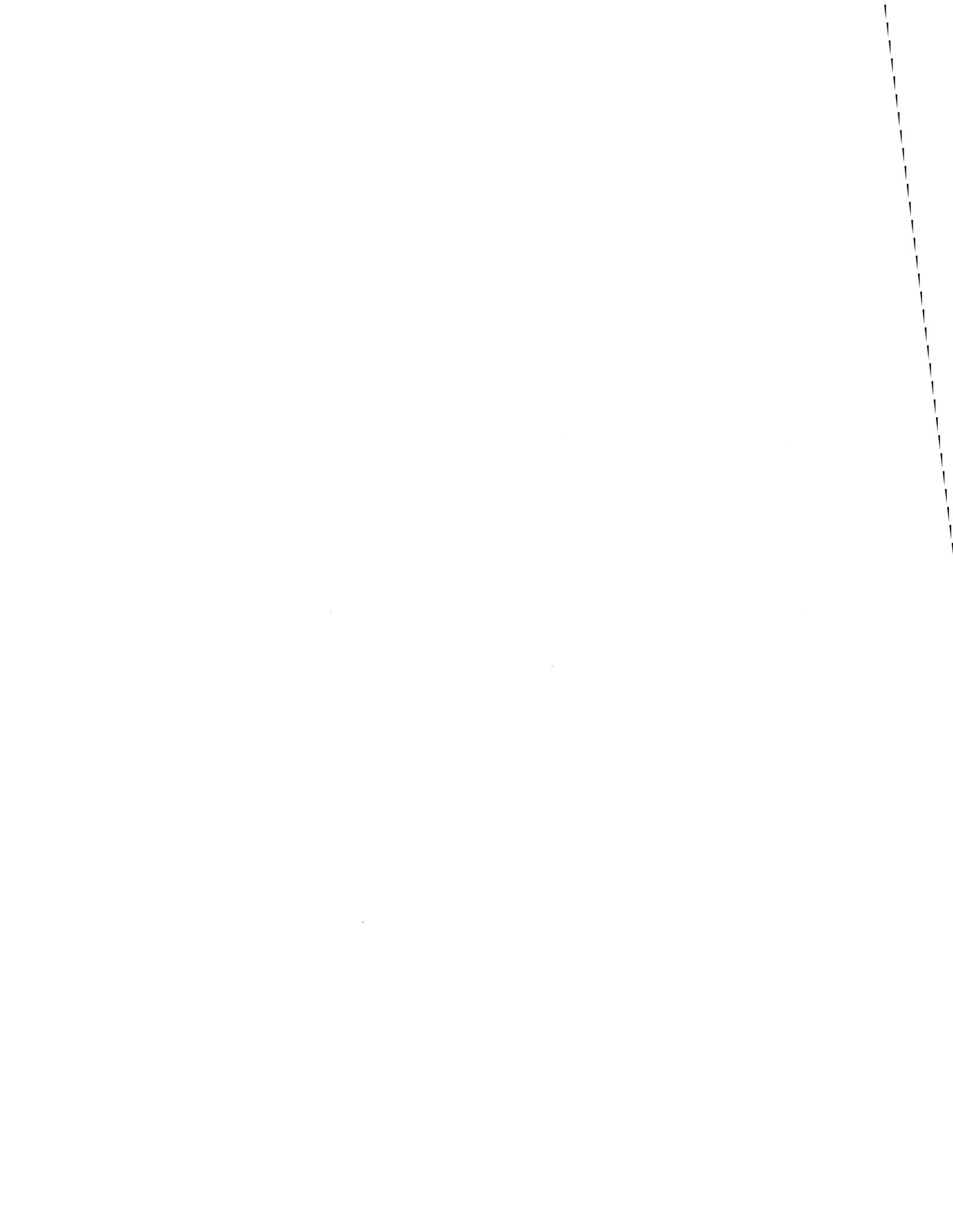


4400 FAMILY
ARTIFICIAL INTELLIGENCE SYSTEMS

SOFTWARE CATALOG



AIM for Success



**Tektronix 4400 Series
Artificial Intelligence
Software Catalog**

August, 1985

MANUAL REVISION STATUS

PRODUCT: AIM 4400 FAMILY SOFTWARE CATALOG

REV DATE	DESCRIPTION
SEP 1985	Original Issue

INTRODUCTION

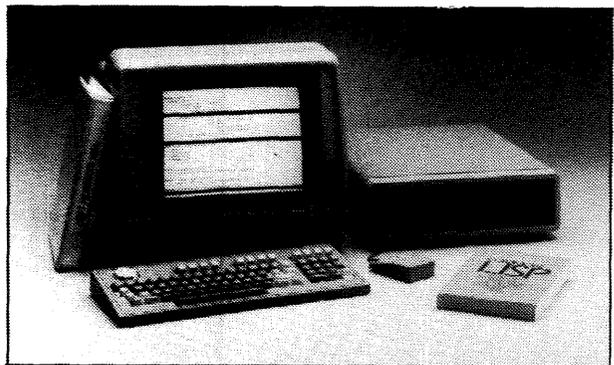
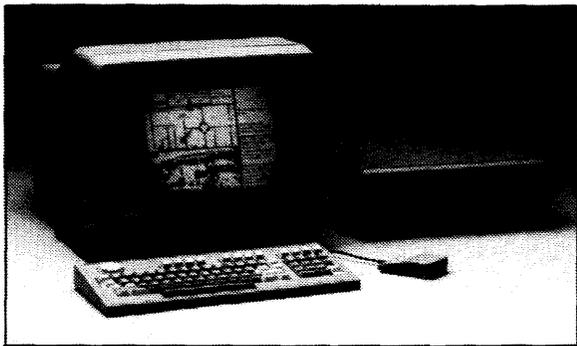
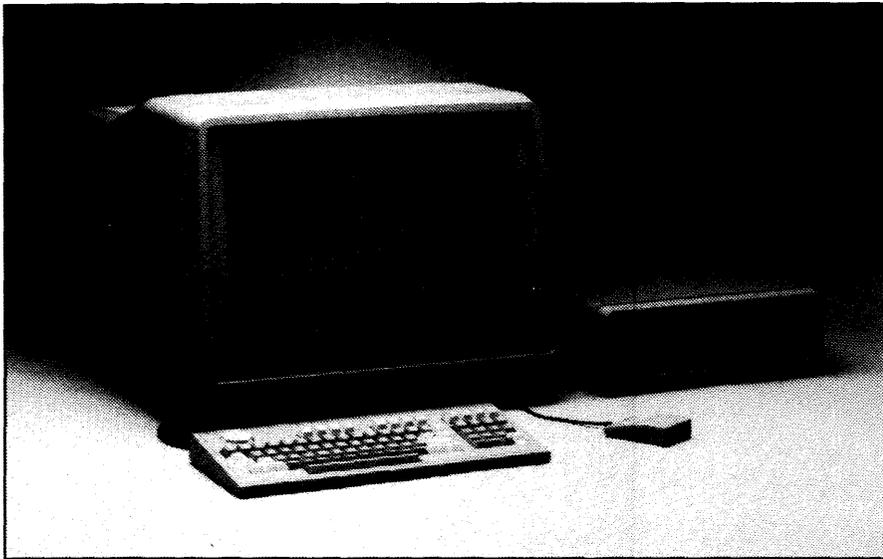
The 4404 Series AI Software Catalog provides information regarding software that is available for the 4400 Series of Artificial Intelligence Systems. This catalog contains product offerings of three types:

1. Software offered and fully supported by Tektronix
2. Software offered but unsupported by Tektronix
3. Software offered and supported by Third Party Software Vendors

Generally, all software contained in this catalog is immediately available for the 4400 Series. Exceptions to this are noted in the description of the software offering.

All Third Party Software can be acquired directly from the company contacts provided in this catalog. Descriptive information on referral products has been approved by the vendors. Tektronix has not qualified or reviewed the claims made about product features or function. We hope the data provided in this catalog will allow you to make an initial assessment which can be followed by product evaluations with the appropriate vendor.

