

whether a transistor is switched on or off and so on.

To arrive at a digital (coded) signal, the dimmer voltage has to be "translated" by a piece of electronics known as an analogue to digital converter. This circuit has one input connected to the dimmer voltage and has five output wires carrying the coded digital signal. Extending the argument of the previous example, six output wires could be used in which case the 15 volts could be covered in $\frac{1}{4}$ -volt increments. This would be known as a six bit system.

Once an analogue voltage has been converted to digital, many forms of recording media using ON/OFF techniques can be used. For instance, a ferrite store is made up of a large number of minute rings of magnetic material (ferrite) which can be magnetised or de-magnetised. The five wires carrying the digital signal would be connected to five of these cores so that one circuit dimmer level can be recorded. Similarly magnetised dots can be set up on magnetic tape or holes punched in paper tape—they all serve a similar purpose.

Strand Electric led the world in producing System IDM, the first instant dimmer memory control designed specifically for theatre, and has consequently had to suffer some of the misfortunes and setbacks which frequently accompany the first adventurer who too hastily enters a new field. With the takeover by the Rank Organisation in November 1968 there inevitably followed a period of marking time while the new setup got its bearings, but one year later, after recruitment from the computing and aerospace industries, Rank Strand was ready to begin the large task of updating the logic circuitry for the many IDM systems¹ already installed in or on order for various countries of the world. In the United States a similar system, called Memo-Q, is manufactured and marketed by Century Strand. Both systems make use of digital stores and other techniques.

At the same time the next generation of controls had to be envisaged. For this a pilot project was given the code title of

DDM which as is the way with such things has stuck. The first "D" stood for digital and was intended to imply that the major part of the operating logic and of course all the storage and playback would remain digital with the minimum of conversion to analogue.

When compared with DDM, the IDM/Memo-Q type of equipment is more or less conventional from both the operational and engineering points of view. Figure 1 shows a simplified schematic of the arrangement. The terminology used to describe each store (Main store, Local store, etc.) has been deliberately adopted in order to make description of the DDM system more readily comprehensible by comparison.

During rehearsal in the case of IDM/Memo-Q, the required lighting levels are set up on a series of potentiometer-type fader levers one per channel. The levels are memorised by first converting from analogue to digital and then recording in the Main store. During playback, recorded cues are recalled (normally in sequence) on to one of the two Local (playback) stores labelled C and D in the diagram. The outputs from these two stores can be proportioned by the playback master controls. The final output on each channel is converted from digital to analogue to provide the control signal for the dimmer. Thus the operation is similar to that of a two preset manual control except that in order to set up each preset in turn, the operator requires merely to recall recorded scenes onto alternate playbacks.

The terms Store and Memory are synonymous, and the former will be used in this article. A store is a device in which digital information can be recorded and recalled when required. A number of different technologies are available for the construction of the store and many popular myths have been created to give apparent virtues to one type or another. However, the decision as to which technique is used is largely a question of economics. As technology advances, the user can expect the type of storage medium to change in order that cost advantages can be passed on.

The Main store is designed to contain one or more complete shows and will

¹The latest version is known as System MSR.