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 Plastic "Small Outline" Packages, Both Plastic and Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

- **Dependable Texas Instruments Quality and Reliability**

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

D7	1	28	VCC
D6	2	27	D8
D5	3	26	D9
D4	4	25	D10
D3	5	24	D11
D2	6	23	D12
D1	7	22	D13
D0	8	21	D14
$\overline{GY}$	9	20	D15
$\overline{G}$	10	19	Y
GW	11	18	S0
CLK/$\overline{SC}$*	12	17	S1
W	13	16	S2
GND	14	15	S3

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

Top pins: D4 D5 D6 D7 VCC D8 D9 (4 3 2 1 28 27 26)

D3	5	25	D10
D2	6	24	D11
D1	7	23	D12
D0	8	22	D13
$\overline{GY}$	9	21	D14
$\overline{G}$	10	20	D15
GW	11	19	Y

Bottom pins: CLK/$\overline{SC}$* W GND S3 S2 S1 S0 (12 13 14 15 16 17 18)

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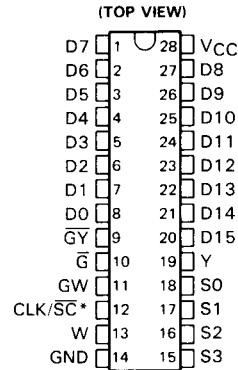
description

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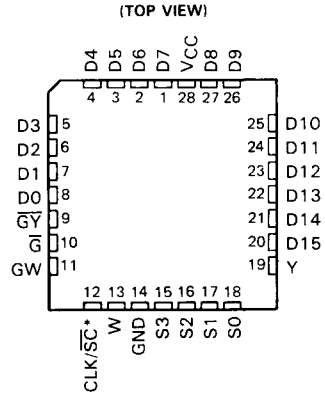
The output controls do not affect the internal operations of the data selector/multiplexer. New data can be setup while the outputs are in the high-impedance state.

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

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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

logic symbols†

'AS850   'AS851
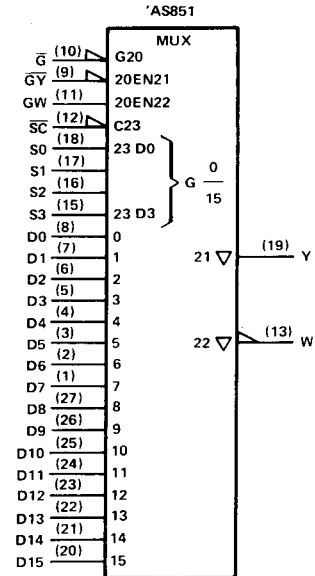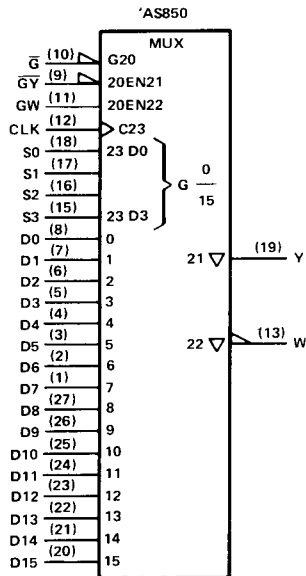
† These symbols are in accordance with ANSI/IEEE Std 91-1984
and IEC Publication 617-12.

