

EE309 Assignment 1

Raghav Singhal

19D070049

1 General Layout

- Timer T0 is used for causing interrupts every 25ms. A jump is provided at the interrupt vector address for T0 Overflow (000BH) to the **Interrupt Service Routine** (ISR). TH0 and TL0 are reloaded to their appropriate values each time the interrupt occurs. A jump is then provided to the **FSM** subroutine.
- **CUR_ST** (40H) and **PressedKey** (41H) are the locations where the current state and the 8-bit key code for the pressed key are stored respectively. **CUR_ST** is initialised to 0.
- In the **FSM** subroutine, we save the **ACC**, **PSW**, **DPH** and **DPL** on the stack, perform the necessary actions, and pop back all these registers.
- The necessary actions include: performing the required test for the current state, performing the action based on the test answer and setting the next state as the current state.

2 Tests for Current State

- This task is executed by the **Do_Test** subroutine, depending on the current state using **Test_Tab**.

```
Test_Tab: DB 0, 1, 1, 1
```

- The jump table **Test_Jmp** is then used to jump to the required subroutine; 0 and 1 corresponding to **AnyKey** and **TheKey** respectively.

```
Test_Jmp:
AJMP AnyKey
AJMP TheKey
```

3 Actions based on Test Results and CUR_ST

- This task is executed by the **Do_Action** subroutine, depending on the test results and the current state; using the **Yes_Actions** label if the test results gave a yes answer, and the **No_Actions** label if a no answer was obtained.

```
Yes_Actions: DB 1, 2, 0, 0
No_Actions:  DB 0, 0, 0, 0
```

- The jump table **Action_Jmp** is then used to jump to the required subroutine; 0, 1 and 2 corresponding to **DoNothing**, **FindKey** and **ReportKey** respectively.

```
Action_Jmp:
AJMP DoNothing
AJMP FindKey
AJMP ReportKey
```

4 Next State based on Test Results and CUR_ST

- This task is executed by the **Set_Next** subroutine, depending on the test results and the current state; using the **Yes_Next** label if the test results gave a yes answer, and the **No_Next** label if a no answer was obtained.

```
Yes_Next: DB 1, 2, 2, 2
No_Next:  DB 0, 0, 3, 0
```

5 Test and Action Subroutines

- **AnyKey**: Sets the F0 flag if any key is pressed, and clears it otherwise.
- **TheKey**: Sets the F0 flag if the key corresponding to the KeyPressed is pressed currently, and clears it otherwise.
- **DoNothing**: Does nothing.
- **FindKey**: Finds which key is pressed and enters its key code into the variable PressedKey.
- **ReportKey**: Inserts the key code for PressedKey in a circular data buffer (FIFO) of 8 bytes.