

AUTO REG. MARK - Auto Registration Mark Sensor

This document describes the new version of the Registration Mark Sensor function on the FC5100. The new version of the Registration Mark Sensor function is available with the firmware version 5.31 or later. The firmware version is shown on the plotter's display when you turn on the power of the plotter.

The AXIS ALIGNMENT function is a very important function that should be used when you intend to cut pre-printed media, such as stickers or decals. When the media is loaded in the plotter, it should be loaded at exactly the same angle and position as it was on the printer which printed the image, to ensure that the position of the contour matches the printed images. Since this cannot be done manually, the AXIS ALIGNMENT function allows one to adjust the angle and position of the media on the plotter electrically, as if it were being loaded on the same printer.

The AXIS ALIGNMENT function locates any distortion of the printed image by first using a reference point to create a virtual angle between the X and Y-axis and then applying a scaling factor to match the cutting data to the printed image. This can be done either manually using the Light Pointer (optional) or the Loupe (optional), or automatically using the AUTO REG. MARK sensing function

The AUTO REG. MARK sensing function senses the registration mark using an optical sensor that reflects light off the white media. If you use media that is thicker than 0.3mm (0.01") the registration mark will be too close to the optical sensor and will be out of sensing range. When you are using transparent, colored or crumpled media the light will not reflect back to the optical sensor as well as it does with white media. In both cases, when the media is not white or is thicker than 0.3 mm (0.01"), use the Light Pointer (optional) or the Loupe (optional). See **AXIS ALIGNMENT** for more details.

When using the AUTO REG. MARK sensing function, you must have both the pre-printed media with registration marks and the cutting data. It is important that you keep this information *after* creating the printing image and the cutting data in order to utilize the AXIS ALIGNMENT function.

Caution: The type of media you use affects the AUTO REG. MARK sensing function. Always use white media that is no thicker than 0.3 mm (0.01").

Caution: Always print the image and registration marks at the same time.

- **Registration mark sensing precision*: Max. 0.3 mm (0.012")**

* Precision measured when sensing a specified pattern using the pen provided as a standard accessory and Graphtec's PC-type non-glossy paper.

WARNING

- Registration marks used in the application software cannot be used.
- Registration marks must be created as data on the software.
- The following points must be noted when creating registration marks.
 - Registration mark line thickness: 0.3 mm (0.01") to 1.0 mm (0.04")
 - Registration mark size: 5 mm (0.2") to 20 mm (0.8") (See " P. 106, Specifying the Registration MARK SIZE.)
 - Registration marks should be either pattern 1 or pattern 2.
 - Registration marks should use single lines with the required line thickness specified. The center of the lines is used as the reference point.

1. AUTO REG. MARK

Remember, when using automatic registration mark recognition, pay special attention to the following points:

- The registration mark pattern
- The registration mark location
- The reading area required for registration mark detection
- The position of the origin point
- Media for which registration marks cannot be detected

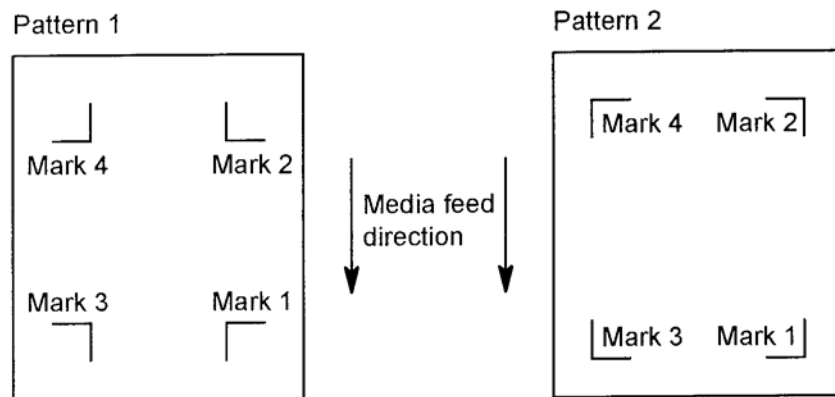
1.1 THE REGISTRATION MARK PATTERN

You can print two, three, or four registration marks depending on the method of axis alignment. Registration mark 1 is located in the lower left corner of the printed image. Registration mark 2 is located along the X-axis of the pre-printed image on a line that goes through registration mark 1. Registration mark 3 is located along the Y-axis of the pre-printed image on a line that goes through registration mark 1. Registration mark 4 is located diagonally opposite Registration mark 1. Registration marks 3 and 4 are optional.

The distance between the registration marks is unlimited. There are four ways to set the distance between registration marks: free length, 5 mm resolution, 10 mm resolution and 50 mm resolution in the Metric mode, or free length, 0.25" resolution, 0.5" resolution, 0.75" resolution, 1.0" resolution and 1.5" resolution in the Inch mode. While in the application software, you must measure and record the distance between the registration marks. The plotter will use this information later to make axis alignment adjustments to ensure accurate contour cuts on the printed image.

The function of the application software is to create the registration mark. You may use that function if the registration mark is matched to the specification of the registration mark for this plotter.

The plotter can read (recognize) the designated registration mark patterns shown below:

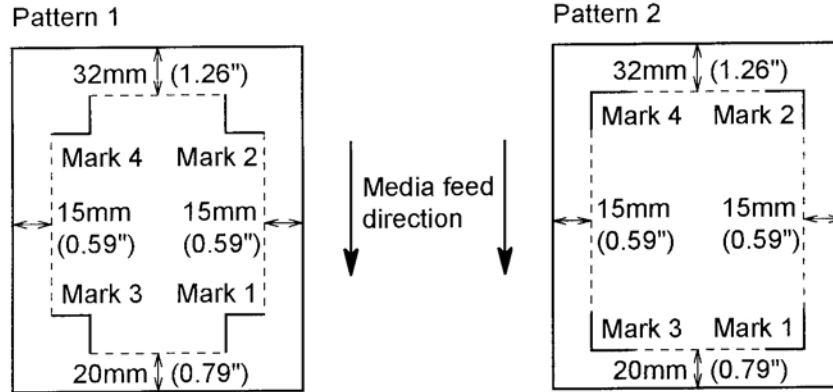


Note: For instructions on how to change the registration mark pattern, see [Setting the Type of Registration Mark](#) for more details.

