

→ 6-1. Add the following in binary. Check your results by doing the addition in decimal.

(a) $1010 + 1011$

(d) $0.1011 + 0.1111$

(b) $1111 + 0011$

(e) $10011011 + 10011101$

(c) $1011.1101 + 11.1$

→ 6-2. Represent each of the following signed decimal numbers in the 2's-complement system. Use a total of eight bits, including the sign bit.

(a) +32

(e) +127

(i) -1

(m) +84

(b) -14

(f) -127

(j) -128

(n) +3

(c) +63

(g) +89

(k) +169

(o) -3

(d) -104

(h) -55

(l) 0

(p) -190

→ 6-3. Each of the following numbers represents a signed decimal number in the 2's-complement system. Determine the decimal value in each case. (*Hint: Use negation to convert negative numbers to positive.*)

(a) 01101

(f) 10000000

(b) 11101

(g) 11111111

(c) 01111011

(h) 10000001

(d) 10011001

(i) 01100011

(e) 01111111

(j) 11011001

→ 6-7. What is the range of unsigned decimal values that can be represented in 10 bits? What is the range of signed decimal values using the same number of bits?

→ 6-9. Perform the following operations in the 2's-complement system. Use eight bits (including the sign bit) for each number. Check your results by converting the binary result back to decimal.

- | | |
|----------------------------|----------------------------|
| (a) Add +9 to +6. | (f) Subtract +21 from -13. |
| (b) Add +14 to -17. | (g) Subtract +47 from +47. |
| (c) Add +19 to -24. | (h) Subtract -36 from -15. |
| (d) Add -48 to -80. | (i) Add +17 to -17. |
| (e) Subtract +16 from +17. | (j) Subtract -17 from -17. |

⇒ 6-10. Repeat Problem 6-9 for the following cases, and show that overflow occurs in each case.

(a) Add $+37$ to $+95$.

(b) Subtract $+37$ from -95 .

→6-13. Add the following decimal numbers after converting each to its BCD code.

(a) $74 + 23$

(d) $385 + 118$

(b) $58 + 37$

(e) $998 + 003$

(c) $147 + 380$

(f) $623 + 599$

→ 6-28. Show how the gates of Figure 6-13 can be implemented using three 74HC00 chips. (P.280)

