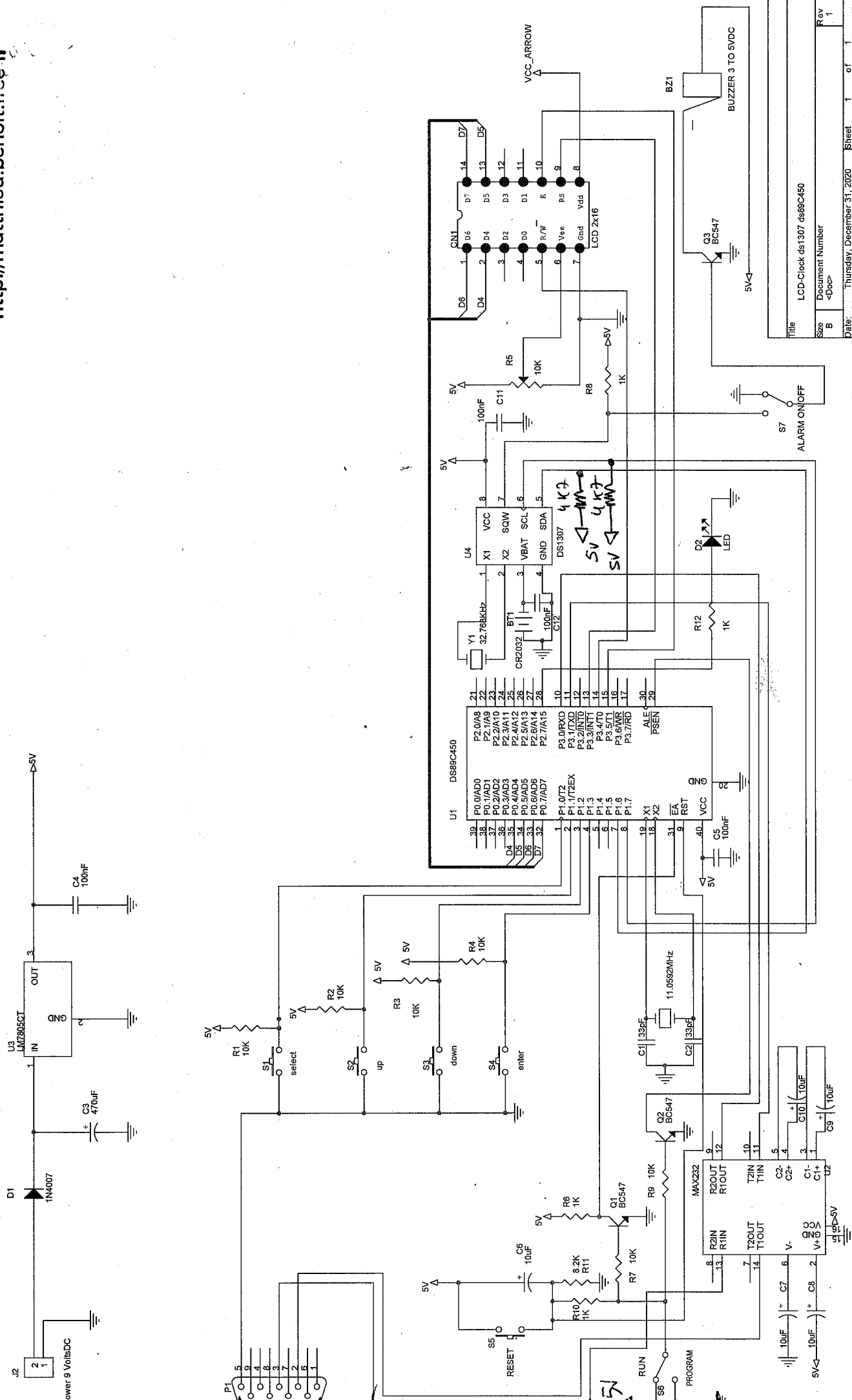
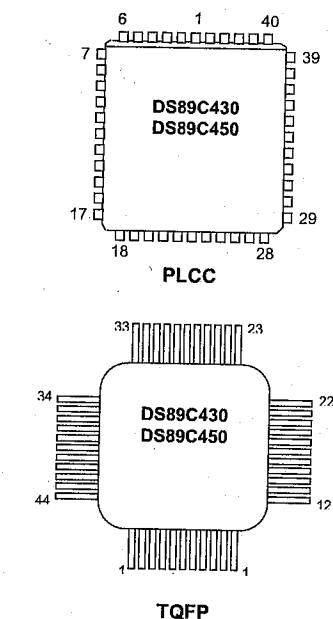




