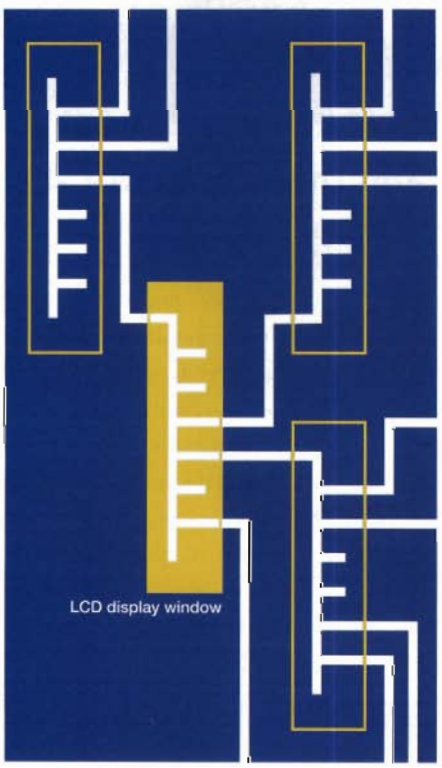
Quad's new bus

The new 77 remote control system is arguably the most advanced yet devised. Ivor Humphreys elaborates

Launched at Live '94 last September, the unassuming looking Quad 77 integrated amplifier is the first in a series of products intended to take the company forward into the next millennium. It also marks the beginning of a new approach to Quad system design, for although the amplifier itself, the forthcoming matching CD player and FM/AM RDS-equipped tuner are all completely defined in both form and function, the future will see new hi-fi and home entertainment technologies introduced, some of which are impossible even to predict let alone specify at this stage. In so far as is possible, Quad's new QUADLINK "data bus" system, which makes its début in the 77 amplifier, will cater for any such introductions. With QUADLINK the set-up can be as simple or complex as desired. It can include audio-visual and multi-room units and all signalling and control will be under the aegis of the 'higher-educated' 77 infra-red remote control.

At a first glance, the 77 integrated amplifier, which is reviewed on page 142, appears to offer little that is so very different from the norm; indeed, with its bare-bones complement of just two line-level inputs, a tape loop, volume and balance controls it seems to provide rather short shrift, especially from a company which has traditionally supplied a comprehensive array of inputs and signal shaping controls. The 77 has no tone controls or filters and it doesn't cater for the LP phono cartridge. Only the 15-pin 'D-socket' on its rear panel hints at anything beyond these minimalist leanings. This is the QUADLINK bus and it carries balanced analogue and digital audio signals, system protocol and commands, and a 30V AC supply for low powered units, enabling virtually any number of 77 units to be connected together in a simple fashion, in many cases with just one mains lead going to the wall socket. The amplifier's conventional line-level and tape circuits augment the bus, and remain available for the connection of standard, non-77 series components. The entire system automatically configures itself at power-on, with every adjustable parameter under microprocessor control and a complete 'map' of the system architecture available in the display panel of the 77 infra-red remote control.



Schematic representation of the Quad 77 remote control panel display window. The 'lit' area indicates the currently displayed 'menu' page; the outlined areas indicate next or previous pages. At any given moment there is a maximum of six new choices. Stubs contained within a window represent immediate commands (or simply a particular display with no button function); branches that extend beyond it represent commands which cause the window to move to the next page, where a further six choices may obtain.

Quad claim that the 77 remote control system is the most advanced in the world. Whereas most handsets simply issue commands, this one uses a two-way link, with the handset instructing and interrogating the main 77 units. Every adjustable parameter of every unit connected to the QUADLINK bus can be addressed from the handset, and with all the settings capable of being shown on its liquid crystal display (LCD) there's no need to strain across the room to read the displays on the main units themselves.

