

# Android 9.0 API – BMW

## KSW Commands

CAN Type: F1X(2011-2012) CIC 8.8/10.25inch

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# Serial port message decoding

Android HU communicates with the Car through MCU using serial port using a **set of (n+1) bytes**.

Every log have been made for Cartype: F1X(2011-2012) CIC 8.8/10.25inch.  
These are all starting with 0xF2.

## Actions message structure

	<b>Header</b> byte[0...1]	<b>Function</b> byte[2...3]	<b>Message</b> {bytes}	<b>Checksum</b> byte[n]
byte[0]	0xF2		MCU KEY MUSIC = 0xF2 = -14	
byte[1]	0x00			
byte[2]	Action Function		Exemple: Set Music Status function	
byte[3]			0xF2 0x00 0x62 0x04:	
byte[q]	Message		Length depends on Action Function: $1 \leq q \leq 10$	
byte[n]	0xNN		Checksum	

## Checksum formula

& is Boolean AND

^ is Boolean XOR

byte = 0x00...0xFF

$$NN = (\text{byte}[1] + \text{byte}[2] + \text{byte}[3] \& 0xFF + \text{byte}[4] + \dots + \text{byte}[n]) \wedge 0xFF$$

## Examples: Action & Event serial port message

Action : example of a serial port message

Action	Shut off the HU Screen	
bytes	Value	Comment
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x6a	
byte[3]	0x02	
byte[4]	0x0d	
byte[5]	0x00	
byte[6]	0x86	checksum

checksum = 0x86 = (0x00 + 0x6a + (0x02 & 0xff) + 0x0d + 0x00) ^ 0xff

"/dev/ttyS3" is the serial port used on Android-9.0 (PX6).

**Shell cmd:** # echo -e "\xf2\x00\x6a\x02\x0d\x00\x86" > /dev/ttyS3

## 0xF2 0x00 : Commands

### 0x60 : Set AirCond: temperature +1

Action	AirCond: temperature +1	
bytes	Value	Comment
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x60	
byte[3]	0x01	
byte[4]	0x01	
byte[5]	0x9d	checksum

### 0x61 : Set AirCond : temperature -1

Action	AirCond: temperature -1	
bytes	Value	Comment
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x61	
byte[3]	0x02	
byte[4]	0x01	
byte[5]	0x81	
byte[6]	0x1a	checksum

### 0x62 : Set Sound Status : mute, volume, type

Action	Set Sound Status : mute, volume, type	
bytes	Value	Comment
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x62	
byte[3]	0x04	
byte[4]	0x00 (mute)   0x01 (unMute)	muteMode
byte[5]	0x01 - 0x0d	Device Mode
	0x01	SRC_MUSIC
	0x02	SRC_MOVIE
	0x03	SRC_BT
	0x04	SRC_BTMUSIC
	0x05	SRC_DVR
	0x06	SRC_AUX
	0x07	SRC_MOBILE_APP
	0x08	SRC_DVD
	0x09	SRC_CMMB
	0x0a	SRC_RADIO
	0x0d	SRC_ATSL_AIRCONSOLE
byte[6]	0x01, 0x02, 0x03, 0x21	Vol Type
byte[7]	0x00 - 0x28	Volume Value from 0 to 40
byte[8]		checksum

## 0x63 : Bluetooth State

Action	Bluetooth state	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x63	
byte[3]	0x02	
byte[4]	0x00	
byte[5]	0x00 – 0x04	Bt State: 0x00: normal mode 0x01: Call mode 0x02: ? 0x03: not used in KSW 0x04: BT in backcar
byte[6]		checksum

## 0x64 : Set Time

Action	Set Time	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x64	
byte[3]	0x07	
byte[4]	2020 = 0x14	RealYear – 2000: 2020 = 20
byte[5]	0x01 – 0x0c	Month 1 – 12
byte[6]	0x01 – 0x1f	Day: 1 – 31
byte[7]	0x00 – 0x17	Hour : 0 – 23
byte[8]	0x00 – 0x3c	Min : 0 – 60
byte[9]	0x00 – 0x3c	Sec: 0 – 60
byte[10]	24h = 0x00   12h = 0x01	Time type: 24h   12h
byte[11]		checksum

