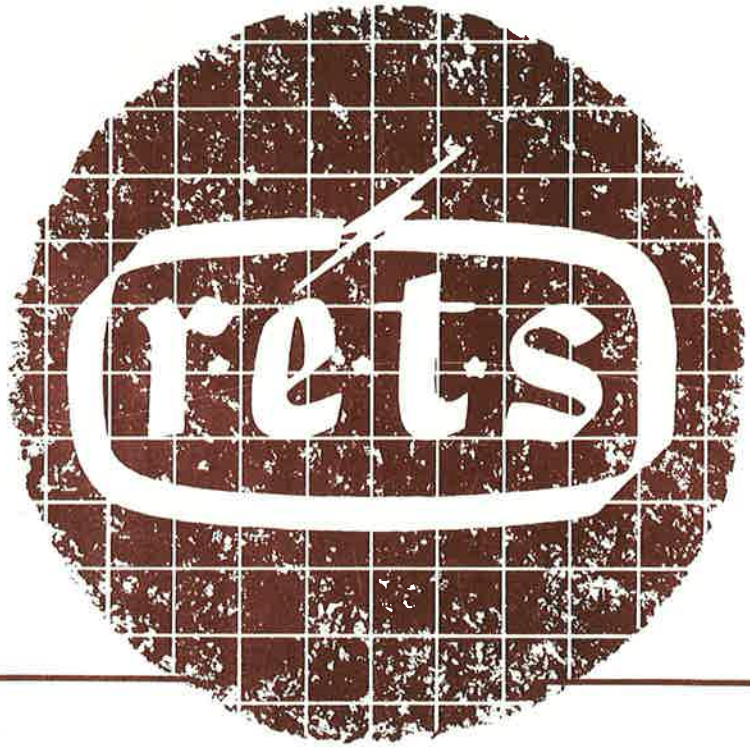
Training Specialists for Industry Since 1935



GENERAL INFORMATION *and* COURSE OUTLINES

R. E. T. S. ELECTRONIC SCHOOLS

INTERNATIONAL OFFICES
1625 E. Grand Blvd • Detroit 11, Michigan

REVISED JANUARY 1, 1966


rets
ELECTRONIC SCHOOLS
1625


rets


ANTENNA COUPLING

GENERAL INFORMATION

1. R.E.T.S. ELECTRONIC SCHOOLS is located at 1625 East Grand Boulevard, Detroit, Mich., immediately East of the intersection with Mt. Elliott Ave. The Edsel Ford Expressway provides direct access to the school from the Mt. Elliott ramps.

   R.E.T.S. Electronic Schools was established in 1935 and has trained thousands of practical engineers and technicians for employment in responsible positions throughout the world.

   R.E.T.S. has established training laboratories throughout the United States and Canada to assist the Electronic Industry in acquiring the added personnel that the rapid growth of Electronics has created.

   The R.E.T.S. training facility at the above address in Detroit, is the parent school and International Headquarters of the R.E.T.S. Electronic Training Systems.

   The school occupies approximately 28,000 sq. feet of floor space in a building completely renovated in 1962, to provide air-conditioned lecture and laboratory rooms. Ample free parking facilities are available in the immediate vicinity of the school.

2. ENTRANCE REQUIREMENTS. The appplicant must have completed four years of secondary school or show an equivalent education that will be evaluated during a personal interview by a member of the Credentials Committee.

3. SCHOOL CALENDAR. The School operates on a continuous schedule usually starting a class each month during the year. Advanced classes are scheduled as necessary according to the School Year progression.

   Enrollment dates are announced 60 to 90 days prior to the starting date. The student may enroll for any scheduled date and a place is reserved for him in that particular class.

4. THE FOLLOWING LEGAL HOLIDAYS ARE OBSERVED. Decoration Day - Independence Day - Labor Day - Thanksgiving Day and the day following - day before Christmas and Christmas Day - day before New Year's and New Year's Day. Friday before Easter.

5. CREDIT FOR PREVIOUS TRAINING. Credit for previous experience or training is granted on an entrance examination basis only. The student may be advanced to that level of training indicated as a result of the successful completion of the examination.

6. VOCATIONAL REHABILITATION PROGRAM. The cooperative effort of R.E.T.S. and the Department of Vocational Rehabilitation in many states has resulted in the rehabilitation of a great number of persons afflicted with physical disabilities into the field of Electronics, where they can earn their livelihood and become an integral part of this nationally important industry. There are many jobs in electronics that can be performed by the physically handicapped. This training may be taken in day or evening classes by either full-time or part-time attendance.

