

"Maple Bus 1.0" Peripheral Hardware Specifications

ASCII STICK

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1. CONFIGURATION OF ASCII STICK

1.1 Definiton of ASCII STICK

The ASCII STICK indicates the input form for the man-machine interface.

The ASCII STICK conforms with the Maple Bus 1.0 Standard Specifications. The device itself belongs to function type "FT₀: Controller," and Expansion Device 2 belongs to "FT₈: Vibration."

Expansion Device 2 is fixed to FT₈.

1.2 Function elements

ASCII STICK function elements are as follows:

- Device: Of the function elements defined by the "FT₀: Controller" function, the device consists of the following elements:
 - Digital direction keys : Ra,La,Da,Ua
 - Digital buttons : A,B,C,D,X,Y,Z,Start
- Expansion Device 2: Of the function elements defined by the "FT₈: Vibration" function, Expansion Device 2 consists of the following elements:
 - Vibration on source number :1
 - Number of vibration sources that can be concurrently selected. :1

1.3 Detailed description of constituent elements

Each of the ASCII STICK function elements is described in detail in the following.

- Device:

- (1) Digital direction keys : Ra,La,Da,Ua

These are 2-value press/release (= ON/OFF) digital type keys (buttons).

The values are press= '0', release= '1'.

The ASCII STICK must not generate the key data of more than 3 keys (buttons) at the same time.

Up, Down, Left, and Right on the stick correspond to Ua, Da, La, and Ra.

- (2) Digital buttons : Rb,Lb,Db,Ub

These are 2-value press/release (= ON/OFF) digital type keys (buttons).

The ASCII STICK must be able to detect whether multiple keys (buttons) are ON at the same time.

The values are: press = '0', release = '1'.

- Expansion Device 2:

- Vibration source information

Vibration sources	: 1	VN='0001'
Vibration source position	: Front	VP='00'
The Vibration axis of Vibration source	: None	VD='00'
Variable vibration intensity	: 8 levels	PF='1'
Continuous vibration	: Possible	CV='1'
Direction setting	: Possible	PD='1'
Arbitrary vibration waveform	: Not possible	OWF='0'
Vibration attribute flag	: Specifies the maxi and min values	VA='0000'
Minimum settable vibration frequency	:	Fmin='07h'(4Hz)
Maximum settable vibration frequency	:	Fmax='3Bh'(30Hz)

* For the direction setting, a "+" direction is forward, and a "-" direction is backward.

2. ASCII STICK OPERATION AND LIMITAION

2.1 Operation as device

The operation of the device conforms with the operation of the "FT₀: Controller" function.

(1) Key scan

It is a requirement that the key data of the digital keys (buttons) is always being updated.

There can always be a good response to data requests from the host.

Since there is no order of priority for key scan, all the keys (buttons) should be concurrently readable.

(2) Optimization, conditions

- a) For the cross keys, no more than 3 keys (buttons) must be ON at the same time (key data must not be generated).
- b) The stick (digital direction keys) Ua and Da, Ra and La must not be On at the same time (key data must not be generated).
- c) The simultaneous ON statuses of multiple digital buttons must detectable.
- d) When two or more keys (buttons) are simultaneously pressed, keys (buttons) that are not pressed must not come ON (key data must not be generated).
- e) Also includes a chattering and cancel function.

(3) Expansion socket

The ASCII stick has two expansion sockets.

However, Expansion Socket 2 (Expansion Device 2) has a built-in function that is equivalent to the Purupuru Pack.

This built-in function can be turned on and off by means of an external switch.

2.2 Operation of expansion device 2

The operation of Expansion Device 2 conforms with the operation of the "FT₈: Vibration" function.

One vibration motor is used for the vibration source.

If the vibration intensity is set to "1," the unit might vibrate just one time instead of continuously; so set the vibration intensity to "2" or higher.

(1) Initial settings

This section describes the operation of the unit after the power has been turned on, after a reset, or after the vibration switch is turned on.

- Vibration is stopped
- Vibration auto-stop time is specified to 5.0 seconds.

