DESCRIPTION

The 82S200 (tri-state outputs) and the 82S201 (open collector outputs) are Bipolar Programmable Logic Arrays, containing 48 product terms (AND terms), and 8 sum terms (OR tems). Each OR term controls an output function which can be programmed either true active-high (F_P), or true active-low (F_P^*). The true state of each output function is activated by any logical combination of 16-input variables, or their complements, up to 48 terms. Both devices are mask programmable by supplying to Signetics Program Table data in one of the formats specified in this data sheet.

The 82S200 and 82S201 are fully TTL compatible, and include chip enable control for expansion of input variables, and output inhibit. They feature either open collector or tri-state outputs for ease of expansion of product terms and application in bus-organized systems.

Both devices are available in commercial and military temperature ranges. For the commercial temperature range (0°C to +75°C) specify N82S200/201, I or N, and for the military temperature range (–55°C to +125°C) specify S82S200/201, I.

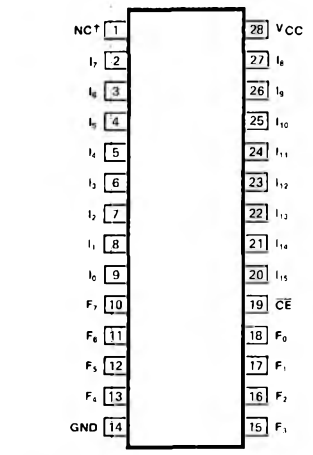
APPLICATIONS*

- **CRT display systems**
- **Random logic**
- **Code conversion**
- **Peripheral controllers**
- **Function generators**
- **Look-up and decision tables**
- **Microprogramming**
- **Address mapping**
- **Character generators**
- **Sequential controllers**
- **Data security encoders**
- **Fault detectors**
- **Frequency synthesizers**

*For diagrams of Typical Applications reference 82S100 (T.S.)/82S101 (O.C.) Data Sheet.

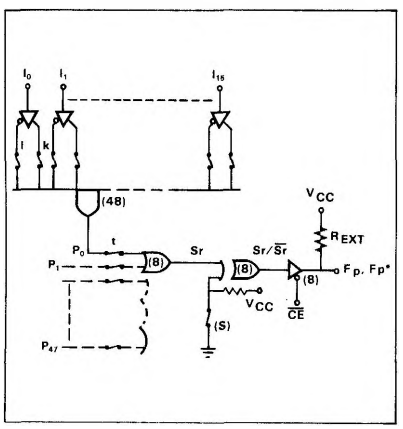
PIN CONFIGURATION

I,N PACKAGE*



*I = Ceramic
N = Plastic
†Open during normal operation

PLA EQUIVALENT LOGIC PATH



LOGIC FUNCTION

Typical Product Term:
$P_0 = I_0 \bullet I_1 \bullet \overline{I_2} \bullet I_5 \bullet \overline{I_{13}}$

Typical Output Functions:
$F_0 = (\overline{CE}) + (P_0 + P_1 + P_2)$ @ S = Closed
$F_0^* = (\overline{CE}) + (\overline{P_0} \bullet \overline{P_1} \bullet \overline{P_2})$ @ S = Open

NOTE

For each of the 8 outputs, either the function Fp (active-high) or F_p^* (active low) is available, but not both. The required function polarity is programmed via link (S).