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Size	B	Document Number	<Doc>
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PIN CONFIGURATIONS

TOP VIEW



P1.0/T2	1	40	VCC
P1.1/T2EX	2	39	P0.0
P1.2/RXD1	3	38	P0.1
P1.3/TXD1	4	37	P0.2
P1.4/INT2	5	36	P0.3
P1.5/INT3	6	35	P0.4
P1.6/INT4	7	34	P0.5
P1.7/INT5	8	33	P0.6
RST	9	32	P0.7
P3.0/RXD0	10	31	EA/VPP
P3.1/TXD0	11	30	ALE/PROG
P3.2/INT0	12	29	PSEN
P3.3/INT1	13	28	P2.7
P3.4/T0	14	27	P2.6
P3.5/T1	15	26	P2.5
P3.6/WR	16	25	P2.4
P3.7/RD	17	24	P2.3
XTAL2	18	23	P2.2
XTAL1	19	22	P2.1
VSS	20	21	P2.0

PDIP

PACKAGE INFORMATION

For the latest package outline information and land patterns, go to www.maxim-ic.com/packages.

PACKAGE TYPE	PACKAGE CODE	DOCUMENT NO.
44 TQFP	C44+2	21-0293
40 PDIP	P40+3	21-0044
40 PLCC	Q44+7	21-0049

This chapter describes the process of physically connecting and testing 8051-based systems. In the first section we describe the function of the pins of 8051 chip. The second section shows the hardware connection for an 8051 Trainer using the DS89C4x0 (DS89C420/30/40/50) chip. It also shows how to download programs into a DS89C4x0-based system using PC HyperTerminal. In Section 8.3 we explain the characteristics of the Intel hex file.

SECTION 8.1: PIN DESCRIPTION OF THE 8051

Although 8051 family members (e.g., 8751, 89C51, 89C52, DS89C4x0) come in different packages, such as DIP (dual in-line package), QFP (quad flat package), and LLC (leadless chip carrier), they all have 40 pins that are dedicated to various functions such as I/O, RD, WR, address, data, and interrupts. It must be noted that some companies provide a 20-pin version of the 8051 with a reduced number of I/O ports for less demanding applications. However, since the vast majority of developers use the 40-pin chip, we will concentrate on that. Figure 8-1 shows the pins for the 8051/52. For the 8052 chip some of the pins have extra functions and they will be discussed as we study them.

