JLX16032C-1 使用说明书

目 录

1. 概述

晶联讯电子专注于液晶屏及液晶模块的研发、制造。所生产 JLX16032C-1 型液晶模块由于使用方便、带中文字库、显示清晰，广泛应用于各种人机交流面板。

JLX16032C-1液晶显示模块是160×32 点阵的汉字图形型液晶显示模块，可显示汉字及图形，内置8192 个中文汉字（16X16 点阵）、128 个字符（8X16 点阵）及64X256点阵显示RAM（GDRAM）。可与CPU 直接接口，提供两种界面来连接微处理机：8-位并行及串行两种连接方式。具有多种功能：光标显示、画面移位、睡眠模式等。

2. JLX16032C-1 图像型点阵液晶模块的特性

1.1 结构牢：带 PCB、背光、铁框
1.2 IC 采用矽创公司 ST7920,功能强大，稳定性好
1.3 功耗低:10 - 100mW（不带背光 10mW,带背光不大于 100mW）；
1.4 显示内容:
- ●160*32 点阵单色图片;
- ●内置8192 个中文汉字（16X16 点阵）、128 个字符（8X16 点阵）及64X256点阵显示RAM（GDRAM）.

1.5 指令功能强:可组合成各种输入、显示、移位方式以满足不同的要求;
1.6 接口简单方便:采用 3 线 SPI 串行接口，可只需 3 位 MPU 的端口。也可选用 8 位并行接口。
1.7 工作温度宽:-20℃ - 70℃;
1.8 可靠性高:寿命为 50,000 小时(25℃)。

3. 外形尺寸及接口引脚功能

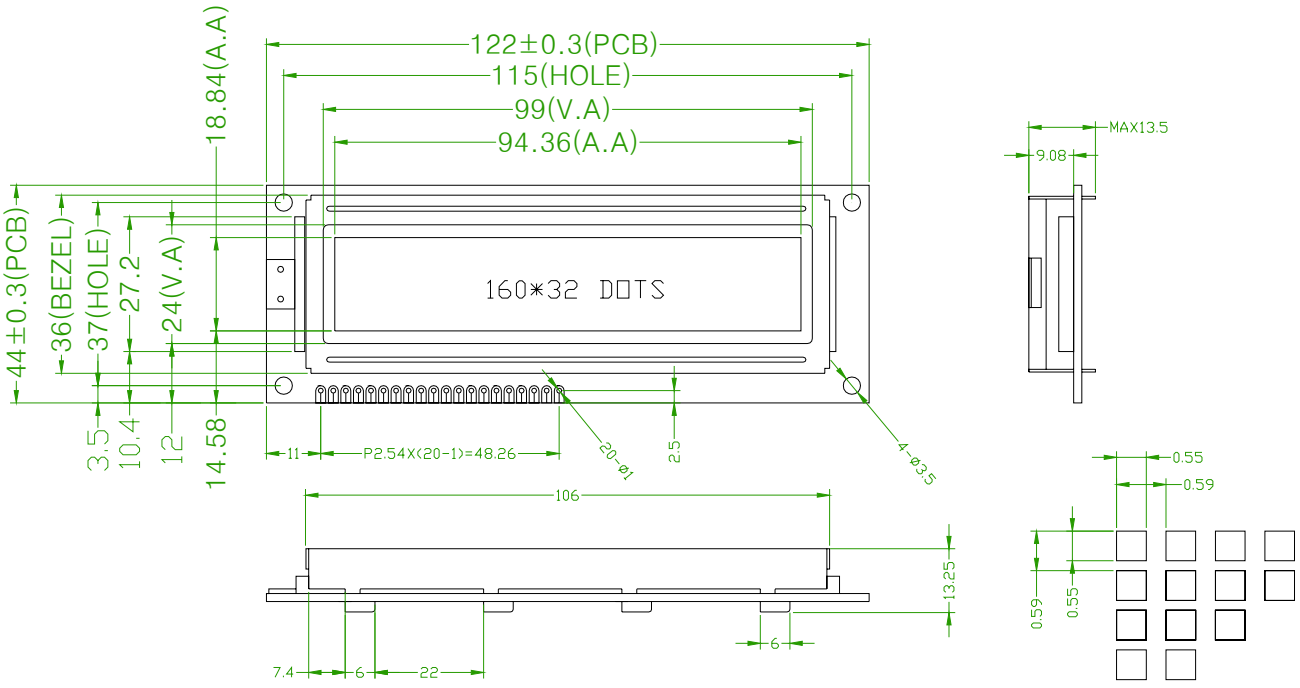


图 1. 外形尺寸

模块的接口引脚功能

引脚	符 号	名 称	功 能
1	VSS	接地	0V
2	VDD	电路电源	5V,或 3.3V 可选
3	V0	LCD V0 电压输入	可以通过此脚对 LCD 驱动电压进行调整
4	RS(CS*)	寄存器选择信号(串行时为片选：CS)	1. 并行接口时：1:数据寄存器 0:指令寄存器 2. 串行接口时：片选信号，低电平有效
5	R/W(SID*)	读写选择(串行时为串行数据:SID)	1.并行接口时：0: 写 1:读 2.串行时为串行数据输入：SID
6	E(SCLK*)	读写使能信号(串行时为串行时钟：SCLK)	1. 并行接口时：读写使能信号 2. 串行时为串行时钟：SCLK
7~14	D0~D7	数据 DB0~DB7	并行接口时：数据总线 DB0~DB7 串行接口时：无效，空脚 4 位并行接口时，DB4~DB7 作为数据总线，DB0~DB3 不起作用
15	PSB	并行/串行选择	1：选择并行，0：选择串行，也可在 PCB 上与 VDD(1)或 VSS(0)连接达到选择并/串接口。
16	NC	空脚	
17	RES	复位	低电平复位，复位完成后，回到高电平，液晶模块开始工作
18	VEE	升压输出	一般不接
19	BLA	LED 背光正极	LED 背光正极,5V
20	BLK	LED 背光负极	LED 背光负极,0V

表 1：模块的接口引脚功能

4.基本原理

4.1 液晶屏（LCD）

在 LCD 上排列着 160×32 点阵.

4.2 工作电图：

图 1 是 JLX16032C-1 图像点阵型模块的电路框图,它由驱动 IC ST7920\ST7921 及几个电阻电容组成。

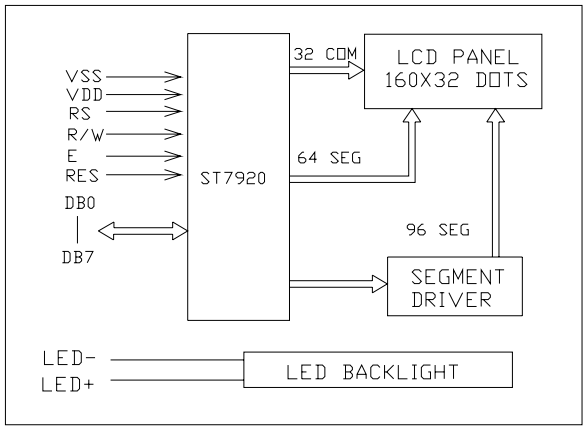


图 2:JLX16032C-1 图像点阵型液晶模块的电路框图

4.3 背光参数

该型号液晶模块带 LED 背光源。它的性能参数如下:

工作温度:-20∽+70° C;

存储温度:-30∽+80° C;

背光板可显示绿色,黄绿色,兰色和白色。背光一般为绿色，也可为客户设计为其他颜色，但价格较绿色贵一点。

正常工作电流为：10∽20mA（若 LED 灯数不止一颗，则乘以相应数量);

工作电压：5.0V;

正常工作条件下，LED 可连续点亮 5 万小时;

5. 技术参数

5.1 最大极限参数（超过极限参数则会损坏液晶模块）

名称	符号	标准值			单位
		最小	典型	最大	
电路电源	VDD - VSS	-0.3		7.0	V
LCD 驱动电压	VDD - V0	VDD - 13.5		VDD + 0.3	V
静电电压		-	-	100	V
工作温度		-20		+70	℃
储存温度		-30		+80	℃

表 2：最大极限参数

5.2 直流（DC）参数

名 称	符 号	测 试 条 件	标 准 值			单位
			MIN	TYPE	MAX	
工作电压	VDD	5.0V 供电	4.0	5.0	5.2	V
输入高电平	VIH	-	2.2		VDD	V
输入低电平	VIO	-	-0.3		0.6	V
输出高电平	VOH	IOH = 0.2mA	2.4		-	V
输出低电平	VOO	IOO = 1.2mA	-		0.4	V
工作电流	IDD	VDD = 5.0V		2.0		mA