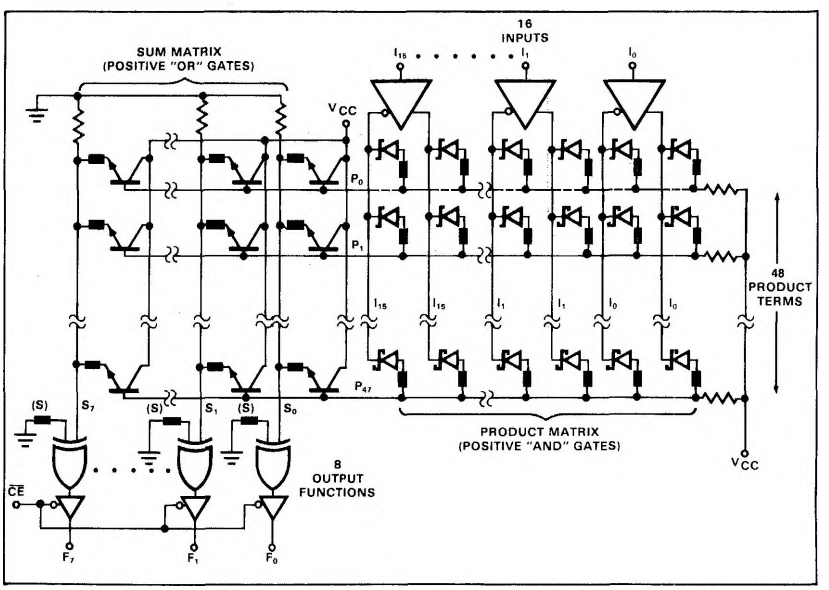
TRUTH TABLE

MODE	Pn	$\overline{CE}$	Sr ? f(Pn)	Fp	F_p^*
Disabled (82S201)	X	1	X	1	1
Disabled (82S200)				Hi-Z	Hi-Z
Read	1	0	Yes	1	0
	0	0		0	1
	X	0	No	0	1

THERMAL RATINGS

TEMPERATURE	MILI-TARY	COM-MER-CIAL
Maximum junction	175°C	150°C
Maximum ambient	125°C	75°C
Allowable thermal rise ambient to junction	50°C	75°C

LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS [1]

PARAMETER		RATING		UNIT
V_{CC}	Supply voltage		+7	Vdc
V_{IN}	Input voltage		+5.5	Vdc
V_{OUT}	Output voltage		+5.5	Vdc
I_{IN}	Input currents	-30	+30	mA
I_{OUT}	Output currents		+100	mA
	Temperature range			°C
T_A	Operating			
	N82S200/201	0	+75	
	S82S200/201	-55	+125	
T_{STG}	Storage	-65	+150	

DC ELECTRICAL CHARACTERISTICS

N82S200/201: $0° \leq T_A \leq +75°C$, $4.75V \leq V_{CC} \leq 5.25V$
S82S200/201: $-55°C \leq T_A \leq +125°C$, $4.5V \leq V_{CC} \leq 5.5V$

PARAMETER		TEST CONDITIONS	N82S200/201			S82S200/201			UNIT
			Min	Typ [2]	Max	Min	Typ [2]	Max	
	Input voltage[3]								V
V_{IH}	High	V_{CC} = Max	2			2			
V_{IL}	Low	V_{CC} = Min			0.85			0.8	
V_{IC}	Clamp[3,4]	V_{CC} = Min, I_{IN} 7 -18mA		-0.8	-1.2		-0.8	-1.2	
	Output voltage	V_{CC} = Min							V
V_{OH}	High (82S200)[3,5]	I_{OH} = -2mA	2.4			2.4			
V_{OL}	Low[3,6]	I_{OL} = 9.6mA		0.35	0.45		0.35	0.50	
	Input current								μA
I_{IH}	High	V_{IN} = 5.5V		<1	25		<1	50	
I_{IL}	Low	V_{IN} = 0.45V		-10	-100		-10	-150	
	Output current	V_{CC} = Max							
I_{OLK}	Leakage[7]	V_{OUT} = 5.5V		1	40		1	60	μA
$I_{O(OFF)}$	Hi-Z state (82S200)[7]	V_{OUT} = 5.5V		1	40		1	60	μA
		V_{OUT} = 0.45V		-1	-40		-1	-60	
I_{OS}	Short circuit (82S200)[4,8]	V_{OUT} = 0V	-20		-70	-15		-85	mA
I_{CC}	V_{CC} supply current[9]	V_{CC} Max		120	170		120	180	mA
	Capacitance[7]	V_{CC} = 5.0V							pF
C_{IN}	Input	V_{IN} = 2.0V		8			8		
C_{OUT}	Output	V_{OUT} = 2.0V		17			17		

AC ELECTRICAL CHARACTERISTICS

$R_1 = 470\Omega$, $R_2 = 1k\Omega$, $C_L = 30pF$

N82S200/201: $0°C \leq T_A \leq +75°C$, $4.75V \leq V_{CC} \leq 5.25V$

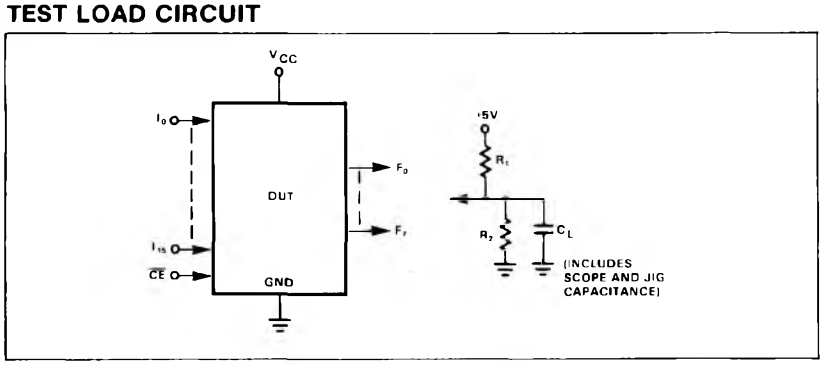
S82S200/201: $-55°C \leq T_A \leq +125°C$, $4.5V \leq V_{CC} \leq 5.5V$

