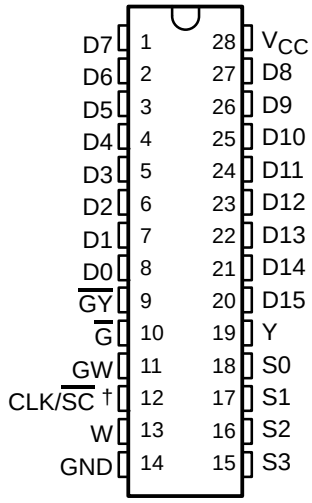
- **4-Line to 1-Line Data Selectors/Multiplexers That Can Select 1 of 16 Data Inputs Typical Applications:**
  - **Boolean Function Generators**
  - **Parallel-to-Serial Converters**
  - **Data Source Selectors**
- **Cascadable to n-Bits**
- **3-State Bus Driver Outputs**
- **'AS850A Offers Clocked Selects; 'AS851B Offers Enable-Controlled Selects**
- **Has a Master Output Control ($\overline{G}$) for Cascading and individual Output Controls ($\overline{GY}$, GW) for Each Output**
- **Package Option Includes 600-mil Standard Plastic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

SN74AS850A, SN74AS851B . . . N PACKAGE
(TOP VIEW)



† CLK for 'AS850A or $\overline{SC}$ for 'AS851B

description

These four-line to one-line data selectors/multiplexers provide full binary decoding to select one-of-sixteen data sources with complementary Y and W outputs. The 'AS850A has a clock-controlled select register allowing for a symmetrical presentation of the select inputs to the decoder while the 'AS851B has an enable-controlled select register allowing the user to select and hold one particular data line.

A buffered group of output controls ($\overline{G}$, $\overline{GY}$, GW) can be used to place the two outputs in either a normal logic (high or low logic level) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance third state and increased drive provide the capability to drive the bus lines in a bus-organized system without the need for interface or pullup components.

The output controls do not affect the internal operations of the data selector/multiplexer. New data can be setup while the outputs are in the high-impedance state.

The SN74AS850A and SN74AS851B are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUT SELECTION TABLE

SELECT INPUTS				'AS850A	'AS851B	INPUT SELECTED
S3	S2	S1	S0	CLK	$\overline{SC}$	
L	L	L	L	↑	L	D0
L	L	L	H	↑	L	D1
L	L	H	L	↑	L	D2
L	L	H	H	↑	L	D3
L	H	L	L	↑	L	D4
L	H	L	H	↑	L	D5
L	H	H	L	↑	L	D6
L	H	H	H	↑	L	D7
H	L	L	L	↑	L	D8
H	L	L	H	↑	L	D9
H	L	H	L	↑	L	D10
H	L	H	H	↑	L	D11
H	H	L	L	↑	L	D12
H	H	L	H	↑	L	D13
H	H	H	L	↑	L	D14
H	H	H	H	↑	L	D15
X	X	X	X	H or L	H	Dn

