## DESCRIPTION

The 7446 and 7447 BCD-to-Seven Segment Decoder/Driver are TTL monolithic devices consisting of the necessary logic to decode a BCD code to seven segment readout plus selected signs.

Incorporated in this device is a blanking circuit allowing leading and trailing zero suppression. Also included is a lamp test control to turn on all segments.

The 7446 and 7447 provide bare collector output transistors for directly driving lamps. The output transistor breakdown of the 7446 is 30 volts and the 7447 is 15 volts.

PIN CONFIGURATION

B PACKAGE
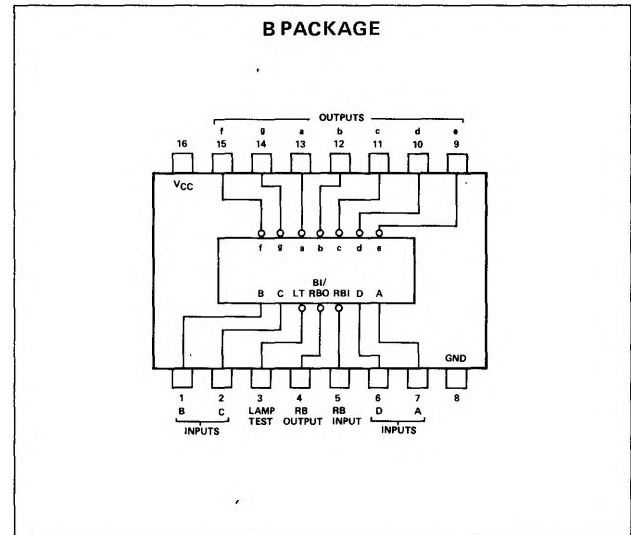
LOGIC DIAGRAM

TRUTH TABLE
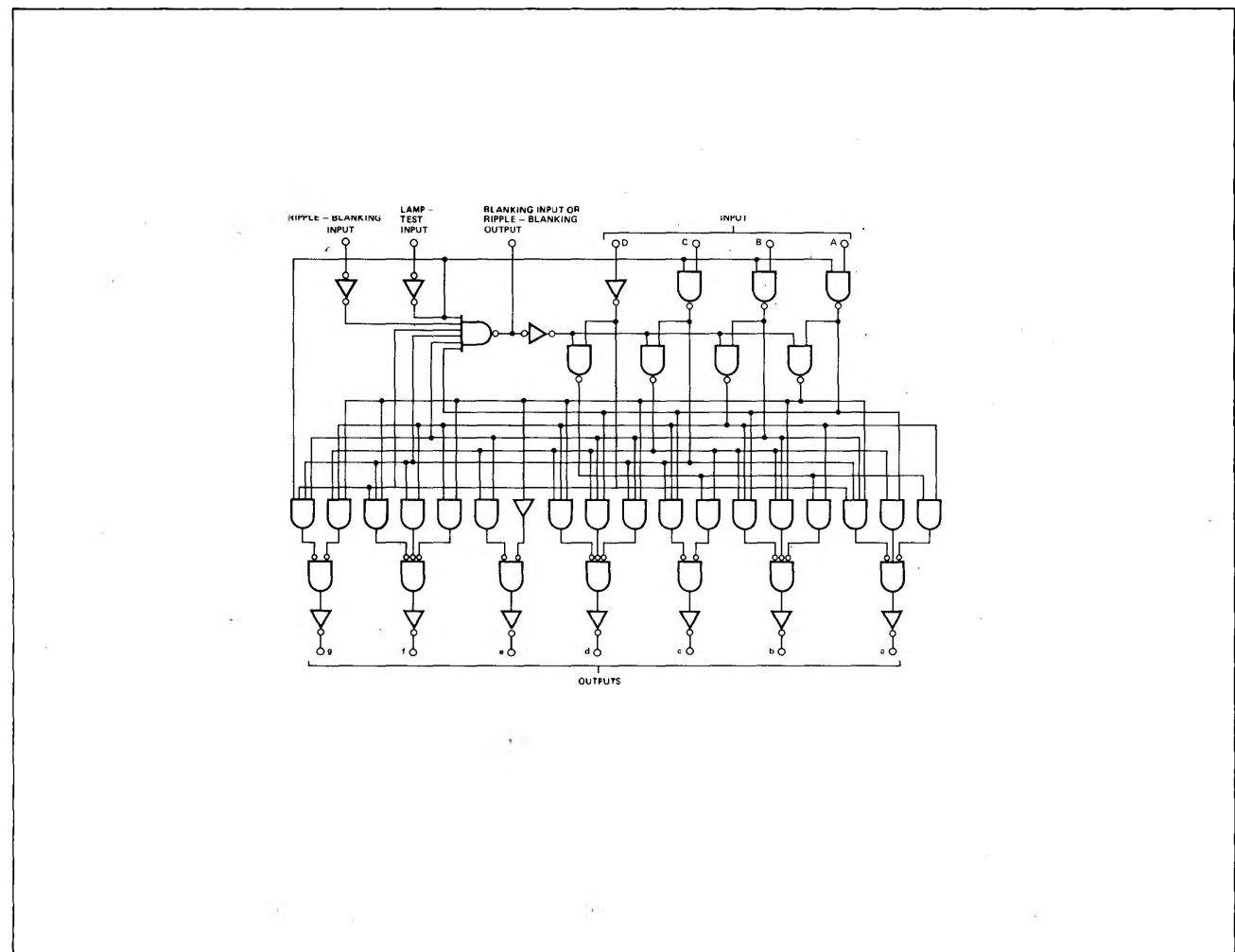
DECIMAL OR FUNCTION	INPUTS							OUTPUTS							NOTE
	LT	RBI	D	C	B	A	BI/RBO	a	b	c	d	e	f	g	
0	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1
1	1	x	0	0	0	1	1	1	0	0	1	1	1	1	1
2	1	x	0	0	1	0	1	0	0	1	0	0	1	0	
3	1	x	0	0	1	1	1	0	0	0	0	1	1	0	
4	1	x	0	1	0	0	1	1	0	0	1	1	0	0	
5	1	x	0	1	0	1	1	0	1	0	0	1	0	0	
6	1	x	0	1	1	0	1	1	1	0	0	0	0	0	
7	1	x	0	1	1	1	1	0	0	0	1	1	1	1	
8	1	x	1	0	0	0	1	0	0	0	0	0	0	0	
9	1	x	1	0	0	1	1	0	0	0	1	1	0	0	
10	1	x	1	0	1	0	1	1	1	1	0	0	1	0	
