RETS Electronic Schools

General Information Catalog

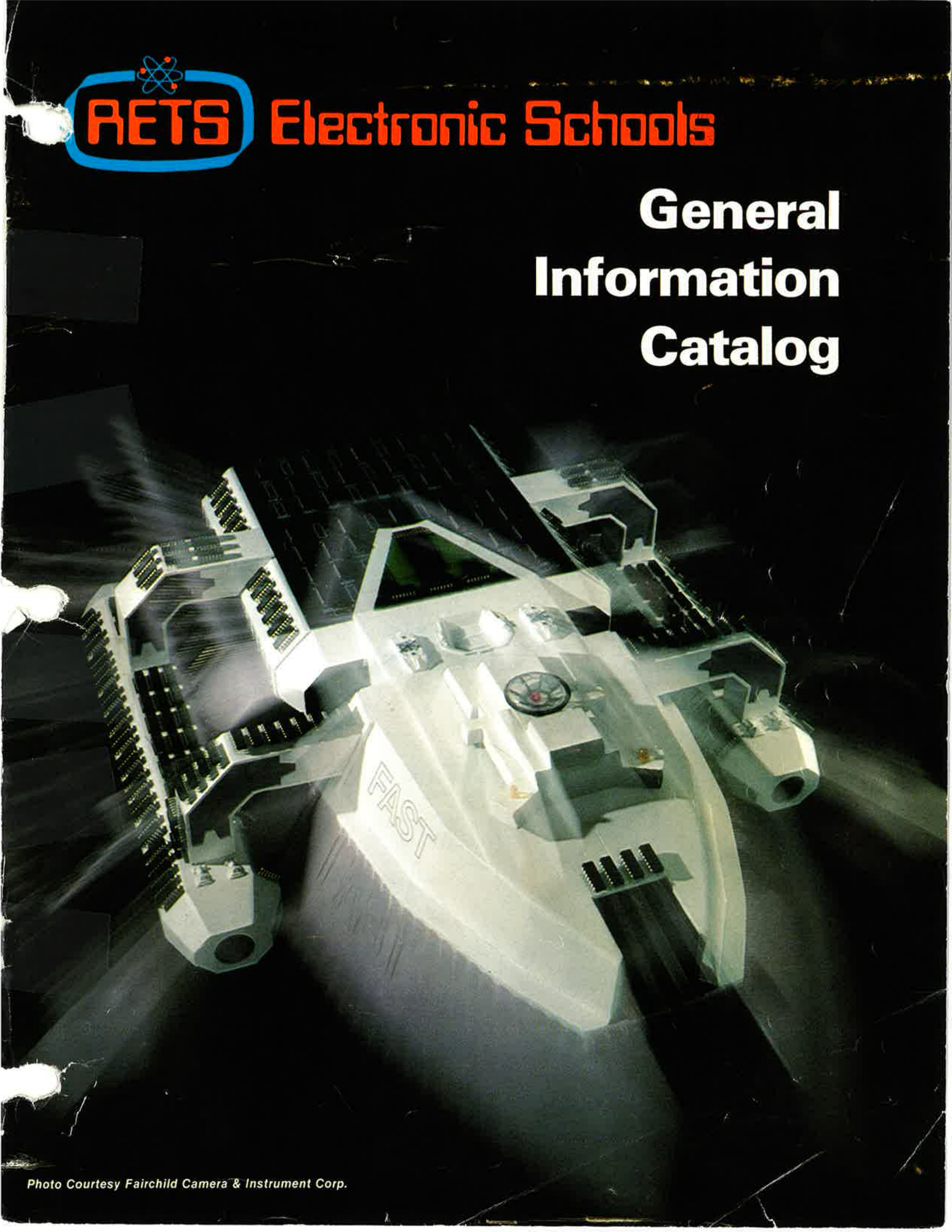

Photo Courtesy Fairchild Camera & Instrument Corp.

RETS Electronic Schools

A DIVISION OF: NATIONAL EDUCATION
AN INTERNATIONAL TRAINING CORPORATION

1625 East Grand Boulevard
Detroit, Michigan 48211
(313) 925-5600

Completely renovated in 1962, this facility occupies approximately 32,000 square feet. There are 19 air-conditioned classrooms available for laboratory or lecture classes with an average class size of 35 students. This site can accommodate a total enrollment of approximately 1,100 students, with ample free parking adjacent to the school.

15115 Deerfield
East Detroit, Michigan 48021
(313) 779-5260

Formerly an elementary school, this new location was opened in October 1979. It serves as the corporate headquarters for RETS as well as an extension campus for the Detroit School. With an average class size of 32 students, the planned enrollment for this facility is 600 students, bringing the total enrollment at the Detroit schools to over 1,700 students. Sitting on over 9 acres, the 29,000 square foot building includes 16 classrooms, 9 executive offices, gymnasium, and parking for over 125 cars. As of this printing, the East Detroit location is in the process of obtaining accreditation by the National Association of Trade and Technical Schools.

ADMINISTRATION

School Director ..... D. Wayne Apostolico
Chief Instructor ..... Thomas Gerwatowski
Lead Instructor ..... Helmar Mayer
Lab Coordinator ..... Dan Barnes
Marketing Manager ..... Don Jackson
Financial Aid Coordinator ..... Theresa Drauch
Office Manager ..... Robert Wiszowaty
Placement Director ..... Shirley Lindquist
Student Services Director ..... Sharon Dziurda

ACCREDITATIONS

RETS is an accredited member of the National Association of Trade and Technical Schools, and also a member of the Michigan Organization of Private Vocational Schools. RETS' courses are approved by the Michigan State Board of Education. RETS is approved for the training of eligible veterans (G.I. Bill) and is authorized by Federal law to enroll non-immigrant alien students.

CATALOG NO. G-100

PUBLISHED DECEMBER, 1979
EFFECTIVE JANUARY 1, 1980

RETS

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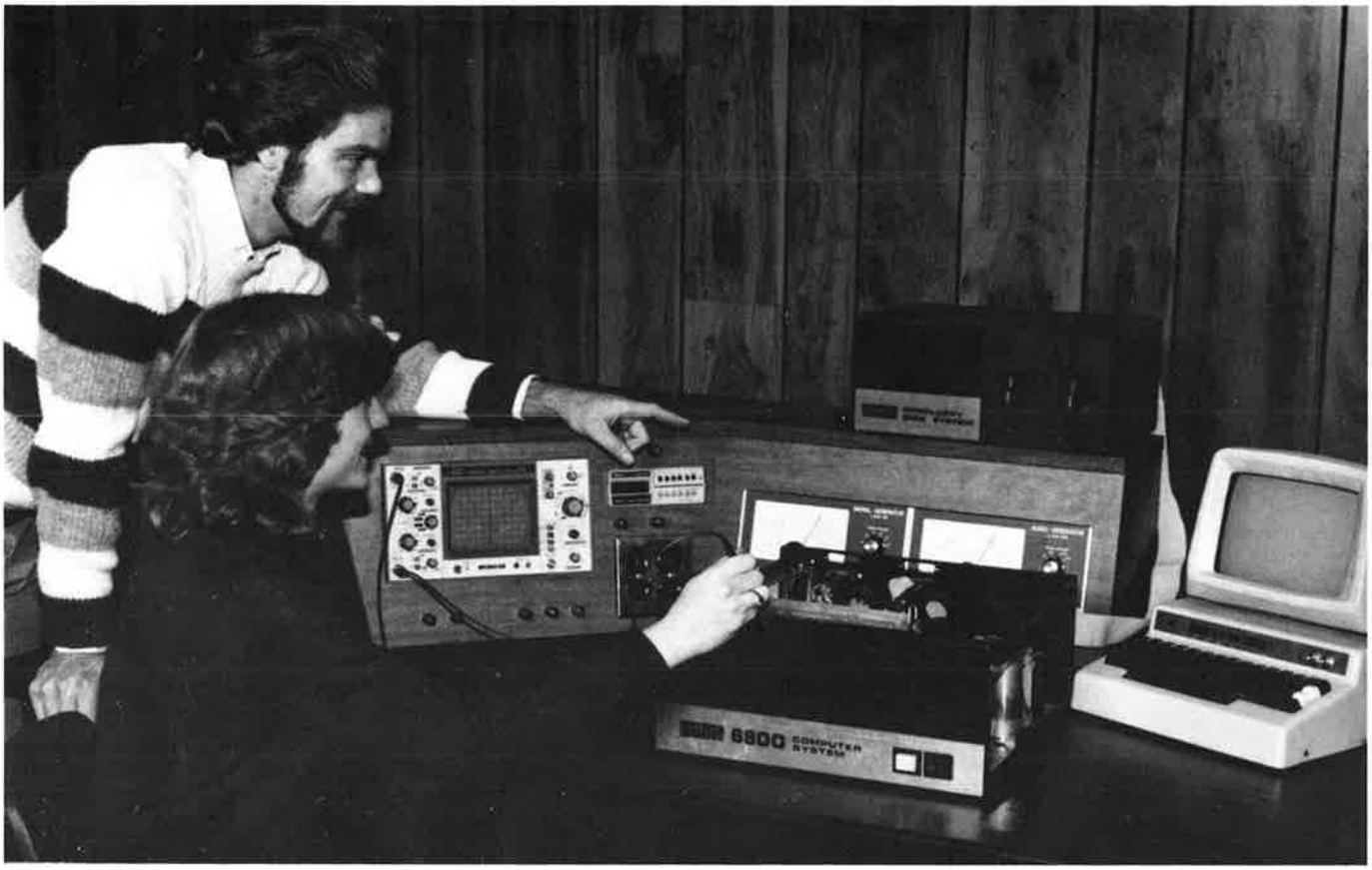
COVER PHOTO: We thank Fairchild Camera and Instrument Corporation, 464 Ellis Street, Mountain View, California, for the use of their interesting photo concept. The electronic devices on the sides and top of the space ship are Fairchild's new family of digital integrated logic circuits. The space ship model was used to dramatize the increased speed of these circuits. We feel that this picture also conveys the importance of electronics in our present and future lives.