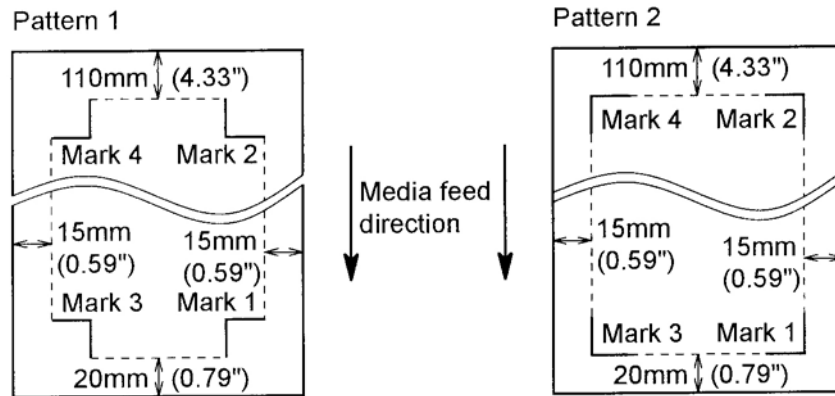
Caution: The size of the registration mark is important; the plotter may not sense a mark that is the wrong width or length. Correct line width is between 0.3 mm (0.01") and 1.0 mm (0.04"). Correct line length is between 5 mm (0.2") and 20mm (0.8"). See [Size Of Registration Mark](#) for more details.

1-2. THE REGISTRATION MARK LOCATION

The location of the registration mark is important. The registration mark must be at least 20mm (0.79") from the leading edge of the media, 15mm (0.59") from the left or right edge of media, and 32mm (1.26") from the back edge of the media. The plotter cannot scan a registration mark that resides along the edge of the media. The following illustrates the location of the registration marks:



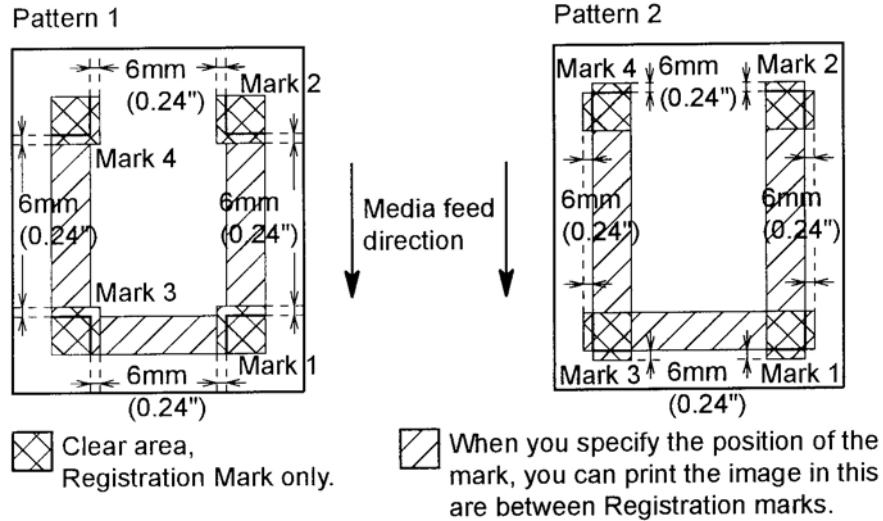
With roll media, the registration mark must be at least 110 mm (4.33") from the back edge of the media.



1-3. THE REGISTRATION MARK READING AREA

In the default setting, the AUTO REG. MARK sensing function senses the registration mark by moving the media or sensor until the plotter locates the registration mark. Normally there is no printed image within 6mm (0.24") of the registration marks.

If you desire images between the registration marks, you may set the plotter to move a set distance sensing for the registration mark. See **Setting the Registration Mark Reading Area** for more details. The following illustrates the reading area the plotter requires for detecting registration marks:



Caution: Do not plot anything except registration marks within the registration mark reading area.

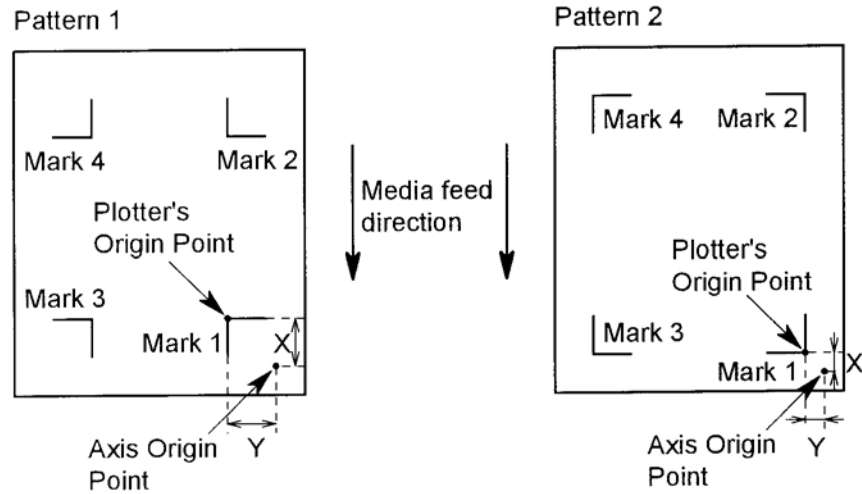
Caution: If dirt, dust or other foreign matter adheres to the media, the plotter may recognize it as a registration mark.

Caution: Be sure to use only black ink for plotting registration marks.

1-4. THE POSITION OF THE ORIGIN POINT

After the registration marks are recognized, the origin point for plotting must be positioned. When you create the cutting data by using the application software, you must know the relationship between the axis origin point and the registration mark. The cutting data contains many coordinate points for cutting. These coordinates are specified from the axis origin point. The plotter sets the origin point at the first corner of the registration mark after it senses the registration marks. If that is *not* the axis origin of the cutting data, you must set the origin point of the cutting data to match the cutting data and the pre-printed image. To set the axis origin point, you must specify the distance from the corner of registration mark 1 to the axis origin point.

The following illustrates when the axis origin point is *not* in the corner of the first registration mark:



To align the axis origin with the registration mark, measure the offset between the axis origin and the registration mark. Input the measured distance into the plotter. See **Setting of Axis Origin Offset** for more details.

Note: You can measure the distance between the axis origin point and the registration mark using one of two methods. You can read the numeric values (representing the distance from the axis origin to the first registration mark) on the screen display of your software application; or you can plot your registration mark and origin point and then actually measure the distance between the registration mark and the origin point.

Caution: You must specify the axis origin correctly. If the location of the axis origin is wrong, then you will not be able to match the cut pattern to the pre-printed image.

1-5. MEDIA FOR WHICH REGISTRATION MARKS CANNOT BE DETECTED

The plotter cannot detect registration marks on the following types of media:

- **Transparent media.** Due to the media's transparency, the sensor will detect the surface of the plotter's writing panel, preventing the accurate recognition of registration marks.
- **Any that is not white or ink that is not black.** Use of a colored medium or registration marks of any color *other* than black, prevents the accurate recognition of registration marks.
- **Coarsely textured drawings or media.** A medium with a stained or wrinkled surface or with faintly plotted registration marks prevents the accurate recognition of registration marks.
- **Improperly secured media.** If the media comes loose, the registration marks cannot be recognized.
- **Excessively thick media.** Registration marks cannot be recognized if the media's thickness exceeds 0.3mm (0.01") because it raises the registration mark to a point outside of the sensor's focal point.

