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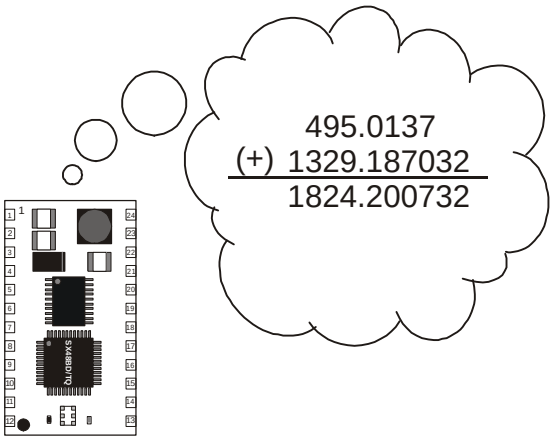

Contents

Introduction to the FloatLite6 Library

The FloatLite6 library can perform addition and subtraction of fixed decimal point numbers up to 6 decimal places. Comparison and equality methods are included. FloatLite6 objects support values from -32768.999999 to 32767.999999.

The FloatLite6Math library includes companion methods for the FloatLite6 library, which will find the minimum, maximum and average of FloatLite6 objects, including FloatLite6 Arrays.

This application note explains how to use the FloatLite6 and FloatLite6Math libraries. The example code provides an interactive demonstration of the FloatLite6 library's addition and subtraction methods. A detailed step-by-step demonstration is included.

This library does not currently include methods for multiplication or division; this is why we used the term "lite" in the name FloatLite6. The "6" in the name FloatLite6 refers to the level of precision.

Downloads, Parts, and Equipment for the FloatLite6 Library

This application note (AppNote013-FloatLite6.exe), which is available to you for free download from the application page from www.javelinstamp.com, includes the following files:

- The application note document (AppNote013-FloatLite6.pdf), in .pdf form.
- The FloatLite6 library file (FloatLite6.java), which contains the majority of all the math functions.
- The FloatLite6 math library (FloatLite6Math.java), which contains extended math functions for minimum, maximum, and average.
- The libraries javadoc files (FloatLite6.pdf, FloatLite6Math.pdf), in .pfd form.
- The test program (FloatLite6Test.java), which is explained in detail in this application note.
- The demonstration program (FloatLite6Demo.java), which will demonstrate most of the methods available to you in the FloatLite6 and FloatLite6Math classes
- An application example (FloatLite6Adder.java), which will add and subtract FloatLite6 values.

These files must be located in specific paths, listed below, within the Javelin Stamp IDE directory. Although the path to this directory can be different, the default root path is: C:\Program Files\Parallax Inc\Javelin Stamp IDE

This file list is organized by directory, then by filename, please verify that your file list is organized in the same way.

<root path>\doc\AppNote013-FloatLite6.pdf
<root path>\doc\FloatLite6.pdf
<root path>\doc\FloatLite6Math.pdf
<root path>\lib\stamp\math\FloatLite6.java
<root path>\lib\stamp\math\FloatLite6Math.java
<root path>\Projects\examples\math\FloatLite6Test.java
<root path>\Projects\examples\math\FloatLite6Demo.java
<root path>\Projects\examples\math\FloatLite6Adder.java

The equipment used to test this example includes a Javelin Stamp, Javelin Stamp Demo Board, 7.5 V, 1000 mA DC power supply, serial cable, and PC with the Javelin Stamp IDE v2.01.

The FloatLite6 Library

The FloatLite6 library contains two class files **`FloatLite6.java`** and **`FloatLite6Math.java`**. The **`FloatLite6.java`** class contains the actual FloatLite6 value as well as various methods for addition, subtraction and equality. The **`FloatLite6Math.java`** class contains additional methods for finding the minimum, maximum and average values of FloatLite6 objects.

The Float Number

A FloatLite6Object (the actual number) is broken up into five fields. The 1st field is an integer which stores the whole number portion of the number. The 2nd field is a boolean value, which stores the sign of the number. A positive number would have a boolean value of **`true`**, a negative number would have a boolean value of **`false`**. The next three fields are all character types. Each character represents 2 digits of the mantissa (value to the left of the decimal point), our mantissa can have 6 digits which is why we need 3 characters. For example, we have a number 98798.123456. The mantissa (123456) will be broken up into three pairs of two (12, 34, 56), each group will be stored as a character. So the 1st character will equal value '12', the 2nd character will equal value '34' and the 3rd character will equal value '56'.

