

Data Template Utility for the TI-83 Plus

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Data Template Utility Overview

The Data Template Utility is a tool that publishers can use to produce a data management application for teachers and students. It consists of two parts: a PC component that the publishers customize to create their own data set application and a TI-83 Plus component that teachers and students use to load the data sets into their calculators.

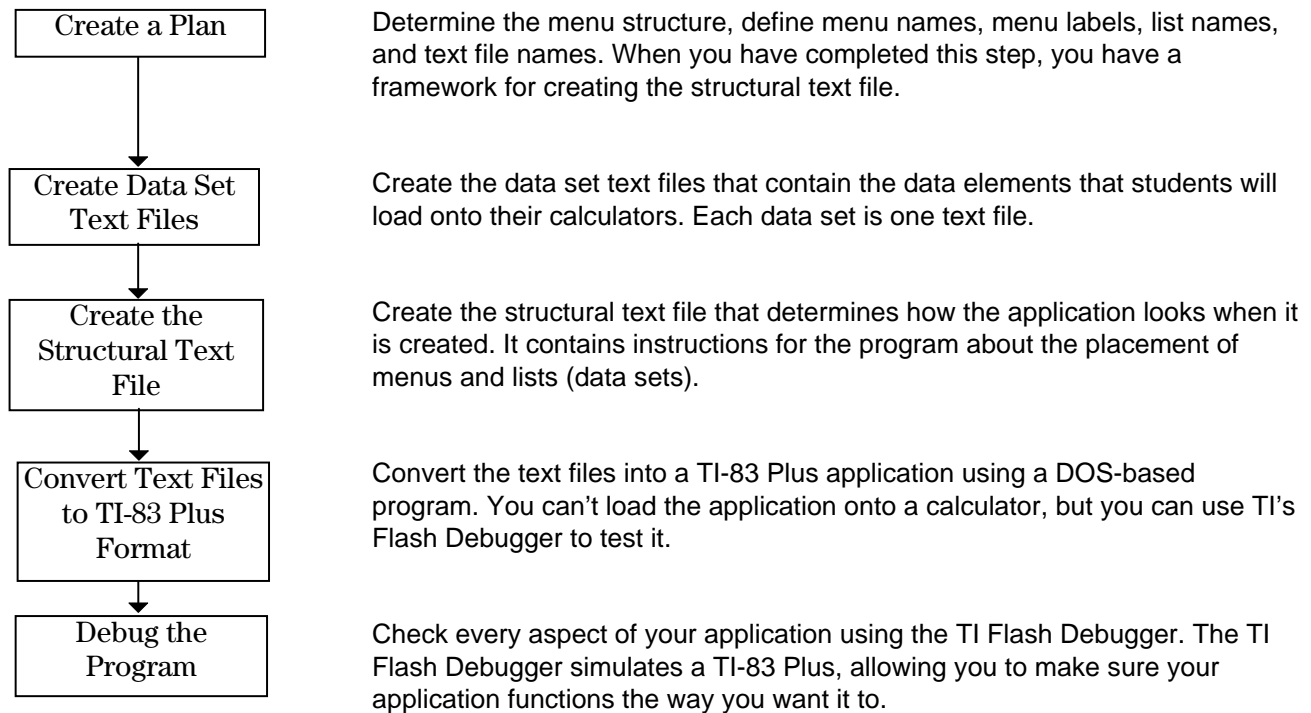
To create a data set application, you create several text files. One text file sets up the structure of the application; the remaining text files contain the data sets for the application.

You convert these text files to a format that can be run on the TI-83 Plus calculator. Following thorough testing, you send the application to Texas Instruments to sign so that it can be shipped to your customers.

Following is a brief tutorial that will help you get accustomed to creating a data set application.

Data Template Utility Tutorial

Good planning is the key to creating your data set application. The following diagram outlines the steps to follow to create a data set application quickly and easily.



Creating a Plan

If you create a plan for your application, you can add the elements to your structural text file quickly and efficiently.

For this tutorial, you'll create a data set application for a statistics course. The students will use the following data sets in various exercises throughout the school year:

- Cooling temperatures of hot water: duration, temperature
- Motion of an object: distance, acceleration, velocity

Once you know what information you will provide in your data set application, you need to determine how you want to present it. You can customize your application by developing a menu structure that divides the information into logical sections. You can also create a splash screen to introduce your application with graphics and text.

You should determine the following things before you start:

- Text and/or picture you want to display on the splash screen
- Name and version number of your application
- Number of menus the application needs
- Number of lists (data sets) for each menu item

- Names of the menus and lists

For this tutorial, assume that you’ve made the following decisions:

- Introductory screen contains only text
- Name and version: “Intro to Stats Data Sets “ Version a0.01-2000
- Two menu items for the two categories of data sets
- Several lists associated with each menu item
- No submenus

The following table shows a detailed plan for this application based on these decisions. Naming Conventions on page 12 gives detailed information on naming menus, lists, and text files.

Item	Description	Menu Name	File Name
Splash screen	INTRO TO STATS DATA SETS Version-1.0a-2000		
Menu item 1	Cooling temperatures of hot water	TEMPERATURE	
Lists for menu item 1	Duration Temperature	DUR TEMP	DUR.TXT TEMP.TXT
Menu item 2	Motion of an object	MOTION	
Lists for menu item 2	Distance Acceleration Velocity	DIST ACCEL VELOC	DIST.TXT ACCEL.TXT VELOC.TXT

Creating Data Set Text Files

Each data set text file contains the data elements that the students will load onto their calculators and use on the exercises. All of the text files you create for a data template application must adhere to a specific set of rules, and these are no exception. For detailed information on how to create them, see Data Set Text Files on page 13. For this tutorial, the data set text files have been created for you.

Creating a Structural Text File

You can use any word processing program to create your text files. Some examples are Microsoft® Word, Notepad, WordPad, or Corel® WordPerfect®. You must save the files as document text files (.txt).

