Code Converters

Code converters are digital logic circuits that translate data from one binary code format (like Binary, BCD, Gray, Excess-3) to another, acting as translators between systems using different codes, essential for compatibility and simplifying hardware. They work by creating truth tables and using K-maps/Boolean algebra to design logic gates for conversions like Binary to Gray or BCD to Excess-3. Code converters are important components in various digital systems and devices, as they help to connect different digital devices together that support data in different formats.

What is a Code Converter?

A code converter is a digital electronic circuit that is used to convert a digital code from one form to another. A digital code is nothing but a piece of data or information represented in binary format, i.e., in the form of strings of 0s and 1s.

A code converter is simply a translator which translates a code from one format to another. For example, binary to decimal converter, BCD to Excess-3 converter, binary to decimal converter, etc.

Code converters are essential components in various digital systems that use different encoding schemes. They help to make two different digital systems compatible with each other.

For example, consider a digital system that supports data in binary format, and we need to connect this system with another system for processing that supports data in decimal format. Then, we need a data converter between them that can translate binary formatted data into decimal format for processing. This is how code converters play an important role in system interfacing.

Function of a Code Converter

The primary function of a code converter is to accept code in one format and translate it into a different format.

A code converter reads and interprets the input code and produces an equivalent output code according to its functionality. For example, a binary-to-decimal code converter takes a binary code as input and generates an equivalent decimal code as output.

Types of Code Converters

Depending on the conversion task that a code converter performs, the following are some common types of code converters −

- Binary to Decimal Converter
- Decimal to BCD Converter
- BCD to Decimal Converter
- Binary to Gray Code Converter
- Gray Code to Binary Converter
- BCD to Excess-3 Converter
- Excess-3 to BCD Converter

Binary to Decimal Converter

A type of code converter used to convert data from binary format to decimal format is called a binary-to-decimal converter.

The input to the binary-to-decimal converter is a number represented in a format of 0s and 1s. Then, the converter uses an algorithm to convert the input binary number into an equivalent decimal number. Finally, it generates a decimal code as output.

Decimal to BCD Converter

A decimal-to-BCD (Binary Coded Decimal) converter is a type of code convert that converts a decimal number into its equivalent 4-bit binary code, called BCD code.

BCD to Decimal Converter

A digital circuit that can convert a binary-coded decimal (BCD) number into an equivalent decimal number is referred to as a BCD-to-decimal converter.

The input to a BCD to decimal converter is an 8421 BCD code and the output generated by the converter is a decimal number.

Binary to Gray Code Converter

A binary-to-gray code converter is a type of code converter that can translate a binary code into its equivalent gray code.

The binary-to-gray code converter accepts a binary number as input and produces a corresponding gray code as output.

Gray Code to Binary Converter

A gray code-to-binary converter is a digital circuit that can translate a gray code into an equivalent pure binary code. Thus, a gray code to binary converter takes a gray code as input and gives a pure binary code as output.

BCD to Excess-3 Converter

A type of code converter in digital electronics that is used to convert a binary-coded decimal number into an equivalent excess-3 code is called a BCD to excess-3 converter.

Excess-3 to BCD Converter

An excess-3 to BCD converter is a type of code converter in digital electronics used to translate an XS-3 code into an equivalent binary-coded decimal.

Therefore, an XS-3 to BCD code converter accepts a digital code in XS-3 format and produces an equivalent digital code in BCD format.

Applications of Code Converters

In digital circuits and systems, the code converters are essential components that allow the conversion of a digital code from one format to another.

Some of the important applications of code converters are listed below −

- Code converters are used in ADC (Analog-to-Digital Converters) and DAC (Digital-to-Analog Converters).
- Code converters are used in computers to translate data between different digital formats.
- Code converters are also employed in display devices like seven segment displays, to convert binary codes into human readable form.
- In digital communication systems, the code converters are used to perform modulation and encoding tasks.
- The code converters are also used as interfacing device between two digital devices or systems that use different encoding schemes.
- Code converters are also used in digital signal processing applications to manipulate and process signals in different formats.
- Code converters are integral parts of almost all digital systems and devices. They allow to interpret and process digital information in different formats.

Natural-binary code				Gray code			
B3	B2	B1	B0	G3	G2	G1	G0
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	0	0	0	1	1
0	0	1	1	0	0	1	0
0	1	0	0	0	1	1	0
0	1	0	1	0	1	1	1
0	1	1	0	0	1	0	1
0	1	1	1	0	1	0	0
1	0	0	0	1	1	0	0
1	0	0	1	1	1	0	1
1	0	1	0	1	1	1	1
1	0	1	1	1	1	1	0
1	1	0	0	1	0	1	0
1	1	0	1	1	0	1	1
1	1	1	0	1	0	0	1
1	1	1	1	1	0	0	0