LEARNING TO MAKE AMERICA WORK

National
Association of
Trade and Technical
Schools

TO EDUCATE FOR LEADERSHIP IN THE WORLD OF ELECTRONICS

RETS Electronic Schools was established in 1935 as an expression of faith in the then embryonic electronics industry. From the very beginning, our policies have been directed toward the education of Applied Electronic Technicians and Electronics Servicing Technicians both in the theoretical and practical phases of electronics. It was our belief that this young industry had an urgent need for professional personnel who could design and construct prototypes, as well as install, maintain, and sell the equipment.

RETS has been built upon these policies. The contributions and accomplishments of our graduates to the electronics industry over the past 45 years have more than proven our convictions.

In the late 1930's and early 1940's RETS personnel conducted valuable research programs in television and taught classes in this new means of communication. When commercial television burst upon the scene in the early post-war years, the school was in an excellent position to assume the responsibility for training young men as technicians to fill the many positions which resulted from television's explosive growth.

During these early years, many of our graduates were employed by the large television networks, as well as independent TV and radio stations. In recent years, however, RETS graduates have been called upon to assume important technical positions in such rapidly expanding fields as aviation, missiles, computers, automation, space exploration and industrial electronics.

Mankind has barely begun to unlock the wonders of the age of electronics. As we probe the secrets of the earth and outer space, the need for skilled technicians will become greater. RETS is proud of its role in our progress this far and accepts the challenge of training future leaders in this exciting field.

Sincerely,

R. Wayne Gilpin

R. Wayne Gilpin
President
RETS Electronic Schools

ENROLLMENT CALENDAR 1980

AVAILABILITY: The following designations are used to indicate course and class availability at various RETS school locations.

D — Detroit, MI
ED — East Detroit, MI
W — Wyoming, MI
N — Nutley, NJ
T — Toledo, OH
ALL — All Schools

FULL-TIME PROGRAMS

ELECTRONIC ENGINEERING TECHNOLOGY

January 7 — D, ED
February 25 — N
March 31 — D, ED, W, T
July 7 — ALL
September 29 — ALL

SPECIALIZED ELECTRONIC SERVICING

January 21 — T
March 31 — N, ED
July 7 — N, T
September 29 — N

CLIMATE CONTROL TECHNOLOGY

January 21 — T
September 29 — T

PART-TIME PROGRAMS

APPLIED ELECTRONIC TECHNOLOGY (2 nights/week)

January 7 — ED
January 28 — T
March 31 — D, ED, W, N
July 7 — D, ED, N
September 29 — ALL

APPLIED ELECTRONIC TECHNOLOGY (Saturdays)

March 29 — N
July 5 — N
September 27 — N

AIR-CONDITIONING HEATING REFRIGERATION

January 22 — T
March 31 — T
September 29 — T

HIGH SCHOOL HONORS (Saturdays)

September 6 — ALL

OTHER PROGRAMS

In addition to the above, there may be courses offered in FCC Radiotelephone license preparation, Digital and Analog Electronics, Microprocessor Technology, and Cable Television Installer. These courses will be offered only if there is a sufficient number of students enrolled to justify beginning the program. For further information on these courses and their availability, contact a RETS Admissions Representative or the Admissions Office.

VACATION PERIODS

June 23 through July 4 • December 22 through January 2

* Electronic Engineering Technology Students are excused from class on the last school day of each quarter.

SCHEDULED HOLIDAYS

New Year's Day • Good Friday • Memorial Day • Independence Day • Labor Day • Thanksgiving and following Friday • Christmas Day

NOTE: RETS reserves the right to make changes in curriculum to reflect latest technology, to reset class schedules and hours, and to consolidate classes.

ADMISSIONS POLICIES AND PROCEDURES

The Admissions Policies of RETS Electronic Schools are within the guidelines recommended by the National Association of Trade and Technical Schools and by the various state approval agencies where RETS schools are located. They are consistent with the vocation oriented philosophy of our Schools. Viable options are provided for conditional admission to those who desire an electronics vocation, but do not meet the formal requirements for admission.

ADMISSION REQUIREMENTS

To be admitted for training, you must have a high school diploma or its generally recognized equivalent (GED). In addition, you must achieve a satisfactory score on an entrance examination. The entrance examination used by RETS consists of the Numerical Ability and Mechanical Reasoning sections of the Differential Aptitude Test (DAT). If you do not have a high school diploma or GED, you may be admitted on a conditional basis by passing the Entrance Examination and agreeing to obtain a GED prior to entering the third quarter of training. If you do not have a GED prior to entering the third quarter, your training will be discontinued until such time as you obtain a GED.*(NOTE: For admission requirements for the Cable Television Installer, High School Honors, and Continuing Education programs, refer to the course outlines for these programs).*

ADMISSION REQUIREMENTS FOR INTERNATIONAL STUDENTS

Special admission policies for international students are listed below. More detailed information may be obtained from the Admissions Department.

1. Because of problems with foreign currency exchange, you should have sufficient funds available to cover the cost of tuition, fees, and living expenses prior to starting school.

2. You must have obtained a minimum score of 425 on the TOEFL (Test of English as a Foreign Language).

3. You must have the equivalent of a U.S. high school education. Proof of educational background should be sent with your application but must be submitted to RETS prior to your formal acceptance and issuance of your I-20 Certificate of Eligibility.

CREDIT FOR PREVIOUS TRAINING OR EXPERIENCE

Students who have previous training or experience will be thoroughly tested upon entrance and will be advanced to the highest level of a program for which they can qualify. Tuition will be pro-rated for the credit allowed.

TUITION

Tuition varies from program to program depending upon its length and operating cost. A separate schedule of tuition, reservation fees, laboratory fees and estimates of books and equipment are included with this bulletin as a supplement. Tuition for audit subjects will be the same as the regular fee.

CANCELLATION AND REFUND POLICY

Cancellation and Refund Policies vary from state to state due to differing laws and regulations. For a detailed explanation of these policies, ask for a copy of the Enrollment Agreement for your desired program.

FINANCIAL AID

The Financial Aid Program at RETS Electronic Schools is designed to function as a multi-purpose service for you. The principle goal is to make it possible for you to attend school. Financial aids consist of grants, loans, VA Assistance, and part-time employment, which may be offered to you in various combinations depending on your needs. In determining the extent of your need, the School must consider the financial support which may be expected from the income, assets, and other resources of your family. Financial aid is considered supplementary to the efforts of you or your family in assisting with school costs. (These financial aid programs are available only to permanent residents and citizens of the United States.) For application forms and further information about any of these programs, you should contact the Financial Aid Manager.

STATE GUARANTEED STUDENT LOAN PROGRAM (GSL)

This loan program makes it possible for you to borrow money for your training from commercial lenders in your home state, or directly from the state. If you qualify, the interest on these loans will be paid by the state while you are in school. You must begin repayment of this loan nine (9) months after you complete your studies or discontinue training, at a simple interest rate of 7%. Your repayments will be in installments over a period of not more than ten (10) years.

NATIONAL DIRECT STUDENT LOANS (NDSL)

To apply for this loan program you must be enrolled in an eligible course of study. The loan amount is determined by an approved needs analysis and repayment begins nine (9) months after termination of your status as a student. During the repayment period a 3% interest is charged on the unpaid balance of the loan principal. You should allow from four to six weeks for processing.

BASIC EDUCATIONAL OPPORTUNITY GRANT (BEOG)

The amount is determined on the basis of family financial information submitted on the BEOG application form. Application forms are available in high schools and financial aid offices. Within six weeks you should receive your notification of eligibility. The Student Eligibility Report (SER) will inform you of the amount of your grants. This SER must be submitted to RETS' Financial Aid Manager.

SUPPLEMENTAL EDUCATIONAL OPPORTUNITY GRANT (SEOG)

To qualify for the SEOG program you must demonstrate "exceptional financial need" as determined by your approved needs analysis. You must be enrolled in an eligible course of study and be making measurable progress toward completion of that course. You should allow four to six weeks for processing your application.

