Design and Equipment Department

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Mark II Nicam-3 Equipment CD2L/41 (Coder) and CD3L/58 (Decoder)

The existing NICAM-3 equipment (CD2M/17 and CD3M/33) is presently used in conjunction with the 13-channel linear PCM network, to distribute audio signals and transmitter control data. In the next few years, it is envisaged that the 13-channel system will be phased out, and more NICAM-3 channels will be brought on-stream. This will provide a total capacity of twenty-four channels on an 8.448 Mbit/sec data bearer, rather than the nineteen channels currently available (13 of LPCM and 6 of NICAM).

The CD2M/17 Coder and CD3M/33 Decoder are relatively bulky and expensive. Originally designed in 1980, they provide a two-channel audio circuit, on a 676 kbit/sec bearer, from equipment occupying 8U height of racking space (4U each). Three such bearers may then be multiplexed to provide the BT-standard, 2.048 Mbit/sec data stream.

A variant of NICAM-3 was developed more recently, for use in Two-Channel Sound-In-Sync distribution equipment (2-C SIS), and this employed a custom-designed Large-Scale Integrated (LSI) gate array device. In this way, component count and, therefore, costs, were reduced to a minimum.

Coding or decoding of NICAM-3 signals involves various stages under the control of a sequencer. This can obviously be realised in a number of ways; for example, the original NICAM-3 codec is totally hardware-controlled (ie. no microprocessor). However, the 2-C SIS equipment is based around the LSI chip and a pair of microprocessors working in tandem; consequently, the amount of extra support hardware necessary has been reduced to a minimum.

It was realised that further equipment could be designed, using a combination of hardware and software control elements, which would allow more than two channels to be converted at the same time. Such equipment would be able to offer substantial savings, both in terms of cost and space requirements.

Design and Equipment Department started looking into the feasibility of developing such units in 1985, and a prototype 6-channel Coder and Decoder were produced. These were each based on the 2-C SIS LSI gate array and a single Z80 microprocessor, and used a separate hardware sequencer. However, the project progressed relatively slowly, owing to the pressure of other work on the Department at that time, and the consequent lack of available effort.

In the meantime, developments in VHF Radio, such as the Radio Data System (RDS) and stereo Radio 1, meant that production of Mark II NICAM-3 equipment would be required to start early in 1989. Therefore, work was stepped up to 'production-engineer' the already-proven prototypes.

This work has now progressed to the stage where the Decoder design is virtually complete, and the Coder is expected to be ready around the end of this year (1988). Each Coder/Decoder pair will handle six audio channels, along with control and other data (eg. RDS), at an overall bit-rate of 2.048 Mbit/sec. Four of these standard bearers may be multiplexed, using commercially-available equipment, into an 8.448 Mbit/sec bit-stream. (Note that access to the dual-channel 676kbit/sec level is not available.) A modulator is being planned for future development, which will allow direct over-video transmission of data at the 2.048Mbit/sec rate.

The Mark II NICAM-3 equipment uses 6U high, triple-depth Eurocards. The Coder and Decoder each use four such cards which, together with a power supply module, occupy less than half the available rack width. Thus, a single 6U rack can easily accommodate twelve audio coding or decoding channels, giving a space saving over the original equipment of 4:1. Latest estimates predict an overall saving of cost of around 50%.

Three overall equipment codes have been allocated for combinations of units, as follows (NB. Each Coder or Decoder retains its own PSU):-

PA1/144 2 off each CD2L/41 Coders in a 6U rack

PA1/145 1 off each CD2L/41 Coder and CD3L/58 Decoder in a 6U rack

PA1/146 2 off each CD3L/58 Decoders in a 6U rack

Further information on the NICAM-3 Mk. II equipment is available from Mr. Nick Cutmore at Avenue House on extension 316.