表 3：直流（DC）参数

6. 读写时序特性

6.1 并行接口时：

从 CPU 写到 LCD 驱动 IC:ST7920（Writing Data from CPU to ST7920）

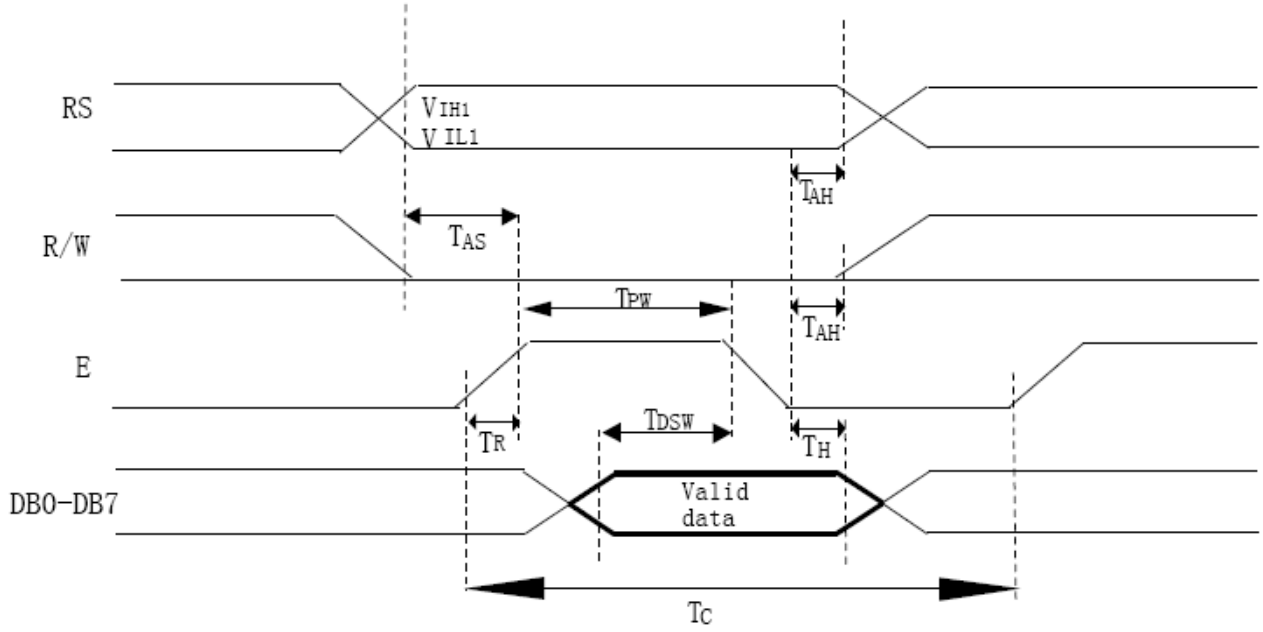
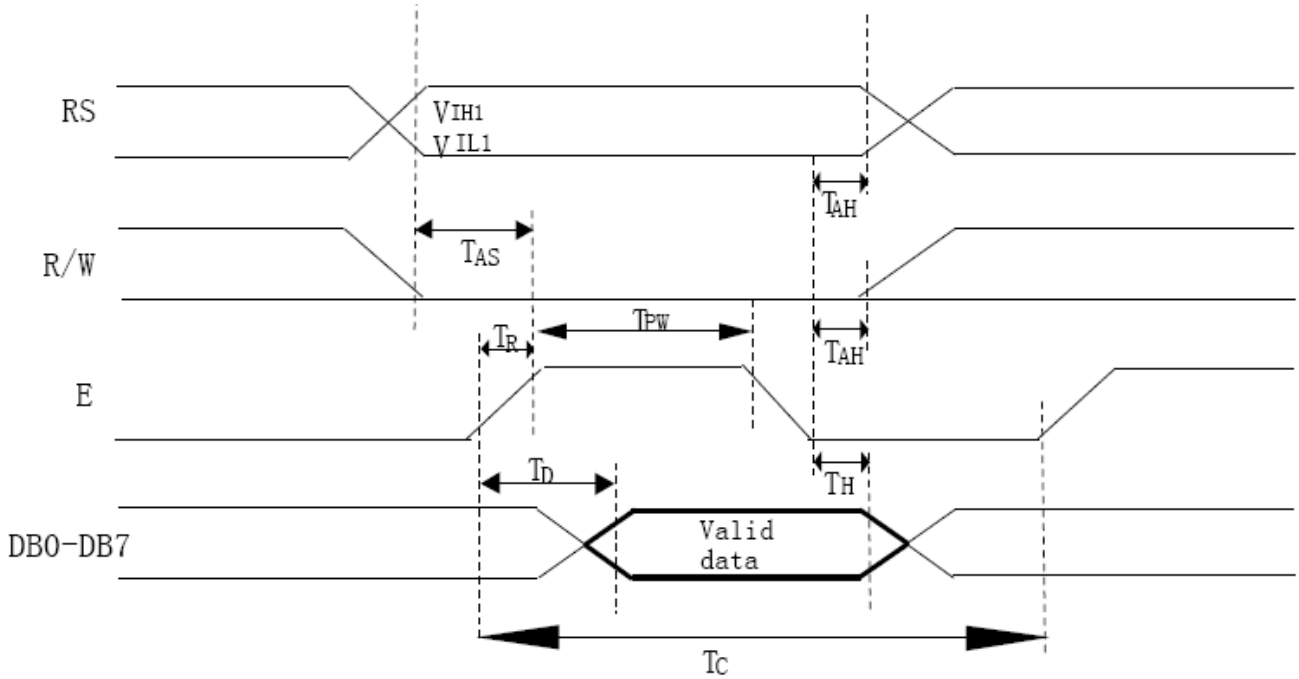


图 3. 从 CPU 写到 IC:ST7920（Writing Data from CPU to ST7920）

从 LCD 驱动 IC:ST7920 读到 CPU



7．指令功能：

7.1 指令表

指令表 **1: (RE=0:** 基本指令集**)**

指令	指令碼										說明	執行時間 (540KHZ)
	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
清除顯示	0	0	0	0	0	0	0	0	0	1	將 DDRAM 填滿 "20H"，並且設定 DDRAM 的位址計數器（AC）到"00H"	4.6 ms
位址歸位	0	0	0	0	0	0	0	0	1	X	設定 DDRAM 的位址計數器（AC）到"00H"，並且將游標移到開頭原點位置；這個指令並不改變 DDRAM 的內容	72us
進入點設定	0	0	0	0	0	0	0	1	I/D	S	指定在資料的讀取與寫入時，設定游標的移動方向及指定顯示的移位	72us
顯示狀態開/關	0	0	0	0	0	0	1	D	C	B	D=1: 整體顯示 ON C=1: 游標 ON B=1: 游標位置反白 ON	72 us
游標或顯示移位控制	0	0	0	0	0	1	S/C	R/L	X	X	設定游標的移動與顯示的移位控制位元；這個指令並不改變 DDRAM 的內容	72 us
功能設定	0	0	0	0	1	DL	X	0 RE	X	X	DL=1 8-BIT 控制介面 DL=0 4-BIT 控制介面 **RE=1: 擴充指令集動作** **RE=0: 基本指令集動作**	72 us
設定 CGRAM 位址	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	設定 CGRAM 位址到位址計數器（AC） **需確認擴充指令中 SR=0 (捲動位址或 RAM 位址選擇)**	72 us
設定 DDRAM 位址	0	0	1	0 AC6	AC5	AC4	AC3	AC2	AC1	AC0	設定 DDRAM 位址到位址計數器（AC） AC6 固定爲 0	72 us
讀取忙碌旗標（BF）和位址	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	讀取忙碌旗標（BF）可以確認內部動作是否完成，同時可以讀出位址計數器（AC）的值	0 us
寫資料到 RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	寫入資料到內部的 RAM (DDRAM/CGRAM/IRAM/GDRAM)	72 us
讀出 RAM 的值	1	1	D7	D6	D5	D4	D3	D2	D1	D0	從內部 RAM 讀取資料 (DDRAM/CGRAM/IRAM/GDRAM)	72 us

指令表 2: (RE=1: 擴充指令集)

