Real Time System

Third Level

Lecture Eight

I/O Interfacing and Programmable Devices

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Goals
Up-on completing this lecture, the student should be able to:

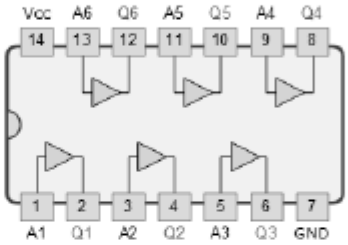
1- Identify the concepts behind interfacing using octal buffers
2- Comprehend the c/c of 74LS373, 74LS374.

Tri-state Buffers are available in integrated circuits form as octal buffer/drivers in both unidirectional and bi-directional forms, with the more common being the TTL 74240, the TTL 74244 and the TTL 74245.

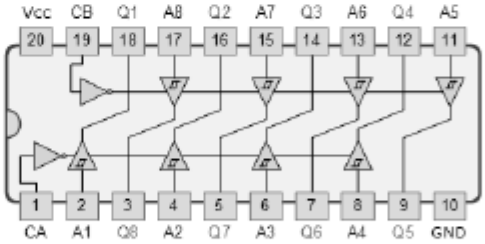
The most commonly available Digital Buffer and Tri-state Buffer IC's include:

- 74LS07 Hex Non-inverting Buffer.
- 74LS17 Hex Buffer/Driver.
- 74LS244 Octal Buffer/Line Driver.
- 74LS245 Octal Bi-directional Buffer.

74LS07 Digital Buffer



74LS244 Octal Tri-state Buffer



74LS244 Octal 3-State Buffer/Line Driver/Line Receiver

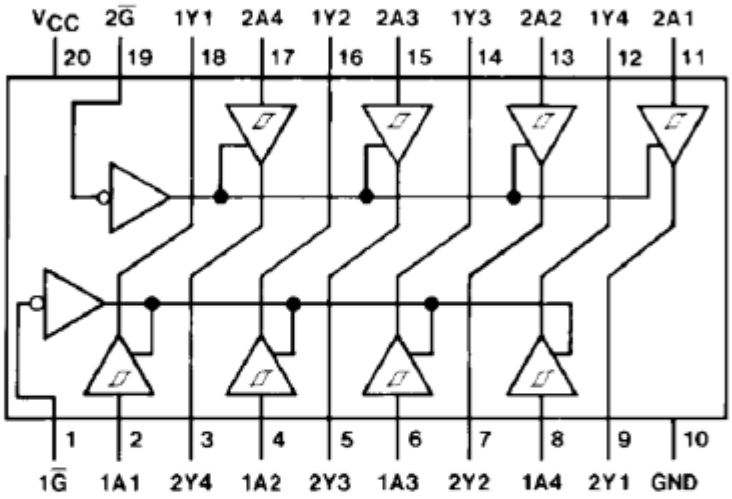
The 74LS244 buffer/line driver is designed to improve the performance of 3-State buffers/ drivers plus to provide improved noise rejection.

In electronics, a driver is an electrical circuit or other electronic component used to control another circuit or component, such as a high-power transistor, liquid crystal display (LCD), and numerous others. They are usually used to regulate current flowing through a circuit or is used to control the other factors such as other components, some devices in the circuit.

Features:-

- 3-State outputs drive bus lines.
- PNP inputs reduce DC loading on bus lines.
- Improves noise rejection.
- Typical I_{OL} (sink current) 24 mA.
- Typical I_{OH} (source current) -15 mA.
- Typical enable/disable time 18 ns.

Connection Diagram



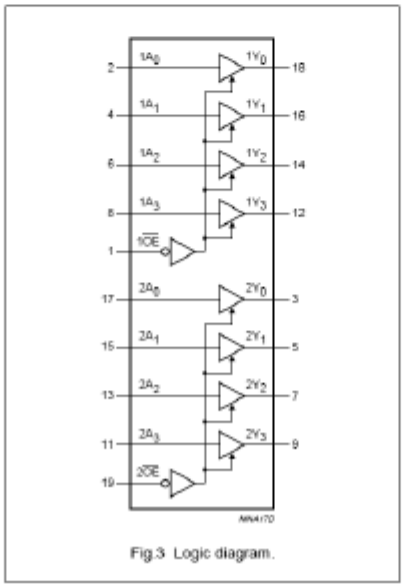


Fig.3 Logic diagram.