(2) Single-pulse vibration operation

This is a "vibration" that consists of just a single pulse.

Once that single pulse ends, vibration stops.

It is recommended that single-pulse vibration be used at 10Hz (Fm = 13h) or less. If the frequency is set to higher than 10Hz, the motor may not turn at all. (This problem becomes more apparent at higher frequencies.)

(3) Continuous vibration operation

During this operation, the vibration pulse is repeated on the set cycle.

Vibration continues until either the vibration stop instruction is received or the automatic vibration stop time is reached.

(4) Convergent (divergent) vibration

Convergent and divergent vibration cannot both be used simultaneously.

This setting can be made with continuous vibration. "Convergent vibration" means that the vibration starts out strong, and then gradually becomes weak. When the vibration stops, it becomes strong again. This process repeats.

If continuous vibration was set, then convergent or divergent vibration continues until either the vibration stop instruction is received or the automatic vibration stop time is reached.

Once vibration has been completed, vibration stops.

(5) Vibration auto-stop time

This function is available only when continuous vibration is being used.

Once this time elapses from the time when vibration starts, vibration automatically stops.

(6) Custom vibration waveform

It is not possible to set a custom vibration waveform.

3. Device ID

In accordance with the device ID definition in the "Maple Bus 1.0" Standard Specifications.

The notation is that of the host's memory image.

3.1 Configuration of the ASCII STICK device ID

(1) Device

The device ID consists of 16 bytes (128 bits).

Bit	7	6	5	4	3	2	1	0
1st Data	0	0	0	0	0	0	0	0
2nd Data	0	0	0	0	0	0	0	0
3rd Data	0	0	0	0	0	0	0	0
4th Data	0	0	0	0	0	0	0	1
5th Data	0	0	0	0	0	0	0	0
6th Data	0	0	0	0	0	0	0	0
7th Data	0	0	0	0	0	1	1	1
8th Data	1	1	1	1	1	1	1	1
9th Data	0	0	0	0	0	0	0	0
10th Data	0	0	0	0	0	0	0	0
11th Data	0	0	0	0	0	0	0	0
12th Data	0	0	0	0	0	0	0	0
13th Data	0	0	0	0	0	0	0	0
14th Data	0	0	0	0	0	0	0	0
15th Data	0	0	0	0	0	0	0	0
16th Data	0	0	0	0	0	0	0	0

Fig. 3.1 Configuration of device ID

- 1st Data -4th Data : Designates type of function that the peripheral is equipped with. (FT)
 5st Data -8th Data FD1 : Designates the function definition block of the first function. (FD1)
 9st Data -12th Data FD2 : Designates the function definition block of the second function. (FD2)
 13st Data -16th Data FD3 : Designates the function definition block of the third function. (FD3)

FT=00h-00h-00h-01h

FD1=00h-00h-07h-FFh

FD2=00h-00h-00h-00h

FD3=00h-00h-00h-00h

(2) Expansion device 2

The device ID consists of 16 bytes (128 bits).

bit	7	6	5	4	3	2	1	0
1st Data	0	0	0	0	0	0	0	0
2nd Data	0	0	0	0	0	0	0	0
3rd Data	0	0	0	0	0	0	0	1
4th Data	0	0	0	0	0	0	0	0
5th Data	0	0	0	0	0	0	0	1
6th Data	0	0	0	0	0	0	0	1
7th Data	0	0	0	0	0	0	0	0
8th Data	0	0	0	0	0	0	0	0
9th Data	0	0	0	0	0	0	0	0
10th Data	0	0	0	0	0	0	0	0
11th Data	0	0	0	0	0	0	0	0
12th Data	0	0	0	0	0	0	0	0
13th Data	0	0	0	0	0	0	0	0
14th Data	0	0	0	0	0	0	0	0
15th Data	0	0	0	0	0	0	0	0
16th Data	0	0	0	0	0	0	0	0

Fig 3.1 Configuration of Expansion device 2 ID

- 1st Data -4th Data : Designates type of function that the peripheral is equipped with. (FT)
 5st Data -8th Data FD1 : Designates the function definition block of the first function. (FD1)
 9st Data -12th Data FD2 : Designates the function definition block of the second function. (FD2)
 13st Data -16th Data FD3 : Designates the function definition block of the third function. (FD3)

FT=00h-00h-00h-01h

FD1=01h-01h-00h-FFh

FD2=00h-00h-00h-00h

FD3=00h-00h-00h-00h

4. DATA FORMATS

The ASCII STICK data formats are explained in the following.

