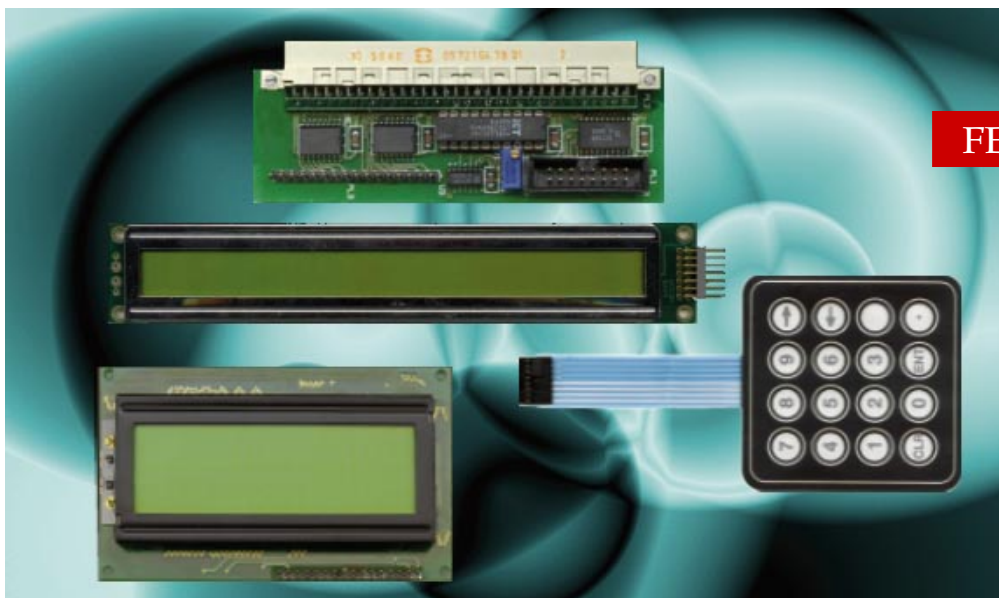




LCD & KEYPAD I/F FOR USE WITH THE FM-200, MICRO-MODULE AND MICRO-MIDGET CONTROLLERS

## LCD & Keypad INTERFACE

VFD's  
LCD's  
Graphics



### FEATURES

- Up to 64 way matrix keypad
- User defined matrices
- Alphanumeric LCD interface
- 2 or 4 line LCDs 10, 20, 40 and 80 Characters
- Graphics LCD Panels
- Vacuum Florescent Displays
- Small Size 33 x 100mm
- Plugs into Module expansion bus connector
- Minos Driver support
- Full Library support
- Operator/User Interface

The picture at the top shows the LCD & Keypad Interface board for the FM-200 Actual Size (100 x 20)  
Bottom pictures show typical LCD's & Keypads for use on the FM Series controllers

### DESCRIPTION

The K-020 is an add on board for use with the FM-200, Micro-Module or Micro-Midget controller boards. It adds a keypad and LCD interface enabling these low cost boards to be turned into a powerful operator/user interface. The unit will plug directly into the Module Bus expansion connector on all of these cards, adding only 30mm in length and making the Micro-Module into a 160 mm eurocard.

#### LCD INTERFACE

As standard the LCD interface supports a range of two and four line alphanumeric liquid crystal displays fitted with a HD44780 compatible controller device. Options are available to enable this board to be used with graphics panels fitted with a HD61830 compatible controller or vacuum fluorescent displays. Software support is provided with a Minos compatible driver enabling data to be displayed from the application program using the standard I/O routines. Please see the examples below for details. A number of compatible displays are distributed by CMS for use with this product.

#### C PROGRAM

```
/* This program will display the time and date on an LCD. The code will work with either a 2 x 40 LCD or a 4 x 40 LCD */
```

```
#include <minos.h>
#include <stdio.h>
void cls(FILE *fp)
/* Clear the screen on a given device */
{
    fprintf(fp,"%c%c", (char)0x1b, (char)0x0c);
}
void tab(FILE *fp, int x, int y)
/* Position the cursor at x,y on the given device */
{
    fprintf(fp,"%c%c%c%c", (char)0x1b, (char)0x0d,
        (char)x, (char)y);
}
```

```
}
void main(void)
{
    FILE d
    struct tm time;
    /* Set up 2 x 40 LCD & initialise */
    row(":LCD",2);
    column(":LCD",40);
    init(":LCD");
    /* Open a path to the LCD */
    lcd = fopen(":LCD","r+");
    /* Clear screen & write data */
    cls(lcd);
    tab(lcd,3,1);
    fprintf(lcd,"Cambridge Microprocessor Systems Ltd");
    fflush(lcd);
    /* Repeat this until a key is pressed on the terminal */
    while (!ready(fileno(stdin)))
    {
        /* Read time & date & display */
        gettime(&time);
        tab(lcd,2,2);
        fprintf(lcd,"%02d:%02d:%02d",time.tm_hour,
            time.tm_min,time.tm_sec);
        tab(lcd,30,2);
        fprintf(lcd,"%02d-%02d-%02d",time.tm_mday,
            time.tm_mon,time.tm_year);
        fflush(lcd);
        delay(100);
    }
    /* close path to the LCD */
    fclose(lcd);
}
```