Form not function

With such a plethora of detail available, one might expect the handset to be of bewildering complexity, especially when controlling an elaborate set-up of component units. The 'layering' of the system is such, though, that for the user it is all remarkably simple. A concept of "Immediate" and "Mode" controls is employed. The handset has just ten push-buttons plus a rotary control and the LCD. Four of the buttons are fixed-function ('hard') controls, three of which are labelled Standby, Source and Page (the fourth, which has just a symbol, moves between stacks of Pages). The remaining six are context-related ('soft'), with their functions determined by the unit under control at any given moment. The central display panel offers a 'menu' page which shows the current function of each button plus its label and other relevant information. According to the particular menu, the buttons will either initiate immediate commands (select input, allow volume adjustment via the knob etc.) or cause a change of mode, leading to another page. Operationally it is straightforward and intuitive; technologically its realization is complex and highly original.

The two main difficulties facing the design team were the need to make the system 'future proof'—keeping it up-to-date as new products and technologies are introduced—and the need to keep it as thrifty as possible with regard to the drain on its internal rechargeable batteries, the latter being a significant problem in a unit which needs to *monitor* the behaviour of the system, not simply issue commands. Quad has devised a logic system based on a set of formalized rules, each of which is built from a dictionary of what it calls "primitive function descriptions" which are (and will be) understood by every QUADLINK product. At power-on, one unit (normally the 77 amplifier) assumes the role of "bus master" and builds a logic model, a sort-of family tree, of the entire system, creating product-specific pointers to all the slave units. This model is automatically updated as units are added or changed and can even be set to accommodate unusual layouts where, for example, two identical 77 CD players might be installed, without causing any conflicts in the control logic. Products yet to be invented will carry ROM-based software which automatically updates the system profile as soon as they are connected.

Remotely satisfactory

Aspects of the dynamic logic model also reside in the handset, a feature which is central to its various power-saving strategies. The electrical current required in maintaining its microprocessor and LCD display is minimal but to keep the infra-red receiver circuits constantly powered would drastically shorten battery life, so the microprocessor continually anticipates the state of the dynamic model, switching on its transceiver for a quick burst now and again to check that its assumptions are still correct. The handset's display is analogous to a movable window through which any part of the model can be viewed. Only the data required for any of the next possible moves needs actually to be resident in the handset. At any given moment there is a maximum

of six new choices, as shown in the diagram. Stubs contained within the window represent immediate commands (or simply a particular display with no button function); branches which extend beyond it represent the mode commands and cause the window to move to another area where a further six choices may obtain. Menus further along the model's family tree are uploaded only when the next press of a mode button could involve them.

A similar routine is used in playing Compact Discs. When a disc is loaded all CD players (whatever the make) read the disc's digital table of contents. This information tells the player all it needs to know, from the length of the disc and display of track timings to the location of the individual tracks on the disc. With the 77 player, however, this information is also posted to the handset. When play is initiated the handset charts the progress of the disc in real time quite independently of the player, again checking every so often to see if something has changed, perhaps through manual intervention at the player's fascia controls.

The power-saving strategies involve the use of a check code routine not unlike those used in computer modem transfers, where error-free transmission is confirmed by a check sum that follows each data 'packet'; if the sum fails to tally, the data is re-sent. With the Quad system the check sum *precedes* the data. If it agrees, the handset is still correct so terminates the connection and free-runs again until the next check code is due; if not it stays on-line and uploads new data. Command instructions are timed to occur just before the bus master's clock pulse, again so as to minimize the panel's on-time. The handset should run for about three months off its batteries in normal use and it is supplied with a recharging cradle/rest which will keep them topped up.

Attention to detail and superb realization are features that we have long associated with Quad. Novelty too is apparent but it has always been employed for legitimate purposes, the result of seeing this or that problem from a different perspective, never for its own sake. The extreme novelty behind the new 77 control system developed by Quad's technical director, Derek Jones, is a logical development of what in the 66 series already seemed comprehensive. It is an ingenious realization of the armchair listener's ideal wish-list: a comprehensive, simple-to-use remote control system, with every detail to hand on a local display, which will grow with the system and is able to look to the future with equanimity

