ART TimeCode

- Provides comprehensive multimedia synchronisation

- Supports professional standards, e.g. SMPTE, MTC

- Frame rates between 1 and 1800fps supported

- Provides uncommitted interrupt scheduling
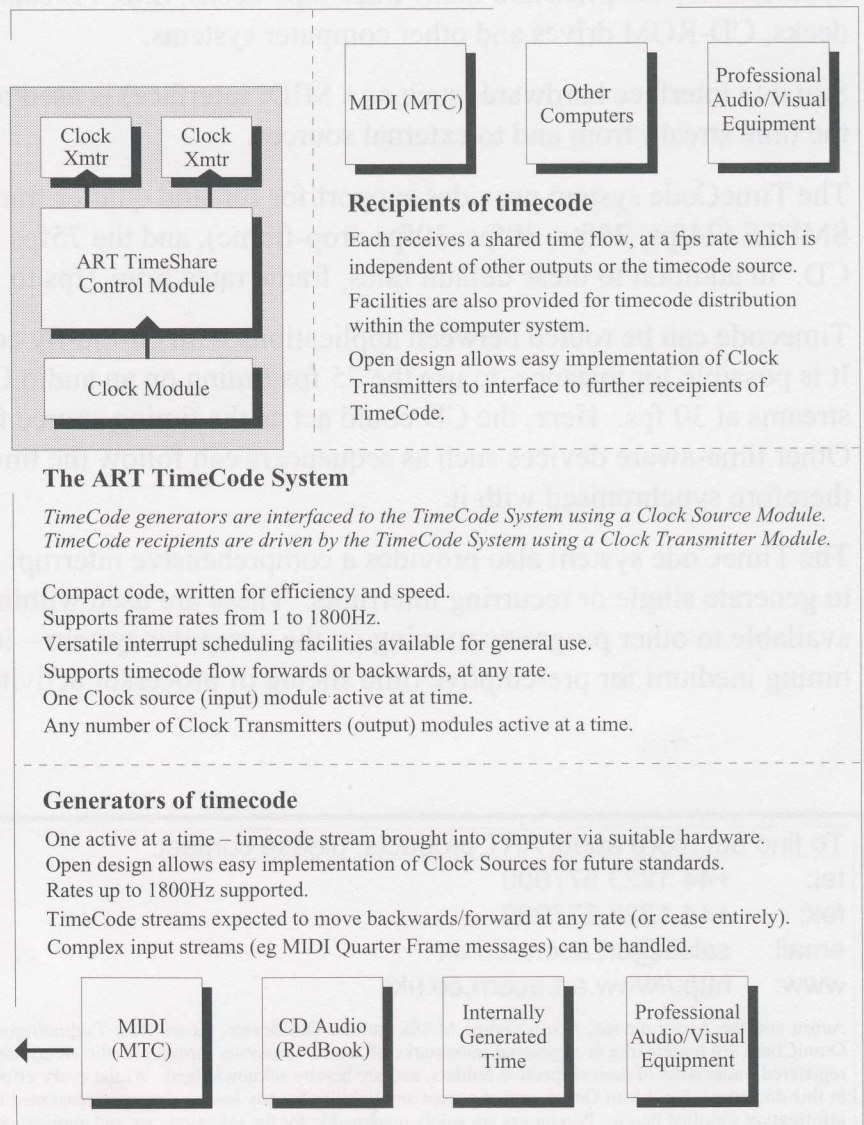
- Full documentation and Developer's Kit available

		Other Computers	Professional Audio/Visual Equipment
MIDI (MTC)			

Clock Xmtr	Clock Xmtr
ART TimeShare Control Module	
Clock Module	

Recipients of timecode

Each receives a shared time flow, at a fps rate which is independent of other outputs or the timecode source.

Facilities are also provided for timecode distribution within the computer system.

Open design allows easy implementation of Clock Transmitters to interface to further recipients of TimeCode.

The ART TimeCode System

TimeCode generators are interfaced to the TimeCode System using a Clock Source Module.
TimeCode recipients are driven by the TimeCode System using a Clock Transmitter Module.

Compact code, written for efficiency and speed.
Supports frame rates from 1 to 1800Hz.
Versatile interrupt scheduling facilities available for general use.
Supports timecode flow forwards or backwards, at any rate.
One Clock source (input) module active at at time.
Any number of Clock Transmitters (output) modules active at a time.

Generators of timecode

One active at a time – timecode stream brought into computer via suitable hardware.
Open design allows easy implementation of Clock Sources for future standards.
Rates up to 1800Hz supported.
TimeCode streams expected to move backwards/forward at any rate (or cease entirely).
Complex input streams (eg MIDI Quarter Frame messages) can be handled.

MIDI (MTC)	CD Audio (RedBook)	Internally Generated Time	Professional Audio/Visual Equipment

Fig. 1 ART TimeCode block diagram

ART TimeCode

Multimedia hardware devices and software applications which can store, manipulate and present time-based data such as animations, video, audio, MIDI and presentation timelines can be synchronised by the ART TimeCode subsystem using (video and audio) industry standard timecodes.

This provides the application developer and end user with a seamless, easy to use interface which eases the development of broadband multimedia presentations. It is no longer necessary to bind all the resources involved in a presentation into one huge monolithic construct. Resources can remain as separate reusable entities whilst being linked by their shared awareness of the flow of timecode.

By using this software an application program or a hardware device attached to the computer system can receive, generate or propagate a high resolution time stream. The direction and rate at which time flows across the timestream can be controlled by the application or hardware device, and the timestream may be routed from the application to other hardware or software clients.

A computer system now becomes capable of synchronising with or controlling a range of other devices which also have an awareness of time. Examples of such devices include MIDI sequencers, synthesizers, samplers and multi-track tape decks, SMPTE-capable video cameras and videotape decks, CD-ROM drives and other computer systems.

Suitable interface hardware (such as a MIDI interface) is used to allow reception and transmission of the time stream from and to external sources.

The TimeCode system provides support for full and quarter frame MTC, four standard variants of SMPTE (24fps, 25fps, 30fps, 30fps drop-frame), and the 75fps frame addressing of Red Book audio CD. In addition to these default rates, frame rates from 1 fps to 1800fps are supported.

Timecode can be routed between applications with on-the-fly conversion of differing frame rates. It is possible for instance, to use the 75 fps timing on an audio CD to produce SMPTE and MTC streams at 30 fps. Here, the CD could act as the timing source for the SMPTE and MIDI systems. Other time-aware devices such as sequencers can follow the time stream from the CD and are therefore synchronised with it.

The TimeCode system also provides a comprehensive interrupt scheduling facility which can be used to generate single or recurring interrupts. These are used within the TimeCode system and are also available to other programs running on the computer system — it could, for instance, be used as the timing medium for pre-emptive time slicing of processor activity.