



UNIT – 2

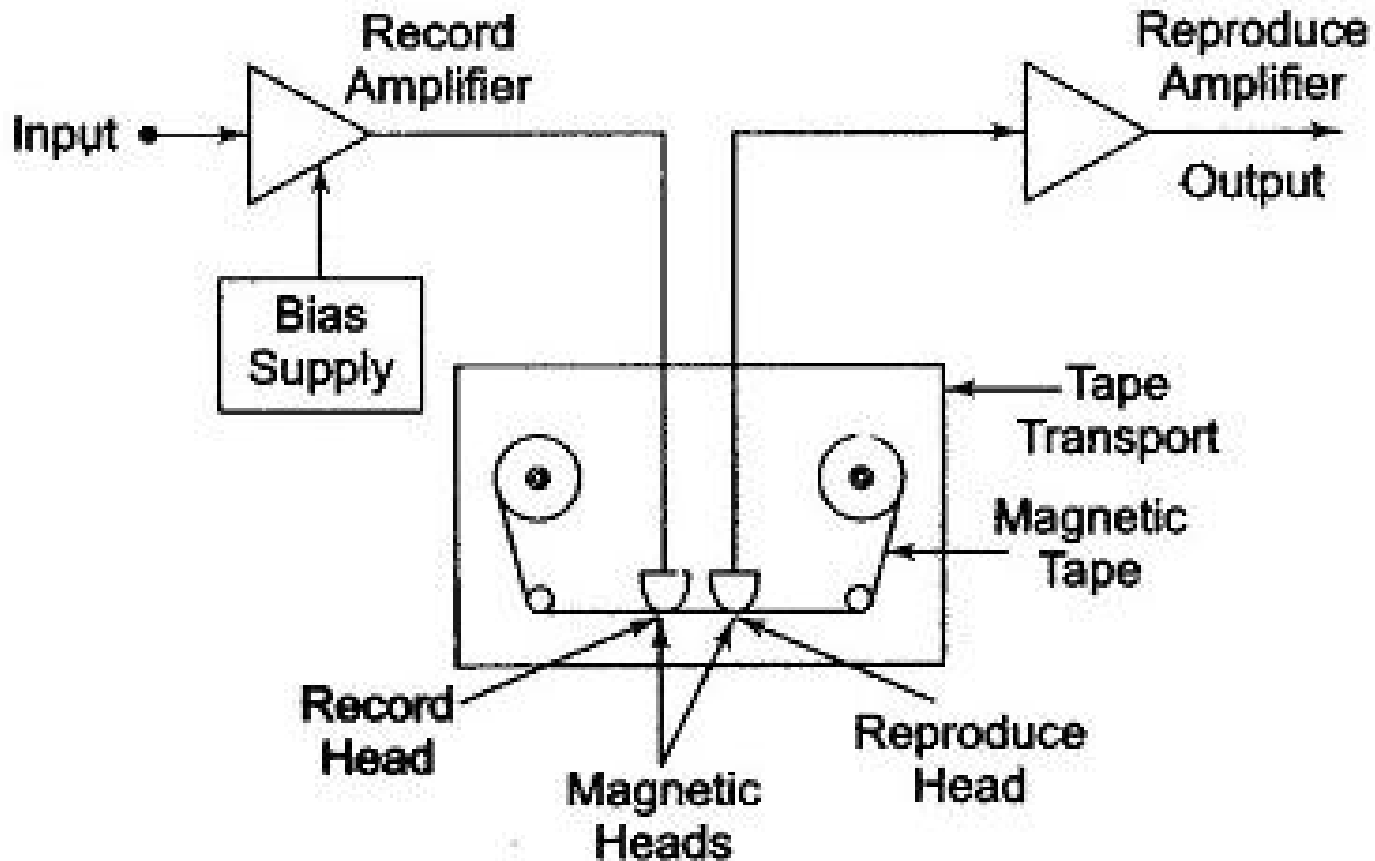
SIGNAL RECORDERS

Magnetic Tape Recorder

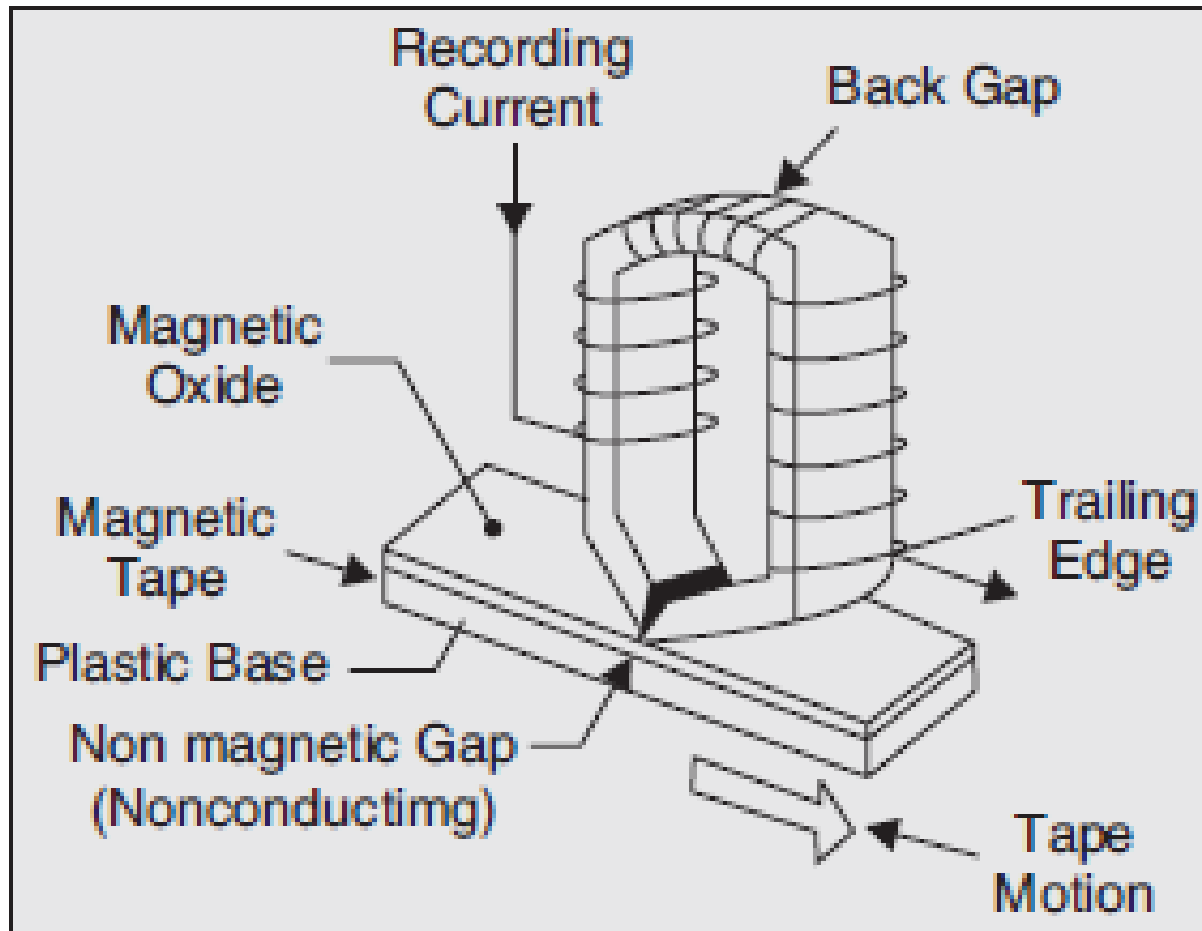
Magnetic Tape Recorder

- A magnetic tape recorder is used to record data which can be retrieved and reproduced in electrical form again.
- This recorder can record signals of high frequency.
- The magnetic tape is made of a thin sheet of tough plastic material; one side of it is coated with a magnetic material (iron oxide).
- The plastic base is usually polyvinylchloride(PVC).
- Recording head, reproducing head and tape transport mechanism are also present.

Magnetic Tape Recorder



Recording Head



Operation of Magnetic Tape Recorders:

- 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.

Reproducing head

- 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.

