

Audio-video Electronics

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Australian synthesiser cracks the world market

In a complete reversal of normal Japanese-Australian audio trading, the giant Matsushita Electric Company (National Panasonic and Technics) has signed a marketing agreement involving an Australian-designed and manufactured music synthesiser system — the CMI or Computer Musical Instrument.

by NEVILLE WILLIAMS

The CMI is manufactured by Fairlight Instruments Pty Ltd, with headquarters at 15 Boundary St, Rushcutters Bay, NSW. It is already being marketed in Australia, USA, Germany, France and England, and the contract signed with Matsushita, said to be worth an initial \$250,000, will put the instrument officially into Japan. In the longer term, it could mean that the CMI will be produced in that country by Matsushita, under licence to Fairlight Instruments.

While, to some readers, the name Fairlight and the initials CMI will be unfamiliar, both are getting to be very well known indeed in world musical circles.

A CMI user list of performers/composers/groups in the UK names seven prominent entertainers including people like John Paul Jones, Peter Gabriel and Mike Oldfield, and groups like "Led Zeppelin", "Pink Floyd" and "Genesis". There is Jean Michel Jarr in France, "Kraftwerk" and six other

user/composers in Germany, Austria and Switzerland, "Fleetwood Mac", "Bee Gee's" and others in USA and, of course, further user/composers in Australia.

A string of studios around the world are included together with university music departments in UK, Canada, USA and Australia. Even the famous Dr Robert Moog, probably the best known name in the world of music synthesisers, has his own CMI.

While the Fairlight CMI is a musical instrument as modern as they come, its roots actually go back some 20 years to a period when there was a lot of local interest in the production of electronic musical instruments. At a do-it-yourself level, we were preoccupied with electronic organs.

A regular visitor to our office was a young sales engineer from the then Ducon organisation, by the name of Anthony Furse. Tony, too, was interested in electronic music but he spurned our concentration on oscillators, filters and what passed for organ voices. He dreamed only of "instruments" that could make musical sounds to order — unique musical sounds, with variable pitch, variable harmonic content, variable attack, variable decay, variable everything . . .

What one would do with such sounds he wasn't sure. Nor were we, at the time!

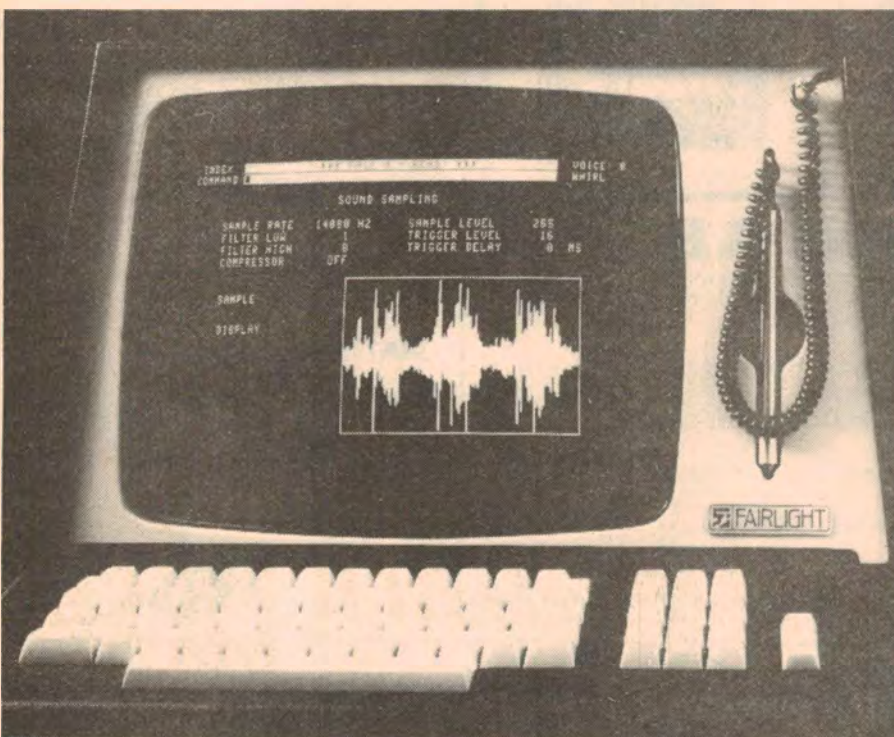
PERSERVERED

But Tony carried right on, giving us little lectures about diode matrixes and such like and his readiness to use as many transistors as might be necessary to achieve the desired end result.