The FloatLite6 class

This class contains the constructors to generate the FloatLite6 objects, which contain the FloatLite6 value as well as the addition, subtraction, equality and supporting methods. For a complete list of all methods available to you with this class, please see the JavaDoc (FloatLite6.pdf) file.

The FloatLite6Math class

This class uses FloatLite6 objects and contains methods that can find the maximum, minimum and average for FloatLite6 values. For a complete list of all methods available to you with this class, please see the JavaDoc (FloatLite6Math.pdf) file.

Testing the FloatLite6 Library

Program Listing 13.1 is a short program that will verify that the library has been correctly installed and is working properly. This program will perform a simple addition operation on two FloatLite6 numbers and display the results in the Javelin Terminal window.

The program begins by creating two FloatLite6 objects, each with a value supplied by passing a string to the constructor.

```
FloatLite6 float1 = new FloatLite6("25513.0024");
FloatLite6 float2 = new FloatLite6("123.03489");
```

The next segment of code prints the value of both of these objects as well as some formatting to the Javelin Terminal window.

```
System.out.print(" ");
System.out.println(float1.toString());
System.out.print("+ ");
System.out.println(float2.toString());
System.out.println("-----------");
```

Next we use the **add** method to add the value of the **float2** object to the value of the **float1** object.

```
float1.add(float2);
```

Then we will display this value.

```
System.out.println(float1.toString());
```

The test program (Program Listing 13.1) will display output, to the Javelin's IDE message window, similar to Figure 13.1.

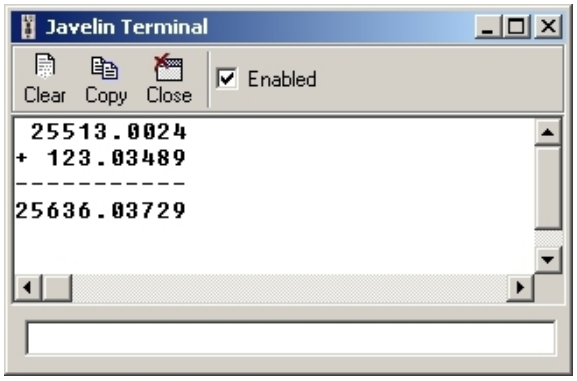

Figure 13.1
Output for
FloatLite6Test.java

Program Listing 13.1 – The FloatLite6Test

```
import stamp.math.*;

/*
 * A simple test which will add 2 FloatLite6 objects.
 * For more information please refer to Application Note #013.
 * Version 1.0 - 03/20/03
 */
public class FloatLite6Test {

  public static void main() {

    // create objects from static strings
```

```
    FloatLite6 float1 = new FloatLite6("25513.0024");
    FloatLite6 float2 = new FloatLite6("123.03489");

    System.out.print(" ");
    System.out.println(float1.toString());
    System.out.print("+ ");
    System.out.println(float2.toString());
    System.out.println("-----------");

    float1.add(float2);                    // Add float2 to float1
    System.out.println(float1.toString());

  }
}
```

The FloatLite6 Example

Program Listing 13.2 uses the addition and subtraction methods from the FloatLite6 library class to create an interactive demonstration that will add two FloatLite6 objects entered from the Javelin Terminal window.

The program begins by allowing you to choose between performing addition or subtraction. It will accept a '+' for addition, a '-' for subtraction or a 'q' to quit. Once you enter the value you will need to press the <ENTER> key.

