

**DMC Co., Ltd.**

Analog Resistive Multi Touch Controller  
FTF-2x Software Specification

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## 1. Scope of Application

This specification applies to FTF-2x controller.

## 2. Outline

This document explains,

Command communications with the host computer in serial communication

Coordinate data format    Etc

### 3. Communication Specifications of Touch Screen Controller

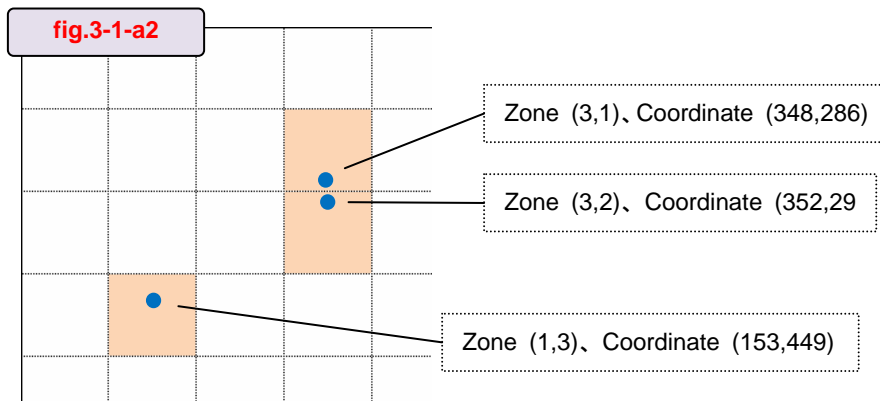
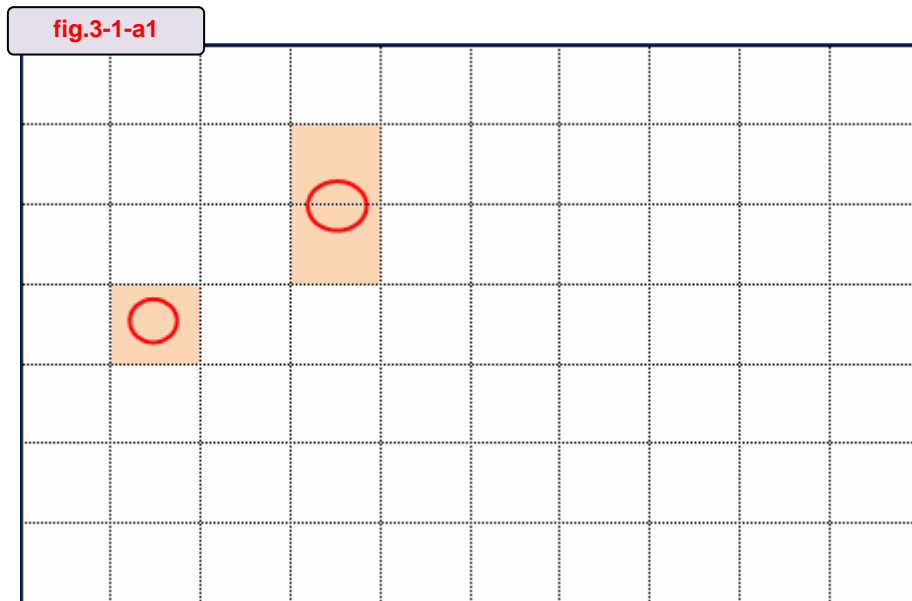
#### 3-1. Coordinate detect – output specifications

MAR controller detects the coordinate data per zone, and outputs every detected coordinate data at the same time.

Each information is output by binary data.

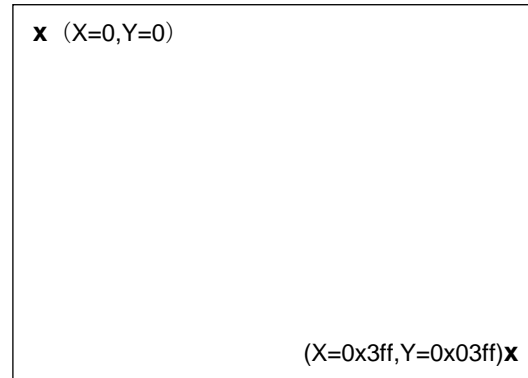
a. Detect – output example:

If there are touch inputs as shown in the fig.3-1-a1, the MAR controller detects and outputs the coordinates in the three coloured zones (fig.3-1-a2).