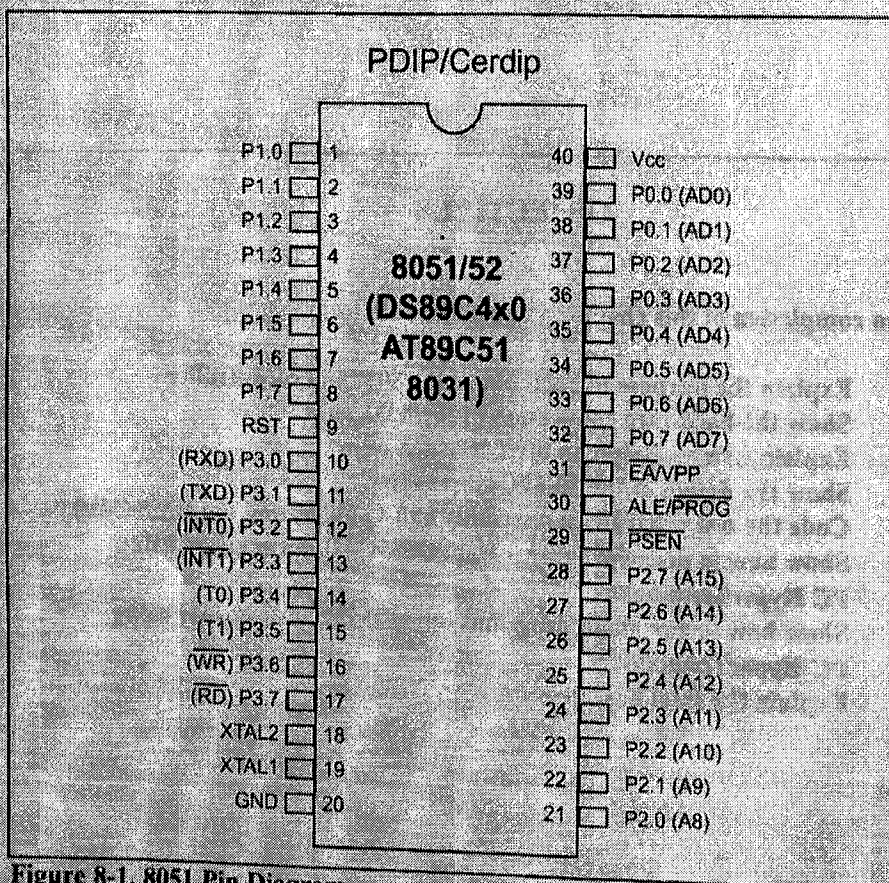


Figure 8-1. 8051 Pin Diagram

Examining Figure 8-1, note that of the 40 pins, a total of 32 pins are set aside for the four ports P0, P1, P2, and P3, where each port takes 8 pins. The rest of the pins are designated as V_{CC} , GND, XTAL1, XTAL2, RST, $\overline{EA}$, $\overline{PSEN}$, and ALE. Of these pins, six (V_{CC} , GND, XTAL1, XTAL2, RST, and $\overline{EA}$) are used by all members of the 8051 and 8031 families. In other words, they must be connected in order for the system to work, regardless of whether the microcontroller is of the 8051 or 8031 family. The other two pins, $\overline{PSEN}$ and ALE, are used mainly in 8031-based systems. We first describe the function of each pin. Ports are discussed separately.

V_{CC}

Pin 40 provides supply voltage to the chip. The voltage source is +5V.

GND

Pin 20 is the ground.

XTAL1 and XTAL2

The 8051 has an on-chip oscillator but requires an external clock to run it. Most often a quartz crystal oscillator is connected to inputs XTAL1 (pin 19) and XTAL2 (pin 18). The quartz crystal oscillator connected to XTAL1 and XTAL2 also needs two capacitors of 30 pF value. One side of each capacitor is connected to the ground as shown in Figure 8-2 (a).

It must be noted that there are various speeds of the 8051 family. Speed refers to the maximum oscillator frequency connected to XTAL. For

example, a 12-MHz chip must be connected to a crystal with 12 MHz frequency or less. Likewise, a 20-MHz microcontroller requires a crystal frequency of no more than 20 MHz. When the 8051 is connected to a crystal oscillator and is powered up, we can observe the frequency on the XTAL2 pin using the oscilloscope.

If you decide to use a frequency source other than a crystal oscillator, such as a TTL oscillator, it will be connected to XTAL1; XTAL2 is left unconnected, as shown in Figure 8-2 (b).