指令	指令碼										說明	執行時間 (540KHZ)
	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
待命模式	0	0	0	0	0	0	0	0	0	1	進入待命模式，，執行任何其他指令都可終止待命模式	72 us
捲動位址或 RAM 位址選擇	0	0	0	0	0	0	0	0	1	SR	SR=1: 允許輸入垂直捲動位址 SR=0: 允許輸入 IRAM 位址(擴充指令) SR=0: 允許設定 CGRAM 位址(基本指令)	72 us
反白選擇	0	0	0	0	0	0	0	1	R1	R0	選擇 4 行中的任一行作反白顯示，並可決定反白與否 R1,R0 初值爲 00 當第一次設定時爲反白顯示在一次設定時爲正常顯示	72 us
睡眠模式	0	0	0	0	0	0	1	SL	X	X	SL=1: 脫離睡眠模式 SL=0: 進入睡眠模式	72 us
擴充功能設定	0	0	0	0	1	DL	X	1 RE	G	0	DL=1 8-BIT 控制介面 DL=0 4-BIT 控制介面 RE=1: 擴充指令集動作 RE=0: 基本指令集動作 G=1 :繪圖顯示 ON G=0 :繪圖顯示 OFF	72 us
設定 IRAM 位址或捲動位址	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	SR=1: AC5~AC0 爲垂直捲動位址 SR=0: AC3~AC0 爲 ICON RAM 位址	72 us
設定繪圖 RAM 位址	0	0	1	0 AC6	0 AC5	0 AC4	AC3 AC3	AC2 AC2	AC1 AC1	AC0 AC0	設定 GDRAM 位址到位址計數器（AC） 先設垂直位址再設水平位址(連續寫入兩個位元組的資料來完成垂直與水平的座標位址) 垂直位址範圍 AC6...AC0 水平位址範圍 AC3…AC0	72 us

请详细参考 IC 资料”ST7920C17.PDF”的第 13～14 页。

备注;当IC1在接受指令前,微处理器必须先确认其内部处于非忙碌状态,即读取BF标志时,BF 需为零,方可接受新的指令;如果在送出一个指令前并不检查BF 标志,那么在前一个指令和这个指令中间必须延长一段较长的时间,即是等待前一个指令确实执行完成。

7. 4 初始化方法

用户所编的显示程序, 开始必须进行初始化, 否则模块无法正常显示, 过程请参考程序

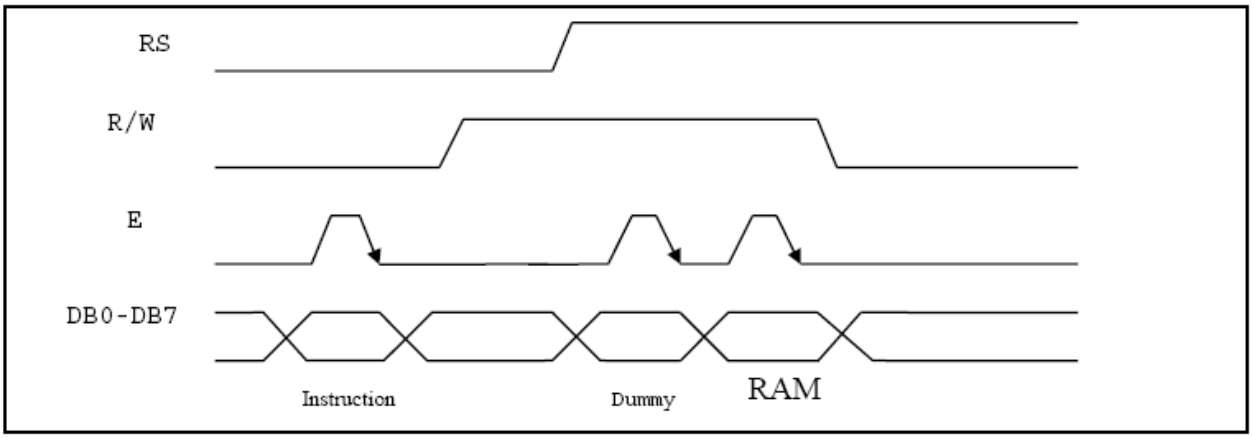
並列介面資料傳輸訊號

當PSB腳接高電位時，ST7920將進入並列模式，在並列模式下可由指令 **DL FLAG** 來選擇8-位元或4-位元介面，主控制系統將配合(RS , RW , E , DB0..DB7)來達成傳輸動作。

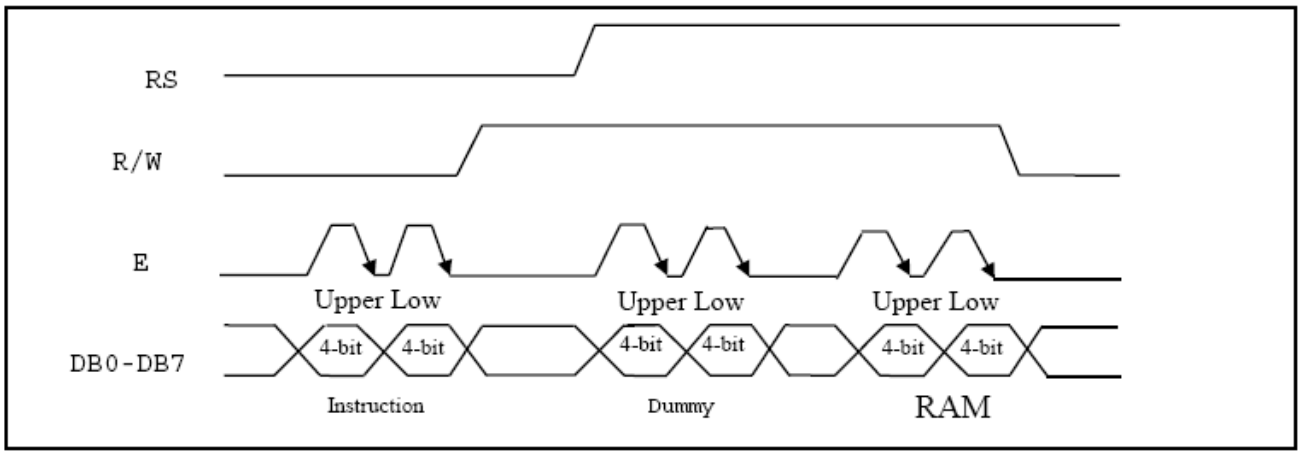
從一個完整的流程來看，當下設定位址指令後(CGRAM,DDRAM,IRAM.....)若要讀取資料時需先 DUMMY READ 一次才會讀取到正確資料第二次讀取時則不需 DUMMY READ 除非又下設定位址指令才需再次 DUMMY READ。

在4-位元傳輸模式中，每一個八位元的指令或資料都將被分爲兩個位元組動作：較高4位元（DB7~DB4）的資料將會被放在第一個位元組的（DB7~DB4）部分，而較低4位元（DB3~DB0）的資料則會被放在第二個位元組的（DB7~DB4）部分，至於相關的另四位元則在4-位元傳輸模式中DB3~DB0介面未使用。

相關介面傳輸訊號請參考下圖說明：|



Timing Diagram of 8-bit Parallel Bus Mode Data Transfer



Timing Diagram of 4-bit Parallel Bus Mode Data Transfer

在接收到同步位元及RW和RS資料的啓始位元組後，每一個八位元的指令將被分爲兩個位元組接收到：較高4位元（DB7~DB4）的指令資料將會被放在第一個位元組的LSB部分，而較低4位元（DB3~DB0）的指令資料則會被放在第二個位元組的LSB部分，至於相關的另四位元則都爲0。

串列傳輸訊號請參考下圖說明：

串列介面與串列傳輸資料

當PSB腳接低電位時，ST7920將進入串列模式，在串列模式下將使用兩條資料傳輸線作串列資料的傳送，主控制系統將配合傳輸同步時脈線（SCLK）與接收串列資料線（SID），來達成串列傳輸的動作。