VOCATIONAL REHABILITATION PROGRAM

The cooperative effort of RETS and the Department of Vocational Rehabilitation in many states has resulted in the training and rehabilitation of a great number of persons afflicted with physical disabilities and their subsequent entry into the field of Electronics. There they are able to 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.

If you are vocationally handicapped, you may apply for educational assistance through the Vocational Rehabilitation Office nearest you.

VETERANS EDUCATIONAL ASSISTANCE

There are a variety of educational assistance programs available to eligible veterans including monthly educational benefits, V.A. Vocational Rehabilitation for disabled veterans, educational benefits for dependents of deceased veterans, and V.A. Education loans. To apply for V.A. benefits, the application for a Certificate of Eligibility (VA 1990 or VA 1995 form) should be completed and sent to RETS' Financial Aid Manager with your copy of a DD214 discharge paper for processing through the Veterans Administration Regional Office. It is recommended that the veteran process his V.A. papers through RETS in order to expedite payment. Additional detailed information on all V.A. programs can be obtained by contacting the Financial Aid Manager.

COMPREHENSIVE EMPLOYMENT AND TRAINING ACT (CETA)

Those who are unemployed, under employed, or economically disadvantaged may qualify for CETA. This program provides a realistic opportunity for career employment after training. Students who qualify can be compensated while attending classroom training. Some CETA programs provide classroom and on-the-job training with subsidized wages to the employer, thus enhancing employment opportunities. Special programs are also available for youth, elderly, handicapped, veterans, and those with limited English speaking ability. For further information on CETA programs, contact the Financial Aid Manager.

NON-GOVERNMENTAL FINANCIAL AID PROGRAMS

RETS has additional tuition financing programs for those who do not qualify for government guaranteed loans, or those who need additional financing to their grants or insured loans. These additional programs are through private sources associated with RETS and further information may be obtained by contacting the Financial Aid Manager.

PART-TIME JOB PLACEMENT ASSISTANCE FOR STUDENTS

The Student Services Department maintains a current listing of employers who need part-time personnel in their business. You may seek these jobs through this Department. In addition, to the job listing, the Student Services Department will assist you in individual counseling to prepare for an interview and will help you secure an interview. The responsibility is yours for securing the job and RETS does not guarantee employment through this service. This Department is pledged to your service if you are in need of part-time work to supplement other incomes and if you are serious in seeking employment. Some of these part-time jobs are available on campus after school hours.

ACADEMIC POLICIES AND PROCEDURES

GRADING

A letter-mark system of grading is used for recording student progress:

A — Excellent (90-100)
B — Good (80-89)
C — Fair (70-79)
D — Passing (65-69)
E — Failing (64-below)
INC — Incomplete

SUBJECT FAILURES

A student who fails any subject in any quarter will not be permitted to enter the next quarter of training. Under these conditions the student will be required to repeat the quarter of training failed. Any student who receives a grade of INC (incomplete) for any subject in any quarter of training may be allowed to continue training on probation, provided arrangements are made to remove the incomplete grade within a reasonable period of time.

ATTENDANCE

RETS believes that regular and punctual attendance is important to a high standard of work. In order to further this belief, the Office of the Director of Education has established the rule that all students must be in attendance a minimum of 90% of the scheduled class time. Any student whose absence falls below this minimum standard is liable for (1) an interruption for unsatisfactory attendance, (2) termination, (3) recycling, or (4) probation. All students are required to make a report to their instructor after each absence. A student will be classified as terminated after one week's absence. Re-entrance will require an interview by a School official. In case of student prolonged illness or accident, death in the family, or other circumstances that make it impractical to complete the course, the School shall make a settlement which is reasonable and fair to both.

PROBATION

A student may be placed on probation for poor grades or unsatisfactory attendance. If a student receives a final grade in any subject below a C, he will be placed on probation for the following quarter. Also, if a student has attendance below the 90% standard in a quarter, he will be placed on probation for the following quarter. To remove probationary status, the student must attain at least a C in all subjects if the probation is on academic grounds. He cannot miss more than 10% of scheduled class time and must make up all required missed time from the prior quarter if the probation is for attendance policy violation.

A student who does not remove his probation as specified will be interrupted and required to recycle.

REPEAT TIME

A student who elects or is required to repeat a quarter of training for academic or attendance reasons will be required to continue paying quarterly tuition. While repeating, a student must pass all subjects and maintain at least 90% attendance, regardless of his original grades or attendance record. The student will also be required to sign a new enrollment agreement reflecting the tuition rates being paid by the class he is joining. The student will not be charged for more than the total number of quarters in the course regardless of the total amount of time it takes him to complete the course. Should a student terminate during his training program, tuition paid toward repeat time is non-refundable.

OUTSIDE STUDY ASSIGNMENTS

All students are responsible for reading and studying materials issued by their instructors. Many times it is necessary for students to spend extra hours out of School studying assigned text material. Our instructors are aware that many students hold full time jobs while attending School. Whenever possible outside assignments will be made prior to a weekend.

MAKE-UP TIME

Regardless of grades or standing in class, a student must make up all missed time that is in excess of 10% of the scheduled class time. A student who misses more than 20% of the scheduled class time will not be permitted to enter the next quarter of training.

TARDINESS OR LEAVE EARLY

As we expect you to be here each day, so we expect you to be here on time. Tardiness or leave earlies are recorded in quarter-hour increments and are included in counting total absences. You make the record. We record it. Employers refer to it.

MAKE-UP WORK

The student is required to make up work missed as a result of absence. The instructor will assign the work that is to be completed for each absence.

RELEASE OF INFORMATION

Student educational records are confidential. The student has the right to inspect, review and in some cases challenge the records kept. No educational information will be given to third parties including grade reports to parents unless authorized by law or in writing by the student. Parents of dependent students (as defined by the Internal Revenue Service) may obtain grade reports.

TRANSFER OF CREDIT

Students successfully completing the Electronic Engineering Technology Course may, according to an Agreement of Articulation between Siena Heights College and RETS Electronic Schools, transfer to Siena Heights, leaving approximately fifty credit hours to complete before being awarded a Bachelor of Applied Science degree. Many other colleges accept RETS training for credit. Contact the Education Office for information on a particular school.

GRADUATION REQUIREMENTS

To graduate, a student must complete each subject in every quarter with a D or better grade and maintain a 90% attendance record. Students satisfactorily completing their course will receive a diploma upon graduation.

CONDUCT AND DISCIPLINE

Students are expected to behave with decorum, to obey the regulations of the School. Unethical or undesirable conduct, which is inconsistent with general good order, wherever it may occur, is held to be sufficient grounds for dismissal.

The attempt of any student to present as his own any work which he has not honestly performed or to pass any examination by improper means is regarded as a most serious offense and renders the offender liable to immediate expulsion. The aiding and abetting of a student in any dishonesty is likewise held to be a grave breech of discipline.

A student failing to achieve the required standards of attendance, conduct or discipline may be dismissed from the school.

Upon the written request of the student, a review board consisting of the student's instructor, a School supervisor, and a School officer will conduct a hearing before the student is dismissed.

WEATHER EMERGENCIES

The School reserves the right to close the School during a weather emergency or other "acts of God." Under these conditions, the student will not be charged with an official absence. The material that would have been covered during the closed day(s) will be made up during the quarter which ensures completion of the entire quarter's scheduled material. This make up may involve outside study assignments. Tuition adjustments will not be made when the School is closed for a weather emergency or other "acts of God."

PROGRESS REPORTS

Student Periodic Progress Reports regarding grades, attendance, and an evaluation of the student's conduct will be furnished at the completion of each quarter to the student or to the person the student designates.

ATTIRE

As we are training you for a career in electronics, we expect you to come to School dressed as you would for your future career. Students are often sent directly from the School to an employment interview — the way you look is important.

Prospective employers frequently visit the School to interview graduating seniors. It is important for all of us to create a good impression; therefore, the School requires that the student refrain from wearing tank tops, shorts, hats or any other unconventional attire during class.

STUDENT COUNSELING

Educational objectives, grades, and attendance are reviewed prior to entering a new quarter of training by a member of the faculty other than the student's instructor. If a student desires counseling between quarters, the chief instructor should be contacted for an appointment.

PERSONAL PROPERTY

RETS assumes no responsiblity whatsoever for loss or damage to a student's personal property, or for any damage to any car; nor loss by theft of any vehicle or any of its contents, in, on, or adjacent to School property.

STUDENT SERVICES

The School maintains several offices to provide assistance to you in a broad range of services and out-of-school activities.

The Student Services Department offers assistance with housing, job placement, personal counseling, community activity information, etc. You may seek academic advice by contacting the Student Academic Advisor.

HOUSING ASSISTANCE

If you are relocating, our Housing Assistance Department will advise and assist you with the following services:

1. Lists of available apartments and rental homes.
2. Information on tenant rights and obligations.
3. Directory assistance, including maps and other information to familiarize you with the city.
4. Roommate referral.
5. Referrals to temporary accommodations.

