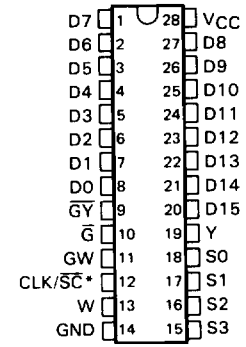
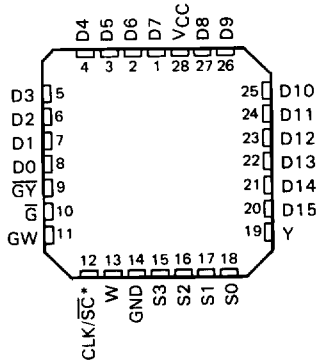
DECEMBER 1983

- 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

SN54AS850, SN54AS851 . . . JD PACKAGE
SN74AS850, SN74AS851 . . . N PACKAGE
(TOP VIEW)



SN54AS850, SN54AS851 . . . FH PACKAGE
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 ($\overline{G}$, $\overline{GY}$, $\overline{GW}$) 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 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 up while the outputs are in the high-impedance state.

The SN54AS850 and SN54AS851 are characterized for operation over the full military temperature range from −55°C to 125°C. The SN74AS850 and SN74AS851 are characterized for operation from 0°C to 70°C.

PRODUCT PREVIEW

This document contains information on a product under development. Texas Instruments reserves the right to change or discontinue this product without notice.

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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 SC.

OUTPUT FUNCTION TABLE

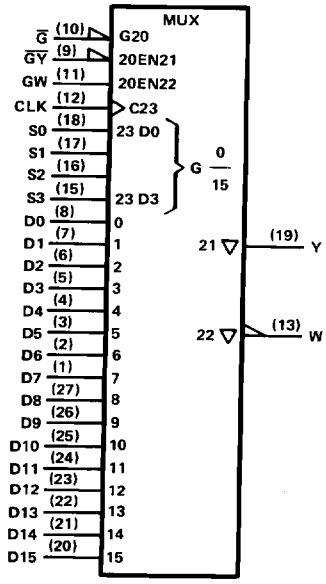
$\overline{G}$	$\overline{GY}$	GW	OUTPUTS Y	OUTPUTS W
H	X	X	Z	Z
L	H	L	Z	Z
L	L	L	D	Z
L	H	H	Z	$\overline{D}$
L	L	H	D	$\overline{D}$

