

# MARS

## Musical Audio Research Station

The *Musical Audio Research Station* (MARS) is a programmable specialized digital machine for real time audio applications which has been entirely developed by the Italian Bontempi-Farfisa research institute IRIS.

MARS has been conceived as an integrated environment in which a graphical user interface, an embedded real-time operating system and two IRIS digital audio processors are linked together to create a flexible and an interactive workstation for audio research, musical production and computer music pedagogy.

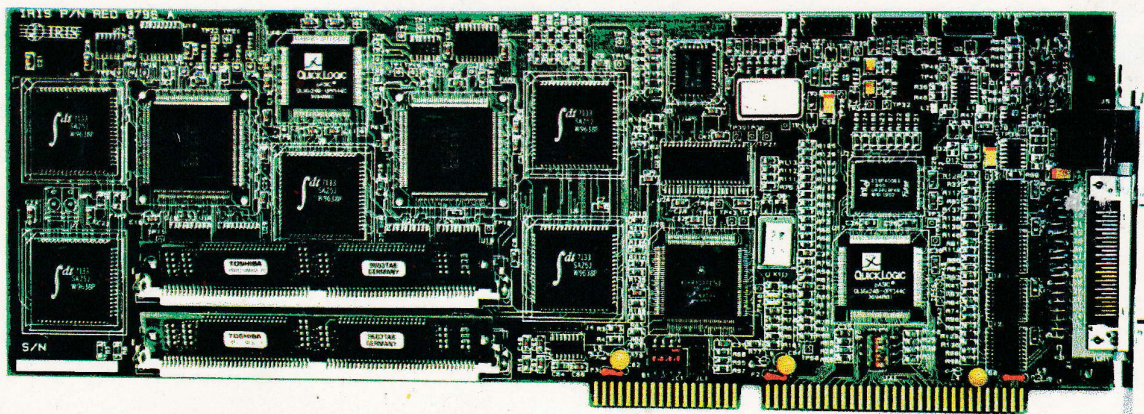
The minimum MARS hardware requires the sound generation board with two powerful and fully programmable IRIS DSPs, 1 Motorola 68302 microcontroller, 8 megabytes of sample RAM and a low-cost audio unit with 16-bit stereo oversampled A/D and 16-bit oversampled quadriphonic D/A.

Hardware expansion allows to plug up to 8 sound generation boards together into the ISA bus extensions of the host PC. On each board, sample RAM may be expanded up to 64 megabytes. Furthermore, IRIS provides a configurable professional audio unit which allows up to 8 analog in and 8 analog out, and 8 AES-EBU in and 8 AES-EBU out or another digital audio interface.

A proprietary development system, the *IRIS Audio Resource Editing System* (ARES) running on Windows 3.x and Windows 95, provides musicians an easy and interactive user interface for graphically programming audio objects and setting MIDI performance environments. It emphasizes symbolic

representations of data in order to offer a user interface which is independent of hardware architecture and which makes musical applications portable. It provides a library of about 200 modules which covers low and high level needs for DSP applications such as arithmetic and logical operations, many types of oscillators and complex sound generators, physical modeling building blocks, and audio effects.

MARS is a development system for every type of real time digital signal processing technique such as analysis, synthesis, every type of filters, and sound effects. MARS is also a development system for sounds and MIDI environment that allows musicians to use it as a musical instrument, once configured, such as any MIDI equipment of a musical studio. MARS is dedicated to people who have reached the limits of the digital musical instruments available right now on the market and to people who like a programmable and flexible sound machine with real time performance for creative sound design, DSP and audio research, music production and performance, and any other kind of applications of sound on computers. MARS has been used in a wide range of research, musical and teaching contexts such as universities, music conservatories, computer music research centers, music studios, interactive museums, and in the musical instruments and audio industry.





MARS DSP's CHARACTERISTICS	
Pipelined architecture, Fully programmable 2's complement fixed point arithmetic on 24 bit 16 x 16 bit multiplier, 24 x 24 bit Arithmetic and Logic Unit 768 x 24 bit words of internal data memory, 512 x 64 bit words of external program memory 32 kHz up to 44.1 kHz of Sampling Rate	
EXAMPLES OF SOME DSP PERFORMANCES (Algorithms realized with optimized assembly language on 1 DSP)	
64 second order filters 64 multi-segment envelope generators (always available) 128 fully controllable simple table-lookup oscillators with 8 selectable internal tables 64 fully controllable interpolated oscillators with external table access 64 delay lines with maximum delay of about 6 minutes at 44.1 kHz 1 FFT on 2048 points	
MARS MEMORY CARDS CONFIGURATION (16 bits word)	
2x4 up to 2x32 megabytes of DRAM	72 pins, high-density SIMM modules
MARS AUDIO UNITS	
<b>Low-cost Unit</b> <ul style="list-style-type: none"> <li>• 2 mono input lines</li> <li>• 4 mono output lines</li> <li>• 1 minijack stereo headphone output</li> </ul>	16 bit oversampled A/D and D/A converters with low noise and distortion > 85 dB S/(N+D) and anti-alias and output smoothing filters
<b>Professional Unit</b> <ul style="list-style-type: none"> <li>• 8 mono XLR balanced input lines</li> <li>• 8 mono XLR balanced output lines</li> <li>• 4 stereo XLR AES-EBU inputs</li> <li>• 4 stereo XLR AES-EBU outputs</li> </ul>	16 bit, 64 x oversampling A/D converters with low noise distortion > 90 dB S/(N+D), linear phase digital anti-alias filter  18 bit, 8 x oversampling D/A converters with low noise and distortion > 93 dB S/(N+D), on-chip post analog lowpass filter  AES-EBU with asynchronous sample rate converter
MARS SOFTWARE PACKAGE	
RT20M	Embedded Real-time Operating System
ARES for Windows 3.x and Windows 95	Interactive Graphical Development Environment
OTHER SPECIFICATIONS	
Sound generation board dimension	Full size ISA card standard IBM
Audio unit dimension	2U Standard Rack Module
Audio unit power requirements	100-240 v AC, 50-60 Hz

# **IRIS s.r.l.**

Parco La Selva, 151  
 I-03018 Paliano (FR) ITALY  
 Tel. +39 (775) 533441  
 Fax. +39 (775) 533343  
 email mc2842@mcLink.it

WEB <http://AIML.dist.unige.it/IRIS/ARES1.html>