Tektronix will publish quarterly bulletins to keep this catalog current. As we continue to add new products to our software program, we ask for your feedback on the kinds of packages you need. A customer survey form is included for you to fill out to help us provide the products you want.



**4400 FAMILY
ARTIFICIAL INTELLIGENCE SYSTEMS**

Products available by Group

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RuleMaster is a trademark of Radian Corporation.

Smalltalk-80 is a trademark of Xerox Corporation.

MPROLOG™ is a trademark of Logicware, Inc.

Objective-C is a trademark of Productivity Products, Inc.

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UNIX is a trademark of AT&T Bell labs.

PROGRAMMING LANGUAGES

Product Name: **Tek Common Lisp**

Function: **Artificial Intelligence Programming Language**

Description:

Tektronix Common Lisp is a full implementation of Common Lisp as specified in *Common Lisp: the Language* by Guy Steele. It has been specifically optimized and enhanced for performance on the Tektronix 4400 Series. Tektronix Common Lisp provides:

- Powerful optimizing compiler with built-in debugging features
- Flexible and full featured interactive user interface
- Rich collection of numerical primitives and built-in functions
- Lexically scoped interpreter and compiler
- Powerful and flexible debugging aids
- Built-in garbage collector and dynamic storage management
- Complete implementation of arrays, vectors and strings
- Full featured Package system for symbol name differentiation
- Powerful facilities for structures and macros
- Built-in user extensible parser and hash table facility
- Lexical closures
- User-extensible data type facility

In addition, Tektronix goes beyond the specifications of the language to include:

- Powerful and robust Foreign Function Interface to C and Fortran programs
- On-line documentation
- User-definable error handler
- Full featured built-in Flavors system for object-oriented programming

Availability Date:	January, 1986
Source Language:	C, 68000 Assembler, Common Lisp
Source Available?	No
Support?	YES
Price:	\$6,000
Contact Information:	Tektronix, Inc.

PROGRAMMING LANGUAGES

Product Name: **Smalltalk-80**

Function: **Artificial Intelligence Programming Language**

Description:

Smalltalk-80 is an object-oriented programming language with a sophisticated window/mouse oriented user interface. It is especially suited for exploratory programming because it allows rapid prototyping and experimentation.

Smalltalk-80 as available on the 4400 Series of Artificial Intelligence Systems is a highly optimized, proprietary implementation which achieves execution speeds only exceeded by systems costing over five times as much. Graphic response is fast enough to support screen animation under direct control of Smalltalk.

Smalltalk-80 provides a robust, integrated programming environment using pop-up menus and windows. Smalltalk code can be input and edited, incrementally compiled in a few seconds, debugged and executed without leaving Smalltalk. Smalltalk's object oriented nature allows problems to be described symbolically and grouped into classes where both multiple and hierarchical inheritance allows each new member to inherit aspects of its parent classes. Smalltalk is extended by defining new classes which are subclasses of existing classes yielding improvements in programmer productivity.

Availability Date:	August, 1985
Source Language:	68000 Assembler
Source Available?	Yes, except for Smalltalk-80 primitives
Support?	YES, by Tektronix, Inc.
Price:	No Charge - comes standard on 4400 Series
Contact Information:	Tektronix, Inc.

PROGRAMMING LANGUAGES

Product Name: **FRANZ LISP**

Function: **Programming Language**

Description:

Franz Lisp is the most widely distributed and extensively used implementation of LISP. Franz Lisp was developed at the University of California at Berkeley for research work in symbolic manipulation, expert systems, and other Artificial Intelligence projects. Several large AI programs have been written using Franz Lisp including OPS5, Macsyma, Reduce, Pearl, and others.

Franz Lisp is similar to Maclisp, a version of lisp available on the DEC 10 and 20 product line. Programs written in other dialects of Lisp can be merged and run under Franz Lisp by the use of compiler declarations and environment libraries. Franz Lisp has been designed to make interfaces to non-Lisp application programs in C or Fortran quite convenient. Tek 4400 Family users can take full advantage of graphics libraries provided in C.