Tape transport mechanism



- The tape transport mechanism moves the tape below the head at constant speed without any strain, distortion or wear.
- The mechanism 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.**

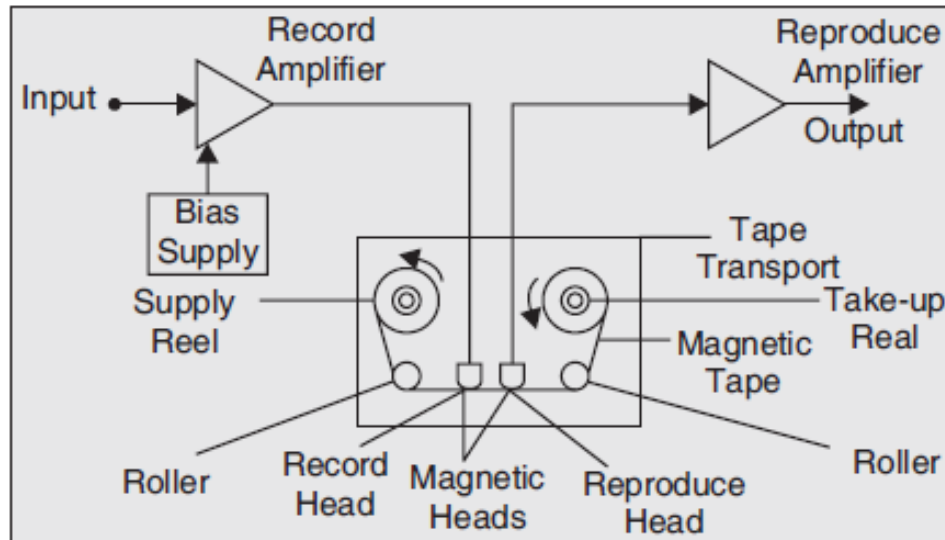
Advantages of Magnetic Tape Recorders:

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

Applications of Magnetic Tape Recorders:

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

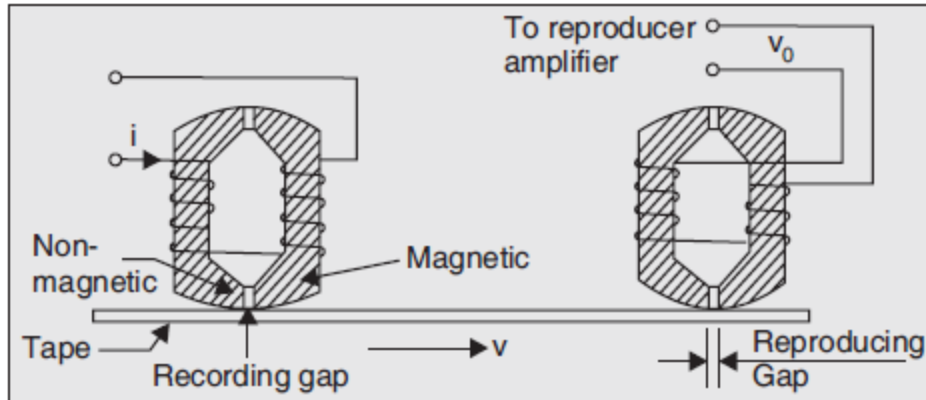
Tape Transport Mechanism



- (a) To handle the tape without straining and wearing it.***
- (b) To guide the tape across magnetic heads with great precision.***
- (c) To maintain uniform and sufficient gap between the tape and heads***
- (d) To maintain proper tension of magnetic tape.***

Method of Recording on Magnetic Tape

Direct Recording Method



The input voltage is converted into proportional current and passed through the winding on the recording head.

A magnetic flux is created at the recording gap and as the tape passes under the gap the oxide particles retain a state of permanent magnetization proportional to the flux existing at the instant the particle leaves the gap

Thus resulting magnetic field created in the recording gap enables magnetic recording of the input information on a tape that passes under the gap.

Direct Recording Method

- For reproduction, the tape is passed 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 direct recording process can be used with varying input signals only, with about 50 Hz being the usual lower limit of frequency
- The average magnetization in the gap will be zero and so there will be zero output voltage, with a gap width of 0.002 mm, and a tape speed of 3 m/s, the frequency response can extend from 50 Hz up to about 1 MHz.
- The main drawback of the direct method of recording is its poor-signal-to-noise ratio, which is typically 25 db/ The direct recording process not given high accuracy because of its poor signal-to-noise ratio.