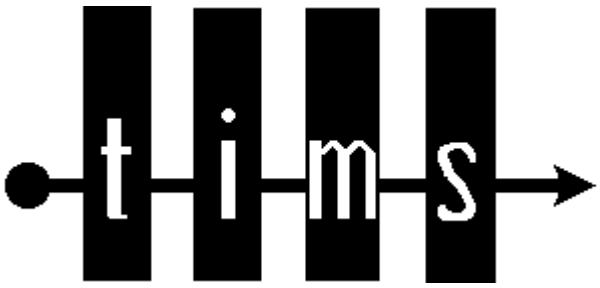
Communication Systems Modelling

with



Volume D2
Further & Advanced Digital Experiments

Tim Hooper

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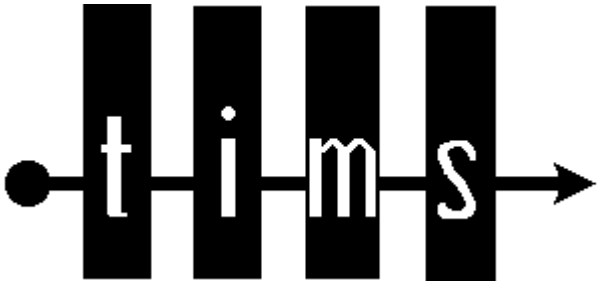

Volume D2
Further & Advanced Digital Experiments

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WHAT IS TIMS ?

TIMS is a **T**elecommunications **I**nstructional **M**odelling **S**ystem. It models telecommunication systems.

Text books on telecommunications abound with block diagrams. These diagrams illustrate the subject being discussed by the author. Generally they are small sub-systems of a larger system. Their behaviour is described by the author with the help of mathematical equations, and with drawings or photographs of the signal waveforms expected to be present.

TIMS brings alive the block diagram of the text book with a working model, recreating the waveforms on an oscilloscope.

How can TIMS be expected to accommodate such a large number of models ?

There may be hundreds of block diagrams in a text book, but only a relatively few individual block *types*. These block diagrams achieve their individuality because of the many ways a relatively few element *types* can be connected in different *combinations*.

TIMS contains a collection of these block types, or *modules*, and there are very few block diagrams which it cannot model.

PURPOSE OF TIMS

TIMS can support courses in Telecommunications at all levels - from Technical Colleges through to graduate degree courses at Universities.

This text is directed towards using TIMS as support for a course given at any level of teaching.

Most early experiments are concerned with illustrating a small part of a larger system. Two or more of these sub-systems can be combined to build up a larger system.

The list of possible experiments is limitless. Each instructor will have his or her own favourite collection - some of them are sure to be found herein.

Naturally, for a full appreciation of the phenomena being investigated, there is no limit to the depth of mathematical analysis that can be undertaken. But most experiments can be performed successfully with

little or no mathematical support. It is up to the instructor to decide the level of understanding that is required.

EXPERIMENT AIMS

The digital experiments in this Volume build on those covered in Volume D1. It is advantageous to have completed as many of those as possible.

As before, the experiments have been written with the idea that each model examined could eventually become part of a larger telecommunications system, the aim of this large system being to transmit a *message* from input to output. The origin of this message, for the digital experiments in Volumes D1 and D2, is generally a pseudo random binary sequence. For the analog experiments, in Volumes A1 and A2, it would ultimately be speech. But for test and measurement purposes a sine wave, or perhaps two sinewaves (as in the two-tone test signal) are generally substituted.

The experiments are designed to be completed in about two hours, with say one hour of preparation prior to the laboratory session.

The four Volumes of ***Communication Systems Modelling with TIMS*** are:

A1 - Fundamental Analog Experiments

A2 - Further & Advanced Analog Experiments

D1 - Fundamental Digital Experiments

D2 - Further & Advanced Digital Experiments

Contents