

UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

Department of Electrical Engineering

Digital-to-Analog Converters

INTRODUCTION

There are a number of digital-to-analog conversion methods that can be used to convert a digital signal to an analog voltage or to an analog current. Devices used to perform such conversions are called digital-to-analog converters (DACs) and are generally designed using weighted resistors and a summing amplifier. Great care must be taken in their design since accuracy and stability depends upon the absolute accuracy of the resistors and their ability to track each other versus temperature. A number of design techniques have been used to reduce error due to temperature changes such as using R-2R resistive ladders, etc.

ASSIGNMENTExperiment A (2 wks):

The student is to devise and implement a circuit to drive the DAC-08 (or an equivalent DAC) from a pulse generator source in such a way as to produce a ramp output. Also, the student is to determine the highest frequency at which the DAC output ceases to be “crisp.”

In addition to the above, the student is to devise and implement a “tracking A/D converter” circuit employing a DAC-08, (but no A/D I.C.).

Experiment B (3 wks):

In addition to all of Experiment A, the student is to devise and implement a circuit employing a DAC-08 that will produce text on a standard oscilloscope display.

REFERENCES

1. References on reserve in the library.
2. Data books.
3. Faculty with expertise in digital devices.

EXPECTED RESULTS (as a minimum)Experiment A:

1. A sketch of the circuit.
2. A sketch, on the same graph, of both the analog input and the DAC output when:
 - a. the input is a 1 KHz 2 Vp-p sinusoid signal.
 - b. the input is a 1 MHz 2Vp-p sinusoid signal.
3. A demonstration of the circuit to a faculty member.

Experiment B:

1. A sketch of the circuit.
2. A demonstration of the student's initials displayed on the screen of a standard oscilloscope to a faculty member..