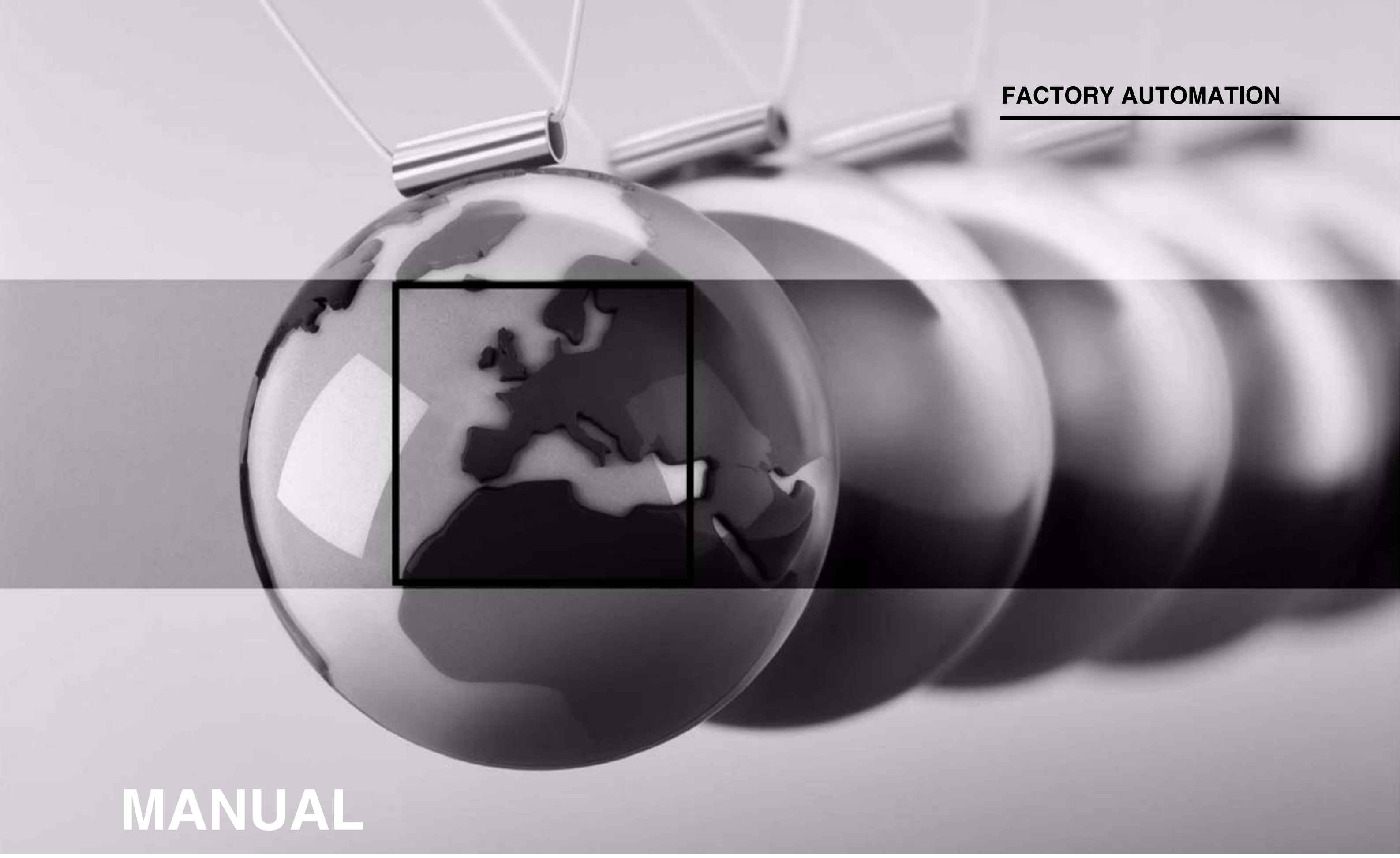
FACTORY AUTOMATION



JAVASCRIPT PROGRAMMING GUIDE

MAH120 / MAH200 / MAH300 / MAC335

PEPPERL+FUCHS
SENSING YOUR NEEDS

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1 Introduction

Identification systems are used for object identification in logistics and provide the first step in cost optimization and quality improvement: automating production processes, reducing throughput times, quality control, and flexible in project planning and production.

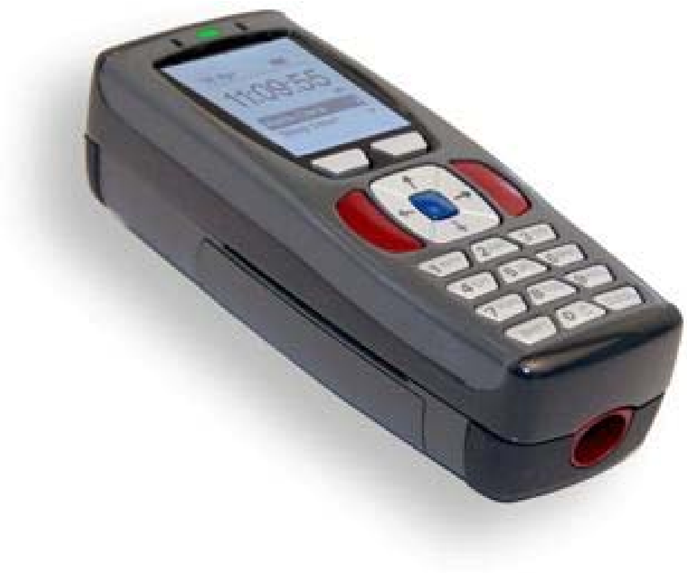


Figure 1 – MAH300

Pepperl+Fuchs’handhelds offer the ultimate in user comfort. All handhelds can be easily programmed via JavaScript and optimally matched to your application requirements.
The MAH series enables reliable detection of all standard 1D and 2D codes. Simply connect the handhelds to a PC or controller via RS 232, USB, or Bluetooth.

AT A GLANCE

- Reads all standard 1D and 2D codes
- Simple operation
  - Vision Configurator:

    ONE operating software for all camerabased code readers
  - Parameterization using control codes replaces external PC
  - Intuitive operation
  - Bidirectional communication
- Reliable detection with
  - Laser pointer
  - Visual and acoustic event message
  - Vibration event message in loud and noise-sensitive environments
- Flexible adaptability due to JavaScript functionality.

The MAH300 provides with its integrated display and keypad the highest level of user comfort.
With the MAH300 you can use the whole potential of JavaScript. In this way the display and keypad can be individually programmed to match your requirements.
Therefore you find some examples and descriptions regarding the JavaScript programming orientated on the example of the MAH300.

1.1 Product Description

This manual describes the application programming interface for the barcode imager. It is assumed the reader will have programming skills and familiarity with the JavaScript language.

- Barcode imager reads code data and can be programmed to transmit code data over a selected communications link or to store code data in barcode imager memory (batch mode).
- The programming environment provides interfaces to:
  - Read and manipulate data in barcode imager memory.
  - Display information on MAH300 display screen.
  - Retrieve data from barcode imager hardware or MAH300 key pad.
  - Retrieve data from or MAH300 key pad.
  - Access data sent by host.
  - Transmit data to a host computer via communications link.
  - Select type of communications link.
  - Set, change, and retrieve barcode imager configuration settings.

1.2 Document Organization

This document is organized as follows:

- Section 1, Introduction: gives a product description and describes how to use this document.
- Section 2, Programming Environment: identifies tools used to create and load application software into barcode imager.
- Section 3, Programming Concepts: discusses how to accomplish various operations on the barcode imager using P+F's application programming interface.
- Section 4, Class Reference: presents classes, objects, methods, properties, and constructors that support application programs.
- Glossary
- Appendices

1.3 Document and Coding Conventions

This document employs the following conventions to aid in readability:

- Words that are part of the application development description use the `Courier New` font.
- P+F examples use the **`bold Courier New`** font.
- Variable names that must be supplied by the programmer are `Courier New` font and are enclosed in relational signs, for example, `<variable_name>.`

The barcode imager JavaScript library uses the following naming conventions:

- identifiers**:** mixed-case with a capital letter where words join (soCalledCamelCase); acronyms and other initialisms are capitalized like words, e.g., nasaSpaceShuttle, httpServer, codeXml
- variables and properties: initial lower case
- classes (i.e., constructors): initial capital
- functions: initial lower case
- unit of measure: suffix to name, separated from name by underscore, using correct case when it's significant, e.g., offset_pixels, width_mm, power_MW, powerRatio_dB

1.4 Related Documents

MAH300, MAH200, MAH120, MAC335 – User Manuals
Document Number #189945, #200930, and #204646

Reader-Host Interface Specification Client Version

1.5 Related Utilities

Reader Download Utility– Downloads JavaScript applications and data files from a host PC to the reader. Valid communication modes are USB Downloader, USB Virtual Com, and RS 232.

Vision Configurator – Provides a user interface to configure the reader.

USB Virtual Com Driver - Software driver that creates a virtual COM port for a USB-cabled reader so it can be used by a computer program that requires input from a serial device.

File Uploader – Utility to transfer files from the reader to the host PC. Valid communication modes are RS 232(115 Baud), USB Downloader mode, and USB Virtual Com.

2 Programming Environment

Pepperl+Fuchs provides an environment for programming, testing, and loading barcode imager applications. JavaScript was selected as the programming language and P+F implemented a barcode imager resident JavaScript engine.

Pepperl+Fuchs provides a computer resident simulator and bundled editor for developing of barcode imager JavaScripts, which can be downloaded to the barcode imager.

2.1 JavaScript Resources

This document is not a JavaScript manual. The following sources provide JavaScript reference books and online documents.

- ***JavaScript: The Complete Reference, Second Edition***
  by Thomas Powell, et al.
- ***JavaScript Demystified (Demystified)***
  by James Keogh.
- ***JavaScript (TM) in 10 Simple Steps or Less***
  by Arman Danesh.
- http://javascript.internet.com/
- http://www.javascript.com/

2.2 Editor

You can use your favorite editing product to create and modify JavaScript code. Turn off any smart quote options in the editor. Smart quotes are not valid in JavaScripts.

In addition, P+F has bundled a freeware editor (SciTE) with the barcode imager JavaScript Engine (JSE) Simulator. See A 1.

2.3 Simulator

P+F provides a Windows PC based simulator for JSE. See A 1 for more information.

2.4 MAH300 CodeViewer Application (only MAH300)

The MAH300 CodeViewer Application runs as a JavaScript application on the MAH300. The menu driven application has features for changing MAH300 configuration settings and for defining the applications that run on the MAH300. JavaScript Developers can make use of the following keywords in the CodeViewer Application:

`Title` – Displays the title of the JavaScript rather than the file name in CodeViewer’s ‘Application’ menu. Add a comment to your script formatted as `$Title: <title of script>$` to implement.

`Revision` – Displays the revision of the JavaScript from the CodeViewer's 'Application/<script>' submenu. Add a comment to your script formatted as `$Revision: <revision of script>$` to implement.

2.5 Security

P+F supplies an encryption utility for license protection.

- Each barcode imager contains a unique reader ID.
- Selected features of the barcode imager are protected by license.
- P+F provides a license file that activates protected features purchased by the customer.
- A license file is required for each barcode imager licensed to use protected features.
- Third party software licenses may also be protected using the encryption utility.

2.6 Debugging

The barcode imager contains a built-in error log that can be useful when debugging scripts. To debug the script when an error has occurred on the reader, issue the '(' command to the reader; the reader responds by sending the error log to the communications port. The error log may contain messages from the firmware that should be ignored. JavaScript errors in the log can be identified by the format: filename:lineNumber. If there are many error codes in the error log, you can issue the ')' command to clear the log and repeat the steps to create the error, leaving only one entry in the log.

Example:

Error log returns:

```
X-ap/gerror-log. storage_init: flMountVolume fail status 26,
formatting.storage_formatFilesystem: status 0.temp.js:3: .
```

```
TypeError: gui.aler is not a function. X-ap/dEOF.
```

This error log contains one firmware error and one JavaScript error. The JavaScript error description begins with temp.js:3: and tells us that on line three of the temp.js file, gui.aler is not recognized as a function. In this case, gui.alert has been misspelled (it is missing the t).

3 Programming Concepts

To help the developer create unique applications for the barcode imager, P+F provides an easy to use, object oriented barcode imager JavaScript application programming interface. The application developer can create complex business applications with simple prompts and simple data entry through the MAH300 user interface features (keypad and display screen).

The features of the programming interface include:

- Simplicity
- A graphical user interface
- Event handlers
- Symbol decoding
- Host communications
- Local data storage
- barcode imager configuration

In support of these features, the environment defines the following objects:

- `gui`
- `reader`
- `storage`
- `comm`

Using these objects and their methods and properties, you can create robust, interactive, and sophisticated user applications.

P+F provides a MAH300 JavaScript Simulator (A 1) for testing scripts and a Download Utility (section 1.5) for transferring scripts to the barcode imager.

A script can be made the default application using the configuration utility, or it may be run from the configuration utility without making it the default.

Note: the default application supplied by P+F allows scripts to be run by host command or configuration code scan; the command is "|run:scriptName.js" (using your own scriptName).

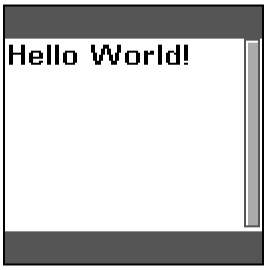
3.1 Simplicity

The "Hello World!" application is traditionally the first application presented in a programming guide. It is an easy to code and understand application that illustrates how the programming environment works.

In its simplest form the "Hello World!" application in the MAH300 environment sends text to the display. With the following single line of code, you can display "Hello World!" in the screen defined by the standard MAH300 `gui` object (section 4.1).

```
gui.show(new gui.Text("Hello World!"));
```

Execution of this script displays the image shown in Figure 2.



