AC NO: 140-5

DATE: 11 Aug 71

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: RADIO MAINTENANCE TECHNICIAN SCHOOL CURRICULUM

1. PURPOSE. This advisory circular provides information on curriculum subjects for persons desiring to establish radio maintenance technician training courses.

2. BACKGROUND. Public inquiries indicate that a need exists for guidance in the form of a sample radio maintenance technician curriculum. This information may be used by persons and schools wishing to offer training to individuals interested in a career in the field of aviation electronics. Although the present supply of technicians reportedly is adequate to meet industry needs, the demands for trained radio maintenance technicians probably will exceed the supply in the next few years. Persons knowledgeable in this field believe that plans to meet the expected shortage should be made now.

3. DISCUSSION. There are presently a number of trade schools and colleges offering various electrical/electronic courses of instruction. The curriculums vary in teaching levels and subject content from technician to engineer, and from two years to four years depending on the type of diploma or degree offered. Considerable emphasis is placed on television and industrial electronics by a number of these schools. Therefore, their graduates are not oriented toward aircraft radio maintenance to a degree they can enter that field without additional training. Many individuals upon leaving the military with backgrounds in radio and electronics are in this category. This is largely due to the degree of specialization required by the military. The greatest need in the field of civil aviation electronic maintenance today is for trained technicians with sufficient knowledge to enter the radio maintenance field as working employees. The objective of the sample curriculum contained in Appendix I to this advisory circular is to provide interested persons with course and subject content sufficient to develop curriculums oriented directly toward the training of radio maintenance technicians who can enter the avionic maintenance field at a level above that of a trainee.

Initiated by: FS-350

4. APPROVAL AND CERTIFICATION. Present Federal Aviation Administration policies apply to these subjects:

   a. FAA course approval, or school certification, will not be required or granted for the preparation and conduct of radio maintenance technician courses.

   b. Course completion will not entitle graduates to any form of FAA certificate or diploma.

5. COURSE OUTLINE. The sample course outline in Appendix I is divided into three sections, with a suggested number of hours for each section shown following the section title. The suggested hours and course section content are to be considered flexible and may be adjusted to satisfy individual school needs or goals.

6. COURSE LENGTH. Optimum total course class and laboratory time should be between 2,000 and 2,200 hours, and between 56 and 72 weeks in length. For the most effective training a nominal class and laboratory time should be approximately 30 hours per week. Instruction time in excess of 40 hours per week is not recommended.

7. LABORATORY WORK. All sections under Blocks I and II, of Appendix I, should be composed of lecture and laboratory work. Actual "hands on" training in equipment theory, experiments, operation, wiring, and installation, adjustment, and troubleshooting should comprise the majority of the allotted laboratory time. The ratio of classroom lecture time to laboratory time may vary depending on the course subject and instructional method.

James F. Rudolph

Director, Flight Standards Service

COURSE CURRICULUM

This appendix lists the subjects required in electronic fundamentals, aircraft systems, and Federal Aviation Regulations, and Federal Communications Commission Rules. The number following each block title indicates a representative number of hours in the course subjects shown under that block title. The order of listing is not indicative of the order in which subjects should be taught. Instead they are only subjects which should be considered in the course curriculum.

Block I. Electronic Fundamentals - 900 hours.

A. Basic Electricity.

Ohm's law, voltage, current, resistance.

Impedance, capacitance, inductance, reactance, series and parallel circuits, network theorems.

Electrical power generation and transformation, magnetism, motor principles, and wave shape.

AC and DC measuring instruments.

Laboratory work should include use of hand tools, meters, oscilloscopes, practical experiments in basic electrical circuits, soldering, aviation wiring practices, and installation procedures.

B. Electronic Theory.

Basic electron theory.

Vacuum tube theory and application.

Circuits including power supplies, RF, IF, and AF amplifiers, detectors, ocillators, AVC, convertors, and limiters.

Basic solid state theory, multibrators, control amplifiers, logic gates, and other circuitry commonly used.

Laboratory work should include practical experience in constructing and analyzing various types of radio stages, including the test adjustment and calibration of various circuits using typical items of avionics test equipment.

C. Technicial Mathematics.

Basic arithmetic with algebraic notations, equations, factoring, fractions, exponents, powers, roots, and graphs.

Algebra, formulas, and applications, positive and negative numbers, vector diagrams.

Trigonometry and slide rule.

D. Graphics.

Drafting fundamentals, blueprints, and wiring diagrams.

Symbols commonly used in aircraft electrical, electronic, and logic curcuit diagrams.

E. Introduction to Computers.

Computer fundamentals, digital and analog, binary number system, Boolean algebra, counting and switching circuits, gates, storage systems.

Laboratory work should include practical experience in analysis and experiments with computer circuits commonly used in aircraft electronic systems, and the functions they perform.

Block II. Aircraft Systems - 1200 hours.

A. Electrical Power.

Generation and distribution systems.
Batteries and battery charging systems.
AC and DC generators, motors, starter-generator combinations.

Protective devices, warning systems, load transfer, and fault clearing.

Airborne auxiliary power units.
Ground power units.

Laboratory work should include load analysis, troubleshooting, and repair, experiments in load distribution, protective devices and limiters, and use of manufacturers' maintenance manuals and publications.

B. Communications.

VHF transmitters, receivers, and transceiver circuits.
HF transmitters, receivers, transceiver circuits, and single-sideband principles.
Emergency locator transmitters including UHF circuits.

Passenger address and crew intercom systems.

Antenna types and wave propagation, transmission lines.

Laboratory work should include study and operation of equipment, troubleshooting, and repair, use of specialized test equipment, and manufacturers' maintenance manuals and publications.

C. Navigation.

LF and MF navigation receivers; Decca, ADF, Loran, Consol, etc.

VHF navigation receivers, VOR.
Instrument landing system receivers; glide slope, localizer marker.

Magnetic compass system, directional gyros, principles of gyros.

Laboratory work should include study and operation of the equipment, troubleshooting use of specialized test equipment, and manufacturers' maintenance manuals and publications.

D. Pulse and Microwave.

Weather radar, antennas, waveguides, transmit-receive units.
Doppler radar systems.

Radio and radar altimeter.

Distance measuring equipment, ATC transponder.

Laboratory work should include study and operation of the equipment, troubleshooting use of specialized test equipment, and manufacturers' maintenance manuals and publications.

E. Flight Control Systems.

Synchros, servomechanisms, resolvers.

Attitude and rate gyros.

Automatic pilots, yaw damper, automatic trim stablizers.

Automatic stablization systems for small aircraft.

Integrated flight systems.

Laboratory work should include study and operation of the equipment, troubleshooting, use of specialized test equipment, and manufacturers' maintenance manuals and publications.

Block III. Regulatory Requirements - 100 hours.

A. Federal Aviation Regulations (FAR).

FAR 1, Definitions and Abbreviations.

FAR 43, Maintenance, Preventative Maintenance, Rebuilding and Alteration.

FAR 65, Certification; Airmen Other than Flight Crewmembers.

FAR 91, General Operating and Flight Rules.

FAR 145, Repair Stations.

Other related FARs and Advisory Circulars.

B. Federal Communications Commission Regulations.

Personnel (operator) licenses.

Aircraft station licenses.

Aeronautical ground station licenses.

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DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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Vacuum tube theory and application.

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Algebra, formulas, and applications, positive and negative numbers, vector diagrams.

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