1-6. IF REGISTRATION MARK CANNOT BE AUTOMATICALLY RECOGNIZED

The registration mark can be recognized automatically using the AUTO REG. MARK sensing function. If the plotter cannot recognize the registration marks, it can be recognized manually using the Light Pointer (optional) or the Loupe (Optional). You need to disable the Registration Mark Sensor function before using the Light Pointer (optional) or the Loupe (Optional). See ***Specifying the Registration Mark Mode*** for more details.

1-7. SPECIFYING THE REGISTRATION MARK MODE

The parameters for the AUTO REGISTRATION MARK sensor should be configured prior to performing the axis alignment. There are two main parameters, the axis alignment method and the scanning method.

1-8. AXIS ALIGNMENT METHOD

There are three types of axis alignment methods, 2 points, 3 points and 4 points. Each number represents the number of registration marks that will be digitized for the angle and the distance adjustment.

- 2 POINT:** The two-point method requires you to create mark 1 and mark 2. Enter the distance between the registration marks; the plotter will adjust the virtual angle of the X-axis and the distance. Enter the axis origin point individually to adjust the offset between the cutting data and the printed image. The plotter can match the cutting data to the pre-printed image that is expanded or contracted in the X-axis.
- 3 POINT:** The three-point method requires you to create mark 1, mark 2 and mark 3. Enter the distance between the registration marks; the plotter then adjusts the virtual angle of both the X- and Y-axis and the distance of both X- and Y-axis. Enter the axis origin point individually to adjust the offset between the cutting data and the printed image. The plotter can match the cutting data to the pre-printed image that is distorted into a parallelogram shape.
- 4-POINT:** The four-point method requires you to create mark 1, mark 2, mark 3 and mark 4. Enter the distance between the registration marks; the plotter then adjusts the virtual angle of both the X- and Y-axis and the distance of both the X- and Y-axis. Enter the axis origin point individually to adjust the offset between the cutting data and the printed image. The plotter can match the cutting data to the pre-printed image that is distorted into a trapezoid shape.

1-9. SCANNING METHODS

There are two types of scanning methods, AUTO and MANUAL. When the AXIS ALIGNMENT key is pressed, the following menu appears.

```

    AUTO REG. MARK>
                SKIP>
                AUTO>
                MANUAL>
    
```

Selecting the F2 key (SKIP) displays the following screen, and returns to the READY status.

```

    CONDITION 1    14
                  30
    READY          4
                  CB09Ux 0
    
```

AUTO: In this mode, the plotter automatically starts scanning for the registration mark until it locates the specified number of registration marks. Using the ARROW keys, move the pen near a registration mark before you select AUTO. Otherwise the plotter may not sense the registration marks.

MANUAL: Using the ARROW keys, move the pen near a registration mark after you select MANUAL. Once MANUAL is selected, the plotter will automatically scan for the registration mark(s) until it locates the specified number of registration marks.

Note: If you select the 2-POINT, 3-POINT, or 4-POINT methods, the AUTO REG. MARK sensing function automatically executes after you press the AXIS ALIGNMENT key. Once the AUTO REG. MARK sensing function begins, none of the control panel keys will respond when pressed. To cancel AUTO REG. MARK sensing, lower the media set lever and then select the INITIAL MENU.

Caution: The size of the registration mark is important; the plotter may not sense a mark that is the wrong width or length. The line width must be between 0.3mm (0.01") and 1.0mm (0.04"). The line length must be between 5mm (0.2") and 20mm (0.8").

Caution: Use white media and print the registration mark in black. If any other color is used the plotter may not sense the mark.

Caution: When the edge of the registration mark is blurry or the media is crumpled, the plotter may not sense the mark or sense it inaccurately.

Note: When the plotter cannot sense the registration mark, you need to disable the Registration Mark Sensor function. Then use the Loupe (optional) or the Light Pointer (optional).

2. Enabling the Registration Mark Sensor Function

The following procedures describe how to enable the Registration Mark Sensor Function. There are two methods available to enable this function.

2-1. INITIAL MENU

You can enable or disable the Registration Mark Sensor Function from the Initial Menu.

- Lower the media set lever. The following menu appears.

```
LOAD MEDIA!  
  
INITIAL MENU>
```

- Press the F4 key to select the INITIAL MENU. The following menu appears.
- Press the F1 key to select AUTO REG. MARK.

```
AUTO REG. MARK>  
  AUTO PRE FEED>  
  INITIAL FEED SPEED>  
    INTERFACE>
```

- Press the F1 key to select MARK SCAN MODE.

```
MARK SCAN MODE>
  MARK TYPE>
  OTHER SETUPS>
```

- Press the F3 key to select ENABLED or press the F4 key to select DISABLED. An asterisk (*) mark appears next to the current setting.

```
MARK SCAN MODE

  ENABLED
  DISABLED*
```

To enable the Registration Mark Sensor function, press the F3 key (ENABLE).
To disable the Registration Mark Sensor function, press the F4 key (DISABLE).

- Press the ENTER key to register your settings.
When the DISABLED is selected, the previous menu appears.
When the ENABLED is selected, the following menu appears.

```
MARK SCAN MODE
      2POINTS
      3POINTS*
      4POINTS
```

If you wish to set another parameter, press the key corresponding to that setting.

- Press the NEXT key until the LOAD MEDIA message appears.

```
LOAD MEDIA!

      INITIAL MENU>
```

- Load the media and raise the media set lever.

2-2. AXIS ALIGNMENT MENU

You can disable the Registration Mark Sensor Function from the Axis Alignment Menu.
If this function was set to disable, you cannot have the Registration Mark Sensor Function menu.
You need to go the Initial Menu to enable this function.

- Press the Axis Alignment key. The following menu appears.

```
AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
```


If the following menu appears, the Registration Mark Sensor function was set to disable.

```
AXIS POINT 1

X =      0 mm
Y =      0 mm>
```

You need to access the Initial Menu and then you set this function to enable. See the Initial Menu section for details.

- When the Registration Mark Sensor Function menu appears, press the F1 key to select AUTO REG MARK.
- Press the F1 key to select MARK SCAN MODE.

```
MARK SCAN MODE>
MARK TYPE>
OTHER SETUPS>
DISTANCE ADJUST>
```

- Press the F3 key to select ENABLED or press the F4 key to select DISABLED. An asterisk (*) mark appears next to the current setting.

```
MARK SCAN MODE

ENABLED
DISABLED*
```

To enable the Registration Mark Sensor function, press the F3 key (ENABLE).
To disable the Registration Mark Sensor function, press the F4 key (DISABLE).