Hello World!

Figure 2 – Hello World Application

Note that in Figure 2, the text is displayed in a text box control with a scroll bar to the right as defined by the MAH300 `gui` object.

3.2 The MAH300 `gui` Object (only MAH300)

The MAH300 application development environment defines a standard GUI display for application software (Figure 3). The display supports simple prompts and data entry.

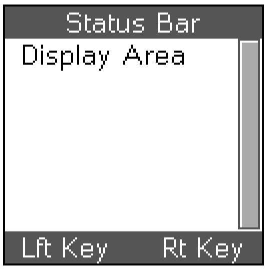


Figure 3 – The Standard `GUI` Display

The standard display consists of a status bar, a display area, and labels for the left and right software programmable keys (softkeys) at the top of the MAH300 key pad (see Figure 7).

The scroll bar on the right side of the screen indicates the relative position within the displayed object as the operator scrolls through forms, menus, or text using the up and down keys on the keypad. This scrolling feature allows the application to display objects larger than the display area.

You can use the MAH300 features of the `gui` object (section 4.1) to develop form and menu applications. Use the gui constructors to build forms and menus and the “show” methods to display them.

3.2.1 Softkey Implementation

Softkeys are general purpose, programmable keys. If defined, the softkeys are always active in that they are not associated with or dependent on any control in the GUI display. Pressing the key always calls the event handler. The `gui.showForm`, `gui.showMenu`, and `gui.showSubmenu` methods include softkey definitions appropriate for the implementation.

The following example shows the basic approach to labeling the softkeys and implementing their event handlers.

```
// define send-key functions used by common softkeys
function sendEnter()  { gui.sendKey(gui.key.enter); }
function sendEscape() { gui.sendKey(gui.key.escape); }

// create some common softkeys
var selectSoftkey = new gui.Softkey("Select", sendEnter);
var okSoftkey     = new gui.Softkey("OK",     sendEnter);
var backSoftkey   = new gui.Softkey("Back",   sendEscape);
var cancelSoftkey = new gui.Softkey("Cancel", sendEscape);
```

P+F provides equivalent definitions to the example above as a part of the MAH300 JavaScript Library gui object. These examples have been provided so you can use them to create your own softkey definitions.

3.2.2 Forms

Use the `gui.Form` object (section 4.1.3.3) to define the forms for your application. Section 4.1.3 defines the form object and several constructors that you can use to create controls on your application form.

The following code example demonstrates how to build and display a form. The event handler functions are empty in the example. The application developer defines the processing within the handlers.

```
// JavaScript Form Demo Script Document
// form event handlers
function myFormOnOk(){/* processing code */}

function myFormOnCancel(){/* processing code*/}

// create the form object
var myForm = new gui.Form(myFormOnOk, myFormOnCancel);

// create the edit control
var edit = new gui.Edit("");

// create the label control
var label = new gui.Label("Employee #:");

// position the controls on the form
myForm.append(label);
myForm.append(edit);

//Specify a child to be active when the form is displayed
(optional)
myForm.setActiveChild(edit);

// Create the caption that will appear on the status bar
myForm.caption = "form demo";

// show the form
gui.showForm(myForm);
```

When the Form Demo Script runs, the MAH300 displays the following image:

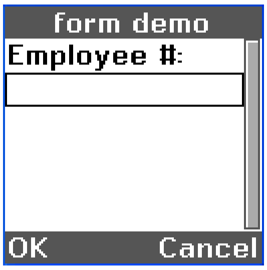


Figure 4 – Form Demo Display

The operator keys an employee number into the edit control and presses the left softkey (OK) to submit the entry to the application.

3.2.3 Menus

Use the `gui.Menu` object (section 4.1.3.6) to define the menus for your application. Use the `gui.MenuItem` constructor to define the controls in the menu. Each control has an associated `onClick` property that defines the function to receive control when the MAH300 firmware detects an enter-key event.

The following code example demonstrates how to build and display menus and submenus. The event handler functions are empty in the example. The application developer defines the processing within the handlers.

```
// JavaScript Menu Demo Script Document
// menu event handlers
function onTimeCard(){/* processing code */
                      alert("TimeCard");}
function onInventory()
{
    gui.showSubMenu(subMenu, myMenu);
}

function onCapital(){alert("capital");}
function onStock(){alert("stock");}

// create menu objects
var myMenu = new gui.Menu();
var subMenu = new gui.Menu();

// create menu entries
var timeCardApp =
    new gui.MenuItem("Time Card", onTimeCard);
var inventoryApp =
    new gui.MenuItem("Inventory", onInventory);
var separator =
    new gui.Separator(1, gui.separatorStyle.horizontalLine);
myMenu.caption = "menu demo";
subMenu.caption = "subMenu demo";

// create subMenu entries
var capital =
    new gui.MenuItem("Capital", onCapital);
var stock =
    new gui.MenuItem("Stock", onStock);

// position the controls on the menus
myMenu.append(separator);
myMenu.append(inventoryApp);
myMenu.append(timeCardApp);

subMenu.append(capital);
subMenu.append(stock);

//Specify a child to be selected when the menu is displayed
(optional)
myMenu.setActiveChild(inventoryApp);
subMenu.setActiveChild(capital);

// set the caption text for the status bar
myMenu.caption = "menu demo";
// show the menu
gui.showMenu(myMenu);
```

When the Menu Demo Script runs, the MAH300 displays the following image:

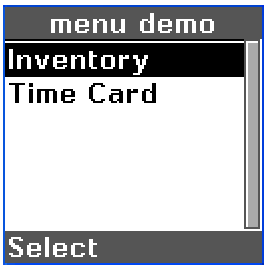


Figure 5 – Menu Demo Display

The Select softkey sends gui.softkey.enter to run the selected (highlighted) application. In this example, the Inventory menu item (a submenu). The script then displays the Inventory submenu shown in Figure 6.

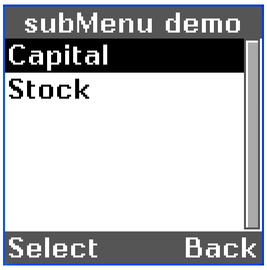


Figure 6 – Sub Menu Demo Display

3.2.4 Text

Use the gui.Text object (section 4.1.3.11) to show text in the display area of the gui object. Do not use it as a text control within a menu or form. Text can exceed the capacity of the display area. The operator can scroll through the data using the up and down arrow keys on the MAH300 keypad.

3.3 Event Handlers

The barcode imager JavaScript environment is event-driven. The barcode imager firmware waits for an event such as a pressed key. The application gains control of an event by setting an object's event handler properties to functions. Events include:

- send and receive of communications packets
- decode operations
- pressed keys
- command execution
- change of reader mode (idle, standby, and power down)

An application gains control only when:

- The barcode imager application development environment defines an event handler property.
- The application creates an event handler function and assigns it to the event handler property.
- The event occurs and is not consumed.

The application can disable an event handler by setting the event handler property to null.

3.3.1 Decode Event Handler

The `reader` object defines an event handler, `onDecode`. If set, the barcode imager calls the specified event handler with the decode results as the only handler parameter. Section 4.2.2.4 discusses decode event handling.

Example:

```
var numDecodes = 0;
var numDecodesProcessed = 0;

reader.onDecodeAttempt = function(count)
{
    numDecodes = count;
    numDecodesProcessed = 0;
}

reader.onDecode = function(decode)
{
    if( ++numDecodesProcessed < numDecodes )
    {
        // process individual decode, save in variables, etc.
    }
    else
    {
        // process the whole set, using saved variables, etc.
    }
}
```

Note: it is necessary to provide `onDecodeAttempt` only if you are interested in how decodes were grouped in an attempt or want to provide feedback on an attempt with zero decodes.

3.3.2 Key Event Handling

The CLEAR, enter, and software programmable keys (softkeys) have special event handling capabilities in the MAH300 application development environment. The event handlers are specified by various objects as constructor function parameters or as object properties.

Figure 7 contains a picture of the MAH300 keypad.

The relationships between objects, keys, and event handler specifications are presented in Table 1. Three objects (`gui.Form`, `gui.Menu`, and `gui.Text`) have a constructor parameter to define event handlers for any non-consumed key. The GUI objects are documented in section 4.1.3.

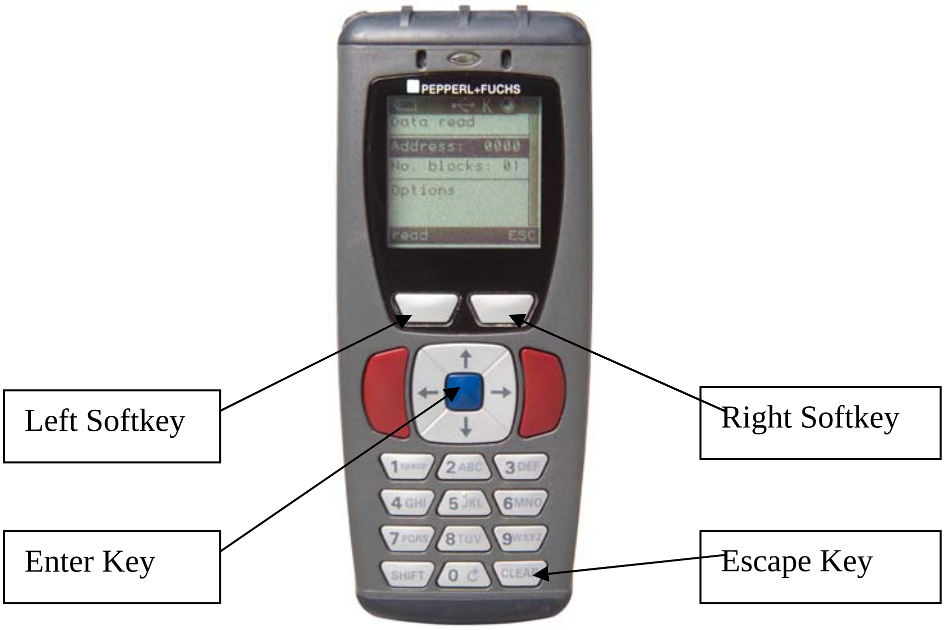


Figure 7 – MAH300 Keypad

Table 1 – Key to Event Handler Mapping

Key	**Object**	**Event Handler Property**

Enter – The blue key at the center of the arrow keys	`gui.Form`
	`gui.Menu`
	`gui.Text`
	`gui.Button`
	`gui.MenuItem`
		`onOk`
		`onOk`
		`onOk`
		`onClick`
		`onClick`

CLEAR – bottom right key (Note: clear is consumed by `gui.Edit`. A virtual Escape key, sent by `cancelSoftkey` and `backSoftkey`, also invokes `onCancel` and is not consumed by `gui.Edit`.)	`gui.Form`
	`gui.Menu`
	`gui.Text`
		`onCancel`
		`onCancel`
		`onCancel`

Left softkey – upper left key	`gui`	`onClick`
Right softkey – upper right key	`gui`	`onClick`

Any non-consumed key	`gui.Form`
	`gui.Menu`
	`gui.Text`
		`onKey`
		`onKey`
		`onKey`

3.3.3 Command Execution

The barcode imager application environment defines a number of commands that can be sent to the barcode imager firmware from the host or by reading codes. The `reader` object (section 4.2) defines an event handler, `onCommand`. If `onCommand` is set, the barcode imager calls the specified event handler before execution of the command and passes the command type and command data to the handler through the calling parameters. The event handler can suppress or execute the received command by returning `false` or `true` respectively.

To receive control after a command has been completed, code the `onCommandFinish` (section 4.2.2.3) event handler.

3.4 Symbol Decoding

The principal use of the barcode imager is capturing, decoding, and processing one-dimensional and two-dimensional bar codes. The barcode imager can read a wide range of code types, or symbologies, and provide access to the data after decoding using the `reader` object (section 4.2). The barcode imager decodes in response to:

- Pressing the read key on the key pad.
- A decode command from the `reader.processCommand` method.

The `reader.onDecode` property defines an event handler that allows the application to access the decode.

To implement a decode event handler, the application defines a handler function and sets it as the `onDecode` property of the `reader` object. Decode information is passed to the event handler as the first argument to `onDecode` (the argument properties are described in section 4.2.2.4).

```
function onDecode(decode)
{
    // Processing
}
reader.onDecode = onDecode;
```

There are four basic application options for processing a decode:

1. Process the data in the script, such as fill in form fields, and then consume the decode by coding `return null`.
2. Let the data be further processed by the barcode imager firmware, typically for sending and/or storing, by coding `return decode`.
3. Transform the data and let the barcode imager firmware process the changed data by setting `decode.data` as necessary and coding `return decode`.
4. Invalidate the decode by coding `return false`. The barcode imager will act as though the decode never occurred.

The following pseudo code presents an example of decode processing addressing the four options. The example transforms decode data based on certain symbologies. Then the example checks the format of the decode data to determine the next processing steps.

Subsections of this section discuss the processing steps in the following example.

