

### DESCRIPTION

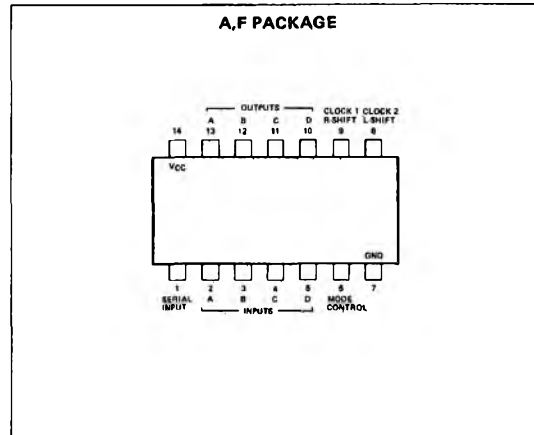
The 54/7495 is a monolithic universal 4-Bit Shift Register designed with standard TTL techniques. The circuit layout consists of 4 R-S master-slave flip-flops, 4 AND-OR-INVERT gates, and 6 inverters configured to form a versatile register which will perform right-shift, left-shift, or parallel-in, parallel-out operations depending on the logical input level to the mode control.

Right-shift operations are performed when a logical 0 level is applied to the mode control. Serial data is entered at the serial input  $D_S$  and shifted one position right on each clock 1 pulse. In this mode, clock 2 and parallel inputs  $D_A$  thru  $D_D$  are inhibited.

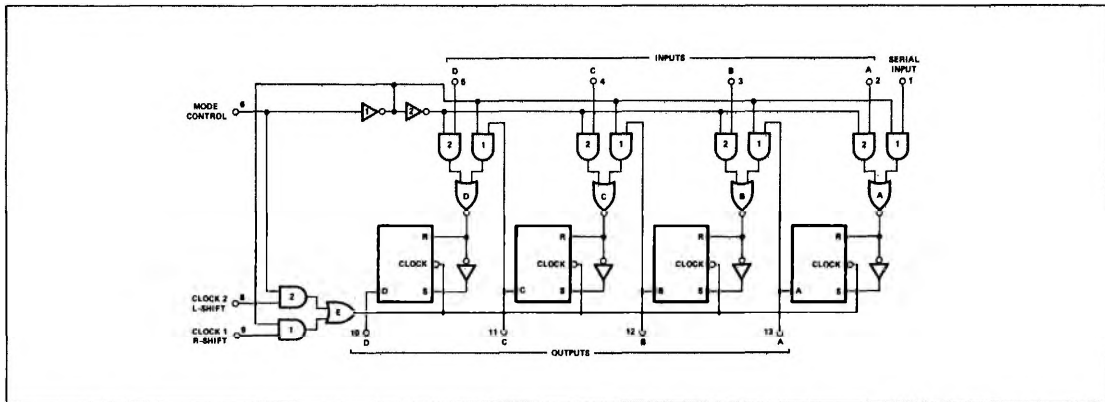
Parallel-in, parallel-out operations are performed when a logical 1 level is applied to the mode control. Parallel data is entered at parallel inputs  $D_A$  thru  $D_D$  and is transferred to the data outputs  $A_0$  thru  $D_0$  on each clock 2 pulse. In this mode, shift-left operations may be implemented by externally tying the output of each flip-flop to the parallel input of the previous flip-flop ( $D_0$  to  $D_C$  and etc.), with serial data entry at input  $D_D$ .

Information must be present at the R-S inputs prior to clocking and transfer of data occurs on the falling edge of the clock pulse.

### PIN CONFIGURATIONS



### LOGIC DIAGRAM



### RECOMMENDED OPERATING CONDITIONS

	MIN	NOM	MAX	UNIT
Supply Voltage $V_{CC}$	4.5	5	5.5	V
	4.75	5	5.25	V
Normalized Fan-Out From Each Output			10	
Width of Clock Pulse $t_{p(\text{clock})}$	20	10		ns
	15	10		ns
Setup Time Required at Serial, A, B, C, or D Inputs $t_{\text{setup}}$	10	10		ns
Hold Time Required at Serial, A, B, C, or D Inputs $t_{\text{hold}}$	0	10		ns
Logical 0 Level Setup Time Required at Mode Control (With Respect to Clock 1 inputs)	15			ns
Logical 1 level Setup Time Required at Mode Control (With Respect to Clock 2 input)	15			ns
Logical 0 Level Setup Time Required at Mode Control (With Respect to Clock 2 input)	5			ns
Logical 1 Level Setup Time Required at Mode Control (With Respect to Clock 1 input)	5			ns

## 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 input terminal	$V_{CC} = \text{MIN}$	2			V
$V_{in(0)}$	Input voltage required to ensure logical 0 at any input terminal	$V_{CC} = \text{MIN}$			0.8	V
$V_{out(1)}$	Logical 1 output voltage	$V_{CC} = \text{MIN}, I_{load} = -800\mu\text{A}$	2.4			V
$V_{out(0)}$	Logical 0 output voltage	$V_{CC} = \text{MIN}, I_{sink} = 16\text{mA}$			0.4	V
$I_{in(0)}$	Logical 0 level input current at any input except mode control	$V_{CC} = \text{MAX}, V_{in} = 0.4\text{V}$			-1.6	mA
$I_{in(0)}$	Logical 0 level input current at mode control	$V_{CC} = \text{MAX}, V_{in} = 0.4\text{V}$			-3.2	mA
$I_{in(1)}$	Logical 1 level input current at any input except mode control	$V_{CC} = \text{MAX}, V_{in} = 2.4\text{V}$ $V_{CC} = \text{MAX}, V_{in} = 5.5\text{V}$			40 1	$\mu\text{A}$ mA
$I_{in(1)}$	Logical 1 level input current at mode control	$V_{CC} = \text{MAX}, V_{in} = 2.4\text{V}$ $V_{CC} = \text{MAX}, V_{in} = 5.5\text{V}$			80 1	$\mu\text{A}$ mA
$I_{OS}$	Short-circuit output current†	$V_{CC} = \text{MAX}$	-18		-57	mA
$I_{CC}$	Supply current	$V_{CC} = \text{MAX}$ N7495	39	50	63	mA

SWITCHING CHARACTERISTICS,  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ ,  $N = 10$ 

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$f_{max}$	Maximum shift frequency	$C_L = 15\text{pF}$	$R_L = 400\Omega$	25	36		MHz
$t_{pd1}$	Propagation delay time to logical 1 level from clock 1 or clock 2 to outputs	$C_L = 15\text{pF}$	$R_L = 400\Omega$		18	27	ns
$t_{pd0}$	Propagation delay time to logical 0 level from clock 1 or clock 2 to outputs	$C_L = 15\text{pF}$	$R_L = 400\Omega$		21	32	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  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .

† Not more than one output should be shorted at a time.