GRADUATE PLACEMENT

The Placement Assistance Department actively seeks jobs for graduates.

This service includes:

1. Job opportunities to graduating classes.
2. On-campus recruitment by employers who elect to visit the School.
3. Individual counseling on the preparation of your personal resumes and how to participate in an interview.
4. Career guidance workshops.

Graduate placement information is forwarded upon request to any alumnus who is unemployed, or in the process of terminating from a company, and is available for immediate employment.

The Placement Assistance Department requires that alumni who accept employment notify RETS in writing of the name and address of the employer and the position accepted.

PART-TIME PLACEMENT

The Placement Assistance Department maintains an up-to-date file of employers in need of part-time and full-time personnel and interested in employing our students.

Placement assistance includes:

1. Individual counseling in preparation for an interview.
2. Assistance with securing an interview.
3. Individual counseling assistance.

STUDENT ATHLETICS

The School Intramural Sports Program is directed by the Student Services Department. The Program provides an opportunity for you to participate in athletic competition as an extra-curricular activity.

STUDENT ORGANIZATIONS AND PUBLICATIONS

A variety of student organizations are available to complement outside activities. Students also have an opportunity to submit articles for the school newspaper that highlight achievements and share ideas. Further information can be obtained from the Student Services Department.

In addition to these services, our offices will be available to assist you in attaining personal or academic counseling, and help with any individual requests possible.

FULL TIME PROGRAMS

ELECTRONIC ENGINEERING TECHNOLOGY

OBJECTIVES: The Electronic Engineering Technology Course was developed by RETS Electronic Schools in conjunction with industry to meet the continuing demand for trained electronic personnel to fill entry level positions in industry. Employment opportunities in the following areas are within the scope of our graduates: computers and peripherals, field service engineering, research and development, applications engineering, aviation and space electronics, automotive electronics, industrial electronics, microprocessor applications engineering, etc.

The management and instructional staff are guided by this objective; consequently, this institution is constantly updating its current program and developing new curriculum areas which prepares us to meet the educational demands of the expanding and everchanging electronics industry.

Employment and advancement after employment often requires more than technical skills. As a result, the philosophy, policies, rules and regulations of RETS Electronic Schools were developed to also aid in the generation of good personal habits and attitudes, communication skills, logic and reasoning capabilities.

COURSE	WEEKS	CONTACT HOURS
Quarter I		
Electronics 101		120.0
Laboratory 101		108.0
Mathematics 101		60.0
Total	12	288.0
Quarter II		
Electronics 102		120.0
Laboratory 102		86.4
Mathematics 102		60.0
Engineering Drawing 101		21.6
Total	12	288.0
Quarter III		
Electronics 103		96.0
Laboratory 103		86.4
Mathematics 103		60.0
Engineering Drawing 102		21.6
Technical Writing 101		24.0
Total	12	288.0
Quarter IV		
Electronics 201		96.0
Laboratory 201		108.0
Mathematics 201		60.0
Technical Writing 201		24.0
Total	12	288.0
Quarter V		
Electronics 202		96.0
Laboratory 202		108.0
Mathematics 202		60.0
Physics 201		24.0
Total	12	288.0
Quarter VI		
Electronics 203		96.0
Laboratory 203		108.0
Mathematics 203		60.0
Communications 201		24.0
Total	12	288.0
Quarter VII		
Electronics 301		96.0
Laboratory 301		108.0
Mathematics 301		48.0
Communications 301		36.0
Total	12	288.0
COURSE TOTALS	84	2016

SPECIALIZED ELECTRONIC SERVICING TECHNOLOGY

OBJECTIVES: The Specialized Electronic Servicing Technology Course was developed by RETS Electronic Schools to meet the continuing demand for trained electronics personnel to fill entry level jobs in this vast industry. Employment opportunities in the following areas are within the scope of our graduates: installation and repair of radio and television systems, hi-fidelity sound systems, intrusion alarm systems, closed-circuit television systems, recording systems, automated dispensing and copy equipment, electronic organs, industrial instrumentation and testing.

Since the terminal objective is employment in the service industry, this course is of an extremely practical nature. The ability of the graduate should be such that he will be immediately profitable to his employer. This is NOT a design engineering course. The mathematics included in the course is limited to that required to understand the operation of practical circuits and systems, which allows as much of the available time as possible to be devoted to practical subject matter.

COURSE	WEEKS	CONTACT HOURS
Quarter I		
Electronics 111		150.0
Laboratory 111		138.0
Total	12	288.0
Quarter II		
Electronics 112		150.0
Laboratory 112		138.0
Total	12	288.0
Quarter III		
Electronics 211		150.0
Laboratory 211		138.0
Total	12	288.0
Quarter IV		
Electronics 212		150.0
Laboratory 212		138.0
Total	12	288.0
COURSE TOTALS	48	1152

CLIMATE CONTROL TECHNOLOGY

(TOLEDO SCHOOL ONLY)

OBJECTIVES: The Climate Control Technology program was developed by RETS Electronic School to meet the continuing demand for entry level service personnel in the field of air conditioning, sheet metal, heating, and refrigeration, and fulfills all academic requirements for city licensing. Employment opportunities in the following areas are within the scope of our graduates: air conditioning, heating, sheet metal, and refrigeration in such positions as installer, service technician, comfort heating and cooling technician, maintenance technician, or refrigeration mechanic.

Heat load calculations, residential duct work design, electrical wiring, and blue print reading are just a few of the areas taught to supplement the theory of the systems that will be encountered.

Since the terminal objective is employment in the service industry, this course is of an extremely practical nature. The ability of the graduate should be such that he will be immediately profitable to his employers.

COURSE	WEEKS	CONTACT HOURS
Quarter I		
CCT-101		180.0
CCL-101		120.0
Total	12	300.0
Quarter II		
CCT-102		180.0
CCL-102		120.0
Total	12	300.0
Quarter III		
CCT-201		180.0
CCL-201		120.0
Total	12	300.0
Quarter IV		
CCT-202		180.0
CCL-202		120.0
Total	12	300.0
COURSE TOTALS	48	1200

CABLE TELEVISION INSTALLER

PURPOSE: The Cable Television Installer Program was designed by RETS Electronic Schools to help students acquire the knowledge and skills which are needed in the cable television industry and which can be utilized to gain employment in that industry as an installer. This program assumes no previous knowledge of the industry and will provide the theoretical and hands-on training needed to master the necessary skills.

COURSE LENGTH: Six weeks, five nights per week, five hours a night.

ADMISSION REQUIREMENTS:

1. High School diploma or GED
2. Basic physical (back X-ray preferred)
3. Valid driver's license will be necessary for employment
4. Passing the Mechanical Reasoning Section of the Differential Aptitude Test (DAT)
5. Personal interview
6. Cannot have a fear of heights

COURSE OUTLINE

A. Introduction to Cable Television
   1. History
   2. Cable Television Regulations

B. How A Typical Cable Television System Operates
   1. Cable Television Personnel and Responsibilities

C. Materials, Responsibilities, and Hardware
   1. Work Orders and Other Paper Work
   2. House Drop Materials
   3. Cable
   4. Transformers
   5. Connectors
   6. Splitters and Amplifiers
   7. Splicing
   8. Taps
   9. Antenna-to-Cable Switches
   10. Waterproofing

D. Basic Electricity
   1. Lightning
   2. Grounding
   3. Ground Loop

E. Tools, Equipment, and Safety
   1. Hand Tools
   2. Drills
   3. Power Hammers
   4. Ram Sets
   5. Masonry Bits

F. Utility Company Regulations

G. The Use and Care of Pole Climbing Equipment
   1. Climbers
   2. Body Belt
   3. Safety Strap
   4. Pole Climbing and Safety
   5. Care of Equipment
   6. Ladders

H. Installation Procedures
   1. Parking
   2. External Cable Run
   3. Surveying Outside and Inside of Building
   4. Messengers
   5. Basement versus No-basement Wiring
   6. Drilling (wood, bricks, masonry, stone, etc.)
   7. Grounding
   8. Internal Wiring
   9. Drop Cable
   10. Tapping the Feeds
   11. Apartment Installation
   12. Installation of Taps
   13. Clean-up

I. VOMs

J. Problems an Installer May Encounter

K. Signal Level Meters and db's

L. Cable Size and Run Versus Signal Strength

M. Buried Cable

N. Television Set Up and Picture Analysis

O. Customer Relations

PART TIME PROGRAMS

APPLIED ELECTRONIC TECHNOLOGY

OBJECTIVES: The Applied Electronic Technology program was developed by RETS Electronic School to provide a vehicle by which serious students could acquire comprehensive training in electronics on a part time basis. It will be assumed that the enrollee has sufficient time outside of class to complete the assigned homework. Each class day will be divided into approximately 60% lecture and a discussion of the assigned homework, and 40% lab. The lab is an extension of the theory in which the students actually construct and test the circuits discussed in lecture, and learn the use of the appropriate test equipment.

