- **Dependable Texas Instruments Quality and Reliability**

description

This R-S flip-flop circuit is based on the master-slave principle. The AND gate inputs for entry into the master section are controlled by the clock pulse. The clock pulse also regulates the state of the coupling transistors which connect the master and slave sections. The sequence of operation is as follows:

1. Isolate slave from master
2. Enter information from AND gate inputs to master
3. Disable AND gate inputs
4. Transfer information from master to slave

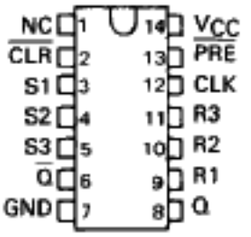
The SN54L71 is characterized for operation over the full military temperature range of −55°C to 125°C.

FUNCTION TABLE

INPUTS					OUTPUTS	
$\overline{PRE}$	$\overline{CLR}$	CLK	S	R	Q	$\overline{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H†	H†
H	H	⊓	L	L	Q_0	$\overline{Q}_0$
H	H	⊓	H	L	H	L
H	H	⊓	L	H	L	H
H	H	⊓	H	H	INDETERMINATE	

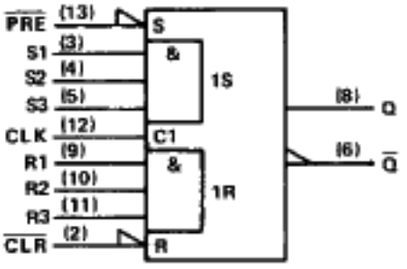
† This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

SN54L71 . . . J PACKAGE
(TOP VIEW)



NC – No internal connection

logic symbol



Pin numbers shown are for J packages.