RST

Pin 9 is the RESET pin. It is an input and is active high (normally low). Upon applying a high pulse to this pin, the microcontroller will reset and terminate

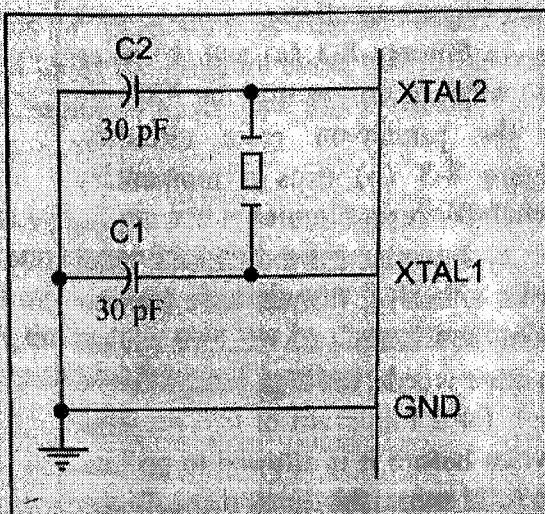


Figure 8-2 (a). XTAL Connection to 8051

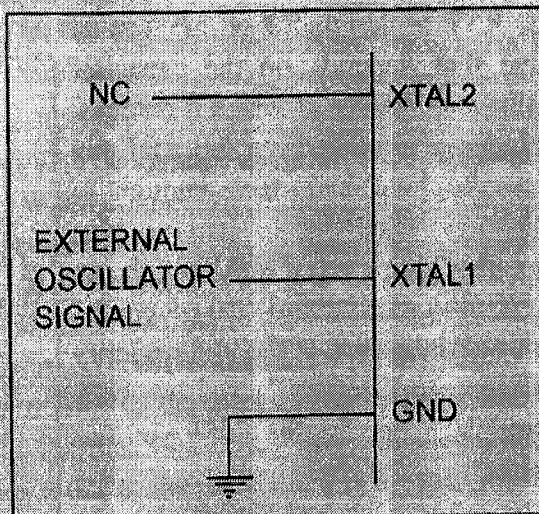


Figure 8-2 (b). XTAL Connection to an External Clock Source

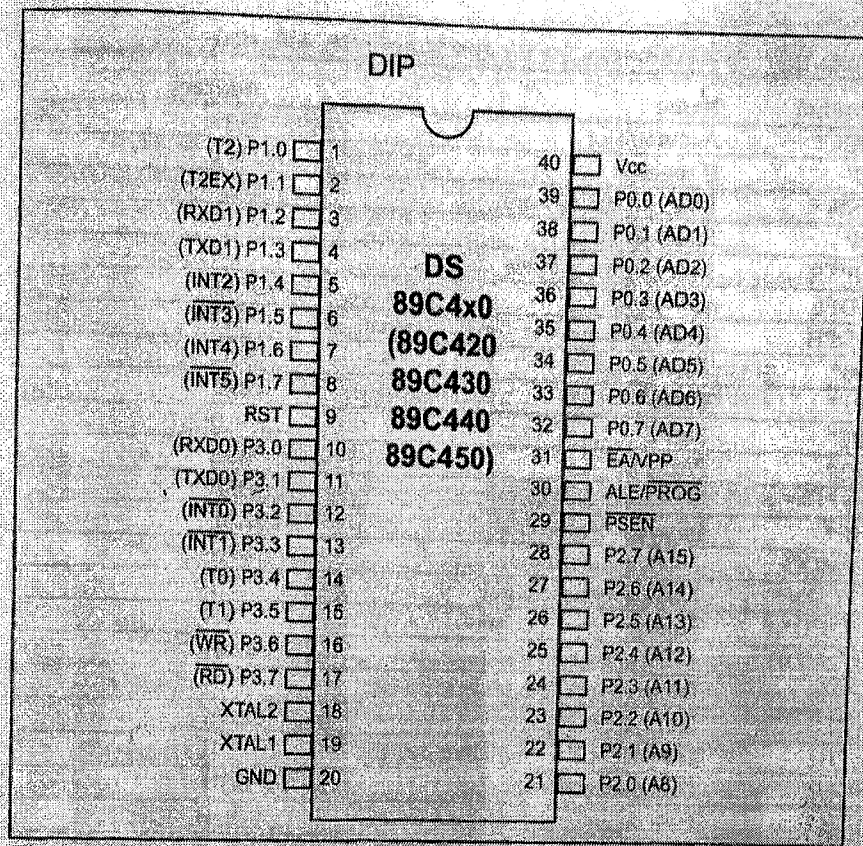


Figure 10-10. DS89C4x0 Pin Diagram

Note: Notice P1.2 and P1.3 pins are used by Rx and Tx lines of the 2nd serial port