Example:

```
function onDecode(decode)
{
    data = decode.data;

    if (decode.symbology == some-special-symbology)
    {
        data = transformed decode.data;
    }
    else if (decode.symbology
                 == some-other-special-symbology)
    {
        data = differently transformed decode.data;
    }

    if (data matches employee-badge format)
    {
        loginForm.employeeField.text = decode.data;
        loginForm.pinField.text = "";
        gui.showForm(loginForm);
        return null;
    }
    else if (data matches part-number format)
    {
        stockForm.partField.text = decode.data;
        gui.showForm(stockForm);
        return null;
    }
    else if (data matches shelf-number format)
    {
        stockForm.shelfField.text = decode.data;
        gui.showForm(stockForm);
        return null;
    }
    else if (data matches wrong formats)
    {
        warning.text = "bad code for this application";
        gui.showForm(warning);
        return null;
    }
    else if (data matches format that is to be ignored)
    {
        return false;  // invalidate the decode
    }
    else // code should be processed by barcode imager firmware
    {
        if ( code should be processed
              with transformed data)
        {
           decode.data = data; // replace the data field
                               // with transformed data
        }
        return decode;
    }
}
```

3.4.1 Transform Data by Symbology

Bar codes read by the barcode imager are encoded in unique symbologies. Particularly within two-dimensional codes, common data items may be present in different locations within the decode depending on the encoding symbology. In the example, line 5 checks the value of `decode.symbology` and transforms the decode data to a common format. To check symbology, compare `decode.symbology` against the symbology codes documented in *Spezification Reader- Host- Interface Client Version*

Note: Sometimes symbology is used to distinguish otherwise like-formatted data; for example, shelf tags may have the same number of digits as UPC codes for the products on the shelves, but have different bar code symbologies that can be used to determine whether the decode is a shelf tag or a product UPC code.

3.4.2 Evaluate Data Format

After the data is converted into a common data format based on the symbology, the application determines the data format and processes according to data content.

```
if (data matches employee-badge format)
{
    loginForm.employeeField.text = decode.data;
    loginForm.pinField.text = "";
    gui.showForm(loginForm);
    return null;
}
else if data matches part-number format
{
    stockForm.partField.text = decode.data;
    gui.showForm(stockForm);
    return null;
}
else if (data matches shelf-number format)
{
    stockForm.shelfField.text = decode.data;
    gui.showForm(stockForm);
    return null;
}
```

The previous statements from the example demonstrate the processing of data within the decode handler. Based on the data format, the application program extracts data from the decode and displays appropriate forms.

These examples execute a `return null` statement to consume the decode for the specified data formats.

3.4.3 Detect Format Errors

If the format matches a known format that should not be used in the current application context, the application can send a warning message, which is displayed in "warning" form.

```
else if data matches wrong formats
{
    warning.text = "bad code for this application";
    gui.showForm(warning);
    return null;
}
```

In this case, the example returns a `null` to consume the decode.

Note: Do not code `alert`, `confirm`, or `prompt`, either as functions or as gui methods, in an onDecode or onCommand event handler. The events originate in the barcode imager firmware, resulting from decodes, commands, or communication events. While the event handler is running, the main application is held idle until the event handler returns. If the event handler is waiting for the user to finish with `alert`, `confirm`, or `prompt`, the main application will be forced to wait as well, resulting in timeout errors.

3.4.4 Let the barcode imager Process the Decode

If you want the barcode imager to process the decode, set the decode as the return statement parameter. If you have changed decode data and want the changes available to the barcode imager, set the appropriate data field in the decode to the changed value before returning the decode.

```
else // code should be processed by barcode imager firmware
{
    if ( code should be processed
          with transformed data)
    {
       decode.data = data; // replace the data field
                             // with transformed data
    }
    return decode;
}
```

3.4.5 Ignore the Decode

You can ignore a particular format by exiting the function with a return value of `false` as shown in the following code segment from the example.

```
else if (data matches format that is to be ignored)
{
    return false;  // invalidate the decode
}
```

Note: Normally, the barcode imager will sound a good-decode beep at the end of decode processing. If you do not want invalidated decodes to cause the usual good-decode beep in the barcode imager firmware, you must configure the reader to process the decodes via JavaScript *before* beeping. Then the barcode imager will only beep if there is at least one decode that is not invalidated. See document *Reader- Host Interface*, specifically setting number 0x93.

If your `reader.onDecode` function returns `false`, you should configure the barcode imager beep this way.

3.4.6 Determine the Orientation of the Decode

You can determine the orientation of a code by using the bounds array. The bounds array has four elements that can be used to give the coordinates of the four corners of the code (the origin is the center of the decode field):

- (decode.bounds[0].x, decode.bounds[0].y) = coordinates of top right corner
- (decode.bounds[1].x, decode.bounds[1].y) = coordinates of top left corner
- (decode.bounds[2].x, decode.bounds[2].y) = coordinates of bottom left corner
- (decode.bounds[3].x, decode.bounds[3].y) = coordinates of bottom right corner

These designations (e.g. top left) refer to the corners of the symbol, *not* as it appears in a particular image, but rather as it appears (most often) in its symbology specification. For example, for Data Matrix, array element 2, which contains the coordinates of the bottom left vertex of the symbol boundary, will *always* be proximate to the intersection of the two lines which form the "∟" of the symbol, regardless of the actual orientation (or mirroring) of the symbol in the image submitted to SwiftDecoder.

In normal orientation, we would expect the signs of the coordinates to be:

- decode.bounds[0].x (-), decode.bounds[0].y (+)
- decode.bounds[1].x (-), decode.bounds[1].y (-)
- decode.bounds[2].x (+), decode.bounds[2].y (-)
- decode.bounds[3].x (+), decode.bounds[3].y (+)

A code that is not "right side up" could be rejected by exiting the function with a return value of `false` as shown in the following example.

```
if (decode.bounds[0].x > 0 && decode.bounds[0].y < 0 &&
decode.bounds[1].x > 0 && decode.bounds[1].y > 0 &&
decode.bounds[2].x < 0 && decode.bounds[2].y > 0 &&
decode.bounds[3].x < 0 && decode.bounds[3].y < 0)
{
    return false;  // invalidate the decode
}
```

Note: Normally, the barcode imager will sound a good-decode beep at the end of decode processing. If you do not want invalidated decodes to cause the usual good-decode beep in the barcode imager firmware; you must configure the reader to process the decodes via JavaScript *before* beeping. Then the barcode imager will only beep if there is at least one decode that is not invalidated. See document *Reader- Host Interface*, specifically setting number 0x93.

3.5 Host Communication

The barcode imager application development environment defines a host communication `comm` object (section 4.4) to support communications with a host resident application. For example, the Download Utility (section 1.5) is a host resident utility that communicates with the barcode imager for downloading files to the barcode imager.

From the host computer's view, the barcode imager is a serial device accessible through a serial or USB port, or through Bluetooth Radio Frequency (RF) communications. barcode imager configuration settings define the active host communications port.

The barcode imager host communications implementation supports two basic styles of communication: raw text and packets. It also supports a set of native protocols.

The application program transfers data to the host by writing to the barcode imager host communications port using the methods defined by the barcode imager `comm` object (section 4.4). Applications gain access to data sent by the host by implementing `onCommand` (and optionally `onCommandFinish`) event handlers defined by the barcode imager's `reader` object properties (section 4.2) and parsing the "|" command, for example.

Example:

```
reader.onCommand = function(type, data)
{
    // intercept | command with app-data: prefix

    if( type == '|'  &&  data.match(/^app-data\:/) )
    {
        return false;  // Suppress the command
    }

    return true;
}
```

For a full discussion of host communications, see *Reader- Host Interface*.

3.6 Data in barcode imager Local Storage

The application development environment provides program access to barcode imager local storage through the `storage` object (section 4.3). Data is maintained in storage as named objects called files. The Download utility can transfer host data into a barcode imager file. The barcode imager application can also store data in files.

The name of a barcode imager file may be 1 - 200 printable ASCII characters.

Use the `erase` and `write` methods of the `storage` object to manage files. Use the `findFirst` and `findNext` methods to locate files. Use the `read` method to access a file or the `upload` method to send it to the host.

3.7 Reader Configuration

The barcode imager configuration settings define the active capabilities of the barcode imager. The application development environment defines the `reader` object (section 4.2), which contains methods for manipulating barcode imager settings. The document *Reader-Host Interface*, defines the configuration items and the values that can be set for each item.

The application developer can dynamically change the active settings by using the `reader.writeSetting` method. This method changes the operational value of the setting, but that value is lost when the reader is turned off. The current values of all settings can be saved by using the `reader.saveSettings` method, which writes the current values of the settings to flash memory from where they are restored on power up.

Example:

```
reader.writeSetting(0x1b, 4);
if ( gui.confirm("Setting changed.\n\nSave now? ",
                 "Setting Change") )
   if ( !reader.saveSettings() )
         alert("Error Saving Settings");
```

Retrieve the current value of a setting by using the `reader.readSetting` method. Restore factory default settings by using the `reader.defaultSettings` method.

4 Class Reference

The built-in objects described in this section enable a JavaScript program to receive data from the barcode imager and control its behavior.

4.1 gui (only MAH300)

The `gui` object provides application programming access to the MAH300 display screen. The MAH300 application development environment defines a standard software GUI format (section 4.1.3) consisting of a status bar, a display area, and labels for the left and right software programmable keys (softkeys) on the MAH300 key pad.

The properties, methods, and classes of the `gui` object support the development of graphical user interfaces in custom software applications.

4.1.1 Methods

The following section documents the methods defined for the MAH300 `gui` object.

4.1.1.1 alert

The `gui.alert` function displays text in the display area of the standard GUI display. Do not call this function within onDecode and onCommand event handlers.

Format:

```
gui.alert(text, title);
```

Where:

`text` – string; text to display as the alert.

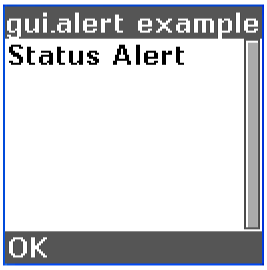
`title` – string; text to display in the gui object status bar; defaults to “Alert.”

Processing suspends until the operator presses an enter key – either the enter key or the left softkey defined as OK.

Example:

```
gui.alert("Status Alert", "gui.alert example");
```

Displays the alert shown in Figure 8 and waits until the operator presses the enter key or the left softkey (OK).



gui.alert example

Status Alert

Figure 8 – gui.alert Example

4.1.1.2 confirm

The `gui.confirm` function displays text in the display area of the standard GUI display and returns a value based on the key pressed. Do not call this function within onDecode and onCommand event handlers.

Format:

```
result = gui.confirm(text, title,
                     leftSoftkeyLabel, rightSoftkeyLabel);
```

Where:

`text` – string; text to display for confirmation

`title` – string; text to display in the gui object status bar; defaults to “Confirm.”

`result` – Boolean; `true` if the confirm receives an enter key (either the enter key or the left softkey); `false` if the confirm receives the right softkey. `leftSoftkeyLabel` – string; text to use as label for the left softkey (default is "Yes").

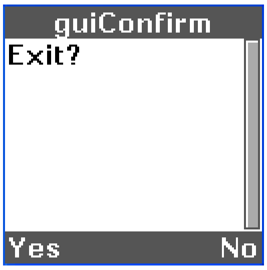
`rightSoftkeyLabel` – string; text to use as label for the right softkey (default is "No").

Processing suspends until the operator presses an enter key or cancel key.

Example:

```
while( !gui.confirm("Exit?", "guiConfirm") );
```

Displays the confirm dialog shown in Figure 9 and waits until the operator presses the enter key or the left softkey.



guiConfirm

Exit?

Figure 9 – gui.Confirm Example

4.1.1.3 enableRefresh

The `gui.enableRefresh` function can be used to temporarily disable screen updates to speed up GUI object construction. The JavaScript application must reenable refresh after GUI object construction is completed.

Format:

```
gui.enableRefresh(enable);
```

Where:

`enable` – Boolean; true enables screen updates, false disables screen updates

Example:

```
gui.enableRefresh(false);

//build GUI objects

gui.enableRefresh(true);
```

Notes: Requires firmware 3478+

4.1.1.4 prompt

The `gui.prompt` function displays text in the display area of the standard GUI display and returns a value based on the key pressed. Do not call this function within onDecode and onCommand event handlers.

Format:

```
result = gui.prompt(text, initial, title);
```

Where:

`text` – string; text to display as a label above a `gui.Edit` control

`initial` – string; the initial string to display as the contents of edit control; default is an empty string.

`title` – string; text to display in the gui object status bar; defaults to “Prompt”.

`result` – string; contents of the edit control if the prompt receives an enter key (either the enter key or the left softkey defined as `OK`); null if the prompt receives the right softkey defined as `Cancel`.

Processing suspends until the operator presses an enter key or `Cancel` key. The operator can key new data into the edit control before pressing enter or the left softkey.

Example:

```
string = gui.prompt("Enter login ID", "None", "guiPrompt");
```

Displays the prompt shown in Figure 10 – gui.Prompt Example.

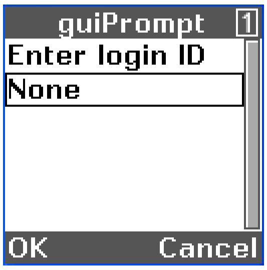


Figure 10 – gui.Prompt Example

The value of `string` depends on the operator action.

- If the operator presses the right softkey (Cancel), the value of `string` is `null`.
- If the operator presses the blue “enter” key or the left softkey (OK) the value of `string` is:
  - <new content> if the operator changes the contents of the edit control
  - "None" if the operator does not change the content.

4.1.1.5 sendKey

The `gui.sendKey` method sends a “pressed key” indication to the MAH300 firmware as though it came from MAH300 keypad.

Format:

```
result = gui.sendKey(key);
```

Where:

`key` – number constant; the key to send. Use number constants defined in section 4.1.2.2.

`result` – Boolean; `true` if successful; `false` if not, which usually means the keypad is locked but can also mean that the key buffer is full.

Example:

```
gui.sendKey(enter);
```

Sends the enter key event to the MAH300 firmware as though the operator had pressed the enter key.

4.1.1.6 sendText

The `gui.sendText` method sends a text string to the MAH300 `gui` object as though it had been entered from the keypad.

Format:

```
result = gui.sendText(text);
```

Where:

`text` – string; the text to send.