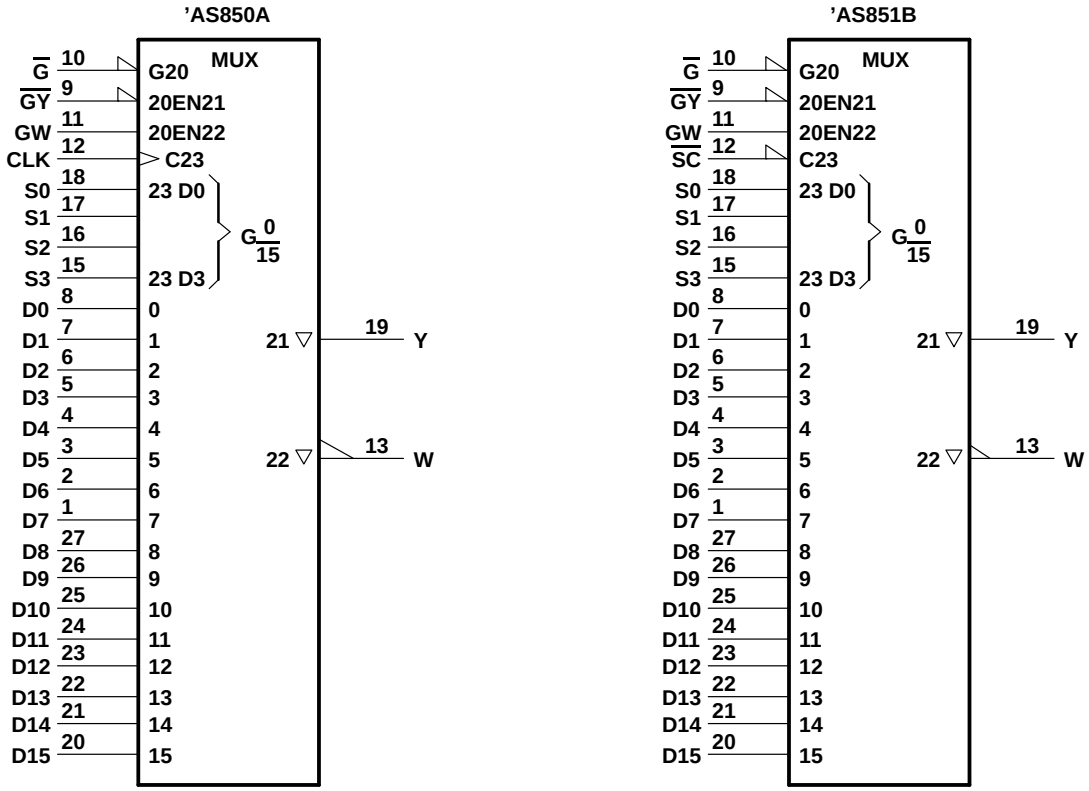
D = the input selected before the most-recent low-to-high transition of CLK or SC.

OUTPUT FUNCTION TABLE

$\overline{G}$	$\overline{GY}$	GW	OUTPUTS Y	W
H	X	X	Z	Z
L	H	L	Z	Z
L	L	L	D	Z
L	H	H	Z	D
L	L	H	D	D

