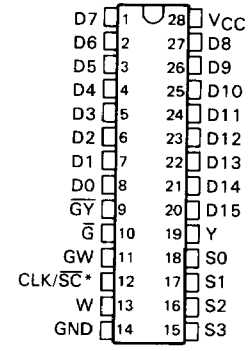
D2822, DECEMBER 1983—REVISED JANUARY 1986

- 4-Line to 1-Line Data Selectors/Multiplexers That Can Select 1 of 16 Data Inputs. Typical Applications:

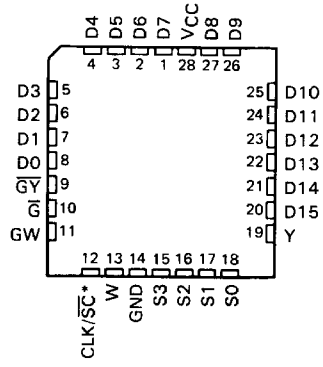
  Boolean Function Generators
  Parallel-to-Serial Converters
  Data Source Selectors

- Cascadable to n-Bits
- 3-State Bus Driver Outputs
- 'AS850 Offers Clocked Selects; 'AS851 Offers Enable-Controlled Selects
- Has a Master Output Control ($\overline{G}$) for Cascading and Individual Output Controls ($\overline{GY}$, GW) for Each Output
- Package Options Include both Plastic and Ceramic Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

SN74AS850, SN74AS851 . . . N PACKAGE
(TOP VIEW)



SN74AS850, SN74AS851 . . . FN PACKAGE
(TOP VIEW)



*CLK for 'AS850 or $\overline{SC}$ for 'AS851

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 ($\overline{G}$, $\overline{GY}$, 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 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.

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
S3	S2	S1	S0	CLK	$\overline{SC}$	SELECTED
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 $\overline{SC}$.

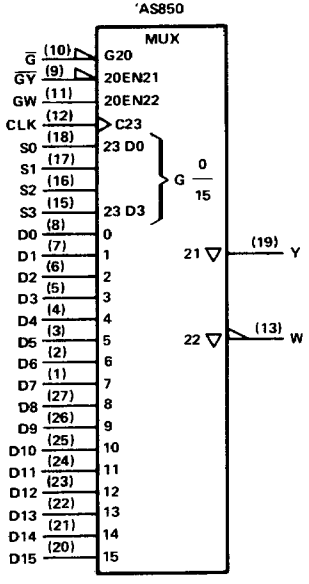
OUTPUT FUNCTION TABLE

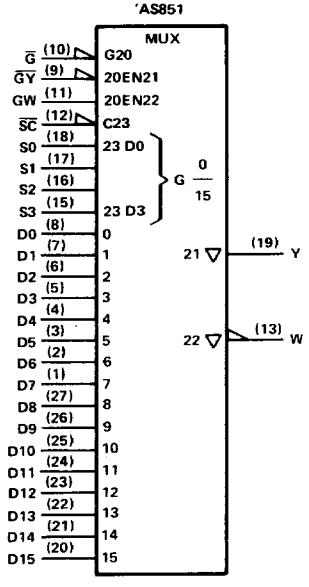
$\overline{G}$	$\overline{GY}$	GW	OUTPUTS Y	W
H	X	X	Z	Z
L	H	L	Z	Z
L	L	L	D	Z
L	H	H	Z	$\overline{D}$
L	L	H	D	$\overline{D}$