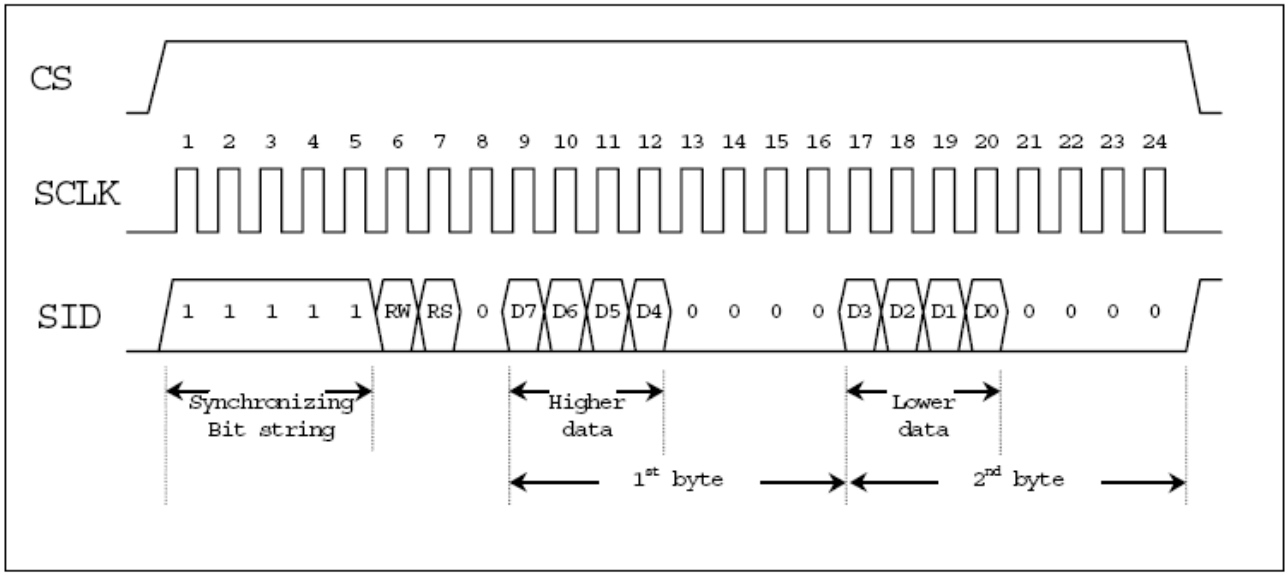
當需要同時連接數顆ST7920晶片時，晶片選擇腳（CS）將要被配合使用，在晶片選擇腳（CS）設爲高電位時，同步時脈線（SCLK）輸入的訊號才會被接收，另一方面，當晶片選擇腳（CS）設爲低電位時，ST7920的內部串列傳輸計數與串列資料將會被重置，也就是說在此狀態下，傳輸中的資料將被終止清除，並且將待傳輸的串列資料計數重設回第一位元；在一個最小的系統架構下，由一個微處理器連接控制單一個ST7920晶片時，相關的連接介面只需要使用同步時脈線（SCLK）與接收串列資料線（SID）兩隻腳，在這個模式下晶片選擇腳（CS）將被固定接到高電位。

ST7920的同步時脈線（SCLK）具有獨立的操作時脈，但是當有連續多個指令需要被傳送時，指令執行的時間將需要被考慮，必須確實等到前一個指令完全執行完成才能傳送下一筆資料，因爲ST7920內部並沒有傳送/接收緩衝區。

從一個完整的串列傳輸流程來看，一開始先傳輸啓始位元組，它需先接收到五個連續的〝1〞（同步位元字串）在啓始位元組，此時傳輸計數將被重置並且串列傳輸將被同步，再跟隨的兩個位元字串分別指定傳輸方向位元（RW）及暫存器選擇位元（RS），最後第八的位元則爲〝0〞。

在接收到同步位元及RW和RS資料的啓始位元組後，每一個八位元的指令將被分爲兩個位元組接收到：較高4位元（DB7~DB4）的指令資料將會被放在第一個位元組的LSB部分，而較低4位元（DB3~DB0）的指令資料則會被放在第二個位元組的LSB部分，至於相關的另四位元則都爲0。

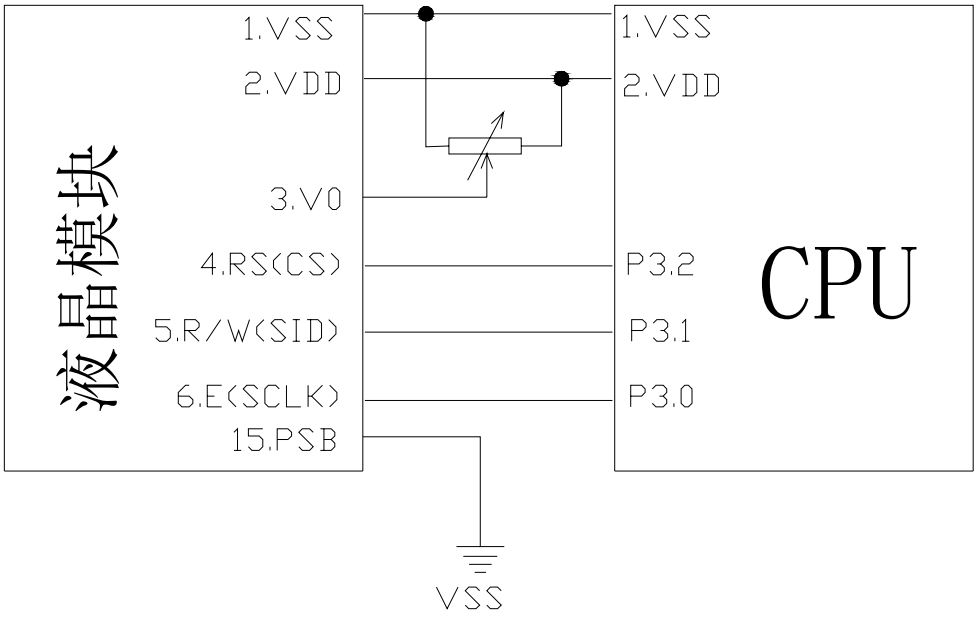
串列傳輸訊號請參考下圖說明：



Timing Diagram of Serial Mode Data Transfer

7.5 程序举例:

7.5.1 液晶模块与 MPU 串行接口图如下(以 8051 系列单片机为例):



特别注意:

1.液晶模块的 PCB 上的第 4 脚印的白字是“RS”,在串口时这个脚变成了实际上是“CS”(片选)。

2. 液晶模块的 PCB 上的第 5 脚印的白字是“RW”,在串口时这个脚变成了实际上是“SID”(串行数据输入)。

3. 液晶模块的 PCB 上的第 6 脚印的白字是“E”,在串口时这个脚变成了实际上是“SCLK”(串行时钟输入)。

串行程序案例（C 语言）:

```
/* Test program for JLX16032C-1,串行
   Driver IC is:ST7920
   Programmed by Ken,2011 年 10 月 21 号
   JLX electronic Co.,ltd,    http://www.jlxlcd.cn;

*/
#include <reg51.H>

sbit cs=P3^2;
sbit sid=P3^1;
```

```
sbit sclk=P3^0;
sbit psb=P3^4;
sbit reset=P3^3;


char code yun[]=
{
/*--  文字:  运  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=31x31   --*/
/*--  宽度不是 8 的倍数，现调整为：宽度 x 高度=32x32  --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x0C,0x00,0x00,0x00,0x0E,0x00,0x01,0x80,
0x07,0x0F,0xFF,0xC0,0x03,0x8F,0xFF,0xC0,0x03,0x80,0x00,0x00,0x03,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x20,0x00,0x00,0x00,0x70,0x03,0x3F,0xFF,0xF8,
0x7F,0x80,0x70,0x00,0x33,0x80,0xF0,0x00,0x03,0x00,0xE0,0x00,0x03,0x01,0xC0,0x00,
0x03,0x01,0x86,0x00,0x03,0x03,0x07,0x00,0x03,0x07,0x03,0x80,0x03,0x0E,0x01,0xC0,
0x03,0x1F,0xFF,0xE0,0x03,0x1F,0xFC,0xE0,0x03,0x0E,0x00,0xE0,0x0F,0x80,0x00,0x40,
0x3D,0xC0,0x00,0x00,0x78,0xF0,0x00,0x00,0x70,0x7F,0xC1,0xFC,0x20,0x1F,0xFF,0xF8,
0x00,0x03,0xFF,0xF0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00
};

char code xing[]={
/*--  文字:  行  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=31x31   --*/
/*--  宽度不是 8 的倍数，现调整为：宽度 x 高度=32x32  --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xC0,0x00,0x00,0x00,0xE0,0x00,0xE0,
0x01,0xE3,0xFF,0xF0,0x03,0x83,0x00,0x00,0x03,0x00,0x00,0x00,0x06,0x00,0x00,0x00,
0x0C,0x60,0x00,0x00,0x38,0x70,0x00,0x00,0x20,0xE0,0x00,0x30,0x00,0xEF,0xFF,0xF8,
0x01,0xCF,0xFF,0xFC,0x03,0x80,0x0E,0x00,0x03,0xC0,0x0E,0x00,0x07,0xC0,0x0E,0x00,
0x0F,0x80,0x0E,0x00,0x1D,0x80,0x0E,0x00,0x31,0x80,0x0E,0x00,0x61,0x80,0x0E,0x00,
0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,
0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x81,0xFE,0x00,
0x01,0x80,0x7C,0x00,0x01,0x00,0x3C,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};

char code char_R[]={
/*--  文字:  R  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x32  --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x7F,0xF0,0x3C,0x78,
0x18,0x1C,0x18,0x1C,0x18,0x0C,0x18,0x0C,0x18,0x1C,0x18,0x1C,0x18,0x78,0x1F,0xF0,
0x19,0xC0,0x19,0xE0,0x18,0xE0,0x18,0xE0,0x18,0x70,0x18,0x70,0x18,0x78,0x18,0x38,
0x18,0x38,0x3C,0x3C,0x7E,0x1E,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00
};

char code char_U[]={

/*--  文字:  U  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x32   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFC,0x3E,0x78,0x1C,
0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,
0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x38,0x18,
0x38,0x18,0x1E,0x70,0x0F,0xE0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};


char code char_N[]={


/*--  文字:  N  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x31   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xF8,0x3E,0x78,0x1C,
0x3C,0x08,0x3C,0x08,0x2E,0x08,0x2E,0x08,0x2F,0x08,0x27,0x08,0x27,0x88,0x23,0x88,
0x23,0xC8,0x21,0xC8,0x21,0xE8,0x20,0xE8,0x20,0xF8,0x20,0x78,0x20,0x78,0x20,0x38,
```

