

ELECTRONIC VOTING MACHINE

Submitted by Group 54

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User Requirements

Design a microprocessor Voting Machine which has provision for 8 candidates. It should keep the count of total votes polled and the count of votes polled for each candidate. Before being put in use, it should check if all memory locations allotted to candidates, and the total count are empty. If not, it should clear these as well as the display. There are two keypads, one for the polling officials and one for the voter. The Polling Officers Keypad also comes with a 16 character LCD Display. To put the voter keypad in use, it needs to be enabled by 8 polling agents and the Presiding officer. If anyone is missing it should not be enabled. This enabling is done using the polling officers' keypad. The polling officer's keypad has keys 0-9, backspace, enter, Poll count, Lock, Unlock, DisplayCount. Each polling agent and Presiding officer have a unique 5-digit numeric code. The system when turned on displays officer 1 on LCD. The polling officer then enters his numeric code. If correct then the n display is updated to officer 2 and so on and finally the Presiding officer enters his code. Each person is allowed 2 retries – if there is a failure the voting is blocked.

Voter will press the button against the candidate's name – the LED will glow for 2 seconds. After 10 hours (7 a.m. to 5 p.m.) it should stop taking input from voter. There has to be a provision that the Presiding officer by pressing the Lock key followed by a 5-digit code can lock voting in between & then can restart it by pressing the Unlock key followed by a separate 5-digit code. For retrieving the count of each candidate the Presiding Officer presses the Poll Count key followed by a 5-digit code. The Presiding officer then enters the Candidates Number Followed by Display Count Key – The count for the candidate is displayed. This is done for all candidates.

Technical Specifications

The Hex Keypad and LCD belong on the Officer side, and the Candidate Keypad and LEDs on the Voter side, and as such the Voters are not supposed to have access to the hex keypad and the LCD. Moreover the keypads have been constructed by interfacing push-buttons instead of using off-the-shelf keypads.

Assumptions

The following assumptions have been made with respect to the system design:

1. The Presiding Officer enters his password, and presses the ENTER button at precisely 7 am following which the 10 hour clock starts, since there is no provision to monitor current time.
2. The officer cannot lock the voting machine for 2 seconds after the current voter has finished voting for the time that the LED is glowing, since the microprocessor is not running multiple threads simultaneously.
3. The vote count is being stored in a word for each candidate therefore it is assumed that the number of votes per candidate will not exceed 65,535
4. Passcodes used are exactly 5 digits long

Justifications

1. No 8259 is being used because there is just one interrupt in the system being sent to the NMI pin from the 8254 to the microprocessor.
2. The Candidate keypad has been interfaced as a one-hot keypad (since an 8bit port is being used either way) instead of a 4*2 matrix to simplify the program. Likewise, the LEDs are interfaced as one-hot

Components Used

1. 8086 Microprocessor
2. 8284 Clock Generator with 15MHz crystal
3. 8255 (2 nos.) for officer side I/O and candidate side I/O
4. 8254 to generate Interrupt after 10 hours have passed
5. LM020L 16x1 Alphanumeric LCD (Manual Attached)
6. 16 button keypad
7. 8 button keypad
8. LEDs (8 nos.)
Using 2 memory banks, Low and High:
9. 2616 2KB ROMs (4 nos.): 2 ROMs at beginning addresses for IVT and 2 for ending addresses at the reset address
10. 6116 2KB RAMs (2 nos.): 2 RAMs for stack and temporary storage a.of dat
11. LS138: 2 decoders for Memory and I/O decoding
12. LS373, LS245, LS244, Gates, Resistors, Switches as required

Address Mapping

Memory:

ROM1: 00000h to 00FFFh

ROM2: 02000h to 02FFFh

RAM: FF000h to FFFFFh

I/O:

Officer Side 8255: 00h to 06h

Voter Side 8255: 10h to 16h

8254: 20h to 26h

Design

A document with the complete, labelled hardware design has been attached with this report.