D = level of selected input D0–D15

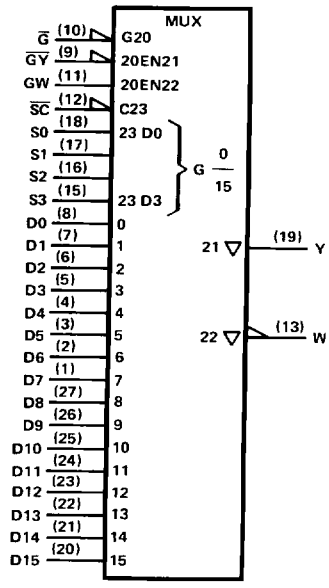
2 ALS AND AS CIRCUITS

logic symbols

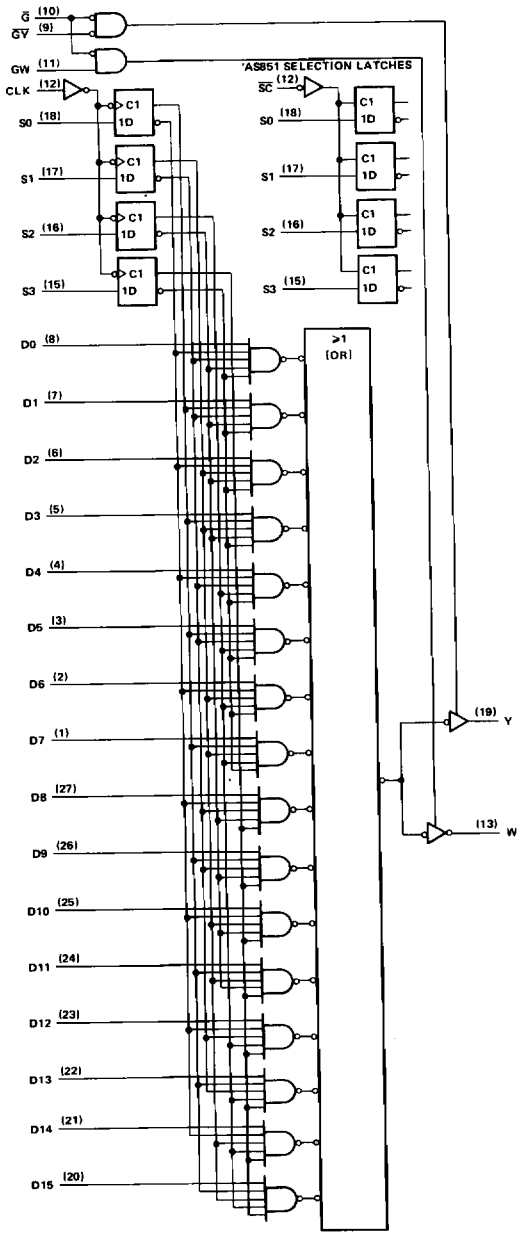
'AS850



'AS851



'AS850 logic diagram (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: SN54AS850, SN54AS851 . . . . . −55°C to 125°C
SN74AS850, SN74AS851 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

			SN54AS850			SN74AS850			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0.8			0.8	V
I_{OH}	High-level output current				−12			−15	mA
I_{OL}	Low-level output current				32			48	mA
f_{clock}	Clock frequency								MHz
t_w	Pulse duration	CLK high							ns
		CLK low							
t_{su}	Setup time, select inputs before CLK↑								ns
t_h	Hold time, select inputs after CLK↑								ns
T_A	Operating free-air temperature		−55		125	0		70	°C

2 ALS AND AS CIRCUITS

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

PARAMETER	TEST CONDITIONS		SN54AS850			SN74AS850			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	C
V_{OH}	V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC}−2			V_{CC}−2			V
	V_{CC} = 4.5 V,	I_{OH} = −12 mA	2.4	3.2					
	V_{CC} = 4.5 V,	I_{OH} = −15 mA				2.4	3.3		
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 32 mA		0.25	0.5				V
	V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.35	0.5	
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			50			50	µA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.4 V			−50			−50	µA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V							mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	V_{CC} = 5.5 V	Outputs active							mA
		Outputs disabled							

†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}.

Additional information on these products can be obtained from the factory as it becomes available.

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
			SN54AS850			SN74AS850			
			MIN	TYP†	MAX	MIN	TYP†	MAX	
f_{max}									MHz
t_{PLH}	Any D	Y		4.7			4.7		ns
t_{PHL}				5			5		
t_{PLH}	Any D	W		5.5			5.5		ns
t_{PHL}				6.2			6.2		
t_{PLH}	CLK	Y		10.2			10.2		ns
t_{PHL}				8.3			8.3		
t_{PLH}	CLK	W		8.8			8.8		ns
t_{PHL}				11.6			11.6		
t_{PZH}	$\overline{G}$	Y		4			4		ns
t_{PZL}				4.9			4.9		
t_{PHZ}	$\overline{G}$	Y		3.1			3.1		ns
t_{PLZ}				3.9			3.9		
t_{PZH}	$\overline{G}$	W		4			4		ns
t_{PZL}				4.9			4.9		
t_{PHZ}	$\overline{G}$	W		3.1			3.1		ns
t_{PLZ}				3.9			3.9		
t_{PZH}	$\overline{GY}$	Y		4			4		ns
t_{PZL}				4.9			4.9		
t_{PHZ}	$\overline{GY}$	Y		3.1			3.1		ns
t_{PLZ}				3.9			3.9		
t_{PZH}	GW	W		6.8			6.8		ns
t_{PZL}				6.6			6.6		
t_{PHZ}	GW	W		4.3			4.3		ns
t_{PLZ}				5.6			5.6		

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
NOTE 1: For load circuit and voltage waveforms, see page 1-12.