- Press the ENTER key to register your settings.
When the DISABLED is selected, the preview menu appears.
When the ENABLED is selected, the following menu appears.

```
MARK SCAN MODE
2POINTS
3POINTS*
4POINTS
```

If you wish to set another parameter, press the key corresponding to that setting.

- Press the NEXT key until the following menu appears.

```
AUTO REG. MARK>
SKIP>
AUTO>
MANUAL>
```

Press the F3 key or the F4 key to start the registration mark sensing.
If you want to return to the READY menu, press the F2 key.

3. Selecting the Axis Alignment Method

The following procedures describe how to align the coordinate axes based on the two-point, three-point or four-point methods.

3-1. TWO-POINTS METHOD

The two-points method requires you to enter REGISTRATION MARK 1, MARK 2 and the AXIS ORIGIN POINT. The AXIS ORIGIN POINT may be located at the same position as MARK 1. To enter this information into the plotter:

- Press the AXIS ALIGNMENT key. The following menu appears.
If a different menu appears, the Registration Mark Sensor function was set to disable. You need to open the Initial Menu and enable the Registration Mark Sensor function.
Press the F1 key to select AUTO REG. MARK.

```

AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
    
```

- Press the F1 key to select MARK SCAN MODE.

```

MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
    
```

- Press the F3 key to select ENABLED. An asterisk (*) mark appears next to the current setting.

```

MARK SCAN MODE

      ENABLED*
      DISABLED
    
```

- Press the ENTER key to register your setting and display the following screen.
Press the F2 key to select 2POINTS method. An asterisk (*) mark appears next to the current setting.

```

MARK SCAN MODE

      2POINTS*
      3POINTS
      4POINTS
    
```

- Press the ENTER key to register your setting. When you select the two-points method, the next setting menu appears. Continue to set other parameters or press the NEXT key to return to the previous menu.

3-2. THREE-POINTS METHOD

The three-points method requires you to enter REGISTRATION MARK 1, MARK 2, MARK 3 and the AXIS ORIGIN POINT. The AXIS ORIGIN POINT may be located at the same position as MARK 1. To enter this information into the plotter:

- Press the AXIS ALIGNMENT key. The following menu appears.
If a different menu appears, the Registration Mark Sensor function was set to disable. You need to open the Initial Menu and enable the Registration Mark Sensor function.
Press the F1 key to select AUTO REG. MARK.

```

AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
    
```

- Press the F1 key to select MARK SCAN MODE.

```

MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
    
```

- Press the F3 key to select ENABLED. An asterisk (*) mark appears next to the current setting.

```

MARK SCAN MODE

      ENABLED*
      DISABLED
    
```

- Press the ENTER key to register your setting and display the following screen.
Press the F3 key to select 3POINTS method. An asterisk (*) mark appears next to the current setting.

```

MARK SCAN MODE

      2POINTS
      3POINTS*
      4POINTS
    
```

- Press the ENTER key to register your setting. If you select the two-points method, the next setting menu appears. Continue to set other parameters or press the NEXT key to return to the previous menu.

3-3. FOUR-POINTS METHOD

The four-points method requires you to enter REGISTRATION MARK 1, MARK 2, MARK 3, MARK 4 and the AXIS ORIGIN POINT. The AXIS ORIGIN POINT may be located at the same position as MARK 1. To enter this information into the plotter:

- Press the AXIS ALIGNMENT key. The following menu appears.
If a different menu appears, the Registration Mark Sensor function was set to disable. You need to open the Initial Menu and enable the Registration Mark Sensor function.
Press the F1 key to select AUTO REG. MARK.

```

AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
    
```

- Press the F1 key to select MARK SCAN MODE.

```

MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
    
```

- Press the F3 key to select ENABLED. An asterisk (*) mark appears next to the current setting.

```

MARK SCAN MODE

      ENABLED*
      DISABLED
    
```

- Press the ENTER key to register your setting and display the following screen.
Press the F4 key to select 4POINTS method. An asterisk (*) mark appears next to the current setting.

```

MARK SCAN MODE

      2POINTS
      3POINTS
      4POINTS*
    
```

- Press the ENTER key to register your setting. If you select the two-points method, the next setting menu appears. Continue to set other parameters or press the NEXT key to return to the previous menu.

4. Setting the Registration Mark Reading Area

The AUTO REG. MARK sensing function senses the registration mark by moving the media or the sensor until the plotter locates the registration mark. Normally there is nothing printed in between the registration marks in order to prevent any sensing errors, however an image can be printed between the registration marks if you tell the plotter *where to read* the registration marks.

You can specify areas that the plotter will not sense by simply specifying the distance between the registration marks. Once the plotter locates the first registration mark, it will automatically move the specified distance and begin scanning for the next mark. You can also use this function to reduce mark-sensing time. Before you begin, you must know the distance between registration marks. The plotter can save up to three sets of settings.

- Press the AXIS ALIGNMENT key.
- Press the F1 key to select AUTO REG. MARK.

```

AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
    
```

- Press the F1 key to select MARK SCAN MODE.

```

MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
    
```

- Press the F3 key to select ENABLED. An asterisk (*) mark appears next to the current setting

```

MARK SCAN MODE

      ENABLED*
      DISABLED
    
```

- Press the ENTER key to register your setting and display the following screen.

```

MARK SCAN MODE

      2POINTS
      3POINTS*
      4POINTS
    
```

Select 2, 3, or 4 and then press the ENTER key to advance to the next menu.

- Press the F1, F2 or F3 key to select the number you wish to store the settings under. An asterisk (*) mark appears next to the current setting.

```

SCAN MARK      *1>
                2>
                3>
    
```

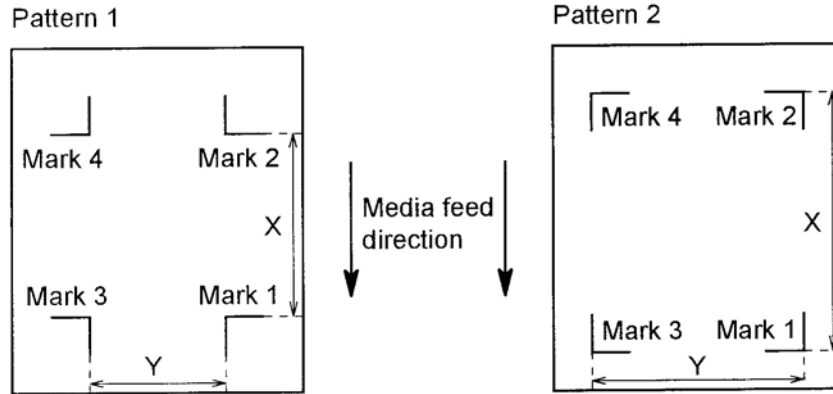
- Press the F3 key or the F4 key to select the axis for setting the distance.
Press the LEFT or RIGHT ARROW key to move the blinking cursor for selecting the digit, and then press the UP or DOWN ARROW key to change the number.

```

MARK POSITION

      X = 0000 mm
      Y = 0000 mm
    
```

The value representing the distance between registration mark 1 and mark 2 is stored in the X-axis. The value representing the distance between registration mark 1 and mark 3 is stored in the Y-axis.



