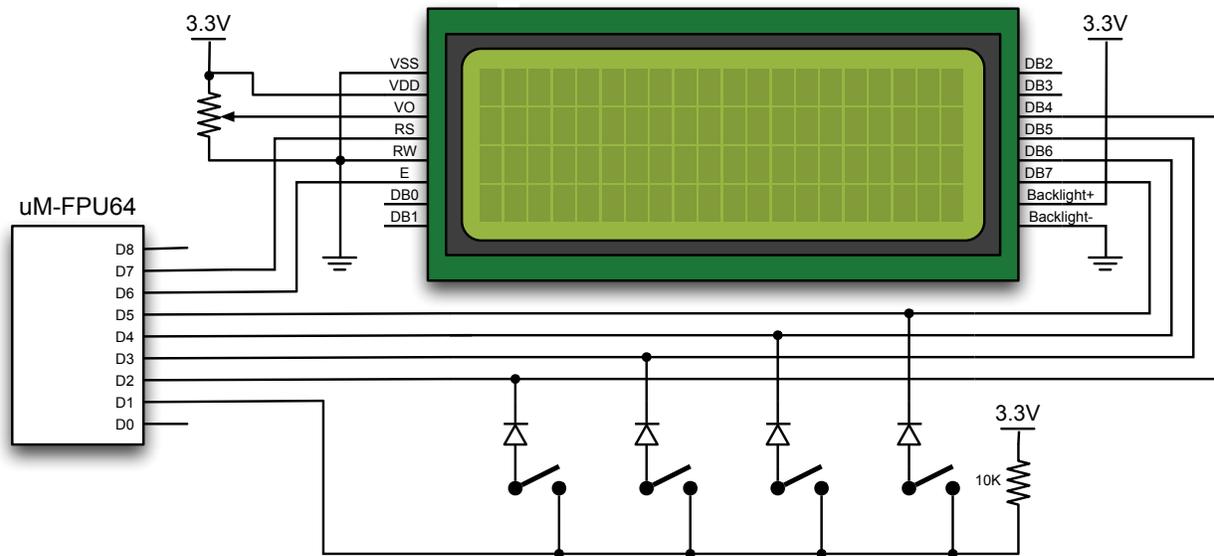# Code Example
uM-FPU64

LCD Menu Interface

Micromega *Corporation*

Introduction

This code example provides an FPU function for displaying menus on a 4x20 LCD display. It uses four switches for user input configured as a 4x1 switch matrix. The four data lines used by the LCD are also used for the four column scan lines for the switch matrix. This reduces the number of pins required for the interface. Diodes are used to isolate the lines and prevent a key press from interfering with the LCD data.
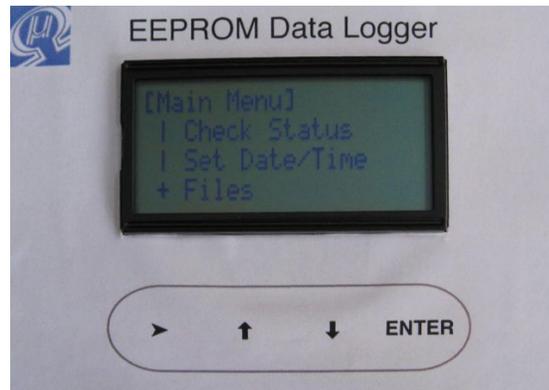
The menu items are stored in the FPU string buffer as comma separated fields. The first field is the title of the menu and is displayed on the first line of the LCD, all other fields are the menu items. Only three menu items can be displayed as a time, but the menu can be scrolled up or down with the *Up* arrow and *Down* arrow buttons. A plus sign is shown in the margin if additional menu items are available at the top or bottom of the menu. The function returns the number of the menu item selected when the *Enter* button is pressed. If the *Next* button is pressed no menu item is selected and a zero is returned.

Connecting to the FPU

The LCD used in this code example is the NewHaven Display 3.3V 4x20 Display (Digi-Key part #NHD-0420H1Z-FL-GBW-33V3-ND). The code can easily be adapted for other LCD displays.

Menu Examples

FPU Functions

Arduino test file: *test_LCD_menu.ino*
FPU functions: *LCD-menu.fp4*

```
initialize
```

Initializes the LCD display.

```
displayMenu() long
```

Displays a menu on the LCD screen, and handles user interaction to select a menu item. The menu items are stored in the FPU string buffer as comma separated fields. The title of the menu is stored in the first field and is displayed on the first line of the LCD. The remaining fields contain the menu items. Only three menu items can be displayed on the LCD, but the menu can be scrolled up or down with the *Up* and *Down* arrow buttons. A plus sign is displayed at the top and bottom of the menu if additional menu items are available above or below. When the *Enter* button is pressed, the function returns the number of the menu item selected. If the *Next* button is pressed, no menu item is selected and a zero is returned.

```
waitkey() long
```

Calls readkey and waits for the first non-zero key code that's different from the last key code, so that holding down a key will not return multiple values.

```
readkey() long
```

Scans the switch array and returns the key code. A bit is set in the return value for each switch that is currently pressed. If no keys are pressed, zero is returned.

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uM-FPU64 features shown in Code Example

- interfacing LCD display using the `DEVIO,LCD` instruction
- using the STRSET, STRSEL, and STRFIELD string instructions

Compiler Functions and Procedures	uM-FPU64 Instructions
`devio(LCD,…)`	`DEVIO,LCD`
`strset(…)`	`STRSET`
`strsel(…)`	`STRSEL, READVAR`
`strfield(…)`	`STRFIELD`

Further Information

See the Micromega website (http://www.micromegacorp.com) for additional information regarding the uM-FPU64 floating point coprocessor, including:

Code Example: *Interfacing Keypad Switches*
uM-FPU64 Datasheet
uM-FPU64 Instruction Set
uM-FPU64 IDE User Manual
uM-FPU64 IDE Compiler Manual