## 0x65 : Set Brightness

Action	Set Brightness	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x65	
byte[3]	0x05	
byte[4]	0 – 0x64	Brightness 0...100
byte[5]	0 – 0x64	Saturation 0...100
byte[6]	0 – 0x64	Contrast 0...100
byte[7]	0 – 0x64	Chroma 0...100
byte[8]	0 – 0x06	Paramode 0...6
byte[9]		ChechSum

## 0x66 : Front Camera Activation (not used 2019.11.18)

Action	Front Camera Activation	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x66	MCU_KEY_F_CAM
byte[3]	0x02	
byte[4]	0x00 – 0x01	Param
byte[5]	0x01	
byte[6]		checksum

## 0x67 : Set Music Source

Action	Set Music Source	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x67	
byte[3]	0x01	
byte[4]	0x01 – 0x0d	Device Mode
	0x01	SRC_MUSIC
	0x02	SRC_MOVIE
	0x03	SRC_BT
	0x04	SRC_BTMUSIC
	0x05	SRC_DVR
	0x06	SRC_AUX
	0x07	SRC_MOBILE_APP
	0x08	SRC_DVD
	0x09	SRC_CMMB
	0x0a	SRC_RADIO
	0x0d	SRC_ATSL_AIRCONSOLE
byte[5]		checksum

## 0x68 : Unknown

Action	Unknown	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x68	MCU_KEY1_3
byte[3]	0x02	
byte[4]	0x00   0x04	0x04 Return mode Request
byte[5]	0x01 – 0x0d	Device Mode
	0x01	SRC_MUSIC
	0x02	SRC_MOVIE
	0x03	SRC_BT
	0x04	SRC_BTMUSIC
	0x05	SRC_DVR
	0x06	SRC_AUX
	0x07	SRC_MOBILE_APP
	0x08	SRC_DVD
	0x09	SRC_CMMB
	0x0a	SRC_RADIO
	0x0d	SRC_ATSL_AIRCONSOLE
byte[6]		checksum

## 0x69 : MCU State Information Set

Action	MCU State Information Set	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x69	MCU_KEY1_4
byte[3]	0x02	
byte[4]		Param0
byte[5]		Param1
byte[6]		checksum

### 0x69 : Param set 1: HU Powered off

Param0	0x10	16
Param1	0x01	1

### 0x69 : Param set 2: Arm in upgrade mode

Param0	0x10	16
Param1	0x03	3

0x69 : Param set 2: Screen in OEM mode

Param0	0x12	18
Param1	0x01	1

0x69 : Param set 3: View Switch from OEM

Param0	0x12	18
Param1	0x02	2

0x69 : Param set 3: Stop Voice

Param0	0x13	19
Param1	0x00	0

0x69 : Param set 2: Start Voice

Param0	0x13	19
Param1	0x01	1

0x69 : Param set 3: PlayState Off

Param0	0x14	20
Param1	0x00	0

0x69 : Param set 2: PlayState On

Param0	0x14	20
Param1	0x01	1

**0x6A : MCU State Parameter Set (Param0, Param1)**

Action	MCU State Parameter Set	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x6A	
byte[3]	0x02	
byte[4]		Param0
byte[5]		Param1
byte[6]		checksum