recommended operating conditions

			SN54AS851			SN74AS851			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0.8			0.8	V
I_{OH}	High-level output current				−12			−15	mA
I_{OL}	Low-level output current				32			48	mA
t_w	Pulse duration	C high							ns
		C low							
t_{su}	Setup time, select inputs before $\overline{CS}$↑								ns
t_h	Hold time, select inputs after $\overline{CS}$↑								ns
T_A	Operating free-air temperature		−55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS		SN54AS851			SN74AS851			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}	V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC}−2			V_{CC}−2			V
	V_{CC} = 4.5 V,	I_{OH} = −12 mA	2.4	3.2					
	V_{CC} = 4.5 V,	I_{OH} = −15 mA				2.4	3.3		
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 32 mA		0.25	0.5				V
	V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.35	0.5	
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			50			50	μA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.4 V			−50			−50	μA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V							mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	V_{CC} = 5.5 V	Outputs active							mA
		Outputs disabled							

†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}.

Additional information on these products can be obtained from the factory as it becomes available.

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
			SN54AS851			SN74AS851			
			MIN	TYP†	MAX	MIN	TYP†	MAX	
t_{PLH}	Any D	Y		4.7			4.7		ns
t_{PHL}				5			5		
t_{PLH}	Any D	W		5.5			5.5		ns
t_{PHL}				6.2			6.2		
t_{PLH}	S0, S1, S2, S3	Y		7.9			7.9		ns
t_{PHL}				9.6			9.6		
t_{PLH}	S0, S1, S2, S3	W		10.1			10.1		ns
t_{PHL}				11.1			11.1		
t_{PLH}	$\overline{SC}$	Y		12			12		ns
t_{PHL}				12.5			12.5		
t_{PLH}	$\overline{SC}$	W		12			12		ns
t_{PHL}				13			13		
t_{PZH}	$\overline{G}$	Y		4			4		ns
t_{PZL}				4.9			4.9		
t_{PHZ}	$\overline{G}$	Y		3.1			3.1		ns
t_{PLZ}				3.9			3.9		
PZH	$\overline{G}$	W		4			4		ns
t_{PZL}				4.9			4.9		
t_{PHZ}	$\overline{G}$	W		3.1			3.1		ns
t_{PLZ}				3.9			3.9		
t_{PZH}	$\overline{GY}$	Y		4			4		ns
t_{PZL}				4.9			4.9		
t_{PHZ}	$\overline{GY}$	Y		3.1			3.1		ns
t_{PZL}				3.9			3.9		
t_{PZH}	GW	W		6.8			6.8		ns
t_{PZL}				6.6			6.6		
t_{PHZ}	GW	W		4.3			4.3		ns
t_{PLZ}				5.6			5.6		

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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.