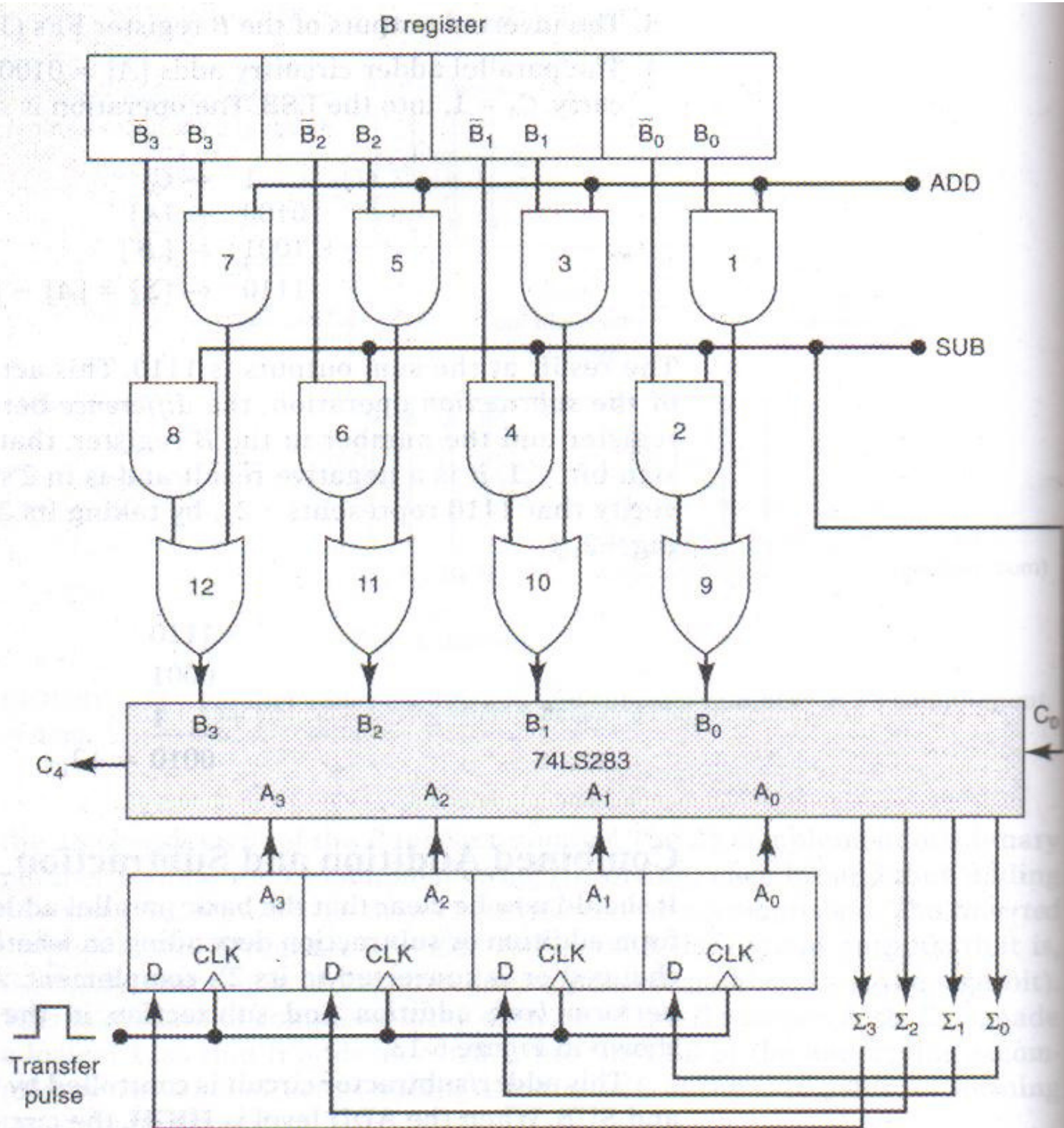


FIGURE 6-13 Parallel adder/subtractor using the 2's-complement system.

CHAPTER 6

- 6-1. (a) 10101 (b) 10010 (c) 1111.0101 (d) 1.1010
(e) 100111000
- 6-2. (a) 00100000 (including sign bit) (b) 11110010
(c) 00111111 (d) 10011000 (e) 01111111
(f) 10000001 (g) 01011001 (h) 11001001
(i) 11111111 (j) 10000000 (k) Can't be done in
eight bits (l) 00000000 (m) 01010100
(n) 00000011 (o) 11111101 (p) Can't be done in
eight bits
- 6-3. (a) +13 (b) -3 (c) +123 (d) -103
(e) +127 (f) -64 (g) -1 (h) -127 (i) +99
(j) -39
- 6-4. (a) -2048 to +2047 (b) 16 bits including sign bit
- 6-5. -16_{10} to 15_{10}
- 6-6. (a) 01001001; 10110111 (b) 11110100; 00001100
(c) 00001111; 11110001 (d) 11111111; 00000001
(e) +128 requires 9 bits (f) 01111111, 10000001
- 6-7. 0 to 1023; -512 to +511
- 6-9. (a) 00001111 (b) 11111101 (c) 11111011
(d) 10000000 (e) 00000001 (f) 11011110
(g) 00000000 (h) 00010101 (i) and (j) 00000000
- 6-11. (a) 100011 (b) 1111001 (c) 100011.00101
(d) .10001111
- 6-12. (a) 11 (b) 111 (c) 101.11 (d) 1111.0011
- 6-13. (a) 10010111 (BCD) (b) 10010101 (BCD)
(c) 010100100111 (BCD) (d) 010100000011 (BCD)
(e) 0001000000000001 (BCD) (f) 0001001000100010
(BCD)
- 6-14. (a) 6E24 (b) 100D (c) 18AB (d) 3000
(e) 10FE (f) 17C3C
- 6-15. (a) 0EFE (b) 229 (c) 02A6 (d) 01FD
(e) 0001 (f) EF00
- 6-16. 16,849 locations
- 6-17. (a) 119 (b) +119 (c) 229; -27