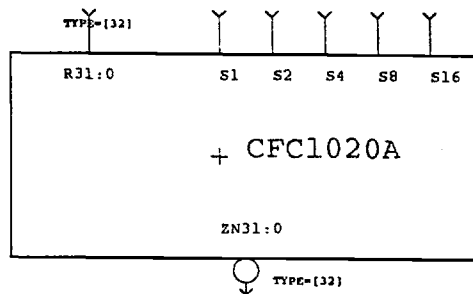


CFC1020A 32-bit Barrel Shifter

DESCRIPTION: CFC1020A performs a 32-bit end-around shift, or what is commonly known as a barrel shift. There are five control lines (S1, S2, S4, S8, and S16) to determine how many places to the left the 32-bit inputs (R31 through R0) will be shifted at the outputs (ZN31 through ZN0). All the outputs are out-of-phase with the inputs.

LOGIC SYMBOL:**INPUTS (LOADING IN TRANSISTOR PAIRS):**

R31(8), R30(8), R29(8), R28(8), R27(8), R26(8), R25(8),
 R24(8), R23(8), R22(8), R21(8), R20(8), R19(8), R18(8),
 R17(8), R16(8), R15(8), R14(8), R13(8), R12(8), R11(8),
 R10(8), R9(8), R8(8), R7(8), R6(8), R5(8), R4(8),
 R3(8), R2(8), R1(8), R0(8), S1(5), S2(5), S4(5), S8(5),
 S16(5)

OUTPUTS (DRIVE IN (#P, #N)):

ZN31(0.5,0.5), ZN30(0.5,0.5), ZN29(0.5,0.5), ZN28(0.5,0.5),
 ZN27(0.5,0.5), ZN26(0.5,0.5), ZN25(0.5,0.5), ZN24(0.5,0.5),
 ZN23(0.5,0.5), ZN22(0.5,0.5), ZN21(0.4,0.5), ZN20(0.5,0.5),
 ZN19(0.5,0.5), ZN18(0.5,0.5), ZN17(0.5,0.5), ZN16(0.5,0.5),
 ZN15(0.5,0.5), ZN14(0.5,0.5), ZN13(0.5,0.5), ZN12(0.5,0.5),
 ZN11(0.5,0.5), ZN10(0.5,0.5), ZN9(0.5,0.5), ZN8(0.5,0.5),
 ZN7(0.5,0.5), ZN6(0.5,0.5), ZN5(0.5,0.5), ZN4(0.5,0.5),
 ZN3(0.5,0.5), ZN2(0.5,0.5), ZN1(0.5,0.5), ZN0(0.5,0.5)

GATE COUNT:

GATES USED = 351
 AREA USED = 359

TRUTH TABLE:

S16	S8	S4	S2	S1	ZN31	ZN30	ZN29	ZN28	ZN27	ZN26	ZN25	ZN24	ZN23	ZN22	ZN21	ZN20	ZN19	ZN18	ZN17	ZN16
0	0	0	0	0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16
0	0	0	0	1	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15
0	0	0	1	0	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14
0	0	0	1	1	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13
0	1	0	0	0	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12
0	1	0	0	1	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11
0	1	0	1	0	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10
0	1	0	1	1	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9
0	0	1	0	0	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8
0	0	1	0	1	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7
0	0	1	1	0	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6
0	0	1	1	1	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5
0	1	1	0	0	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4
0	1	1	0	1	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3
0	1	1	1	0	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2
0	1	1	1	1	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1
1	0	0	0	0	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0
1	0	0	0	1	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31
1	0	0	1	0	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30
1	0	0	1	1	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29
1	1	0	0	0	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28
1	1	0	0	1	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27
1	1	0	1	0	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26
1	1	0	1	1	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25
1	0	1	0	0	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24
1	0	1	0	1	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23
1	0	1	1	0	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22
1	0	1	1	1	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21
1	1	1	0	0	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20
1	1	1	0	1	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19
1	1	1	1	0	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18
1	1	1	1	1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17

S16	S8	S4	S2	S1	ZN15	ZN14	ZN13	ZN12	ZN11	ZN10	ZN9	ZN8	ZN7	ZN6	ZN5	ZN4	ZN3	ZN2	ZN1	ZN0
0	0	0	0	0	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0
0	0	0	0	1	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31
0	0	0	1	0	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30
0	0	0	1	1	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29
0	1	0	0	0	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28
0	1	0	0	1	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27
0	1	0	1	0	R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26
0	1	0	1	1	R8	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25
0	0	1	0	0	R7	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24
0	0	1	0	1	R6	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23
0	0	1	1	0	R5	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22
0	0	1	1	1	R4	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21
0	1	1	0	0	R3	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20
0	1	1	0	1	R2	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19
0	1	1	1	0	R1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18
0	1	1	1	1	R0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17
1	0	0	0	0	R31	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16
1	0	0	0	1	R30	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15
1	0	0	1	0	R29	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14
1	0	0	1	1	R28	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13
1	1	0	0	0	R27	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12
1	1	0	0	1	R26	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11
1	1	0	1	0	R25	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10
1	1	0	1	1	R24	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9
1	0	1	0	0	R23	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8
1	0	1	0	1	R22	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7
1	0	1	1	0	R21	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6
1	0	1	1	1	R20	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5
1	1	1	0	0	R19	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4
1	1	1	0	1	R18	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3
1	1	1	1	0	R17	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2
1	1	1	1	1	R16	R15	R14	R13	R12	R11	R10	R9	R8	R7	R6	R5	R4	R3	R2	R1

AC CHARACTERISTICS*:

PATH	10K TYP. DELAY (NS)
R(I) TO OUTPUT ZN(I)	6.9
S(I) TO OUTPUT ZN(I)	9.1

*ASSUMING OUTPUT LOADING OF 3