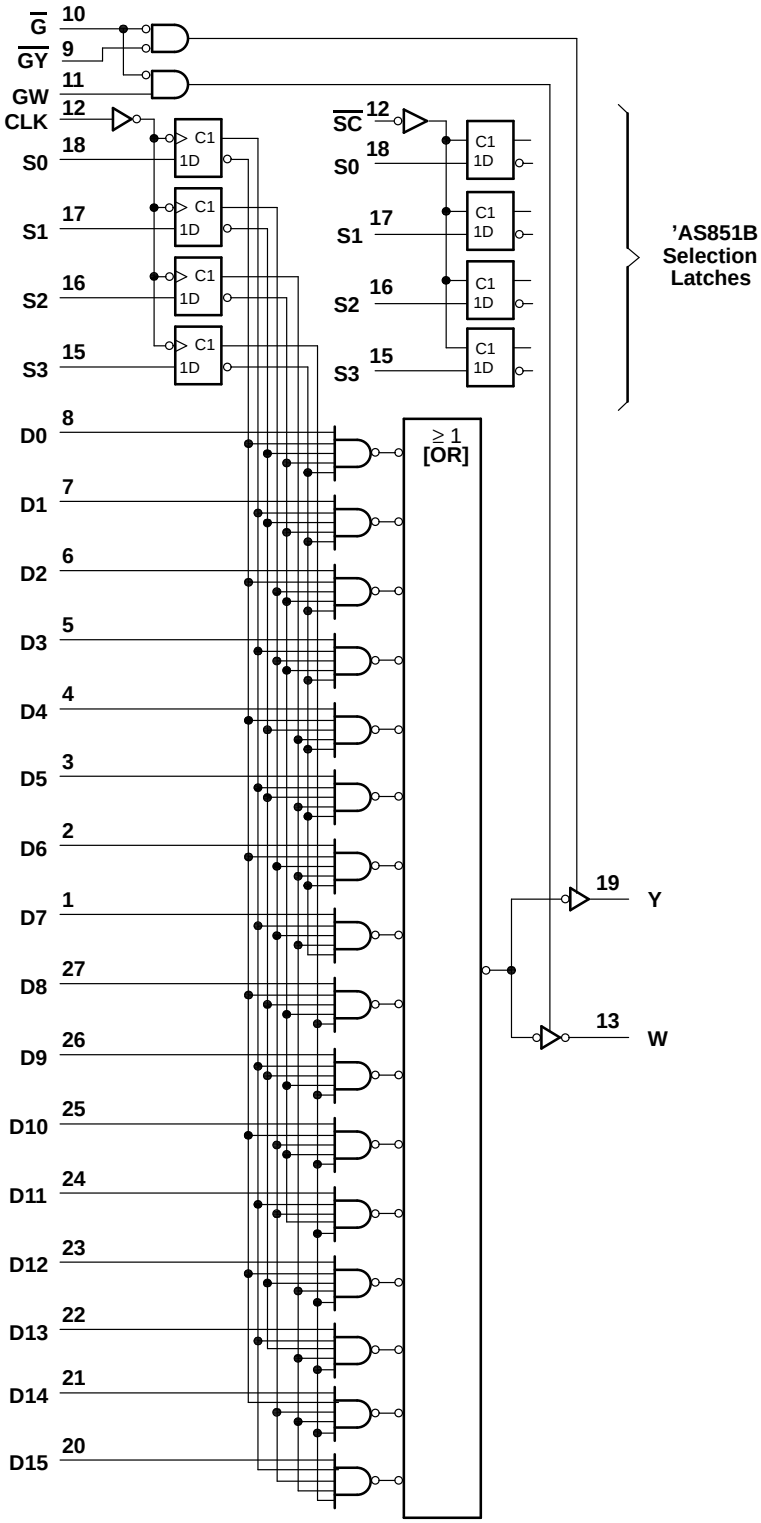
D = level of selected input D0 – D15

logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

'AS850A logic diagram (positive logic) (see inset for 'AS851B)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} . . . . . 7 V
Input voltage . . . . . 7 V
Operating free-air temperature range: . . . . . 0°C to 70°C
Storage temperature range . . . . . –65°C to 150°C

SN74AS850A recommended operating conditions

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		4.5	5	5.5	V
V_{IH}	High-level input voltage		2			V
V_{IL}	Low-level input voltage				0.8	V
I_{OH}	High-level output current				–15	mA
I_{OL}	Low-level output current				48	mA
f_{clock}	Clock frequency		0		60	MHz
t_w	Pulse duration	CLK high	8			ns
		CLK low	8			
t_{su}	Setup time, select inputs before CLK↑		10			ns
t_h	Hold time, select inputs after CLK↑		0			ns
T_A	Operating free-air temperature		0		70	°C

SN74AS850A electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP‡	MAX	UNIT
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2	V
V_{OH}		V_{CC} = 4.5 V,	I_{OH} = –2 mA	2.5			V
		V_{CC} = 4.5 V,	I_{OH} = –15 mA	2	3.3		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 48 mA		0.35	0.5	V
I_{OZH}		V_{CC} = 5.5 V,	V_O= 2. 7 V			50	µA
I_{OZL}		V_{CC} = 4.5 V,	V_O = 0.4 V			–50	µA
I_I		V_{CC} = 5.5 V,	V_I = 7 V			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20	µA
I_{IL}	D, G	V_{CC} = 5.5 V,	V_I = 0 .4 V			–1	mA
	All others					–0.5	
I_O‡		V_{CC} = 5.5 V,	V_O= 2.25 V	–30		–112	mA
I_{CC}		V_{CC} = 5.5 V	Outputs active		50	81	mA
			Outputs disabled		52	85	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit current, I_{OS}.

