

5490 / 7490 Decade Counter

	Schottky TTL				High-Speed TTL				Low-Power Schottky TTL				Standard TTL				Low-Power TTL			
	Device Type	Package			Device Type	Package			Device Type	Package			Device Type	Package			Device Type	Package		
		C	P	M/CF		C	P	M/CF		C	P	M/CF		C	P	M/CF		C	P	M/CF
T.J.																				
FAIRCHILD																				
MOTOROLA																				
N. S. C.																				
PHILIPS																				
SIGNETICS																				
SIEMENS																				
FUJITSU																				
HITACHI																				
MITSUBISHI																				
NEC																				
TOSHIBA																				

Electrical Characteristics SN54LS/SN74LS90A

absolute maximum ratings over operating free-air temperature range

Supply voltage, V _{CC}	7V	Operating free-air temperature range	SN54LS	-55°C to 125°C
input voltage	7V		SN74LS	0°C to 70°C
Interemitter voltage (see Note 1)	5.5V	Storage temperature range		65°C to 150°C

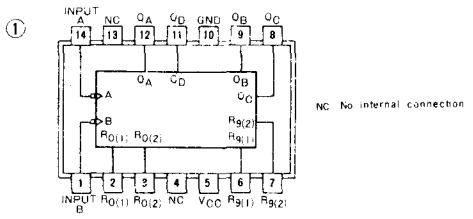
recommended operating conditions

	SN54LS90A			SN74LS90A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V _{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I _{OH}			-400			-400	μA
Low-level output current, I _{OL}			4			8	mA
Count frequency, f _{count}	A input	0	32	0	32		MHz
	B input	0	16	0	16		
Pulse width, t _w	A input	15	15	15	15		ns
	B input	30	30	30	30		
Reset inputs	15	15					
Reset inactive-state setup, t _{setup}	25	25					ns
Operating free-air temperature, T _A	-55	125	0	70			°C

electrical characteristics over recommended operating free-air temperature range

PARAMETER*	TEST CONDITIONS†	MIN	TYP‡	MAX	UNIT
V _{IH}	High-level input voltage		2		V
V _{IL}	Low-level input voltage			0.8	V
V _I	Input clamp voltage	V _{CC} = MIN, I _I = 18mA		-1.5	V
V _{OH}	High-level output voltage	V _{CC} = MIN, V _{IH} = 2V, V _{IL} = 0.8V, I _{OH} = -400μA	2.7	3.4	V
V _{OL}	Low-level output voltage	V _{CC} = MIN, V _{IH} = 2V, V _{IL} = 0.8V, I _{OL} = 8mA	0.25	0.5	V
I _I	Input current: a) Any reset maximum input voltage	V _{CC} = MAX, V _I = 7V		0.1	mA
	b) A input	V _{CC} = MAX, V _I = 5.5V		0.2	
	c) B input	V _{CC} = MAX, V _I = 5.5V		0.4	
i _{IH}	High-level input current	V _{CC} = MAX, V _I = 2.7V		20	μA
	A input			40	
	B input			80	
i _{IL}	Low-level input current	V _{CC} = MAX, V _I = 0.4V		0.4	mA
	A input			2.4	
	B input			3.2	
I _{OS}	Short-circuit output current	V _{CC} = MAX	SN54LS	-20	100
			SN74LS	-20	-100
I _{CC}	Supply current	V _{CC} = MAX. See Note 2	9	15	mA
f _{max}	from A to output Q _A		32	42	MHz
	from B to output Q _B		16		
t _{PLH}	from A to output Q _A	V _{CC} = 5V, T _A = 25°C, C _L = 15pF, R _L = 2kΩ	10	16	ns
t _{PHL}	from A to output Q _B		12	18	
t _{PLH}	from A to output Q _D		32	48	ns
t _{PHL}	from A to output Q _C		34	50	
t _{PLH}	from B to output Q _B		10	16	ns
t _{PHL}	from B to output Q _C		14	21	
t _{PLH}	from B to output Q _C		21	32	ns
t _{PHL}	from B to output Q _D		23	35	
t _{PLH}	from B to output Q _D		21	32	ns
t _{PHL}	from B to output Q _D		23	35	
t _{PHL}	from Set-to-0 to Any output		26	40	ns
t _{PLH}	from Set-to-9 to output Q _A , Q _D		20	30	ns
t _{PHL}	from Set-to-9 to output Q _B , Q _C		26	40	ns

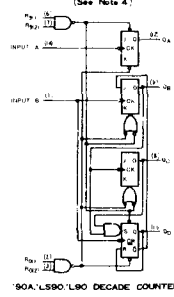
Pin Assignment (Top View)



Function Table

BCD COUNT SEQUENCE				BI-QUINARY (5-2)				RESET: COUNT							
90A, L590, L90 (See Note 3)				90A, L590, L90 (See Note 3)				90A, L590, L90 (See Note 3)							
COUNT	OUTPUT Q _D	OUTPUT Q _C	OUTPUT Q _B	OUTPUT Q _A	OUTPUT Q _A	OUTPUT Q _C	OUTPUT Q _B	RESET INPUTS R ₀₍₁₎	RESET INPUTS R ₀₍₂₎	RESET INPUTS R ₉₍₁₎	RESET INPUTS R ₉₍₂₎	OUTPUT Q _D	OUTPUT Q _C	OUTPUT Q _B	OUTPUT Q _A
0	L	L	L	L	L	L	L	H	H	L	L	X	L	L	L
1	L	L	L	H	L	L	L	H	H	L	X	L	L	L	L
2	L	L	H	L	L	L	H	X	X	H	H	L	L	L	H
3	L	L	H	H	L	L	H	X	L	X	L	L	X	L	COUNT
4	L	H	L	L	L	L	H	L	X	L	X	L	X	L	COUNT
5	L	H	L	H	L	L	L	L	X	L	X	L	X	L	COUNT
6	L	H	H	L	L	L	H	X	L	L	X	X	L	L	COUNT
7	L	H	H	H	L	L	H	X	L	L	L	X	L	L	COUNT
8	H	L	L	L	L	L	H	X	L	L	X	X	L	L	COUNT
9	H	L	L	H	L	L	L	X	L	L	L	X	L	L	COUNT

Functional Block Diagram



- NOTES:
- This is the voltage between two emitters of a multiple-emitter transistor. For this circuit, this rating applies between the two R₀ inputs, and it also applies between the two R₉ inputs.
 - I_{CC} is measured with all outputs open, both R₀ inputs grounded following momentary connection to 4.5 V, and all other inputs grounded.
 - Output Q_A is connected to input B for BCD count. Output Q_D is connected to input A for bi-quinary count. H = high level, L = low level, X = irrelevant.
 - The J and K inputs shown without connection are for reference only and are functionally at a high level.

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
 ‡ All typical values are at V_{CC} = 5V, T_A = 25°C.
 § Not more than one output should be shorted at a time.
 ¶ Q_A outputs are tested at I_{OL} = 16mA plus the limit value for I_{IL} for the B input. This permits driving the B input while maintaining full fan-out capability.
 * f_{max} = maximum count frequency.
 t_{PLH} = propagation delay time, low-to-high-level output
 t_{PHL} = propagation delay time, high-to-low-level output