Software written in Franz Lisp on a variety of machines can usually be downloaded, recompiled, and executed on the Tek 4400 Family without any modifications being required, protecting software investments.

Documentation for Franz Lisp has been recently augmented by a textbook written by Prof. Robert Wilensky, of the University of California at Berkeley. The book is entitled LISPcraft and was published in 1984 by W.W. Norton.

Availability Date:	August, 1985
Source Language:	C
Source Available?	No
Support:	YES, by Tektronix, Inc.
Price:	\$3,000
Contact Information:	Tektronix, Inc.

PROGRAMMING LANGUAGES

Product Name: **MPROLOG**

Function: **Programming Language**

Description:

Mprolog is a programming language used in artificial intelligence applications where problems are solved by specifying what answers are needed rather than describing a detailed solution procedure. Mprolog is non-procedural, based entirely on facts, rules, and logical relationships.

Once known relationships between the elements of a problem are established in the knowledge base, Mprolog can make logical inferences from the relationships when queried by the user. Mprolog can explain how the conclusion was derived. Mprolog also offers a complete development environment for enhancing programmer productivity. The Mprolog Program Development Support System (PDSS) is an integrated system with editing and debugging tools.

Since the Mprolog interpreter is accessible from PDSS, predicate definitions can be tested immediately. Program modules can also be translated into binary format to yield more compact and efficient executable programs.

Availability Date:	August, 1985
Source Language:	68010 Assembler
Source Available?	No
Support:	YES
Price:	\$4,000
Contact Information:	Tektronix, Inc.

PROGRAMMING LANGUAGES

Product Name: **C Compiler**

Function: **Programming Language**

Description:

The Tektronix C Compiler is fully compatible with Bell Laboratories System V "C" Compiler and is modeled after the language described by Kernighan and Ritchie in the *C Programming Language* (Kernighan and Ritchie, 1978).

Advanced features include:

- Enumeration types
- Passing, returning and assigning structures/unions and bit fields
- Support for unsigned char, unsigned short and unsigned long
- Code optimization
- Supports separately compilable and linkable modules
- Provision of graphics and math libraries
- Allows direct access to 4400 Family AI System features

Availability Date:	August, 1985
Source Language:	68000 Assembler
Source Available?	No
Support?	YES, by Tektronix, Inc.
Price:	No Charge - comes standard on 4400 Series
Contact Information:	Tektronix, Inc.

EXPERT SYSTEMS

Product Name: **KES**

Function: **Environment for implementing interactive expert systems**

Description:

The Knowledge Engineering System (KES) is an environment and support tool for implementing interactive expert systems. The purpose of KES-developed expert systems is to enable users to make decisions related to domain-independent, i.e., it is not restricted to any one knowledge area because the system and the knowledge base are strictly separated. In order to build an expert system using KES the domain expert need only create a file which contains the necessary expertise to be used in solving a problem. No knowledge of programming or artificial intelligence techniques is required. KES accepts the knowledge base file and converts it into a form suitable for combination with the expert system software. This separation of the knowledge base and the system software allows the development of a variety of knowledge bases, each of which can be utilized by the system to produce operational expert systems.

KES has three separate subsystems, each with its own method of representing knowledge and making inferences. The production rule subsystem has knowledge represented as conditional rules that are used by a consequent-driven rule interpreter. In the hypothesize-and-test subsystem knowledge is represented by descriptive frames; the inference engine is based on the minimal set cover theory and is capable of evaluating multiple hypotheses simultaneously. In the Bayes subsystem the knowledge is in tables of prior and conditional probabilities. Among the advantages of KES are its ease of use, both for a knowledge base author and an end-user; and the fact that it is fully supported and documented and has a proven record in a variety of applications.