## b. Origin

Fig.3-1-b1 The Origin of Theoretical Coordinate



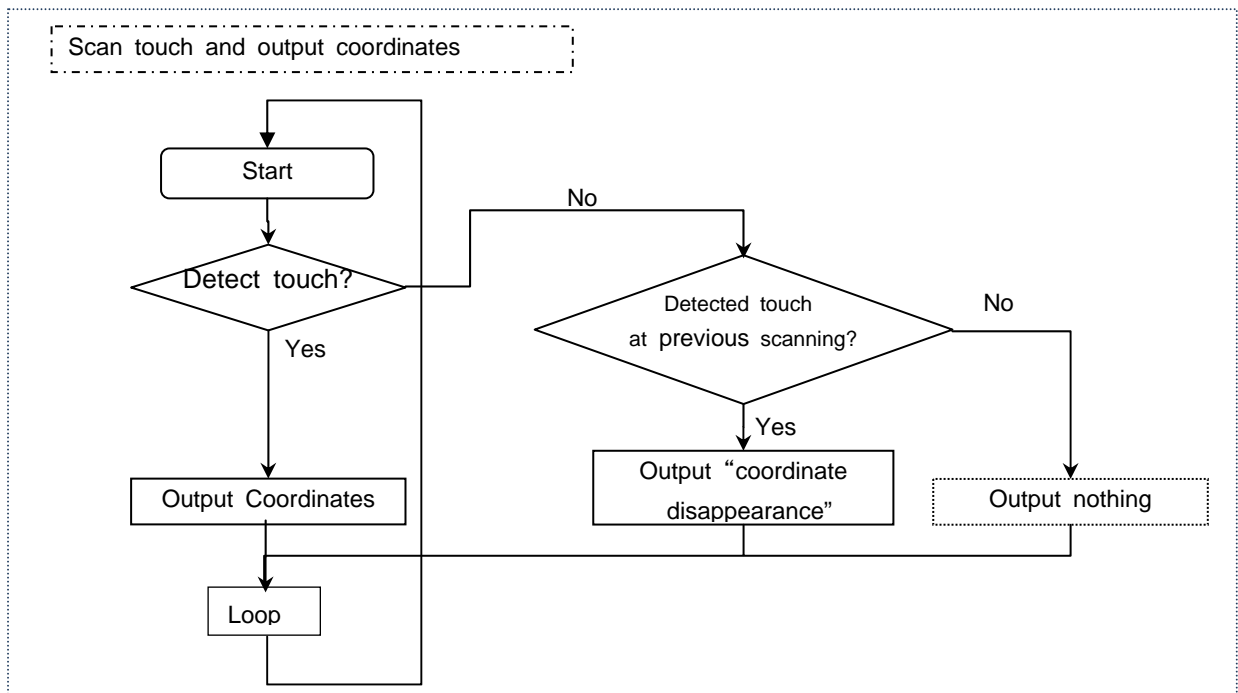
MAR controller detects coordinates by the resolution of 1024(X) x 1024(Y). These coordinates are absolute values and do not depend on the zones.

3-2. Output Coordinates

The MAR controller board outputs coordinates of the detected touch point(s) as detected coordinate data per scanning. When no touch point is detected, no coordinate will be output at a scanning. If more than one touch point is/are detected at the previous scanning, and no touch point is detected at the subsequent scanning, the MAR controller will output “coordinate disappearance”.

The maximum number of simultaneous touch points the MAR controller can detect and output is 20 points.

Fig. 3-2



### 3-3. Output Format

The data format sent by the MAR controller is as follows.

