DDM—A Revolution in Lighting Control

*David Baker**

The Editor feeling that there was a grave danger of overfacing the public with Bentham, especially as he insisted on doing the Triptych article, has prevailed upon David Baker to take up the lighting control story with an engineer's description of the latest system DDM.

For several years now the name DDM has been something of a dream. Some less generous might say it had almost become a myth. However, speed and single-mindedness of purpose have over the last year resulted in the completion of the final stages of evolution. Let us therefore examine how and why we have arrived at this important milestone.

Firstly we need to understand two commonly used terms, namely "digital" and "memory". With a conventional control board, if a fader lever is moved from zero through lever position 1 to 2 and so on through to position 10, then its output will increase (in Rank Strand systems) from zero through to about 15 volts. The technical term "analogue" is applied to this voltage and implies that it can be varied smoothly over its full range and that its level can be simply measured with a meter. The voltage from the fader lever is of course used to control the output from the appropriate thyristor dimmer.

A memory control system is capable of recording the level set on the fader lever. Most people these days are familiar with the domestic recorder using magnetic tape in either reel or cassette form. In this type of instrument, a strong signal causes the magnetic tape to be more heavily magnetised than a weak one. However, anyone who has used this equipment will know that on re-play the level of the signal can vary widely according to quality of tape used, presence of dirt, tape speed and the design of the recording and playback heads. To the domestic user, this presents little embarrassment since any such variations can be taken up by adjustment of the volume control. However, a memory control system must be able to record a dimmer level, play it back many times and even re-record it, without change.

The problem is that magnetic materials are not suitable for the accurate recording of levels unless special techniques are employed, one of which is to use a digital approach. Put simply, digital means that everything has to be defined in terms of simple, two-state criteria, i.e. ON/OFF or 0/1 or YES/NO, etc. With this arrangement, a level is represented by a number in binary code. A full appreciation of this subject really merits a separate article. It is however a sobering thought to find that one's nine-year-old son has been taught binary arithmetic as part of his normal school curriculum! For those of us educated in a supposedly less-enlightened age, a simple example will serve to illustrate the principles involved. Let us imagine that we had a system of coinage with only five pieces, which we used to represent $\frac{1}{2}$, 1, 2, 4 and 8 pence respectively. These coins could be identical in shape and size being distinguished merely by different "labels". Between them they would give us any monetary value from zero to 15 pence in $\frac{1}{2}$ pence increments. Similarly, five "dots" on magnetic tape can be used to represent any recorded dimmer level for 0–15 volts, depending upon which dots are magnetised. Thus the first dot would represent $\frac{1}{2}$ volt, the second 1 volt, the third 2 volts, the fourth 4 volts and the fifth 8 volts. These would give us any voltage value from zero to 15 volts in $\frac{1}{2}$-volt increments. Thus dimmer voltages can only be represented in $\frac{1}{2}$-volt increments.

With the digital approach, the accuracy required in recording and playback only needs to be quite crude since we simply have to determine whether a "dot" on the magnetic tape is magnetised or not or

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**Chief Engineer, Rank Strand Electric since December 1969. Prior to this he was Technical Manager of Elliott Automation's Space and Guided Weapons Division.*