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0x20,0x38,0x70,0x18,0xF8,0x18,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};


char code char_I[]={
/*--  文字:  I  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x31    --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x1F,0xF8,0x03,0xC0,
0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,
0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,
0x01,0x80,0x03,0xC0,0x1F,0xF8,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};

char code char_G[]={
/*--  文字:  G  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x31    --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x07,0xF8,0x0E,0x78,
0x1C,0x38,0x38,0x18,0x30,0x18,0x70,0x08,0x70,0x00,0x70,0x00,0x60,0x00,0x60,0x00,
0x60,0x00,0x60,0x00,0x60,0x7E,0x70,0x3C,0x70,0x18,0x70,0x18,0x30,0x18,0x38,0x18,
0x18,0x38,0x1E,0x78,0x07,0xF0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};


char code char_JLX[]={
/*--  调入了一幅图像：E:\work\图片收藏夹\16032.bmp  --*/
/*--  宽度 x 高度=160x32  --*/
0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,
0xFF,0xFF,0xFF,0xFF,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,
0x90,0x00,0x48,0x20,0x40,0x0F,0xE0,0x08,0x88,0x08,0x04,0x00,0x02,0x01,0x00,0xEF,
0xC0,0x90,0x00,0x11,0x8B,0xFC,0x49,0x20,0x22,0x08,0x23,0xF5,0x05,0xFC,0x04,0x03,
0xFF,0x01,0x08,0xA8,0x40,0x90,0x3F,0xF9,0x82,0x04,0x49,0x2F,0xFF,0x0F,0xE1,0x22,
0x00,0x08,0x7F,0xC0,0x04,0x3F,0xFC,0xA8,0x41,0x08,0x00,0x11,0xA0,0x90,0x49,0x20,
0x20,0x08,0x21,0x2F,0x80,0x48,0x44,0x40,0x18,0x02,0x00,0xAF,0xC1,0x08,0x7F,0xD1,
0x91,0x49,0xF9,0x23,0xFC,0x0F,0xE1,0xE2,0x1C,0x48,0x44,0x40,0x10,0x07,0xF0,0xC8,
0x42,0x04,0x00,0x11,0x80,0x40,0x49,0x22,0x24,0x00,0x01,0x22,0x05,0xF8,0x7F,0xC7,
0xFF,0x8C,0x10,0xAF,0xC4,0x42,0x1F,0x11,0x8B,0xFC,0x49,0x22,0x24,0x3E,0xF9,0xFF,
0xC4,0x48,0x44,0x40,0x10,0x17,0xF0,0xAA,0x48,0x41,0x11,0x11,0x90,0x40,0x49,0x22,
0x24,0x22,0x89,0x22,0x04,0x48,0x44,0x40,0x10,0x24,0x10,0xAA,0x80,0x80,0x11,0x11,
0xB0,0xE0,0x79,0x22,0x24,0x3E,0xF9,0x75,0x05,0x48,0x7F,0xC0,0x10,0x07,0xF0,0xE9,
0x00,0x90,0x1F,0x11,0x91,0x51,0xC9,0x22,0x24,0x22,0x8B,0xA5,0x06,0x4A,0x04,0x10,
0x10,0x04,0x10,0x88,0x81,0x08,0x11,0x11,0x96,0x4C,0x90,0x22,0x2C,0x3E,0xF8,0x28,
0x84,0x46,0x04,0x10,0x10,0x04,0x10,0x8A,0x43,0xFC,0x00,0x51,0x90,0x40,0x20,0x20,
0x20,0x22,0x88,0x30,0x40,0x42,0x03,0xF0,0x30,0x04,0x30,0x8C,0x21,0x04,0x00,0x21,
0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x04,0x00,0x08,0x10,0x40,0x3F,
0x80,0x04,0x00,0x20,0x89,0x04,0x20,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x04,0x03,
0xC8,0x0B,0xFC,0x20,0x83,0xFE,0x1F,0xF0,0xBF,0xC4,0x20,0x01,0x80,0x40,0xE3,0x80,
0x0E,0x1C,0x07,0xE2,0x7F,0x80,0x00,0x3F,0x82,0x04,0x00,0x00,0x89,0x04,0x20,0x01,
0x80,0xC1,0x24,0x40,0x11,0x22,0x04,0x02,0x90,0x21,0x20,0x20,0x83,0xFC,0x00,0x13,
0xDF,0x84,0xFC,0x01,0x80,0x42,0x04,0x42,0x01,0x22,0x3F,0xC3,0x14,0x11,0x78,0x3F,
0x82,0x04,0x3F,0xF8,0x90,0x9F,0x24,0x01,0x80,0x42,0xC4,0x4A,0x86,0x02,0x20,0x42,
0xBF,0x02,0x48,0x00,0x03,0xFC,0x01,0x01,0xDF,0x84,0x24,0x01,0x80,0x43,0x24,0x47,
0x01,0x04,0x20,0x42,0x44,0x0A,0xA8,0xFB,0xE0,0x90,0x09,0x42,0xB0,0x85,0xFE,0x01,
0x80,0x42,0x24,0x47,0x01,0x08,0x3F,0xC2,0x44,0x16,0x50,0x8A,0x24,0x92,0x09,0x22,
0x9F,0x84,0x20,0x01,0x80,0x42,0x24,0x4A,0x81,0x10,0x00,0x03,0xBF,0xB2,0x20,0xFB,
0xE2,0x94,0x11,0x10,0x84,0x07,0x50,0x01,0x80,0x42,0x24,0x42,0x11,0x20,0x52,0x42,
0x04,0x12,0x50,0x8A,0x21,0x98,0x21,0x08,0xBF,0xD8,0x88,0x01,0x80,0xE1,0xC3,0x80,
0x0E,0x3E,0x49,0x22,0x04,0x12,0x88,0xFB,0xE0,0x92,0x41,0x08,0x89,0x01,0x04,0x01,
0x80,0x00,0x00,0x00,0x00,0x00,0x89,0x22,0x04,0x13,0x04,0x8A,0x2F,0xFF,0x03,0x00,
0xF0,0xC2,0x02,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
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0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0xFF,0xFF,0xFF,0xFF,
0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF


};

char code char_JLX1[]={
/*--  调入了一幅图像：E:\work\图片收藏夹\16032雪花1.bmp  --*/
/*--  宽度x高度=160x32  --*/
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55

};

char code char_JLX2[]={
/*--  调入了一幅图像：E:\work\图片收藏夹\16032雪花2.bmp  --*/
/*--  宽度x高度=160x32  --*/
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
```

```
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA
};