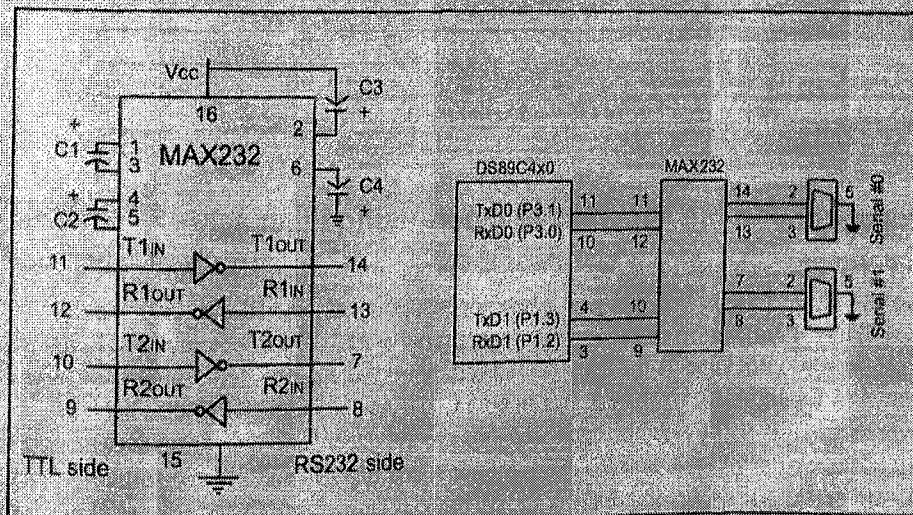


Figure 10-11. (a) Inside MAX232 and (b) its Connection to the DS89C4x0

- the on-chip ROM. This results in a much longer development time for the 89C51 system compared with the DS89C4x0 system.
2. The two serial ports on the DS89C4x0 allow us to use one for PC interfacing with the chip, and the other for data acquisition.

