DESIGN AND DEVELOPMENT OF AN AM AND FM COMMUNICATIONS TRAINER

Undergraduate Design Project
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ABSTRACT

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The design and development of the AM and FM communications trainer was conducted at Bancod, Indang, Cavite and Commonwealth, Quezon City. The design was tested and evaluated at the New Engineering Building, Cavite State University, Indang, Cavite.

Specifically, the study aimed to: 1) design and develop an electronic laboratory trainer that consisted of modularized circuits capable of generating intelligence, radio-frequency, amplitude-modulated and frequency-modulated signals and demonstrating the process of AM and FM communications from transmission to reception; 2) design and develop self-contained modularized AM and FM transmitter and receiver circuits boards that can be connected to or detached from the main trainer frame; 3) design and develop measurement points at specified locations in the trainer circuits to which multimeters can be connected to provide numerical information on the values of voltage at those points; 4) demonstrate the process of AM and FM by designing and developing terminals at the transmitter and receiver stages to which oscilloscopes can be connected to provide waveform displays of the modulating signal, the RF carrier signal, the intermediate-frequency signals, and the amplitude-modulated and frequency-modulated signals; 5) devise laboratory experiments that will test the students' learning of the trainer; 6) test the trainer's performance; and 7) conduct a cost computation of the project.

The design project was composed of four modules, namely: an AM transmitter, an AM receiver, a FM transmitter, and a FM receiver. Accessories included a rack frame, a pair of storage boxes, connecting leads, a dc power supply module with multiple outputs, an experiment manual, and a user's manual. A microphone, an amplifier, a cassette player, a cathode ray oscilloscope and a function generator were used during the testing and evaluation of the trainer. The trainer had multimeter and oscilloscope terminals which were placed at selected points in the illustrated circuits of each module. The multimeter gave rms values of voltage of the AM, FM, IF, intelligence or RF carrier signal passing through the point to which the instrument was connected. The oscilloscope provided waveform displays of the signals passing through the point to which it was connected. A special built-in field strength meter for the AM transmitter and a spectrum analyzer served as indicators for the presence of AM and FM signal strength, RF field strength and frequency.

The trainer was designed to be used by BS ECE and BS Computer Engineering students taking up analog communications subjects. During the final evaluation, the trainer was able to display intelligence, amplitude-modulated, frequency-modulated and intermediate-frequency signals.

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