With this file, you set up the menu structure and tell the application which of the data set text files belong to each menu. Let’s take a look at the example file:

Open **indata.txt** with your word processor. This file has two columns. (The columns may or may not line up neatly, depending on your word processor.) The left column contains the data for the menu structure. This is where you type all of your information. The right column contains instructions or explanations for the data column. This information helps you create your text file but is ignored by the program. You won’t change anything in this column.

The text file is also divided into sections.

- The first section defines the application name and the splash screen.
- The next section defines the application's main menu.
- The remaining sections define the menus, submenus, and lists that you access from the main menu.

Let's start with the first section.

Note: Line numbers have been added to our text file example for reference. If your text file is long, you may want to add line numbers to your file as well. During the conversion process, some error messages may refer to line numbers. If you add them to your file, be sure to place three asterisks before each number so that the program does not try to process them.

Application Name and Splash Screen

According to the table on page 5, the splash screen has three lines of text. Two lines are a description of the application (INTRO TO STATS DATA SETS) and the remaining line is the version number (Version a0.01-2000).

How to Proceed

Line	Instructions
line 1	The first step is to name the application. This name appears in the Applications menu on the TI-83 Plus. It can be up to 8 characters long. (For this tutorial, use STATDATA .)
line 2	You can either have the user press any key to proceed past the introductory screen, or you can set a time delay to have the application automatically proceed after a specified number of seconds. For this tutorial, use a 3 second time delay. Type 3 for this time delay.
line 3	The introductory screen will only have text, so type 0 .
line 4	Since there is no graphic on the introductory screen, type 0 .
line 5	Type 3 on this line for the three lines of text on the introductory screen.
line 6	You can choose to use either large or small font for each line of text on your introductory screen. For this tutorial, use large font for the first two lines and small font for the third line. Enter 0 for large font for this line of text.
line 7	Next, you have to specify the row where the text will be displayed. You can choose any row from 1 (the first row on the screen) to 8 (the last row on the screen). Start the text on line 2. Enter 2 for the row for this line of text.
line 8	Now you're ready to enter the first line of text for the introductory screen. Since there is a space in the text line, you must enclose the text in quotation marks. Type " Intro to Stats " for the first line of text.
line 9	Now you're ready to set up the second row of the introductory screen. Type 0 for large font.
line 10	Place the second row of text on line 4 .
line 11	Type " Data Sets " for the second line of text. Remember to include the quotation marks.
line 12	Type 1 for small font for the third line of text.
line 13	Place the third line of text on line 7 .

- line 14 Type **“Version a0.01 2000”** for the third line of text.
 line 15 Leave this line blank so that the sections in your file will be separated.

Following is an example of this section of the structural text file:

STATDATA	*** line 1 Application name
3	*** line 2 Delay in seconds: 0 if key input; 1-5 if delay
0	*** line 3 0 if no graphic (text only); 1 if graphic used
0	*** line 4 Graphic file name; 0 if no graphic
3	*** line 5 Number of lines of text on introductory screen
0	*** line 6 0 if large font, 1 if small font for first line of text
2	*** line 7 Row to start on (1-8) for first line of text
“Intro to Stats”	*** line 8 Intro screen text (<=16 chars lg. font; <=24 chars sm. font)
0	*** line 9 0 if large font, 1 if small font for second line of text
4	*** line 10 Row to start on (1-8) for second line of text
“Data Sets”	*** line 11 Intro screen text (<=16 chars lg. font; <=24 chars sm. font)
1	*** line 12 0 if large font, 1 if small font for second line of text
7	*** line 13 Row to start on (1-8) for second line of text
“Version a0.01 2000”	*** line 14 Intro screen text (<=16 chars lg. font; <=24 chars sm. font)
	*** line 15

Figure 1 Introductory Screen

Application Main Menu

The next step is to create the first menu that the user sees. According to the table on page 5, this screen will display the two menu names that correspond to the two types of data sets that the students will use.

How to Proceed

Line	Instructions
line 16	The first menu label is only for reference to designate the menu level. The default is TopMenu . You do not need to change it.
line 17	According to the table, you will have 2 menus. Type 2 on this line.
line 18	Next, you have to let the program know what type of information follows. Your next lines refer to menus, so type 0 .
line 19	This is the main heading of the application. Type “Intro to Stats” on this line. Remember to include the quotation marks.
line 20	This line displays the text for the first menu item. Type Temperature for the first line.

line 21 Each menu item needs an internal reference name. This name is not displayed; it is only used internally. These names were defined earlier on the table of page 5. Type **TEMP** on this line.

Insert lines for the next menu display line and reference name (refer to the table on page 5, if needed). *You do not have to copy the descriptive text in the right column.* Leave a blank line at the end of this section so that your sections will be separated. When you are finished, you should have added 3 more lines, with a total of 24 lines of text so far.

Following is an example of this section of the structural text file:

StatData	*** line 16 Menu label (for reference) - may be up to 8 characters
2	*** line 17 Number of items that will be displayed on this screen
0	*** line 18 0 for a menu, 1 for selection screen
“Intro to Stats”	*** line 19 Menu title displayed in upper left corner - up to 11 chars
Temperature	*** line 20 Menu name displayed on the first line
TEMP	*** line 21 Menu label (for reference) - may be up to 8 characters
Motion	*** line 22 Menu name displayed on the second line
MOTN	*** line 23 Menu label (for reference) - may be up to 8 characters
	*** line 24

Figure 2 Application Main Menu

Submenus and Lists

In this section, we will specify the data sets that go with the menu items we just created.

How to Proceed

Line	Instructions
------	--------------

line 25	The first menu reference name (from the application main menu section above) is TEMP . Type that name on this line.
line 26	There are 2 data sets for the TEMP menu, so type 2 on this line.
line 27	The following items are the names of the data sets. When you select one of them, the application opens and reads the data set. Therefore, you need to type 1 for selection screen.
line 28	The names of the data sets follow, with one on each line. Type DUR.TXT , the first data set name, on this line.