7. TUITION. Tuition rates are listed in the Course Outline on the following pages. Budget plans are available for payment of tuition.

8. PARKING. A marked-off area on the east side of the building is reserved for the use of Faculty and Visitors.

   An additional area, in this same location, is available to students.

   R.E.T.S. assumes no responsibility, whatsoever, for any damage to any car, nor by loss by theft of any vehicle or any of its contents.

9. CONDUCT. Students are required to maintain the ordinarily accepted rules for gentlemanly conduct. Students who do not do so are required to discontinue their training.

BULLETIN

GENERAL INFORMATION *CONTINUED*

10. ABSENCES. A student is required to make a report to his instructor after each absence. If the absence is unexcused, the student is warned. Five unexcused absences result in the student being sent to a School Official at which time he is either dismissed from school, or, if extenuating circumstances prevailed, given an opportunity to correct himself. If no improvement, AN INTERRUPTION FOR UNSATISFACTORY ATTENDANCE will result.

11. TARDINESS. Excused tardiness will be entered on the student's class record as excused. Unexcused tardiness will be entered as one hour's absence for tardiness. Excessive tardiness without an acceptable excuse will not be tolerated. In all cases the student is warned, but, after the third recurrence, he is either dismissed from the school or placed on probation.

12. MAKE-UP WORK. The student is required to make up work missed as a result of his absence. The instructor will assign the work that is to be completed to his satisfaction. If the student is absent too many times and is unable to maintain the class progress, he will be put back a class.

When there are employment complications causing the student to arrive late or leave early, his schedule may be adjusted to add one-half hour to the normal schedule.

13. STANDARDS OF PROGRESS.

GRADING. A standard system is used for recording student progress:

(A) Excellent, (B) Good, (C) Fair, (D) Passing, (E) Failure, and (INC) Incomplete.

MINIMUM PROGRESS. To graduate, a student must complete all lecture assignments and practical laboratory work with a (D) rating or better.

PROBATION & REPEATING. The Director may place a failing student on probation for a period of 30 days. If his grades do not improve by the end of the probationary period, he may be dismissed from the school.

PROGRESS RECORDS. Student Periodic Progress Reports regarding grades, attendance, and an evaluation of the student's conduct, will be furnished to the persons he designates.

14. LEAVES. When a student returns to School after a short leave to complete military reserve or national guard obligations he will be permitted to re-enter at a phase of training that is identical to the one he left. Earlier phases of training may be repeated at no additional tuition costs as determined by the School.

15. PLACEMENT SERVICE. (a) Unemployed students in training at R.E.T.S. are provided Employment Services to aid them in getting work to continue their education until graduation.

(b) Graduating students and Alumni will be provided employment opportunities with the Electronic Industry through their representatives and the school's liaison with the industry. In the past, 34 nationally known electronics companies have sent their representatives to interview the graduating classes at R.E.T.S.

16. FOREIGN STUDENTS. The Immigration and Naturalization Service of the U.S. Department of Justice has approved R.E.T.S. as qualified to accept foreign students for full-time training in Electronics. Visas and compliance with the rules and regulations of the Immigration and Naturalization Service are the responsibility of the student. Prospective enrollees may apply for admission under the same entrance requirements as for domestic students.

17. HOUSING. Assistance will be given where possible. The Detroit area provides, within walking distance of R.E.T.S. Electronic Schools, adequate furnished apartment and rooming facilities as described in local newspapers. It is suggested that out-of-town students establish their residence or reservation at least two weeks in advance of their class starting dates.

PRACTICAL ELECTRONICS and COMMUNICATIONS ENGINEERING COURSE

Total Weeks 108 **Total Hours 2700**

TRAINING PROGRAM SCHEDULE

School Year	Semester		Weeks	Hours
1	One		12	300
	Two		12	300
	Three		12	300
		Totals	36	900
2	Four		12	300
	Five		12	300
	Six		12	300
		Totals	36	900
3	Seven		12	300
	Eight		12	300
	Nine		12	300
		Totals	36	900