Inside audio

Bose Auditioner

The result of a nine-year research project by Bose Corporation, Auditioner is an audio demonstration system which is claimed to enable acoustic consultants and architects to predict with remarkable accuracy the sonic characteristics of a 'space'— a studio, concert hall, railway station concourse, hotel lobby etc—before it is built, thus enabling adjustments to be made to a design before it is finalized. Based on a combination of advanced acoustic modelling, signal processing, digital processing and playback apparatus, the system comprises a desktop computer workstation which is fitted with a custom-designed audio microprocessor, and a proprietary audio playback system, the complete set-up fitting inside two suitcases for easy transport. Bose claims that this is the first such system to produce a sound that is almost identical to that which will be heard when the building is completed. So confident is the company that it guarantees that the final sound quality of any facility designed using the Auditioner system "will meet or exceed the quality heard when the design was accepted". Bose believes this to be the first time such a guarantee of sound quality performance has been offered.

Auditioner is the outcome of a project Bose began in 1985, when it began to develop a computer program for predicting sound system performance. Called "Modeler" this was claimed to be the first such program to take account of both the radiation characteristics of sound sources and the acoustic characteristics of the listening environment. Today the program is licensed to more than 350 sound system engineers and companies around the world.

First a model is assembled from architectural plans, with each room surface designated a material whose acoustic properties have been fully characterized. Sound sources are modelled from a database included in the program, each represented by its measured three-dimensional sound radiation characteristics. Once these have been 'placed' the operator can ask the program to predict a number of sound propagation characteristics, such as sound intensity throughout the audience area or the maximum sound pressure levels that can be expected at given locations. Local sound reflections are also predicted for any point in the room and with this and other data (manipulated with an algorithm proprietary to Bose) it is possible to predict how intelligible speech will be in various listener positions in the room. The program can iterate hundreds of times in a few minutes, providing far more accurate results than can be obtained with conventional and less comprehensive analytical tools.

In Auditioner this predictive tool is used to configure a programmable digital audio processor—an extremely complex filter using specialized circuits (completely beyond the capabilities of standard DSP components)—which modifies the signals from a standard music source (CD player or whatever) in much the same way that the room itself will with live music or speech. The output from this processor is fed to two near-field loudspeakers which provide the listener with a facsimile of the sound as it will experienced in the hall. A/B switching between models allows ready comparison of the results with different hall designs and furnishings.

Predicting the acoustics of a hall or 'space' is a notoriously inexact science, because there are so very many parameters involved. Often too the expensive of employing top-notch acoustic consultants (such as Artec, designers of Symphony Hall, Birmingham as well as a number of highly regarded halls in the USA) is impractical, resulting too often in poor, even chronic acoustic consequences. The Bose Auditioner is expected to help narrow the gap between what is intended and what actually obtains

Akio Morita

It was announced at the end of November that Akio Morita, co-founder, Chairman of the Board and Representative Director of Sony Corporation, has resigned his position as Chairman for health reasons. Mr Morita underwent surgery for a cerebral haemorrhage in November 1993 and although he has been making a gradual recovery he felt that the rate of improvement was not sufficient to allow him to resume his duties in good enough time. He continues as Honorary Chairman, however, and will offer his support to Sony's president, Representative Director and Chief Executive Officer, Norio Ohga. At the time of going to press the post of chairman had not been filled but it has been decided that the Corporation's co-founder and Honorary Chairman, Masaru Ibuka, is to be Chief Adviser.

Akio Morita was born in January 1921. He graduated from Osaka Imperial University in 1944 and two years later co-founded Tokyo Tsushin Kogyo KK (the Tokyo Telecommunications Engineering Corporation) with Masaru Ibuka. The company name was officially changed to Sony in 1958. In 1959 Morita became Vice President, in 1971 President and in 1976 Chairman and CEO. In 1989 he became Chairman of the Board and is now Founder and Honorary Chairman. Morita has held many other posts outside Sony, including positions in Japanese business management and with various technical bodies. His achievements have been recognized by awards bestowed by learned bodies and governments world-wide. Among them are his being made Honorary Member of the Institute of Electrical and Electronics Engineers (IEEE) and, in 1993, Honorary Knight Commander of the Most Excellent Order of the British Empire by HM the Queen of England