Insert lines for the next data set for TEMP. Then enter the information for the next menu item. For each menu item, you must have the following lines in the structural text file. (Refer to the table on page 5, if needed.)

- Menu label (for reference)
- Number of lists to follow

- One line for each data set name.

As before, you do not have to copy the descriptive text in the right column. When you are finished, you should have added 7 more lines, for a total of 35 lines of text.

Following is an example of this section of the structural text file:

TEMP	*** line 25 Submenu label (for reference) - may be up to 8 characters
2	*** line 26 Number of items that will be displayed on this screen
1	*** line 27 0 for menu, 1 for selection screen
DUR.TXT	*** line 28 Name of data set text file to open and read
TEMP.TXT	*** line 29 Name of data set text file to open and read
MOTN	*** line 30 Submenu label (for reference) - may be up to 8 characters
3	*** line 31 Number of items that will be displayed on this screen
1	*** line 32 0 for menu, 1 for selection screen
DIST.TXT	*** line 33 Name of data set text file to open and read
ACCEL.TXT	*** line 34 Name of data set text file to open and read
VELOC.TXT	*** line 35 Name of data set text file to open and read

Figure 3 Submenus and Lists

The last step is to save your file as a text file (.txt) with an 8-character name. For this tutorial, use **statdata.txt**. Now, it's ready to be converted.

Converting the Text File to TI-83 Plus Format

When you have completed the text files that make up your custom application, you convert them to TI-83 Plus format. All of your text files as well as **mergfile.bin** and **template.exe** must be in the same directory.

Steps	Keystrokes
1. Go to the MS DOS prompt on your computer.	Click the Start button. Choose Programs , then MS-DOS Prompt .
2. Change the active directory to the one where your data template files are stored.	Example: C:\datasets\statdata
3. Type template (name of your text file)	Example: template statdata.txt
4. Press Enter. The program executes and either gives you an error message or displays the message " OUTFILE.HEX contains final output. "	

Congratulations! You have just created your first application. The program creates an application file with a **.hex** extension that can be opened and reviewed using the TI Flash Debugger.

Note: Each time you convert a data set application, the output file is **outfile.hex**. You should rename your application, keeping the **.hex** extension. If you do not, you run the risk of **outfile.hex** being overwritten the next time a data set application is converted.

If your application doesn't work the way you wanted it to, make changes to the structural text file (and/or data set text files) and convert it again. When you are satisfied that your application is sound, you can send it to TI to have it signed. It is then ready for distribution.

For more information about using TI Flash Debugger, see Using the TI Flash Debugger on page 20.

For more detailed information about creating structural text files, see Structural Text File on page 13.

Following is the entire structural text file created in this tutorial.

Application Name and Introductory Screen	STATDATA	*** line 1 APPLICATION NAME
	3	*** line 2 Delay: 0 if key input; 1..5 if delay
	0	*** line 3 0 if no splash table & only strings
		*** line 4 Graphic file name; 0 if no graphic
	3	*** line 5 Number of items to be displayed on this screen
	0	*** line 6 0 if large font, 1 if small font
	2	*** line 7 Row to start on (1-8) for the first line of text
	"Intro to Stats"	*** line 8 Intro screen text (<=16 chars lg font; <= 24 sm font)
	0	*** line 9 0 if large font, 1 if small font
	4	*** line 10 Row to start on (1-8) for the second line of text
	"Data Sets"	*** line 11 Intro screen text (<=16 chars lg font; <= 24 sm font)
	1	*** line 12 0 if large font, 1 if small font
	7	*** line 13 Row to start on (1-8) for the third line of text
	"Version a0.01 2000"	*** line 14 Intro screen text (<=16 chars lg font; <= 24 sm font)
Application Main Menu		*** line 15
	StatData	*** line 16 Menu label (for reference) - may be up to 8 chars
	2	*** line 17 Number of items to be displayed on this screen
	0	*** line 18 0 for a menu, 1 for selection screen
	"Intro to Stats"	*** line 19 Menu title displayed in left corner - up to 11 chars
	Temperature	*** line 20 Menu name displayed on the first line
	TEMP	*** line 21 Menu label (for reference) - may be up to 8 chars
	Motion	*** line 22 Menu name displayed on the second line
MOTN	*** line 23 Menu label (for reference) - may be up to 8 chars	