0x6A : Param set 1

Param0	0x01	1
Param1	0x00   0x01	KESAIWEI_SYS_BACKCAR_MIRROR Default: 0

0x6A : Param set 8

Param0	0x08	8
Param1	0x00   0x01	KESAIWEI_SYS_LANGUAGE Default: 1

0x6A : Param set 9

Param0	0x09	9
Param1	0x00   0x01	KESAIWEI_SYS_SD_HOST Default: 0

0x6A : Param set 11

Param0	0x0b	11
Param1	0x00   0x01	KESAIWEI_SYS_CAMERA_SELECTION Default: 1

0x6A : Param set 12

Param0	0x0c	12
Param1	0x00   0x01	KESAIWEI_SYS_DVD_SELECTION Default: 0

0x6A : Param set 13

Param0	0x0d	13
Param1	0x00   0x01	SYS_BLACK_SCREEN Default: 0

0x6A : Param set 14

Param0	0x0e	14
Param1	0x00   0x01	KESAIWEI_SYS_VIDEO_DRIVING_BAN Default: 0

0x6A : Param set 18

Param0	0x12	18
Param1	0x00   0x01	KESAIWEI_RECORD_BT_OFF Default: 0

0x6A : Param set 19

Param0	0x13	19
Param1	0x00   0x01	KSW_ORIGINAL_CAR_VIDEO_DISPLAY Default: 1

0x6A : Param set 20

Param0	0x14	20
Param1	0x00   0x01	KESAIWEI_SYS_FRONT_CAMERA Default: 0

0x6A : Param set 22

Param0	0x16	22
Param1	0x00   0x01	KESAIWEI_SYS_REVERSING_TRACK Default: 1

0x6A : Param set 23

Param0	0x17	23
Param1	0x00   0x01	KESAIWEI_SYS_RADAR Default: 1

0x6B : Click on Screen in Coordinates iX, iY

Action	Click on Screen in Coordinates iX, iY	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x6B	MCU_KEY2_10
byte[3]	0x06	
byte[4]	0x01 – 0x0d	Device Mode
	0x01	SRC_MUSIC
	0x02	SRC_MOVIE
	0x03	SRC_BT
	0x04	SRC_BTMUSIC
	0x05	SRC_DVR
	0x06	SRC_AUX
	0x07	SRC_MOBILE_APP
	0x08	SRC_DVD
	0x09	SRC_CMMB
	0x0a	SRC_RADIO
	0x0d	SRC_ATSL_AIRCONSOLE
byte[5]	0x00 – 0x05	(iX / 256)
byte[6]	0x00 – 0xFF	(iX % 256)
byte[7]	0x00 – 0x01	(iY / 256)
byte[8]	0x00 – 0xFF	(iY % 256)
byte[9]	0x00   0x01	iClickStatus
byte[10]		checksum

Example :

Click at (iX, iY) = (1111 x 252)

1111 = 4 x 256 + 87      => byte[5] = 0x04, byte[6] = 0x57

252 = 0 x 256 + 252      => byte[7] = 0x00, byte[8] = 0xFC

## 0x6C : Set Brightness level (from settings): Action unknown

Action	Set Brightness level	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x6C	MCU_KEY1_5
byte[3]	0x01	
byte[4]	0x00 – 0x64	Brightness Setting: 0 – 100
byte[5]		checkSum

## 0x6F : Message Beat Timer

Action	Clock: Beat Timer	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x6F	
byte[3]	0x01	
byte[4]	0x00   0x01   0x02	Beat Timer 0: Stop the clock 1: clear messages + wait 2 sec 2: normal mode
byte[5]		checkSum

## 0x70 : Set Android ARM Settings

Action	Set Android ARM Settings	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x70	
byte[3]	0x02	
byte[4]	Param0	
byte[5]	Param1	
byte[6]		checkSum

### 0x70 : Param set 1

Param0	0x01	1
Param1	0x00   0x01	RECORD_CAR_TYPE Default : 0

### 0x70 : Param set 2

Param0	0x02	2
Param1	0x00   0x01	RECORD_AMPLIFIER Default : 0

### 0x70 : Param set 3

Param0	0x03	3
Param1	0x00   0x01	RECORD_AUX_SWITCHING Default : 0

### 0x70 : Param set 4

Param0	0x04	4
Param1	0x00   0x01	RECORD_DVR Default : 0

### 0x70 : Param set 5

Param0	0x05	5
Param1	0x00 – 0x03	SYS_BT_TYPE_KEY Default : 0

### 0x70 : Param set 6

Param0	0x06	6
Param1	0x00   0x01	CCC_IDRIVE_TYPE Default : 0



0x70 : Param set 7

Param0	0x07	7
Param1	0x00   0x01	KSW_AGREEMENT_SELECT_INDEX Default : 0

0x70 : Param set 8

Param0	0x08	8
Param1	0x00   0x01	REVEERSING_MUTE_SELECT_INDEX Default : 0

0x70 : Param set 9

Param0	0x09	9
Param1	0x00   0x01	HANDSET_AUTOMATIC_SET_INDEX Default : 0

0x70 : Param set 10

Param0	0x0a	10
Param1	0x00   0x01	IDEOGRAM Country (1: zh, CN, TW Countries) Default : 0