(Coordinate Information Output format)

Header 1		0xC0(fixed value)	
Header 2		0xF0(fixed value)	
Number of coordinate points		0x00~0x14	Number of zones touched
Coordinate Information	Zone column number	0x00~0x09	Column number of the touch detected zone
	Zone row number	0x00~0x06	Row number of the touch detected zone
	X value : Upper	0x00~0x03	Upper 2bit of X value
	X value : Lower	0x00~0xFF	Lower 8bit of X value
	Y value : Upper	0x00~0x03	Upper 2bit of Y value
	Y value : Lower	0x00~0xFF	Lower 8bit of Y value
: (*a)		:	(Repeat)
Terminator 1		0xF0(fixed value)	
Terminator 2		0xC0(fixed value)	

(\*a)...The items in [Coordinate Information] vary depending on the [Number of coordinate points ]

Output data example :

If there are 3 touch inputs shown as 3-1-a, the controller would output data as below.

0xC0	Header		Byte 1	
0xF0	"			
0x03	Number of output coordinate points		} 23Byte	
0x01	1 <sup>st</sup> point	Zone column number		
0x03	Zone row number			
0x00	Upper X value			
0x99	Lower X value			
0x01	Upper X value			
0xC1	Lower Y value			
0x03	2 <sup>nd</sup> point	Zone column number		
0x01	Zone row number			
0x01	Upper X value			
0x5C	Lower X value			
0x01	Upper X value			
0x1E	Lower Y value			
0x03	3 <sup>rd</sup> point	Zone column number		
0x02	Zone row number			
0x01	Upper X value			
0x60	Lower X value			
0x01	Upper X value			
0x29	Lower Y value			
0xF0	Terminator			Bytes 23
0xC0	"			

3-4. Notification of coordinate disappearance information

When no coordinate point is detected (=no touch input), MAR controller will output particular coordinate information that represents "0 detection".

This happens only when the controller detects more than one point in the previous scanning and detects no point in the new scanning.

(In the sample program, this information is used to detect the "pen-up of all the remaining touches").

(coordinate disappearance information output format)

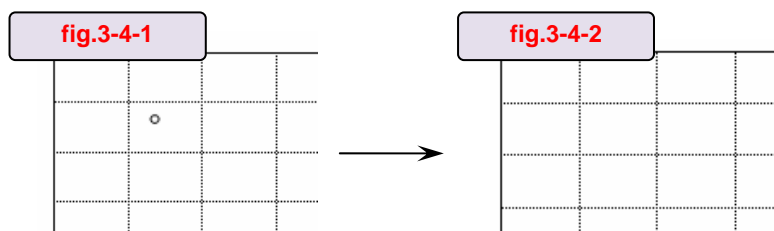
Header 1	0xC0(fixed value)	} 5Byte
Header 2	0xF0(fixed value)	
Coordinate disappearance information	0x00(fixed value)	
Terminator 1	0xF0(fixed value)	
Terminator 2	0xC0(fixed value)	

Output data example :

When 1 point (fig.3-4-1) keeps on being touched, then the touch is released (no touch) (fig.3-4-2), the controller would output (send) the following data.

0xC0	Header	} During touched (fig.3-4-1), this data keeps on being output.
0xF0	"	
0x01	Number of output coordinate points	
0x02	1 <sup>st</sup> point Zone column number	
0x02	Zone row number	
0x00	Upper X value	
0x78	Lower X value	
0x00	Upper X value	
0xA0	Lower Y value	
0xF0	Terminator	
0xC0	"	