PARAMETER		TO	FROM	N82S200/201			S82S200/201			UNIT
				Min	Typ[2]	Max	Min	Typ[2]	Max	
	Access time									ns
T_{IA}	Input	Output	Input		35	50		35	80	
T_{CE}	Chip enable	Output	Chip enable		15	30		15	50	
	Disable time									ns
T_{CD}	Chip disable	Output	Chip enable		15	30		15	50	

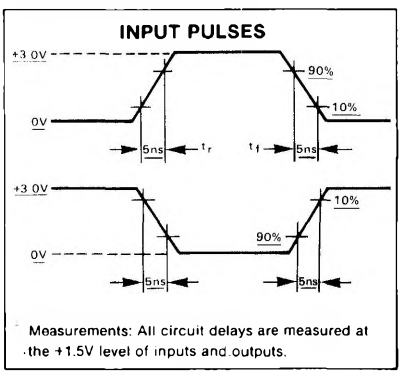
NOTES

1. Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only, and functional operation of the device of these or any other condition above those indicated in the operation of the device specifications is not implied.
2. All typical values are at $V_{CC} = 5V$, $T_A = 25°C$.
3. All voltage values are with respect to network ground terminal.
4. Test one at the time.
5. Measured with V_{IL} applied to $\overline{CE}$ and a logic high stored.
6. Measured with a programmed logic condition for which the output test is at a low logic level. Output sink current is applied thru a resistor to V_{CC}.
7. Measured with V_{IH} applied to $\overline{CE}$.
8. Duration of short circuit should not exceed 1 second.
9. I_{CC} is measured with the chip enable input grounded, all other inputs at 4.5V and the outputs open

TEST LOAD CIRCUIT

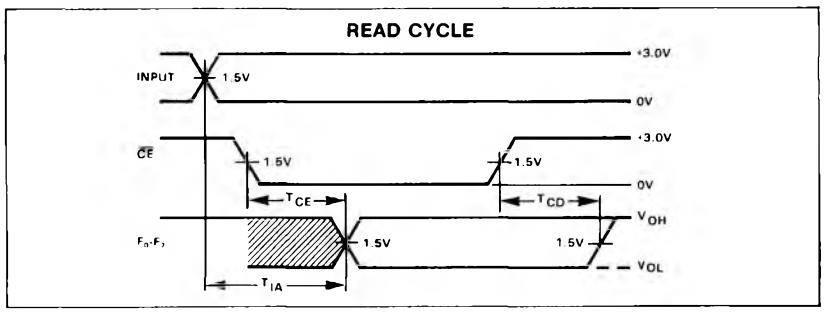


VOLTAGE WAVEFORM



Measurements: All circuit delays are measured at the +1.5V level of inputs and outputs.

TIMING DIAGRAM



TIMING DEFINITIONS

T_{CE} Delay between beginning of Chip Enable low (with Address valid) and when Data Output becomes valid.

T_{CD} Delay between when Chip Enable becomes high and Data Output is in off state (Hi-Z or high).

T_{IA} Delay between beginning of valid Input (with Chip Enable low) and when Data Output becomes valid.

16X48X8 PLA PROGRAM TABLE

THIS PORTION TO BE COMPLETED BY SIGNETICS

CF (XXXX) _____

CUSTOMER SYMBOLIZED PART # _____

DATE RECEIVED _____

COMMENTS _____

CUSTOMER NAME _____

PURCHASE ORDER # _____

SIGNETICS DEVICE # _____

TOTAL NUMBER OF PARTS _____

PROGRAM TABLE # _____

REV _____ DATE _____

PROGRAM TABLE ENTRIES

INPUT VARIABLE			OUTPUT FUNCTION		OUTPUT ACTIVE LEVEL	
Im	$\overline{Im}$	Don't Care	Prod. Term Present in F_P	Prod. Term Not Present in F_P	Active High	Active Low
H	L	— (dash)	A	• (period)	H	L