`result` – Boolean; `false` if all specified text could not be sent to the GUI (in which case, none of it will have been sent); otherwise, `true`.

Example:

```
reader.onDecode =
   function(decode) { gui.sendText(decode.data); }
```

Sends all decode data to the `gui` object as though it had been entered from the keypad.

4.1.1.7 setFont

The `gui.setFont` method sets the font of the MAH300 gui display to the specified font.

Format:

```
gui.setFont(font);
```

Where:

`font` – string; the file name of the font.

`result` – Boolean; `false` if the specified font file could not be loaded; otherwise, `true`.

Example:

```
gui.setFont(“myFontFile.fnt”);
```

Sets the GUI font to myFontFile.

Notes: The default font is uniread10Bold.fnt. Contact P+F for a list of currently available fonts.

4.1.1.8 show

The `gui.show` method instructs the MAH300 to write the specified form, menu, or text object to the MAH300 display as a standard `gui` object (section 4.1.3).

This low level approach is not recommended for use in most applications. Instead, P+F recommends using the `gui.showForm`, `gui.showMenu`, and `gui.showSubMenu` methods.

Format:

```
gui.show(object);
```

Where:

> `object` – object to show on the display. The object must be a `gui.Form` `gui.Menu`, or `gui.Text` object (section 4.1.3).

Note: This method does not return a value.

4.1.1.9 showForm

The `gui.showForm` method instructs the MAH300 to display the specified form on the MAH300 display as a standard `gui` object (section 4.1.3).

Format:

```
gui.showForm(yourForm);
```

Where:

> `yourForm` – form object to show on the display; the object must be a `gui.Form` object (section 4.1.3.3).

Note: This method does not return a value.

To insert a caption into the status bar, set the `yourForm.caption` property.

By default, the left software programmable key is set to `gui.okSoftkey` (section 4.1.4.3). You may also define a custom `leftSoftkey` for your `form` object, e.g., `yourForm.leftSoftkey = yourSoftkey`, in which case `gui.showForm` will use your softkey.

By default, the right software programmable key is set to `gui.cancelSoftkey` (section 4.1.4.2). You may also define a custom `rightSoftkey` for your `form` object.

4.1.1.10 showMenu

The `gui.showMenu` method instructs the MAH300 to display the specified menu on the MAH300 display as a standard `gui` object (section 4.1.3). This menu is the top level menu; sub-menus can be created using the `gui.showSubMenu` method.

Format:

```
gui.showMenu(yourMenu);
```

Where:

> `yourMenu` – menu object to show on the display. The object must be a `gui.Menu` object (section 4.1.3.6).

Note: This method does not return a value.

To insert a caption into the status bar, set the `yourMenu.caption` property.

This method sets the left software programmable key to `gui.selectSoftkey` (section 4.1.4.4).

This method sets the right software programmable key to `gui.backSoftkey` (section 4.1.4.1) if the `yourMenu.onCancel` property is set; otherwise, `null`.

4.1.1.11 showSubMenu

The `gui.showSubMenu` method instructs the MAH300 to display the specified menu on the MAH300 display as a standard `gui` object (section 4.1.3).

Format:

```
gui.showSubMenu(yourMenu, parentMenu);
```

Where:

> `yourMenu` – menu object to show on the display. The object must be a `gui.Menu` object (section 4.1.3.6).
>
> `parentMenu` – parent menu to display in response to `gui.backSoftkey`.

Note: This method does not return a value.

To insert a caption into the status bar, set the `yourMenu.caption` property.

This method sets the left software programmable key to `gui.selectSoftkey` (section 4.1.4.4).

This method sets the right software programmable key to `gui.backSoftkey` (section 4.1.4.1) and sets the menu object's `onCancel` property to a function that shows the parent menu.

4.1.1.12 splash

The `gui.splash` method displays an image on the MAH300 screen and suspends execution until a key is pressed. An optional timeout value will restart execution after a specified time, if no key is pressed.

Note: The key that is pressed to cancel the splash screen is consumed. If a decode occurs while the splash screen is displayed, the splash screen will be dismissed as if a key had been pressed; the decode is not consumed.

Format:

```
result = gui.splash(imageName, stringText, timeout_ms);
```

Where:

`imageName` – string; the name of the image file to display (section 4.1.3.4).

stringText – string; the text string to be displayed below the image in the softkey area of the display.

`timeout_ms` – number; the number of microseconds to wait before timeout of the splash display.

`result` – Boolean; `true` if a key was pressed before timeout; `false` if a timeout occurred.

Example:

```
result = gui.splash(CorpLogo.img, ”Version 1”, 2000);
```

displays a corporate logo image and the text “Version 1” on the display for two seconds.

The MAH300 supports only its native format, which uses the extension `.img`. The image must be 128x128 pixels (for splash screen only). Images are not cropped; they will either display in their entirety or will not display at all. The MAH300 displays the image in four grayscale values from white to black.

P+F provides a utility to convert standard .pgm format files to the MAH300’s native .img format (contact P+F for more information http://www.pepperl-fuchs.com). Several image conversion programs are available, commercially and as freeware, to convert other formats to .pgm files.

4.1.1.13 translateDigitToCustom

The `gui.translateDigitToCustom` method changes the keypad input to a custom key map.

Format:

```
gui.translateDigitToCustom = function(digit, index);
```

Where:

`digit` – number of button on keypad (0-9).

`index` – index of custom key map.

Example:

```
var keyMap = new Array("0.!@#$%&*()","1
@","abc2ABC","def3DEF",
"ghi4GHI","jkl5JKL","mno6MNO","pqrs7PQRS","tuv8TUV","wxyz9WXYZ
");

gui.translateDigitToCustom = function(digit, index)
{
    if (keyMap[digit])
    {
        return keyMap[digit][index % keyMap[digit].length];
    }
    else
    {
        return digit;
    }
}
```

returns the characters specified by the “keyMap” variable.

Note: Requires firmware 3478+.

4.1.2 Properties

The following section documents the properties defined for the MAH300 `gui` object.

4.1.2.1 inputMode

The `gui.inputMode` object contains constants that define input modes for the MAH300.

The constant definitions are:

```
gui.inputMode.numeric
gui.inputMode.caps
gui.inputMode.lower
gui.inputMode.latinCaps
gui.inputMode.latinLowerCase
gui.inputMode.symbols
```

The character sets defined for these modes are described in A 2.

4.1.2.2 key

The `gui.key` property is a read-only object containing number constants specifying keys for use with the `gui.sendKey` method. The constants are named:

- `up`
- `down`
- `left`
- `right`
- `enter` (the blue key on the keypad)
- `back` (“CLEAR” on the keypad)
- `escape`
- `home`
- `end`
- `leftSoftkey`
- `rightSoftkey`

Constants `escape`, `home`, and `end` have no keypad counterpart.

Constants `leftSoftkey` and `rightSoftkey` represent the left and right software programmable keys on the MAH300.

4.1.2.3 leftSoftkey

The `gui.leftSoftkey` property identifies an event handler for the `onClick` property of a `gui.Softkey` object and the key label, associated with the left programmable key on the MAH300. The application program defines a `gui.Softkey` object. See the example in section 3.2.1

Setting `gui.leftSoftkey` to null disassociates the softkey object from the property (removing the event handler and the softkey label).

When menus and forms are shown using the `gui.showMenu`, `gui.showSubMenu`, and `gui.showForm` methods, the `gui.leftSoftkey` property is set automatically.

4.1.2.4 rightSoftkey

The `gui.rightSoftkey` property identifies an event handler for the `onClick` property of a `gui.Softkey` object and the key label, associated with the right programmable key on the MAH300. The application program defines a `gui.Softkey` object. See the example in section 3.2.1.

Setting `gui.rightSoftkey` to null disassociates the softkey object from the property (removing the event handler and the softkey label).

When menus and forms are shown using the `gui.showMenu`, `gui.showSubMenu`, and `gui.showForm` methods, the `gui.rightSoftkey` property is set automatically.

4.1.2.5 statusText

The gui.statusText property is a string that specifies text for display in the status bar at the top of a MAH300 GUI screen. When gui.status is null, the MAH300 displays status icons in the status bar. Note: The input mode icon will always be displayed in addition to the status text when an edit control is active.

With menus and forms, use the caption property (section 4.1.6.1) to automatically set gui.statusText when the menu or form is shown.

4.1.3 Objects

The MAH300 application development environment provides the user classes described in this section for use in building forms for the MAH300 gui object. The instances of these classes are referred to as controls in this document.

4.1.3.1 gui.Button

The gui.Button constructor creates a button control for a GUI form. The onClick event handler is called when the enter key on the MAH300 keypad is pressed and the button control is active. Program the function to return Boolean true if the control's default processing of the key should continue. Otherwise, program the function to return false; the control will act as if not clicked.

Format:

```
var <button_name> =
   new gui.Button(text, onClick);
```

Where:

<button_name> – program-provided button control.

text – string; a label for the button. This property can be changed after the object is created.

onClick – function for handling the button click event. The MAH300 calls this function when the operator presses the OK enter key on the MAH300 keypad when the GUI button is the active control.

Example:

```
// button control event handler
function rFOnClick(){reader.writeSetting(0x1b, 4);}
function rs232OnClick(){reader.writeSetting(0x1b, 1);}

// create the form object
var myForm = new gui.Form();

// create the button
var rfButton = new gui.Button("RF Comm", RFOnClick);
var rs232Button = new gui.Button("RS232 Comm", RS232OnClick);

// position the controls on the form
myForm.append(rfButton);
myForm.append(rs232Button);

// Place text on the status bar
gui.statusText = "button demo";

// show the form
gui.showForm(myForm);
```

Displays the form shown in Figure 11.

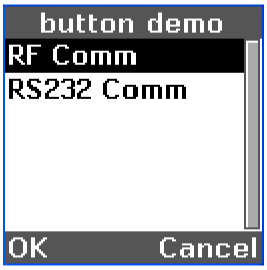


Figure 11 – Button Demo

When the operator presses the left softkey or the enter key when the control labeled “RF Comm” is active, the script executes a `reader.writeSettings` method to set the communications mode setting to RF (Bluetooth). When the “RS232 Comm” control is active and the operator presses the key, the script executes a `reader.writeSettings` method to set the communications mode setting to RS232.

Note: The active control is highlighted.

4.1.3.2 gui.Edit

The `gui.Edit` constructor creates an edit control for a GUI form. The MAH300 operator can enter data into the edit control.

Format:

```
var <edit_name> =
   new gui.Edit(text, defaultInputMode, validInputModes,
onChar, readOnly);
```

Where:

`<edit_name>` – program-provided edit control.

`text` – string; the initial value for the edit control. The control contains `text` when it is first displayed on the `gui` object. This property can be changed after the object is created.

`defaultInputMode` – number; the input mode that is selected when the user navigates to the edit control and enters data. Modes are defined by `gui.inputMode` (section 4.1.2.1).

Note: The user can change to another input mode using the shift key.

`validInputModes` – number; a bitwise combination of input modes as defined by `gui.inputMode` (section 4.1.2.1); defines the input modes that are valid in the edit control.

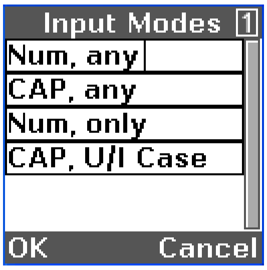
`onChar` – function; the function to run when a character is entered into an edit control.

readOnly – Boolean; false allows the text to be changed by the user, true prevents the text from being changed.

Example:

```
function quit() { reader.runScript(".default.js"); }

var form = new gui.Form(null, quit);
form.Caption = "Input Modes";

form.append(new gui.Edit("Num, shft any",
                          gui.inputMode.numeric));
form.append(new gui.Edit("CAP, shft any",
                          gui.inputMode.caps));
form.append(new gui.Edit("Num only",
                          gui.inputMode.numeric,
                          gui.inputMode.numeric));
form.append(new gui.Edit("CAP, U/l Case",
                          gui.inputMode.caps,
                          gui.inputMode.caps
                          | gui.inputMode.lowerCase));
gui.showForm(form);
```

Displays the form shown in Figure 12.



Num, any

CAP, any

Num, only

CAP, U/l Case

Figure 12 -- Input Modes Example

The text in each edit control identifies the default input mode of the control and the modes which are enabled for the shift key.

Note: onChar and readOnly require firmware 3478+

4.1.3.3 gui.Form

The `gui.Form` constructor creates a `Form` object for the MAH300 GUI. The `gui.Form` constructor defines three event handlers for key events. Event handlers are null if not specified.

The following controls can be used in a form:

- `gui.Button`
- `gui.ToggleButton`
- `gui.Edit`
- `gui.Image`
- `gui.Label`
- `gui.Separator`

Form controls must be appended (section 4.1.5.1) or prepended (section 4.1.5.2) to the form object.

Format:

```
var <form_name> = new gui.Form(onOk, onCancel, onKey);
```

Where:

`<form_name>` – program-provided form control.

`onOk` – function for handling the enter key. The MAH300 calls this function when the operator presses the enter key on the MAH300 keypad and the active control is not a button.

`onCancel` – function for handling the `CLEAR` key. The MAH300 calls this function when the operator presses the key on the MAH300 keypad and the active control is not an `edit` control. This function is also called when the escape key is issued as a softkey.

`onKey` – function for handling any key, soft or real, not consumed by the active control (section 4.1.6.2).

To add a label to the form in the status area, set the form's `caption` property to a string containing the label.

Example:

See section 3.2.2.

4.1.3.4 gui.Image

The `gui.Image` constructor creates an image object that can be displayed in the MAH300 GUI form.

Format:

```
var <image_name> = new gui.image(name);
```

Where:

`<image_name>` – program-provided image control.