## LCD & Keypad INTERFACE



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### MODULA-2 PROGRAM

```
(*Writes the date and time to the Lcd display.*)

MODULE Lcd;
(* Library modules to be used *)
FROM Terminal IMPORT
WriteString,WriteLn;
FROM Video IMPORT Cls, Tab, Cursor;
FROM Fio IMPORT Open, Close,
Row,Column, Init;
FROM ADIO IMPORT ReadTime, ReadDate;
FROM System IMPORT Delay;
VAR path : INTEGER;
date, time : ARRAY [0..15] OF CHAR;

BEGIN
(* set up 2 x 40 LCD & initialise *)
Row(":LCD",2);
Column(":LCD",40);
Init(":LCD");
(* Open a path to the LCD *)
path := Open(":LCD");
Terminal.pathout := path;
Video.pathout := path;
(* Clear screen and write data *)
Cls;
Tab(12,1);
Cursor(FALSE);
WriteString("C.M.S. LCD Demo");
LOOP
(* Read time & date & display *)
ReadTime(time);
ReadDate(date);
Tab(4,2);
WriteString(date);
Tab(30,2);
WriteString(time);
Delay(100)
END;
(* Close the path to the LCD *)
Close(path)
END Lcd.
```

example programs below. By defining the row and column configurations for a particular keypad all types of matrix keypad can be supported. If the keypad is not required or not all signals on the keypad connector are used, spare channels can be used as general purpose I/O channels using the standard PC library code.

### C PROGRAM

```
/* This program will read key presses from the keypad and print the character returned from the keypad.*/

#include <stdio.h>
#include <minos.h>
#include <errno.h>

void main(void)
{
int path;
unsigned char inchar;
short rows = 0xf0ff;
short cols = 0x0fff;
cls();
/* Clear the screen */
cursor(0);
/* Turn the cursor off */
row(":KBD",rows);
column(":KBD",cols);
init(":KBD");
if ((path=open(":KBD",3))!=-1)
{
printf("Unable to open a path
to:'KBD' error - %d\n",errno);
fflush(stdout);
return;
}
tab(15,3);
printf("Cambridge Microprocessor
Systems Ltd - Keypad Demo");
tab(9,5);
printf("Press any key on the keypad.
Hit any key on terminal to stop\n");
fflush(stdout);
/* This bit is repeated until a key
is typed on the terminal */
while (!ready(fileno(stdin)))
{
if (ready(path)0)
{
read(path,&inchar,1);
tab(27,10);
}
}
}
```

```
printf("Character typed was
%02x",
(int)inchar);
fflush(stdout);
}
}
printf("\n");
cursor(1);
/* Turn the cursor back on */
close(path);
}
```

### MODULA-2 PROGRAM

```
MODULE Keys;
FROM Terminal IMPORT
WriteString,WriteHex, WriteLn;
FROM InOut IMPORT ReadChar;
FROM Fio IMPORT Open;
VAR Path : INTEGER;
X: CHAR;

BEGIN
Path := Open(":KBD");
WriteString("Press keypad to display
key values");
WriteLn;
LOOP
ReadChar(Path,X);
WriteHex(INTEGER(X),5);
WriteLn
END
END Keys.
```

### KEYPAD INTERFACE

The keypad interface enables many matrix keypads to be connected to the controller. There are 16 I/O channels available allowing keypads of up to 64 keys with an 8 x 8 matrix to plug in directly. A Minos compatible driver is provided to allow the keypad to be accessed from the application program as shown in the

## SPECIFICATION

**LCD Interface** HD44870 Compatible, 2 or 4 Line, Alphanumeric or Graphics option, Vacuum Fluorescent Display option, 16 pin boxed IDC type header display connector

**Keypad Interface** 16 channels of I/O, PCF8574 Devices, User Configured Matrix, 16 way SIL Pin Strip

**Size** 33 x 100 x 10 mm (160 x 100 mm Eurocard when used with Micro-Module)

**Digital I/O** 16 channels of CMOS, TTL I/O (if keypad is not used)

## ORDER CODES

Order Code	Description	Price
K-020	Alphanumeric LCD and Keypad Interface	£45
K-021	Graphics LCD and Keypad Interface	£45
K-240	2 x 40 Alphanumeric LCD	£95
K-244	4 x 40 Alphanumeric LCD	£179
K-246	240 x 128 Graphics LCD Panel with adapter	£179
K-247	256 x 64 Graphics LCD Panel with adapter	£149
K-248	4 x 4 IP67 Matrix Keypad	£45
K-249	4 x 4 Membrane Keypad	£22



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