Outline of Training Program and Tuition Cost

FIRST SCHOOL YEAR (Semesters One, Two and Three) SUBJECTS & HOURS

I. Electronics Theory - I Electrical Characteristics & Measuring Equipment Tube Testing, Resistance & Resistance Measurements Electron Tubes & Transistors Inductance & Capacitance	Lecture	60 hours
Basic Mathematics	Math	30 hours
II. Electronics Theory - II Generators & Motors Rectifiers, Power Supplies & Their Applications Electromagnetic Waves & Wave Propagation Electronic Tubes	Lecture	60 hours
Mathematics - Logarithms	Math	30 hours
III. Electronics Theory - III Alternating Current Circuits Characteristics of Reactive Circuits A. M. Detector Circuits Oscillators & Oscillator Circuits & Mixer Operations Measuring Equipment, Resistance & Current Measurements	Lecture	60 hours
Mathematics - Logarithms, Slide Rule & Fundamentals of Algebra	Math	30 hours
IV. Electronics Laboratory Electronic Measurements Construction Techniques Radio Receiver Servicing	Lab	180 hours
Semester One Total		450 hours

Outline of Training Program and Tuition Cost

CONTINUED

V. Communications Theory		
Introduction to Frequency Modulation Systems & Television		
F. M. Detector & Audio Amplifier Circuits		
Conversion of Light Energy to Electrical Energy		
Operation of Broadcast & Industrial TV Receivers & Equipment		
Wide Band Signal Circuits		
Television & Industrial Electronic Servicing		
Fundamentals of Electronic Reporting	Lecture	45 hours
Mathematics - Fundamentals of Algebra	Math	20 hours
VI. Communications Circuit Analysis - I		
The Video Signal		
RF Tuners for TV Reception		
IF Amplifiers in Broadcast & Industrial Television		
Intercarrier Sound Circuits		
Sync Separation & DC Restoration		
Vertical Oscillators & Deflection Circuits		
Low Voltage Power Supplies for Electronic Equipment		
Fundamentals of Electronic Reporting (Continued)	Lecture	45 hours
Mathematics - Trigonometry	Math	20 hours
VII. Communications Circuit Analysis - II		
Horizontal Oscillator & AFC Circuits		
Horizontal Deflection Circuits		
Wide Band Detectors		
AGC Circuits & Testing		
Cathode Ray Display Devices		
Television Receiver Servicing - RF & IF Alignment		
Electromagnetic Waves & VHF Antennas		
Fundamentals of Electronic Reporting (Continued)	Lecture	45 hours
Mathematics - Trigonometry	Math	20 hours
VIII. Industrial Electronics - I		
Diagrams & Rectifiers; Regulated Supplies		
Instrumentation		
Vacuum and Gas-Filled Tubes; Phase Shift Devices		
Timing and Sequence Timing Circuits		
Photocell Amplifiers		
Control Circuits	Lecture	50 hours
Mathematics - Advanced Algebra	Math	25 hours
IX. Communications Laboratory		
Television Receiver Servicing		
Industrial Systems Analysis	Lab	180 hours
First School Year Total		900 hours

Cost: $125.00 enrollment fee and $240.00 for each semester, includes
(a) Textbooks, (b) Lab Fees, (c) Tuition

Outline of Training Program and Tuition Cost

CONTINUED

SECOND SCHOOL YEAR (Semesters Four, Five and Six) SUBJECTS & HOURS

I. Radio Receivers		
Amplitude Modulated Receivers		
Frequency Modulated Receivers		
Engineering Report Writing		
Applied Physics	Lecture	80 hours
Mathematics of Alternating Current Circuits	Math	30 hours
II. Radio Transmitters		
Reactive Circuits		
Vacuum Tube Amplifiers & Classes of Operation		
Oscillators		
Power Supplies		
Transmitter Circuits		
Amplitude Modulation Systems		
Frequency Modulation Systems		
Audio Frequency Speech Amplifiers		
Audio Frequency Voltage and Power Amplifiers		
Applied Physics	Lecture	100 hours
Mathematics of AC Circuits and Vacuum Tube Parameters	Math	45 hours
III. Antenna Systems & Transmission Lines	Lecture	20 hours
Mathematics of Antenna & Transmission Line Systems	Math	10 hours
IV. Generators & Motors		
FCC Question Review	Lecture	20 hours
V. Electronics Laboratory		
Mobile Transmitters & Receivers		
Electronic Drafting	Lab	145 hours
VI. The Communications Field		
Requirements		
The Federal Communications Commission	Lecture	20 hours
VII. Federal Communications Commission (FCC) Rules		
FCC Regulations		
FCC Elements One, Two, Three, and Four	Lecture	100 hours
VIII. Advanced Electronics		
Semiconductor Devices		
Radar & Microwave Techniques		
Computers & Computer Systems		
Industrial Electronics - II	Lecture	100 hours
Mathematics - Functions & Graphs, Differentiation & Integration	Math	50 hours

