

# 54/7442A • 54LS/74LS42

## 54/7443A • 54/7444A

### 1-of-10 DECODER

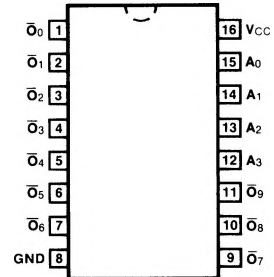
**DESCRIPTION**—The '42, '43 and '44 are multipurpose decoders. For any valid input combination, one and only one output is LOW. For all invalid input combinations all outputs are HIGH. The '42 accepts four BCD inputs and provides ten mutually exclusive outputs; the '43 accepts four lines of EXCESS-3 encoded data and provides ten mutually exclusive outputs; the '44 accepts four lines of EXCESS-3 Gray encoded data and provides ten mutually exclusive totem pole outputs.

- **MULTIFUNCTION CAPABILITY**
- **MUTUALLY EXCLUSIVE OUTPUTS**
- **DEMULTIPLIXING CAPABILITY**
- **FULLY TTL AND CMOS COMPATIBLE**

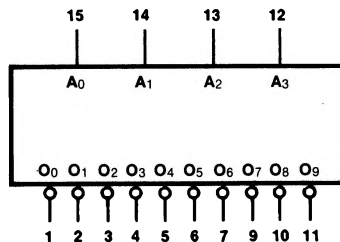
**ORDERING CODE:** See Section 9

PKGS	PIN OUT	COMMERCIAL GRADE	MILITARY GRADE	PKG TYPE
		$V_{CC} = +5.0\text{ V} \pm 5\%$ , $T_A = 0^\circ\text{ C to } +70^\circ\text{ C}$	$V_{CC} = +5.0\text{ V} \pm 10\%$ , $T_A = -55^\circ\text{ C to } +125^\circ\text{ C}$	
Plastic DIP (P)	A	7442APC, 74LS42PC 7443APC, 7444APC		9B
Ceramic DIP (D)	A	7442ADC, 74LS42DC 7443ADC, 7444ADC	5442ADM, 54LS42DM 5443ADM, 5444ADM	6B
Flatpak (F)	A	7442AFC, 74LS42FC 7443AFC, 7444AFC	5442AFM, 54LS42FM 5443AFM, 5444AFM	4L

#### CONNECTION DIAGRAM PINOUT A



#### LOGIC SYMBOL



$V_{CC} = \text{Pin } 16$   
 $\text{GND} = \text{Pin } 8$

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

PIN NAMES	DESCRIPTION	54/74 (U.L.) HIGH/LOW	54/74LS (U.L.) HIGH/LOW
A <sub>0</sub> — A <sub>3</sub>	BCD Inputs ('42)	1.0/1.0	0.5/0.25
A <sub>0</sub> — A <sub>3</sub>	EXCESS-3 Inputs ('43)	1.0/1.0	
A <sub>0</sub> — A <sub>3</sub>	EXCESS-3 GRAY Inputs ('44)	1.0/1.0	
$\bar{O}_0$ — $\bar{O}_9$	Decimal Outputs (Active LOW)	20/10	10/5.0 (2.5)

**FUNCTIONAL DESCRIPTION** — Logically, the '42, '43 and '44 differ only in their input codes. The '42 accepts the standard 8421 BCD code. The '43 accepts the EXCESS-3 decimal code while the '44 accepts the EXCESS-3 Gray code. For any input combination within the assigned ten states, only one output is LOW, as shown in the Truth Table. For all invalid input combinations, all ten outputs are HIGH.

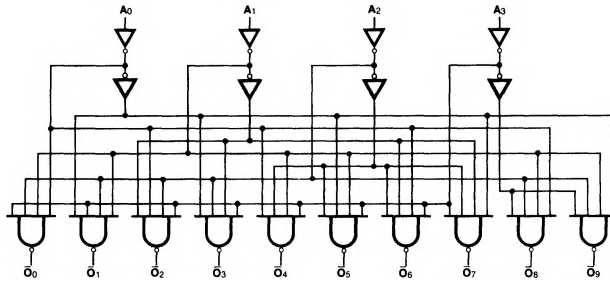
The '42 can be used as a conventional 1-of-8 decoder by treating the most significant input A<sub>3</sub> as an active LOW Enable. Similarly, it can be used as an 8-output demultiplexer by using A<sub>3</sub> as the data input.