The objective of this program is to provide a method by which an individual may obtain entry level employment in the electronics industry, or to serve as a means by which existing industrial electronic technicians can update to the current state-of-the-art technology, or to provide a method by which employees in unskilled occupations can obtain a lateral transfer to the electronics department within their companies. This course also prepares the student for entry into one of the specialized programs offered by RETS such as: Industrial/Computer Electronic Technology, Home Entertainment Technology, or Communications Technology. Employment opportunities in the following areas are within the scope of our graduates: automotive electronics, installation and maintenance of electro-mechanical copying and dispensing machines, electronic test technician, industrial maintenance technician, electronic security technician, etc.

Two Nights a Week

COURSE	WEEKS	CONTACT HOURS
TL100 — Basic Electronic Principles	12	108.0
TL101 — Electronic Circuit Concepts	12	108.0
TL200 — Digital/Analog Principles and Systems	12	108.0
Totals	36	324.0

Saturday Only

TL100 — Basic Electronic Principles	24	108.0
TL101 — Electronic Circuit Concepts	24	108.0
TL200 — Digital/Analog Principles and Systems	24	108.0
Totals	72	324.0

HOME ENTERTAINMENT TECHNOLOGY

PREREQUISITE: Completion of the Applied Electronic Technology program or equivalency.

OBJECTIVES: The Home Entertainment Technology program, offered two nights a week, was developed by RETS Electronic Schools to provide a vehicle by which graduates of the Applied Electronic Technology program, or existing electronic technicians, may upgrade their skill levels in Home Entertainment Technology.

This course was designed to meet the continuing demand for entry level personnel trained to maintain and repair entertainment electronic equipment, such as color television, high-fidelity sound systems, tape recorders, stereo multiplex, closed circuit television systems, and electronic organs. This course also provides the electronic service industry with a general purpose electronic servicing technician. Since the terminal objective of the course is employment in the service industry, the course is of an extremely practical nature. The ability of the graduate should be such that he will be immediately profitable to his employer with minimal "on-the-job" training.

COURSE	WEEKS	CONTACT HOURS
TL400 — Black & White TV and Audio Systems	12	108.0
TL401 — Color Television & Electronic Systems	12	108.0
Totals	24	216.0

ELECTRONIC COMMUNICATIONS TECHNOLOGY

PREREQUISITE: Completion of the Applied Electronic Technology Program or equivalency.

OBJECTIVES: The Electronic Communications Technology program, which is offered two nights a week, was developed by RETS Electronic Schools to meet the continuing demand for trained electronic personnel to fill entry level positions in the commercial and non-commercial communications industry. Two-way mobile communications, commercial radio and television broadcast engineering, CB transceiver repair and installation, electronic instrumentation and test, marine two-way communications installation and maintenance, and microwave communications are just a few of the employment opportunities that graduates would qualify for. FCC Radio/Telephone License preparation is an integral part of this course. The mathematics included in this course is limited to that required for the preparation needed to take the FCC exams.

Since this course is offered on a part time basis only, it will be assumed that the enrollee has sufficient time outside of class to complete the assigned homework.

COURSE	WEEKS	CONTACT HOURS
TL500 — Transmitter Principles	12	108.0
TL501 — Transceiver Theory and Repair	12	108.0
Totals	24	216.0

INDUSTRIAL/COMPUTER ELECTRONIC TECHNOLOGY

PREREQUISITE: Completion of the Applied Electronic Technology program or equivalency.

OBJECTIVES: The Industrial/Computer Electronic Technology program offered two days a week, was developed by RETS Electronic Schools to provide a method by which graduates of the Applied Electronic Technology program, or existing electronic technicians, may attain the skills suitable for entry into the industrial or computer industry. Since this course is offered on a part time basis, it will be assumed that the enrollee has sufficient time outside of class to complete the assigned homework. Each class day will be divided into approximately 60% lecture and a discussion of the assigned homework, and 40% lab. The lab is an extension of the theory in which the student actually constructs and tests the circuits discussed in lecture, and learns the use of the appropriate test equipment.

Computer installation and maintenance, computer peripherals, numerical control, instrumentation, applications engineering, and industrial electronics are just a few of the occupational areas that are available to graduates of this program. Existing electronic technicians who take this course for upgrading should expect to see new avenues of upward mobility opening for them within their present companies.

COURSE	WEEKS	CONTACT HOURS
TL300 — Microprocessors	12	108.0
TL301 — Industrial Electronics & Computers	12	108.0
Totals	24	216.0

RESIDENTIAL and COMMERCIAL AIR CONDITIONING, HEATING, and REFRIGERATION

(Toledo School Only)

OBJECTIVES: The Residential and Commercial Air Conditioning, Heating, and Refrigeration program was developed by RETS Electronic Schools to provide a vehicle by which serious students could acquire comprehensive training in air conditioning, heating, and refrigeration on a part time basis. It will be assumed that the enrollee has sufficient time outside of class to complete the assigned home work. The lab portion of each class day is an extension of the theory in which students actually perform many of the tests, constructions, and fabrications that would be expected of a maintenance person working in the field.

Employment opportunities in the following areas are within the scope of our graduates: air conditioning, heating, sheet metal, and refrigeration in such positions as installers, service technicians, comfort heating and cooling technicians, maintenance technicians, or refrigeration mechanics.

COURSE	WEEKS	CONTACT HOURS
CCP-111	12	96.0
CCP-112	12	96.0
CCP-211	12	96.0
CCP-212	12	96.0
Totals	48	384.0

HIGH SCHOOL HONORS PROGRAM

OBJECTIVES: This program was designed by RETS Electronic Schools to give high school seniors the opportunity to start their training in electronics while still attending high school. Meeting on Saturdays, the students will have the opportunity to experience the same labs and lectures that are offered in our full time resident programs. Since this program is offered part time, it will be assumed that the students have the necessary time outside of class to complete the assigned homework.

Upon successful completion of this course, a student may advance up to two quarters of training in the Electronic Engineering Technology program, provided that he or she can demonstrate the necessary math proficiency.

In order to qualify for enrollment, an applicant should be maintaining a 'B' average in his/her high school work and present a letter of recommendation from their high school counselor or Industrial Arts instructor.

COURSE	WEEKS	CONTACT HOURS
TL100 — Basic Electronic Principles	24	108.0
TL101 — Electronic Circuit Concepts	24	108.0
Totals	48	216.0

CONTINUING EDUCATION

Advancements in electronic technology occur on a daily basis. The technology that was considered to be revolutionary five years ago may well be considered obsolete today. This poses a serious problem for many engineers and technicians. If their present employment does not allow for the continuing education necessary to keep pace with the changing technology, they may well find the state-of-the-art slipping away from them. Quite often, industry sponsors employees in the attendance of seminars. Unfortunately only a limited amount of education can be obtained in this fashion. A three day crash course is no substitute for proper resident training. Addressing this problem, RETS Electronic Schools makes available several courses for existing technicians and engineers for the primary purpose of upgrading their technical expertise. These courses have specific prerequisites and are current with today's technology. As these courses are offered on a part time basis, it will be assumed that the enrollee has sufficient time outside of class to complete the assigned home work. Upon completion of these courses the graduate will have obtained the skill levels necessary to implement the application of these technologies in his/her present position or to prepare him or her for employment in other areas that would demand such expertise.

MICROPROCESSORS

PURPOSE:

To upgrade the technical skills of the electronic technicians and engineers in the area of microprocessors.

LENGTH:

Twelve weeks, two nights a week, with nine contact hours per week.

PREREQUISITE:

All enrollees must have a sound understanding of analog and digital electronics and must possess a minimum of one year of experience in the field as an engineer or technician, or must have completed the Applied Electronic Technology program.

CONTENT:

This course will concentrate on microprocessors, their hardware, software, and applications. The topics of in-depth discussion will be:

A. Tri-state and open collector technology
B. Microprocessor — systems overview
C. Bus structures
D. Specific block diagrams of microprocessors
E. Internal block diagrams
F. Analysis of specification sheets of processor chips
G. Hardware
H. Machine language programming
    1. Addressing modes
    2. Structure
    3. Interrupt routines
    4. Considerations of writing an executive (monitor program)
    5. Timing loops
I. Assembler language programming (introduction)
J. Memory devices and architecture
K. Memory decoding and buffering
L. Memory organization (small system versus large system)
M. Support ICs
    1. Serial outputs
    2. Parallel outputs
    3. Support software
    4. Analysis of specification sheets
N. Hardware versus software
O. Applications
    1. Industrial
    2. Automotive
    3. Minicomputers
    4. Transducers
    5. Keyboards and seven segment displays
P. Lab involves machine language programming and construction of interfacing circuits
Q. Latest innovations in microprocessor research

NOTE: See TL300 — Microprocessors.

DIGITAL and ANALOG INTEGRATED CIRCUIT CONCEPTS

PURPOSE:

To upgrade the technical skills of the technicians and engineers in the field of digital electronics.

LENGTH:

Twelve weeks, two nights a week, with nine contact hours per week.

PREREQUISITE:

All enrollees must have a thorough understanding of analog electronics, the use of oscilloscopes and other test equipment, and at least one year of experience in the field.