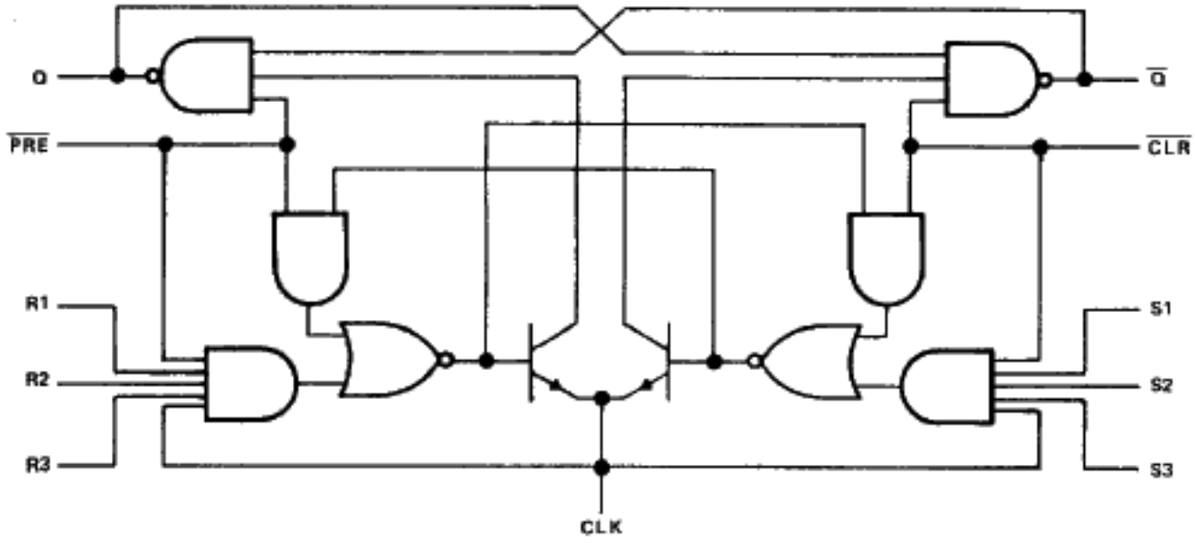
positive logic

$$R = R1 \cdot R2 \cdot R3$$
$$S = S1 \cdot S2 \cdot S3$$

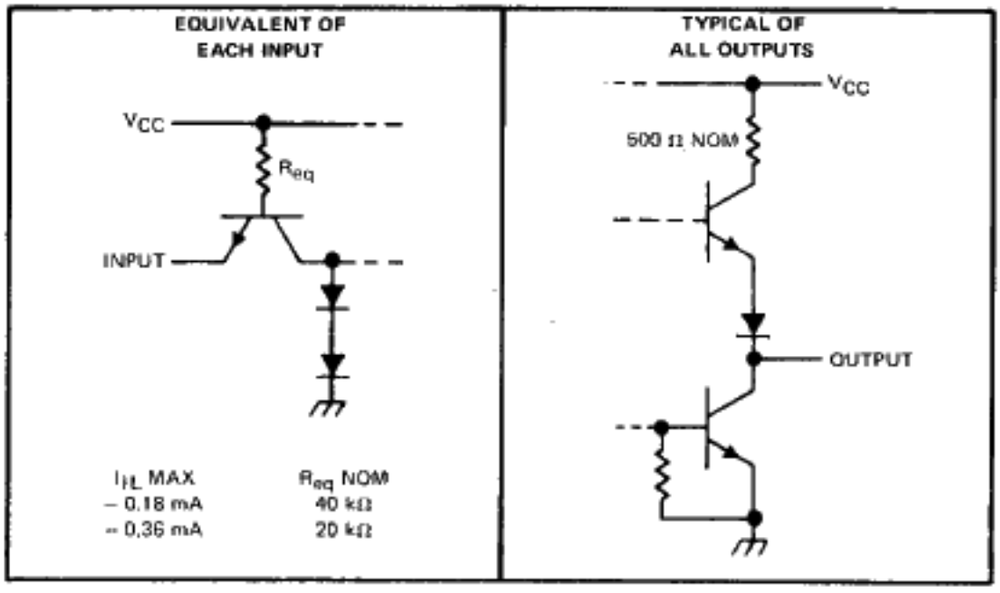
3

TTL DEVICES

logic diagram



schematics of input and outputs



TEXAS INSTRUMENTS
POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage . . . . . 5.5 V
Operating free-air temperature . . . . . −55°C to 125°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage valves are with respect to network ground terminal.

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	Clock input			0.6	V
		All other inputs			0.7	
I_{OH}	High-level output current				−0.1	mA
I_{OL}	Low-level output current				2	mA
t_w	Pulse duration	CLK high or low	200			ns
		$\overline{PRE}$ or $\overline{CLR}$ low	100			
t_{su}	Setup time before CLK ↑		0			ns
t_h	Hold time-data after CLK ↓		0			ns
T_A	Operating free-air temperature		−55		125	°C

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

PARAMETER		TEST CONDITIONS †	MIN	TYP‡	MAX	UNIT
V_{OH}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX, I_{OH} = −0.1 mA	2.4	3.3		V
V_{OL}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX, I_{OL} = 2 mA		0.15	0.3	V
I_I	R or S	V_{CC} = MAX, V_I = 5.5 V			0.1	mA
	All other				0.2	
I_{IH}	R or S	V_{CC} = MAX, V_I = 2.4 V			10	μA
	$\overline{PRE}$ or $\overline{CLR}$				20	
	CLK				−0.2	mA
I_{IL}	R or S	V_{CC} = MAX, V_I = 0.3 V			−0.18	mA
	All other				−0.36	
I_{OS}		V_{CC} = MAX	−3		−15	mA
I_{CC}		V_{CC} = MAX, See Note 2		0.76	1.44	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
NOTE 2: With all outputs open, I_{CC} is measured with the Q and $\overline{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
f_{max}			R_L = 4 kΩ, C_L = 50 pF	25	3		MHz
t_{PLH}	$\overline{PRE}$ or $\overline{CLR}$	Q or $\overline{Q}$			35	75	ns
t_{PHL}	$\overline{PRE}$ or $\overline{CLR}$ (CLK high)	$\overline{Q}$ or Q			60	150	ns
	$\overline{PRE}$ or $\overline{CLR}$ (CLK low)					200	
t_{PLH}	CLK	Q or $\overline{Q}$		10	35	75	ns
t_{PHL}				10	60	150	

NOTE 3 : See General Information Section for load circuits and voltage waveforms.