Outline of Training Program and Tuition Cost

CONTINUED

IX. Electronics Laboratory		
Transistor Circuits		
Industrial Systems		
Computers & Calculators - Circuit Analysis	Lab	180 hours
Second School Year Total		900 hours

Cost: $240.00 for each semester, includes
(a) Textbooks, (b) Lab Fees, (c) Tuition

THIRD SCHOOL YEAR (Semesters Seven, Eight and Nine) SUBJECTS & HOURS

I. Semiconductor Devices		
Parameters, Equivalent Circuits & Characteristic Curves		
Transistor Analysis	Lecture	30 hours
Mathematics of Semiconductor Parameters & Circuits	Math	15 hours
II. Television Circuit Analysis & Communications Engineering		
Joint Circuit Analysis of:		
Television Systems		
Radar & Microwave Systems	Lecture	70 hours
Mathematics of Systems Analysis	Math	35 hours
III. Color Television Systems and Engineering		
Circuit Analysis & Testing:		
Chroma, Burst, IF and RF Amplifier Circuits		
Color Analysis and Reception		
Frequency Spectrum & Bandpass Studies		
Color Picture Tubes		
Matrix Circuits	Lecture	60 hours
Mathematics of Color Television Systems	Math	30 hours
IV. Industrial Electronics - III		
Closed Circuit Radio & Television Systems		
Resistance Welding		
Industrial Electronic Maintenance		
Mathematics of Industrial Circuits	Lecture	20 hours
V. Engineering Laboratory - I	Math	10 hours
Systems Development, Measurements & Servicing	Lab	180 hours
VI. Preliminaries for Technical Manual Research & Construction		
Electronics Field Orientation		
Advanced Technical Reporting Techniques		
Advanced Technical Manual Research	Lecture	80 hours
Applied Mathematics - Differentiation and Integration	Math	20 hours

Outline of Training Program and Tuition Cost

CONTINUED

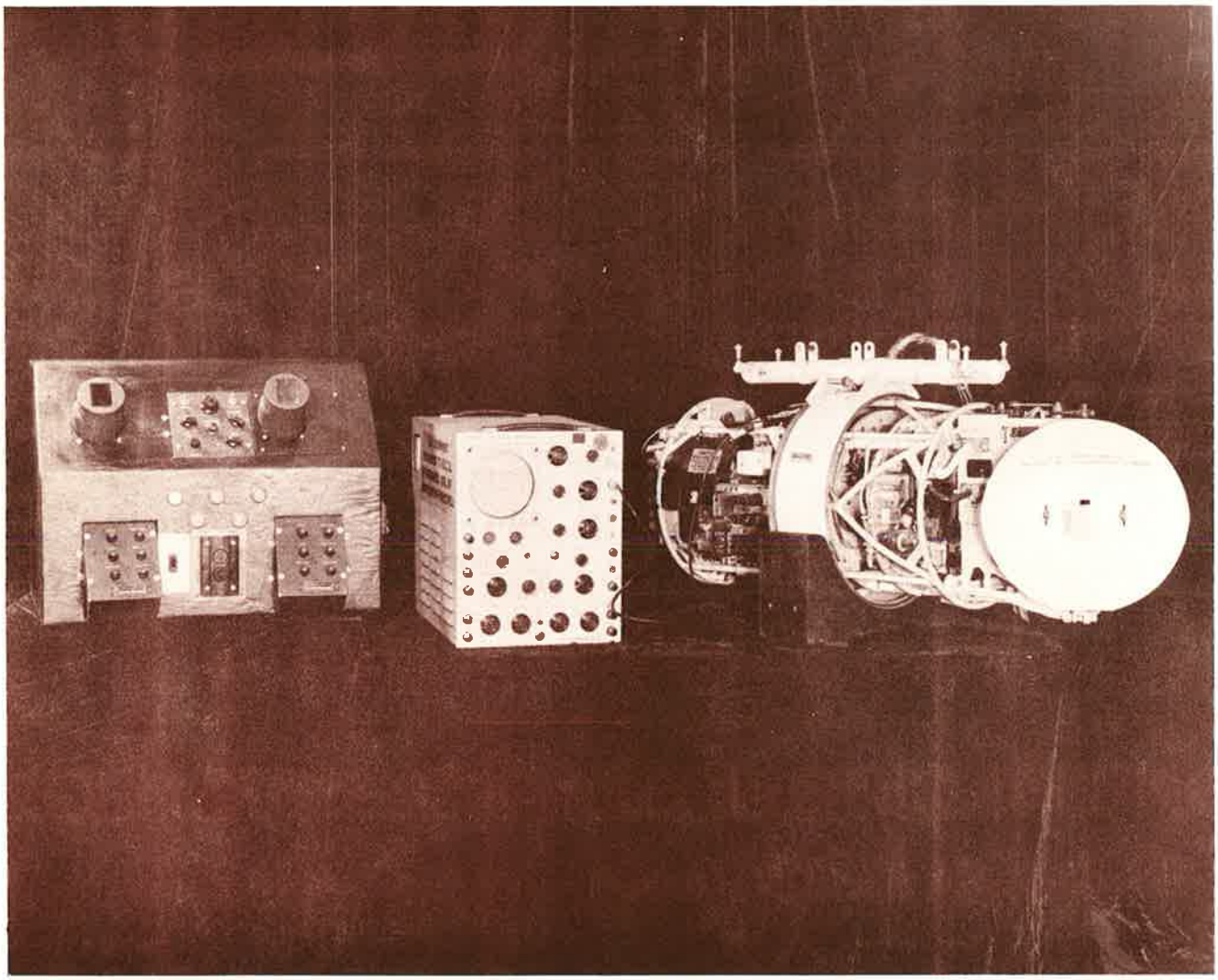
VII. Engineering Thesis developed through . . . . . .