0x70 : Param set 15

Param0	0xf	15
Param1	0x00   0x01	COLLECT_CAN_DATA_SWITCH_INDEX Default : 0

0x70 : Param set 16

Param0	0x10	16
Param1	0x00   0x01	AUX_ACTIVATION_FUNCTION_INDEX Default : 0

0x70 : Param set 17

Param0	0x11	17
Param1	0x00   0x01	VOICE_KEY_FUNCTION_INDEX Default : 0

0x70 : Param set 18

Param0	0x12	18
Param1	0x00   0x01	360_CAMERA_TYPE_INDEX Default : 0

0x70 : Param set 19

Param0	0x13	19
Param1	0x00   0x01	BACKLIGHT_CONTROL_INDEX Default : 0

0x70 : Param set 20

Param0	0x14	20
Param1	0x00   0x01	AHD_CAMERA_TYPE Default : 0

0x70 : Param set 21

Param0	0x15	21
Param1	0x00   0x01	MAP_KEY_FUNCTION_INDEX Default : 0

0x70 : Param set 23

Param0	0x17	23
Param1	0x00   0x01	AUX_ITEM_POSITION Default : 0

### 0x71 : ARM DVD Switch View

Action	ARM DVD Switch View	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x71	
byte[3]	0x01	
byte[4]	0x00   0x01	Param0
byte[5]		checksum

### 0x73 : Set Music Equalizer

Action	Set Music Equalizer	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x73	
byte[3]	0x04	
byte[4]	0x00 - 0x17	Low: 0 - 23
byte[5]	0x00 - 0x17	Mid: 0 - 23
byte[6]	0x00 - 0x17	High: 0 - 23
byte[7]	0x00 - 0x04	Equalizer Mode: 0 - 4
byte[8]		checksum

### 0x74 : Cmd Wheel State

Action	Command Wheel State				
byte[0]	0xF2				MCU_KEY_MUSIC
byte[1]	0x00				
byte[2]	0x74				CMD_WHEEL_STATE
byte[3]	0x01				
byte[4]	0x05   0x06   0x08   0x09				Param: 5, 6, 8 or 9
byte[5]					checksum

### 0x75 : Set Radio FM

Action	Set Radio FM	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x75	
byte[3]	0x03	
byte[4]	0x01   0x02	FM: ON: 1   OFF:2
byte[5]	0x00 - 0xFF	(CurFreq >> 8) & 255
byte[6]	0x00 - 0xFF	CurFreq & 255
byte[7]		checksum

### 0x76 : BMT VAL : Unknown

Action	BMT Val	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x76	CMD_BMT_VAL
byte[3]	0x03	
byte[4]	0x01 - 0x1c	InterfaceStatus 1 : Android mode 2 : OEM mode 5 : DVR 6 : AUX 8 : DVD KSW 9 : CMMB 12 : DVD USR
byte[5]	0x00 - 0x01	BackCarState
byte[6]	0x00 - 0x01	BackLight isOff
byte[7]		checksum

## 0x77 : Display Type

Action	BMT Val	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x77	CMD_DSP_TYTE
byte[3]	0x03	
byte[4]	0x00 - 0xff	AMBIENT_LIGHT_R_VALUE Default: 255
byte[5]	0x00 - 0xff	AMBIENT_LIGHT_G_VALUE Default: 255
byte[6]	0x00 - 0xff	AMBIENT_LIGHT_B_VALUE Default: 255
byte[7]	0x00 - 0xff	CUR_SELECT_POSITION Default: 255
byte[8]		checksum

## 0x78 : Voice Control, specific to XinCheng client

Action	Command Mute	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x78	CMD_MUTE
byte[3]	0x02	
byte[4]	0x00 - 0x1c	Param 0 - 12
byte[5]	0x00   0x01	Param 0 - 1
byte[6]		checksum

## 0x79 : Volume in BackCarMode

Action	Command Main Volume	
byte[0]	0xF2	MCU_KEY_MUSIC
byte[1]	0x00	
byte[2]	0x79	CMD_MAIN_VOL
byte[3]	0x04	
byte[4]	0x00   0x01	KSW_COCKBOARD_ASCENDING_STATUS Default: 0
byte[5]	0x00   0x01	KSW_AIRMATIC_STATUS Default: 0
byte[6]	0x00   0x01	KSW_AUXILIARY_RADAR_STATUS Default: 0
byte[7]	0x00   0x64	KSW_INSTRUMENT_BACKLIGHT_VALUE Default: 12
byte[8]		checksum

## Version

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HU & Android Version	PX6-9.0
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MCU Version	615043bALS-CIC-HW7-200504 B1280
CarType	F1X(2011-2012) CIC 8.8/10.25inch
	2.12 Document format changed
	2.11 Description of every function used to send broadcast to the MCU.
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