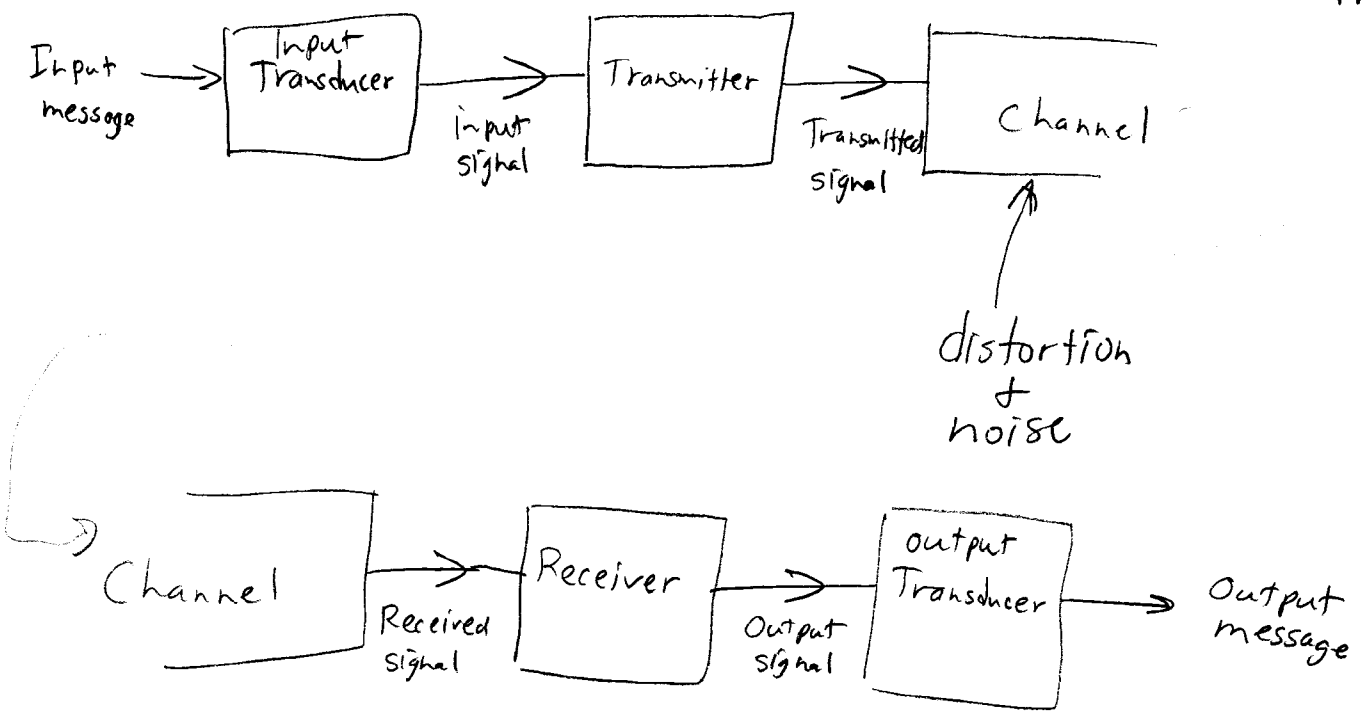

Hopefully, the output message resembles the input message.

Input message — what we want to send. (sound)

input transducer — converts it to an electrical signal (A microphone, camera, etc.)

Transmitter — converts it to something that can be sent over the channel.

Channel — carries it to the destination, possibly not very well. We need to cope with it.

Receiver — hopefully extracts the information from what we receive over the channel

Output transducer - converts back to what we want to receive (speaker)

Channel — we are stuck with it — it adds noise + distortion

+ thermal noise.
adjacent channels —
lightning
interference
jamming
etc.

Measure of quality is "SNR" "signal to noise ratio"

Analog or digital message —

- Analog: continuous audio
- digital: discrete. coded samples of audio as numbers.

Outline -

2

Math background - (ch1, 2 & 3)

① Basics — coding, noise, bandwidth, modulation, radiation.

② Signals — Energy, power

- Classification — Analog & digital
  periodic / aperiodic
- Operations — time shifting,
  time scaling
  time inversion.
- correlation. — (how to identify the signal we want, distinguish it from unwanted)
- Fourier series (orthogonal basis functions)

Overview — emphasis on meaning, rather than math

③ Analysis & Transmission of signals

- Fourier analysis.
- bandwidth.
- convolution
- Distortion — Linear
  Nonlinear
- Filters.
- Spectral density

more overview — No coverage of DSP.

(4) AM —

Concept of modulation, "carrier", "sidebands"

modulator circuits (not in book)

Demodulation -
more circuits

Variations — QAM (Quadrature AM)
(phase tricks to overlay signals)

SSB (single sideband)
circuits —
Why?
how? (90° phase shift??)

"Vestigial" sideband. (TV)
circuits
how, why

Detection —
envelope detector
Synchronous detection — phase locked loop
~~VCO~~

"Superheterodyne" receiver
— used for AM —
based on AM, sideband, etc.

Television — (just intro here)
(AM, QAM, etc all together!)

(5) FM —

Freq + phase modulation

Concept
bandwidth
Transmitter design
Receiver design.

Advantages + disadvantages

Generation — Armstrong method
direct.

Transmitter design

Demodulation — Limiter

- Ratio detector
- Foster-Seely — discriminator
- slope detector

Phase locked loop
Zero crossing detectors

Interference.
pre-emphasis, deemphasis.

FM Stereo
TV sound.
"SCA"

(6) Pulse code modulation

Sampling, interpolation, aliasing.

Quantizing.
nonuniform quantizer.

Bandwidth, SNR.

~~Section~~ "T1" line.

delta modulation.

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(7) Digital data Transmission.

Coding methods.

pulse shaping
Scrambling
Multi-~~level~~ level.

Carrier system — Amplitude shift keying
frequency shift keying
phase shift keying (circuits)

Demodulation — circuits
Multiplexing,