

✓ 010754  
54/74166

8-BIT SHIFT REGISTER

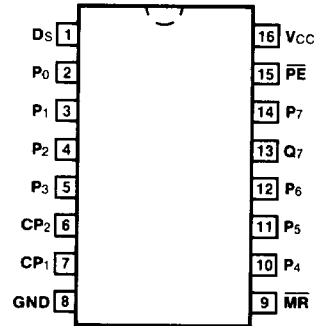
**DESCRIPTION** — The '166 is an 8-bit, serial- or parallel-in, serial-out shift register using edge triggered D-type flip-flops. Serial and parallel entry are synchronous, with state changes initiated by the rising edge of the clock. An asynchronous Master Reset overrides other inputs and clears all flip-flops. The circuit can be clocked from two sources or one CP input can be used to trigger the other.

- 35 MHz TYPICAL SHIFT FREQUENCY
- ASYNCHRONOUS MASTER RESET
- SYNCHRONOUS PARALLEL ENTRY
- GATED CLOCK INPUT CIRCUITRY

**ORDERING CODE:** See Section 9

PKGS	PIN OUT	COMMERCIAL GRADE	MILITARY GRADE	PKG TYPE
		V <sub>CC</sub> = +5.0 V ±5%, T <sub>A</sub> = 0°C to +70°C	V <sub>CC</sub> = +5.0 V ±10%, T <sub>A</sub> = -55°C to +125°C	
Plastic DIP (P)	A	74166PC		9B
Ceramic DIP (D)	A	74166DC	54166DM	7B
Flatpak (F)	A	74166FC	54166FM	4L

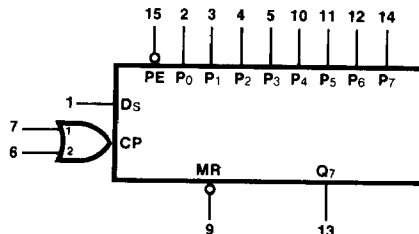
**CONNECTION DIAGRAM**  
PINOUT A



**INPUT LOADING/FAN-OUT:** See Section 3 for U.L. definitions

PIN NAMES	DESCRIPTION	54/74 (U.L.) HIGH/LOW
CP <sub>1</sub> , CP <sub>2</sub>	Clock Pulse Inputs (Active Rising Edge)	1.0/1.0
D <sub>S</sub>	Serial Data Input	1.0/1.0
PE	Parallel Enable Input (Active LOW)	1.0/1.0
P <sub>0</sub> — P <sub>7</sub>	Parallel Data Inputs	1.0/1.0
MR	Asynchronous Master Reset Input (Active LOW)	1.0/1.0
Q <sub>7</sub>	Last Stage Output	20/10

**LOGIC SYMBOL**



V<sub>CC</sub> = Pin 16  
GND = Pin 8

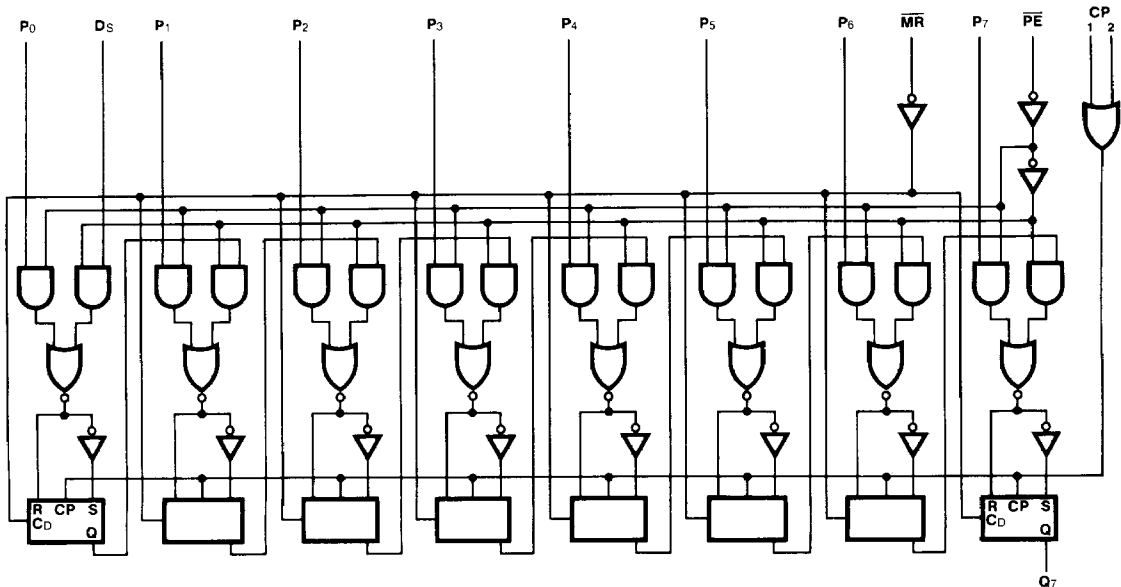
**FUNCTIONAL DESCRIPTION** — Operation is synchronous (except for Master Reset) and state changes are initiated by the rising edge of either clock input if the other clock input is LOW. When one of the clock inputs is used as an active HIGH clock inhibit, it should attain the HIGH state while the other clock is still in the HIGH state following the previous operation. When the Parallel Enable ( $\overline{PE}$ ) input is LOW, data is loaded into the register from the Parallel Data ( $P_0 - P_7$ ) inputs on the next rising edge of the clock. When  $\overline{PE}$  is HIGH, information is shifted from the Serial Data ( $D_S$ ) input to  $Q_0$  and all data in the register is shifted one bit position (i.e.,  $Q_0 \rightarrow Q_1, Q_1 \rightarrow Q_2$ , etc.) on the rising edge of the clock.