//=============delay_short time====================
void delay(int i)
{
 int j,k;
 for(j=0;j<i;j++)
 for(k=0;k<110;k++);
}

void delay_short(int i)
{
 int j,k;
 for(j=0;j<i;j++)
 for(k=0;k<1;k++);
}



//============transfer command to LCM==============
void transfer_command(int data1)
{
    int i;
```

```
    cs=1;
    for(i=0;i<5;i++)
    {
        sid=1;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
    }
    sid=0;        //r_w=0
    sclk=0;delay_short(1);
    sclk=1;delay_short(1);
    sid=0;        //rs=0
    sclk=0;delay_short(1);
    sclk=1;delay_short(1);
    sid=0;
    sclk=0;delay_short(1);
    sclk=1;delay_short(1);
    for(i=0;i<4;i++)
    {

        if(data1&0x80) sid=1;
        else sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
        data1=data1<<=1;
     }

    for(i=0;i<4;i++)
    {
        sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
    }
    for(i=0;i<4;i++)
    {

        if(data1&0x80) sid=1;
        else sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
        data1=data1<<=1;
     }

    for(i=0;i<4;i++)
    {
        sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
    }
    cs=0;
}

//-----------transfer data to LCM---------------
void transfer_data(int data1)
{
    int i;
    //check_busy1();
    cs=1;
    for(i=0;i<5;i++)            /*SID=1,5 个脉冲，同步信号串*/
    {
        sid=1;
```

```
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
    }
    sid=0;                          /*这一位为 R/W 设置，R/W=0 表示写*/
    sclk=0;delay_short(1);
    sclk=1;delay_short(1);
    sid=1;                          /*这一位为 RS 设置，RS=1 表示数据寄存器*/
    sclk=0;delay_short(1);
    sclk=1;delay_short(1);
    sid=0;
    sclk=0;delay_short(1);
    sclk=1;delay_short(1);
    for(i=0;i<4;i++)            /*传数据的高 4 位*/
    {

        if(data1&0x80) sid=1;
        else sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
        data1=data1<<=1;
     }

    for(i=0;i<4;i++)            /*SID=0,过 4 个脉冲*/
    {
        sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
    }
    for(i=0;i<4;i++)            /*传数据的低 4 位*/
    {

        if(data1&0x80) sid=1;
        else sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
        data1=data1<<=1;
     }

    for(i=0;i<4;i++)            /*SID=0,过 4 个脉冲*/
    {
        sid=0;
        sclk=0;delay_short(1);
        sclk=1;delay_short(1);
    }

    delay_short(1);
    cs=0;
    delay_short(1);
}



void clear_screen()
{
    int i,j;
    transfer_command(0x36);/*选用扩展指令集*/
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+j);   /*垂直地址*/
```

```
        transfer_command(0x80);  /*水平地址*/


        for(i=0;i<32;i++)
        {
            transfer_data(0x00);

        }
    }
}



void display_3232(int y,int x,char code *p)
{
    int i,j;
    transfer_command(0x36);    /*选用扩展指令集*/
    delay_short(10);
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+(y-1)+j);  /*垂直地址*/

        transfer_command(0x80+(x-1));    /*水平地址*/

        for(i=0;i<4;i++)
        {
            transfer_data(*p);
            p++;
        }
    }
}


void display_1632(int y,int x,char code *p)
{
    int i,j;
    transfer_command(0x36);
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+y+j);

        transfer_command(0x80+x);

        for(i=0;i<2;i++)
        {
            transfer_data(*p);
            p++;
        }
    }
}

void display_16032(int y,int x,char code *p)
{
    int i,j;
    transfer_command(0x36);/*选用扩展指令集*/
    delay_short(10);
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+(y-1)+j);  /*垂直地址*/
        transfer_command(0x80+(x-1));    /*水平地址*/
```

```
        for(i=0;i<20;i++)                 //20
        {
             transfer_data(*p);
             p++;
        }
    }


}


//--------------wait a switch,jump out if P2.0 get a signal"0"------------------
void Switch()
{
 repeat:
    if (P2&0x01) goto repeat;
    else ;
    if (P2&0x01) goto repeat;
    else
    delay(20);
}


//============initial
void initial()
{
    delay(1000);
    transfer_command(0x30);
    delay(500);
    transfer_command(0x01);
    delay(500);
    transfer_command(0x06);
    delay(500);
    transfer_command(0x0c);
    delay(200);

}

void clear_DDRAM()
{
    transfer_command(0x30);
    delay_short(10);
    transfer_command(0x01);
    delay_short(10);
}


/*调用中文字库里的汉字*/
void display_char(int y,int x,int char_length,char *dp)
{
   int i;
    transfer_command(0x30);/*选用基本指令集*/
    delay_short(10);
    delay_short(10);
    transfer_command(0x80+(y-1)*(0x10)+(x-1));
   for(i=0;i<char_length;i++)
   {
        transfer_data(*dp);
        dp++;
        transfer_data(*dp);/*  以上两行数据合起来显示一个汉字*/
```

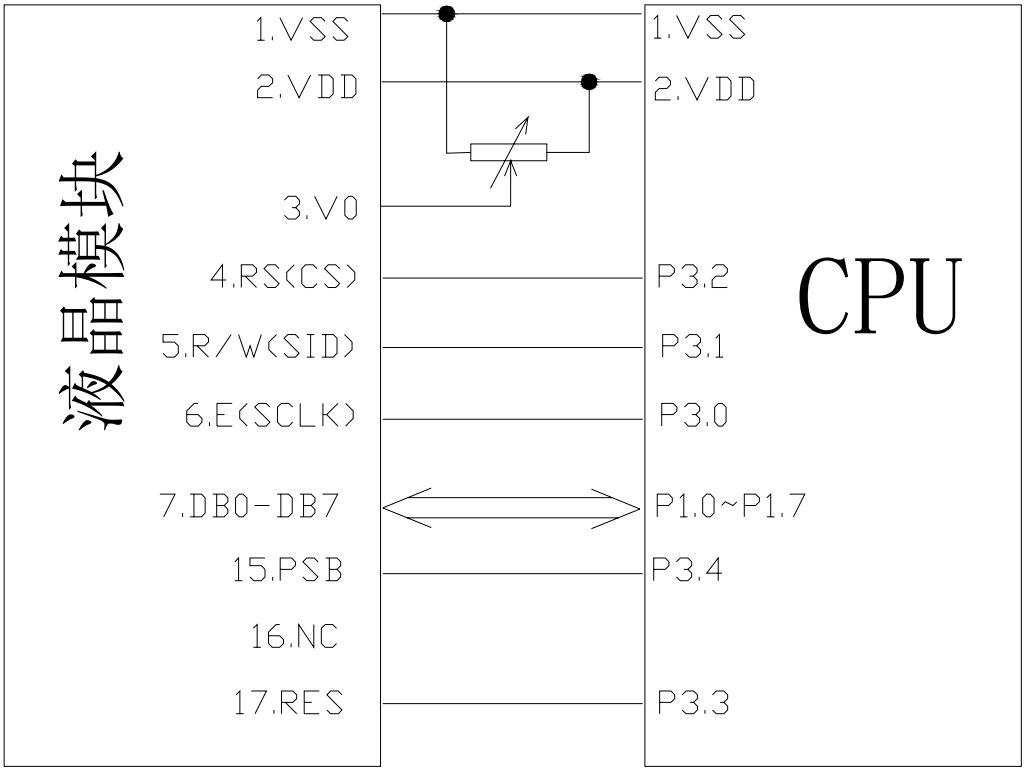
```
            dp++;
        }
    }


    /*主程序*/
    void main(void)
     {
        delay(1000);
        psb=0;                  //选择串口
        initial();              //初始化
        while(1)
        {
            clear_DDRAM();
            display_16032(1,1,char_JLX);      //显示 160x32 点阵的图
            Switch();                         //等待按键 P2.0 口
            display_16032(1,1,char_JLX1);
            Switch();
            display_16032(1,1,char_JLX2);
            Switch();
            clear_screen();         //图形模式的清屏
            clear_DDRAM();              //文本模式的清屏

            display_char(1,1,10,"深圳市晶联讯电子公司");  //（在第 1 行，第 1 列，10 个汉字）调用显示汉字子程序
            display_char(2,1,10,"JLX16032A,160*32DOTS");  //（在第 2 行，第 2 列，10 个汉字）调用显示汉字子程序
            Switch();               //等待按键 P2.0 口
            clear_DDRAM();
            clear_screen();
            display_3232(1,1,yun); //第一个是垂直地址，第二个是水平地址，第三个是图案数据
            display_3232(1,3,xing);//第一个是垂直地址，第二个是水平地址，第三个是图案数据
            Switch();
            clear_screen();
            display_1632(0,2,char_R);//显示 16x32 点阵的字符”R“
            display_1632(0,3,char_U);
            display_1632(0,4,char_N);
            display_1632(0,5,char_N);
            display_1632(0,6,char_I);
            display_1632(0,7,char_N);
            display_1632(0,8,char_G);
            Switch();               //等待按键 P2.0 口
        }
    }
```

7.5.2 并行接口接线方法与程序举例：

液晶模块与 MPU 并行接口图如下(以 8051 系列单片机为例)：



并行程序案例：（C 语言）