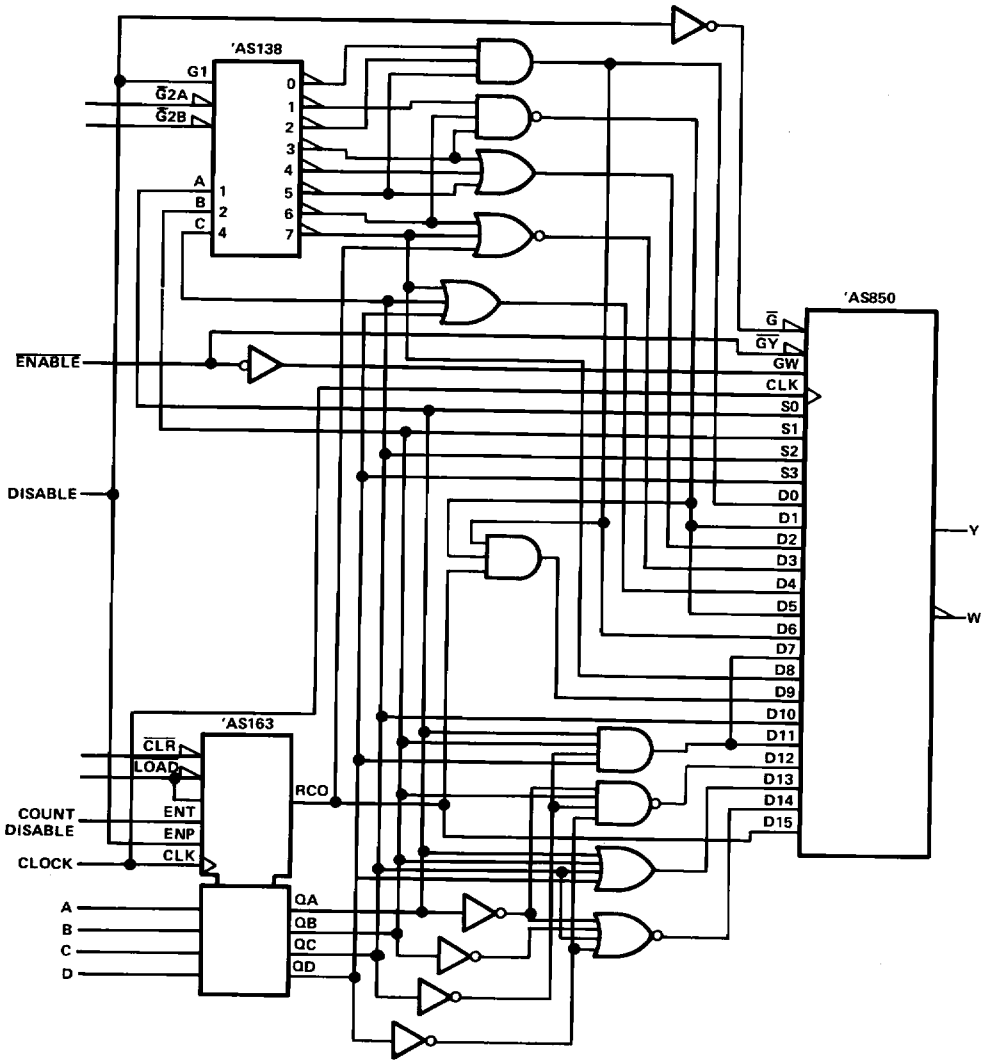


FIGURE 1—1-OF-16 BOOLEAN FUNCTION GENERATOR

TYPICAL APPLICATION DATA

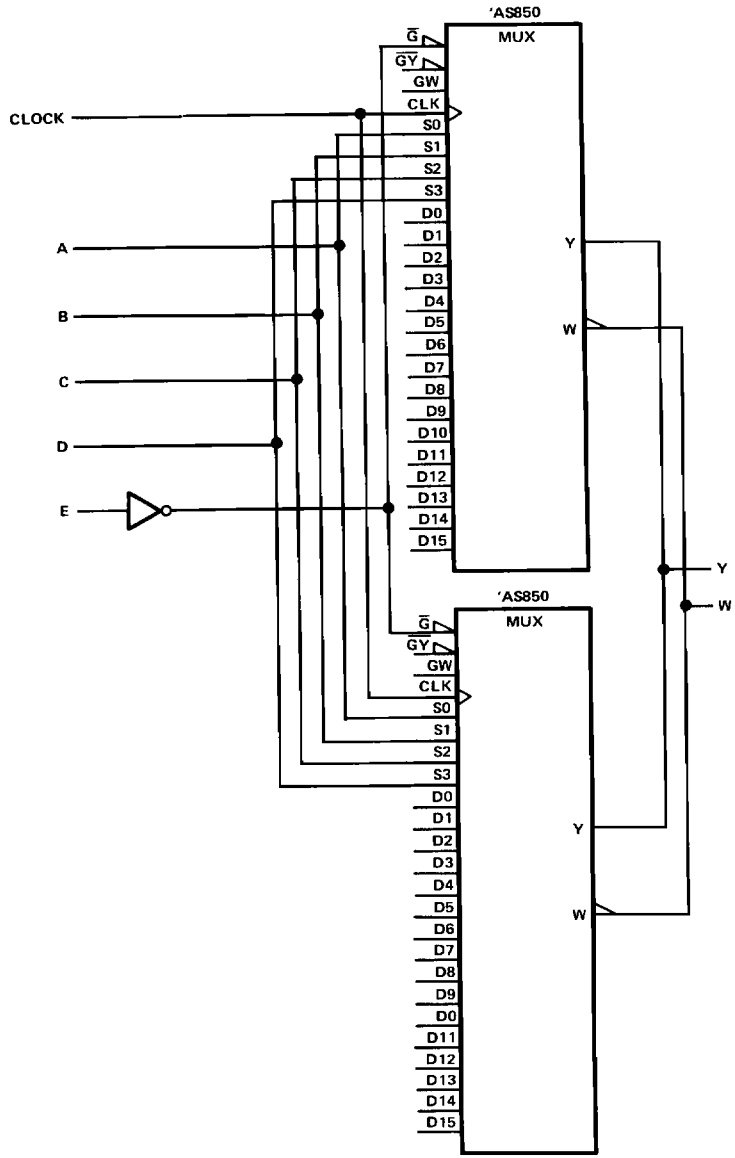


FIGURE 2–1-OF-32 DATA/SELECTOR/MULTIPLEXER