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 0°C to 70°C		UNIT
			MIN	MAX	
f_{max}			60		MHz
t_{PLH}	Any D	Y	3	10.5	ns
t_{PHL}			3	11	
t_{PLH}	Any D	W	3	8.5	ns
t_{PHL}			1	8.5	
t_{PLH}	CLK	Y	3	14.5	ns
t_{PHL}			3	17.5	
t_{PLH}	CLK	W	3	15	ns
t_{PHL}			3.5	13	
t_{PZH}	$\overline{G}$	Y	2	9.5	ns
t_{PZL}			3	11	
t_{PHZ}	$\overline{G}$	Y	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\overline{G}$	W	2	9	ns
t_{PZL}			3	10	
t_{PHZ}	$\overline{G}$	W	1	6	ns
t_{PLZ}			2	9	
t_{PZH}	$\overline{GY}$	Y	2	9	ns
t_{PZL}			3	11.5	
t_{PHZ}	$\overline{GY}$	Y	1	6	ns
t_{PLZ}			2	9	
t_{PZH}	GW	W	2	10	ns
t_{PZL}			3	12	
t_{PHZ}	GW	W	1	6	ns
t_{PLZ}			2	11	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of *ALS/AS Logic Data Book*, 1986.

recommended operating conditions

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			–15	mA
I_{OL}	Low-level output current			48	mA
t_w	Pulse duration, $\overline{SC}$ low	10			ns
t_{su}	Setup time, select inputs before $\overline{SC}\uparrow$	4.5			ns
t_h	Hold time, select inputs after $\overline{SC}\uparrow$	0			ns
T_A	Operating free-air temperature	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP‡	MAX	UNIT
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2	V
V_{OH}		V_{CC} = 4.5 V,	I_{OH} = –2 mA	2.5			V
		V_{CC} = 4.5 V,	I_{OH} = –15 mA	2	3.3		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 48 mA		0.35	0.5	V
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2. 7 V			50	µA
I_{OZL}		V_{CC} = 5.5 V,	V_O = 0.4 V			–50	µA
I_I		V_{CC} = 5.5 V,	V_I = 7 V			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20	µA
I_{IL}	D, $\overline{G}$	V_{CC} = 5.5 V,	V_I = 0 .4 V			–1	mA
	All others					–0.5	
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	–30		–112	mA
I_{CC}		V_{CC} = 5.5 V	Outputs active		50	81	mA
			Outputs disabled		52	85	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit current, I_{OS}.

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX		UNIT
			MIN	MAX	
t_{PLH}	Any D	Y	3	10.5	ns
t_{PHL}			3	11	
t_{PLH}	Any D	W	3	8	ns
t_{PHL}			1	8	
t_{PLH}	S0, S1, S2, S3	Y	3	18	ns
t_{PHL}			3	19	
t_{PLH}	S0, S1, S2, S3	W	3	16	ns
t_{PHL}			3	15	
t_{PLH}	$\overline{SC}$	Y	3	18	ns
t_{PHL}			3	20	
t_{PLH}	$\overline{SC}$	W	3	16	ns
t_{PHL}			3	15	
t_{PZH}	$\overline{G}$	Y	2	8	ns
t_{PZL}			3	11	
t_{PHZ}	$\overline{G}$	Y	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\overline{G}$	W	2	8	ns
t_{PZL}			3	10	
t_{PHZ}	$\overline{G}$	W	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\overline{GY}$	Y	2	8	ns
t_{PZL}			3	11	
t_{PHZ}	$\overline{GY}$	Y	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	GW	W	2	10	ns
t_{PZL}			3	12	
t_{PHZ}	GW	W	1	6.5	ns
t_{PLZ}			2	11	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of *ALS/AS Logic Data Book*, 1986.

TYPICAL APPLICATION DATA

The ’AS850A or ’AS851B can be used as a 1-of-16 Boolean function generator. Figure 1 shows the ’AS850A in one example.