11	1	x	1	0	1	1	1	1	1	0	0	1	1	0	
12	1	x	1	1	0	0	1	1	0	1	1	1	0	0	
13	1	x	1	1	0	1	1	0	1	1	0	1	0	0	
14	1	x	1	1	1	0	1	1	1	1	0	0	0	0	
15	1	x	1	1	1	1	1	1	1	1	1	1	1	1	
BI	x	x	x	x	x	x	0	1	1	1	1	1	1	1	2
RBI	1	0	0	0	0	0	0	1	1	1	1	1	1	1	3
LT	0	x	x	x	x	x	1	0	0	0	0	0	0	0	4

NOTES:

1. BI/BRO is wire-OR logic serving as blanking input (BI) and/or ripple-blanking output (RBO). The blanking input must be open or held at a logical 1 when output functions 0 through 15 are desired and ripple-blanking input (RBI) must be open or at a logical 1 during the decimal 0 input. X = input may be high or low.

2. When a logical 0 is applied to the blanking input (forced condition) all segment outputs go to a logical 1 regardless of the state of any other input condition.

3. When ripple-blanking input (RBI) is at a logical 0 and A = B = C = D = logical 0, all segment outputs go to a logical 1 and the ripple-blanking output goes to a logical 0 (response condition).

4. When blanking input/ripple-blanking output is open or held at a logical 1, and a logical 0 is applied to lamp-test input, all segment outputs go to a logical 0.