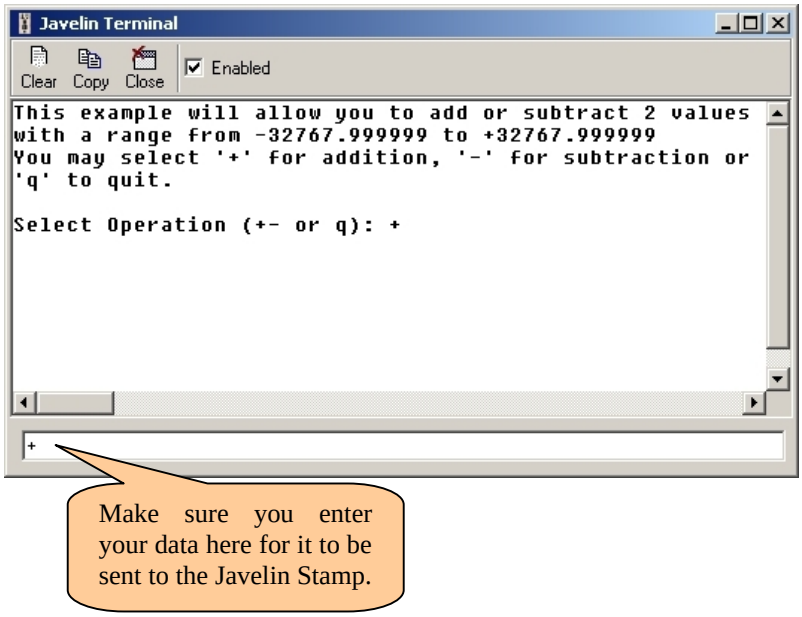

Figure 13.2
Menu selection for FloatLite6Adder.java

After you enter a menu selection, you will be prompted to enter the first and second numbers. Again, after you have entered each number, press the <ENTER> key. *If you enter a value out of the range of acceptable parameters, or enter an incorrect character, the result for that value will be defaulted to zero.*

Once the two values are entered, the Javelin will perform the calculation that you selected on these two numbers and print the result. The display is nicely formatted so that all decimal values are in-line with each other.

Your output should be similar to the output shown in Figure 13.3.

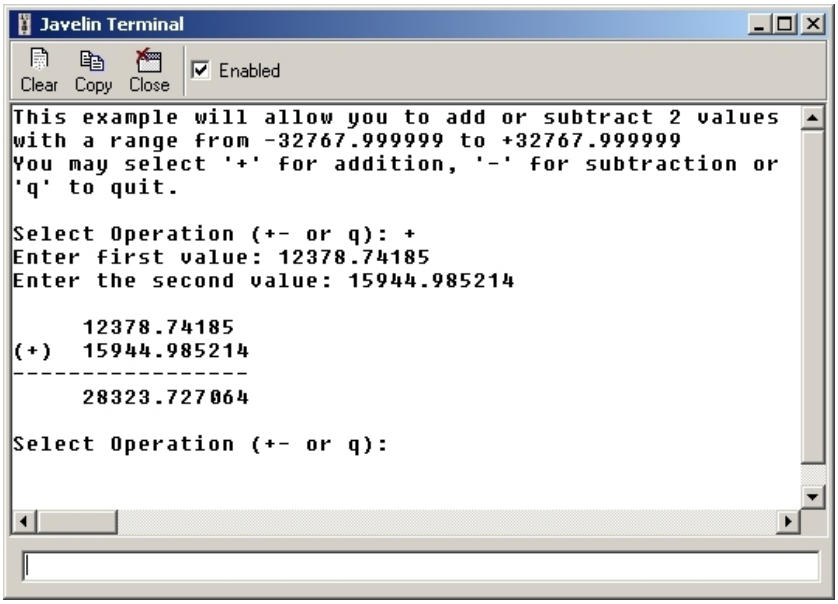

Figure 13.3
Output for
FloatLite6Adder.java

This program uses the methods below from the FloatLite6 library class.

- **`FloatLite6()`**
  This constructor will create the FloatLite6 object and set the FloatLite6 value by passing a String, StringBuffer, Character Array, or another FloatLite6 object. Here we pass in a String, which has been set to zero.

- **`setValue()`**
  This method will change the value of the FloatLite6 object after it has been created. It will accept a String, StringBuffer, CharacterArray, a FloatLite6 object, or an integer. Here we pass in a StringBuffer, which contains the value entered from the keyboard.

- **`toString()`**
  When called, this method will return a String that contains the value of the FloatLite6 object. This is a convenient method to use within a print statement, which is what we used if for here.

- **`add()`**
  This method will add the passed value to the calling FloatLite6 object. It will accept a FloatLite6 object, an integer, or a String. In this example, we pass in a FloatLite6 object.

- **`subtract()`**
  This method will subtract the passed value from the calling FloatLite6 object. It will accept a FloatLite6 object, an integer, or a String. In this example, we pass in a FloatLite6 object.

- **`getInteger()`**
  This method will return the whole number portion of a FloatLite6 object as an integer. We used this method to determine how many spaces we needed to add so that the decimal points are in-line.

- **`getSign()`**
  This method will return the sign of the FloatLite6 object as a boolean value. If the value is **`true`** the object is positive, if the value is **`false`** the object is negative. We used this method to adjust the spacing when a negative sign was present so our formatted output would have the decimals all in-line.