Enter distance X to the "X=", distance Y to the "Y=".

- Note:** If you select the 2-POINTS method, the Y-axis information is ignored.
- Note:** After the plotter senses the first registration mark, it discontinues sensing, moves to the specified distance and starts searching for the next registration mark.
- Note:** If the distance is set at 0 mm (0 inch), the plotter moves slowly searching for the next registration mark.
- Note:** Always enter a distance value that is shorter than the actual distance between the registration marks. The plotter will move to the new location and start searching for the registration mark. If the sensor starts searching *after* it passes the registration mark, the sensor will not locate the registration mark.

Caution: If you set the distance of the X-axis to longer than the length of the media, the plotter will move the required distance and the media will fall off of the plotter.

- Press the ENTER key to register your setting.
- The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```

MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
    
```

5. Selecting the Registration MARK TYPE

The MARK TYPE function is used to select the registration mark pattern. There are two types of registration patterns that the plotter can sense, pattern 1 and pattern 2.

- Press the AXIS ALIGNMENT key.
- Press the F1 key to select AUTO REG. MARK.

```
AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
```

- Press the F2 key to select MARK TYPE.

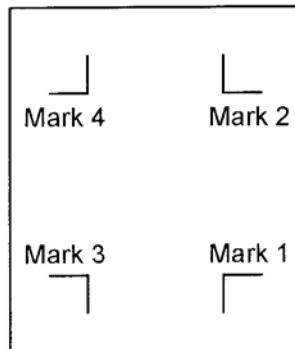
```
MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
```

- Press the F3 key for pattern type 1 or the F4 key to select pattern type 2 to be used when printing the image and registration mark on the media. An asterisk (*) mark appears next to the current setting.

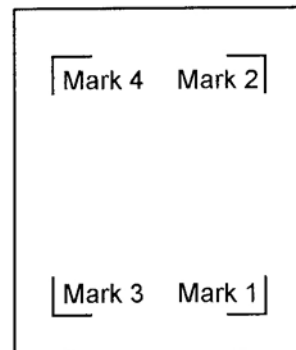
```
MARK TYPE

1*
2
```

Pattern 1



Pattern 2



Media feed
direction

- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```
MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
```

6. Specifying the Registration MARK SIZE

The MARK SIZE function allows you to specify the size of the registration mark. The size of the registration mark is important. The line width must be between 0.3 mm (0.01 inch) and 1.0 mm (0.04 inch) and the length must be between 5 mm (0.2 inch) and 20 mm (0.8 inch).

- Press the ALIGNMENT key.
- Press the F1 key to select AUTO REG. MARK.

```

AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
    
```

- Press the F3 key to select OTHER SETUPS.

```

      MARK SCAN MODE>
      MARK TYPE>
      OTHER SETUPS>
      DISTANCE ADJUST>
    
```

- Press the F1 key to select MARK SIZE.

```

      MARK SIZE>
      SENSOR OFFSET ADJ>
      AXIS ORIGIN OFFSET>
      PAPER-WEIGHT>
    
```

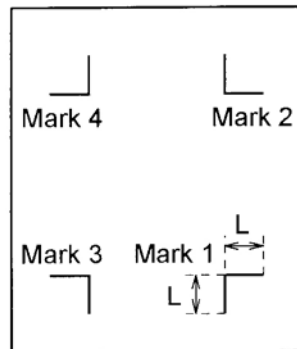
- Press the UP or DOWN ARROW key to set the length. The length can be set from 5 mm (0.2 inch) to 20 mm (0.8 inch) in 1 mm (0.04 inch) increments.

```

      MARK SIZE

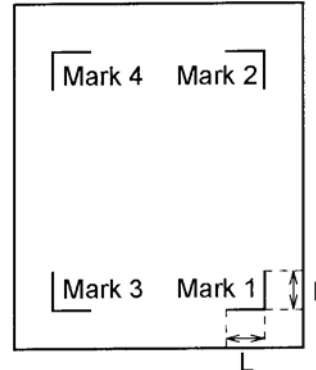
                                     15mm
    
```

Pattern 1



Media feed
direction

Pattern 2



Enter length L into the MARK SIZE menu.

- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```
MARK SIZE>
SENSOR OFFSET ADJ>
AXIS ORIGIN OFFSET>
PAPER-WEIGHT>
```

7. Setting the DISTANCE ADJUSTMENT

The DISTANCE ADJUST function allows you to specify the method to precisely adjust the distance between the registration marks. The distance between registration marks is automatically corrected to a value.

There are two types of distance adjustment methods available, manual and auto. When manual is selected, you must enter the distance between the registration marks to set the scaling factor, therefore, you must know the distance between the registration marks. When auto is selected, the plotter sets the scaling factor automatically by digitizing the distance between the registration marks and by setting the resolution. You may select 5mm resolution, 10mm resolution or 50mm resolution in the Metric mode. You may select 0.25" resolution, 0.5" resolution, 0.75" resolution, 1.0" resolution or 1.5" resolution in the Inch mode.

- Press the AXIS ALIGNMENT key.
- Press the F1 key to select AUTO REG. MARK.

```
AUTO REG. MARK>
SKIP>
AUTO>
MANUAL>
```

- Press the F4 key to select DISTANCE ADJUST.

```
MARK SCAN MODE>
MARK TYPE>
OTHER SETUPS>
DISTANCE ADJUST>
```

- The following menu displays.