Research, Study and Analysis to include the utilization of Magnetic Amplifiers, Transistorized Circuits, Printed Circuits and Miniaturized materials wherever needed and proper. Thesis will be supported by drawings, charts, tables, exhibits, footnotes and bibliographies when developing Electronic Circuit Designs, Construction, and Testing Techniques. The result of the Student's effort will permit the production of a Technical Manual as an integral part of one of the following Electronic areas.

a. Communications
b. Telemetry
c. Industrial Automation
d. Computers
e. Broadcast Systems

Laboratory development toward Thesis	
Applied Mathematics	300 hours
VIII. Class Presentation of Engineering Reports & Critiques	50 hours
Graduation Exercises	
Third School Year Total	900 hours

Cost: $240.00 for each semester, includes
(a) Textbooks, (b) Lab Fees, (c) Tuition



Part Time Training Program

ELECTRONIC TECHNICIAN COURSES

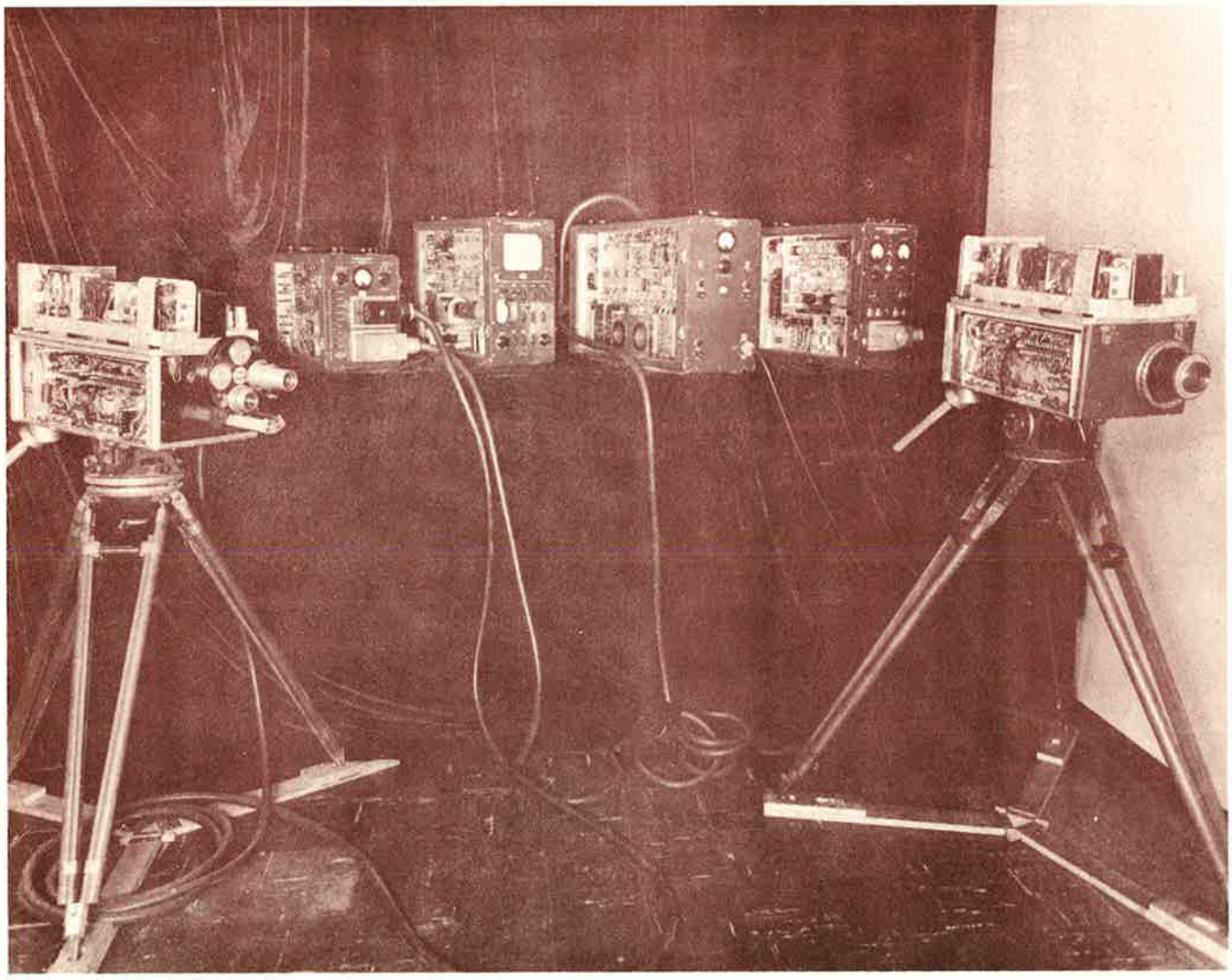
A specialized training program in Electronics is available under the R.E.T.S. combination resident and home study system. This program is especially planned for the student who must remain fully employed while in training and consists of approximately 12 hours of home study each week and one evening (or morning) of attendance (4 hours) each week for laboratory work. The course in Electronic Technology covers Basic Electronics, Television Systems and Servicing, and Industrial Electronics. The course in Advanced Electronic Technology covers F.C.C. Preparation, Electronics Drafting, Commercial Receiving and Transmitting Systems, Transistors, Computers, Microwaves, Applied Mathematics, and Physics.