CONTENT:

A. Basic Gates
B. Arithmetic Groups
C. Flip-Flops
D. Registers
E. Counters
F. Multiplexers
G. Comparators
H. Specification Sheets (state-of-the-art)
I. MSI
J. LSI
K. Op Amps
L. D/A and A/D Conversion Techniques
M. Analog and Digital Applications

NOTE: See TL200 — Digital and Analog Principles and Systems.

SUBJECT DESCRIPTIONS

ELECTRONIC ENGINEERING TECHNOLOGY

ELECTRONICS 101

A study of the fundamental principles of electrical conduction includes the effects of series and parallel resistors, capacitors and inductors on voltage, current and power. The principles of magnetism and electromagnetism will be explored through solenoids, alternators, generators and motors. The operating characteristics of rectifiers will be studied and applied to power supply circuits. Some of the electrical principles studied in this quarter will be illustrated with the automotive electrical system.

ELECTRONICS 102

A comprehensive study of solid state principles and circuits which includes the static and dynamic characteristics of low and high frequency amplifiers. The operation and function of basic electronic circuits, such as AF amplifiers, RF amplifiers, detectors, AGC, various sinewave oscillators, various relaxation oscillators, mixers, antenna input circuits, FET amplifiers, and regulated power supplies, will also be studied. In addition, basic troubleshooting will be presented.

ELECTRONICS 103

Design techniques for discrete solid state components are studied with emphasis on power supplies and amplifiers. This quarter also provides an extensive study of linear integrated circuits and their applications, such as active filters, comparators, differentiators, function generators, IC timers, inverting and noninverting amplifiers, oscillators, phase locked loop, regulated power supplies, and summing amplifiers. Manufacturer's data sheets and application notes are thoroughly discussed and interpreted.

ELECTRONICS 201

A presentation of the building blocks of digital electronics which includes basic gates, encoders, decoders, flip-flops, counters, shift registers, multiplexers, demultiplexers, digital readouts, basic arithmetic units, and digital integrated circuits. Applications of digital electronics are also examined Analog-to-digital and digital-to-analog conversion techniques, along with the current digital technologies are also studied.

ELECTRONICS 202

The theory and operation of microprocessors are thoroughly examined. Assembly language programming with program debugging techniques are also studied. Several families of microprocessors are examined. The hardware and software implications of using different families are compared. All the necessary support hardware is also taught such as, memory devices and architecture, drivers, decoders, executive programs, etc.

ELECTRONICS 203

This quarter is an introduction to the application of electronics in the industrial environment. With the use of all previously learned material, the student studies industrial systems and transducers. All previously studied material will be applied to motor controls, conversion devices, proximity controls, sequence timing, induction and dielectic heating, temperature controls, etc. Numerical controlled machines and programmable controllers are taught in detail. Television concepts are also taught as needed for the development of CRT terminals. Several other terminals are also taught.

ELECTRONICS 301

This quarter provides a comprehensive study of computers and computer peripherals which includes the theory and operation of card punches, card readers, cassettes, data communications equipment, disk packs, floppy disks, line printers, magnetic recording devices, magnetic tape stations and modems. Basic programming is extensively taught along with an introduction to several business languages.

ELECTRONICS LABORATORY 101

Resistors, capacitors and inductors are utilized to construct DC and AC circuits and then pertinent voltage, current and power measurements are performed. There are also laboratory projects to demonstrate the principles of electromagnetism and automotive electrical systems. Halfwave, fullwave, bridge and doubler power supplies are constructed. Appropriate test equipment, such as the oscilloscope and the volt-ohm-milliammeter, are used to either troubleshoot or analyze circuit conditions.

ELECTRONICS LABORATORY 102

A solid state superheterodyne receiver is constructed which affords the student an opportunity to test and examine many of the circuits that are discussed in lecture. Besides the circuits in the radio, various other amplifiers, oscillators, and power supplies are constructed and pertinent measurements are performed. Practical troubleshooting techniques that utilize the signal generator, oscilloscope and VOM are emphasized throughout this phase.

ELECTRONICS LABORATORY 103

Many of the power supplies and amplifiers designed and discussed in theory are constructed and tested. Measurements of gain, input and output impedance, frequency response, etc. are performed. Linear integrated circuits and specialized IC's are also used as the student learns to interpret manufacturers' data sheets and application notes.

ELECTRONICS LABORATORY 201

The digital circuits discussed in theory are constructed using digital IC's. The student will learn, through the construction of several prototypes, the importance of decoupling, fan-in and fan-out limitations and interfacing techniques. Through the designing, construction and troubleshooting of these prototypes the student will experience many of the same problems that will be encountered when later working in the field.

ELECTRONICS LABORATORY 202

During this phase, the student will write machine language programs, enter and debug these programs, and construct many various interfaces as they learn microprocessors. Hands on experience with RAMS, ROMS, and other microprocessor support chips will enable the student to better understand the microprocessor based systems that he/she will encounter in industrial electronics and computers. Serial to parallel and parallel to serial conversion techniques as well as digital to analog and analog to digital conversion as they apply to microprocessors, are also examined in lab.

ELECTRONICS LABORATORY 203

Industrial circuits and systems are constructed during this phase, utilizing the technologies previously learned. Logical test procedures and troubleshooting techniques are emphasized throughout this quarter. Practical experience is also gained through exposure to on-site computer peripherals.

ELECTRONICS LABORATORY 301

The students breadboard digital circuits that are representative of the individual sections of the computer. Hands-on experience with computer hardware is achieved through extensive examination and troubleshooting of various on-site computers. During the last half of this phase, the students select a project which they individually must conceive, research, design, prototype, debug and present to their class.

MATHEMATICS 101

The basic fundamentals of arithmetic, which include addition, subtraction, multiplication, division, fractions, decimals, powers, roots, scientific notation, ratio and proportion, are reviewed and applied to Ohm's Law, the power formulas, voltage divider theorems, and the reactance formulas. The calculator and its applications are also presented in this phase. Basic algebra is reviewed and applied to linear equations, graphs, factoring, exponents and radicals, which provides preparation for comprehension of advanced electronic formulas.

MATHEMATICS 102

This phase applies the Pythagorean theorem to resistive-capacitive, resistive-inductive, and resistive capacitive-inductive circuits. The techniques for solving linear equations and story problems are emphasized through a continuation of basic algebra. The trigonometric functions are introduced and applied to simple and complex AC circuits.

MATHEMATICS 103

This phase provides a thorough study of common logarithms and their applications. Logarithms are used to solve multiplication, division, roots and power problems. They are also extensively applied to voltage, current and power calculations through decibel problems.

MATHEMATICS 201

The binary, octal and hexidecimal numbering systems and conversion techniques between the systems are studied during this phase. Digital arithmetic and codes are also covered including Boolean algebra and Karnaugh mapping. In addition, the Thevinen, Norton and Superposition theorems are studied and applied to electronic circuit analysis.

MATHEMATICS 202

This phase provides additional study in algebra which includes transposition, binomial and trinomial factoring, and solution of multi-variable linear equations. The fundamentals of trigonometry and J operators are reviewed and utilized.

MATHEMATICS 203

This phase provides an introduction to calculus which includes algebraic graphs, functions, limits, increments and derivatives. These early principles of calculus are applied to average and instantaneous rate of change problems including transient waveform analysis.

MATHEMATICS 301

This phase provides additional studies incalculus with emphasis on differentiation and integration. The terminal objective of this quarter is to enable the student to pursue advanced electronics theory.

ENGINEERING DRAWING 101

A study and application of basic drafting techniques which includes graphic symbols, basic lines and line weights, lettering, geometrical constructions, various types of views and projections, dimensioning, notes, and a familiarization with JIC standards.

ENGINEERING DRAWING 102

This phase applies the basic drafting techniques that were studied in Drawing 101 to schematic diagrams. Schematics of solid state devices are emphasized and the layout and design of printed circuit boards is taught.

TECHNICAL WRITING 101

The basic principles of grammar, punctuation, sentence and paragraph construction are reviewed in preparation for technical report writing.

TECHNICAL WRITING 201

During this phase, the student will study the fundamentals of technical writing which include methods for logical organization of ideas and a format for technical reports. Experience is achieved in this area by submitting technical reports on the laboratory projects that are conducted throughout the quarter.

COMMUNICATIONS 201

This course emphasizes the accurate and effective communication by written word of data and/or ideas. Resumes, technical and business correspondence are also studied during this phase.

COMMUNICATIONS 301

The basic principles of oral expression are explored during this phase. The students receive experience in this area by giving oral presentations on technical topics. Particular emphasis is given throughout the quarter to communications within the work environment beginning with the employment interview.

PHYSICS 201

This phase explores the basic principles of force, motion, work, energy, power, friction, rotation, torque, gears, and pulleys, which provide preparation for the mechanical aspects of electronic devices. The nature of light and the principles of optical instruments are also studied.