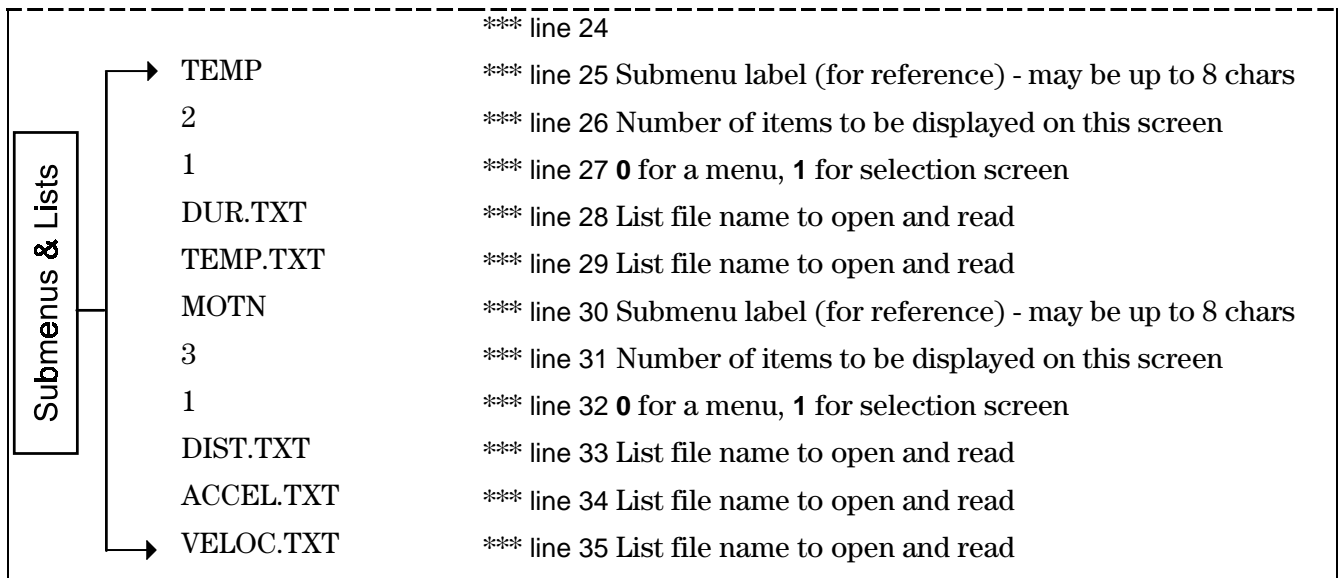


Figure 4 Tutorial structural text file

Creating a Data Set Application

To create a data set application, you create several text files. Data set text files contain the individual data sets for the application. The structural text file sets up the structure of the application.

Choosing a Word Processor

You can use any word processing program to create your text files. Some examples are Microsoft® Word, Notepad, WordPad, or Corel® WordPerfect®. You must save the files as document text files (.txt).

You don't need to use any particular word processor features to create this file. In fact, if you do use formatting features (including tabs other than the default settings), you'll lose all of the formatting when you save your file as a document text (.txt) file.

Naming Conventions

Both text files and menus have specific naming limitations, as described below.

Names for . . .	Have these limitations
<hr/>	
Text files	
Structural	Can be up to 8 characters long - a file with a longer name cannot be converted
Data Set	<ul style="list-style-type: none">• Can be up to 8 characters long- a file with a longer name cannot be opened by the conversion program• First 5 characters must begin with a letter• First 5 characters can contain only letters and numbers (these characters become the list name)• Data sets whose file names have the same first 5 characters will be considered duplicates
Lists	<ul style="list-style-type: none">• First 5 characters of the data set file name• Will be converted to uppercase, if necessary
Menus and Submenus	<ul style="list-style-type: none">• Can be up to 11 characters long• Can have upper and lowercase letters• Can have spaces

Data Set Text Files

Create each data set as a separate file. For example, to create the data sets for distance, acceleration, and velocity of an object in motion, you would create three text files. One file would contain the data for distance, one for acceleration, and one for velocity.

These files must be created using a specific structure. Following are some guidelines:

You must do this:	You can do this:	You cannot do this:
<ul style="list-style-type: none"> • Create a file that only contains data elements • Include only data elements in the file (no other text) • Place each data element on a separate line • Make sure that the first 5 characters of the file name are unique • Use only e or E for exponents • Use only i or I for complex numbers 	<ul style="list-style-type: none"> • Use decimal point notation • Use scientific notation, or complex numbers if needed (e.g., 3.400000e02 or 5.75I). • Use exponents from -99 to 99 for scientific notation • Have up to 999 elements in a dataset 	<ul style="list-style-type: none"> • Use commas to separate thousands • Leave blank lines between data elements

Examples:

Distance text file (DIST.TXT)

```
1.2
1.2
1.0
0.8
0.1
```

Acceleration text file (ACCEL.TXT)

```
16
16
9
1
8
```

Velocity text file (VELOC.TXT)

```
1.2
1.2
1.0
0.8
0.1
```

Structural Text File

With this file, you set up the menu structure and tell the application which of the data set text files belong to each menu.

You can use the example file that you received with the application files to create a new one. Data in this file must be presented in a specific order so that the program processes it correctly. The example file, **indata.txt** already has descriptive information that tells you what data is required on each line.

The structural text file contains two columns. The left column contains the data for the menu structure. This is where you type all of your information. The right column contains instructions or explanations for the data column. This information helps you create your text file but is ignored by the program. You won't change anything in this column.

The text file is also divided into sections. The first section defines the application name and the introductory screen. The next section defines the application's main menu. The remaining sections define the menus, submenus, and lists that you access from the main menu.

Let's start with the first section. Open **indata.txt** with your word processor.

Introductory Screen

The first step in creating the structural text file is to set up an introductory screen. An introductory screen is typically used to display the name of the application, the application version number, and possibly a graphic. You can use only text or only a graphic, or you can use both together on the same screen. You also have the option of using large or small font for lines containing text.

Note: The TI-83 Plus picture format is the only format that is supported by the Data Template Utility. You cannot use any other graphic format (such as .gif, .jpeg, or .bmp) when you create a data set application.

How to Proceed

Line	Instructions
------	--------------

line 1	First, name the application. This name that in the Applications menu on the TI-83 Plus. Type a name, up to 8 characters long.
--------	-------------------------------------------------------------------------------------------------------------------------------

line 2	You can either have the user press any key to proceed past the splash screen, or you can set a time delay to have the application automatically proceed after a specified number of seconds. Do one of the following:
--------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

- Enter **0** to have the user press any key to continue past the introductory screen. If you have the user press any key, the text **PRESS ANY KEY** is automatically placed on row 8.
- Enter a number from **1** to **5** for the number of seconds that the introductory screen will be displayed.

line 3	Do one of the following:
--------	--------------------------

- Enter **0** if the introductory screen contains only text.
- Enter **1** if the introductory screen displays a graphic. Graphics must be in TI-83 Plus format (**.8xi**).

line 4	Do one of the following:
--------	--------------------------

- Enter **0** if the introductory screen contains only text.
- Enter the full name of the graphic (i.e. pic1.8xi)

line 5	Enter the number of lines of text that will be on the introductory screen.
--------	----------------------------------------------------------------------------

- line 6 You can choose to use either large or small font for each line of text on your introductory screen. Do one of the following:
- Enter **0** for large font for this line of text. You may use a maximum of 16 characters per line.
 - Enter **1** for small font for this line of text. You may use a maximum of 24 characters per line.
- line 7 Next, enter the row where the text will be displayed. You can choose any row from 1 (the first row on the screen) to 8 (the last row on the screen). *Remember that if you chose to have the user press any key to continue past the introductory screen, row 8 already contains the text PRESS ANY KEY.*
- line 8 Now you're ready to enter the first line of text for the introductory screen. If the text contains a space, you must enclose it in quotation marks. Type the text on this line.
-

Continue this 3-step (and hence, 3 line) process for each line of text on the introductory screen:

1. Enter the font size - **0** for large, **1** for small.
2. Enter the row number where the text will be displayed - from **1** to **8**.
3. Enter the text, remembering to put it in quotes if it contains one or more spaces.