**TRUTH TABLE**

'42A • 'LS42 BCD INPUT				'43A EXCESS-3 INPUT				'44A EXCESS-3 GRAY INPUT				ALL TYPES DECIMAL OUTPUT										
A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	$\bar{O}_0$	$\bar{O}_1$	$\bar{O}_2$	$\bar{O}_3$	$\bar{O}_4$	$\bar{O}_5$	$\bar{O}_6$	$\bar{O}_7$	$\bar{O}_8$	$\bar{O}_9$	
L	L	L	L	L	L	H	H	L	L	H	L	L	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	H	L	L	L	H	H	L	L	H	L	H	H	H	H	H	H	H	H
L	L	H	L	L	H	L	H	L	H	H	H	L	H	H	H	H	H	H	H	H	H	H
L	L	H	H	L	H	H	L	L	H	L	H	L	H	H	L	H	H	H	H	H	H	H
L	H	L	L	L	H	H	H	L	H	L	L	L	H	H	H	L	H	H	H	H	H	H
L	H	L	H	L	H	L	L	L	H	H	L	L	H	H	H	H	L	H	H	H	H	H
L	H	H	L	L	H	L	H	L	H	H	H	L	H	H	H	H	L	H	H	H	H	H
L	H	H	H	L	H	L	L	L	H	H	H	L	H	H	H	H	H	L	H	H	H	H
H	L	L	L	L	H	L	H	H	H	H	L	L	H	H	H	H	H	H	H	L	H	H
H	L	L	H	L	H	L	L	L	H	L	H	L	H	H	H	H	H	H	H	H	H	L
H	L	H	L	L	H	H	L	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H
H	L	H	H	L	H	H	L	L	H	L	L	L	H	H	H	H	H	H	H	H	H	H
H	H	L	L	L	H	H	H	L	H	L	L	L	H	H	H	H	H	H	H	H	H	H
H	H	L	H	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H
H	H	H	L	L	L	L	H	L	L	L	H	L	H	H	H	H	H	H	H	H	H	H
H	H	H	H	L	L	H	L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H

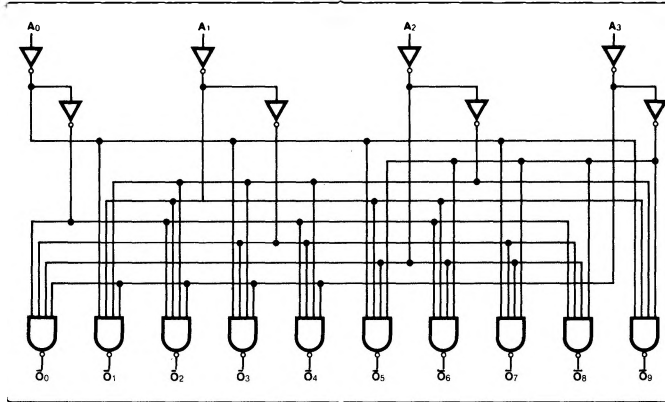
H = HIGH Voltage Level  
L = LOW Voltage Level

**LOGIC DIAGRAMS**  
**'42A • 'LS42**



**'43A**

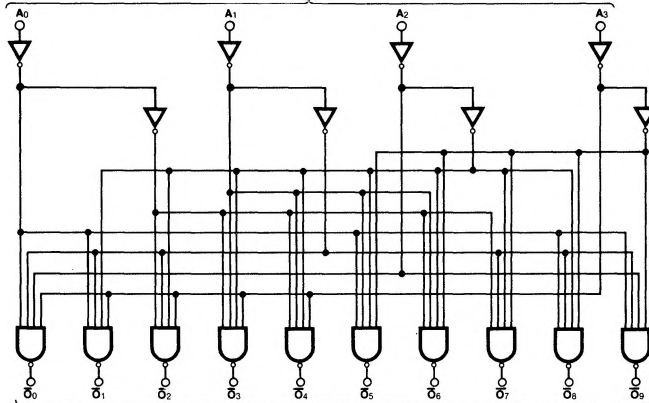
INPUTS



OUTPUTS

**'44A**

INPUTS



OUTPUTS

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

SYMBOL	PARAMETER		54/74		54/74LS		UNITS	CONDITIONS
			Min	Max	Min	Max		
I <sub>OS</sub>	Output Short Circuit Current	XM	-20	-55	-20	-100	mA	V <sub>CC</sub> = Max
		XC	-18	-55	-20	-100		
I <sub>CC</sub>	Power Supply Current	XM	41		12		mA	V <sub>CC</sub> = Max
		XC	56		12			

**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		54/74LS		UNITS	CONDITIONS
		C <sub>L</sub> = 15 pF R <sub>L</sub> = 400 Ω		C <sub>L</sub> = 15 pF			
		Min	Max	Min	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> to $\bar{O}_n$ , 2 Levels	25		18 25		ns	Figs. 3-1, 3-20
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> to $\bar{O}_n$ , 3 Levels	30 30		20 27			