D = level of selected input D0—D15

2 LSI Devices

logic symbols†





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

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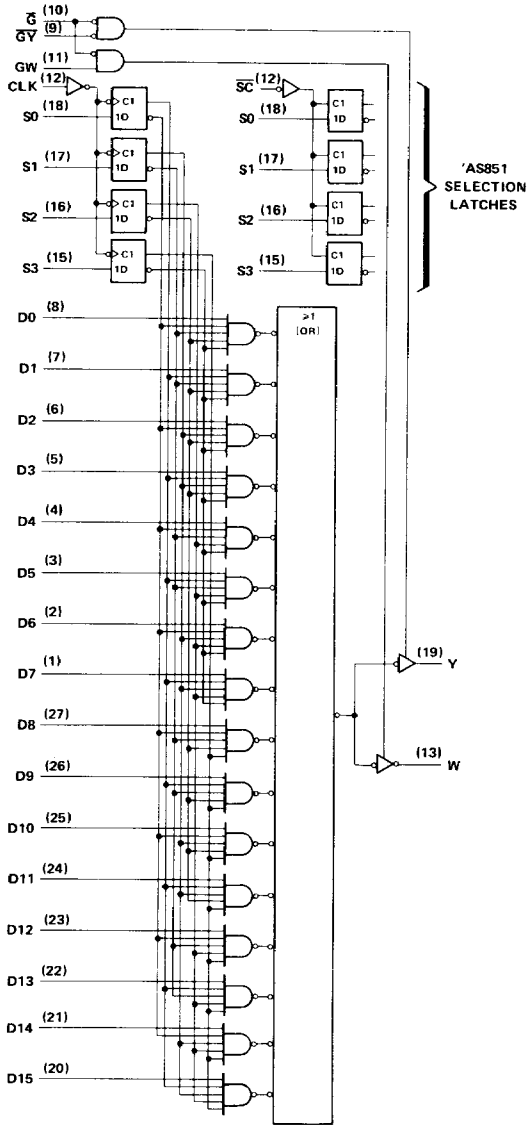
'AS850 logic diagrams (positive logic) (see inset for 'AS851)



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	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}.

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SN74AS850 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	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}	$\overline{G}$	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_{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.

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 $\overline{SC}$↑	4.5			ns
t_h	Hold time, select inputs after $\overline{SC}$↑	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 V,	I_I = −18 mA			−1.2	C
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	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}.

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SN74AS851 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	
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.

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.