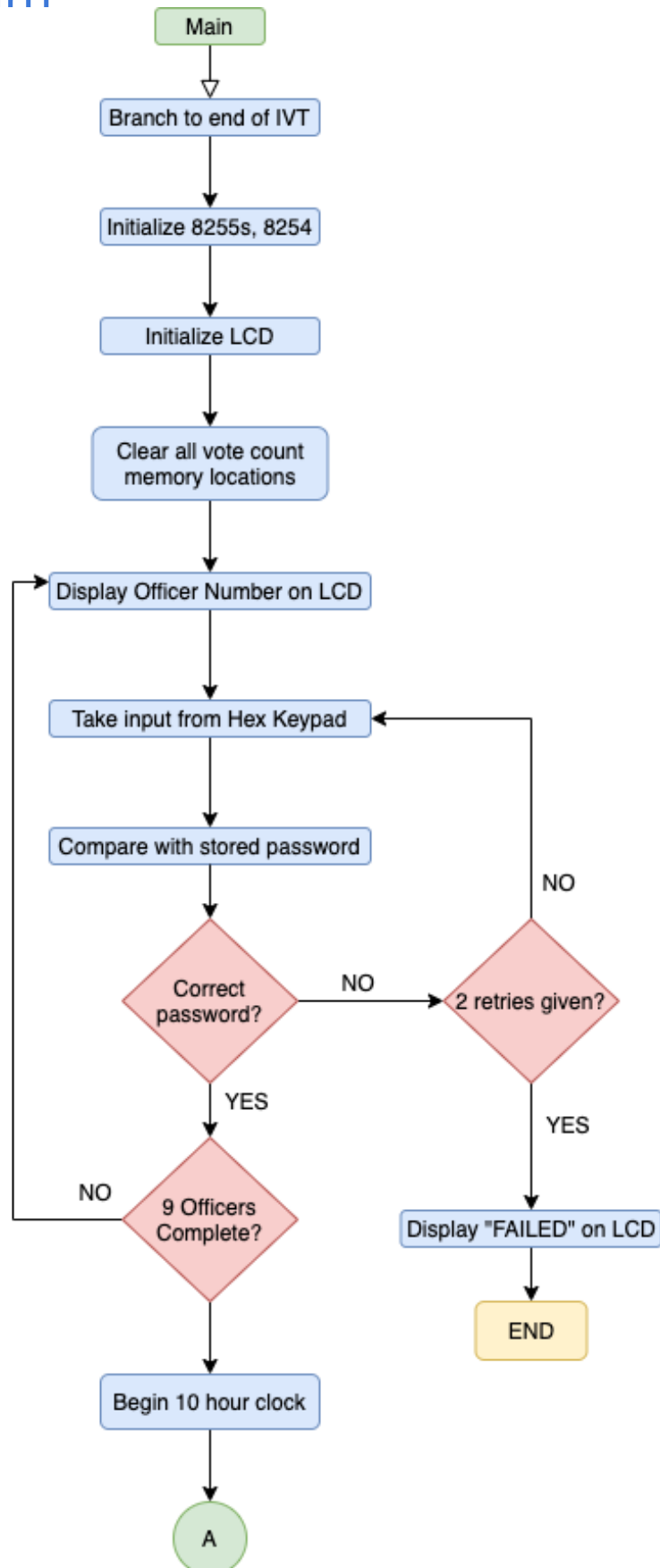
NOTE

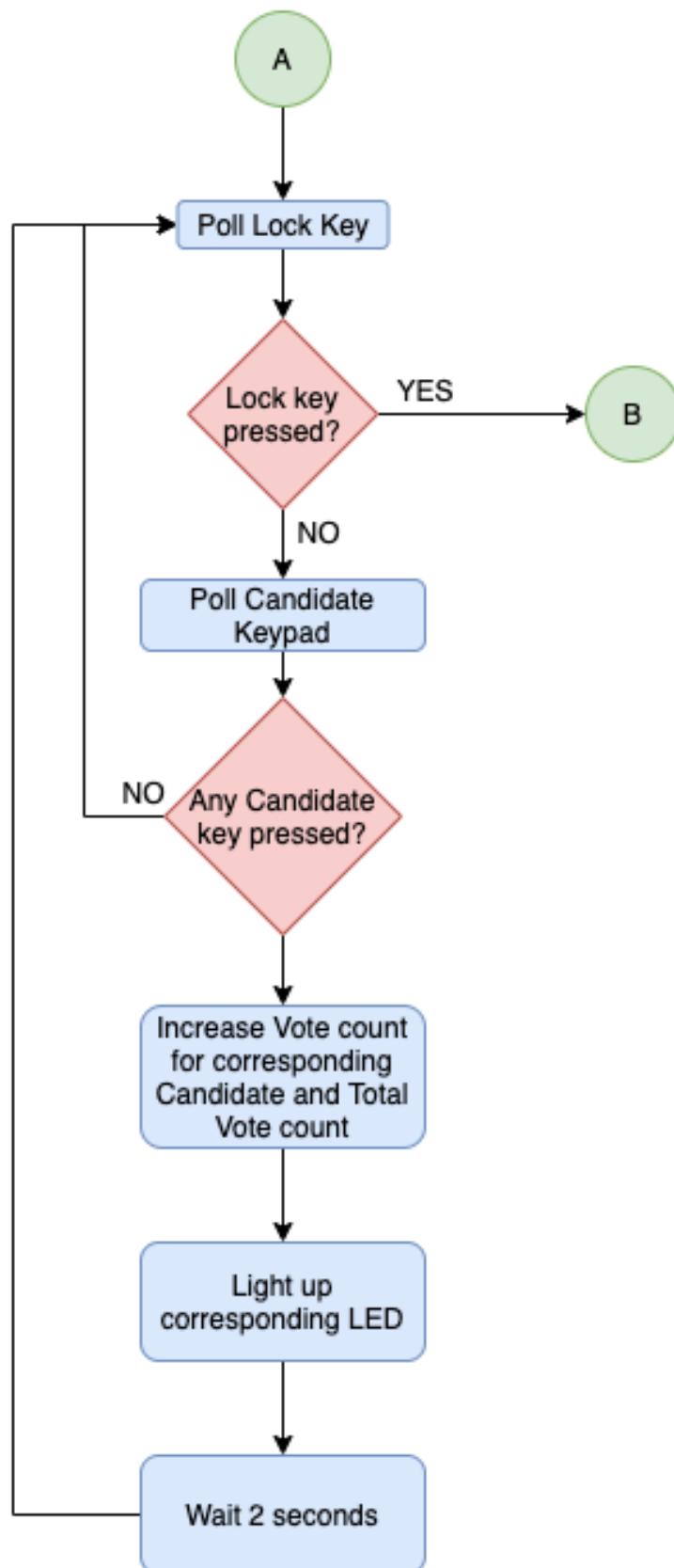
Relevant information like address mapping, device configuration, etc. has been clearly specified in the attached document as and when required.

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Software Flowcharts

Main program:

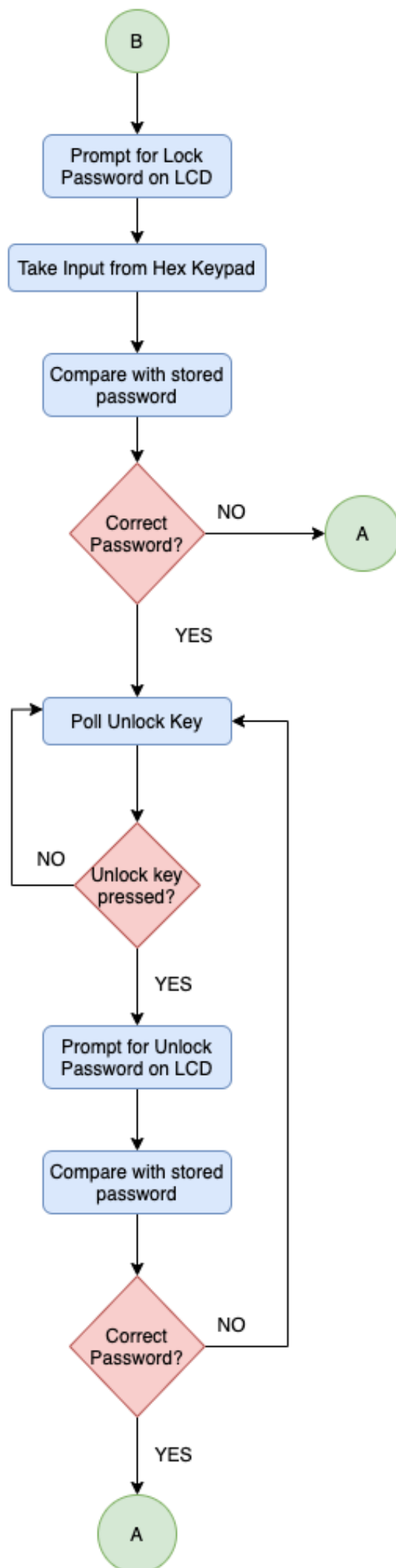




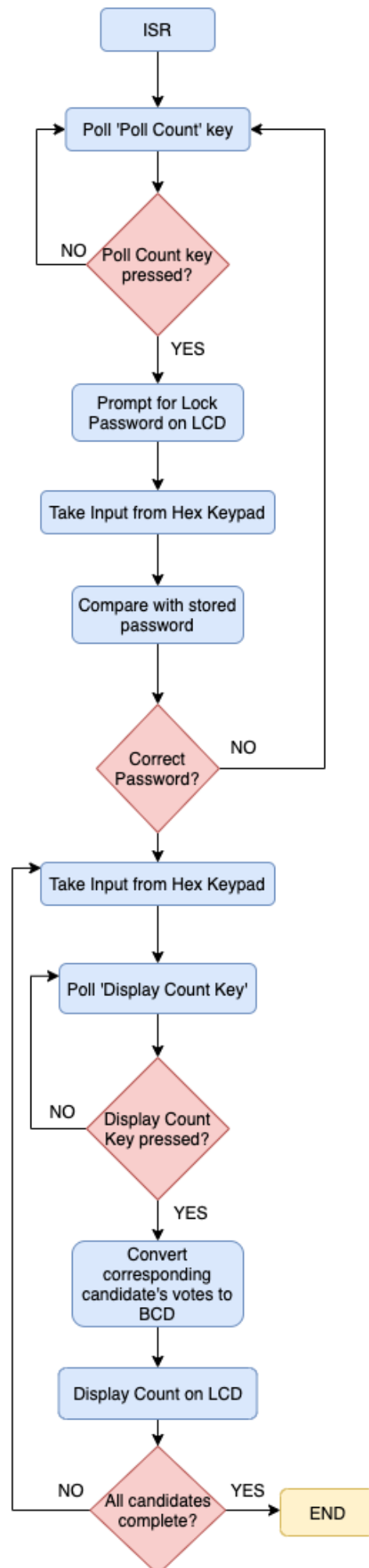
NOTE

The program stays in A unless:

1. The Lock key is pressed in which case it goes into B
2. The NMI is raised by the 8254 in which case it goes into the ISR



ISR



Variations in Proteus

1. 8284 is not being used instead the microprocessor clock has been set and the 8253 uses a pulse generator as clock
2. 8253 instead of 8254 is being used because 8254 is not available
3. The control line generation of RLOW, RHIGH, WLOW, WHIGH is not explicit as shown in the hardware design document, but the same effect has been achieved using gates
4. 2732 ROM is used instead of 2716 hence slight variation in
 - a. ROM 1 address which ends at **01FFF** in Proteus instead of **00FFF** as per this design
 - b. ROM 2 address which starts at **FE000** in Proteus instead of **FF000** as per this design
5. A Generic LCD has been used, as was available in Proteus

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Firmware

The implementation of the design has been attached as an EMU8086 .asm file along with a compiled .bin file.

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List of attachments:

The following has been attached with this document packaged as G54.zip:

1. Hardware design document (G54HW.pdf)
2. Proteus File (G54design.dsn)
3. EMU8086 ASM file (G54code.asm)
4. Binary File after assembly (G54code.bin)
5. Manual for LM020L LCD (LCD.pdf)

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