



ROHINI

COLLEGE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF BIOMEDICAL ENGINEERING

III Semester

BM3301 SENSORS AND MEASUREMENTS

UNIT – 5

5.7 Magnetic Tape recorders

A magnetic tape recorder, often referred to simply as a tape recorder or reel-to-reel recorder, is a device that records and plays back audio signals using magnetic tape as the recording medium. This technology was widely used for audio recording and playback from the mid-20th century until digital recording technologies largely replaced it. The major advantage of using a magnetic tape recorder is that once the data is recorded, it can be replayed an almost indefinite number of times.

5.7.1 Basic Components of a Tape Recorder

A magnetic tape recorder consists of the following basic components.

1. **Magnetic Tape:** The magnetic tape is a thin strip coated with a magnetic material (usually iron oxide). The tape is wound on reels and moves past the recording/playback heads.
2. **Recording/Playback Head:** These are electromagnetic components that read or write data onto the magnetic tape. They consist of a coil and a core made of a magnetic material.
3. **Tape transport mechanism:** The transport mechanism includes the components responsible for moving the magnetic tape. This typically involves motors, capstans, and pinch rollers. The capstan is a rotating shaft that maintains a constant tape speed, while the pinch roller presses the tape against the capstan, ensuring proper tension.

4. **Erasers (Optional):** Some tape recorders include an erasing head that can erase previously recorded information from the tape. This is particularly useful for reusing tapes.

5. **Record and Playback Electronics:** The record electronics process incoming audio signals, amplify them, and send them to the recording head to create the magnetic pattern on the tape. The playback electronics amplify the signals read by the playback head, preparing them for output to speakers or other audio devices.

6. **Metering System:** A metering system, such as a VU meter, provides visual feedback on the level of the audio signals during recording and playback. This helps users monitor and adjust recording levels.

5.7.2 Working of Magnetic Tape Recorder

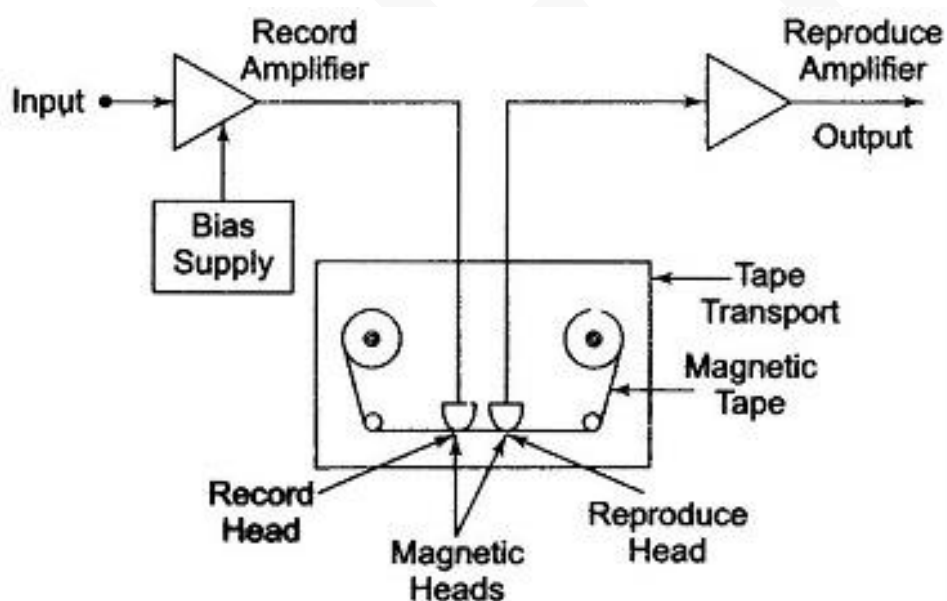


Fig. 5.7.1 Magnetic Tape recorder

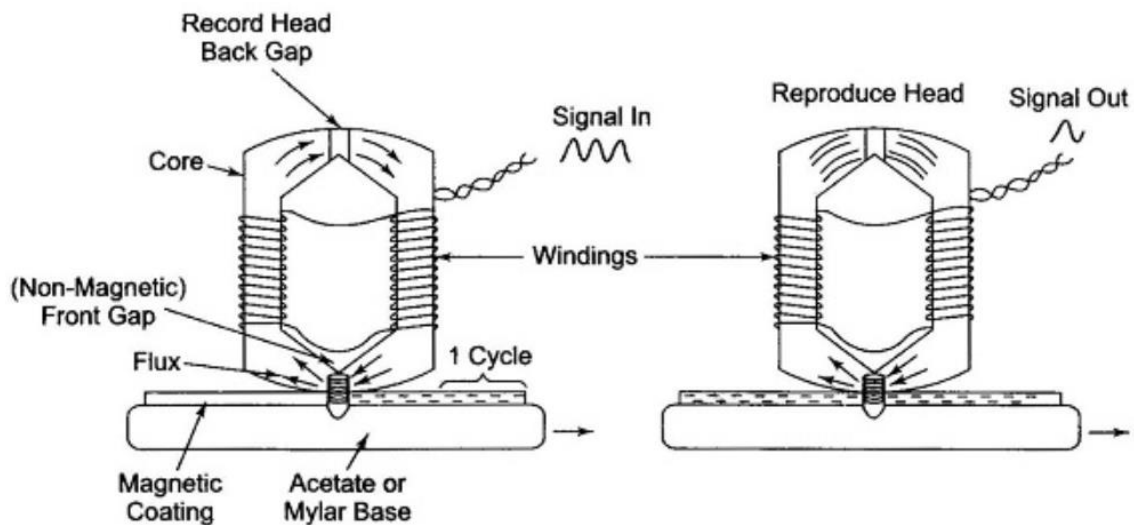


Fig. 5.7.2 Magnetization of tape

Figure 5.7.2 shows simply how the tape is magnetized. If a magnetic field is applied to any one of the iron oxide particles in a tape and removed, a residual flux remains. The relationship between the residual flux and the recording field is determined by the previous state of magnetization and by the magnetization curves of the particular magnetic recording medium.

Operation of Magnetic Tape Recorders:

1. The recording head consists of core, coil and a fine air gap of about 10 micrometer. The coil current creates a flux, which passes through the air gap to the magnetic tape and magnetizes the iron oxide particles as they pass the air gap. So the actual recording takes place at the trailing edge of the gap.
2. The reproducing head is similar to that of a recording head in appearance. The magnetic tape is passes over a reproducing head, thereby resulting in an output voltage proportional to the magnetic flux in the tape, across the coil of the reproducing head. Thus the magnetic pattern in the tape is detected and converted back into original electrical signal.
3. The tape transport mechanism moves the tape below the head at constant speed without any strain, distortion or wear. The mechanism much be such as to guide

the tape passed by the magnetic heads with great precision, maintain proper tension and have sufficient tape to magnetic head contact.

4. There are three methods of magnetic tape recording which are used for instrumentation purposes.
 - Direct recording
 - FM recording
 - Pulse Duration Modulation recording (PDM)

Advantages of Magnetic Tape Recorders:

1. Wide frequency range
2. Low distortion.
3. Immediate availability of the signal in its initial electrical form as no time is lost in processing.
4. The possibility of erase and reuse of the tape.
5. Possibility of playing back or reproducing of the recorded signal as many times as required without loss of signal.

Applications of Magnetic Tape Recorders:

1. Data recording and analysis on missiles, aircraft and satellites.
2. Communications and spying.
3. Recording of stress, vibration and analysis of noise.
