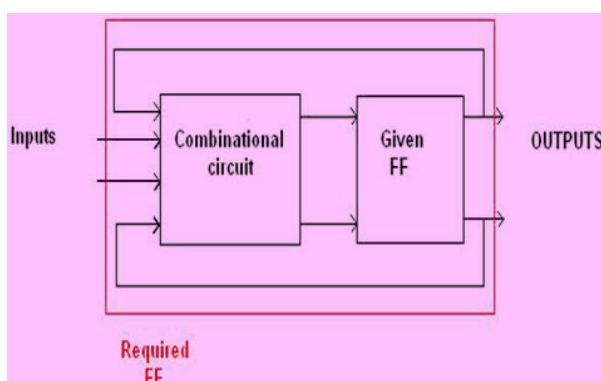


# Know About Different Types of Flip Flop Conversion

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In electronics, flip flop is an [electronic circuit](#) and is also called as a latch. Flip flops consist of two stable states which are used to store the data. These are basic building blocks of a [digital electronic system](#) which are used in various systems like communications, computers, etc. A basic flip flop can be used to construct a cross coupled inverting elements like invert gates, FETs, BJTs, inverters, vacuum tubes. Conversion of one type of flip flop to another can be done by using a combinational logic circuit. For instance, If a JK Flip Flop is necessary, the i/ps are given to the combinational circuit & the o/p of the combinational circuit is given to the i/ps of the actual flip-flop. Therefore, the o/p of the actual flip-flop is the o/p of the required flip-flop. In this article, the various flip flop conversions will be discussed.



Flip Flop Conversion

## Flip Flop Conversion

The main purpose of the flip flop conversion is to convert a flip flop into a desired type-B flip flop using some conversion logic. The flip flop conversions are classified into different types that are

- SR-FF to JK-FF Conversion
- JK-FF to SR-FF Conversion
- SR-FF to D-FF Conversion
- D-FF to SR-FF Conversion
- JK-FF to T-FF Conversion
- JK-FF to D-FF Conversion



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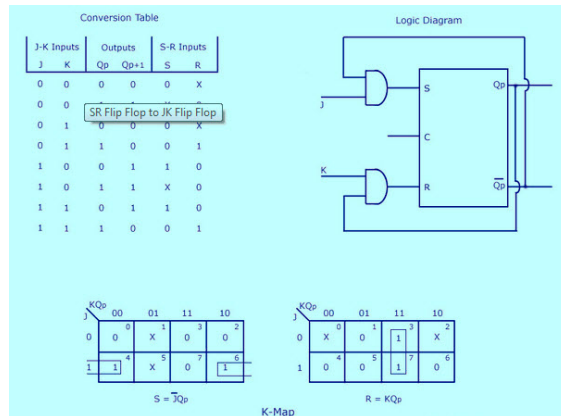
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- D-FF to JK-FF Conversion

## SR-Flip Flop to JK-Flip Flop Conversion

In JK-flipflop, j and k are given as external i/ps to S and R in SR-flip flop. Here, both S & R are o/ps of the combinational circuit. The truth tables of flip flop conversions are shown below. The current state is denoted with  $Q_p$  &  $Q_{p+1}$  is the next state to be found when the J & K i/ps are applied.



SR-FF to JK-FF Conversion

There are eight possible combinations for two i/ps J and K. For every combination of J, K &  $Q_p$ , the equivalent  $Q_{p+1}$  states are found.  $Q_{p+1}$  simply recommends the future values to be found by the JK-flip flop after the importance of  $Q_p$ . Then the table is finished by writing the values of S & R compulsory to get each  $Q_{p+1}$  from the equivalent  $Q_p$ . That is, the S and R values are compulsory to change the state of the flip flop from  $Q_p$  to  $Q_{p+1}$  are written

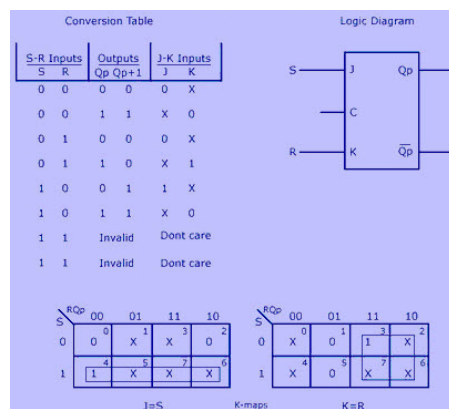
## JK-Flip Flop to SR-Flip Flop Conversion

The conversion of the JK-FF to SR-FF is opposite to the SR-FF to JK-FF. Here S & R will be the external i/ps to J & K, that is shown in the below logic diagram, J & K will be the o/ps of the combinational circuit. So, the J and K values have to be acquired in terms of S, R &  $Q_p$ . The logic diagram is shown below. The conversion table for flip flop to be written in terms of S, R,  $Q_p$ ,  $Q_{p+1}$ , J & K. There are eight possible combinations for two i/ps S and R.

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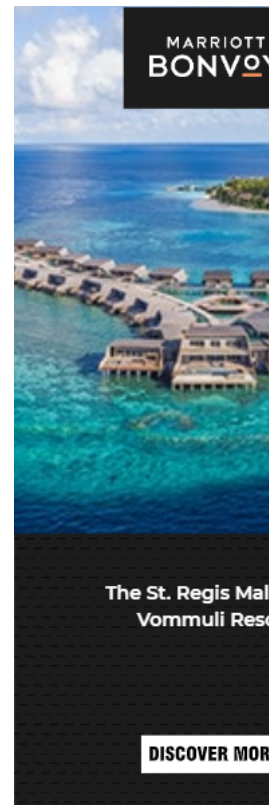


JK-FF to SR-FF Conversion

For every combination, the equivalent  $Q_{p+1}$  o/p's are found. The o/p's for the combinations of S=R=1 are not acceptable for an SR-FF. Therefore the o/p's are considered as invalid and the J & K values are taken as "don't care".

