

SN74AS850, SN74AS851 1 OF 16 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

D2822, DECEMBER 1983 REVISED JANUARY 1986

- 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
- 'AS850 Offers Clocked Selects; 'AS851 Offers Enable-Controlled Selects
- Has a Master Output Control ($\bar{G}$) for Cascading and Individual Output Controls ($\bar{G}Y$, GW) for Each Output
- Package Options Include Plastic "Small Outline" Packages, Both Plastic and Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

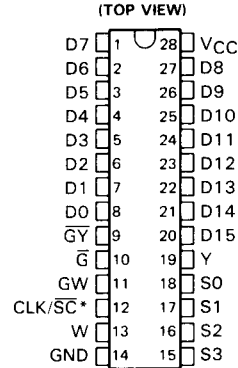
These four-line to one-line data selectors/multiplexers provide full binary decoding to select one-of-sixteen data sources with complementary Y and W outputs. The 'AS850 has a clock-controlled select register allowing for a symmetrical presentation of the select inputs to the decoder while the 'AS851 has an enable-controlled select register allowing the user to select and hold one particular data line.

A buffered group of output controls ($\bar{G}$, $\bar{G}Y$, 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 pull-up components.

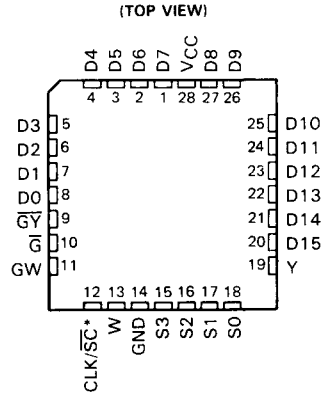
The output controls do not affect the internal operations of the data selector/multiplexer. New data can be setup while the outputs are in the high-impedance state.

The SN74AS850 and SN74AS851 are characterized for operation from 0°C to 70°C.

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*CLK for 'AS850 or $\bar{S}C$ for 'AS851

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PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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INPUT SELECTION TABLE

SELECT INPUTS				'AS850	'AS851	INPUT SELECTED
S3	S2	S1	S0	CLK	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

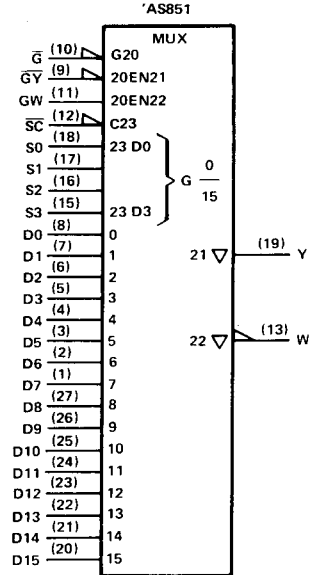
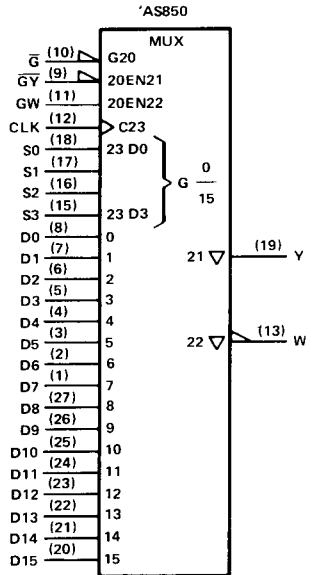
Dn = the input selected before the most-recent low-to-high transition of CLK or SC.