Leave a blank line at the end of this section so that your sections will be separated.

Following is an example of the first section of a structural text file:

Note: Line numbers have been added to our text file example for reference. If your text file is long, you may want to add line numbers to your file as well. During the conversion process, some error messages may refer to line numbers. If you add them to your file, be sure to place three asterisks before each number so that the program does not try to process them.

STATDATA	*** line 1 APPLICATION NAME
3	*** line 2 Delay in seconds: 0 if key input; 1-5 if delay
0	*** line 3 0 if no graphic (text only); 1 if graphic used
0	*** line 4 Graphic file name; 0 if no graphic
3	*** line 5 Number of lines of text on intro screen
0	*** line 6 0 if large font, 1 if small font for first line of text
2	*** line 7 Row to start on (1-8) for first line of text
“Intro to Stats”	*** line 8 Intro screen text (<=16 chars, lg font; <= 24 chars sm font)
0	*** line 9 0 if large font, 1 if small font for 2nd line of text
4	*** line 10 Row to start on (1-8) for 2nd line of text
“Data Sets”	*** line 11 Intro screen text (<=16chars, lg font; <= 24 chars sm font)
1	*** line 12 0 if large font, 1 if small font for 3rd line of text
7	*** line 13 Row to start on (1-8) for 3rd line of text
“Version a0.01 2000”	*** line 14 Intro screen text (<=16 chars, lg font; <= 24 chars sm font)
	*** line 15

Figure 5 Introductory Screen

Application Main Menu

The next step is to create the first menu that the user sees.

How to Proceed

Line	Instructions
line 16	The first menu label is only for reference to designate the menu level. The default is TopMenu . You do not need to change it.
line 17	Enter the number of first-level menus that your application has.
line 18	Type 0 (for menu) to let the program know what type of information follows.
line 19	This is the main heading of the application. Enter a name, up to 11 characters long, on this line. Remember to enclose the text in quotation marks if it contains one or more spaces.
line 20	Enter the name of your first menu item. You may use up to 16 characters. Remember to enclose the text in quotation marks if it contains one or more spaces.
line 21	Each menu item needs a unique internal reference name. You will use this name when you set up submenus or lists that are displayed when you select this menu option. Reference names are case-sensitive (i.e., CHAP1, Chap1, and chap1 are all different references) Enter a name up to 8 characters long.

Insert lines for the remaining menu items for the application’s main menu. *You do not have to copy the descriptive text in the right column.* For each menu item, you need a line for the following:

- Menu name displayed
- Menu label (for reference)

Leave a blank line at the end of this section so that your sections will be separated.

Following is an example of the application main menu section of a structural text file:

TopMenu	*** line 16 Menu label (for reference) - may be up to 8 characters
2	*** line 17 Number of items that will be displayed on this screen
0	*** line 18 0 for a menu, 1 for selection screen
“Intro to Stats”	*** line 19 Menu title displayed in upper left corner - up to 11 characters
“Chapter 1”	*** line 20 Menu name displayed on the first line
CHAP1	*** line 21 Menu label (for reference) - may be up to 8 characters
“Chapter 2”	*** line 22 Menu name displayed on the second line
CHAP2	*** line 23 Menu label (for reference) - may be up to 8 characters
	*** line 24

Figure 6 Application Main Menu

Submenus and Lists

Now you can either create another level of menus (submenus), or you can specify the data sets that go with the menu items you just created. A data set application can have a maximum of 250 menus (including the top menu and submenus) and 250 lists.

How to Create Submenus

Line	Instructions
line 25	This menu label is for reference to designate the menu level. Type a name, up to 8 characters long, that describes this menu level.
line 26	Enter the number of second-level menus that your application has.
line 27	Type 0 (for menu) to let the program know what type of information follows.
line 28	This is the heading of the new menu level. Enter a name, up to 11 characters long, on this line. Remember to enclose the text in quotation marks if it contains one or more spaces.
line 29	Enter the name of the first menu item for this level. You may use up to 16 characters. Remember to enclose the text in quotation marks if it contains one or more spaces.
line 30	Each menu item needs an internal reference name. You will use this name when you set up submenus or lists that are displayed when you select this menu option. Enter a name up to 8 characters long.

Insert lines for the remaining menu items for this menu level menu. *You do not have to copy the descriptive text in the right column.* For each menu item, you need a line for the following:

- Menu name displayed
- Menu label (for reference)

Leave a blank line at the end of this section so that your sections will be separated.

How to Add Lists to Your Application

Line	Instructions
line 26	Enter the menu reference name for the menu item that is one level above the lists.
line 27	Enter the number of data sets for this menu item.
line 28	Enter 1 (for selection screen) to let the program know what type of information follows.
line 29	Enter the full file name of the first data set (i.e. DUR.TXT).