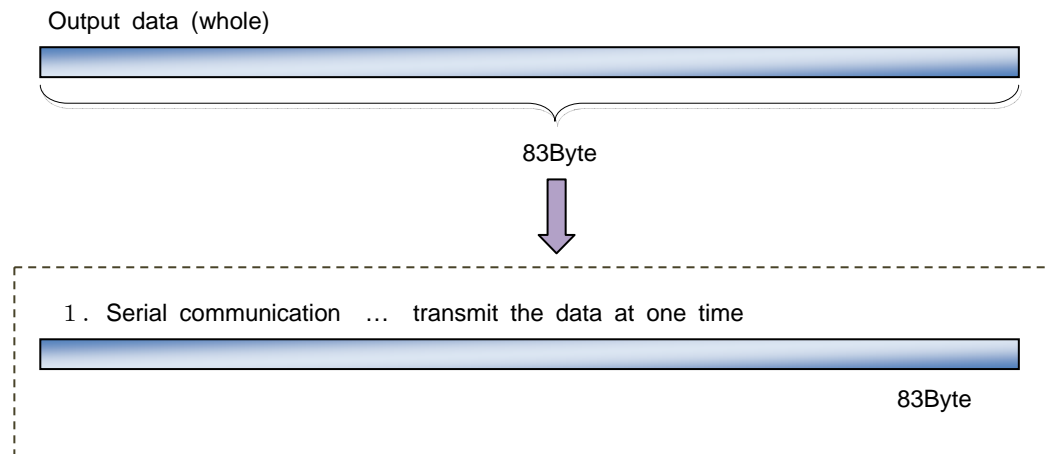
0xC0	Header	} When the touch is released (fig.3-4-2), this data would be output one time.
0xF0	"	
0x01	Number of output coordinate points	
0xF0	Terminator	
0xC0	"	



**3-5. Continuity of output data**

The MAR controller of serial communication specifications outputs these data in one time (without gap/interval).

Output data example :



## 4 Command Input Specifications

As receiving the below commands, the controller for MAR touch screen makes particular actions and transmits the reception results (reply commands) as necessary.

Character data is used when transmitting the command to the controller.

### 4-1. Reset Command

This command initializes the controller. After receiving the command, the controller completes the initialization in approximately 60ms and return to the original sampling action.

The controller transmits the reply command (refer to the section 4-4.) immediately after it received the reset command (just before the initialization starts).

After the command is issued, it takes 800ms of waiting time until the next command can be issued.

Start Command	'R'	fixed(0x52)
End Command	CR	fixed(0x0D)

(Reset Command Format)

} 2Byte



**4-3. Restricted Area Activation Cancellation Command**

This command cancels the restricting actions by Restricted Area Activation Command (b.) and restores it into the state that all zones are scanned when touched. After receiving the command, the controller will complete the transition to the normal sampling mode (or detect an error) in approximately 200ms and transmit the reply command (refer to the section 4-4.).

After the command is issued, it takes 200ms of waiting time until the next command can be issued.

(Restricted Area Activation Cancellation Command Format)

Start Command	'N'	Fixed(0x4E)	} 2Byte
End Command	CR	Fixed(0x0D)	

**4-4. Reply from controller**

Controller transmits the processing results of the commands (4-1.),(4-2.), and (4-3.) in the following formats.

(Normal end format)

Normal end (ACK)	0x06	1Byte
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(Abnormal end format)

Abnormal end (NAK)	0x15	1Byte
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## **5. Notes on use**

### **5-1. Others**

- § This specification may be changed for improvement without prior notices.
- § No liabilities are taken by us for any damage caused by use of this product.
- § This product intends to be used for the standard applications (e.g. office equipment and OA devices, industrial use, communication devices, household equipment). Avoid its use where failure or malfunction directly may affect the human body or special applications where extremely high reliability is required (e.g. airline and space industries, nuclear controls, medical use for life-sustaining).
- § Semi-conductor devices may fail in a certain possibility. Keep the safety design in your mind so that possible failure in this product shall not cause physical accidents such as injury and death, fire and other social damages.

## 6. Changes & Improvements

### 6-1. Version History

Ver. 1.0 (August 07, 2010)

First Edition

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**DMC Co., Ltd.**

<http://www.dmccoltd.com/english/>

9F Kanda Sent-Building 1-2-4, Yushima, Bunkyo-ku, Tokyo, 113-0034 Japan  
Phone: +81-3-5209-7131 (Japanese), 7135 (English) Fax: +82-3-5209-7130