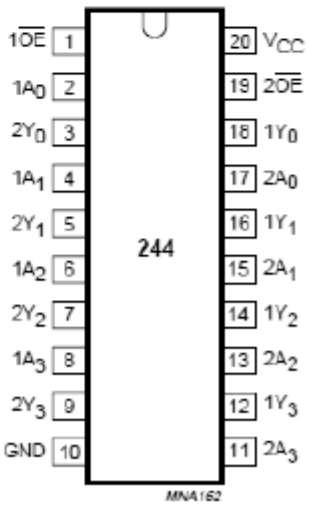


Fig.1 Pin configuration.

Function Table

Inputs		Output
$\overline{G}$	A	Y
L	L	L
L	H	H
H	X	Z

L = LOW Logic Level
H = HIGH Logic Level
X = Either LOW or HIGH Logic Level
Z = High Impedance

Absolute Maximum Ratings

The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

- Supply Voltage 7V.
- Operating Free Air Temperature Range 0°C to +70°C.
- Storage Temperature Range -65°C to +150°C.

Recommended Operating Conditions

Symbol	Parameter	Min	Nom	Max	Units
V_{CC}	Supply Voltage	4.75	5	5.25	V
I_{OH}	HIGH Level Output Current			–15	mA
I_{OL}	LOW Level Output Current			24	mA
T_A	Free Air Operating Temperature	0		70	°C

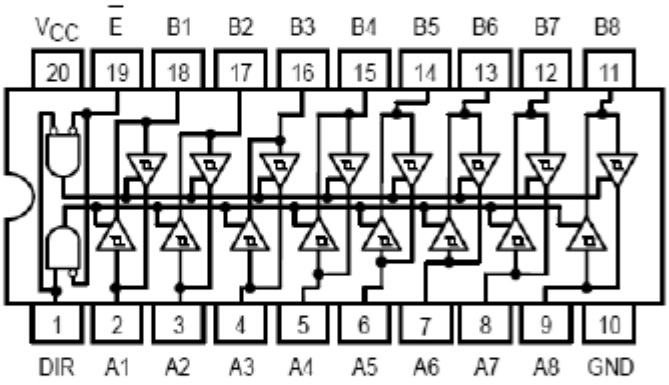
74LS245 Octal Bus Transceiver

These octal bus transceivers are designed for asynchronous two-way communication between data buses. These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (OE) input can disable the device so

Features:-

- 3-State Outputs Drive Bus Lines.
- PNP Inputs Reduce DC Loading on Bus Lines.
- Improves Noise rejection.
- 2-Way Asynchronous Data Bus Communication.
- Typical I_{OL} (sink current) 24 mA.
- Typical I_{OH} (source current) -15 mA.

Logic and Connection Diagrams

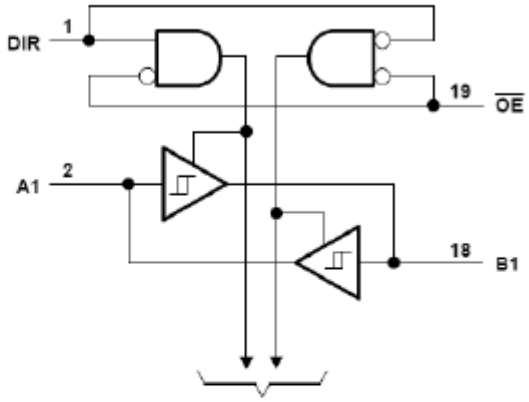


TRUTH TABLE

INPUTS		OUTPUT
$\overline{E}$	DIR	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	Isolation

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

logic diagram (positive logic)



recommended operating conditions

		SN74LS245			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.75	5	5.25	V
I_{OH}	High-level output current			−15	mA
I_{OL}	Low-level output current			24	mA
T_A	Operating free-air temperature	0		70	°C

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