Insert lines for the remaining data sets for this menu item. Then enter the information for the next menu item. For each menu item, you need lines for the following:

- Menu label (for reference)
- Number of items that will be displayed on the screen
- **0** for a menu, **1** for selection screen
- One line for each data set name

As before, you do not have to copy the descriptive text in the right column. Following is an example of the submenus and lists section of a structural text file:

CHAPI	***line 25 Submenu label (for reference) - may be up to 8 characters
2	***line 26 Number of items that will be displayed on this screen
0	***line 27 0 for a menu, 1 for selection screen
“Chapter 1”	***line 28 Submenu title in upper left corner - up to 11 characters
Exercises	***line 29 Submenu name displayed on first line
EXER1	***line 30 Submenu label (for reference) - may be up to 8 characters
Review	***line 31 Submenu name displayed on second line
REV1	***line 32 Submenu label (for reference) - may be up to 8 characters
	***line 33
EXER1	***line 34 Submenu label (for reference) - may be up to 8 characters
5	***line 35 Number of items that will be displayed on this screen
1	***line 36 0 for a menu, 1 for selection screen
DUR.TXT	***line 37 Name of data set text file to open and read
TEMP.TXT	***line 38 Name of data set text file to open and read
DIST.TXT	***line 39 Name of data set text file to open and read
ACCEL.TXT	***line 40 Name of data set text file to open and read
VELOC.TXT	***line 41 Name of data set text file to open and read
	***line 42
REV1	***line 43 Submenu label (for reference) - may be up to 8 characters
3	***line 44 Number of items that will be displayed on this screen
1	***line 45 0 for a menu, 1 for selection screen

YARD.TXT	***line 46 Name of data set text file to open and read
GLASS.TXT	***line 47 Name of data set text file to open and read
KEYS.TXT	***line 48 Name of data set text file to open and read
	***line 49
CHAP2	***line 50 Submenu label (for reference) - may be up to 8 characters
2	***line 51 Number of items that will be displayed on this screen
0	***line 52 0 for a menu, 1 for selection screen
“Chapter 2”	***line 53 Submenu title in upper left corner - up to 11 characters
Exercises	***line 54 Submenu name displayed on first line
EXER2	***line 55 Submenu label (for reference) - may be up to 8 characters
Review	***line 56 Submenu name displayed on second line
REV2	***line 57 Submenu label (for reference) - may be up to 8 characters
	***line 58
EXER2	***line 59 Submenu label (for reference) - may be up to 8 characters
4	***line 60 Number of items that will be displayed on this screen
1	***line 61 0 for a menu, 1 for selection screen
BOOK.TXT	***line 62 Name of data set text file to open and read
MIXED.TXT	***line 63 Name of data set text file to open and read
OZONE.TXT	***line 64 Name of data set text file to open and read
PULSE.TXT	***line 65 Name of data set text file to open and read
	***line 66
REV2	***line 67 Submenu label (for reference) - may be up to 8 characters
5	***line 68 Number of items that will be displayed on this screen
1	***line 69 0 for a Menu, 1 for selection screen
DURAT.TXT	***line 70 Name of data set text file to open and read
CIGAR.TXT	***line 71 Name of data set text file to open and read
GRBG.TXT	***line 72 Name of data set text file to open and read
SURV.TXT	***line 73 Name of data set text file to open and read
HOUSE.TXT	***line 74 Name of data set text file to open and read

Figure 7 Submenus and Lists

The last step is to save your file as a text file (.txt) with an 8-character name. Now, it’s ready to be converted.

Converting the Text File to TI-83 Plus Format

When you have completed the text files that make up your custom application, you convert them to TI-83 Plus format. All of your text files as well as **mergfile.bin** and **template.exe** must be in the same directory.

Steps	Keystrokes
1. Go to the MS DOS prompt on your computer.	Click the Start button. Choose Programs , then MS-DOS Prompt .
2. Change the active directory to the one where your data template files are stored.	Example: C:\datasets\statdata
3. Type template (name of your text file)	Example: template statdata.txt
4. Press Enter. The program executes and either gives you an error message or displays the message “ OUTFILE.HEX contains final output. ”	

The program creates an application file, **outfile.hex**, that can be opened and reviewed using the TI Flash Debugger. (You can rename **outfile.hex**, as long as you keep the **.hex** extension.) If your application doesn't work the way you wanted it to, you will probably need to make changes to the structural text file - or possibly one of the data set text files - and convert it again. When you are satisfied that your application is sound, you can send it to TI to have it signed. It is then ready for distribution.

*Note: Each time you convert a data set application, the output file is **outfile.hex**. You should rename your application, keeping the **.hex** extension. If you do not, you run the risk of **outfile.hex** being overwritten the next time a data set application is converted.*

Using the TI Flash Debugger

TI Flash Debugger simulates the way your application will function when it is installed and used on the TI-83 Plus.

Loading Your Application

1. Double-click the FlashSim icon on your computer's desktop to launch the program.
2. From the **File** menu, select **New**. A *CPU* dialog box is displayed.
3. From the **Load** menu, select **Application**. A *Load Application* dialog box is displayed.
4. Click the down arrow next to the Look in field to navigate to your **.hex** file. You may have to browse directories to find the correct one.
5. Click **Open**. The fields in the *CPU* dialog box are completed with information from your application.
6. Click ►. A simulated TI-83 Plus is displayed.

Your application is loaded onto the simulated TI-83 Plus. You can use the simulated calculator in the same way you would use a real one. (Use a mouse to click on the calculator keys.) You're now ready to test your application to make sure that everything is displayed correctly and that all of the lists will load properly.

Reviewing Your Application

Review your application to make sure that

- Delay is correct and works for your purposes
- Text and graphics are displayed properly
- Menu and list structures are correct
- Lists will load the way you want them to
- There are no errors in the lists when they are loaded

The text on the application screens and the number of screens will vary depending on how the application was designed. However, many menu options remain the same for every application.