OUTPUT FUNCTION TABLE

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

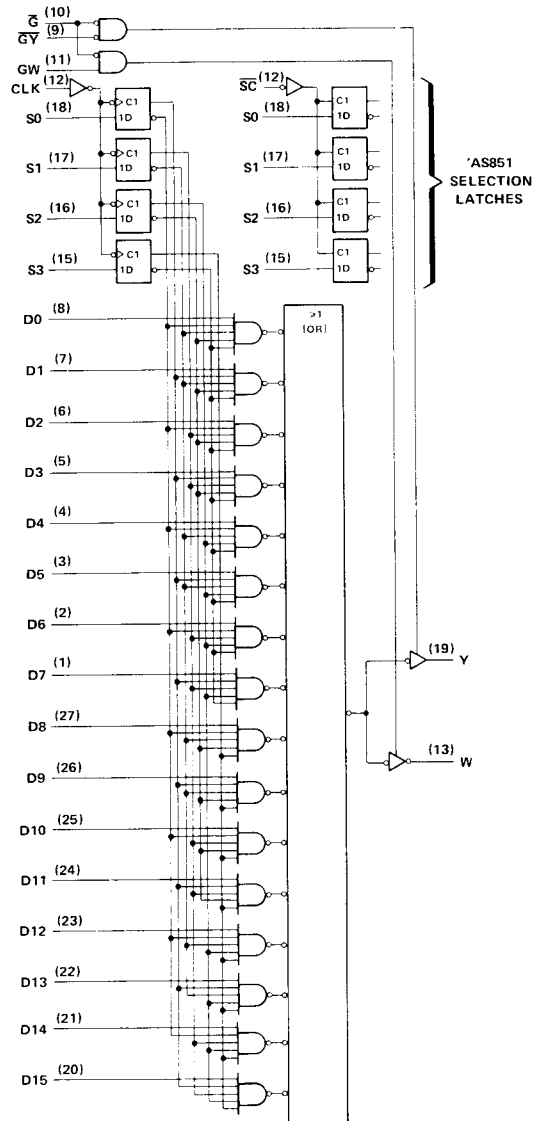
D = level of selected input D0–D15

logic symbols†



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

'AS850 logic diagrams (positive logic) (see inset for 'AS851)



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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

SN74AS850 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

SN74AS850 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 to 5.5 V,		I _{OH} = -2 mA		V _{CC} - 2	V
		V _{CC} = 4.5 V,		I _{OH} = -15 mA			
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, $\bar{G}$	V _{CC} = 5.5 V,		V _I = 0.4 V		-1	mA
	-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	mA
				Outputs disabled		52	

† All typical values are at $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.

‡ The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit current, I_{OS} .

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SN74AS850 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$ $C_L = 50 \text{ pF},$ $R_1 = 500 \Omega,$ $R_2 = 500 \Omega,$ $T_A = 0^\circ\text{C to } 70^\circ\text{C}$		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	ns
t_{PHL}			1	6	
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}	$\bar{G}$	Y	2	8	ns
t_{PZL}			3	11	
t_{PHZ}	$\bar{G}$	Y	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\bar{G}$	W	2	8	ns
t_{PZL}			3	21	
t_{PHZ}	$\bar{G}$	W	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	$\bar{G}\bar{Y}$	Y	2	8	ns
t_{PZL}			3	11	
t_{PHZ}	$\bar{G}\bar{Y}$	Y	1	6	ns
t_{PLZ}			2	8	
t_{PZH}	GW	W	2	10	ns
t_{PZL}			3	25	
t_{PHZ}	GW	W	1	6	ns
t_{PLZ}			2	11	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

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SN74AS851 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 $\overline{SC}^\dagger$	4.5			ns
t_h Hold time, select inputs after $\overline{SC}^\dagger$	0			ns
T_A Operating free-air temperature	0		70	°C