SPECIALIZED ELECTRONICS SERVICING

ELECTRONICS 111

A study of the fundamental principles of electrical conduction which includes the effects of series and parallel resistors, capacitors and inductors on voltage, current and power. The principles of magnetism and electromagnetism will be explored through solenoids, alternators, generators and motors. The operating characteristics of rectifiers will be studied and applied to power supply circuits. Additionally, the student will be exposed to soldering techniques and an introduction to solid state principles and devices.

ELECTRONICS 112

A comprehensive study of solid state circuits which includes the static and dynamic characteristics of low and high frequency amplifiers. The operation and function of basic electronic circuits, such as AF amplifiers, RF amplifiers, detectors, AGC circuits, various sinewave oscillators, mixers, antenna input circuits, various relaxation oscillators, FET amplifiers, regulated power supplies, high fidelity sound systems, and FM stereo multiplex systems will be covered. In addition the student will study the following specialized solid state devices: SCRs, UJTs, diacs, and triacs.

ELECTRONICS 211

This quarter includes a study of the building blocks of digital electronics which encompasses basic gates, encoders, decoders, flip-flops, counters, shift registers, multiplexers, demultiplexers, digital readouts, basic arithmetic units, and digital integrated circuits. Linear ICs including op amps, timers, audio output ICs, etc. are also covered.

ELECTRONICS 212

Solid state, black and white, and color television is thoroughly examined by extensive analysis of television tuners, IF amplifiers, sound circuits, sync circuits, AGC circuits, video amplifiers, vertical and horizontal sweep circuits, vertical and horizontal output circuits, and low and high voltage supplies. Service procedures for black and white, and color television will also be covered.

ELECTRONIC LABORATORY 111

Resistors, capacitors, and inductors are utilized to construct DC and AC circuits, and then pertinent voltage, current, and power measurements are performed. There are also laboratory projects to demonstrate the principles of electromagnetism. Halfwave, fullwave, bridge and doubler power supplies are constructed. Appropriate test equipment, such as the oscilloscope and the volt-ohm-milliammeter, are used to either troubleshoot or analyze circuit conditions.

ELECTRONIC LABORATORY 112

A solid state superheterodyne receiver is constructed which affords the student an opportunity to test and examine many of the circuits that are discussed in lecture. Besides the circuits in the radio, various other amplifiers, oscillators, and power supplies are constructed and pertinent measurements are performed. Experiments with specialized solid state devices, such as UJTs, SCRs, diacs, triacs, and linear ICs are also performed. Practical troubleshooting techniques that utilize the signal generator, oscilloscope and VOM are emphasized throughout this quarter.

ELECTRONIC LABORATORY 211

In the first half of the quarter, all of the digital circuits discussed in lecture are constructed during lab with integrated circuits. In the last half of the quarter, the students learn to troubleshoot and install instrusion alarm systems and various other automated systems involving both analog and digital techniques.

ELECTRONIC LABORATORY 212

During this quarter, the students are furnished a solid state television. The laboratory projects are designed to produce an understanding of the dynamic analysis of the television's circuits with appropriate test equipment, such as DVMs, dot bar generators, triggered sweep oscilloscopes, and sweep and marker generators. Extensive familiarization with color televison receiving systems and troubleshooting techniques is a requirement for this quarter. Both static and dynamic convergence adjustments must be performed along with both luminance and chroma channel alignment procedures. In addition, the student becomes familiar with the servicing techniques employed in organ equipment.

CLIMATE CONTROL TECHNOLOGY

CCT-101

The fundamental electrical laws and elements are studied and applied to single phase motor theory, testing, protection, and starting circuits. Basic household wiring, schematic reading and low voltage control systems are also covered. Hermetic compressors and the electrical components in air conditioners are taught this quarter.

CCT-102

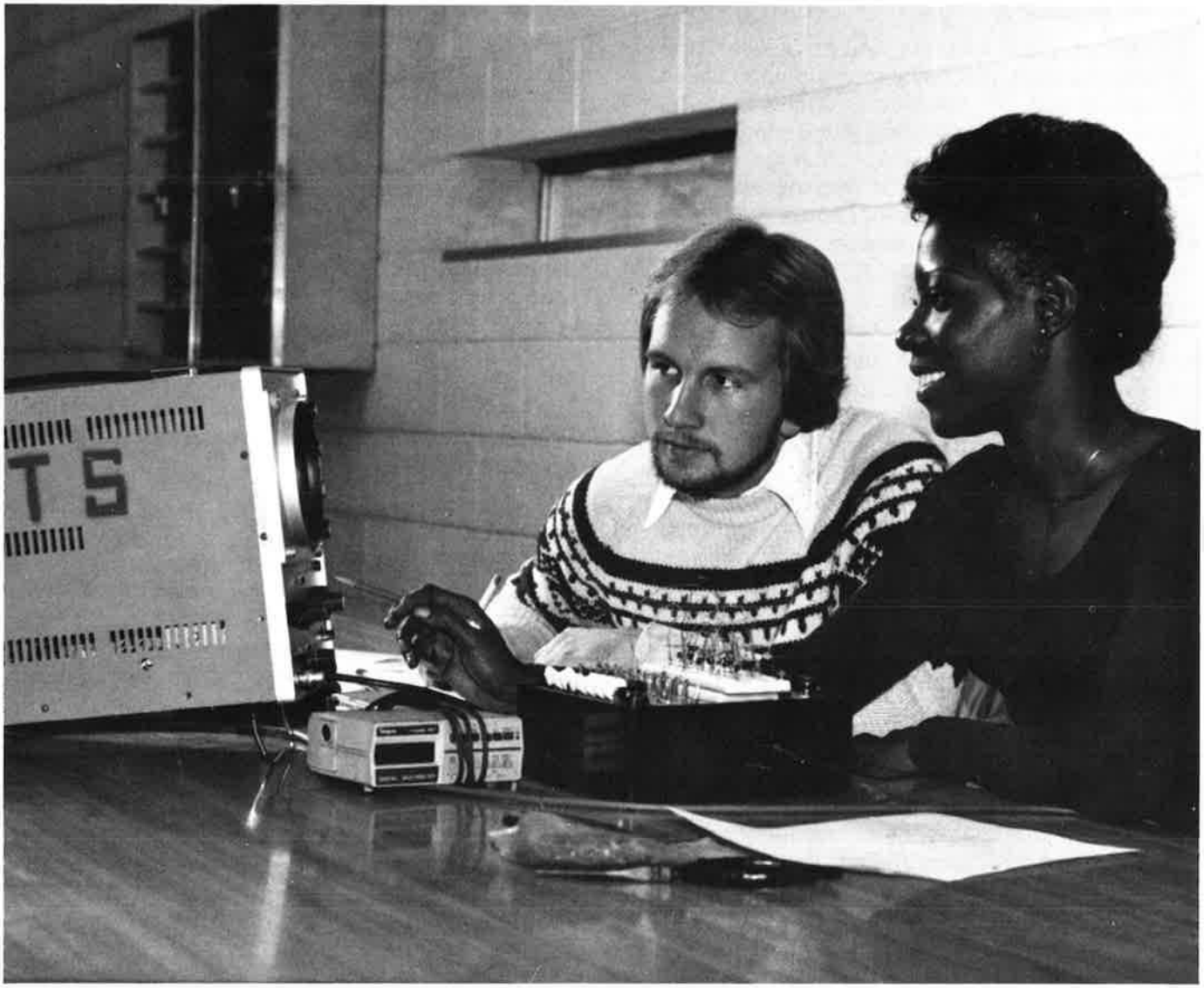
The fundamental principles of refrigeration which are taught this quarter include, but are not limited to, the following topics: refrigerants, compressors, metering devices, thermostatic expansion valves, defrost time clocks, commercial condensing units, evaporator defrost methods, commercial load calculation, and refrigeration piping design.

CCT-201

A study of heating equipment and their control devices, basic installation procedures, and an in-depth look at service and repair of several types of heating equipment is included in this quarter of training. An outline of procedures for installation of proper chimneys and flues on gas and oil fired equipment is also included. The types of heating equipment covered are: gas fired furnaces, oil furnaces, heat pumps, time guard circuits, oil, gas electric fired boilers. Humidification, humidifiers, and electronic air cleaners are also covered this quarter.

CCT-202

The principles and procedures used for the calculations of heat loss and heat gain surveys are covered in this quarter. This information equips the student with the expertise necessary to determine the proper size of equipment required to efficiently perform the job expected. Air distribution, warm air heating plans, and residential duct work design are some of the topics covered, along with basic blue print reading, insulation, and fiberglass ducts. Also the introduction of sheet metal tools and equipment are covered along with the fabrication methods of some common sheet metal fittings such as a takeoff, 90° elbow, transition, offset, square-to-round, and others.



CCL-101

The lab equipment used during this quarter consists of: basic electrical training boards, low voltage control trainers, window air conditioners, central air conditioning equipment, and a variety of commercial refrigeration equipment. The scope of this quarter allows for a concentration on electrical bread-boarding and repair with the use of the appropriate test equipment.