**MODE SELECT TABLE**


INPUTS				RESPONSE
$\overline{MR}$	$\overline{PE}$	$CP_1$	$CP_2$	
L	X	X	X	Asynchronous Reset; $Q_n = \text{LOW}$
H	X	H*	X	Hold
H	X	X	H*	
H	L	L	$\nearrow$	Parallel Load; $P_n \rightarrow Q_n$
H	L	$\nearrow$	L	
H	H	L	$\nearrow$	Shift; $D_S \rightarrow Q_0, Q_0 \rightarrow Q_1$ , etc.
H	H	$\nearrow$	L	

\*The HIGH signal on one CP input must be established while the other CP input is HIGH.  
 H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial

**LOGIC DIAGRAM**



**DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE** (unless otherwise specified)

SYMBOL	PARAMETER	54/74		UNITS	CONDITIONS
		Min	Max		
I <sub>CC</sub>	Power Supply Current		127	mA	V <sub>CC</sub> = Max, CP <sub>1</sub> =  D <sub>S</sub> = 4.5 V CP <sub>2</sub> , MR, PE, P <sub>n</sub> = Gnd

**AC CHARACTERISTICS:** V<sub>CC</sub> = +5.0 V, T<sub>A</sub> = +25°C (See Section 3 for waveforms and load configurations)

SYMBOL	PARAMETER	54/74		UNITS	CONDITIONS
		C <sub>L</sub> = 15 pF R <sub>L</sub> = 400 Ω			
		Min	Max		
f <sub>max</sub>	Maximum Clock Frequency	25		MHz	Figs. 3-1, 3-8
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay CP <sub>n</sub> to Q <sub>7</sub>		26 30	ns	
t <sub>PHL</sub>	Propagation Delay MR to Q <sub>7</sub>		35	ns	Figs. 3-1, 3-16

**AC OPERATING REQUIREMENTS:** V<sub>CC</sub> = +5.0 V, T<sub>A</sub> = +25°C

SYMBOL	PARAMETER	54/74		UNITS	CONDITIONS	
		Min	Max			
t <sub>s</sub> (H) t <sub>s</sub> (L)	Setup Time HIGH or LOW D <sub>S</sub> or P <sub>n</sub> to CP <sub>n</sub>	20		ns	Fig. 3-6	
t <sub>h</sub> (H) t <sub>h</sub> (L)	Hold Time HIGH or LOW D <sub>S</sub> or P <sub>n</sub> to CP <sub>n</sub>	0		ns		
t <sub>s</sub> (H) t <sub>s</sub> (L)	Setup Time HIGH or LOW PE to CP <sub>n</sub>	30		ns		
t <sub>h</sub> (H) t <sub>h</sub> (L)	Hold Time HIGH or LOW PE to CP <sub>n</sub>	0		ns		
t <sub>w</sub> (H)	CP <sub>n</sub> Pulse Width HIGH	20		ns		Fig. 3-8
t <sub>w</sub> (L)	MR Pulse Width LOW	20		ns		Fig. 3-16