SN74AS851 electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS		MIN	TYP [†]	MAX	UNIT
V_{IK}	$V_{CC} = 4.5 \text{ V}$,	$I_I = -18 \text{ mA}$			-1.2	C
V_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$,	$I_{OH} = -2 \text{ mA}$	$V_{CC} - 2$			V
	$V_{CC} = 4.5 \text{ V}$,	$I_{OH} = -15 \text{ mA}$	2	3.3		
V_{OL}	$V_{CC} = 4.5 \text{ V}$,	$I_{OL} = 48 \text{ mA}$		0.35	0.5	V
I_{OZH}	$V_{CC} = 5.5 \text{ V}$,	$V_O = 2.7 \text{ V}$			50	μA
I_{OZL}	$V_{CC} = 5.5 \text{ V}$,	$V_O = 0.4 \text{ V}$			-50	μA
I_I	$V_{CC} = 5.5 \text{ V}$,	$V_I = 7 \text{ V}$			0.1	mA
I_{IH}	$V_{CC} = 5.5 \text{ V}$,	$V_I = 2.7 \text{ V}$			20	μA
I_{IL}	D, $\overline{G}$	$V_{CC} = 5.5 \text{ V}$,	$V_I = 0.4 \text{ V}$		-1	mA
	All others				-0.5	
$I_{O^\dagger}$	$V_{CC} = 5.5 \text{ V}$,	$V_O = 2.25 \text{ V}$	-30		-112	mA
I_{CC}	$V_{CC} = 5.5 \text{ V}$	Outputs active		50	81	mA
		Outputs disabled		52	85	

[†] All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

[‡] The output conditions have been chosen to produce a current that closely approximates one-half of the true short-circuit current, I_{OS} .

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WITH 3-STATE OUTPUTS

SN74AS851 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 0 °C to 70 °C		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	6	
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	21	
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 _{PLL}			2	8	
t _{PZH}	GW	W	2	10	ns
t _{PZL}			3	25	
t _{PHZ}	GW	W	1	6	ns
t _{PLZ}			2	11	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

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TYPICAL APPLICATION DATA

The 'AS850 or 'AS851 can be used as a 1-of-16 Boolean function generator. Figure 1 shows the 'AS850 in one example.

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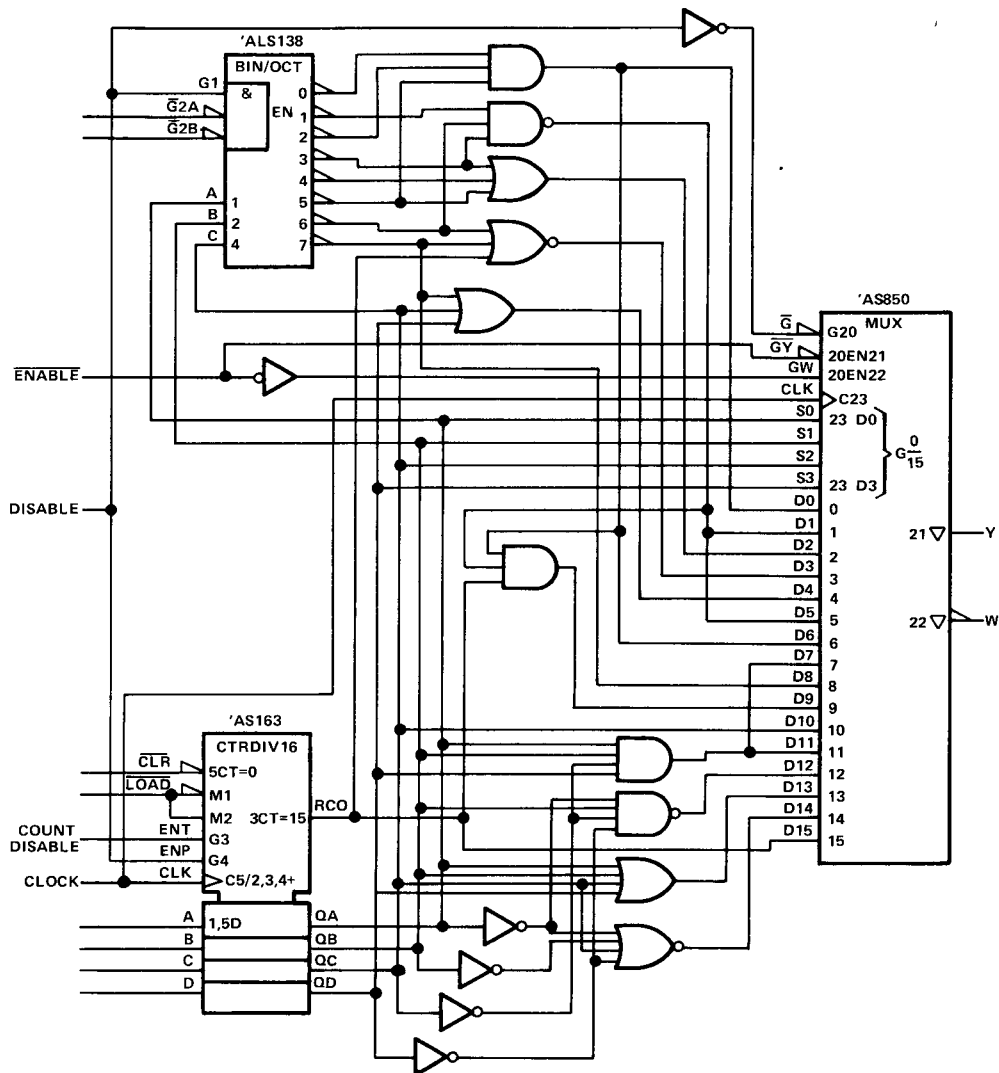