•ELECTRONIC TECHNOLOGY

TOTAL WEEKS 75

•ADVANCED ELECTRONIC TECHNOLOGY

TOTAL WEEKS 75



ELECTRONIC TECHNICIAN COURSE in

ELECTRONIC TECHNOLOGY

TRAINING PROGRAM SCHEDULE				
Phase	**Weeks**	**Resident Training**	**Home Assignments**	**Total Hours**
One	25	100 hours	300 hours	400
Two	25	100 hours	300 hours	400
Three	25	100 hours	300 hours	400
Totals	75	300	900	1200

OUTLINE OF TRAINING PROGRAM AND TUITION COSTS

PHASE ONE — Basic Electronics & Radio Systems (Subjects & Hours)

I. Electronics Theory - I

D.C. & A.C. Electrical Circuits
Electrical Characteristics & Measuring Equipment
Resistance & Resistance Measurements
Electronic Tubes & Transistors
Capacitance & Inductance
Lab requiring volt-ohm-milliammeter in measurements of voltage, resistance and current

Resident Training 32 hours
Home Assignments 96 hours

II. Electronics Theory - II

Rectifiers & Filter Circuits
AC/DC & AC Power Supplies & Their Application
Electromagnetic Waves & Wave Propagation
The Broadcast System
Electron Tube Analysis
Alternating Currents & Reactive Circuits
Radio & Audio Frequency Detection Devices

Resident Training 32 hours
Home Assignments 96 hours

III. Electronics Theory - III

Measuring Equipment; Resistance & Current Measurements
Oscilloscope Measurements of Circuit Characteristics
Using the Signal Generator
Radio ,Intermediate, and Audio Frequency Amplifiers
Circuit Coupling
Oscillator and Mixer Operations
Transistor Devices and Circuits
Frequency Modulation Systems

Resident Training 36 hours
Home Assignments 108 hours

Phase One Totals: Resident Training 100 hours
Home Assignments 300 hours

PHASE TWO — Applications for Electronics & Television Systems (Subjects & Hours)

IV. Communications - Introduction

Introduction to Commercial & Industrial Television Systems Principles
Generalized Circuit Functions and Operations
Component and Circuit Electrical Characteristics of High-frequency Systems
Generalized Servicing Procedures for TV-Industrial Electronics
The Composite Video Signal
Power Supplies for Complex Electronic Systems
Tuner Circuits for High-frequency Reception