'AS850 logic diagrams (positive logic) (see inset for 'AS851)
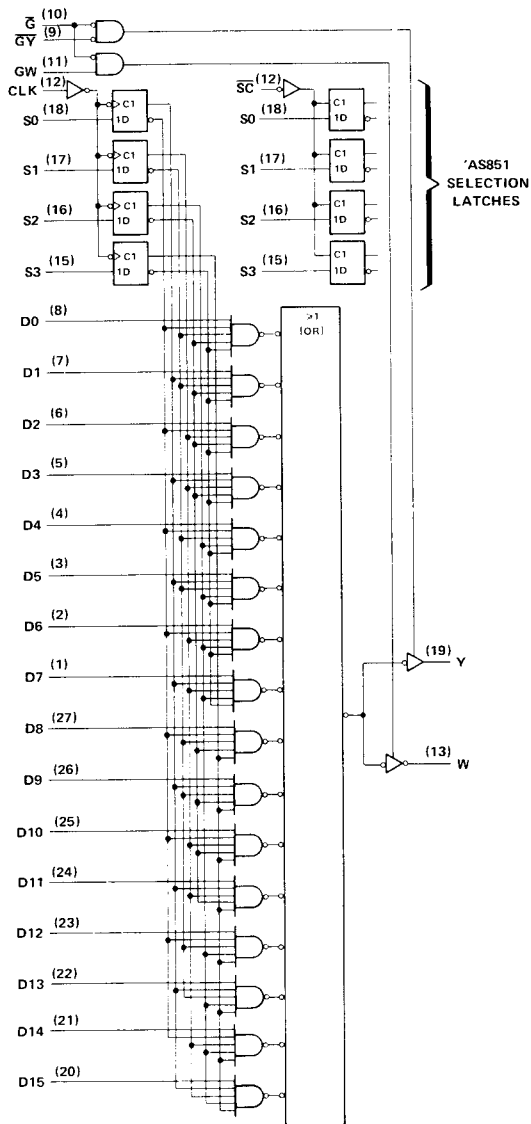
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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

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	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.

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

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.

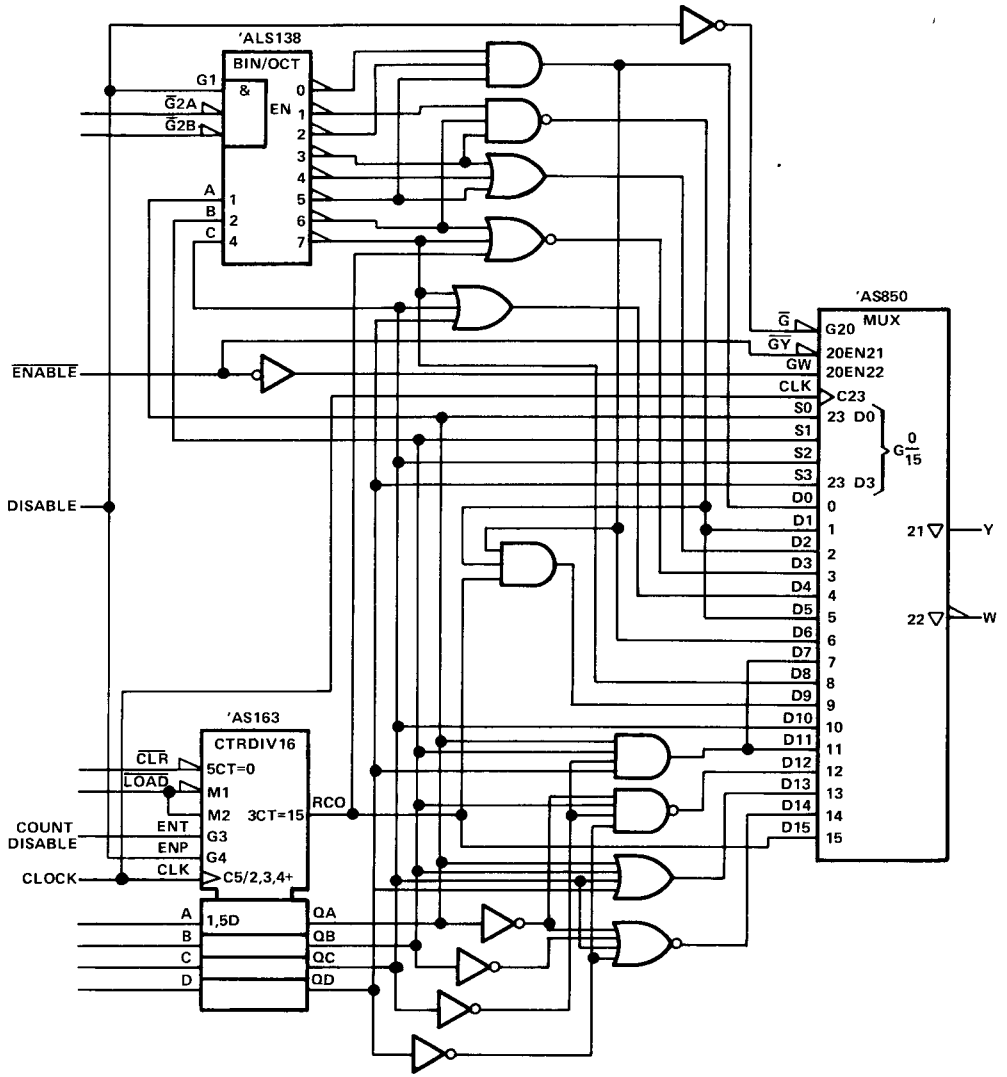**FIGURE 1. 1-of-16 BOOLEAN FUNCTION GENERATOR**

