

MessagePad 2000 Screen Size and Gray-Scale Graphics
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An Introduction to the MessagePad 2000 screen

The MessagePad 2000 platform provides a new screen for Newton applications. The new screen is one quarter VGA size (320x480 pixels) and provides 16-level gray-scale. This new screen resolution provides exactly twice the screen real estate over the MessagePad 120 and 130. As a result, applications now have greater freedom in their choice of how to present information.

Along with the increased screen size comes gray-scale. The MessagePad 2000 screen provides applications with a palette of 16 gray levels. Where images once had to be shown using dithered gray levels, the MessagePad 2000 screen provides real gray tones. In anticipation of possible future devices, the MessagePad 2000 screen is actually working with color values internally. The gray levels are simply a mapping from color values to gray.

The button bar has changed as well. Gone are the silk-screen buttons. Gone are the arrow buttons that don't quite make sense when the screen is rotated. Gone is the restriction to only rotate to a single portrait or landscape orientation. The MessagePad 2000 screen can now rotate to any of the four possible portrait or landscape orientations. The orientation that works best can be used. Don't like the button bar at the left of the screen in landscape? Now you can put it on the right side. With the demise of the silk-screen buttons comes another handy feature. Any application can be put on the button bar. Simply drag the icons you don't want on the button bar into the Extras Drawer and drag the icons you do want onto the bar.

What it looks like

Here's what the new screen looks like in landscape mode with the icon bar on the right:

<<Insert picture of MessagePad 2000 screen here, call out notable features: Arrows rotate with the screen, Assist off the button bar, Formulas on>>

How to look good.

There are a few issues that developers must handle properly in order to have their applications look good on the MessagePad 2000 display. The main issue is dealing with the increased screen size and the soft button bar. Depending on how an application sizes its main view it may end up using only half the screen, or it may end up using the entire screen with interface elements in strange places.

As long as applications follow the recommended techniques for sizing the base view, most problems can be avoided. A naive way of sizing your base view is to set

the viewBounds to hard numbers and to assume that the screen will be the right size to accommodate the view. When the MessagePad 110 was released, the screen size changed. This caused any application with hard viewBounds to look odd on the new screen size. Putting a viewSetupFormScript in your applications base view is the right way to avoid problems with the screen size. Here's an example:

```
func()
begin
    local maxWidth := 200;
    local maxHeight := 300;
    local params := GetAppParams();
    self.viewBounds := RelBounds(
        params.appAreaLeft,
        params.appAreaTop,
        Min(maxWidth, params.appAreaWidth),
        Min(maxHeight, params.appAreaHeight)
    );
end
```

By using a maximum size that is reasonable for your application, you can be sure that all your careful layout won't be ruined by a suddenly increased screen size.

View justifications also need to be carefully planned so that increased screen size doesn't cause sub-views to suddenly change position.

Working with Gray Scale

Let's now turn our attention to the gray scale capability of the MessagePad 2000 screen. Gray scale is one of those features that can differentiate a run-of-the-mill application from one that's genuinely pleasing to the eye.

The new gray scale screen allows applications to display gray shapes, pictures and text. Along with the gray scale capabilities come several new features for Newton QuickDraw. These new features support anti-aliased bitmaps, Clipboard support and several new shape manipulations.

Gray QuickDraw can directly display 1, 2 or 4-bit color images. Pictures or shapes that use 8, 16 or even 32-bit color can also be drawn by interpolating the color values as grays. One thing to keep in mind is that sizes go up dramatically as larger bit-depths are used for pictures.

The Platform file for MessagePad 2000 will be able to directly import color pictures into packages to be displayed as gray. In the case of bitmaps, multiple versions of the bitmap at 1, 2, 4, 8, 16 or 32 bits per pixel can be included in the picture. The appropriate image will be displayed to match the display capability.

None of the built-in protos have been changed to take advantage of the new gray

capability. There are a couple of reasons for this. The first and most obvious reason is space. Protos that use gray will simply take up more space than the current versions. More importantly, existing applications won't know that gray is being used. The results could be visually odd if the gray areas didn't blend reasonably. There is nothing preventing an application from defining its own protos that use gray to good effect.

All shapes can now include predefined color values for the gray tones or gray patterns that will be tiled into the shape. Fill and pen patterns can be defined.

Monochrome bitmaps can be anti-aliased by shrinking and gray interpolation. This is especially useful for fax or other scanned image viewing. If the bitmap being interpolated is not a bitmap (it has more than one bit per pixel) then anti-aliasing is not performed.

A number of functions are now provided for working with RGB data. A drawing application can pretend that it is running on a color display and the color values will be interpolated into gray levels. By working with RGB values an application can be ready for color in the event that future Newton devices provide color support.

There have been a number of capabilities added that have nothing directly to do with the new gray scale screen. These new capabilities make life a little easier for applications that are doing a lot of graphics work.

Clipboard data can now be converted into Shapes. This makes it easier for applications to allow users to transfer shapes between applications.

Shapes can now be directly flipped or rotated to allow applications more freedom in how shapes are manipulated. Bitmaps can now be displayed with a mask. This allows bitmaps to have odd shapes but to still occlude the background (more or less like Macintosh icons).

Ink is now easier to handle. First of all, you can get the list of point in either X,Y order or in Y,X (previously the only way to get the points), whichever suits your use of the data. The number of points obtained can be tuned by specifying a distance between points as well.

Selection handles are now supported through the styles frame for a shape. You can also determine whether a point hits the selection handle. This helps applications that support direct user manipulation of shapes.

Summary

The MessagePad 2000 screen provides a lot of new screen real estate for applications that need larger areas to work with. The new gray capabilities and drawing function

open a number of new arenas for application and user interface design.