Resident Training	32 hours
Home Assignments	96 hours

V. Communications Circuit Analysis - I

Electron Tube and Component Function in Wide-band Circuits
RF & IF Amplifiers in High-frequency Systems
Wide-band Detectors and Circuits
Cathode-ray Display Devices in Communications & Test Equipment
Intercarrier Sound System and Signal Separation
Using the Composite Video Signal - Separating Synchronizing Signals and Restoring DC Values
Vertical Oscillator and Deflection Circuits
Horizontal Oscillator, AFC and Deflection Circuits
Oscilloscope and Meter Measurement of Circuit Characteristics

Resident Training	32 hours
Home Assignments	96 hours

VI. Communications Circuit Analysis - II

Automatic Gain Control Circuits & Similarities
Reception of Electromagnetic Radiation in High-frequency Systems
Antenna Arrays and Characteristics for VHF and UHF
UHF Receiving Equipment
Radio and Intermediate Frequency Alignment Procedures for Television Systems
Commercial and Industrial Television Manufacturing Specifications and Service Procedures
Oscilloscope, Volt-ohm-milliammeter, and Signal Generator Applications in Measurements

Resident Training	36 hours
Home Assignments	108 hours

Phase Two Totals:	Resident Training	100 hours
	Home Assignments	300 hours

Electronic Technician Course in
ELECTRONIC TECHNOLOGY

CONTINUED

PHASE THREE — Electronics in Industrial Systems (Subjects & Hours)

VII. Industrial Electronics - I

Introduction to Graphical Symbols and Terminology
Power Supplies for Industrial Equipment - Regulated Supplies
Instrumentation
Alternating Current
Vacuum Tubes in Industry
Gas-filled Tubes and Phase Shift Devices
Circuit Characteristics - Sequence Timing
Lab Projects Requiring Circuit Development & Testing

Resident Training	32 hours
Home Assignments	96 hours

VIII. Industrial Electronics - II

Motor Controls
Photoelectric Devices
Resistance Welding
Conversion Devices & Proximity Controls
Induction & Dielectric Heating
Saturable Reactors and Magnetic Amplifiers
Automation and Switching Logic
Transistors
Lab Projects Requiring Circuit Development & Testing

Resident Training	32 hours
Home Assignments	96 hours

IX. Industrial Electronics - III

Ultrasonics
Synchro Devices & Servomechanisms
Temperature Controls
Inspection & Sorting Controls
Counting Controls
Closed Circuit Radio & Television Systems
Industrial Electronics Systems Maintenance
Lab Projects Requiring Circuit Development & Testing

	Resident Training	36 hours
	Home Assignments	108 hours
Phase Three Totals:	Resident Training	100 hours
	Home Assignments	300 hours
Course Totals:	Resident Training	300 hours
	Home Assignments	900 hours

Total Cost of Electronic Technology Course ($752.50) includes
(a) Textbooks, (b) Lab Fees, (c) Tuition
Budget Plans Available

ELECTRONIC TECHNICIAN COURSE in

ADVANCED ELECTRONIC TECHNOLOGY

TRAINING PROGRAM SCHEDULE				
Phase	**Weeks**	**Resident Training**	**Home Assignments**	**Total Hours**
One	25	100 hours	300 hours	400
Two	25	100 hours	300 hours	400
Three	25	100 hours	300 hours	400
Totals	75	300	900	1200

OUTLINE OF TRAINING PROGRAM AND TUITION COSTS

PHASE ONE — Advanced Electronic Theory, Math for Electronics, Physics, Electronics Drafting, FCC Questions Review (Subjects & Hours)

I. Advanced Electronics Theory

Mathematics for DC and AC Circuits
Applied Physics (Power, Work, and Efficiency)
Logarithms, Decibels and The Slide Rule
The Federal Communications Commission
FCC Regulations
Fundamentals of Electronics Drafting

Resident Training 32 hours
Home Assignments 96 hours

II. Advanced Electronics Theory and FCC Question Review

Magnetism
Magnetic Circuits
Motors and Generators
Inductance and Capacitance Design Characteristics
Trigonometry for AC Circuits
FCC Preparation
Electronics Drafting

Resident Training 32 hours
Home Assignments 96 hours

Electronic Technician Course in
ADVANCED ELECTRONIC TECHNOLOGY

CONTINUED

III. Advanced Electronics Theory and FCC Questions Review

Vector Analysis of Inductive Circuits
Vector Analysis of Capacitive Circuits
Vector Analysis of Resistive Circuits
Series Resonant Circuits
Parallel Resonant Circuits
High and Low Pass Filters
FCC Preparation
Fundamentals of Electronic Reporting