Then he transferred to Fairchild Australia, as it then was and, with access to integrated circuits, his enthusiasm knew no bounds.

Out of all this "midnight oil" research, and with the co-operation of John Crocker, came two hybrid analog/digital synthesisers, designated officially as "Qasar I" and "Qasar II".

An Arts Council Grant helped in 1973 and the ambitious "Qasar M-1" fol-



A close-up view of the VDU (Video Display Unit) screen showing a pattern identified with Page 8 — the sampling of external sound. Note the light pen clipped to the right hand side of the panel. The keyboard in the foreground is a normal alphanumeric computer style unit but the user program is as suggestive as possible of musical notation.

lowed, developed in conjunction with the late Don Banks, a senior lecturer at the Canberra School of Music, and a leading exponent of electronic music.

In 1975, Fairlight became associated with the project and the present CMI — Computer Musical Instrument — is a streamlined, rationalised and commercial version of the development M-8, the latter still having an honoured place in Anthony Furse's home.

But the push and worldwide initiative behind the CMI, nowadays, is Fairlight all the way.

While the CMI is correctly described as a Computer Musical Instrument, it is not a single rigid assembly but a number of free-standing modules interconnected with cables.

CENTRAL COMPUTER

At the heart of the instrument is the central computer unit — a large rectangular box, as shown, containing the logic circuitry and memory banks on plug-in PC boards, plus two floppy-disk magnetic data stores. Fairlight state that "the CMI uses four Motorola microprocessors in its architecture."

Also provided are an array of inter-connection and input/output sockets, plus audio-in and audio-out facilities and the necessary analog-digital-analog converters. Audio-in can be from microphone or line, with audio outputs available to headphones, loudspeaker (20W, 80) or multiple lines.

In a studio or sound laboratory situation, connection would normally be made to other on-the-spot audio installations.

One key peripheral component is a VDU — Video Display Unit — giving a "green screen" monochrome image with very high resolution. The VDU has a variety of roles; amongst other things, it identifies and gives the user access to the programs and other facilities stored on the floppy disks and in the computer's memory.

For example, when the unit is first switched on, the graphics on the screen will indicate the memory loading routines and, this done, display the first information "page" — Page 1, Index. This may remind the user that Page 2 lists the synthesised waveforms available on a library floppy disk in the right-hand disk slot.

Or the index may direct the user to Page 3, relating to the use of one or more peripheral music keyboards. Pages 4 and 5 have to do with synthesis of waveforms by the addition of harmonics, while Page 7 allows waveforms displayed on the VDU screen to be directly modified by means of an associated light pen.

Still other pages relate to facilities for



Mr Kyoshi Matsushita (left) with Fairlight's Managing Director Kim Rylie at the Fairlight factory in Sydney. Mr Matsushita said: "We look forward to a long and enjoyable relationship with Fairlight".

manipulating attack, decay, level, vibrato, glissando, etc, or the sampling of real-life sounds via microphone or analog recording. Or, yet again, the composition of music by typing musical notes and instructions directly on a computer style keyboard, using the video screen to display the user's input.

The synthesis of sounds by the addition of harmonics is a way-out extension of the idea behind the original Hammond organs. By a system of slide potentiometers, the organist, in these days, could synthesise tones by adding to the 8ft fundamental selected proportions of the 16ft sub-harmonic and of



From the rear: the central computer unit including audio circuitry and floppy discs; the VDU with light pen; the computer style keyboard; the 6-octave music keyboard. The small numeric key pad at the front-right can be used as a tone selector — in the manner of organ stops — for stage performances.

the lower order upper harmonics.