`name` – string; the name of an image file in file storage (section 4.1.3.4).

Example:

```
var myForm = new gui.Form();
var image = new gui.Image("MyImage.img");
myForm.append(image);
gui.showForm(myForm);
```

The image can be up to 128x94 pixels depending on the form. Images are not cropped; they either display in their entirety or do not display at all. The MAH300 displays the image in four grayscale values from white to black.

The image file format is specific to the MAH300. P+F provides a utility to convert standard .pgm format files to the MAH300 native .img format. Several image conversion programs are available, commercially and as freeware, to convert other formats to .pgm files.

4.1.3.5 gui.Label

The `gui.Label` constructor creates a label control that can be displayed in the MAH300 GUI menu or form.

Format:

```
var <label_name> = new gui.Label(text);
```

Where:

`<label_name>` – program-provided label control.

`text` – string; the text to be displayed as a label. This property can be changed after the object is created.

Example:

See the form example in section 3.2.2.

4.1.3.6 gui.Menu

The `gui.Menu` constructor creates a menu object for the MAH300 GUI. The `gui.Menu` constructor defines three event handlers for key events. Event handlers are null if not specified.

The following controls can be used in a menu:

- `gui.MenuItem`
- `gui.Separator`
- `gui.ToggleButton`

Menu controls must be appended (section 4.1.5.1) or prepended (section 4.1.5.2) to the menu object.

Format:

```
var <menu_name> = new gui.Menu(onOk, onCancel, onKey);
```

Where:

`<menu_name>` – program-provided menu.

`onOk` – function for handling the enter key. The MAH300 calls this function when the operator presses the enter key on the MAH300 keypad when the active control is not a button.

`onCancel` – function for handling the `CLEAR` key. The MAH300 calls this function when the operator presses the `CLEAR` key on the MAH300 keypad and the active control is not an `edit` control. This function also is called when the escape virtual key is issued (typically by a softkey).

`onKey` – function for handling any key, soft or real, not consumed by the active control (section 4.1.6.2).

Example: See the menus example in section 3.2.3.

4.1.3.7 gui.MenuItem

The `gui.MenuItem` constructor creates a `MenuItem` control for display in a MAH300 GUI menu. The `onClick` processing function is called when the enter key on the MAH300 keypad is pressed and the `MenuItem` control is active.

Format:

```
var <menuItemItem_name> =
   new gui.MenuItem(text, onClick);
```

Where:

`<menuItem_name>` – program-provided `MenuItem` control.

`text` – string; a label for the `MenuItem`.

`onClick` – function for handling the `MenuItem`. The MAH300 calls this function when the operator presses the enter key on the MAH300 keypad when the `MenuItem` is the active control. Program the function to return Boolean `true` if the control's default processing of the key should continue. Otherwise, program the function to return `false`; the control will act as if not clicked.

Example:

See section 3.2.3.

4.1.3.8 gui.MultiLineEdit

The `gui.MultiLineEdit` constructor creates a multiple line edit control for the GUI screen. The MAH300 operator can enter data into the multiple line edit control. The `gui.MultiLineEdit` constructor consumes the entire GUI screen, so it cannot be appended/prepended to a menu or form. To access a multiple line edit control from a menu

Format:

```
var <multiLineEdit_name> =
   new gui.MultiLineEdit(text, defaultInputMode,
validInputModes, onChar);
```

Where:

`<edit_name>` – program-provided multiple line edit control.

`text` – string; the initial value for the multiple line edit control. The control contains `text` when it is first displayed on the `gui` screen. This property can be changed after the object is created.

`defaultInputMode` – number; the input mode that is selected when the user navigates to the edit control and enters data. Modes are defined by `gui.inputMode` (section 4.1.2.1).

Note: The user can change to another input mode using the shift key.

`validInputModes` – number; a bitwise combination of input modes as defined by `gui.inputMode` (section 4.1.2.1); defines the input modes that are valid in the edit control.

`onChar` – function; the function to run when a character is entered into a multiple line edit control.

Other Functionality:

`insert` – function, arg: string; this function inserts a string where the cursor is when the function is called.

Format: <multiLineEditControlName>.insert(string);

Where

`< multiLineEditControlName>` – program- provided multiple line edit control.

`string` – string; text to insert into multiLineEdit control.

Example:

```
var main = new gui.Menu
main.append(new gui.Button("Notes", function() {
gui.showDialog(captureNotes); }));

gui.showMenu(main);

storage.write("saveNotes.txt","");

var captureNotes = new gui.MultiLineEdit("",
gui.inputMode.caps)
captureNotes.leftSoftkey = new gui.Softkey("Save", function()
{storage.append("saveNotes.txt", captureNotes.text);
captureNotes.text = ""; gui.showMenu(main); });
captureNotes.rightSoftkey = new gui.Softkey("Cancel",
function() { captureNotes.text = ""; gui.showMenu(main); });
```

Note: Requires firmware 3478+

4.1.3.9 gui.Separator

The `gui.Separator` constructor creates a separator control for display in a MAH300 GUI menu or form. Use the separator to insert white space or lines into a form to increase separation between controls.

Format:

```
var <separator_name> =
   new gui.Separator(height, style);
```

Where:

`<separator_name>` – program-provided separator control.

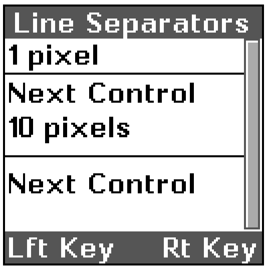
`height` – number; the height in pixels of the separator; minimum 1 pixel.

`style` – number; the style of the separator. `style` must be selected from one of the following numeric constants:

- `gui.separatorStyle.blank`
- `gui.separatorStyle.horizontalLine`

- gui.separatorStyle.horizontalGroove
- gui.separatorStyle.horizontalRidge

The `gui.separatorStyle.horizontalLine` style adds a line in the approximate center of the separator space as shown in Figure 13.



Line Separators

1 pixel

Next Control

10 pixels

Next Control

Figure 13 – gui.Separator Lines

Example:

See the menu example in section 3.2.3.

4.1.3.10 gui.Softkey

The `gui.Softkey` object provides processing control of the programmable or “soft” keys on the MAH300 just below the display screen.

Format:

```
var <softkey> = new gui.Softkey(text, onClick);
```

Where:

`<softkey>` – program-provided softkey object.

`text` – string; a label for the softkey; displays on the GUI.

`onClick` – function; the function to be executed when the softkey is pressed.

Set the `gui.leftSoftkey` or `gui.rightSoftkey` property to `<softkey>` as appropriate. The MAH300 JavaScript Library defines a set of useful softkey objects (section 4.1.4).

Example:

```
function leftSoftkeyOnClick()
{
  /* processing code */
}
function rightSoftkeyOnClick()
{
  /* processing code */
}

var left = new gui.Softkey("Ok", leftSoftkeyOnClick);
var right =
         new gui.Softkey("Cancel", rightSoftkeyOnClick);

gui.leftSoftkey = left;
gui.rightSoftkey = right;
```

4.1.3.11 gui.Text

The `gui.Text` constructor creates a text object that can be displayed in the MAH300 GUI display area. Text length can exceed the capacity of the display area. The `Text` control includes a scroll bar to indicate relative position within the text when the operator presses the up and down arrow keys.

Format:

```
var <text_name> =
   new gui.Text(text, onOk, onCancel, onKey);
```

Where:

`<text_name>` – program-provided text control.

`text` – string; text data to display on the MAH300 GUI. To display multi-line text, insert the new-line character (“\n”) in the text string. This property can be changed after the object is created.

`onOk` – function for handling the enter key. The MAH300 calls this function when the operator presses the enter key on the MAH300 keypad.

`onCancel` – function for handling the `CLEAR` key. The MAH300 calls this function when the operator presses the `CLEAR` key on the MAH300 keypad. This function also is called when the escape key is issued (typically by a softkey).

`onKey` – function for handling any key, soft or real, not consumed by the active control (section 4.1.6.2).

Note: The `gui.Text` constructor should be used only to display text, not as a control within a `gui.Form` or `gui.Menu`.

Other Functionality:

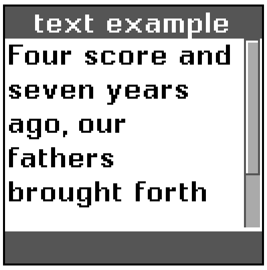
`leftClipString` – function with a single string argument.

Return: string; the input string parameter is truncated when necessary so the result string can be displayed without exceeding the maximum width of the MAH300 display.

Example:

```
gui.statusText = "text example";
gui.show(new gui.Text
         ("Four score and seven years ago, our fathers brought
         forth upon this continent, etc ..."));
```

displays the screen shown in Figure 14.



```
text example
Four score and
seven years
ago, our
fathers
brought forth
```

Figure 14 – gui.Text Example

Note: The scroll bar indicates that there is more text to display than is currently on the screen.

4.1.3.12 gui.ToggleButton

The `gui.ToggleButton` constructor defines a button control for a GUI form. When a toggle button is clicked, an indicator in the button is alternately displayed or suppressed.

Format:

```
var <togglebutton_name> =
   new gui.ToggleButton(text, initiallyChecked, onToggle);
```

Where:

`<togglebutton_name>` – program-provided toggle button control.

`text` – string; a label for the toggle button.

`initiallyChecked` – Boolean; `true`, the button displays the checked indicator when first shown; `false`, the button does not display the checked indicator when first shown.

`onToggle` – function for handling the button click event. It passes a single Boolean parameter; `true`, the button is checked; `false`, the button is not checked. The MAH300 calls this function when the operator presses the `OK` enter key on the MAH300 keypad when the GUI button is the active control.

Other Functionality:

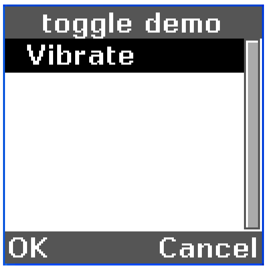
`checked` – Boolean; current state of toggle button.

`toggle` – function; toggles the toggle button as if activated by the GUI screen.

Example:

```
// form event handlers
// button control event handler
function toggleOnClick(checked)
        {reader.writeSetting(0xa7, checked);}

// create the form object
var myForm = new gui.Form();

// create the button
var toggle =
    new gui.ToggleButton("Vibrate", false, toggleOnClick);

// position the controls on the form
myForm.append(toggle);

// Place text on the status bar
myForm.caption = "toggle demo";

// show the form
gui.showForm(myForm);
```

initially shows the form in Figure 15.

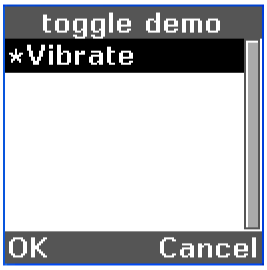


toggle demo

Vibrate

Figure 15 – Toggle Not Selected

Pressing the left softkey (OK) toggles the indicator, as shown in Figure 16, and turns on the vibrate feature of the MAH300. Pressing OK again turns off the indicator and the vibrate feature.



toggle demo

*Vibrate

Figure 16 – Toggle Selected

Notes: toggleButton.checked and toggleButton.toggle() require firmware 3478+.

4.1.4 Predefined Softkey Objects

The softkey objects described in this section are defined by the MAH300 JavaScript library.

4.1.4.1 backSoftkey

The `gui.backSoftkey` object defines a softkey object. It labels the softkey “Back” and sends the escape key when the softkey is clicked.

Example:

```
gui.rightSoftkey = gui.backSoftkey;
```

4.1.4.2 cancelSoftkey

The `gui.cancelSoftkey` object defines a softkey object. It labels the softkey “Cancel” and sends the escape key when the softkey is clicked.

Format:

```
gui.rightSoftkey = gui.cancelSoftkey;
```

4.1.4.3 okSoftkey

The `gui.okSoftkey` object defines a softkey object. It labels the softkey “OK” and sends the enter key when the softkey is clicked.

Format:

```
gui.leftSoftkey = gui.okSoftkey;
```

4.1.4.4 selectSoftkey

The `gui.selectSoftkey` object defines a softkey object. It labels the softkey “Select” and sends the enter key when the softkey is clicked.

Example:

```
gui.leftSoftkey = gui.selectSoftkey;
```

4.1.5 Form and Menu Common Methods

4.1.5.1 append(control)

The `append` function places the specified `control` as the last control in the specified menu or form.

Format:

```
<MenuOrForm_name>.append(control);
```

Where:

`control` – the control to append.

Note: A control cannot be used more than once in a form or menu.

Example:

See section 3.2.2.

4.1.5.2 prepend(control)

The `prepend` function places the specified `control` as the first control in the specified menu or form.

Format:

```
<MenuOrForm_name>.prepend(control);
```

Where:

`control` – the control to `prepend` to the menu.

Note: A control cannot be used more than once in a menu or form.

Example:

See forms example in section 3.2.2.

4.1.5.3 setActiveChild(control)

The `setActiveChild` selects (but does not activate) the specified control when the menu or form is displayed. This method is optional.

Format:

```
<MenuOrForm_name>.setActiveChild(control);
```

Where:

`control` – the control to `select` when the menu is displayed.

Example:

See forms example in section 3.2.2.

Note: You must show the form/menu after setting the active child in order for this function to work properly.

4.1.6 Form and Menu Common Properties

The properties and methods described in the following section are common to the `gui.Menu` and `gui.Form` objects.

4.1.6.1 caption

The `caption` property is a string that is used by `gui.showForm`, `gui.showMenu`, and `gui.showSubMenu` to display a caption in the status bar of the MAH300 `gui` object.

Format:

```
<MenuOrForm_name>.caption = "<caption_string>";
```

Example:

See forms example in section 3.2.2.