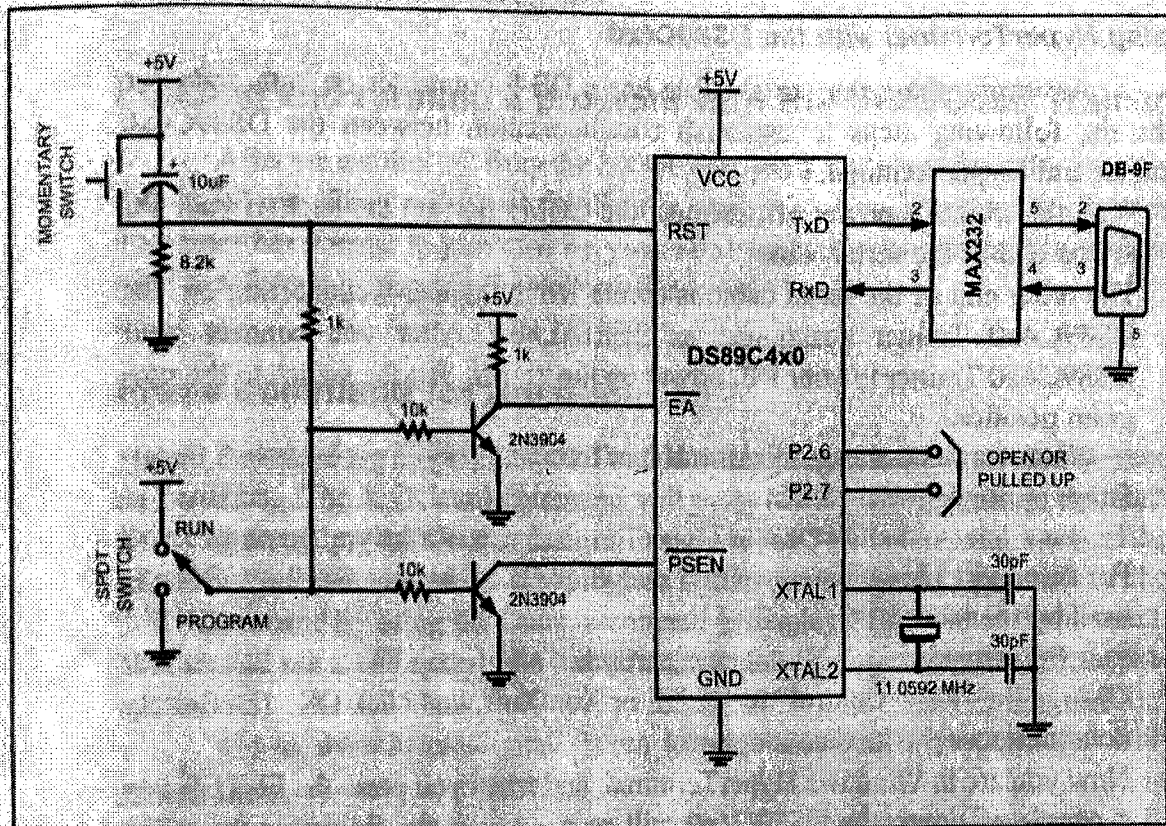


Figure 8-6. DS89C4x0 Trainer (for MAX232 connection, see Section 10.2)

Notice from Figure 8-6 that the reset circuitry and serial port connections are the same as in any 8051-based system. However, the extra circuitry needed for programming are two transistors, a switch, and 10K and 1K-ohm resistors. In fact, you can add these components to your 8751/89C51 system and use it as a DS89C4x0 system by simply plugging a DS89C4x0 chip in the socket. The switch allows you to select between the program and run options. We can load our program into the DS89C4x0 by setting the switch to V_{CC} , and run the program by setting it to Gnd.

Figure 8-6 shows the connection for the 8051 Trainer from www.MicroDigitalEd.com. The Trainer provided by this web site has both of the serial ports connected and accessible via two DB-9 connectors. It also has 8 LEDs and 8 switches along with the P0 - P3 ports, all of which are accessible via terminal blocks. It also comes with an on-board power regulator.

See the following Web site for the DS89C4x0 Trainer:

www.MicroDigitalEd.com

Communicating with the DS89C4x0 trainer

After we build our DS89C4x0-based system, we can communicate with it using the HyperTerminal software. HyperTerminal comes with Microsoft Windows 98, NT, 2000, and XP.

Using HyperTerminal with the DS89C4x0

Assuming that your serial cable has a DB-9 connector on both ends, we take the following steps to establish communication between the DS89C4x0 Trainer and HyperTerminal.

1. With the trainer's power off, connect the COM1 port on the back of your PC to one end of the serial cable.
2. The other end of the serial cable is connected to the DB-9 connection on the DS89C4x0 Trainer designated as SERIAL#0. After you connect your DS89C420 Trainer to your PC, power up the trainer. Set the switch to the program position.
3. In Windows Accessories, click on HyperTerminal. (If you get a modem installation option, choose "No".)
4. Type a name, and click OK (or HyperTerminal will not let you go on).
5. For "Connect Using" select COM1 and click OK. Choose COM2 if COM1 is used by the mouse.
6. Pick 9600 baud rate, 8-bit data, no parity bit, and 1 stop bit.
7. Change the "Flow Control" to NONE or Xon/Xoff, and click OK. (Definitely do not choose the hardware option.)
8. Now you are in Windows HyperTerminal, and when you press the ENTER key a couple of times, the DS89C4x0 will respond with the following message:
DS89C420 LOADER VERSION 1.0 COPYRIGHT (C) 2000 DALLAS SEMICONDUCTOR>

