

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: COMMUNICATION CIRCUITS & SYSTEMS

Code No.: ELN 237-8

Program: ELECTRONIC TECHNICIAN

Semester: THREE

Date: AUGUST, 1986

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APPROVED:

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Chairperson

86/08/10
Date

COMMUNICATIONS CIRCUITS AND SYSTEMS I

Course Name

ELN 237-8

Course Number

GOALS:

A first course in Analog Electronic communications at a technology level.

The principles of resonance impedance matching and filtering are first studied, then the generation and electronic processing of CW, AM, and SSB signals, THEN FM

The emphasis is on the applications of above principles in the 1 To 100 MHz range of frequencies.

METHOD OF ASSESSMENT:

Written tests	75%
Lab reports and practical tests	25%

TEXTBOOKS:

Study Material by Les Harvey
"Modern Electronic Communication" by Gary M. Miller

OBJECTIVES: BLOCK I

Resonant Circuits

Series LCR Circuits
Parallel LCR Circuits
Impedance and Q
Selectivity and Bandwidth

Coupling

Coupling networks
Broad Band RF coupling
Narrow Band RF coupling
Tuned RF transformers

RF Filters

Constant K filters
Derived m filters
Hi pass filter
Lo pass filter
Band pass filter
Band stop filter

OBJECTIVES - Continued

Impedance Matching

Matching a high impedance load to a Lo IMP. generator
Matching a Lo impedance load to a high impedance generator
Tuned-coupled matching circuits
Parallel to series transformations
Matching with filters
L, T and PI networks

Block II

Small Signal CL "A" RF Amplifiers

FET Amplifiers
BJT Amplifiers
Integrated circuit amplifiers
Decoupling
Impedance matching and mismatching
Gain control
Stability
Narrow band and broad band AMP

RF Power Amplifiers in CL "C"

Input power
Output power
Dissipated power
Efficiency
Class "C" biasing and current flow angle
Input and output impedance matching
Load impedance for a given power
Push-pull amplifiers
Frequency multiplication

RF Oscillators

Positive feedback
Barkhausens condition
AC equivalent circuits
Interelement capacitance
Frequency stability
Representative Jscillator circuits: Hartley, Colpitts, Clapp,
Armstrong, Ultraaudion
Crystal oscillators: Pierce, Miller, Overtone
Crystal excitation and protection

Block III

AM Fundamentals

- Continuous wave
- Combining signals in linear devices
- Combining signals in nonlinear devices
- AM signal in time Domain
- Modulation index
- Power distribution in AM signals
- Base Modulation
- Collector modulation

AM Transmitter Systems

- CB transmitter
- Monolithic IC transmitters
- Trapezoidal measurements
- Dummy antenna

AM Reception

Tuned Radiofrequency Receivers

- Selectivity
- Sensitivity
- AM Detection
- Linear Integrated Circuit TRF Receiver

Superheterodine Receivers

- RF Stage
- Mixer Stage
- Local Oscillator
- Intermediate frequency
- Detector stage
- Audio amplifier
- Tuning and Adjustments
- Electronic tuning
- Automatic Gain control
- Image frequency
- Integrated Circuit Superheterodine

Single Side Band Transmitter

- Basic concepts
- The SSB signal in the time and frequency domain
- Power distribution on the SSB signal
- Feeding and selective feeding
- Disadvantages of SSB
- The balance modulator
- Crystal, Ceramic and Mecanic filters
- SSB transmitters
- ISB transmitters
- The filter method
- The Phase method

FM PRINCIPLES

Modulation index
Power distribution in the FM wave
Bandwidth requirements
Bessel functions
Deviation ratio
Phase modulation
Preemphasis and deemphasis

FM RECEIVERS

Block diagram
FM limiter
foster-seeley discriminator
ratio detector
PLL demodulator
FM detector alignments

FM TRANSMITTERS

The direct method
The indirect method
Reactangle modulator
Varactor modulator
Crosby FM system
Phase modulator

STEREOPHONIC BROADCASTING

Block diagram of transmitter
Block diagram of receiver
Stereo Demodulation
SCA decoder
Linear IC stereo decoders

BLOCK V

COMMUNICATIONS TECHNICS

Double frequency conversion
UP conversion
Delayed AGL
Auxiliary AGL
Bandspreading
Variable Sensitivity
Variable Selectivity
Noise Limiter
TheSiMeter
Squelch
CB transcievers
CB frequency synthesizers
Facsimile
Mobile telephone
The communications transceiver