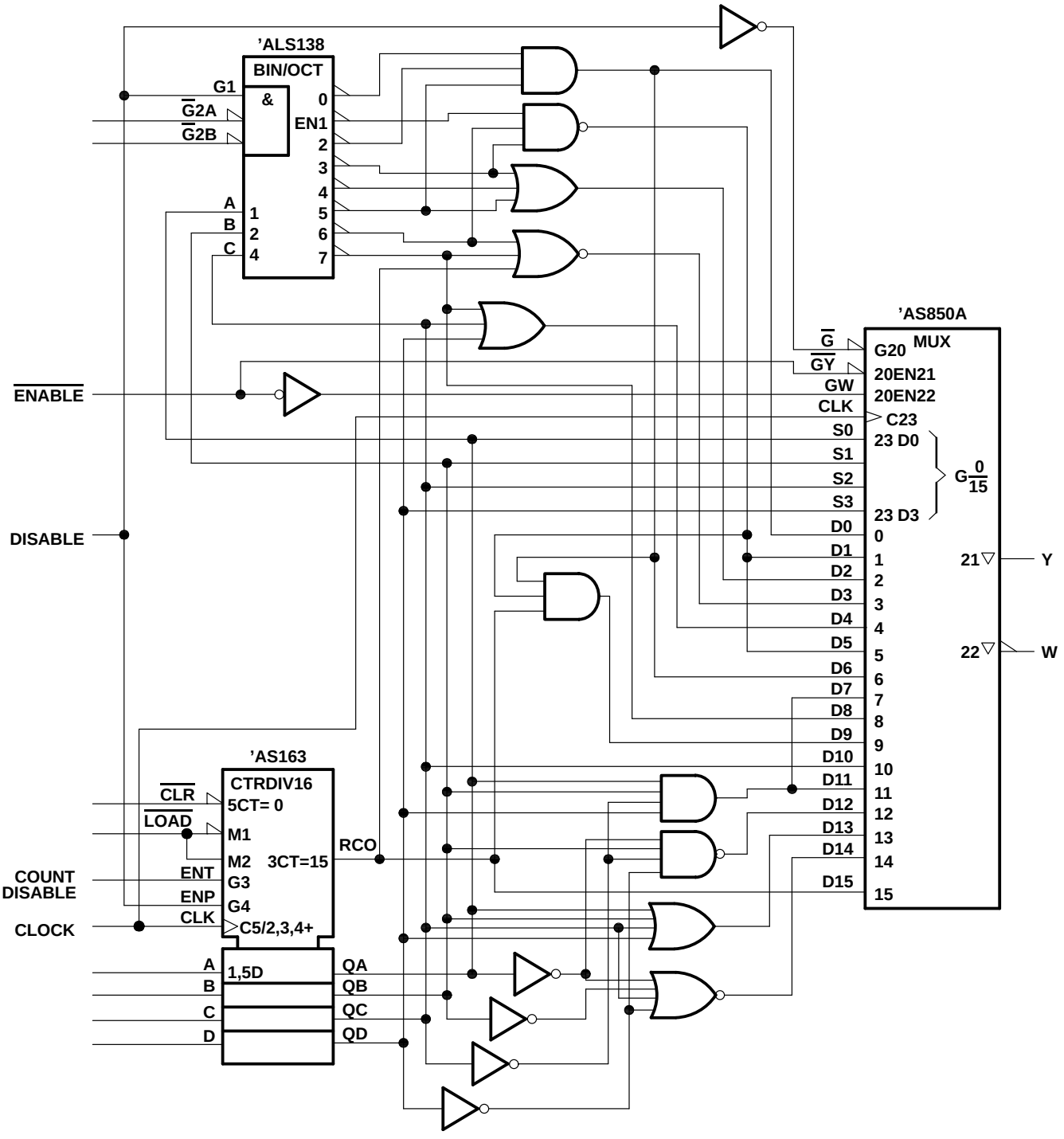


Figure 1. 1 - of - 16 Boolean Function Generator

TYPICAL APPLICATION DATA