```
DISTANCE ADJUST
OFF
CUSTOM*
STANDARD
```

The item marked with the asterisk (*) is the current setting.
To turn off distance adjustment (manual input), press the F2 key (OFF).
For Custom distance adjustment, press the F3 key (CUSTOM).
For Standard distance adjustment, press the F4 key (STANDARD).

OFF: This is the manual mode. You must enter the distance between the registration marks to set the scaling factor, therefore, you must know the distance between the registration marks.

CUSTOM: This is the auto mode. The plotter sets the scaling factor automatically by digitizing the distance between the registration marks and by setting the resolution. You may select the resolution for calculation of the scaling factor.

STANDARD: This is the auto mode. The plotter sets the scaling factor automatically by digitizing the distance between the registration marks and by setting the resolution. The plotter selects the resolution depending on the distance between the marks, as follows.

When LENGTH UNIT is set to METRIC:

Distance between marks	Selected resolution
Up to 50 cm (500 mm)	5 mm
50 cm (500 mm) to 1 m (1000 mm)	10 mm
1 m (1000 mm) or longer	50 mm

When LENGTH UNIT is set to INCH:

Distance between marks	Selected resolution
Up to 25 inches (2' 1")	0.25 inch
25 inches (2' 1") to 50 inches (4' 2")	0.5 inch
50 inches (4' 2") to 75 inches (6' 3")	0.75 inch
75 inches (6' 3") to 100 inches (8' 4")	1.0 inch
100 inches (8' 4") or longer	1.5 inch

- Press the Enter key to register your setting.
- If CUSTOM is selected for distance adjustment, the following menu is displayed.
When LENGTH UNIT is set to METRIC:

DISTANCE ADJUST
5mm*
10mm
50mm

The item marked with the asterisk (*) is the current setting.

To set a distance adjustment of 5 mm (rounded up for less than 5), press the F2 key (5 mm).

To set a distance adjustment of 10 mm (rounded up for less than 10), press the F3 key (10 mm).

To set a distance adjustment of 50 mm (rounded up for less than 50), press the F4 key (50 mm).

When LENGTH UNIT is set to INCH:

DISTANCE ADJUST
0.25inch RESOLUTION

Press the UP or DOWN ARROW key to change the parameter. You can select the parameter from 0.25", 0.5", 0.75", 1.0" and 1.5".

- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```

MARK SIZE>
SENSOR OFFSET ADJ>
AXIS ORIGIN OFFSET>
PAPER-WEIGHT>
    
```

8. Setting of AXIS ORIGIN OFFSET

Unless the origin point has been moved to a new position, it is always located in the corner of the registration mark. Use the AXIS ORIGIN OFFSET function when you wish to move the origin of the plotter.

In order to set the origin point of the cutting data to match the cutting data and pre-printed image, you must know the location of the axis origin point from the registration mark. Next, uses the following procedure to set the axis origin point a specific distance from the corner of registration mark 1.

- Press the AXIS ALIGNMENT key.
- Press the F1 key to select AUTO REG. MARK.

```

AUTO REG. MARK>
SKIP>
AUTO>
MANUAL>
    
```

- Press the F3 key to select OTHER SETUPS.

```

MARK SCAN MODE>
MARK TYPE>
OTHER SETUPS>
DISTANCE ADJUST>
    
```

- Press the F3 key to select AXIS ORIGIN OFFSET

```

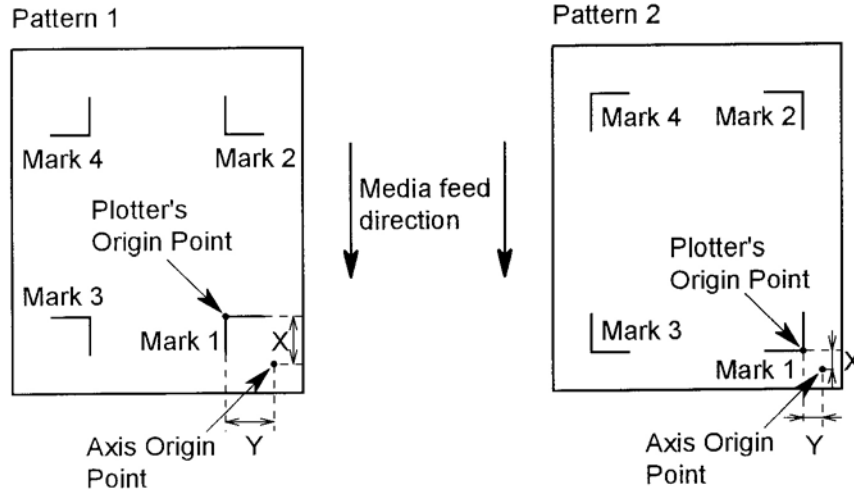
MARK SIZE>
SENSOR OFFSET ADJ>
AXIS ORIGIN OFFSET>
PAPER-WEIGHT>
    
```

- Press the F3 or F4 key to select the axis for setting distance. Press the F2 key to change polarity for distance setting. Press the LEFT or RIGHT ARROW key to move the blinking cursor to select a digit, then press the UP or DOWN ARROW key to change the number.

```

AXIS ORIGIN OFFSET
      +/- >
X = 000.0 mm
Y = 000.0 mm
    
```

In the X-Axis, enter the distance between registration mark 1 and the axis origin point on the X-axis. In the Y-Axis, enter the distance between registration mark 1 and the axis origin point on the Y-axis. The distance can be set from -200mm (-7.8") to 200mm (7.8"). Press the F2 key to toggle polarity, the “-” mark appears on the distance setting when you’ve selected negative.

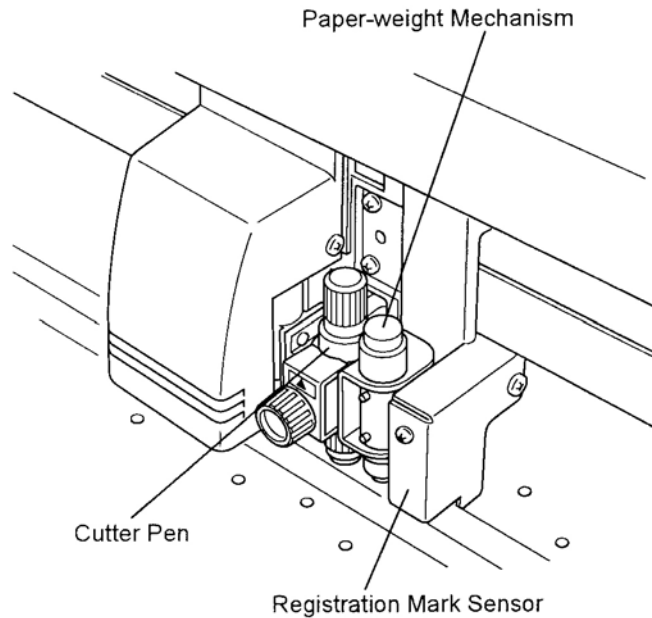


- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```
MARK SIZE>
SENSOR OFFSET ADJ>
AXIS ORIGIN OFFSET>
PAPER-WEIGHT>
```

9. Setting of PAPER-WEIGHT Function

The PAPER-WEIGHT function adds extra weight to hold the media down against the cutting surface to prevent a sensing error caused by media rising up from the cutting surface.



Use the following procedure to enable or disable this function:

- Press the AXIS ALIGNMENT key.
- Press the F1 key to select AUTO REG. MARK.

```
AUTO REG.MARK>  
    SKIP>  
    AUTO>  
    MANUAL>
```

- Press the F3 key to select OTHER SETUPS.