The notation is that of the host's memory image.

4.1 Device data format

4.1.1 Read format

This is the key data format when the controller function data are read.

The data format size is 8 bytes.

The command uses [Get Condition].

Bit	7	6	5	4	3	2	1	0
1st Data	Ra	La	Da	Ua	Start	A	B	C
2nd Data	1	1	1	1	1	X	Y	Z
3rd Data	0	0	0	0	0	0	0	0
4th Data	0	0	0	0	0	0	0	0
5th Data	1	0	0	0	0	0	0	0
6th Data	1	0	0	0	0	0	0	0
7th Data	1	0	0	0	0	0	0	0
8th Data	1	0	0	0	0	0	0	0

Fig 4.1 Read format

Key data explanation

1st : Digital button data. (ON = '0', OFF = '1')

2nd : Digital button data. (ON = '0', OFF = '1')

3rd : Analog axis 1 (A1) data.

Since there are no analog axes, "00h" is assumed for this value.

4th : Analog axis 2 (A2) data.

Since there are no analog axes, "00h" is assumed for this value.

5th : Analog axis 3 (A3) data.

Since there are no analog axes, the midpoint "80h" is assumed for this value.

6th : Analog axis 4 (A4) data.

Since there are no analog axes, the midpoint "80h" is assumed for this value.

7th : Analog axis 5 (A5) data.

Since there are no analog axes, the midpoint "80h" is assumed for this value.

8th : Analog axis 6 (A6) data.

Since there are no analog axes, the midpoint "80h" is assumed for this value.

4.1.2 Write format

There is no write format for writing data to the controller functions.

Controller functions are read only.

4.2 Expansion device 2 data format

4.2.1 Vibration source information

This gets the vibration source information and characteristics.

Data Address	Data	Setting example	Description
+0000h	Command code	0Ah	Specifies Get Media Info
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	02h	Data size is 8 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	VN	01h	Specifies Vibration Source -1
+0009h	Phase	00h	Fixed value
+000Ah	Block No.	0000h	Fixed value
+000Bh			

Fig 4.2 Example of Getting Vibration Source Information

Before making the vibration settings, this command must be used to get the vibration source information.

An error results if the vibration source number (VN) is greater than the number indicated by FD.

The return data is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	08h	Specifies Data Transfer
+0001h	Destination AP	00h	Port A
+0002h	Origin AP	02h	Expansion device (LM-Bus No.2)
+0003h	Data size	02h	Data size is 8 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	Vibration source information Vset0	10h	Vibration source - 1, prior, no vibration axis
+0009h	Vset1	E0h	Continuous, directional, minimum/maximum
+000Ah	Fm0	07h	Minimum: 4Hz
+000Bh	Fm1	3Bh	Maximum: 30Hz

Fig 4.3 Example of Vibration Source Information

4.2.2 Vibration setting

(1) Forward rotation Settings

An example of the settings for forward rotation is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	0Eh	Specifies Set Condition
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	02h	Data size is 8 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	Vibration setting CTRL	11h	Vibration source - 1, continuous vibration
+0009h	POW	70h	Strength +7
+000Ah	Freq	27h	Vibration frequency 20Hz
+000Bh	Inc	00h	No vibration gradient

Fig 4.4 Example of Forward Rotation Settings

With this command, vibration source - 1 continues to rotate in the forward direction for the period of time set for continuous rotation.

Issue the reverse rotation command to change the rotation direction.

It is not necessary to first stop vibration source - 1. In this event, the reversal will generate a physical jolt.

To stop vibration, issue the stop command (strength: 0).

