Experiment 5

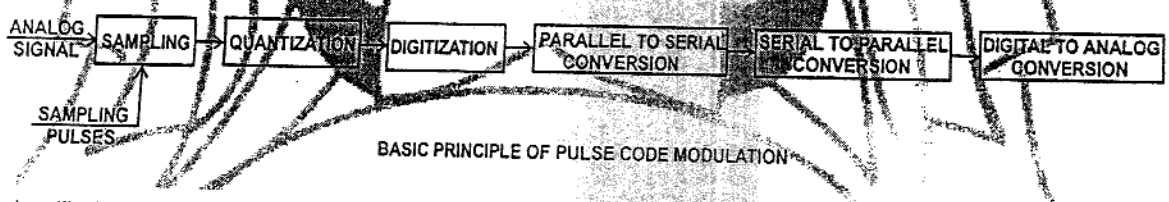
Objective

To study the Pulse Code Modulation Technique:

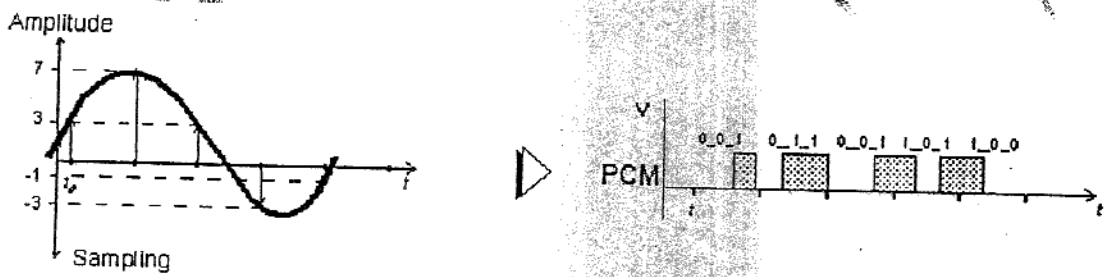
Theory

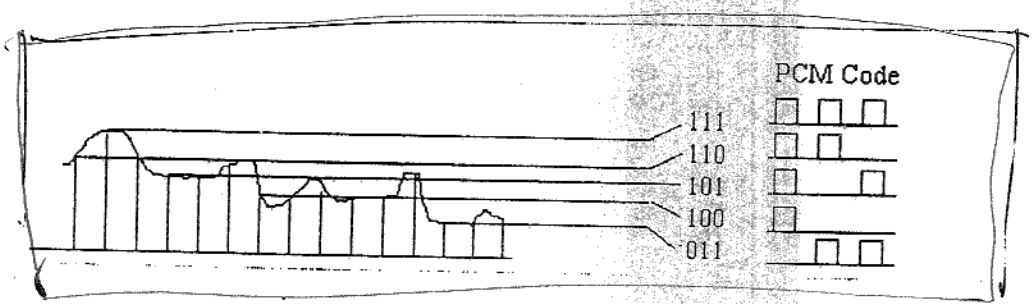
Basic Principle of PCM:

The analog signal is sampled at a rate more than the Nyquist rate. Through the process of sampling a PAM signal is generated. The signal is then quantized and digitized. The parallel data word available after the analog to digital conversion is converted to a serial data stream after coding and it is sent through the channel. This coded data stream is said to be PCM coded data and is transmitted serially by the PCM transmitter.



