

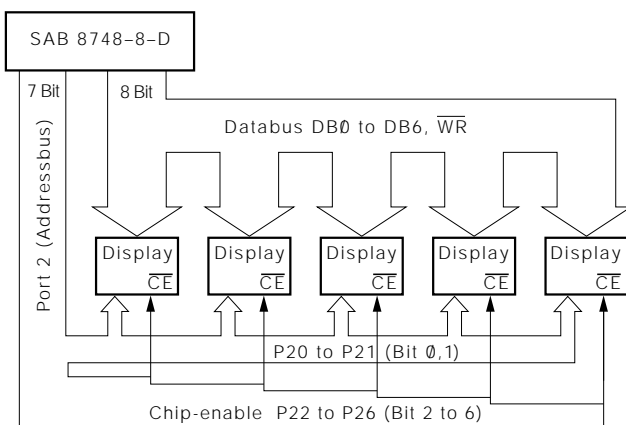
Moving Messages Using Intelligent Display[®] Devices and 8748 Microprocessor Appnote 20

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Output and display of texts including an important operator information are not only limited to devices of data processing systems but they are more and more applied in other fields of electronics, e.g. in industrial and consumer as well as control engineering. If data of different kinds (e.g. program results, error indications, decision criteria, test results, etc.) are displayed as moving news, they have a striking effect calling the operator's attention.

The text can easily be read when each character remains for 0.25 s on the display. A special advantage of a moving news panel being controlled by a microcomputer is in that the information can immediately be modified. The described circuit of Figure 1 operates with SAB 8748. Its program memory capacity (EPROM) is 1 KByte and up to 900 characters can be stored. If the microcomputer is replaced by another one incorporating a different program, the information which is to be displayed is also exchanged.

Figure 1.



The described circuit offers the advantage in requiring a minimum of components. The single chip microcomputer SAB 8748

operates in conjunction with an alphanumeric 16 segment LED display DL2416. It incorporates memory decoder and driver.

Hardware

The ASCII coded data is transferred from the SAB 8748 to the display ICs via the bus port (DB0 to DB6) and via the \overline{WR} -output (strobe). The information at pins P20 and P21 addresses the specific digits of the display IC DL2416. The signals at P22 to P26 select the individual ICs via the chip enable input \overline{CE} . When one pin of port 1 is connected to ground, the microcomputer supplies the corresponding text. An output of 4 different texts is possible.

The text may have any length as long as the memory capacity of 900 bytes is not exceeded. There are no additional components required than indicated in the circuit of Figure 2.

Software

The first 100 bytes of the EPROM are reserved for the program. As the program counter can only be read as data memory within 256 bytes, additional instructions are necessary (see listing). At the beginning of the program, port 1 is read. If a signal with low level is available at one of the pins, the starting address of the corresponding text is loaded to register 2 (low address) and 3 (high address). Now output registers 20H to 32H have to be filled with blanks. Then the first letter is transferred from text memory to data memory. Now the microprocessor operates in a waiting loop, determining the speed of the moving news. At an oscillator frequency of 3 MHz the timer has an overflow after $\frac{1}{3} \times 10^{-6} \mu s \times 15 \times 32 \times 256 = 40.96$ ms. The moving news text is stepping four times per second after 6 overflows have occurred; that means the 900 characters need in total $3 \frac{3}{4}$ minutes. If the 8 bit word zero (figure 0, not the ASCII character for 0) is read as character, the text end is recognized by the program. Therefore a counting is not necessary; that means all characters have been transferred. Now the program returns to read port 1.

The flowchart is shown in Figure 3.

Components for Circuit 2

- 1 8 bit single chip microcomputer SAB 8748-8-D
- 1 1 KByte EPROM, 3 MHz version)
- 5 4 digit alphanumeric LED displays DL2416
- with memory, decoder and driver,
(4 mm character height, 16 segments)
- 1 Crystal 3 MHz
- 4 Push buttons for PC board mounting,
- 2 break-make contacts, lateral operation

Figure 2.

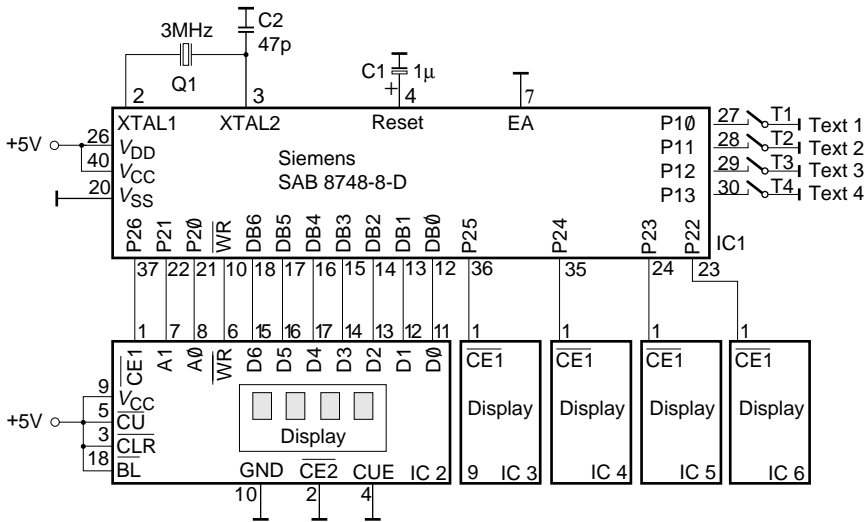


Figure 3. Flowchart