4.1.6.2 onKey

The `onKey` property is a property of type function that is used by `gui.Form`, `gui.Menu`, and `gui.Text` to provide control for any key not consumed by the active control. Key constants are defined in section 4.1.2.2.

Format:

```
function processKey(key)
{
   /* processing code */
}
<MenuOrForm_name>.onKey = processKey;
```

4.2 reader

The `reader` object models the barcode imager hardware and firmware. Use the methods and properties of the reader object to command the behavior of the barcode imager such as:

- Executing commands on the barcode imager
- Running a JavaScript on the barcode imager
- Reading and changing barcode imager settings
- Obtaining data decoded from bar codes

4.2.1 Methods

This section documents the methods defined for the barcode imager's `reader` object.

4.2.1.1 beep

The `beep` method causes the barcode imager to beep.

Format:

```
reader.beep(numBeeps);
```

Where:

`numBeeps` – number; number of beeps.

Note: This method does not return a value.

Example:

```
reader.beep(3);
```

Cause the reader to beep 3 times

4.2.1.2 defaultSettings

The `defaultSettings` method resets selected barcode imager settings to manufacturing defaults; it is equivalent to sending the 'J' command using the `reader.processCommand` method (section 4.2.1.3).

Format:

```
reader.defaultSettings();
```

Note: This method has no arguments and no return value.

barcode imager settings are defined in the document *Reader-Host Interface*, which also identifies settings that this command does not reset.

4.2.1.3 processCommand

The `processCommand` method instructs the barcode imager to execute a command.

Format:

```
result = reader.processCommand(commandType, data);
```

Where:

`commandType` – string, 1 character; the command to be processed on the barcode imager.

`data` – string; data as required to process the command.

`result` – depending on the command, either:

- a Boolean value
- a data string

For `commandType, data,` and resulting values, see document *Reader-Host Interface*

Example:

```
reader.processCommand('$', "\x03"); // read a code
```

Sends a “$” command code (post event) with a one-byte value of 3 (event type = read near and far fields) to the barcode imager firmware.

4.2.1.4 readSetting

The `readSetting` method returns the current value of the specified configuration setting.

Format:

```
value = reader.readSetting(settingNumber);
```

Where:

`settingNumber` – number; integer value representing the setting to be read.

For `settingNumber` values, see document Reader-Host Interface,

Example:

```
value = reader.readSetting(0x1b);
```

Returns the current value of the barcode imager setting hex 1b (communications mode).

4.2.1.5 runScript

The `runScript` method instructs the barcode imager to schedule the load, compile, and execution of the specified JavaScript. The barcode imager schedules execution of the script immediately after the currently executing event handler or main script completes. The `runScript` method does not include a mechanism to return to the calling script.

Format:

```
result = reader.runScript(scriptName);
```

Where:

`scriptName` – string; the name of the JavaScript to be run. The script must first be loaded into barcode imager flash by name. See the Download Utility (section 1.5).

`result` – Boolean; `true` if the script was loaded successfully; `false` otherwise. A return of `false` usually means that the script could not be found.

Example:

In the forms example (section 3.2.2), the onTimeCard function could be defined as follows:

```
function onTimeCard()
    {reader.runScript("TimeCardApp.js");}
```

The operator, at the end of a work shift, could press the “TimeCard” button to access a time card application.

4.2.1.6 saveSettings

The `saveSettings` method writes the current values of the barcode imager configuration settings into flash memory. Operational setting values are loaded from flash memory when the barcode imager initializes. Any changed configuration settings will be lost at reader shutdown unless saved in flash memory.

Format:

```
result = reader.saveSettings();
```

Where:

`result` – Boolean; `false` if the flash write fails; `true` otherwise.

Note: There are no arguments to this method.

4.2.1.7 setDisplayLed

The `setDisplayLed` method activates the LED of the MAH300 above the display.

Format:

```
reader.setDisplayLed(color);
```

Where:

`color` – must be reader.green, reader.red, reader.amber, or reader.none.

Note: Setting 0x014d must be set to false for setDisplayLed to function properly. Requires firmware 3478+.

4.2.1.8 setInterval

The `setInterval` method works similarly to the HTML DOM setInterval method, except that the resolution is in seconds rather than milliseconds.

Format:

```
intervalId = reader.setInterval(function, interval_sec);
```

Where:

`intervalId` – program provided interval ID.

`function` – program provided function to run at the specified interval.

`interval_sec` – amount of time (in seconds) to delay before running the function again.

Note: Requires firmware 3478+.

4.2.1.9 clearInterval

The `clearInterval` method works similarly to the HTML DOM clearInterval method, and is used in conjunction with setInterval to stop processing a function called by setInterval.

Format:

```
reader.clearInterval(intervalId);
```

Where:

`intervalId` – program provided interval ID.

Note: Requires firmware 3478+.

4.2.1.10 setTimeout

The `setTimeout` method works similarly to the HTML DOM setTimeout method, except that the resolution is in seconds rather than milliseconds.

Format:

```
timeoutId = reader.setTimeout(function, timeout_sec);
```

Where:

`timeoutId` – program provided timeout ID.

`function` – program provided function to run after the specified timeout.

`timeout_sec` – amount of time (in seconds) to delay before running the function.

Note: Requires firmware 3478+.

4.2.1.11 clearTimeout

The `clearTimeout` method works similarly to the HTML DOM clearTimeout method, and is used in conjunction with setTimeout to stop processing a function called by setTimeout.

Format:

```
reader.clearTimeout(timeoutId);
```

Where:

`timeoutId` – program provided timeout ID.

Note: Requires firmware 3478+.

4.2.1.12 shiftJisToUnicode

The `shiftJisToUnicode` method converts a string from Shift-JIS encoding to Unicode encoding.

Format:

```
unicodeString = reader.shiftJisToUnicode(text);
```

Where:

`text` – String; text encoded as JIS.

`unicodeString` – String; text encoded as Unicode.

Example:

```
myUnicodeString = reader.shiftJisToUnicode(myString);
```

Sets myUnicodeString to the Unicode encoded equivalent of myString.

4.2.1.13 writeSetting

The `writeSetting` method changes the operational value of a single barcode imager configuration setting.

Format:

```
writeSetting(settingNumber, value);
```

Where:

`settingNumber` – number; the setting to be changed.

`value` – number; the value to be written to the configuration setting.

For the possible values of `settingNumber` and `value`, see document *Reader-Host Interface*

Note: This method does not return a value.

Example:

```
reader.writeSetting(0x1b, 4);
```

Sets the reader communications mode to Bluetooth RF. See also the `gui.Button` example in section 4.1.3.1.

4.2.2 Properties

This section documents the properties defined for the barcode imager's `reader` object.

4.2.2.1 onBatteryLevelChange

The `onBatteryLevelChange` property of the `reader` object provides processing control when the barcode imager detects a change in its battery charge level.

Format:

```
function batteryCharge( previousLevel,
                        currentLevel )
{
  /* Processing statements */
}
reader.onBatteryLevelChange = batteryCharge;
```

Where:

`previousLevel` – integer; previous battery charge level.

`currentLevel` – integer; current battery charge level.

Possible battery charge levels are documented in sections 4.2.2.9 through 4.2.2.12.

Example:

```
function batteryCharge( previousLevel,
                        currentLevel )
{
  if ( currentLevel == reader.amber )
       alert("Battery Low");
}
reader.onBatteryLevelChange = batteryCharge;
```

Sends an alert when the battery level drops to amber.

4.2.2.2 onCommand

The `onCommand` property of the barcode imager calls the specified function when the reader:

- Receives a configuration command from a communication port.
- Decodes a configuration command from a code read by the barcode imager.

The application uses this property as an event handler to:

- Receive notification of command processing.
- Prevent execution of a command.

The function will not be called in response to a `reader.processCommand` call or commands within a stored-code ("performance strings"). Performance strings are documented in *Reader-Host Interface*

Return Boolean `true` to instruct the reader to process the command. Return Boolean `false` to suppress the command. When a command is suppressed, the firmware will not send any response to the host, but the JavaScript application may provide its own response to the host.

Format:

```
function filterCommand(commandType, commandData)
{
   var shouldSuppressCommand = false;

   /* Processing statements */

   return !shouldSuppressCommand;
}
reader.onCommand = filterCommand;
```

Where:

`commandType` – string; 1 character; specifies the command being processed.

`commandData` – string; data to be process by the command.

Example:

```
function notifyErase(commandType)
{
   if ( commandType == ')' )
         print("Erasing Error Log...");
}
reader.onCommand = notifyErase;
```

Sends a debugging message to the host to show that the erase command was detected.

4.2.2.3 onCommandFinish

The `onCommandFinish` property of the `reader` object provides processing control upon completion of a command.

Format:

```
function finishedCommand(commandSuccess,
                         responseType,
                         responseData)
{
   /* Processing statements */
}
reader.onCommandFinish = finishedCommand;
```

Where:

`commandSuccess` – Boolean; contains the return status of the command: true = success, false = failure.

`responseType` – string; 1 character; specifies the response type.

`responseData` – string; the response data.

Example:

```
function finishedCommand(commandSuccess,
                         responseType,
                         responseData)
{
   if( !commandSuccess )
         alert("Command failed ("
               + responseType + ":" + responseData + ")");
}
reader.onCommandFinish = finishedCommand;
```

sends an alert when a command fails.

4.2.2.4 onDecode

The `onDecode` property of the `reader` object provides processing control to the application program at the completion of a decode action. The barcode imager firmware passes the decode object to the function through the calling argument.

Code the function in your script and return a code as follows:

`null` – the decode has been consumed by the JavaScript application; there should be no further processing of it by the barcode imager firmware.

`false` – invalidate the decode; if the barcode imager firmware is so-configured, it will act as if there had not been a decode; the good-decode-beep will be suppressed.

`decode` object (modified or unmodified) – the barcode imager firmware will continue to process the modified or unmodified decode data.

Format:

```
function onDecode(decode)
{
   var valid       = true;
       /* set to false below if decode is to be invalidated */

   var passthrough = true;
       /* set to false below if decode is consumed here */

   /* processing statements, which may modify decode.data,
      valid, and/or passthrough */

   if( !valid )
       return false;

   if( !passthrough )
       return null;

   return decode;
}
reader.onDecode = onDecode;
```

Where:

`decode` – object having the following properties:

data – string; the text decoded from the bar code.

symbology – read-only number; the symbology number (see document *Reader-Host Interface*,).

symbologyModifier – read-only number; the symbology modifier number (see document *Reader-Host Interface*).

symbologyIdentifier – read-only string; this is the AIM identifier ("]cm").

x – read-only number; unit is pixels, 0 is center of image.

y – read-only number; unit is pixels, 0 is center of image.

x,y combined specify the position of the center of the bar code in the image (relative to the center of the image; the values can be positive or negative).

time – read-only Date object; a JavaScript Date object indicating the time the code was read.

quality_percent – read-only number; a code quality metric returned by the decoder. The precise meaning is symbology-specific.

linkage – read-only number; indicates that a code is one part of a composite code. See document *Reader-Host Interface*

bounds – 4-element array, indexed from 0 – 3. Each element is a decode.bounds object with 2 properties: x and y, both are integers and read only. Note: Requires firmware 3280+.

Example: See the discussion of symbol decoding in section 3.4.

4.2.2.5 onDecodeAttempt

The `onDecodeAttempt` property of the `reader` object provides processing control to the application program at the completion of a decode action, before any of the decoded symbols are passed to `reader.onDecode`.

Format:

```
function onDecodeAttempt(count)
{
   /* processing statements */
}
reader.onDecodeAttempt = onDecodeAttempt;
```

Where:

`count` – number; a count of the number of symbols that were read by a single decode request.

Note: This method does not return a value.

Example:

```
var ok = false;

reader.onDecodeAttempt = function(count)
{
    ok = count >= 2;
}
```

```
reader.onDecode = function(decode)
{
    if( !ok )
        return false;

    return decode;
}
```

Ensures there at least two decodes per attempt; otherwise, invalidates the single decode. Each decode found in the field of view will be decoded only once per attempt, so this example ensures there are two distinct symbols in the field of view. The reader must have been configured (section 3.7) to support multiple reads per attempt.

4.2.2.6 onIdle

The `onIdle` property of the `reader` object provides processing control to the application program whenever the reader is idle; i.e., no events (such as button presses) are active or queued. This event is posted when the JavaScript has nothing else queued and is <u>not</u> related to the barcode imager active time (setting hex 32).

Format:

```
function onIdle()
{
   /* processing statements */
}
reader.onIdle = onIdle;
```

Note: This method does not return a value.

Example:

```
function onIdle()
{
    reader.processCommand('.', "\x22\x05\x32\x64");
}

reader.onIdle = onIdle();
```

Flashes both LEDs on the MAH200 green 5 times, with LEDs on for ½ second and off for 1 second.

Note: Requires firmware 3280+

4.2.2.7 onStandby

The `onStandby` property of the `reader` object provides processing control to the application program whenever the reader is is about to enter the standby mode.

Format:

```
function onStandby()
{
   /* processing statements */
}
reader.onStandby = onStandby;
```

Where:

`return` – Boolean; true if the reader should be allowed to enter the standby mode; false to prevent it.

Example:

```
function onStandby()
{
     if (comm.isConnected) return false;
     else return true;
}

reader.onStandby = onStandby();
```

Prevents the reader from entering standby if it is connected and allows it to enter standby otherwise.

4.2.2.8 batteryLevel

The `batteryStatus` property of the `reader` object contains a read only integer specifying the battery charge level. Possible battery charge levels are:

`reader.green` – not low.

`reader.amber` – somewhat low.

`reader.red` – very low.

`reader.none` – battery not present.

