Chapter 5 Notes
MUM 2600
Professor Calle

Chapter 5 - The Analog Audio Tape Recorder

Analog recording is mostly described as punchy, rich or gutsy.

The Tape

Analog tape is a magnetic medium.
The tapes thickness comprised mostly of PVC. (polyvinyl chloride)
The PVC is bonded with a magnetic oxide.
The molecules of the oxide work together to create small permanent magnets called domains.
When the tape is un-magnetized, the domains are randomly oriented over the tape's surface.
Random magnetization creates a cancellation of the north and south poles causing the playback head to produce a non-signal.
When recording a signal, the magnetization form the recording head orients the individual domains in such away as to create a magnetic flux. When this flux is played back at the same speed that it was recorded and amplified, it can be processed to recreate the original performance.

Analog Tape Recorders can be found in these formats:

Type of Format	Manufacturer	Tape & Head Configurations
2 track	Otari MX-5050, Ampex ATR-102	1/4"
4 track	Teac A-3340	1/2"
8 track	Fostex R8, Tascam 388	1/2"
16 track	Tascam MS-16, Tascam ATR-60	1"
24 track	Otari MTR-90, Studer A827	2"

The functions of the tape transport include play, forward, reverse, stop and most importantly to create a constant speed and tension for the tape during recording and playback.

Most tape recorders use three magnetic tape heads. The tape head functions are to record, reproduce and erase.

The most commonly used tape speeds in professional studios are 15 ips and 30 ips. Faster tape speeds (30 ips) will reproduce a tighter bottom end, higher output levels and lower noise ratios. Lower tape speeds (15 ips and in some cases 7.5 ips) will reproduce a rougher, gutsier sound.

DEFINITIONS
Ips – inches per second.

Equalization (EQ) – a term used to denote an intentional change in relative amplitudes at different frequencies.
Note: Analog tape adds an inherent 6-dB-per octave boost in the playback head's response that makes it necessary to add EQ cutting 6 dB per octave at playback electronics.

Print-Through is a form of tape deterioration occurring due to the transfer of a recorded signal from one layer of the tape to the adjacent tracklayer by means of magnetic induction. This effect occurs due to tape's wear, age and or thickness and is especially prevalent when recording signals at a high level. This "bleed" produces a false (ghost) signal or "pre-echo" during playback.

Azimuth refers to the recording head's tilt in the plane parallel to the tape.
Zenith refers to the head's tilt toward or away from the tape.

Advantages: Ease of use, sound quality, universal acceptance. Analog was the standard for many years.

Disadvantages: Machines are expensive, tape is delicate and has a short life-span, recorders need constant maintenance, lack of editing possibilities, limited tracks, destructive recording only, hard to transport, media is expensive and lastly, analog tape is no longer the standard.

Maintenance regularly includes degaussing (demagnetization), cleaning, head alignment and electronic calibration. This maintenance is the one of the primary responsibilities of the assistant audio engineer at analog recording facilities.