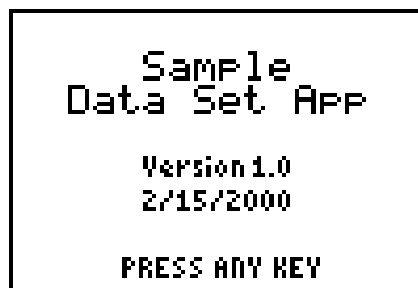
Starting the Application

*Note: To select a menu option, press the number or letter corresponding to the option or press \odot to highlight the option, then press **ENTER**.*

1. Press **APPS** to display a list of applications on your calculator.



2. Select your application. An introductory screen is displayed.



- If you have a time delay, the next screen is displayed automatically. If not, press any key to continue.

```

SAMPLE                               Quit
1:Chapter 1
2:Chapter 2
3:Chapter 3
4:Chapter 4
5:Chapter 5

```

Selecting Data Sets to Load

From the Sel All Load screen, you select the data sets you want to load. You can quickly select or deselect all of them by using the All menu option.

- Select the appropriate menu option(s) for the data set(s) that you want to load. The Sel All Load screen is displayed.

```

SAMPLE                               Quit
1:Chapter 1
2:Chapter 2
3:Chapter 3
4:Chapter 4
5:Chapter 5

```

- Move the cursor to each data set that you want to load and press **[ENTER]**. You may select as many data sets as you want.

```

Sel All Load
▣ OZONE
▣ DURATION
* PULSE

```

*Note: You can deselect a single list by pressing **[ENTER]** again.*

*To select all of the data sets on this screen, use **⏴** to move the cursor to All, then select **1:All**.*

*You can also deselect all of the datasets on this screen by selecting **2:All-**.*

```

Sel All Load
1:All+
2:All-

```

Loading Data Sets Onto the TI-83 Plus

Data sets are loaded as lists into your calculator's RAM. Once they're in RAM, you can use them just like any other list. Your application includes a feature that lets you place the lists in the list editor at the same time that you load them into RAM. *Note: The list editor capacity is 20 lists.*

You can use the Set Up Editor to

- add the data sets to the end of the list editor
- replace the contents of the list editor with the selected data sets

1. Use \blacktriangleright to move the cursor to Load.
2. Select **1:SetUpEditor**. The Sel All SetUp screen is displayed.

```
Sel All Load
1:SetUpEditor
2:Load
```

3. Select one of the following options:
 - 1:Add to Editor** to append the selected data sets to the end of the lists in your list editor
 - 2:Exchange Lists** to replace the lists that are currently in your list editor with the selected data sets
 - 3:No Change** to load the lists onto your calculator but not into your list editor.
4. Select **2:Load** to load the lists according to the option you selected in step 3.

```
Sel All SETUP
1:Add to Editor
2:Exchange Lists
3:No Change
```

```
Sel All Load
1:SetUpEditor
2:Load
```

A message is displayed to confirm that the lists you selected were loaded.

```
List(s) have
been loaded.

Done

PRESS ANY KEY
```

5. Press any key to return to the previous menu.

```
SAMPLE Quit
1:Chapter 1
2:Chapter 2
3:Chapter 3
4:Chapter 4
5:Chapter 5
```

6. To load more lists, repeat the steps in the Selecting Data Sets to Load section and steps 1-5 above.

Handling Duplicate List Names

What if you already have a list on your calculator that has the same name as the data set you're trying to load the application will prompt you to take action. You can

- rename the new list
- overwrite the old list
- skip the new list altogether and load the remaining ones

And, of course, you have options to overwrite every duplicate list or to quit the application.

1. Select one of the following options:

1: Rename to rename the list (current name is displayed at the bottom left of the screen)

2: Overwrite to overwrite the current list (the old list is erased)

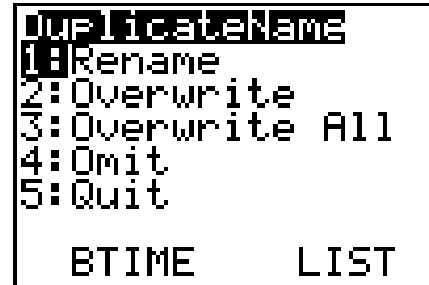
3: Overwrite All to overwrite each duplicate list encountered

4: Omit to skip the current list and continue loading the remaining ones

5: Quit to return to the Sel All Load screen.

2. To rename the list, select 1: Rename.

3. Type a new name (up to 5 characters) at the Name= prompt.



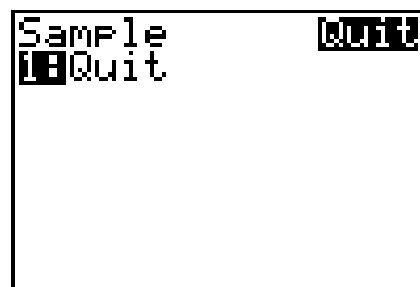
4. Press **[ENTER]**. The list is renamed and the remaining lists are loaded (unless there is another duplicate name).



Quitting the Application

1. From any menu, use **⬅** to move the cursor to Quit.
2. Select **1:Quit** to quit the application

*Note: You can also press **[2nd][QUIT]** from any screen to quit the application.*



Exiting the TI Flash Debugger

To exit without saving the current settings, click **File>Exit**.

To save the current settings so that you can continue debugging later:

1. Click **File>Close**. The TI Flash Debugger dialog box is displayed.
2. Click **Yes**. The Save As dialog box is displayed.
3. Name your file (if necessary).
4. Navigate to the location where you want to save your file (if necessary).
5. Click **Save**.
6. Click **File>Exit**.

Getting Your Application Signed by Texas Instruments

After you have thoroughly tested your application and are satisfied that it works correctly, you are ready to have it signed by Texas Instruments. Your application *must* be signed by TI in order for students and teachers to be able to download it onto their calculators successfully.

To get your application signed, e-mail the converted file (.hex) to **pubsubmit@list.ti.com**. Send the e-mail message using an e-mail account that can be recognized as belonging to a publishing company.

Include the following information in the text of your e-mail message:

- textbook name
- publisher's name
- editor's name

Your application will be returned to you via e-mail. You will receive both your .hex file and your signed .8xk file.

