EXPERIMENT No.- 01

TITLE: Study of various Line coding schemes.

AIM: To generate Unipolar NRZ, Polar NRZ, Unipolar RZ and Polar RZ and Bipolar NRZ line code.

EQUIPMENTS: Data Formatting kit, Cathode Ray Oscilloscope (CRO), Power supply, Patch cords.

THEORY:

Unipolar RZ:

In this line code, a binary „ 1' is represented by a non-zero voltage level during a portion of the bit duration, usually for half of the bit period, and a zero voltage level for rest of the bit duration. A binary „0' is represented by a zero voltage level during the entire bit duration. The main advantage of unipolar RZ are case of generation requires single power supply and which allows simple timing recovery. A number of disadvantages exists for this line code. It has a non-zero DC component and non-zero DC content, which can load to DC wander. A long string of „0's will back pulse transition and could load to loss of synchronization. There is no error detection capability. The bandwidth requirement is also higher than non-return to zero signal.

Polar RZ:

In this scheme, a binary „1' is represented by alternating positive voltage levels, which return to zero for a portion of the bit duration, generally half the bit period. A binary „0's is represented by a negative voltage level and return to zero for half bit duration. This code has no DC component and zero DC content, completely avoiding +ve DC wander problem. Timing recovery is rather easy by squaring, or full-wave rectifying. It requires low bandwidth. The obvious disadvantage is that the error rate performance is worst. A long string of 0's or 1's could not appear and so improves in synchronization, and two power supplies are required for this code. Polar NRZ In this line code, a binary 1 is represented by a positive voltage +v and a binary 0 is represented by a negative voltage -v over the full bit period. This code is also referred to as NRZ(L), since a bit is represented by maintaining a level during its entire period. This code can also be represented by assigning negative voltage for logic 1 and positive voltage for logic 0.

The advantage of polar NRZ includes a low-bandwidth requirements, very good error probability, and great reduced DC because the waveform has a zero DC component. A major disadvantage of this code that there is no error detection capability and that a long string of 1's or 0's could result in loss of synchronization and power supplies are required to generate this code.

Bipolar NRZ:

In this scheme, a binary „1' is represented by positive and negative voltage levels in alternating mark level in full bit period. A binary „0' is represented by a zero voltage levels during entire bit duration. This code also called as alternate mark inversion (AMI) since 1's are represented by alternating positive and negative pulses. This code has no DC component and zero DC content, completely avoiding the DC wander problem. Because of the alternative polarity pulses for binary 1's, this code has error detection and hence correction also possible. A long string of 0's could result in loss of synchronization, and two power supplies are required for this code.

Bipolar RZ:

In this scheme, a binary „1' is represented by alternating positive and negative voltage a levels for a half bit period duration and maintaining zero for other of period. A binary „0' is represented by a zero voltage levels during entire bit duration. This code also called as AMI. This code has no DC component and zero DC Conant, completely avoiding the DC wander problem. Because of alternative polarity pulses

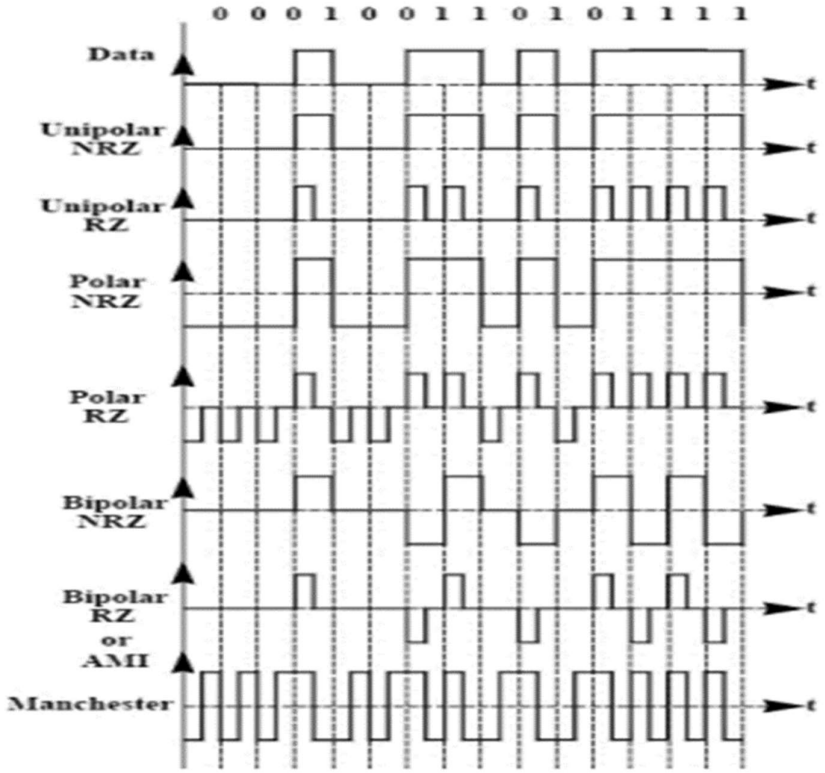
for binary 1's, this code has error detection and hence correction also possible. A long string of 0's could result in loss of synchronization, and two process supplier and required for this code.

Manchester Coding:

In this scheme, a binary 1 is represented by a pulse that has positive voltage during the first-half of the bit duration and negative voltage during second-half of the bit duration. A binary „0' is represented by a pulse that has negative voltage during first-half of the bit duration and positive voltage during second-half of the bit duration. The advantage of this code includes a zero DC content and so avoiding DC-wandering problems. The code having alternation positive and negative pulses and so timing recovery is simple and it has good error rate performance. The main disadvantage of this scheme is larger bandwidth. It has no error detection possibility.

Characteristics of line codes:

Transmission Bandwidth, DC component, Power Spectrum, Power Efficiency, Error detection and correction capability, Adequate timing content for self-synchronization, Transparency.



PROCEDURE:

1. Connect the power supply to the kit and switch it on.
2. Make the connections between clock source, Data source and Line codes.
3. Observe waveform at output for various encoding scheme and compare with the model graph.
4. Plot the waveforms for different Line codes on graph paper.

OBSERVATION:

The different Line code formats are observed with the help of CRO and are traced with the help of graph paper.

CONCLUSION:

Thus, the study Line coding schemes verified successfully