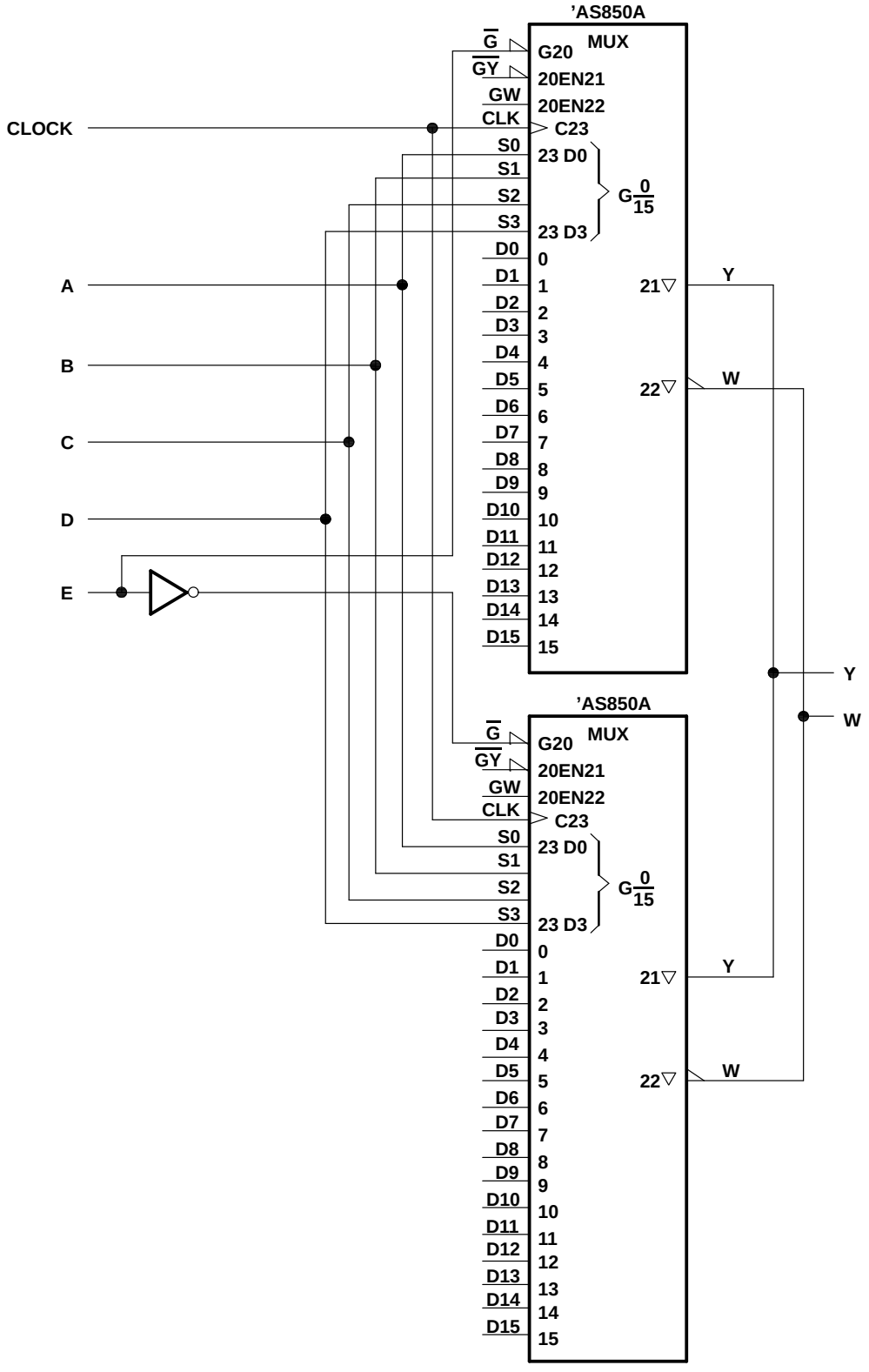


Figure 2. 1 - of - 32 Data/Selector/Multiplexer

TYPICAL APPLICATION DATA