NOTE

Enter (—) for unused inputs of used P-terms

NOTES

1. Entries independent of output polarity.
2. Enter (A) for unused outputs of used P-terms

NOTES

1. Polarity programmed once only
2. Enter (H) for all unused outputs

PRODUCT TERM*																	ACTIVE LEVEL*							
	INPUT VARIABLE*																OUTPUT FUNCTION*							
NO.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
0																								
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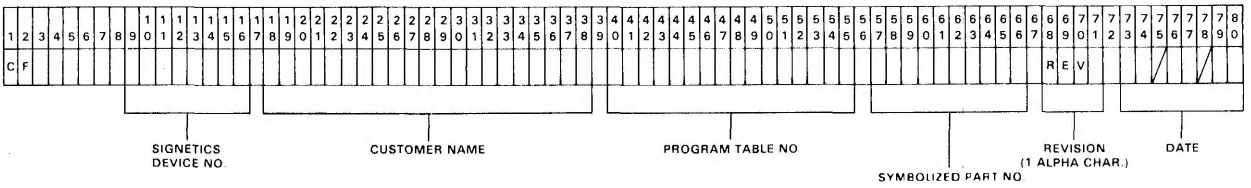
*Input and Output fields of unused P-terms can be left blank. Unused inputs and outputs are PLA terminals left floating.

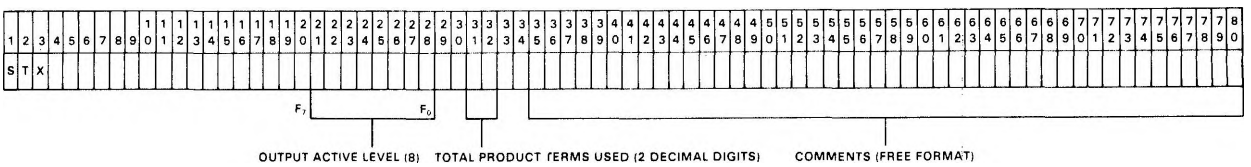
PUNCHED CARD CODING FORMAT

The PLA Program Table can be supplied directly to Signetics in punched card form, using standard 80-column IBM cards. For each PLA Program Table, the customer should prepare an input card deck in accordance with the following format. Product Term cards 3 through 50 can be in any order. Not all 48 Product Terms need to be present. Unused Product Terms require no entry cards, and will be skipped during the actual programming sequence:

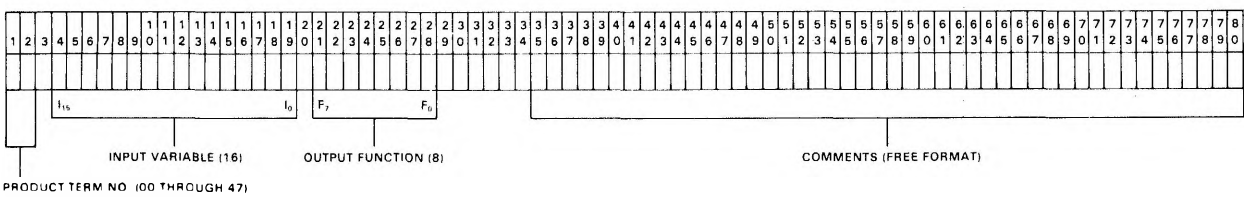
CARD NO.1—Free format within designated fields.



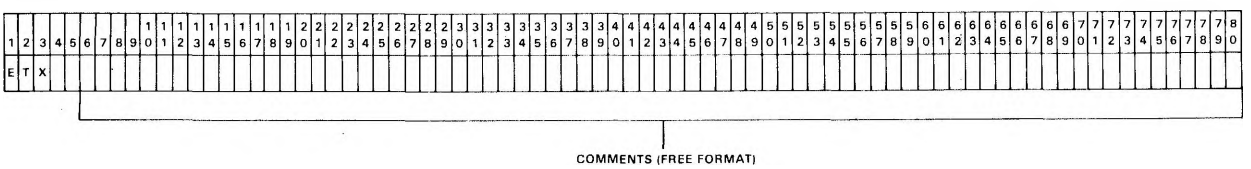
CARD NO. 2—



CARD NO. 3 through NO. 50



CARD NO. 51



Output Active Level entries are determined in accordance with the following table:

OUTPUT ACTIVE LEVEL	
Active high H	**Active low** L

NOTES

1. Polarity programmed once only
2. Enter (H) for all unused outputs.

Input Variable entries are determined in accordance with the following table:

INPUT VARIABLE		
Im H	$\overline{Im}$ L	Don't care — (dash)

NOTE

Enter ( ) for unused inputs of used P-terms.