BASIC PRINCIPLE OF PULSE CODE MODULATION





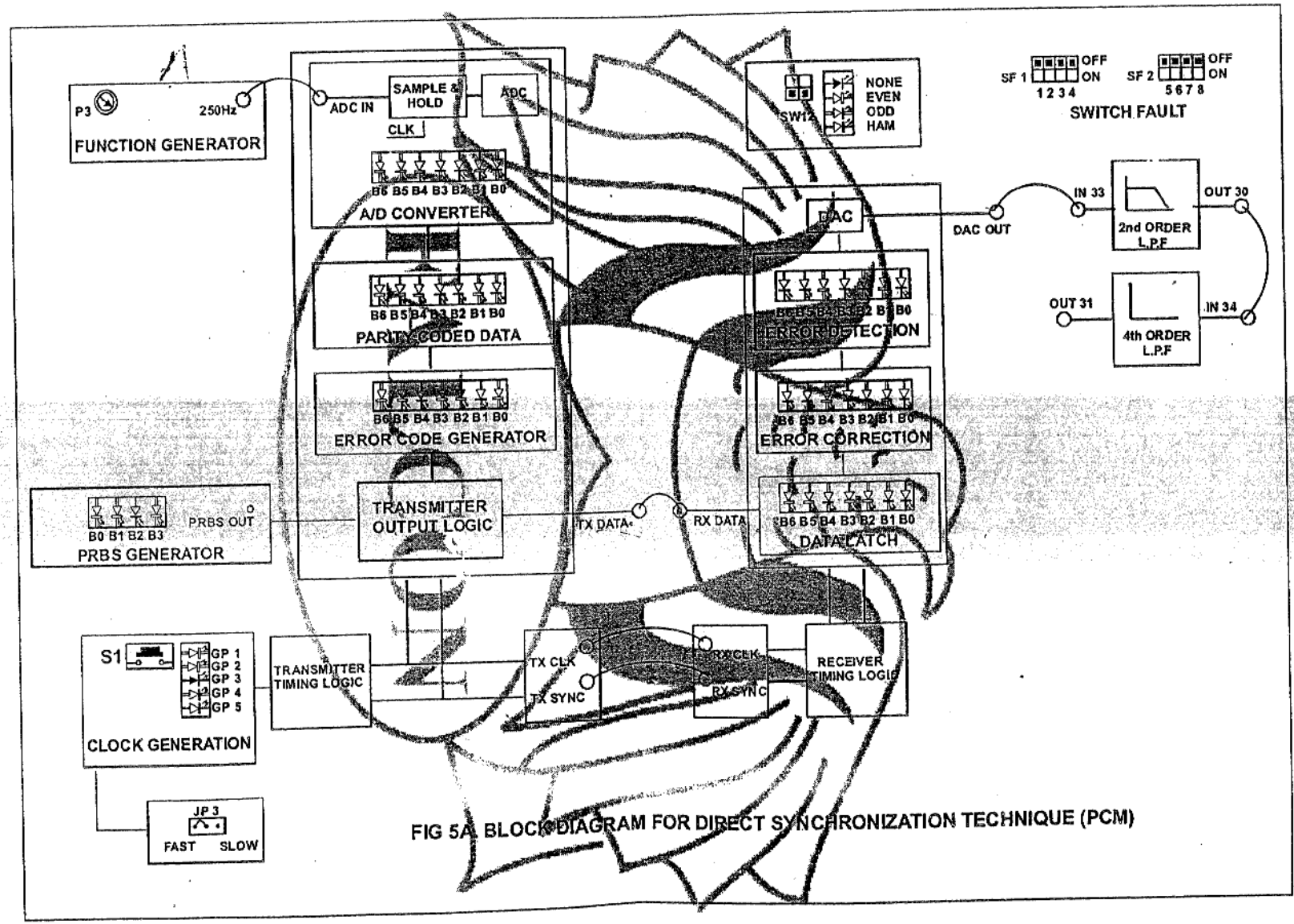


FIG 5A BLOCK DIAGRAM FOR DIRECT SYNCHRONIZATION TECHNIQUE (PCM)

5A. USING DIRECT SYNCHRONIZATION TECHNIQUE (TX CLK & TX SYNC are transmitted to the receiver)