The CMI goes far beyond this by making available on call a string of up to 32 harmonics.

And, in this modern day and age, they are not called up by a similar array of slide potentiometers. The amplitude of the harmonics can be displayed as a bar graph on the VDU screen, rather like the display on a hifi graphic equaliser. Control of the amplitude of any given harmonic is achieved optoelectronically by holding a light pen against the particular bar on the screen!

Alternatively, the actual waveform can be viewed, enabling the user to study the connection between harmonic structure, wave envelope shape and the sound, as heard through phones or loudspeaker. (We understand that the CMI does not have provision to manipulate the relative phase of harmonics, on the grounds that it is

tonally not very significant).

What the CMI does provide is the facility for the observer to modify the shape of a waveform displayed on the screen, or even to draw in a waveshape, using the light pen.

The sampling of everyday sounds is also an extension of an electronic organ technique — in this case used in Allen digital organs. Allen's technique is to sample the waveform from a particularly meritorious or interesting pipe, record the envelope shape in digital form and preserve it on a plug-in card or in an internal ROM memory chip. The waveform is then "clocked out" at frequencies determined by the playing keys, so that the one basic waveform becomes the foundational tone for a whole rank of electronically simulated pipes.

Because the CMI may be involved in a whole array of everyday non-

repetitive sounds, it cannot manage with a single sample waveform. Instead, it uses its extensive memory resources to record a whole train of waves relating to a particular sound, which therefore contain information about progressive changes in amplitude and harmonic structure.

Recorded in digital form, such data can be modified as necessary and clocked out at any desired rate to simulate different musical pitches. So while the CMI could simulate an organ, if it had to, its resources are more likely to be directed towards the creation of sounds which are not readily achievable by other means.

So, if someone wants to build a melody from the crash of breaking glass, or the barking of a dog, it would be logical to turn to the CMI.

As a decided bonus, the CMI can readily be triggered by external signals, making it possible to achieve superb synchronisation in film or tape sound tracks, as for TV commercials.

As mentioned earlier, the CMI can be used in conjunction with a normal 72-note touch-sensitive keyboard, making it immediately accessible to keyboard musicians. Indeed, with the central unit out of sight and with no VDU connected, it can be used in a group situation, with plug-in expression controls, but with a range of totally novel pre-set voices.

In this role, the keyboard is polyphonic to a limit of eight keys but the capability can be dispersed as desired to as many as eight different keyboards or other player-instrument operating in monophonic mode.

While this offers tremendous versatility, it does limit the instrument to the capability of the players. And it would also limit the achievement of a composer who lacked keyboard fluency.

To meet this situation, the CMI has a sequencer which can assemble and play in real time eight-note polyphonic melodies which have been entered into the memory, however tediously, by an ordinary typewriter/computer style keyboard.

To use this facility, the operator obviously needs to know much about musical scoring and notation, but little about programming, in the computer sense.

Following a prepared routine, the composer enters on line (say) 0010 information about key signatures, rhythm beat rate and the octave in which the music is pitched.

Then, on lines 0020, 0030, 0040, etc, he/she simply types in the notes

CRAIG Car Stereo



One of America's top-selling car stereo equipment ranges is now available in Australia through a national network of specialist car sound dealers. A Sydney company, which specialises in car sound equipment — Sonic International — has the Australian distribution rights for the Craig "Road Rated" car stereo, which has an established reputation for quality and performance. Mr Martin J. McMurray, General Manager of Sonic International, said the Craig Corporation "is the third largest seller in the American car sound industry".

Initially, the Craig range in Australia will comprise seven radio/cassette units, nine alternative loudspeaker selections and a choice of power amplifiers up to 30W per channel. A "Road Rated" cassette player, the Craig T619 radio/cassette unit features Dolby NR, auto reverse, locking fast forward and rewind, electronic track selection, and an in-built power output of 12 watts per channel. The "flagship" model T693 provides electronic preset station selection for both AM and FM. For further information: Mr M. J. McMurray, Sonic International, 4 Clarendon St, Artarmon, NSW 2064. Phone (02) 439 8900.

