

Overview

MINI-MAX/51-C2 has a AT89C51ED2 processor with 64K Flash memory and 22MHz clock speed. Clock speed can be doubled internally to 44MHz. With such a clock speed, MINI-MAX/51-C2 can execute million of instructions per second and has much more processing power than the popular game-oriented home computers of the 80's and early 90's, such as Atari or Commodore 64.

You might wonder why anybody would use a small computer board like the MINI-MAX/51-C2 for games when there is all the speed, memory and speed of the PC's and XBOX'es and the like. After all, MINI-MAX/51-C2 has no video or sound and is no match for the speed of a desktop PC. However, thanks to its precise timing and control capabilities, MINI-MAX/51-C2 can be used for contest type games where the it is important to detect who finished first. Also, since it only draws 50mA or less from its power supply, MINI-MAX/51-C2 is suitable for timing and controlling many outdoor games. Some examples are:

- Pinewood derby
- Model car racing
- Knowledge contests
- Trivia Quiz (Jeopardy game)
- Reflex test
- Robotics Control (Robot race, robotic soccer, etc.)

and many others. The list is only limited by your imagination !!!

Theory of Operation

In this application note, we will describe how the MINI-MAX/51-C2 is used to implement 2 games:

Trivia Quiz (Jeopardy)
Reflex Tester

Please email to us at info@bipom.com if you have any ideas about other games and we can add them for you J

As shown in Figure 1, MINI-MAX/51-C2 uses an LCD screen (LCD242) to display messages to the players and 5 pushbuttons to accept input from the players. Pushbuttons are wired to 10-pin keypad port (Port 2) of the MINI-MAX/51-C. LCD242 is connected to the 14-pin LCD connector (next to the microcontroller).

Figure 1 shows the front panel of the game. Front panel is made of plexiglass. The blue background and the letters on the front panel are prepared by printing the view on an inkjet printer, laminating the paper and gluing to it to the plexiglass.

Figure 2 shows the wiring diagram. All the wires are hidden behind the front panel. Note that the buttons have a common ground point when wiring.