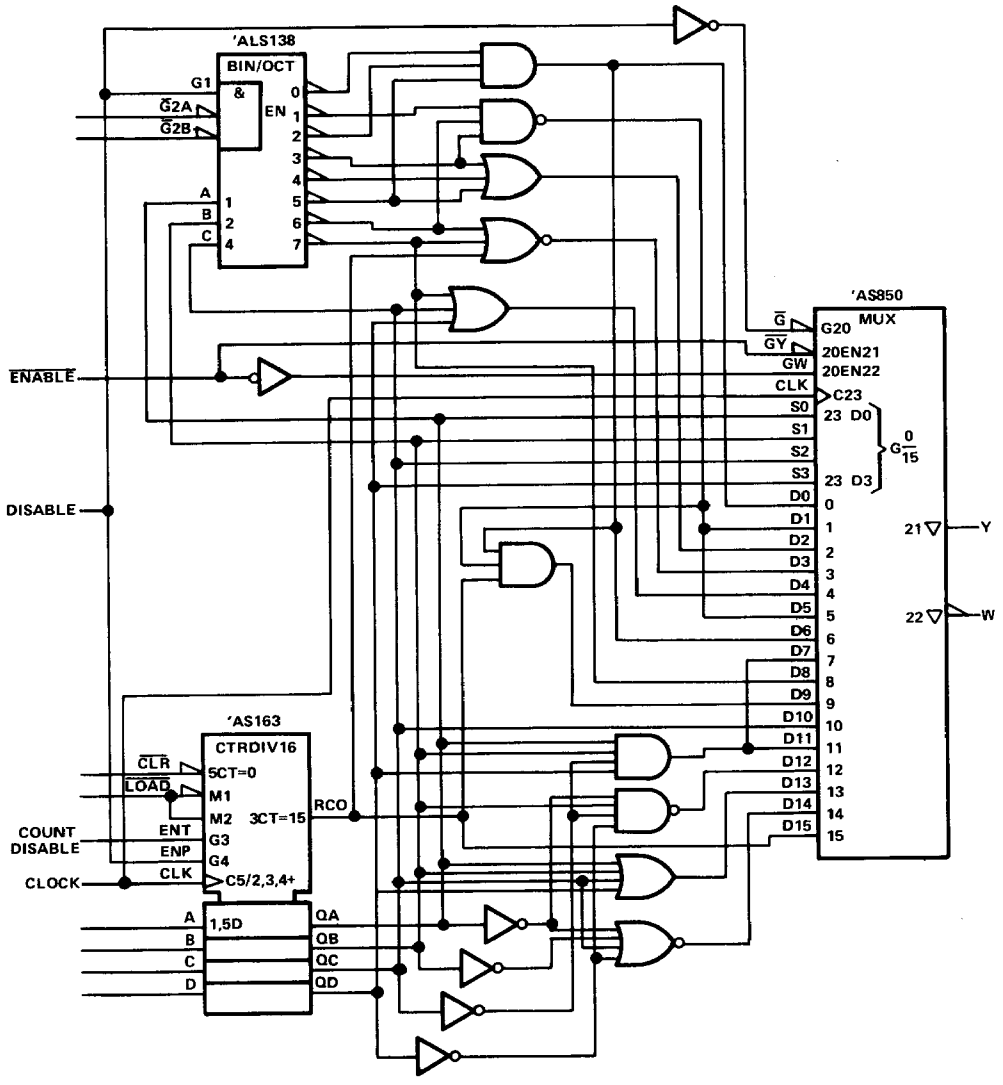

FIGURE 1. 1-of-16 BOOLEAN FUNCTION GENERATOR

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TYPICAL APPLICATION DATA

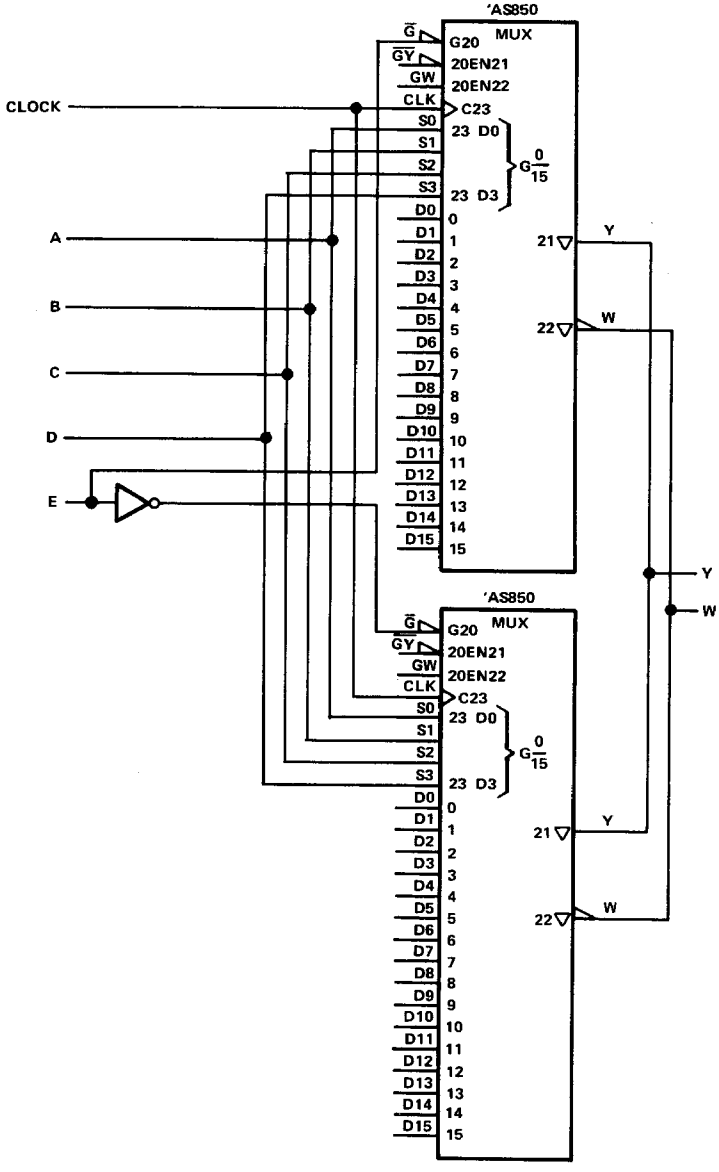