TYPICAL APPLICATION DATA

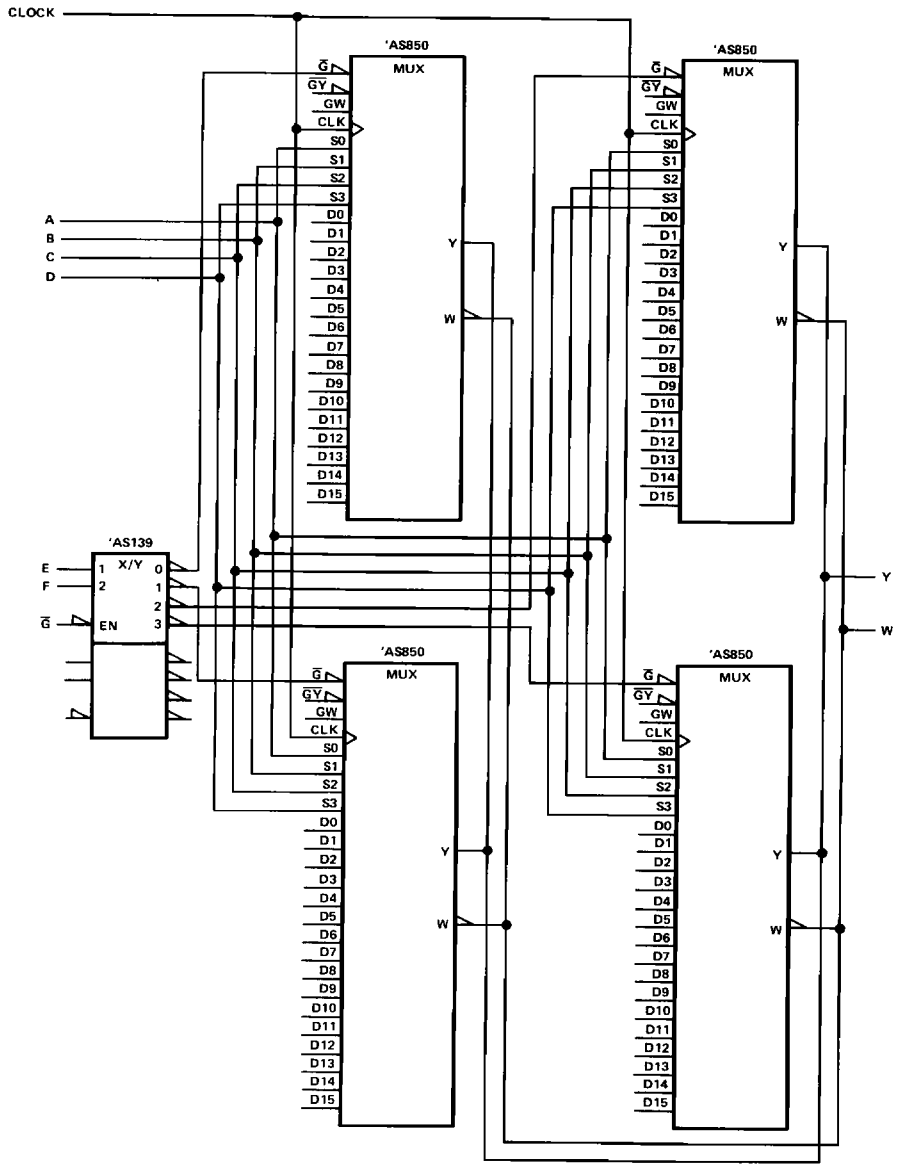


FIGURE 3–1-OF-64 DATA SELECTOR/MULTIPLEXER

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