CCL-102

The student will be trained to repair both electrical and refrigeration failures which are typical of those found in the field. Examples of the types of equipment that the student will have "hands-on" training on are: window air conditioners, central air conditioners, commercial ice machines, open type display cases, walk-in coolers, etc.

CCL-201

The lab projects in this quarter consists of dismantling and repairing of heat pumps, oil, gas, and electric hydronic boilers, oil furnaces, and gas furnaces. Proper troubleshooting procedure and testing of a unit's efficiency is also practiced in the lab along with the repair and installation procedures for electronic air cleaners and humidifiers.

CCL-202

The proper use of most sheet metal hand tools, and various equipment commonly used in the heating and air conditioning industry is covered during this phase. Typical of some sheet metal equipment used are: rotary machine, cleat benders, box and pan brakes, flanging attachments, stomp shear, and more. The student will fabricate a project which will allow him to obtain practical experience on some equipment which normally would only be found in a sheet metal shop.

APPLIED ELECTRONIC TECHNOLOGY AND OTHER PART-TIME PROGRAMS

TL100 — BASIC ELECTRONIC PRINCIPLES

A study of the fundamental principles of electrical conduction, which includes the effects of series and parallel resistors, capacitors and inductors on voltage, current and power, is accomplished by exploring the following topics: generation of electricity, units and symbols, electrical laws, series and parallel circuits, measuring equipment, fundamentals of AC and oscilloscopes, inductance, capacitance, reactance, resonance, power supplies, electronic systems concepts, and soldering techniques. Basic AC and DC circuits will be constructed in lab as the student learns to use multimeters, oscilloscopes, and other test equipment. Some of the electrical principles studied in this quarter will be illustrated by the study of the automotive electrical system.

TL-101 — ELECTRONIC CIRCUIT CONCEPTS

A comprehensive study of solid state principles and circuits which includes the static and dynamic characteristics of low and high frequency amplifiers. The function and operation of basic circuits is studied through the following topics: solid state principles, audio amplifiers, detectors, automatic gain control schemes, filter circuits, RF amplifiers, oscillators, signal tracing and electronic devices, FETS, regulated power supplies, specialized solid state devices, blocking oscillators and multivibrators, and vacuum tubes. A solid state superheterodyne receiver is constructed during lab which allows the student to test and examine many of the circuits discussed in theory. Signal generators, VOMs, oscilloscopes and other test equipment are utilized in the construction and testing of the receiver.

TL200 — DIGITAL/ANALOG PRINCIPLES AND SYSTEMS

The principles of digital and analog ICs and some of their applications in common electronic circuits and systems are studied through an examination of the following topics: relay logic, motors and motor controls, sequence timing, basic gates and logic circuits, arithmetic units, flip-flops, counters and shift registers, digital readouts, multiplexing and comparators, solid state memory, transducers, operational amplifiers, and A to D and D to A converters. Analog and digital ICs are used in lab to construct many of the circuits discussed in theory. Electromechanical devices and basic industrial circuits are used to illustrate the applications for all previously studied material.

TL300 — MICROPROCESSORS

Hardware, software, firmware, and microprocessor applications are thoroughly examined. Tri-state and open collector technology are reviewed as the concepts of bus structuring are developed. Memory devices and architecture, machine language programming, assembly language programming, and microprocessor support chips are thoroughly discussed as micro-based systems are developed. Many of the common microprocessors are examined and manufacturers' data sheets and manuals will be used. The student will learn to write programs (including an examination of monitors and interrupt subroutines), build interfaces, and debug micro-based systems. This course assumes a sound understanding of analog and digital principles and these principles will not be covered as part of this course.

TL301 — INDUSTRIAL ELECTRONICS AND COMPUTERS

Basic electronics, analog/digital principles and microprocessors are applied to common industrial circuits and systems. The following topics will be studied during this quarter: power control, induction and dielectric heating, resistance welding, ultrasonic systems, automatic process systems, numerical control concepts, N/C systems, synchro and servo systems, processor controlled systems, programmable controllers, interfacing schemes, and peripherals. Computer fundamentals which includes the operation, function, and typical circuitry of the arithmetic unit, the control unit, the input/output units and memory are studied. During lab, many of the circuits discussed in theory are constructed.

TL400 — BLACK & WHITE TELEVISION AND AUDIO SYSTEMS

The principles of and service procedures for both tube-type and solid state black and white TV are thoroughly examined through the following topics: TV systems, block diagrams, RF tuners, stagger-tuned circuits, video amplifiers, sync circuits, vertical circuits, horizontal circuits, solid state tuners, wide-band solid state amplifiers, solid state sweep circuits, and black and white TV service. Solid state, black and white TV is thoroughly examined by extensive analysis of television tuners, IF amplifiers, sound circuits, sync circuits, AGC circuits, video amplifiers, vertical and horizontal sweep circuits, vertical and horizontal output circuits, and low and high voltage supplies. AM receivers, FM and FM stereo receivers, and other audio systems are examined.

TL401 — COLOR TELEVISION AND ELECTRONIC SYSTEMS

In this quarter, the parallels between black and white TV and color TV are developed. The color television and its service procedures are thoroughly examined through the following topics: color signal characteristics, setup procedures, color generators, video signal circuits, color signal circuits, color picture tubes and associated circuits, alignment of video circuits, alignment of color circuits, specialized TV service

equipment, focus and convergence circuits, tube-type color TV service, and solid state color TV service. The laboratory projects are designed to produce an understanding of the function and operation of the circuits within the television. This is accomplished by static and dynamic analysis of the TV's circuits with appropriate test equipment, such as DVMs, triggered sweep oscilloscopes, dot bar generators, and sweep and marker generators. A study of tape recorders, electronic organs, and home entertainment equipment is also included in this phase of training.

TL500 — TRANSMITTER PRINCIPLES

This quarter provides preparation for the 3rd and 2nd class FCC licenses, which are required by the Federal government for certain types of employment in broadcast stations, and to repair transmitters and transceivers. Basic transmitter principles, circuits, and FCC preparation are studied through an examination of the following topics: DC theory review, AC theory review, math as applied to AC and DC theory, resonance and filters, low and high frequency amplifiers, solid state devices, power supply theory, measuring devices, oscillators, basic transmitters, amplitude modulation systems, frequency modulation systems, and motors and generators.

TL501 — TRANSCEIVER THEORY AND REPAIR

This quarter provides preparation for the 1st class FCC license and a study of citizen-brand (CB) radio and microwave systems through an examination of the following topics: antennas and transmission lines, transmitter frequency measuring methods, CB (citizen-band) installation and SWR checks, broadcast station logs and equipment, FCC (Federal Communications Commission) regulations, frequency synthesis and phase lock loops, CB power and frequency measurements, CB repair techniques, television broadcasting and receiving, and microwave systems. CB transceivers will be utilized in lab to demonstrate many of the principles discussed in theory.

AIR CONDITIONING, HEATING REFRIGERATION

CCP-111

The fundamental principles of electricity and their applications to single phase motors, motor starting circuits, low voltage control circuits, electric components in the air conditioner and schematic diagrams are studied during this quarter. In lab, the principles discussed in theory are clarified by hands-on projects with window air conditioners, central air conditioners, and commercial wiring and the proper use of appropriate test equipment.

CCP-112

A study of the fundamental principles of the refrigeration cycle, temperature/pressure relationships, proper procedures for charging and discharging of a system along with proper evacuation methods, are thoroughly examined this quarter. Additional topics of discussion includes commercial evaporators, cooling towers evaporative condensers, low ambient controls, compressor capacity controls, and commercial load calculations. Lab projects consists of tube bending, flaring, brazing, evacuation, and charging of various types of refrigeration equipment. Troubleshooting of refrigeration failures and learning the proper use of refrigeration hand tools and test equipment is also studied.

CCP-211

The theory of operation of various types of heating systems, troubleshooting procedures, repair and/or replacement of their components is the subject matter for this quarter. Emphasized are: oil and electric hydronic boilers, humidifiers, and electronic air cleaners. Also covered are proper venting procedures, combustion efficiency instruments, and fuel pumps. Both troubleshooting and repair of heating systems will be experienced by the student in lab. Combustion efficiency tests are taken on various types of equipment to help determine the degree of economical operation. The equipment that the student has the opportunity to repair and observe the operation of are as follows: heat pumps, oil furnaces, gas furnaces, electric, gas and oil fired boilers, humidifiers, and electronic air cleaners.

CCP-212

During this phase of training, basic procedures for heat loss/heat gain calculations are discussed along with residential duct work design, heating plans, and general sheet metal work. An explanation of various types of sheet metal, hand tools, and equipment will also be covered. An explanation of sheet metal projects and the use of the tools and equipment will be given. A good percentage of lab time during this phase will be spent on the fabrication of several sheet metal projects. These projects will be interconnected and completely fabricated by the student from the layout plans in the lessons. Some of the sheet metal equipment used are as follows: rotary machine, box and pan brake, slip roll forming machine, various stakes, flanging attachments, and more. When this project is completed, the student may take it with him if he/she wishes.