FIGURE 2. 1-of-32 DATA SELECTOR/MULTIPLEXER

TYPICAL APPLICATION DATA

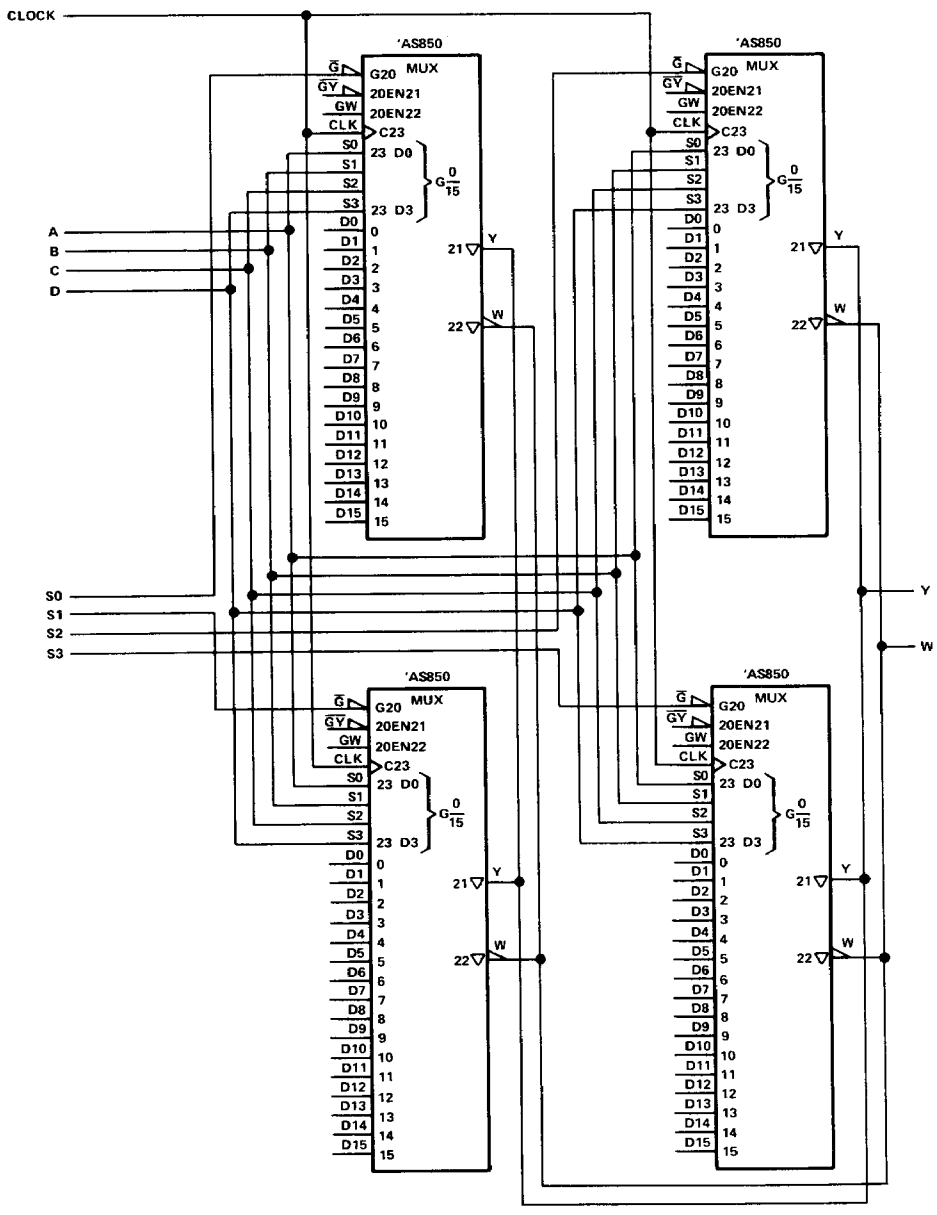

FIGURE 3. 1-of-64 DATA SELECTOR/MULTIPLEXER

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