Output Function entries are determined in accordance with the following table:

OUTPUT FUNCTION	
Product term present in Fp A	Product term not present in Fp • (period)

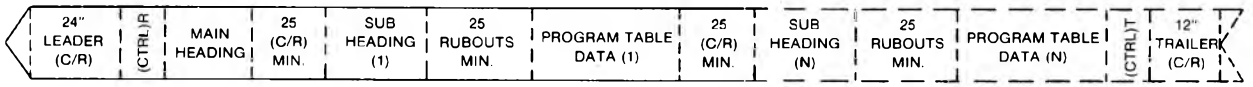
NOTES

1. Entries independent of output polarity
2. Enter (A) for unused outputs of used P-terms.

TWX TAPE CODING FORMAT

The PLA Program Table can be sent to Signetics in ASCII code format via airmail using any type of 8-level tape (paper, mylar, fanfold, etc.), or via TWX: just dial (910) 339-9283, tell the operator to turn the paper puncher on, and acknowledge. At the end of transmission instruct the operator to send tape to Signetics Order Entry.

A number of Program Tables can be sequentially assembled on a continuous tape as follows, however limit tape length to a roll of 1.75 inch inside diameter, and 4.25 inch outside diameter:



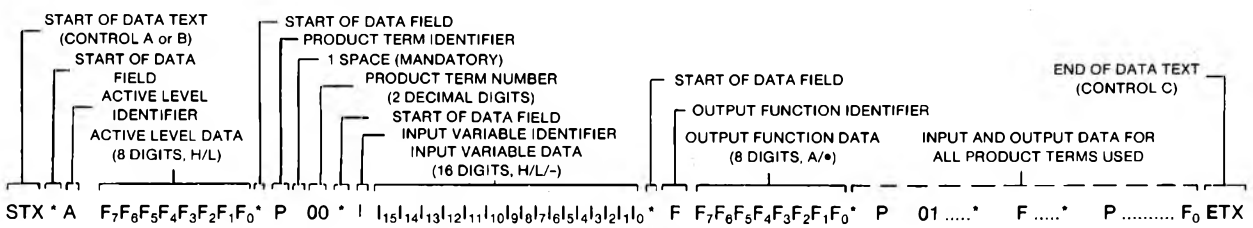
A. The MAIN HEADING at the beginning of tape includes the following information, with each entry preceded by a ($) character, whether used or not:

1. Customer Name _____
2. Customer TWX No. _____
3. Date _____
4. Purchase Order No. _____
5. Number of Program Tables _____
6. Total Number of Parts _____

B. Each SUB HEADING should contain specific information pertinent to each Program Table as follows, with each entry preceded by a ($) character, whether used or not:

1. Signetics Device No. _____
2. Program Table No. _____
3. Revision _____
4. Date _____
5. Customer Symbolized Part No. _____
6. Number of Parts _____

C. Program Table data blocks are initiated with an STX character, and terminated with an ETX character. The body of the data consists of Output Active Level, Product Term, and Output Function information separated by appropriate identifiers in accordance with the following format:



Entries for the 3 Data Fields are determined in accordance with the following Table:

INPUT VARIABLE		
I_m	$\overline{I}_m$	Don't care
H	L	— (dash)

NOTE

Enter (—) for unused inputs of used P-terms.

OUTPUT FUNCTION	
Product term present in Fp	Product term not present in Fp
A	• (period)

NOTES

1. Entries independent of output polarity.
2. Enter (A) for unused outputs of used P-terms.

OUTPUT ACTIVE LEVEL	
Active high	**Active low**
H	L

NOTES

1. Polarity programmed once only.
2. Enter (H) for all unused outputs.

Although the Product Term data are shown entered in sequence, this is not necessary. It is possible to input only one Product Term, if desired. Unused Product Terms require no entry. ETX signalling end of Program Table may occur with less than the maximum number of Product Terms entered.

NOTES

1. Corrections to any entry can be made by backspace and rubout. However, limit consecutive rubouts to less than 25.
2. P-Terms can be re-entered any number of times. The last entry for a particular P-Term will be interpreted as valid data.
3. Any P-Term can be deleted entirely by inserting the character (E) immediately following the P-Term number to be deleted, i.e., *P 25E deletes P-Term 25.
4. To facilitate an orderly Teletype print out, carriage returns, line feeds, spaces, rubouts etc. may be interspersed between data groups, but only preceding an asterisk (*).
5. Comments are allowed between data fields, provided that an asterisk (*) is not used in any Heading or Comment entry.