIS4 Data	56	DBPT SQ Value
12	SIS Status	57	PBPT SQ Value
13	NOT USED	58	DSAB SQ Value
14	NOT USED	59	PSAB SQ Value
15	Battery Voltage	60	DCAB SQ Value
16	DSB	61	PCAB SQ Value
17	PSB	62	RDSAB SQ Value
18	PADS	63	RPSAB SQ Value
19	WL STB Value	64	DAB LS
20	WL STG Value	65	PAB LS
21	WL2 STB Value	66	DBPT LS
22	WL2 STG Value	67	PBPT LS
23	NOT USED	68	DSAB LS
24	Firing Voltage DAB	69	PSAB LS
25	Firing Voltage PAB	70	DCAB LS
26	Firing Voltage DBPT	71	PCAB LS
27	Firing Voltage PBPT	72	RDSAB LS
28	Firing Voltage DSAB	73	RPSAB LS
29	Firing Voltage PSAB	74	DAB HS
30	Firing Voltage DCAB	75	PAB HS
31	Firing Voltage PCAB	76	DBPT HS
32	Firing Voltage RDSAB	77	PBPT HS
33	Firing Voltage RPSAB	78	DSAB HS

34	DAB STB Value	79	PSAB HS
35	PAB STB Value	80	DCAB HS
36	DBPT STB Value	81	PCAB HS
37	PBPT STB Value	82	RDSAB HS
38	DSAB STB Value	83	RPSAB HS
39	PSAB STB Value	84	
40	DCAB STB Value	85	
41	PCAB STB Value	86	
42	RDSAB STB Value	87	
43	RPSAB STB Value	88	
44	DAB STG Value	89	
		90	

### 3.2.6 User Function Service

#### Request Message

Byte	Parameter Name	Hex Value
1	Length byte	03
2	Function Code byte	79
3	User Function Code byte	xx
4	Checksum	xx

#### Response Message except for ACU Reset Request

Byte	Parameter Name	Hex Value
1	Length byte	03
2	Complement Function Code byte	86
3	User Function Code byte	xx
4	Checksum	xx

#### Response Message for ACU Reset Only

Byte	Parameter Name	Hex Value
1	User Function Code byte	FF

#### User Function Codes

Function Codes	Description
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0	
1	Clear EEPROM Crash Record
2	Clear FRAM Crash Record
3	Start Diag.
4	Stop Diag.
5	Front Injection Start
6	Front Injection Data
7	Front Injection Stop
8	Crash Output
10	Clear Operation Timer Counter Area
11	Clear FRAM IGN Counter
13	FRAM Mass Erase
14	DFLASH Mass Erase
15	Side Injection Start
16	Side Injection Data
17	Side Injection Stop
20	WL1 On
21	WL1 Off
22	WL2 On
23	WL2 Off
30	Front / Side Algorithm Reset
31	Clear Fault Record
255	ECU Reset

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