```
MARK SCAN MODE>  
    MARK TYPE>  
    OTHER SETUPS>  
    DISTANCE ADJUST>
```

- Press the F4 key to select PAPER-WEIGHT

```
MARK SIZE>  
    SENSOR OFFSET ADJ>  
    AXIS ORIGIN OFFSET>  
    PAPER-WEIGHT>
```

- Press the F3 key to enable this function. Press the F4 key to disable this function. An asterisk (*) mark appears next to the current setting.

```
PEPER-WEIGHT  
  
ON*  
OFF
```

Note: When ON is selected, the plotter will move to the home position to enable the PAPER-WEIGHT mechanism before and after the plotter scans the registration mark.

- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```
MARK SIZE>  
SENSOR OFFSET ADJ>  
AXIS ORIGIN OFFSET>  
PAPER-WEIGHT>
```

10. Setting the SENSOR OFFSET ADJUSTMENT

The SENSOR OFFSET ADJ function is used to determine the corrective values you should input in order to adjust the precision of the registration mark sensor.

The plotter utilizes an optical sensor to sense or read a registration mark that is not in the same location as the pen. There are two methods available to adjust the offset factor:

METHOD 1: The plotter scans a printed cross mark then plots a second cross mark based on the reading of the printed cross mark. The plotter then adjusts for offset.

METHOD 2: The plotter plots the cross mark, reads it, then plots another cross symbol for use in determining the corrective values to be input in order to adjust the precision of the registration mark sensor. The plotter plots the second cross mark based on the reading of the first cross mark then adjusts for offset.

Note: To avoid confusion, plot using different color pens between the first and second cross marks.

- Load the media and set the pen in the plotter. If you wish to use METHOD 1, you must load media with a printed cross mark.
- Press the AXIS ALIGNMENT key
- Press the F1 key to select AUTO REG. MARK

```
AUTO REG. MARK>  
SKIP>  
AUTO>  
MANUAL>
```

- Press the F3 key to select OTHER SETUPS.

```
MARK SCAN MODE>
MARK TYPE>
OTHER SETUPS>
DISTANCE ADJUST>
```

- Press the F2 key to select SENSOR OFFSET ADJ.

```
MARK SIZE>
SENSOR OFFSET ADJ>
AXIS ORIGIN OFFSET>
PAPER-WEIGHT>
```

- Press the F3 or F4 key to select METHOD 1 or METHOD 2

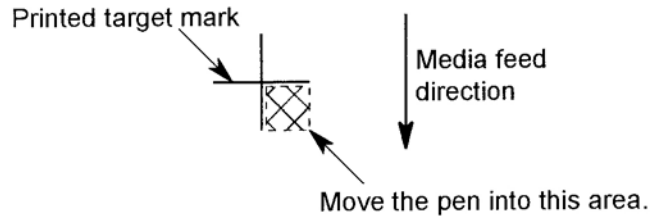
```
SENSOR OFFSET ADJUST
METHOD 1>
METHOD 2>
```

Select either METHOD 1 or METHOD 2

10-1. ADJUSTMENT METHOD 1

The plotter scans a printed cross mark and then plots a second cross mark based on the reading of the printed cross mark. The plotter then adjusts for offset.

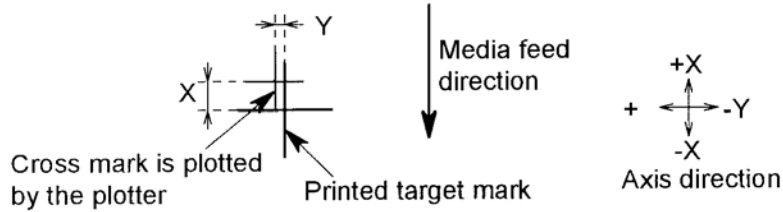
- Press the POSITION key to move the pen near to the pre-printed cross mark.



- Press the F4 key to select SCAN

```
SENSOR OFFSET ADJUST
PARAMETER SET>
SCAN>
```

The plotter scans the pre-printed cross mark, then plots the cross mark. You must measure the distance between the pre-printed cross mark and the cross mark plotted by your plotter. If the location of the two cross marks match, press the NEXT key to cancel this mode. If the location of the cross marks do not match, change the PARAMETER SET.



- Press the F3 key to select **PARAMETER SET**.

```

SENSOR OFFSET ADJUST

PARAMETER SET>
SCAN>
    
```

The following menu appears:

```

SENSOR OFFSET ADJUST
      + / - >
X = 00.0 mm
Y = 00.0 mm
    
```

Press the F3 or F4 key to select the axis for setting distance.

Press the F2 key to toggle polarity for the distance setting, the “-” mark appears on the distance setting when negative is selected.

Press the LEFT or RIGHT ARROW key to move the blinking cursor to select the digit, then press the UP or DOWN ARROW key to change the number.

If the two cross marks match, set 00.0 mm on both the X and Y-axis.

- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```

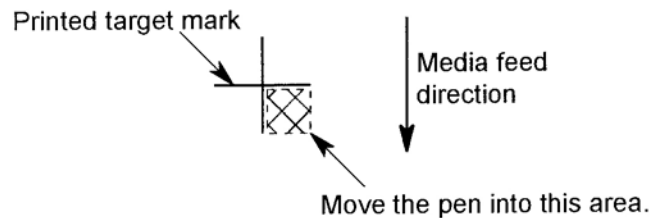
SENSOR OFFSET ADJUST

METHOD 1>
METHOD 2>
    
```

10-2. ADJUSTMENT METHOD 2

The plotter plots the cross mark, reads it, and plots another cross symbol for use in determining the corrective values to be input in order to adjust the precision of the registration mark sensor. The plotter plots the second cross mark based on the reading of the first cross mark then adjusts for offset.

- Press the POSITION key to move the pen to plot the first cross mark.

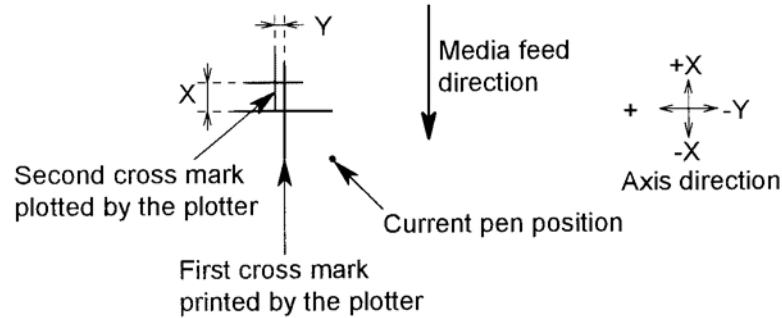


- Press the F4 key to select SCAN

```

SENSOR OFFSET ADJUST

  PARAMETER SET>
    SCAN>
    
```



The plotter plots the first cross mark. The following menu appears.

- Change the pen to a different color. Press the ENTER key to continue the process.

```

CHANGE PEN

PRESS ENTER KEY!
    