```
/* Test program for JLX16032c
   Driver IC is:ST7920
   Programmed by Ken,   Feb.15,2011
   JLX electronic Co.,ltd,    http://www.jlxlcd.cn;

*/
#include <reg51.H>

sbit rs=P3^2;
sbit r_w=P3^1;
sbit e_1=P3^0;
sbit psb=P3^4;
sbit reset=P3^3;

#define  data_bus  P1
#define  uchar unsigned char

char code yun[]=
{
/*--  文字:  运  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=31x31    --*/
/*--  宽度不是 8 的倍数，现调整为：宽度 x 高度=32x32  --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x0C,0x00,0x00,0x00,0x0E,0x00,0x01,0x80,
0x07,0x0F,0xFF,0xC0,0x03,0x8F,0xFF,0xC0,0x03,0x80,0x00,0x00,0x03,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x20,0x00,0x00,0x00,0x70,0x03,0x3F,0xFF,0xF8,
0x7F,0x80,0x70,0x00,0x33,0x80,0xF0,0x00,0x03,0x00,0xE0,0x00,0x03,0x01,0xC0,0x00,
0x03,0x01,0x86,0x00,0x03,0x03,0x07,0x00,0x03,0x07,0x03,0x80,0x03,0x0E,0x01,0xC0,
0x03,0x1F,0xFF,0xE0,0x03,0x1F,0xFC,0xE0,0x03,0x0E,0x00,0xE0,0x0F,0x80,0x00,0x40,
0x3D,0xC0,0x00,0x00,0x78,0xF0,0x00,0x00,0x70,0x7F,0xC1,0xFC,0x20,0x1F,0xFF,0xF8,
0x00,0x03,0xFF,0xF0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00
};
```

```
char code xing[]={
/*--  文字:  行  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=31x31   --*/
/*--  宽度不是 8 的倍数，现调整为：宽度 x 高度=32x32  --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xC0,0x00,0x00,0x00,0xE0,0x00,0xE0,
0x01,0xE3,0xFF,0xF0,0x03,0x83,0x00,0x00,0x03,0x00,0x00,0x00,0x06,0x00,0x00,0x00,
0x0C,0x60,0x00,0x00,0x38,0x70,0x00,0x00,0x20,0xE0,0x00,0x30,0x00,0xEF,0xFF,0xF8,
0x01,0xCF,0xFF,0xFC,0x03,0x80,0x0E,0x00,0x03,0xC0,0x0E,0x00,0x07,0xC0,0x0E,0x00,
0x0F,0x80,0x0E,0x00,0x1D,0x80,0x0E,0x00,0x31,0x80,0x0E,0x00,0x61,0x80,0x0E,0x00,
0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,
0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x80,0x0E,0x00,0x01,0x81,0xFE,0x00,
0x01,0x80,0x7C,0x00,0x01,0x00,0x3C,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};

char code char_R[]={
/*--  文字:  R  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x32  --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x7F,0xF0,0x3C,0x78,
0x18,0x1C,0x18,0x1C,0x18,0x0C,0x18,0x0C,0x18,0x1C,0x18,0x1C,0x18,0x78,0x1F,0xF0,
0x19,0xC0,0x19,0xE0,0x18,0xE0,0x18,0xE0,0x18,0x70,0x18,0x70,0x18,0x78,0x18,0x38,
0x18,0x38,0x3C,0x3C,0x7E,0x1E,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00
};

char code char_U[]={

/*--  文字:  U  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x32   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFC,0x3E,0x78,0x1C,
0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,
0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x30,0x08,0x38,0x18,
0x38,0x18,0x1E,0x70,0x0F,0xE0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};


char code char_N[]={


/*--  文字:  N  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x31   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xF8,0x3E,0x78,0x1C,
0x3C,0x08,0x3C,0x08,0x2E,0x08,0x2E,0x08,0x2F,0x08,0x27,0x08,0x27,0x88,0x23,0x88,
0x23,0xC8,0x21,0xC8,0x21,0xE8,0x20,0xE8,0x20,0xF8,0x20,0x78,0x20,0x78,0x20,0x38,
0x20,0x38,0x70,0x18,0xF8,0x18,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};


char code char_I[]={
/*--  文字:  I  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x31   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x1F,0xF8,0x03,0xC0,
0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,
0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,0x01,0x80,
0x01,0x80,0x03,0xC0,0x1F,0xF8,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};

char code char_G[]={
/*--  文字:  G  --*/
/*--  宋体 23;  此字体下对应的点阵为：宽 x 高=16x31   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x07,0xF8,0x0E,0x78,
0x1C,0x38,0x38,0x18,0x30,0x18,0x70,0x08,0x70,0x00,0x70,0x00,0x60,0x00,0x60,0x00,
0x60,0x00,0x60,0x00,0x60,0x7E,0x70,0x3C,0x70,0x18,0x70,0x18,0x30,0x18,0x38,0x18,
0x18,0x38,0x1E,0x78,0x07,0xF0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00};
```