Example:

```
batteryLevel = reader.batteryLevel;
```

4.2.2.9 red

The `red` property of the `reader` object contains a read only constant for use with reader.batteryLevel and reader.setDisplayLed.

Note: Requires firmware 3478+

4.2.2.10 green

The `green` property of the `reader` object contains a read only constant for use with reader.batteryLevel and reader.setDisplayLed.

Note: Requires firmware 3478+

4.2.2.11 amber

The `amber` property of the `reader` object contains a read only constant for use with reader.batteryLevel and reader.setDisplayLed.

Note: Requires firmware 3478+

4.2.2.12 none

The `red` property of the `reader` object contains a read only constant for use with reader.batteryLevel and reader.setDisplayLed.

Note: Requires firmware 3478+

4.2.2.13 cabled

The `cabled` property of the `reader` object contains a read only Boolean value containing the cabling state of the barcode imager hardware. The value will be `true` if cabled and `false` if not cabled.

Example:

```
cabled = reader.cabled;
```

Note: Requires firmware 3478+.

4.2.2.14 charging

The `charging` property of the `reader` object contains a read only Boolean value containing the charging state of the barcode imager hardware. The value will be `true` of charging and `false` if not charging.

Example:

```
charging = reader.charging;
```

Note: Requires firmware 3280+.

4.2.2.15 hardwareVersion

The `hardwareVersion` property of the `reader` object contains a read only string containing the version number of the barcode imager hardware.

Example:

```
hwVersion = reader.hardwareVersion;
```

4.2.2.16 oemId

The `oemId` property of the `reader` object contains a read-only string containing the barcode imager unique OEM identifier from the locked flash memory.

Example:

```
oemId = reader.oemId;
```

4.2.2.17 readerId

The `readerId` property of the `reader` object contains a read-only string containing the barcode imager unique ID from the locked flash memory.

Example:

```
rid = reader.readerId;
```

4.2.2.18 softwareVersion

The `softwareVersion` property of the `reader` object contains a read only string containing the version number of the firmware currently running in the barcode imager.

Example:

```
swVersion = reader.softwareVersion;
```

4.3 storage

The `storage` object provides application software access to barcode imager file storage. Files are written to storage by the `storage.write` method and by downloading from the host (see section 3.6).

Note: Names of files can be 1 - 200 printable ASCII characters. For compatibility with host file systems, P+F recommends you do not use characters that are reserved by host operating systems: /, \, :, ?, *, [,], ', ", etc. Files should be kept to a maximum length of 32K bytes. Files are stored in UTF8 format, which encodes Unicode characters in one or more bytes each.

4.3.1 Methods

The following section documents the methods defined for the barcode imager `storage` object.

In this section, the examples use elements of a time card application that assumes time card records are maintained as files organized by employee number. The naming convention for the time card records is `TimeCard<employee_number>.`

4.3.1.1 append

The `storage.append` method adds data to the end of a file.

Format:

```
result = storage.append(name, data);
```

Where:

`name` – string; the name of the object to append.

`data` – string; the data to add to the end of the file.

`result` – Boolean; `true` if the append succeeded; `false` if the append failed.

Example:

```
storage.append("TimeCard” + employeeNumber, tcRecord);
```

Adds the time card record to the end of the time card record that already exists for the employee specified by `employeeNumber`.

Note: Requires firmware 3226+

4.3.1.2 erase

The `storage.erase` method erases a file.

Format:

```
result = storage.erase(name);
```

Where:

`name` – string; the name of the object to erase.

`result` – Boolean; `true` if the file existed (the object is deleted); `false` if the file did not exist.

Example:

```
storage.erase("TimeCard” + employeeNumber);
```

Erases the time card record for the employee specified by `employeeNumber`.

4.3.1.3 findFirst

The `storage.findFirst` method locates the first file where the name matches a regular expression specified in the call parameter.

Format:

```
name = storage.findFirst(expression);
```

Where:

`expression` – regular expression (not a string); a regular expression used by the barcode imager to match against names of stored objects.

`name` – string; the name of the first matching file; `name` is `null` if no file matches the `expression`.

Example:

```
name = storage.findFirst(/^TimeCard.*/);
```

Sets `name` to the name of the first time card record file.

4.3.1.4 findNext

The `storage.findNext` method locates the next file where the name matches the regular expression specified in the `expression` parameter of a previous `storage.findFirst` call. The matching names are not ordered, but they will not be repeated; a `findFirst - findNext` sequence will return all matching files, provided that there are no other intervening storage method calls. (You can put the files into an array and use JavaScript's sort method when you need them ordered.)

Format:

```
name = storage.findNext();
```

Where:

`name` – string; the name of a file; `name` is `null` if no remaining file matches the previous regular expression.

Example:

```
name = storage.findNext();
```

Sets `name` to the name of the next time card record file.

4.3.1.5 read

The `storage.read` method reads a file.

Format:

```
data = storage.read(name);
```

Where:

`name` – string; the `name` of a file.

`data` – string; the contents of the file; `null` if there was no file with that name.

Example:

```
data = storage.read(name);
```

Sets `data` to the contents of the time card record specified by `name`.

4.3.1.6 size

The `storage.size` method returns the size of a file in bytes.

Format:

```
nameSize = storage.size(name);
```

Where:

`name` – string; the `name` of a file.

`nameSize` – integer; the size of the file in bytes.

Example:

```
nameSize = storage.size(“name”);
```

Sets `nameSize` to the size of the time card record specified by `name`.

Note: Requires firmware 3280+

4.3.1.7 upload

The `storage.upload` method uploads a file to the host over the current active host comm port.

Format:

```
result = storage.upload(name, withHeaderAndFooter);
```

Where:

`name` – string; the name of a file.

`withHeaderAndFooter` – Optional boolean; If set to false the file is uploaded without the header (ap/g(file size))and footer (ap/d(checksum)). If the parameter is not included the header and footer will be included with the upload.

`result` – Boolean; `false` if there was a failure on the communications port; otherwise, `true`. If the current communications mode is a 2-way mode, `true` indicates that the data has been sent to and acknowledged by the host.

Note: The upload protocol is documented with the "^" command in document *Reader-Host Interface*. Uploaded files may be split into multiple packets as defined in the protocol.

Example:

```
name = storage.findFirst(/TimeCard.*/);
while (name)
{
   if ( !storage.upload(name) )
         alert(name + " upload failed!");
   name = storage.findNext();
};
```

Uploads all time card records to the host. If a time card record fails to upload, the operator is alerted.

4.3.1.8 write

The `storage.write` method writes a file to storage. If the file does not exist, the barcode imager creates it. If there was an existing file of the same name, it is replaced.

Format:

```
result = storage.write(name, data);
```

Where:

`name` – string; name of a file.

`data` – string; data to be written.

`result` – Boolean; `true` if the file was successfully written; otherwise, `false`.

Note: When replacing an existing file, if there is insufficient storage space to hold the new file, it will not be written; however, the old file will be erased.

Example:

```
result = storage.write("TimeCard" + employeeNumber, tcRecord);
```

Writes a time card record to a file.

4.3.2 Properties

The following section documents the properties defined for the barcode imager `storage` object.

4.3.2.1 fullness_percent

The `storage.fullness_percent` property is a read-only integer containing the percent of storage in use.

4.3.2.2 isFull

The `storage.isFull` property is a read-only Boolean value; `true` if storage is full and cannot be added to; otherwise, `false`.

4.4 comm

The `comm` object models the host commutation feature of the barcode imager. Use the methods and properties of the `comm` object to send either packet or text data to the host.

4.4.1 Methods

The following section documents the methods defined for the barcode imager `comm` object.

4.4.1.1 connect

The `connect` method instructs the barcode imager communication driver to attempt to establish a connection.

Format:

```
result = comm.connect(timeout_sec);
```

Where:

`timeout_sec` – integer, the number of seconds for the communication driver to continue to attempt to establish a connection.

`result` – Boolean; `false` if there was a failure to connect; otherwise, `true`.

Example:

```
result = comm.connect(30);
```

Causes the reader to attempt to connect for up to thirty seconds. The reader stops attempting to connect when either a connection is made or the timeout is reached (i.e. if a connection is established after three seconds, the reader does not wait for the remaining twenty seven seconds before moving to the next queued task).

Note: Requires firmware 3280+

4.4.1.2 disconnect

The `disconnect` method instructs the barcode imager communication driver to disconnect from the host.

Format:

```
comm.disconnect();
```

Example:

```
comm.disconnect();
```

Causes the reader to disconnect from the host.

Note: This method does not return a result. Requires firmware 3280+

4.4.1.3 sendPacket

The `sendPacket` method instructs the barcode imager to send a data packet to the host via the communications port currently specified by the active barcode imager communication settings. The barcode imager creates a packet formatted according to the active barcode imager packet protocol configuration setting.

For a discussion of data packets, see document *Reader-Host Interface*

Format:

```
result = comm.sendPacket(type, data);
```

Where:

`type` – string, length 1; the type of packet to send. The packet types are documented in document *Reader-Host Interface*.

`data` – string; data to be inserted into the packet.

`result` – Boolean; `false` if there was a failure on the communications port; otherwise, `true`. If the current communications mode is a 2-way mode, `true` indicates that the data has been sent to and acknowledged by the host.

Example:

```
reader.onDecode =
   function(decode) {comm.sendPacket('z', decode.data)};
```

Sends a packet containing results of a decode to the current comm port.

4.4.1.4 sendText

The `sendText` method instructs the barcode imager to send arbitrary text (which may include NULL characters) to be sent via the active communication port; the text will be sent “raw” regardless of the reader comm mode settings. This method buffers the data until the

USB packet size limit is reached or a ‘z’ packet is sent. For an immediate response, send the data as a ‘z’ packet using comm.sendPacket.

Format:

```
result = comm.sendText(data);
```

Where:

`data` – string; data to be sent via the active communication port.

`result` – Boolean; `false` if there was a failure on the communications port; otherwise, `true`. If the current communications mode is a 2-way mode, `true` indicates that the data has been sent to and acknowledged by the host.

Example:

```
reader.onDecode =
function(decode) {comm.sendText("decode.data"); }
```

Sends the raw text “decode.data” via the active communications port.

Note: Requires firmware 3280+

4.4.2 Properties

The following section documents the properties defined for the barcode imager `comm` object.

4.4.2.1 isConnected

The `isConnected` property of the `comm` object contains a read-only Boolean specifying the host connection status. Possible connection values are:

`true` – reader is connected to the host.

`false` – reader is not connected to the host.

Example:

```
connected = comm.isConnected;
```

4.5 Functions

The following section documents functions that enhance the application development environment.

4.5.1 Dialog (only MAH300)

The barcode imager JavaScript Engine provides the following functions like those defined by JavaScript in Web browsers:

- alert
- confirm
- prompt

These functions interact with the MAH300 standard GUI display. The MAH300 displays the name of the function in the GUI status bar and the text associated with the function, and then waits until a key is pressed. The following subsections describe the operation of each function in the MAH300 environment.

Similar but more flexible functions are provided in the `gui` object (see section 4.1). For example, if you want to change the caption on these displays use the `gui` object functions.

4.5.1.1 alert

The `alert` function displays text in the display area of the standard GUI display. Do not call this function within onDecode and onCommand event handlers.

Format:

```
alert(text);
```

Where:

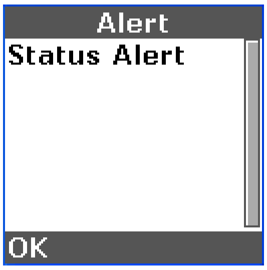
`text` – string; text to display as the alert.

Processing suspends until the operator presses an enter key – either the enter key or the left softkey defined as OK.

Example:

```
alert("Status Alert");
```

Displays the alert shown in Figure 17 and waits until the operator presses the enter key or the left softkey (OK).



Status Alert

Figure 17 – Alert Example

4.5.1.2 confirm

The `confirm` function displays text in the display area of the standard GUI display and returns a value based on the key pressed. Do not call this function within onDecode and onCommand event handlers.

Format:

```
result = confirm(text);
```

Where:

`text` – string; text to display for confirmation.

`result` – Boolean; `true` if the confirm receives an enter key (either the enter key or the left softkey defined as `OK`); `false` if the confirm receives the right softkey defined as `Cancel`.

Processing suspends until the operator presses a suitable key.

Example:

```
result = confirm("Exit?");
```

Displays the confirm shown in Figure 18 and waits until the operator presses the left softkey (OK) or the right softkey (Cancel).

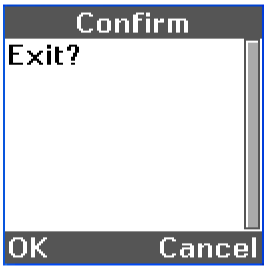


Figure 18 – Confirm Example

If you want softkey labels other than OK and Cancel (for example, Yes and No), use the `gui.confirm` method (section 4.1.1.2).

4.5.1.3 prompt

The `prompt` function displays text in the display area of the standard GUI display and returns a value based on the key pressed. Do not call this function within onDecode and onCommand event handlers.

Format:

```
result = prompt(text, default);
```

Where:

`text` – string; text to display as a label above a `gui.Edit` control.

`default` – string; a default string to display as the contents of edit control.

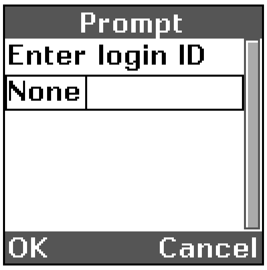
`result` – string; contents of the edit control if the prompt receives an enter key (either the enter key or the left softkey defined as `OK`); null if the prompt receives the right softkey defined as `Cancel`.

Processing suspends until the operator presses an enter key or `Cancel` key. The operator can key new data into the edit control before pressing enter or the left softkey.