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TYPICAL APPLICATION DATA
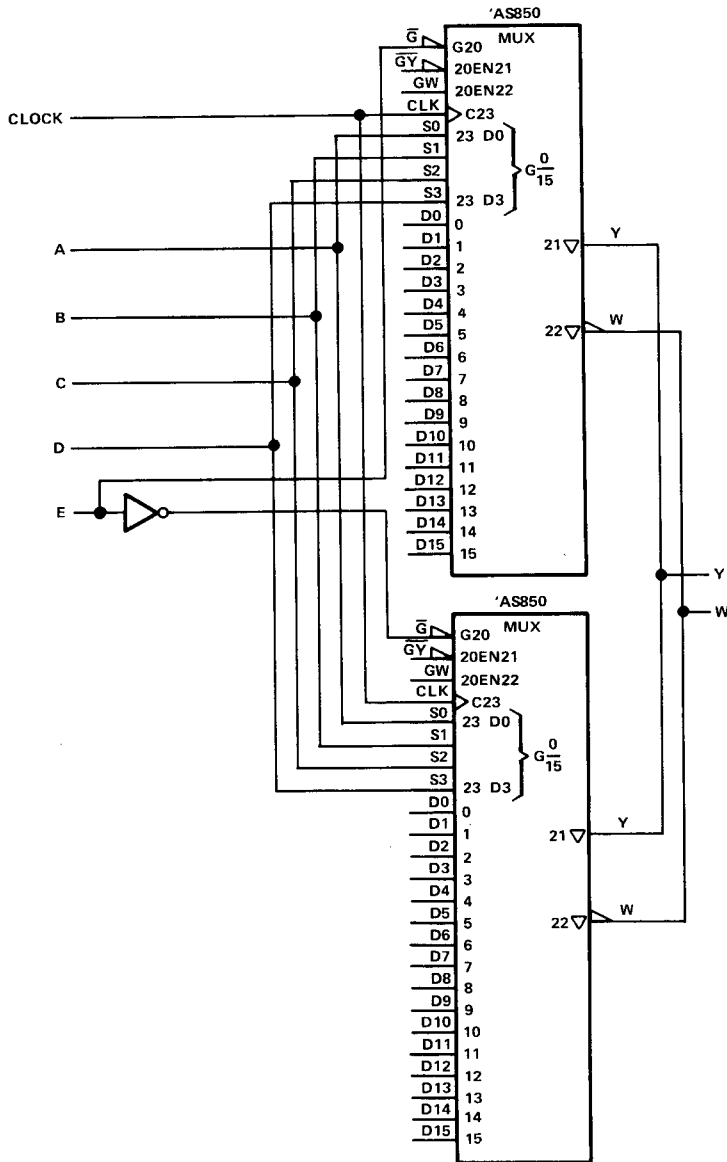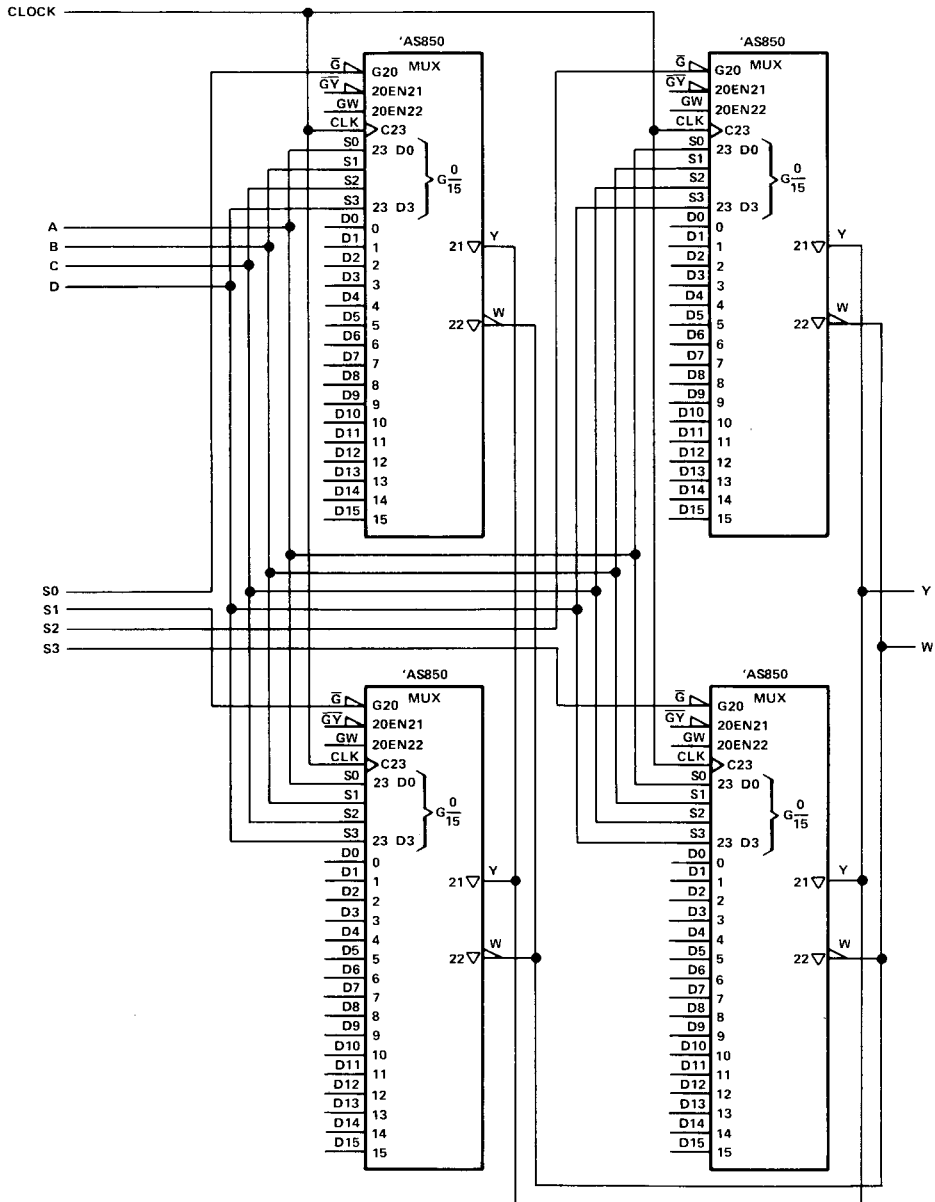

FIGURE 2. 1-of-32 DATA SELECTOR/MULTIPLEXER

TYPICAL APPLICATION DATA

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

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