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with a few simple intervening signs such as + to indicate one octave up, R to signify a rest, = to indicate double speed, etc.

A stereo demonstration tape supplied to us by Fairlight contained a variety of sound that was nothing short of startling, both in its variety and in the sheer tonal complexity achieved, when raised to orchestral proportions by multi-tracking. The cassette, "Just Fairlight Number Three", contains snatches from 25 tracks, all CMI-synthesised sound, patched and faded into an 18-minute sound documentary — with and without superimposed voice.

At the end of the exercise, the CMI can produce a melody that has never before been played or which may, indeed, be unplayable in terms of normal fingering. And, if something needs to be modified, it is no more difficult than modifying any other computer program.

With the kind of versatility indicated even by these rather superficial observations, there is good reason to believe that the CMI has turned the player/instrument upside down.

With even the most complicated electronic organs and the early generations of synthesiser, musicians could ultimately explore and exhaust their total resources.

With the CMI, with its extensive hardware and its receptiveness to newly created ideas and software, there seems to be no end to the concepts that remain to be investigated.

Anthony Furse put it this way:

"The early synthesisers were interesting in their day, but their performance was technology limited. Working with oscillators, shapers, gates and so on, we could not keep ahead of the musicians. Now the boot is on the other foot."

And from Dr Robert Moog comes this tribute:

"It's spectacular when you get into this machine.

"I'm not going overboard . . . This is the feeling I've had in the six months since I started using the Fairlight.

"There really is no limit; nothing ever converges in it. You begin to work on something and out of that comes three or four other ideas.

"What it does is just too useful musically and too general and too versatile to be limiting in any significant way."

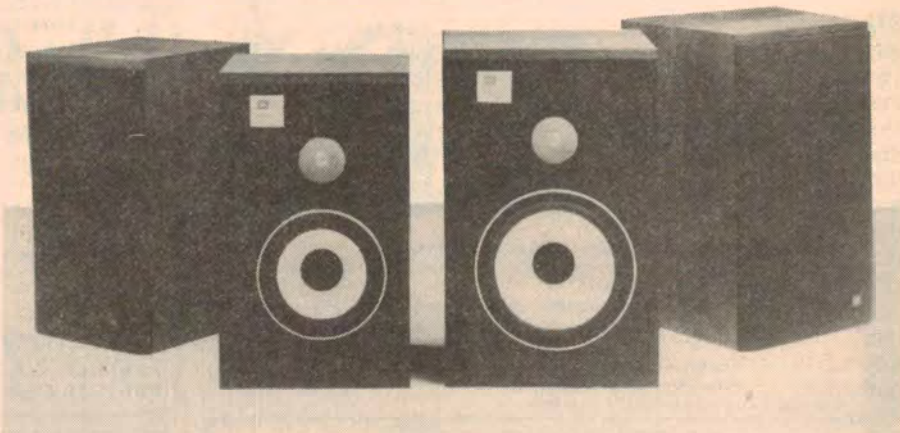
Perhaps that's why Matsushita, who have enormous research facilities of their own, decided to sign a marketing agreement with a small but dedicated group "down under".

For further details: Fairlight Instruments Pty Ltd, 15 Boundary St, Rushcutter's Bay, NSW 2011. Phone (02) 331 6333.

In Brief

HOME MUSIC TAPING is a multi-billion dollar industry in the United States, according to a recent survey made by Warner Communications Inc. In fact, they quote the commercial value of the

Bookshelf loudspeakers from JBL



James B. Lansing Sound Inc have introduced two new high performance bookshelf loudspeaker systems which, they claim, share much of the technology from their larger JBL domestic and professional models. Designated as types L46 and L56, they can be used with amplifiers delivering between 10W (min) and 100W (max) per channel. The L46 measures 527(H) x 317(W) x 267(D) mm and has an SPL rating of about 88dB (1W, 1m). The L56 is slightly larger and offers somewhat extended bass response. For further details, contact Harman Australia Pty Ltd, Unit A2, 6-8 Byfield St, North Ryde, NSW 2113. Phone (02) 887 3233.