```

You must measure the distance between the first and second cross marks plotted by the plotter. If the location of the two cross marks match, press the NEXT key to cancel this mode. If the cross marks do not match, change the PARAMETER SET.

- Press the F3 key to select PARAMETER SET.

```

SENSOR OFFSET ADJUST

  PARAMETER SET>
    SCAN>
    
```

- The following menu appears.

```

SENSOR OFFSET ADJUST
      +/- >
X = 00.0 mm
Y = 00.0 mm
    
```

Press the F3 or F4 key to select the axis for setting distance.

Press the F2 key to toggle polarity for the distance setting, the “-” mark appears on the distance setting when negative is selected.

Press the LEFT or RIGHT ARROW key to move the blinking cursor to select the digit, then press the UP or DOWN ARROW key to change the number.

If the two cross marks match, set 00.0 mm on both the X and Y-axis.

- Press the ENTER key to register your setting. The following menu appears. If you wish to set another parameter, press the key corresponding to that setting.

```

SENSOR OFFSET ADJUST

      PARAMETER SET>
      SCAN>
    
```

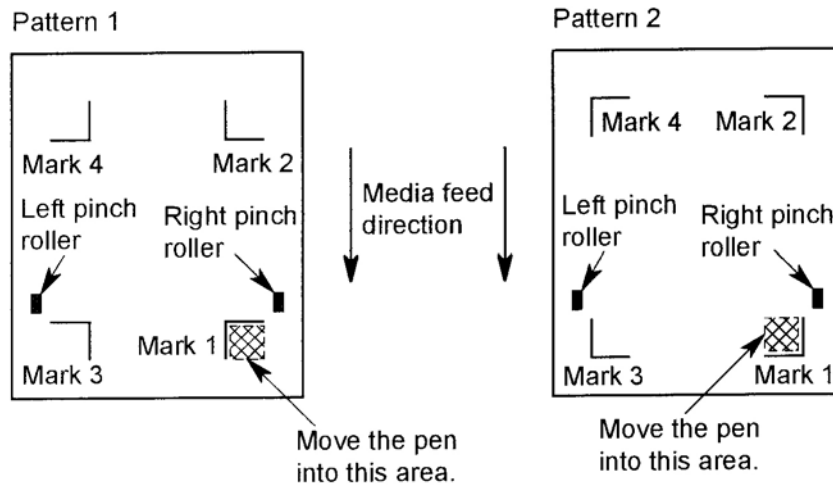
11. Using the AUTO REG. MARK Sensing Function

- Load pre-printed media into the plotter. Make sure that the pinch roller is set outside of the registration mark.
- Press the AXIS ALIGNMENT key. The following menu appears.
If the following menu does not appear, the Registration Mark Sensor function was set to disable. You need to access the Initial Menu and then set this function to enable.

```

AUTO REG. MARK>
      SKIP>
      AUTO>
      MANUAL>
    
```

- If you want to skip the registration mark sensing function, press the F2 key (SKIP) to return to the READY menu.
- When using AUTO scan mode, press the POSITION key to move the pen to the specified area. In this mode, the plotter starts to search the first registration mark from the current pen position.



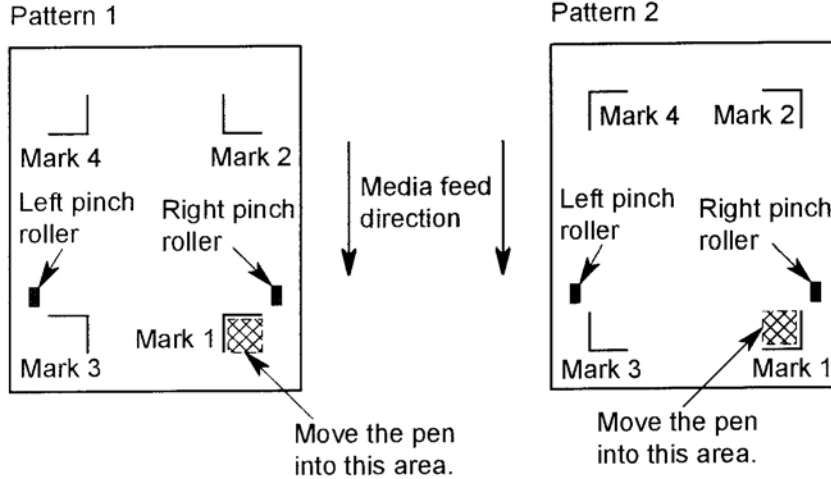
Press the F3 key (AUTO) to start scanning for the registration marks.

- When using MANUAL scan mode, press the F4 key (MANUAL) to start scanning. The following message appears.

```

MOVR TO MARK 1
USE THE POSITION KEY
TO MOVE THE PEN AND
THEN PRESS ENTER.
    
```

Use the POSITION key to move the pen tip to the specified area.



When the ENTER key is pressed, the plotter will start scanning for the registration marks.

- When you select DISTANCE ADJUSTMENT to CUSTOM or STANDARD, the plotter reads the distance between the registration marks and then automatically aligns the axes and adjusts the distance.

After all the registration marks are read, the plotter moves the pen and media to the AXIS ORIGIN POINT. The axis origin location is set in the AXIS ORIGIN OFFSET menu and then the READY menu appears.

- When you select the DISTANCE ADJUSTMENT to OFF, the following menu appears after the plotter scans the registration marks:

```

DISTANCE
POINT 1-2
          00302.0 mm>
OK?      00302.0 mm>
    
```

The measured distance between registration mark 1 and mark 2 is shown on the third row. If the distance between the marks is a known value, set the actual distance on the fourth row. Press the RIGHT or LEFT ARROW key to move the blinking cursor and press the UP or DOWN ARROW key to change the number for setting the actual distance.

- Press the ENTER key to store the setting.
- When selecting the 2-POINTS scan mode, the plotter moves the pen and media to the AXIS ORIGIN point. The AXIS ORIGIN OFFSET menu is used to set the AXIS ORIGIN point location. Then the READY menu appears.

- When selecting the 3-POINTS or 4-POINTS scan mode, the following menu appears:

DISTANCE	
POINT 1-3	
	00302.0 mm>
OK?	00302.0 mm>

The measured distance between registration mark 1 and mark 3 is shown on the third row. If the distance between the marks is a known value, set the actual distance on the fourth row. Press the RIGHT or LEFT ARROW key to move the blinking cursor and press the UP or DOWN ARROW key to change the number for setting the actual distance.

- Press the ENTER key to store the setting.
When selecting the 3-POINTS scan mode, the plotter moves the pen and media to the AXIS ORIGIN point. The AXIS ORIGIN OFFSET menu is used to set the AXIS ORIGIN point location. Then the READY menu appears.
- Send the cutting data to the plotter from the computer.