Example:

```
string = prompt("Enter login ID", "None");
```

Displays the prompt shown in Figure 19.



Prompt

Enter login ID

None

Figure 19 – Prompt Example

The value of `string` depends on the operator action.

- If the operator at any time presses the right softkey (Cancel), the value of `string` is null.
- If the operator changes the contents of the edit control to <new content> and presses the left softkey (OK), the value of `string` is <new content>.
- If the operator presses the left softkey (OK) without changing the contents of the edit control, the value of `string` is “None” (the value entered as the second call parameter).

4.5.2 Process Control

4.5.2.1 sleep_ms

The barcode imager defines a sleep function to control time-sequence. Any busy-loops or time-consuming tasks should sleep to give other tasks time to run. It is very important to include a sleep_ms(0) function in your code periodically to give the main task a chance to update the watchdog timer. Failure to do so will cause a watchdog timeout error.

Event handlers such as `onClick` run during main code sleep. The event handlers themselves must NOT sleep; they should handle the event and return as quickly as possible.

Format:

```
sleep_ms(milliseconds);
```

Where:

`milliseconds` – number; the minimum number of milliseconds to sleep.

4.5.3 Other Functions

4.5.3.1 format

The `format` function allows you to combine variables and text into a string. Its operation is similar to the `sprintf` function of the C language.

Format:

```
string = format(<control_string>, <argument_list>);
```

Where:

`<control_string>` – contains a combination of characters that will be included in the string and format specifiers that instruct `format` how to process the items in the argument list.

`<argument_list>` – a comma-separated list of items to be processed according to format specifiers in the control string.

Example:

```
n = 45;
s = "ID";
string = format("%s = %d", s, n);
```

creates the string:

```
"ID = 45"
```

Format specifiers are taken from the standard C library and are discussed in A 3.

The output string is truncated to 1023 characters. If an error occurs, the output string is “format error.”

4.5.3.2 include

The `include` function executes the included script inline.

Format:

```
result = include(scriptName);
```

Where:

`scriptName` – string; the name of the script to be included.

`result` – Boolean; `true` if the script could be loaded and executed; otherwise, `false`.

Example:

```
include("myScript.js");
```

adds the definitions in `myScript.js` to the application. The definitions become part of the “including” script.

4.5.3.3 print

The `print` function sends text to stdout (the active communication port), not to the MAH300 display. Limit the use of the `print` function to debugging. Use the `comm` object methods for normal data output to communication ports.

Format:

```
print(text);
```

Where:

`text` – string; debugging data to be sent to the active communications port.

4.5.3.4 setStandbyMessage

The `setStandbyMessage` allows you to create a custom standby message to display when the reader enters standby mode.

Format:

```
setStandbyMessage(text);
```

Where:

`text` – string; message to display when the reader enters standby mode.

Note: Requires firmware 3280+

Glossary and Acronyms

Term	**Definition**
Control	User Class object instantiated in a MAH300 GUI form.
MAH300	P+F Handheld reader with display and keypad
RF	Radio Frequency
Code Data	Data resulting from the decode process after data capture or bar code read
Smart Quote	Previously formatted quotation marks, usually found in a word processing program
Softkey	User programmable key found on the MAH300
Consume	Used with no return value by the user defined application or firmware

A 1. MAH300 Simulator (only MAH300)

P+F provides a JavaScript simulator as part of the MAH300 Application Development environment. A free source code editor, `SciTE`, is packaged with the simulator.

From the editor you can execute the current edit file and walk through JavaScript errors detected during execution.

A 1.1. *Installation*

The simulator/editor package is distributed as a `.zip` file. To install, simply unzip the file into any directory in your Microsoft® Windows® environment. This document refers to this installation directory as the base directory. The unzip process creates two subdirectories, `editor` and `jse`, and a shortcut, `JSE.exe`, to the `SciTE` editor tailored to the MAH300 simulator.

The editor directory contains the editor and associated operational files, and SciTE documentation. The file `editor/SciTEDoc.html` contains the editor user manual. The directory contains additional SciTE html documents that discuss an array of extensions, add-ons, and programming interfaces. These discussions are beyond the scope of this document.

The `jse` directory contains the MAH300 JavaScript simulator and associated operational files. When you start the `JSE.exe` program, the directory `jse` becomes the default directory for script files.

A 1.2. *Using JSE*

To execute the editor, double click on the JavaScript icon in the base directory.

JSE displays an editor window. From there, you can run the simulator (section A 1.2.2).

A 1.2.1. Editor Window

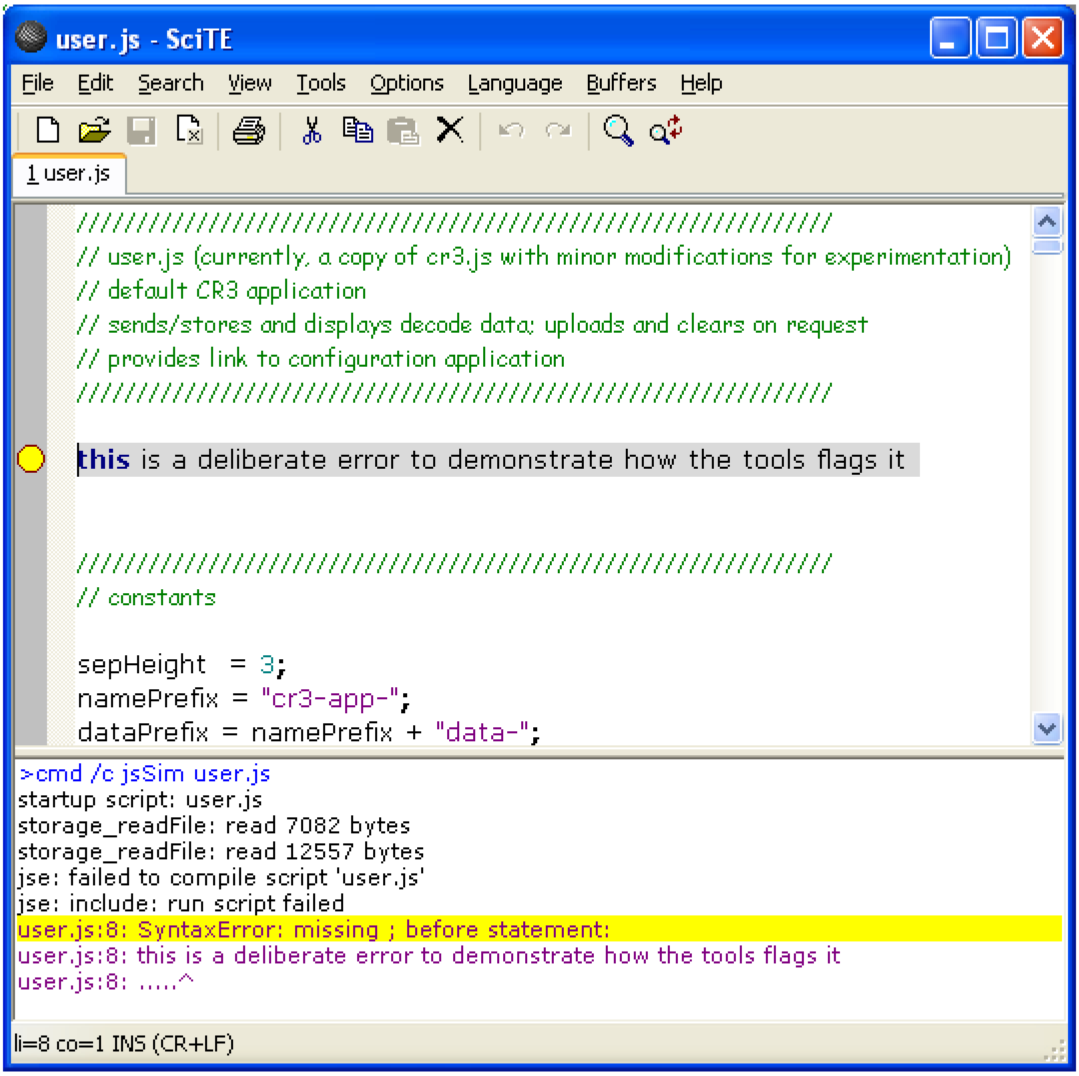
The editor displays the window shown in Figure 20, which shows the execution of a script, `user.js`, which purposely includes an error to demonstrate the editor display.

Two keys control execution and error evaluation when the editor window has focus: function key 4 (`F4`) and function key 5 (`F5`).

- `F4` steps through detected errors when repeatedly pressed.
- `F5` instructs the editor to execute the currently selected script.

For additional controls and features of the editor, see the `SciTE` user documentation in `<base_directory>/editor/SciTEDoc.html`.

In Figure 20 the `F5` key has been pressed to start execution of the script, and the `F4` key has been pressed to highlight the first error. Note the yellow circle at the left of the display that highlights the currently selected statement in error. Note: SciTE includes an option to display line numbers (see the SciTE `View` menu).



```
////////////////////////////////////////////////////////////////////
// user.js (currently, a copy of cr3.js with minor modifications for experimentation)
// default CR3 application
// sends/stores and displays decode data; uploads and clears on request
// provides link to configuration application
////////////////////////////////////////////////////////////////////

this is a deliberate error to demonstrate how the tools flags it


////////////////////////////////////////////////////////////////////
// constants

sepHeight  = 3;
namePrefix = "cr3-app-";
dataPrefix = namePrefix + "data-";
```

```
>cmd /c jsSim user.js
startup script: user.js
storage_readFile: read 7082 bytes
storage_readFile: read 12557 bytes
jse: failed to compile script 'user.js'
jse: include: run script failed
user.js:8: SyntaxError: missing ; before statement:
user.js:8: this is a deliberate error to demonstrate how the tools flags it
user.js:8: .....^
```

li=8 co=1 INS (CR+LF)

Figure 20 – Editor Display

A 1.2.2. Simulator Window

Figure 21 shows both segments of the MAH300 simulator window. The upper segment, `MAH300 Simulator`, simulates the display screen on the MAH300. The lower segment, `Simulated Decode`, contains a data entry control into which you can type text to simulate scanning a bar code (key in or copy and paste data and press enter). It may be necessary to input characters that cannot be keyed in. To input these characters, use URL encoding (% followed by the hexadecimal value of the character). For example, <SOH>1234<EOT> would be encoded as %011234%04. The simulated decode window can be resized, but does not support multiple line input.

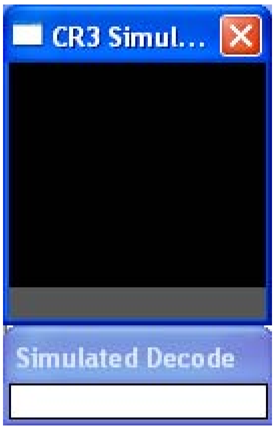


Figure 21 – MAH300 Simulator Display

The standard computer keyboard mappings simulate the keypad of the MAH300 as follows:

- F1 simulates the left MAH300 softkey.
- F2 simulates the right MAH300 softkey.
- Backspace simulates the MAH300 clear key.
- Enter simulates the blue key in the MAH300 cursor pad.
- The arrow, shift, and number keys simulate the corresponding MAH300 keys.
- Alt+F4, or typing “q” twice, closes both segments of the MAH300 Simulator Display. (You can also close the display by clicking the `MAH300 Simulator` close (“X”) button.)

For a complete discussion of the MAH300 key pad, see the *MAH300 – User Manual*

A 2. Input Modes

The input mode determines the character set that is active for the MAH300 keypad. The modes are described in Table 2.

Table 2 – Keypad Input Modes

inputMode	**characters**
numeric	0123456789
caps	A-Z, 0-9 and all ASCII non-alphanumeric symbols: '!', '"', '#', '$', '%', '&', '\'', '(', ')', '*', '+', ',', '-', '.', '/', ':', ';', '<', '=', '>', '?', '@', '[', '\\', ']', '^', '_', '`', '{', '|', '}', '~'
lower	a-z, 0-9 and all ASCII non-alphanumeric symbols
latinCaps	All characters in caps plus all accented capital letters from the ISO-8859-1 character set and the additional ISO-8859-1 non-alphanumeric symbols
latinLowerCase	All characters in lowercase plus all accented lowercase letters from the ISO-8859-1 character set and the additional ISO-8859-1 non-alphanumeric symbols
symbols	All ASCII and ISO-8859-1 non-alphanumeric symbols

A 3. Format Specifiers

The control string of the format function accepts the following codes from the standard C library:

%d	signed decimal integers
%i	signed decimal integers
%e	lowercase scientific notation
%E	uppercase scientific notation
%f	floating point decimal
%g	uses %e or %f , whichever is shorter
%G	uses %E or %f, whichever is shorter
%o	unsigned octal
%s	character string
%u	unsigned decimal integers
%x	lowercase unsigned hexadecimal
%X	uppercase unsigned hexadecimal
%%	insert a percent sign

Flag, width, and precision modifiers are the same as in the standard C library definition.

FACTORY AUTOMATION – SENSING YOUR NEEDS

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Contact
Pepperl+Fuchs GmbH
Lilienthalstraße 200
68307 Mannheim · Germany
Tel. +49 621 776-4411 · Fax +49 621 776-27-4411
E-mail: fa-info@pepperl-fuchs.com

Worldwide Headquarters
Pepperl+Fuchs GmbH · Mannheim · Germany
E-mail: fa-info@pepperl-fuchs.com

USA Headquarters
Pepperl+Fuchs Inc. · Twinsburg, OH · USA
E-mail: fa-info@us.pepperl-fuchs.com

Asia Pacific Headquarters
Pepperl+Fuchs Pte Ltd · Singapore
Company Registration No. 199003130E
E-mail: fa-info@sg.pepperl-fuchs.com

www.pepperl-fuchs.com

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