FIGURE 1. 1-of-16 BOOLEAN FUNCTION GENERATOR

TYPICAL APPLICATION DATA

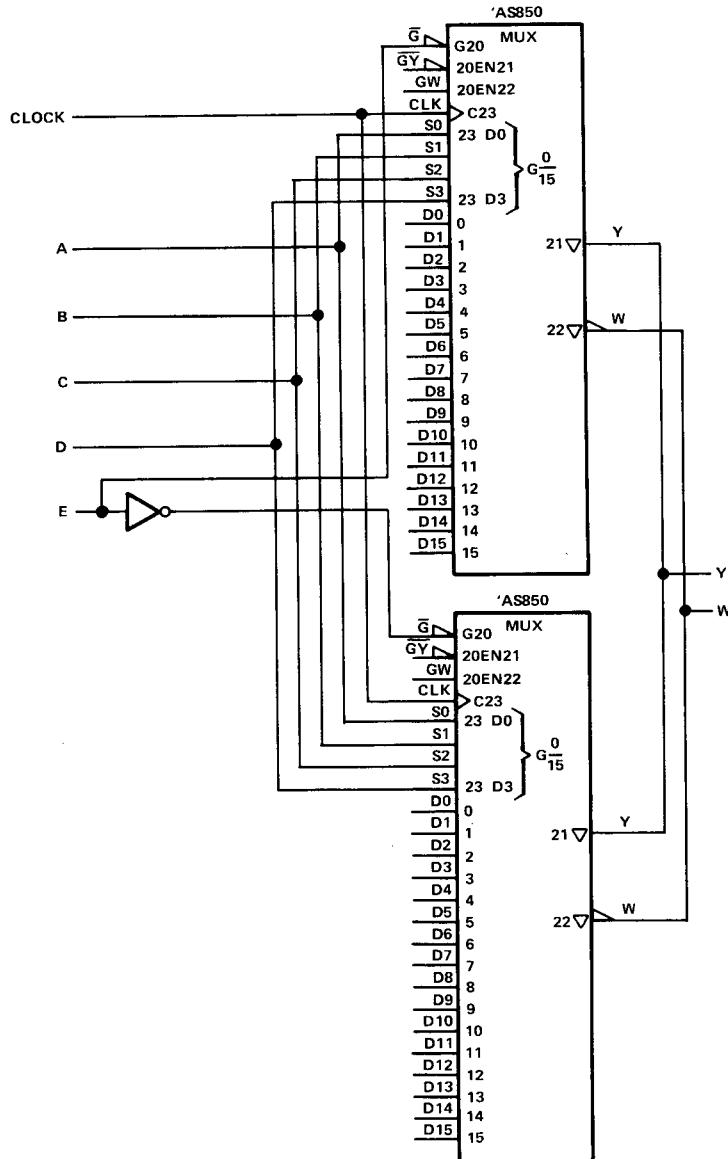


FIGURE 2. 1-of-32 DATA SELECTOR/MULTIPLEXER

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