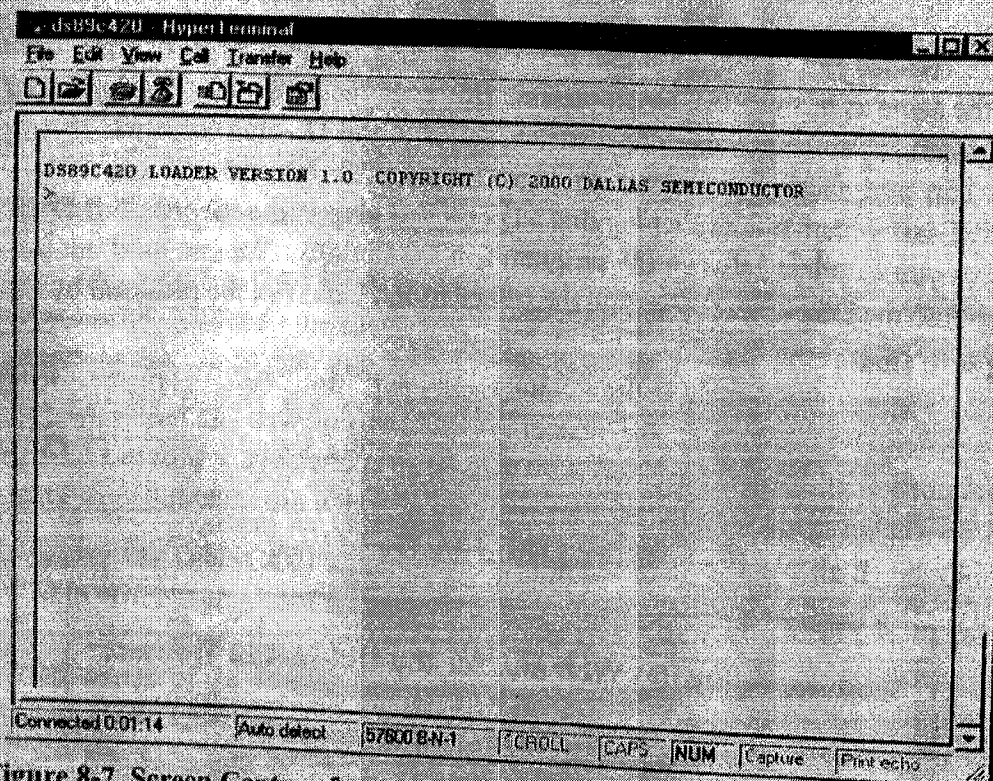


Figure 8-7. Screen Capture from HyperTerminal for DS89C4x0 Trainer

Click here for production status of specific part numbers.

MAX220-MAX249

+5V-Powered, Multichannel RS-232 Drivers/Receivers

General Description

The MAX220-MAX249 family of line drivers/receivers is intended for all EIA/TIA-232E and V.28/V.24 communications interfaces, particularly applications where $\pm 12V$ is not available.

The MAX225, MAX233, MAX235, and MAX245/MAX246/MAX247 use no external components and are recommended for applications where printed circuit board space is critical.

The MAX220-MAX249 are offered in 26 different packages with temperatures from 0 to +70°C up to -55°C to +125°C. See ordering information table at the end of the data sheet for all package and temperature options.

Applications

- Interface Translation
- Multidrop RS-232 Networks
- Portable Diagnostics Equipment

Benefits and Features

Saves Board Space

- Integrated Charge Pump Circuitry
 - Eliminates the Need for a Bipolar $\pm 12V$ Supply
 - Enables Single Supply Operation from +5V Supply
- Integrated Capacitors (MAX223, MAX233, MAX235, MAX245-MAX247)

Saves Power for Reduced Power Requirements

- 5 μW Shutdown Mode

Ordering Information and Selection Table appears at end of data sheet.

AutoShutdown and UCSP are trademarks of Maxim Integrated Products, Inc.

MAX220/MAX232/MAX232A Pin Configuration and Typical Operating Circuit