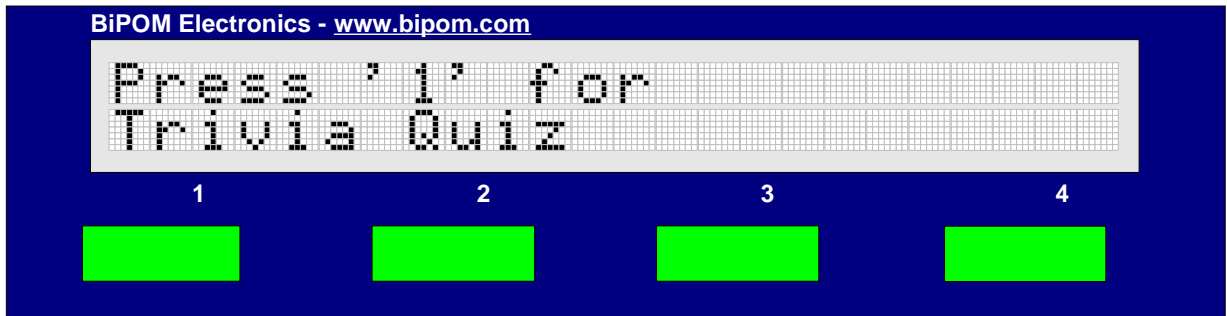


Figure 1

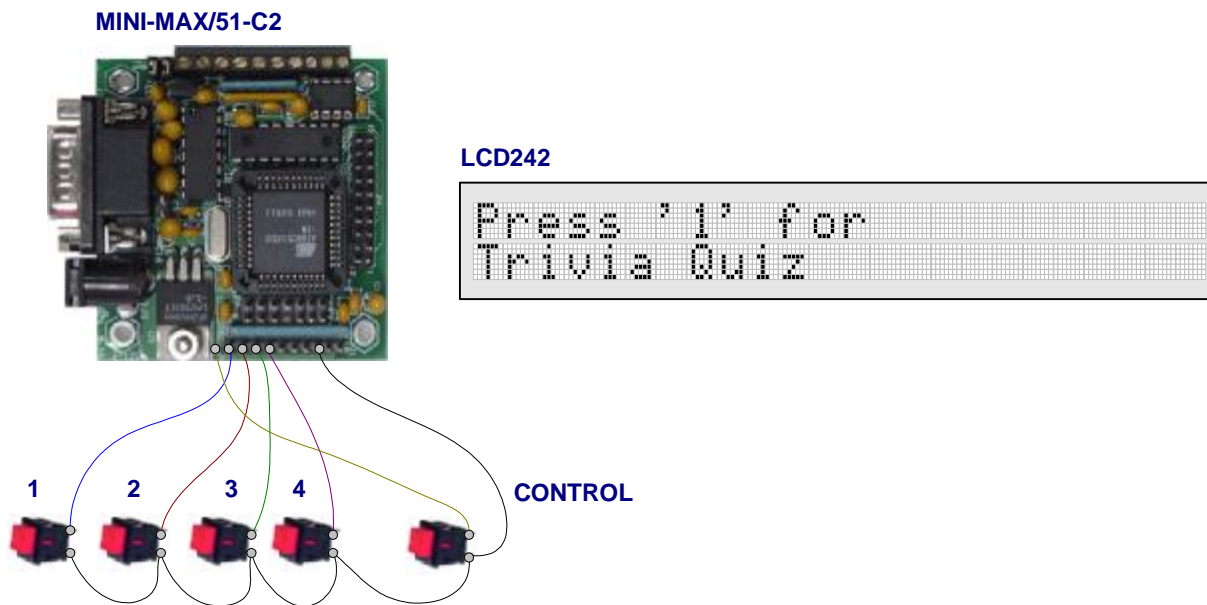


Figure 2

When power is applied, the program displays a introduction message for the first time:

- o **Bipom Electronics**
- o **Mini-Max51-C** <delay>
- o **Button Application**
- o **Rev 1.0**" <delay>

This is followed by Main Menu scrolling through selections w/ some delay in between and checking the buttons for selection entry like:

- o **Press '1' for**
- o **Trivia Quiz** <delay 2 seconds >
- o **Press '2' for**
- o **Reflex Test** <delay 2 seconds>
- o ... (later on other selections can be added with other revisions)

Pressing '1' takes you to Trivia Quiz where:

- A question is displayed on LCD and the hardware timer starts counting. Also at the bottom right corner of the LCD (row 2 column 24) controller displays countdown from 9 to 0 changing every second giving the players max 10 seconds to guess the answer. Example:
 - o **What's the capital**
 - o **of Argentina? 9**
 - o <1 sec delay>
 - o **What's the capital**
 - o **of Argentina? 8**
 - o ...(and so on)
- During the countdown if any player(s) hits the button(s), question on the LCD is erased and first, if any second, third and fourth players and their time is displayed on the LCD like:
 - o **PL: 3 1**
 - o **TM(ms): 830 965**
 - o (and then maybe two late hits)
 - o **PL: 3 1 4 2**
 - o **TM(ms): 830 965 2380 4500**
- Pressing the Control button once displays the correct answer to the question:
 - o **Answer: Buenos Aires**
- If no player hits the buttons, at the end of the countdown LCD automatically displays:
 - o **No Buttons Pressed**
 - o **Answer: Buenos Aires**
- Pressing the Control button once again takes it to the next question, and so on:
 - o **What's the name**
 - o **of 9th planet? 9**
 - o <1 sec delay>
 - o **What's the name**
 - o **of 9th planet? 8**
 - o ...
- Pressing and holding the Control button takes it back to the Main Menu.

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Pressing '2' takes you to the Reflex Test where:

- At random time controller displays cursor in the middle of the LCD (OR this can be some word or command like "!!! PRESS NOW!!!") and starts the hardware timer and checks the buttons.
- With the first hit to any button (say #3), LCD displays:
 - o **WINNER 3 !!!**
 - o **Reflex Time 022ms**
- Pressing the Next/(hold)Control button once clears out the LCD and starts Reflex Test one more time at another random time.
- Pressing and holding the Next/(hold)Control button takes it back to the Main Menu.

Pressing '3' and '4' doesn't do anything at the moment, but we can add some other games (like Frogstomp) based on customer requests.

Parts List

MINI-MAX/51-C2 – 8051-based Microcontroller Board
5 push-buttons
LCD242 – LCD Display, 24 X 2

Software

Trivia and reflex test game example is part of our 8051 Development System programming package (available in version 2.16h and higher). It is under *microcexamples\8051\games\trivia* folder.

Please download the latest 8051 Development System package from www.bipom.com/8051dev.shtm