(2) Reverse rotation settings

An example of the settings for reverse rotation is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	0Eh	Specifies Set Condition
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	02h	Data size is 8 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	Vibration setting CTRL	11h	Vibration source - 1, continuous vibration
+0009h	POW	07h	Strength -7
+000Ah	Freq	27h	Vibration frequency 20Hz
+000Bh	Inc	00h	No vibration gradient

Fig 4.5 Example of Reverse Rotation Settings

With this command, vibration source - 1 continues to rotate in the reverse direction for the period of time set for continuous rotation.

Issue the reverse rotation command to change the rotation direction.

It is not necessary to first stop vibration source - 1. In this event, the reversal will generate a physical jolt.

To stop vibration, issue the stop command (strength: 0).

(3) Rotation stop settings

An example of the settings for stopping rotation for vibration source - 1 is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	0Eh	Specifies Set Condition
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	02h	Data size is 8 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	Vibration setting CTRL	10h	Vibration source - 1, no continuous vibration
+0009h	POW	00h	Strength 0
+000Ah	Freq	27h	Vibration frequency 20Hz
+000Bh	Inc	00h	No vibration gradient

Fig 4.6 Example of Rotation Stop Settings

This command stops rotation for vibration source - 1.

- * As long as the strength is set to "0," any settings that are made for continuous vibration, frequency (Freq), or vibration gradient (Inc) are ignored.

(4) Checking the vibration settings while vibration is in progress

An example of checking the current vibration settings for the vibration source is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	09h	Specifies Get Condition
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	01h	Data size is 4 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	

Fig 4.7 Example of Checking the Current Vibration Settings

This command can be used to check the current vibration settings.

The data returned by this command is the vibration settings that were set with the previous [Set Condition] command.

If [Get Condition] is issued before [Set Condition] is sent, the return data will consist entirely of "00h."

4.2.3 Automatic vibration stop time setting

An example of the automatic vibration stop time setting is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	0Ch	Specifies Block Write
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	03h	Data size is 12 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	VN	00h	Specifies the automatic vibration stop time
+0009h	Phase	00h	Fixed value
+000Ah	Block No.	0000h	Fixed value
+000Bh			
+000Ch	ASR	0002h	Specifies Vibration Source -1
+000Dh			
+000Eh	AST 1	13h	Time setting (5.0)
+000Fh	Dummy	00h	Fixed value

Fig 4.8 Example of Automatic Vibration Stop Time Setting

This command can change the automatic vibration stop time setting. In the above example, the automatic vibration stop time setting is set to 5.0 seconds. The details of the AST setting are shown below.

Auto-stop time	AST	AST ₇	AST ₆	AST ₅	AST ₄	AST ₃	AST ₂	AST ₁	AST ₀
0.25 Sec	00h	0	0	0	0	0	0	0	0
0.50 Sec	01h	0	0	0	0	0	0	0	1
0.75 Sec	02h	0	0	0	0	0	0	1	0
1.00 Sec	03h	0	0	0	0	0	0	1	1
:	:	:	:	:	:	:	:	:	:
5.00 Sec	13h	0	0	0	1	0	0	1	1
:	:	:	:	:	:	:	:	:	:
10.0 Sec	27h	0	1	1	0	0	1	1	1
:	:	:	:	:	:	:	:	:	:
30.0 Sec	77h	0	1	1	1	0	1	1	1
:	:	:	:	:	:	:	:	:	:
60.0 Sec	EFh	1	1	1	0	1	1	1	1
:	:	:	:	:	:	:	:	:	:
64.0 Sec	FFh	1	1	1	1	1	1	1	1

Fig 4.9 Bit Configuration of the Automatic Vibration Stop Time Setting

4.2.4 Checking the automatic vibration stop time setting

An example of checking the automatic vibration stop time setting is shown below.