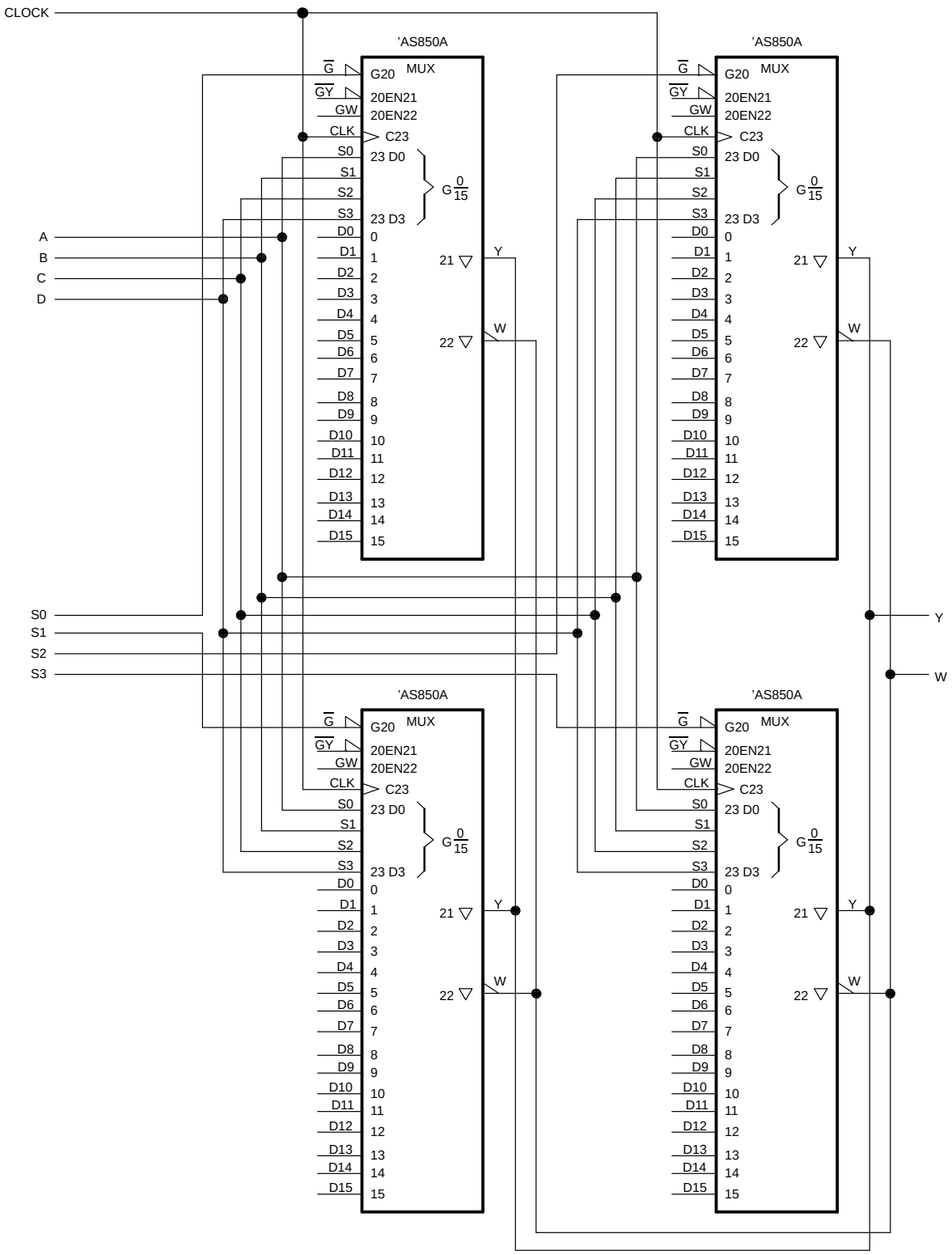


Figure 3. 1 - of - 64 Data Selector/Multiplexer

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