

DIGITAL COMMUNICATION LAB

Electrical Engineering Department

Experiment 5: MATCHED FILTER

AIM: To study matched filter using hardware

Components Required:

- Breadboard
- Digital Storage Oscilloscope (DSO)
- D flip-flop
- Function Generator
- Resistors:
- Capacitor:
- Wires and Probes

Theory

A matched filter is a signal processing technique that is widely used in a variety of digital communication applications to detect signals in noisy data. It works by designing a filter that is matched to the shape of the signal that is being transmitted or received. When the noisy signal is passed through the matched filter, it amplifies the signal and reduces the noise, resulting in a clearer and more reliable

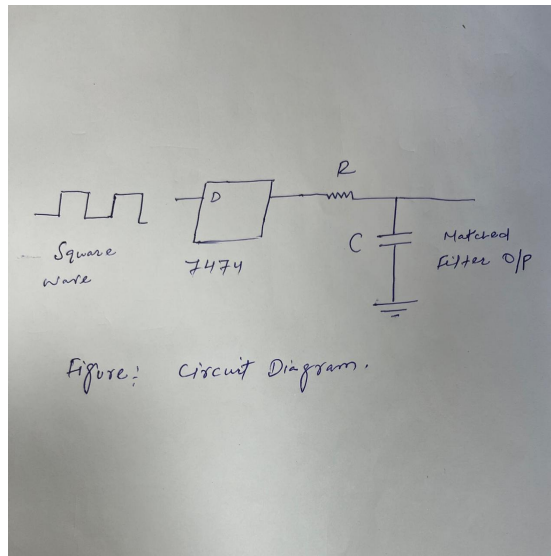


Figure 1: Circuit Diagram

signal.

The matched filter is designed to match the shape of the transmitted pulse, with the goal of maximizing the SNR of the received signal. The matched filter is a time-reversed copy of the transmitted pulse. This means that the filter output is the convolution of the received signal with the time-reversed pulse. The result is a filtered signal that has a higher SNR than the original signal.

PROCEDURE:

1. Make the connections as per the circuit diagram.
2. Take square wave as input from the function generator.
3. Fix the frequency, amplitude, and offset voltage for the input signals.
4. Observe the output and notice the peaks on the DSO.

WAVEFORM:

- Attach a copy of your output.
- Verify matched filter on MATLAB.

Conclusion: Study and analysis of matched filter using hardware and verification using MATLAB.