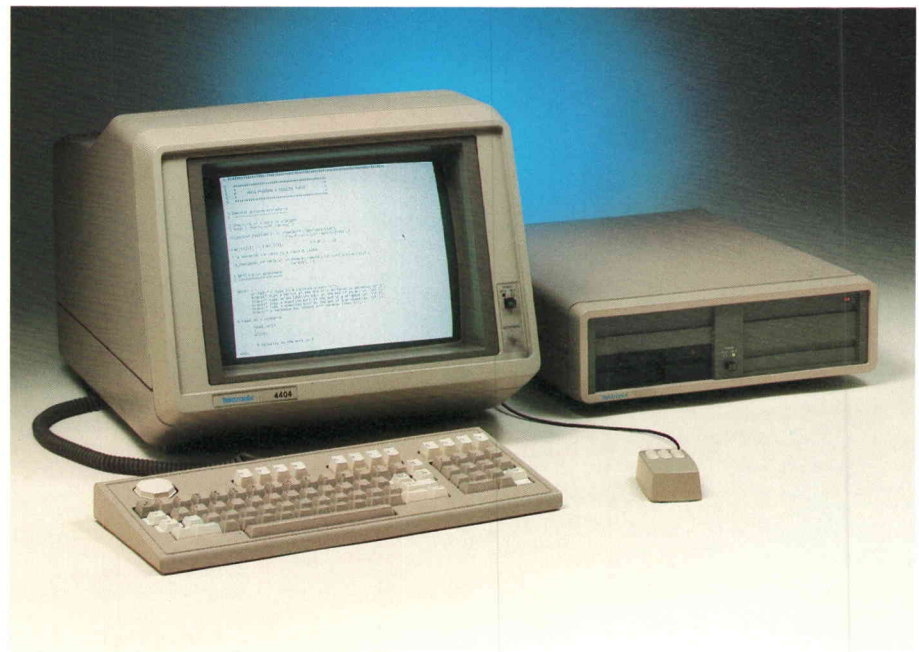
A non-procedural programmer-friendly language for Artificial Intelligence research and development.

MPROLOG™ PROGRAMMING LANGUAGE



- **Configured for the Tektronix 4404 Artificial Intelligence System**
- **Supported with an interactive development environment for maximum programmer productivity and convenience**
- **Modular development capability reduces complexity of large AI programs**

MPROLOG—A Fifth Generation Language

MPROLOG, as implemented on the 4404 Artificial Intelligence System, is a unique language that allows programmers to solve problems by specifying what answers are needed rather than describing a detailed solution procedure. MPROLOG is non-procedural, based entirely on logical relationships or rules, among an assortment of facts. This allows programmers to concentrate on the problem/solution without the confusion of computer-constrained procedures.

A non-procedural language for rapid AI development

MPROLOG is an ideal AI language because it operates on the principle of "controlled deduction." The programmer creates a network of facts and rules that describe the known relationships between the elements of a problem. Once the logical network is defined, MPROLOG has the ability to make logical inferences from the relationships when queried by the programmer. MPROLOG can also explain how it arrived at a conclusion, by tracing its search and deduction strategy for the programmer on request. These characteristics make MPROLOG ideal for many AI applications including expert systems, natural language processing, data-base query languages and automatic programming systems.

An environment for productivity

MPROLOG is a full language implementation for the 4404 Artificial Intelligence System that also adds a complete development environment for enhanced programmer productivity. The MPROLOG Program Development Support System (PDSS) is an integrated system with interactive editing and debugging tools. The MPROLOG interpreter is accessible from PDSS so that predicate definitions and programs can be tested immediately. Operational MPROLOG program modules can be translated to binary format to yield more compact and efficient executable programs.

An editor that speaks MPROLOG

PDSS automatically provides a skeleton for MPROLOG programs which the programmer completes by entering the necessary predicate definitions. MPROLOG's line-oriented editors allow the programmer to modify individual statements within a predicate definition. Other PDSS commands perform editing operations at the program module and predicate definition levels. Many of the PDSS commands may be used with "selectors" to indicate a particular module, definition or statement. Operations are selectively performed at the appropriate level of detail. This scope control enables the programmer to make changes quickly throughout a program module or to concentrate on a small program segment.

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Modularity to reduce complexity

To help manage large, complex AI programs, MPROLOG modules can be developed individually and then consolidated to create a single application program. The modularity also allows program libraries to be developed so that common functions can be reused to save programming time and improve reliability. Module interface declarations allow the programmer to control the scope of interactions between modules—to decide which identifiers and predicate names are visible outside a module and which are local only.

Flexibility and convenience in program preparation

Besides operating in the interactive program development mode, MPROLOG programs may be translated into more efficient executable modules. A pretranslator performs syntactical analysis, semantic analysis, and optimization on the source text, converting it into an intermediate binary format that can be linked with other modules by the consolidator. The programmer simply indicates all modules to be included in the final program. Consolidated modules are then executed as a single program by the MPROLOG interpreter.

An effective testing environment

Using PDSS, the programmer can interactively edit and execute MPROLOG programs from the same workspace. The programmer gets immediate feedback on the operation of program modules or predicate definitions. Integrated trace and debugging facilities give extensive information about program execution, the search process, and the state of variables. A filtering feature enables the programmer to set a scope for the trace, limiting the amount of information returned by the debug system. This allows the programmer to focus on a specific area without being overwhelmed by unwanted data. Break facilities, including multiple levels of PDSS, are also available for debugging MPROLOG programs. For example, when a program is interrupted by an error, the programmer could start a new level of PDSS, correct the error, then return to the previous level and resume execution.

An extensive set of built-in predicates

MPROLOG provides over 250 built-in predicates to perform commonly-used functions for the programmer. These are accessible directly in MPROLOG source code and include the following categories:

Predicate	Usage
arithmetic	+−/*, exponentiation, bitwise manipulation, modulo, absolute value
string handling	concatenate, decompose and match substrings, remove blanks, numerical conversions
operator handling	add, delete operators or inquire about operator attributes
term handling	decompose into a list, unify objects, determine predicate name of an object
module handling	activate and deactivate modules, load modules, execute a goal
database handling	erase predicate, add and delete statements, test predicate to see if it belongs to a definition, rename a definition
checking	test if an argument is a digit, identifier, number, letter, string or variable
exception handling	propagate errors to an outer level, detect errors by type or by region, set an error code
symbolic variables	convert string to variable, check instantiation, class conversions
control	specify choices that need not be considered during backtracking, create a list of ancestor goals, execute an object
input/ output	specify current I/O channel, open and close files, test for end of file
DEC-10	general use, internal database, definite clause compatibility grammars, and program development

Performance for complex problems

MPROLOG makes complex problems easier to solve and reduces program development time. The inherent efficiency of MPROLOG is enhanced by the power of the 4404 hardware. The 4404 MPROLOG system is an ideal vehicle for both software development and end-user AI applications.
PROLOG is one of the acknowledged languages in artificial intelligence technology. Now, Tektronix adds the programmer productivity and application development tools needed to move AI into the marketplace.

Ordering Information

4404 Artificial Intelligence System.
- 4400P31 PROLOG Programming Language
  - Opt. 02 5¼" Floppy Media
- 4400P32 EMACS Editor
  - Opt. 02 5¼" Floppy Media

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