```
char code char_JLX[]={
/*--  调入了一幅图像：E:\work\图片收藏夹\16032.bmp  --*/
/*--  宽度 x 高度=160x32  --*/
0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,
0xFF,0xFF,0xFF,0xFF,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,
0x90,0x00,0x48,0x20,0x40,0x0F,0xE0,0x08,0x88,0x08,0x04,0x00,0x02,0x01,0x00,0xEF,
0xC0,0x90,0x00,0x11,0x8B,0xFC,0x49,0x20,0x22,0x08,0x23,0xF5,0x05,0xFC,0x04,0x03,
0xFF,0x01,0x08,0xA8,0x40,0x90,0x3F,0xF9,0x82,0x04,0x49,0x2F,0xFF,0x0F,0xE1,0x22,
0x00,0x08,0x7F,0xC0,0x04,0x3F,0xFC,0xA8,0x41,0x08,0x00,0x11,0xA0,0x90,0x49,0x20,
0x20,0x08,0x21,0x2F,0x80,0x48,0x44,0x40,0x18,0x02,0x00,0xAF,0xC1,0x08,0x7F,0xD1,
0x91,0x49,0xF9,0x23,0xFC,0x0F,0xE1,0xE2,0x1C,0x48,0x44,0x40,0x10,0x07,0xF0,0xC8,
0x42,0x04,0x00,0x11,0x80,0x40,0x49,0x22,0x24,0x00,0x01,0x22,0x05,0xF8,0x7F,0xC7,
0xFF,0x8C,0x10,0xAF,0xC4,0x42,0x1F,0x11,0x8B,0xFC,0x49,0x22,0x24,0x3E,0xF9,0xFF,
0xC4,0x48,0x44,0x40,0x10,0x17,0xF0,0xAA,0x48,0x41,0x11,0x11,0x90,0x40,0x49,0x22,
0x24,0x22,0x89,0x22,0x04,0x48,0x44,0x40,0x10,0x24,0x10,0xAA,0x80,0x80,0x11,0x11,
0xB0,0xE0,0x79,0x22,0x24,0x3E,0xF9,0x75,0x05,0x48,0x7F,0xC0,0x10,0x07,0xF0,0xE9,
0x00,0x90,0x1F,0x11,0x91,0x51,0xC9,0x22,0x24,0x22,0x8B,0xA5,0x06,0x4A,0x04,0x10,
0x10,0x04,0x10,0x88,0x81,0x08,0x11,0x11,0x96,0x4C,0x90,0x22,0x2C,0x3E,0xF8,0x28,
0x84,0x46,0x04,0x10,0x10,0x04,0x10,0x8A,0x43,0xFC,0x00,0x51,0x90,0x40,0x20,0x20,
0x20,0x22,0x88,0x30,0x40,0x42,0x03,0xF0,0x30,0x04,0x30,0x8C,0x21,0x04,0x00,0x21,
0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x04,0x00,0x08,0x10,0x40,0x3F,
0x80,0x04,0x00,0x20,0x89,0x04,0x20,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x04,0x03,
0xC8,0x0B,0xFC,0x20,0x83,0xFE,0x1F,0xF0,0xBF,0xC4,0x20,0x01,0x80,0x40,0xE3,0x80,
0x0E,0x1C,0x07,0xE2,0x7F,0x80,0x00,0x3F,0x82,0x04,0x00,0x00,0x89,0x04,0x20,0x01,
0x80,0xC1,0x24,0x40,0x11,0x22,0x04,0x02,0x90,0x21,0x20,0x20,0x83,0xFC,0x00,0x13,
0xDF,0x84,0xFC,0x01,0x80,0x42,0x04,0x42,0x01,0x22,0x3F,0xC3,0x14,0x11,0x78,0x3F,
0x82,0x04,0x3F,0xF8,0x90,0x9F,0x24,0x01,0x80,0x42,0xC4,0x4A,0x86,0x02,0x20,0x42,
0xBF,0x02,0x48,0x00,0x03,0xFC,0x01,0x01,0xDF,0x84,0x24,0x01,0x80,0x43,0x24,0x47,
0x01,0x04,0x20,0x42,0x44,0x0A,0xA8,0xFB,0xE0,0x90,0x09,0x42,0xB0,0x85,0xFE,0x01,
0x80,0x42,0x24,0x47,0x01,0x08,0x3F,0xC2,0x44,0x16,0x50,0x8A,0x24,0x92,0x09,0x22,
0x9F,0x84,0x20,0x01,0x80,0x42,0x24,0x4A,0x81,0x10,0x00,0x03,0xBF,0xB2,0x20,0xFB,
0xE2,0x94,0x11,0x10,0x84,0x07,0x50,0x01,0x80,0x42,0x24,0x42,0x11,0x20,0x52,0x42,
0x04,0x12,0x50,0x8A,0x21,0x98,0x21,0x08,0xBF,0xD8,0x88,0x01,0x80,0xE1,0xC3,0x80,
0x0E,0x3E,0x49,0x22,0x04,0x12,0x88,0xFB,0xE0,0x92,0x41,0x08,0x89,0x01,0x04,0x01,
0x80,0x00,0x00,0x00,0x00,0x00,0x89,0x22,0x04,0x13,0x04,0x8A,0x2F,0xFF,0x03,0x00,
0xF0,0xC2,0x02,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0xFF,0xFF,0xFF,0xFF,
0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF


};

char code char_JLX1[]={
/*--  调入了一幅图像：E:\work\图片收藏夹\16032 雪花 1.bmp  --*/
/*--  宽度 x 高度=160x32  --*/
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
```

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0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55

};

char code char_JLX2[]={
/*--  调入了一幅图像：E:\work\图片收藏夹\16032雪花2.bmp  --*/
/*--  宽度x高度=160x32  --*/
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
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0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,
0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0x55,0xAA,0xAA,0xAA,0xAA,
0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA,0xAA
};


/*=============延时====================*/
void delay(int i)
{
 int j,k;
 for(j=0;j<i;j++)
 for(k=0;k<110;k++);
}

//============delay time====================
void delay1(int i)
{
 int j,k;
 for(j=0;j<i;j++)
 for(k=0;k<2;k++);
}

/*====等待按键：P2.0 与地相接时按键生效============*/
void Switch()
{
 repeat:
    if (P2&0x01) goto repeat;
    else
    delay(1000);
}


//===检查忙标志位 BF================================
void check_busy1()
{
    rs=0;
    data_bus=0xff;
    if(P1^7==1)
    {
        r_w=1;
        e_1=1;
        e_1=0;
    }
    else;
}
```

```
/*===送指令到液晶模块驱动 IC==========================*/
void transfer_command(int data1)
{
    check_busy1();
    rs=0;
    r_w=0;
    data_bus=data1;
    e_1=1;
    delay1(50);  //STC90C516RD+:延时 50,STC12C5A60S2：延时 500
    e_1=0;
    delay1(50);

}
/*=========传送数据到液晶模块驱动 IC============*/
void transfer_data(int data1)
{
    check_busy1();
    rs=1;
    r_w=0;
    data_bus=data1;
    e_1=1;
    delay1(5);
    e_1=0;
    delay1(5);



}


void clear_screen()
{
    int i,j;
    transfer_command(0x36); /*选用扩展指令集*/
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+j);    /*垂直地址*/

        transfer_command(0x80);    /*水平地址*/


        for(i=0;i<32;i++)
        {
            transfer_data(0x00);

        }
    }
}

void clear_ddram()
{
    transfer_command(0x30);
    transfer_command(0x01);
    delay(10);
}
```

```
void display_3232(int y,int x,char code *p)
{
    int i,j;
    transfer_command(0x36);     /*选用扩展指令集*/
    delay(10);
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+(y-1)+j); /*垂直地址*/

        transfer_command(0x80+(x-1));    /*水平地址*/

        for(i=0;i<4;i++)
        {
            transfer_data(*p);
            p++;
        }
    }
}


void display_1632(int y,int x,char code *p)
{
    int i,j;
    transfer_command(0x36);
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+y+j);
        transfer_command(0x80+x);
        for(i=0;i<2;i++)
        {
            transfer_data(*p);
            p++;
        }
    }
}

void display_16032(int y,int x,char code *p)
{
    int i,j;
    transfer_command(0x36); /*选用扩展指令集*/
    for(j=0;j<32;j++)
    {
        transfer_command(0x80+(y-1)+j); /*垂直地址*/
        transfer_command(0x80+(x-1));    /*水平地址*/
        for(i=0;i<20;i++)                //20
        {
            transfer_data(*p);
            p++;
        }
    }


}




/*初始化*/
void Initial_ic()
```

```
{
    transfer_command(0x30); /*选用基本指令集*/
    delay(200);
    transfer_command(0x01);     /*清屏*/
    delay(200);
    transfer_command(0x06); //
    delay(200);
    transfer_command(0x0c); /*开显示，关光标*/
    delay(200);

}

/*调用中文字库里的汉字*/
void display_char(int y,int x,int char_length,uchar *p)
{
    uchar i=0;
    transfer_command(0x30); /*选用基本指令集*/
    delay(10);
    //transfer_command(0x01);     /*清屏*/
    delay(10);
    transfer_command(0x80+(y-1)*(0x10)+(x-1));
    for(i=0;i<char_length;i++)
    {
        transfer_data(*p);
        p++;
        transfer_data(*p);/*  以上两行数据合起来显示一个汉字*/
        p++;

        //      delay(50);
    }
}



 /*主程序*/
void main(void)
 {
    delay(1000);
    psb=1;                              //选择并口
    Initial_ic();                       //初始化
    while(1)
    {
        clear_ddram();                  //文本模式下清屏
        display_16032(1,1,char_JLX);    //显示一幅 160x32 点阵的图像
        Switch();                       //等待按键 P2.0 口
        display_16032(1,1,char_JLX1);   //显示一幅 160x32 点阵的图像
        Switch();
        display_16032(1,1,char_JLX2);
        Switch();
        clear_ddram();
        display_char(1,1,10,"深圳市晶联讯电子公司");  //（在第 1 行，第 1 列，10 个汉字）调用显示汉字
子程序
        display_char(2,1,10,"JLX16032A,160*32DOTS");  //（在第 2 行，第 2 列，10 个汉字）调用显示汉字
子程序
        Switch();                       //等待按键 P2.0 口
        clear_ddram();
        clear_screen();
        display_3232(1,1,yun);          //第一个是垂直地址，第二个是水平地址，第三个是图案数据
        display_3232(1,3,xing);         //第一个是垂直地址，第二个是水平地址，第三个是图案数据
        Switch();
```

```
        clear_screen();                 //图形模式下清屏
        display_1632(0,2,char_R);       //写 16x32 点阵的字“R”
        display_1632(0,3,char_U);       //写 16x32 点阵的字“U”
        display_1632(0,4,char_N);
        display_1632(0,5,char_N);
        display_1632(0,6,char_I);
        display_1632(0,7,char_N);
        display_1632(0,8,char_G);
        Switch();                       //等待按键 P2.0 口
    }
}
```