Procedure

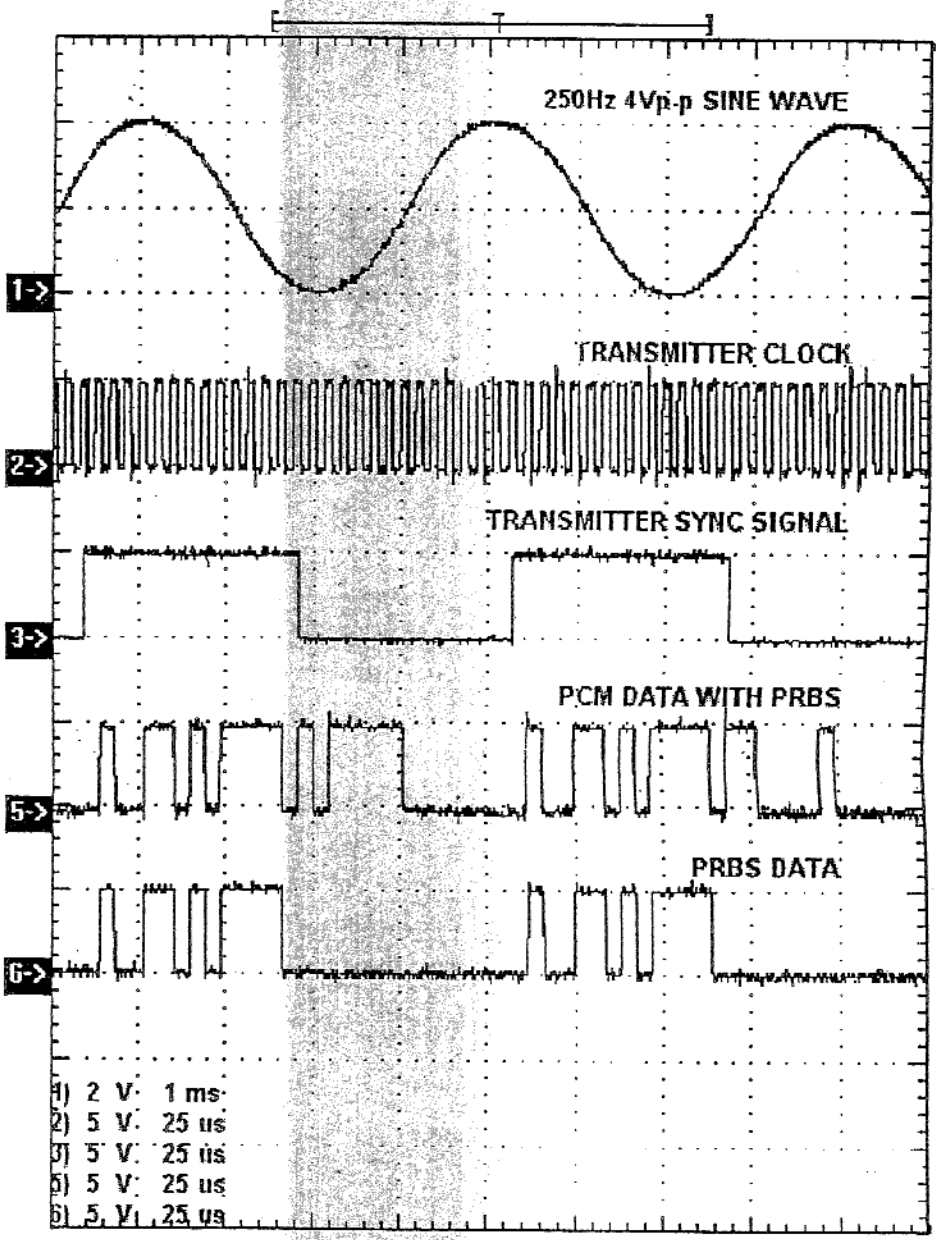
1. To provide the timing and synchronization information to the receiver section, connect **TX CLK** post to **RX CLK** post and **TX SYNC** to **RX SYNC** post.
2. The serial data is converted to the parallel data & directly observed on the corresponding LED indication at the Data Latch section.
3. Observe the D/A converted data at the **DAC OUT** post.
4. Connect the **DAC OUT** post to the **IN33** post of the 2nd order LPF. Connect **OUT 30** post of 2nd order LPF to **IN34** post of 4th order LPF.
5. Observe the recovered signal at the **OUT31** post of the 4th order LPF.