SEGMENT IDENTIFICATION

SEGMENT IDENTIFICATION

NUMERICAL DESIGNATIONS – RESULTANT DISPLAYS
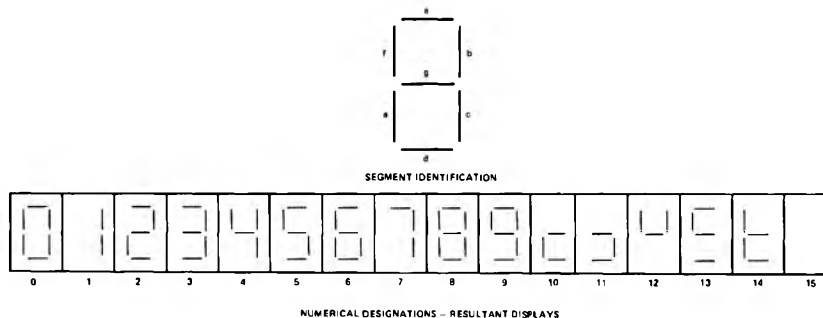
RECOMMENDED OPERATING CONDITIONS

	MIN	NOM	MAX	UNIT
Supply Voltage V_{CC} (See Note 1): N7446, N7447 Circuits	4.75	5	5.25	V
Continuous Voltage at Outputs a through g: N7446 Circuits			30	V
N7447 Circuits			15	V
Normalized Fan-Out From Outputs a through g to Series 54/74 loads:				
N7446, N7447 Circuits			12	
Normalized Fan-Out From BI/RBO Node to Series 54/74 loads:				
N7446, N7447 Circuits			5	
Output Sink Current, I_{sink}: N7446, N7447 Outputs a through g			20	mA
N7446, N7447, BI/RBO Node			8	mA

NOTES:
1. These voltage values are with respect to network ground terminal.
2. Input voltage must be zero or positive with respect to network ground terminal.
3. This rating applies when the output is off.

ELECTRICAL CHARACTERISTICS (over recommended operating free-air temperature range unless otherwise noted)

PARAMETER		TEST CONDITIONS *	MIN	TYP **	MAX	UNIT
$V_{in(1)}$	Input voltage required to ensure logical 1 at any point	V_{CC} = MIN	2			V
$V_{in(0)}$	Input voltage required to ensure logical 0 at any input	V_{CC} = MIN			0.8	V
V_{on}	On-state output voltage at outputs a through g	V_{CC} = MIN, I_{sink} = 40mA		0.27	0.4	V
$V_{out(0)}$	Logical 0 output voltage at BI/RBO node	V_{CC} = MIN, I_{sink} = 8mA		0.3	0.4	V
V_{off}	Off-state output voltage at outputs a through g (S5446 and N7446 only)	V_{CC} = MAX, I_{off} = 250 A	30			V
V_{off}	Off-state output voltage at outputs a through g (S5447 and N7447 only)	V_{CC} = MAX, I_{off} = 250 A	15			V
$V_{out(1)}$	Logical 1 output voltage at BI/RBO node	V_{CC} = MIN, I_{load} = 200 A	2.4	3.7		V
$I_{in(0)}$	Logical 0 level input current at any input except BI/RBO node	V_{CC} = MAX, V_{in} = 0.4V			-1.6	mA
$I_{in(0)}$	Logical 0 level input current at BI/RBO node	V_{CC} = MAX, V_{in} = 0.4V			-4.2	mA
$I_{in(1)}$	Logical 1 level input current at any input except BI/RBO node	V_{CC} = MAX, V_{in} = 2.4V			40	μA
		V_{CC} = MAX, V_{in} = 5.5V			1	mA
I_{OS}	Short-circuit output current at BI/RBO node	V_{CC} = MAX			-4	mA
I_{CC}	Supply current	V_{CC} = MAX N7446, N7447		53	90	mA

SWITCHING CHARACTERISTICS, V_{CC} = 5V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{pd1}	Propagation delay time to logical 1 level from A input to any output	C_L = 15pF, R_L = 280 Ω			100	ns
t_{pd0}	Propagation delay time to logical 0 level from A input to any output	C_L = 15pF, R_L = 280 Ω			100	ns
t_{pd1}	Propagation delay time to logical 1 level from RBI input to any output	C_L = 15pF, R_L = 280 Ω			100	ns
t_{pd0}	Propagation delay time to logical 0 level from RBI input to any output	C_L = 15pF, R_L = 280 Ω			100	ns

* For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable circuit type.

** All typical values are at V_{CC} = 5V, T_A = 25°C.