	Resident Training	36 hours
	Home Assignments	108 hours
Phase One Totals:	Resident Training	100 hours
	Home Assignments	300 hours

PHASE TWO - Advanced Applications of Electronics and Commercial Radio Receiving and Transmitting Systems (Subjects & Hours)

IV. Vacuum Tubes

Triode Vacuum Tube Design Characteristics
Multi-Electrode Tube Design Characteristics
Low Frequency Amplifier Design
High Frequency Amplifier Design
Power Supplies
Mathematics - Functions and Graphs
FCC Preparation

	Resident Training	32 hours
	Home Assignments	96 hours

V. Commercial Radio Receiving Systems

AM Receivers
Crystal Filters
Beat Frequency Oscillators
Noise Limiters and Squelch Circuits
FM Receivers
FCC Preparation

	Resident Training	32 hours
	Home Assignments	96 hours

VI. Commercial Transmitting Systems

Oscillators
RF Amplifiers
Neutralizing Principles
Master Oscillator-Power Amplifier Circuits
Buffers and Frequency Multipliers
Modulation Systems
Mobile Equipment
Test and Auxiliary Equipment
FCC Preparation

	Resident Training	36 hours
	Home Assignments	108 hours
Phase Two Totals:	Resident Training	100 hours
	Home Assignments	300 hours

Electronic Technician Course in
ADVANCED ELECTRONIC TECHNOLOGY

CONTINUED

PHASE THREE — Transistors, Computer Systems, Micro-wave Systems and Applied Physics (Subjects & Hours)

VII. Transistors and Applied Physics

Transistor Amplifier Configurations
Parameters
Bias Stabilization
Classes of Operation
Complementary Symmetry Circuit
Tuned Amplifiers
Oscillators

Resident Training	32 hours
Home Assignments	96 hours

VIII. Computer Fundamentals

Computer Systems
Pulse and Switching Circuits
Triggered Circuits
Pluggable Unit Circuitry

Resident Training	32 hours
Home Assignments	96 hours

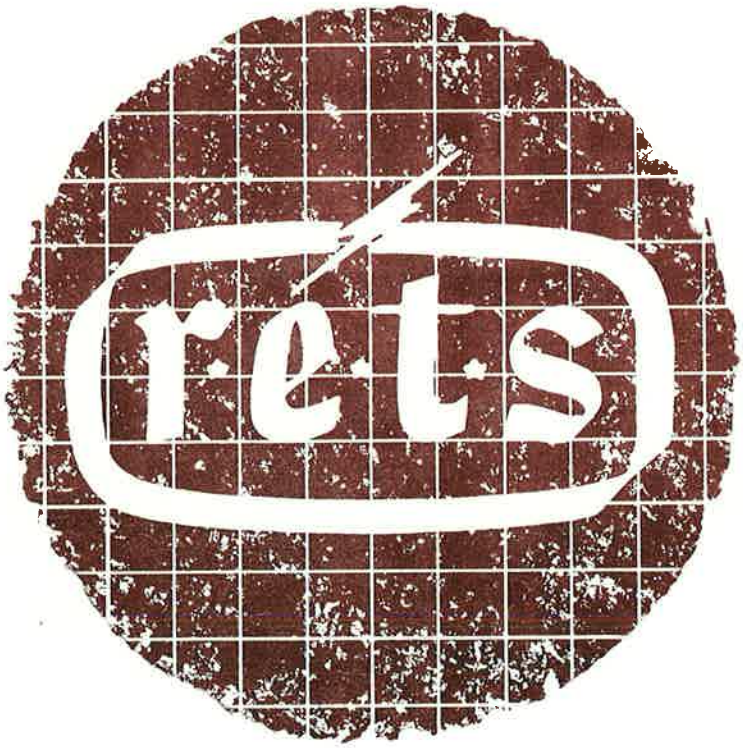
IX. Micro-wave Technology

Electron Tube Considerations
Magnetrons
Klystrons
Converters for UHF
Antennas
Transmission Lines
Principles of Radar
Radar Systems

Final F.C.C. Preparation

	Resident Training	36 hours
	Home Assignments	108 hours
Phase Three Totals:	Resident Training	100 hours
	Home Assignments	300 hours
Course Totals:	Resident Training	300 hours
	Home Assignments	900 hours

Total Cost of Advanced Electronic Technology Course ($675.00) includes
(a) Textbooks, (b) Lab Fees, (c) Tuition
Budget Plans Available



World's Largest Resident Electronic Training Organization