Data Address	Data	Setting example	Description
+0000h	Command code	0Bh	Specifies Block Read
+0001h	Destination AP	02h	Expansion device (LM-Bus No.2)
+0002h	Origin AP	00h	Port A
+0003h	Data size	02h	Data size is 8 bytes
+0004h	Function type	00h	The function type specifies the vibration.
+0005h		00h	
+0006h		01h	
+0007h		00h	
+0008h	VN	00h	Specifies the automatic vibration stop time
+0009h	Phase	00h	Fixed value
+000Ah	Block No.	0000h	Fixed value
+000Bh			

Fig 4.10 Example of Checking the Automatic Vibration Stop Time Setting

This command can be used to check the current automatic vibration stop time setting.

The data that is returned by this command is the data that was set by the previous [Block_Write] command.

4.2.5 Setting and checking a custom vibration waveform

This product does not permit the setting or checking of a custom vibration waveform.

If the setting command is issued, a "Command Unknown" error is generated.

5. ASCII STICK INFORMATION

This chapter explains information about specific devices (device statuses).

5.1 Types

Device statuses applicable to the various devices are as follows.

Fixed Device Status

This is a set form of device status, consisting of 112 bytes in all, that must be designated.

Free Device Status

The individual devices can use this status freely. It consists of 40 bytes.

5.2 Device

5.2.1 Fixed Device Status

The following information is recorded in the Fixed Device Status.

(1) Device ID

Capacity	: 16 bytes	
Description	: Function Type	"FT ₀ " only
	Function definition 1st	Ra, La, Da, Ua, S, A, B, C, X, Y, Z
	Function definition 2nd	None
	Function definition 3rd	None
Data	: 00h-00h-00h-01h -00h-00h-07h-FFh -00h-00h-00h-00h -00h-00h-00h-00h	

(2) Destination

Capacity	: 1 byte
Description	: Worldwide
Data	: FFh

(3) Connection direction

Capacity	: 1 byte	
Description	: Expansion socket	Upward
Data	: 00h	

(4) Product name

Size : 30 bytes
Description : "ASCII STICK" in hankaku characters.
A space code (20h) is inserted for unused space.

(5) License

Size : 60 bytes
Description : Generally, it designates
"Produced By or Under License From SEGA ENTERPRISES,LTD."
A space code (20h) is inserted for unused space.

(6) Standby current consumption

Size : 2 bytes
Description : 27mA
Data : 01h-0Eh

(7) Maximum current consumption

Size : 2 bytes
Description : 37mA
Data : 01h-72h

5.2.2 Free Device Status

The host obtains this status by the All Device Request.

The following 40 bytes of data are recorded in this status.

"Version 1.000,1999/06/15,315-6211-AP ,Direction Key & A,B,C,X,Y,Z,Start Button"

5.3 Expansion device 2

5.3.1 Fixed Device Status

Device statuses applicable to the various devices are as follows.

(1) Device ID

Capacity	: 16 bytes		
Description	: Function Type	"FT ₈ " only	
	Function definition 1st	Vibration source	:2
		Number of vibration sources that can be concurrently selected	
			:1
	Function definition 2nd	None	
	Function definition 3rd	None	
Data	: 00h-00h-01h-00h -01h-01h-00h-00h -00h-00h-00h-00h -00h-00h-00h-00h		

(2) Destination

Capacity	: 1byte
Description	: World wide
Data	: FFh

(3) Connection direction

Capacity	: 1 byte	
Description	: Expansion socket	Upward
Data	: 00h	

(4) Product name

Size	: 30bytes
Description	: "Puru Puru Pack" in hankaku characters. A space code (20h) is inserted for unused space.

(5) License

Size	: 60bytes
Description	: Generally, it designates "Produced By or Under License From SEGA ENTERPRISES,LTD." A space code (20h) is inserted for unused space.

(6) Standby current consumption

Size	: 2bytes
Description	: 0mA
Data	: 00h-00h

(7) Maximum current consumption

Size	: 2bytes
Description	: 143mA
Data	: 05h-96h

5.3.2 Free Device Status

The host obtains this status by the All Device Request.

The following 40 bytes of data are recorded in this status.

"Version 1.000,1999/06/15,315-6211-AP ,Vibration Motor:1 , Fm:4 - 30Hz ,Pow:7 "

6. AFTERWORD

This product is an ASCII product.