Tip	Use the FloatLite6 and FloatLite6Math javadoc files (FloatLite6.pdf and FloatLite6Math.pdf in your <"Javelin Stamp IDE\doc"> folder) as a reference to find out more about using the methods available to you.

Program Listing 13.2 – The FloatLite6Adder

```
import stamp.math.*;
import stamp.core.*;

/*
 * A FloatLite6 example for Application Note #013.
 * This example will allow you to add or subtract 2 float numbers.
 * Version 1.0 - 03/20/03
 */
public class FloatLite6Adder {

  public static void main() {

    FloatLite6 FL1 = new FloatLite6("0");   // FloatLite6 object
    FloatLite6 FL2 = new FloatLite6("0");   // FloatLite6 object

    StringBuffer sb = new StringBuffer(12); // Temp buffer
    int inputValue;                         // Keyboard input value
    char op;                                // Operation (Addition/Subtraction)
```

```
System.out.println("This example will allow you to add or subtract 2 values"+
                   " with a range from -32767.999999 to +32767.999999");
System.out.println("You may select '+' for addition, '-' for subtraction "+
                   "or 'q' to quit.");

while (true) {
  // Get operation (+/-) from Javelin Terminal Window
  System.out.print("\nSelect Operation (+- or q): ");
  op = (char)Terminal.getChar();
  Terminal.getChar();
  if (op=='q'||op==13)
    break;
  if (op!='+' && op!='-')  {
    System.out.println("Not an operation.");
    continue;
  }

  // Get 1st value from Terminal Window
  sb.clear();
  System.out.print("\nEnter first value: ");
  inputValue = Terminal.getChar();
  if (inputValue==13) sb.append(0);
  while (inputValue!=13) {
    sb.append((char)inputValue);
    inputValue = Terminal.getChar();
  }

  FL1.setValue(sb);                    // Store as float

  // Get 2nd value from Terminal Window
  sb.clear();
  System.out.print("\nEnter the second value: ");
  inputValue = Terminal.getChar();
  if (inputValue==13) sb.append(0);
  while (inputValue!=13) {
    sb.append((char)inputValue);
    inputValue = Terminal.getChar();
  }
  FL2.setValue(sb);                    // Store as float

  // Print the 2 values entered (if invalid a zero will substitute)
  System.out.print("\n\n    ");
  align(FL1);
  System.out.println(FL1.toString());
  System.out.print("(");
  System.out.print(op);
  System.out.print(") ");

  align(FL2);
  System.out.println(FL2.toString());
  System.out.println("-----------------");
```

```
      // Perform calculation based on operation supplied by user
      switch (op) {
        case '+' : FL1.add(FL2);
                   break;
        case '-' : FL1.subtract(FL2);
                   break;
      }

      // Print the answer for the specified operation
      System.out.print("    ");
      align(FL1);
      System.out.println(FL1.toString());
    }// end while

    System.out.println("\nDone");

  }// end method: main

  /* Align with spaces so decimal points are in-line */
  static public void align(FloatLite6 FL){
    int x=FL.getInteger();
    int xNeg=1;
    if (x==0) xNeg++;
    if (FL.getSign()) xNeg--;
    int xLen=0;
    while (x>0){
      x/=10;
      xLen++;
    }
    for(x=0;x<(6-xLen-xNeg);x++)
      System.out.print(" ");
  }
}// end class: FloatLite6Adder
```

FloatLite6 and FloatLite6Math Demonstration

FloatLite6Demo.java is a detailed, step-by-step, comprehensive demonstration of the FloatLite6 and FloatLite6Math library classes and is included with this application note. This program is best used by using the debugger and "stepping over" the code so you can observe the output while you read the comments.

Published Resources – for More Information

This class was developed to allow the Javelin to perform floating-point addition and subtraction. Any enhancements to this class to provide support for multiplication or division are welcomed. Please contact javelinlibrary@parallax.com for more information.

Javelin Stamp Discussion Forum – Questions and Answers

The Parallax, Inc. Javelin Stamp Discussion Forum is a searchable repository of design questions and answers for the Javelin Stamp. To view the Javelin Stamp Forum, go to www.javelinstamp.com and follow the Discussion link. You can also join this forum and post your own questions. The Parallax technical staff, and Javelin Stamp users who monitor the list, will see your questions and reply with helpful tips, part numbers, pointers to useful web pages, etc.