## SR-Flip Flop to D-Flip Flop Conversion

As shown in the below figure, actual inputs of the flip flop are S & R where D is the external i/p. The four combinations of the S & R in terms of D and  $Q_p$ , conversion table, logic diagram and the Karnaugh map are given below.



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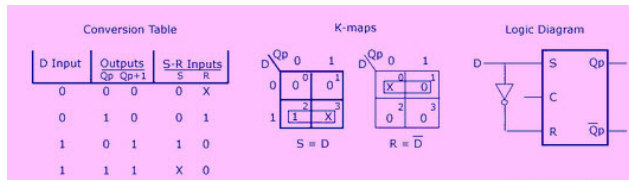
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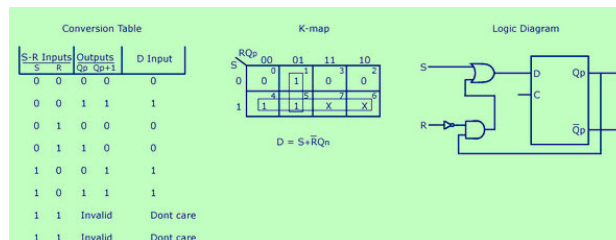
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SR-FF to D-FF Conversion

## D-Flip Flop to SR-Flip Flop Conversion

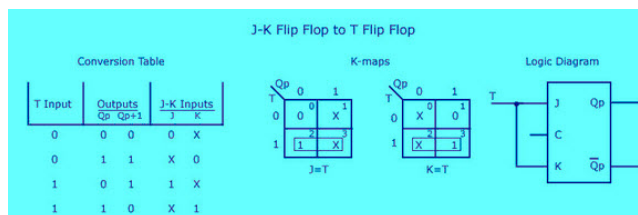
In this type of conversion, D is the actual i/p of the flip flop where S & R are the external i/ps. There are Eight possible combinations obtained from the external i/ps S, R & Qp. Nevertheless, since the combination of S=R=1 is unacceptable, the values of D and Qp+1 are taken as "don't care". The logic diagram of D-FF to SR-FF is showing the conversion from D-FF to SR-FF, and the Karnaugh map for D in terms of S, R & Qp are given below.



D-FF to SR-FF Conversion

## JK-Flip Flop to T-Flip Flop Conversion

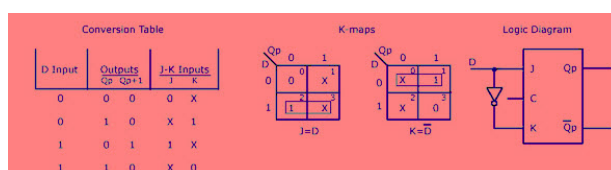
In this type of conversion, J & k are the actual i/ps of the flip flop where K is considered as the external i/p. Four combinations are created by T, Qp, J & K that are expressed in terms of T & Qp. The Karnaugh map, the logic diagram and conversion table, are given below.



JK-FF to T-FF Conversion

## JK-Flip Flop to D-Flip Flop Conversion

In this type of flip flop conversion, J&K are the actual inputs where D is the external input of the flip flop. The four combinations of the flip flop will be done by using D & Qp, and in terms of these two J&K are expressed. The conversion table with four combinations, JK-FF to D-FF conversion logic diagram and Karnaugh map for J & K in terms of D & are shown below.

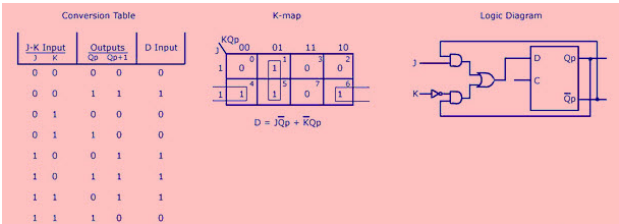


JK-FF to D-FF Conversion

## D-Flip Flop to JK-Flip Flop Conversion

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In this type of flip flop conversion, J & K are the external i/ps of the flip flop where D is the actual input. The eight combinations can make by using J, K and Qp that is shown in the conversion table below. D is stated in terms of J, K & Qp. The Karnaugh map D in terms of J, K & Qp, conversion table and the **logic diagram** of the D-FF to JK-FF is shown below.



D-FF to JK-FF Conversion

Thus, this is all about different types of flip flop conversions, that includes SR-FF to JK-FF , JK-FF to SR-FF , SR-FF to D-FF , D-FF to SR-FF , JK-FF to T-FF , JK-FF to D-FF and D-FF to JK-FF . We hope that you have got a better understanding of this concept. Furthermore, any doubts regarding the applications of flip-flops or **electronics projects**, please give your feedback by commenting in the comment section below. Here is a question for you, what are the applications of flip flops?

①

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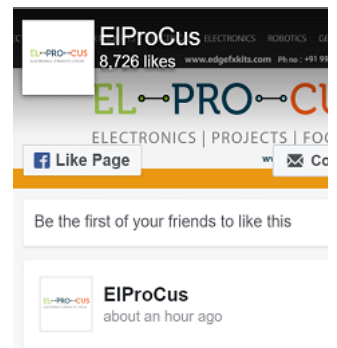
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