Observations

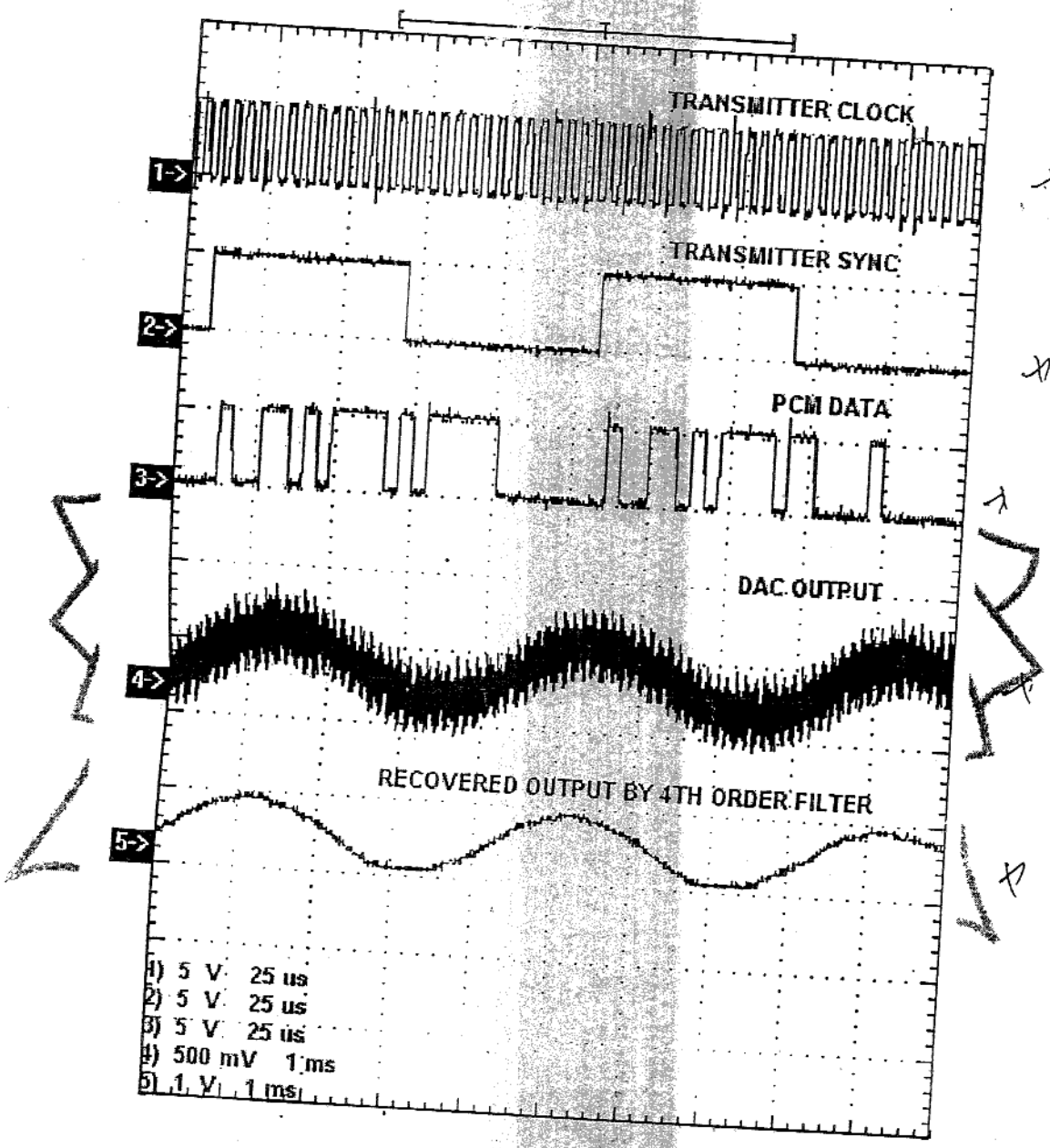
a. Input signal
b. PCM Data **TX DATA**, **TXCLK**, **TXSYNC**
c. PRBS data **PRBS OUT**
d. **RXCLK**, **RXSYNC**, **RXDATA**
e. **DAC OUT**
f. Received signal **OUT 31**

Conclusion

At the receiver side, the 4th order low pass butterworth filter is used as a reconstruction unit, which reproduces the signals (sine wave and DC signal levels) same as that of the transmitter side. In this case, it is observed that the reconstructed sine wave has a good linearity.



PCM MODULATION



PCM DEMODULATION USING DIRECT SYNCHRONIZATION TECHNIQUE