Customizing the End Users Guide

Texas Instruments has prepared an end users guide that you can customize and distribute with your application. (You *must* customize it before sending it to your customers because it contains text that must be updated to accurately reflect your application and its use.) The end users guide is in rich text format (.rtf), so that you can open and customize it using any word processor.

To customize the end user guide:

1. Download **enduser.rtf** and the font files (*.ttf) from TI's website.
2. Install the font files on your computer.
3. Open **enduser.rtf** with your word processor.
4. Replace all text in red with text that applies to your application.
5. Update the table of contents (it contains red text).
6. Change the red text to black.
7. Save the file.

Before you distribute it, you may want to make it a read-only or password-protected file so that it cannot be changed by anyone outside of your organization.

Error Recovery Instructions

Warnings

Conversion Program

The following warning messages could be displayed when you convert the structural text file to an application in TI-83 Plus format.

When you see this warning message . . .	The conversion program has taken this action . . .
WARNING: Delay converted to a maximum of 5 seconds.	Reduced the delay to 5 seconds
WARNING: String (text) > (number) characters.	Truncated the text to 16 characters for large font or 24 characters for small font
WARNING: List name (name) converted to uppercase	Extracted the first 5 characters of the data set text file name and converted it to uppercase so that it can be used as a list name
WARNING: List name (name) > 5 characters	Truncated the list name to the first 5 characters
WARNING: Out of Range Data	Introductory screen text is specified on a row that will not be displayed on the screen. No action is taken by the conversion program.

Application

The following warning messages could be displayed when you review your application using the TI Flash Debugger.

Warning Message	Description
Editor Full: Not all lists fit in editor	The list editor can contain a maximum of 20 lists. The application loads lists into the editor until it is full. It loads remaining lists into RAM outside of the list editor.
Please select lists first	You have selected an option in the Set Up Editor without having any lists selected. Select at least one list and try again.

Errors

Conversion Program

The following error messages could be displayed when you convert the structural text file to an application in TI-83 Plus format.

Error Message	Description	Recovery
ERROR: Can't open (file name) for reading	A file is read-protected, open, or doesn't exist.	Check the following: <ul style="list-style-type: none">• file name was spelled incorrectly• file is not already open• file is not read-protected• file name is more than 8 characters long
ERROR: Can't open (file name) for writing	A file is write-protected.	Make sure that the file is not write-protected. If it is not, you might have low memory.
ERROR: App name (name) is too long	The application name is more than 8 characters.	Change the application name on line 1 of the structural text file to a length up to 8 characters.
ERROR: Unexpected EOF in (file name) at (line number)	A file doesn't contain all of the data that is expected.	Make sure that all menus and text strings have been included in the structural text file.
ERROR: Invalid delay value was specified	A non-numeric delay value was specified.	Change the delay value to a number from 1 to 5. If the value is correct, the file could contain a line that is out of order or a comment line that isn't preceded by three asterisks (***)).
ERROR: Bad data in (line number)	A non-numeric value was found at the line number.	Change the value to a number. If the value is correct, the file could contain a line that is out of order or a comment line that isn't preceded by three asterisks (***)).
ERROR: Too many Menu Labels	Over 250 menus are in the application.	Change the menu structure so that there are less than 250 menus.
ERROR: Length of (name) is too long	The length of a title, menu, or list name exceeds the maximum allowable.	Shorten the name, making sure that you do not create a duplicate name by doing so.
ERROR: Too many lists	Over 250 lists are in the application.	Change the application structure so that there are less than 250 lists.
ERROR: No list elements in file (name)	The data text file is empty.	Add at least one element to the data text file.

Error Message	Description	Recovery
ERROR: Too many list elements in file (name)	The data text file contains more than 999 elements.	Reduce the number of data elements to less than 999.
ERROR: Syntax with (character) found on line (number) of file (name)	The data file contains one of the following types of invalid data: <ul style="list-style-type: none"> • exponent followed by a decimal point • multiple decimal points • multiple exponents • invalid character 	Correct the data in the specified file.
ERROR: Unresolved menu reference with label (name)	The template file is incomplete.	Review the structural text file to find the reference name and determine the correct action to take to correct the error.
ERROR: Unmatched quotes on input line (number)	A text string was started with quotation marks, but was not finished with them.	Place quotation marks at the end of the text string.

Application

The following error messages could be displayed when you review your application using the TI Flash Debugger.

Error Message	Description	Recovery
ERR: ARCHIVED	You have attempted to load a list that is already archived.	To skip the list and leave the archived one on the calculator, select 1:Omit. To overwrite the archived list: <ol style="list-style-type: none"> 1. Press [2nd][MEM] 2. Select 6:Unarchive 3. Type the name of the list 4. Press [ENTER]. The list is now unarchived so that it can be overwritten.

Error Message	Description	Recovery
DuplicateName	You have attempted to load a list that is already in RAM.	Select one of the following options: Rename to rename the current list OverWrite to overwrite the list that is already on the calculator OverWrite All to overwrite any lists that are already on the calculator that are duplicates Omit to skip the list and leave the one that is already on the calculator Quit to stop loading lists
ERR: BREAK	You have pressed [ON] when a list was being loaded to RAM. The list that was being loaded was not created.	If you want to load the list, run the application again.
ERR: MEMORY	There is not enough free RAM to load the list.	Remove some data from RAM and run the application again.
ERR: SYNTAX	The list being loaded contains bad data.	The list cannot be loaded. The publisher must correct the application data.

How to Contact Customer Support

Customers in the US, Canada, Mexico, Puerto Rico, and the Virgin Islands

For general questions, contact Texas Instruments Customer Support:

phone: **1-800-TI-CARES (1-800-842-2737)**

e-mail: ti-cares@ti.com

For technical questions, call the Programming Assistance Group of Customer Support:

phone: **1-972-917-8324**

Customers outside the US, Canada, Mexico, Puerto Rico, and the Virgin Islands

Contact TI by e-mail or visit the TI calculator home page on the World Wide Web.

e-mail: ti-cares@ti.com

Internet: www.ti.com/calc