TYPICAL APPLICATION DATA

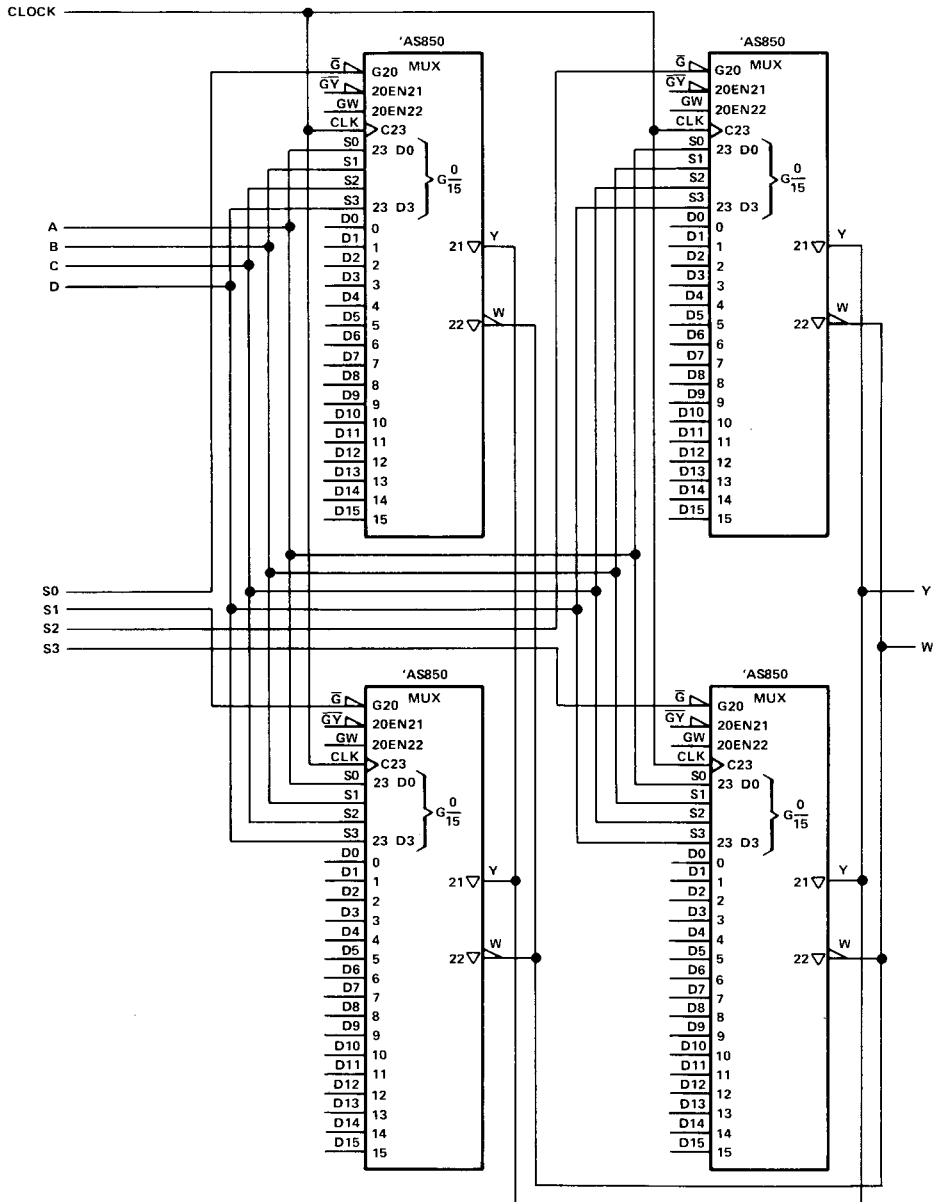


FIGURE 3. 1-of-64 DATA SELECTOR/MULTIPLEXER

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