	KES	KES II (Written in C)
Availability Date:	July, 1985	Production Rule Deduction - Aug., 1985 Hypothesis & test Deduction - Nov., 1985 Bayesian analysis - February, 1986
Source Language:	Franz Lisp	C
Source Available?	No	No
Support?	YES, by Software A&E	YES, by Software A&E
Price:	\$7000	\$7000
Contact Information:	Software A&E, Inc. 1500 Wilson Boulevard Suite 800 Arlington, Virginia 22209 (703) 276-7910	16 New Park Road Chichester, West Sussex PO19 1XH United Kingdom +44 243 789310

EXPERT SYSTEMS

Product Name: **RuleMaster**

Function: **A software tool for building expert systems**

Description:

Rulemaster is a flexible set of software tools that can be used in the development of expert systems. The RuleMaster expert system building package contains two principal components: RuleMaker, for inducing rules from examples, and Radial, an interpreted language for expressing and executing rules.

RuleMaster knowledge is in a form of a highly structured rule set. Rules are modularized and can be developed and tested separately. Control can be easily specified within each module and between modules to produce the effect of forward or backward chaining. Because of the structuring available in RuleMaster, a problem can be broken down into small components. Each rule is developed separately as an individual module by entering examples to specify particular cases.

RuleMaster has the ability to explain lines of reasoning, access other information sources, and interface to any user's code in various languages.

Radial is a block structured, interpreted language for expressing and executing rules based on finite state machine theory. It offers the same visibility and scoping rules as Pascal and Algol, and allows users to define abstract data types and associated operators specific to an application. This can be used to make Radial rules expressible in a form very close to the natural language of each domain.

Availability Date:	July, 1985
Source Language:	C
Source Available?	No
Support?	YES - from Radian Corporation
Price:	\$15,000
Contact Information:	Radian Corporation 8501 Mo-Pac Blvd. P.O. Box 9948 Austin, Texas 78766 (512) 454-4797

PROGRAMMING LANGUAGES

Product Name: **OPS5**

Function: **Programming Language for production systems**

Description:

OPS5 is a member of a class of programming languages known as production systems. A production system is a program composed entirely of conditional statements called productions. A production is similar to an IF-THEN statement in conventional programming languages. IF certain conditions are true, THEN some action is performed.

Unlike other conventional languages, OPS5 does not use variables to assign values or to keep the "state" of the application. Instead, a working memory is loaded with expressions to reflect existing operating conditions. Also, a conventional program uses sequential execution of statements plus a number of control constructs such as subroutine calls, loops, and conditional branching. A production system like OPS5 uses LHS (left hand side or the IF part of an IF-THEN statement) satisfaction.

Each production's LHS is a description of the states in which the production is applicable; the LHS becomes true when there is information in working memory that the production can process. When the interpreter performs the match process, it is in effect searching for a production that knows how to process the data that is in working memory. When it finds that production and executes its RHS (right hand side or the THEN part of an IF-THEN statement), working memory is changed, and so on the next cycle, the interpreter performs the match again to find a production that can handle the new data.

OPS5 is used primarily for applications in the areas of artificial intelligence, expert systems, and cognitive psychology.

Availability Date:	August, 1985
Source Language:	Franz Lisp
Source Available?	Yes - U.S only
Support:	No - Available "as is"
Price:	\$350
Contact Information:	Tektronix, Inc.

PROGRAMMING LANGUAGES

Product Name: **OPS83**

Function: **Programming Language for production systems**

Description:

OPS83, like OPS5, is a member of a class of programming languages known as production systems. OPS83 incorporates a new, proprietary compiler technology that makes it substantially faster (30 times) than OPS5. OPS83 is very compact. More memory is therefore available for application programs. This allows larger and more complex knowledge-based systems to be developed.

OPS83 can be conceived as two sublanguages, an imperative sublanguage, which incorporates the features of C or PASCAL, and a rule-based sublanguage, which has similar features as other members of the OPS family. OPS83 supports modular development and separate compilation. See the description of OPS5 for more information on the rule-based sublanguage, and in particular, production systems.

OPS83 is used primarily for applications in the areas of artificial intelligence, expert systems, and cognitive psychology.

Availability Date:	August, 1985
Source Language:	C
Source Available?	No
Support:	YES, by Production Systems Technologies
Price:	\$2000
Contact Information:	Production Systems Technologies 642 Gettysburg Street Pittsburgh, Pennsylvania 15206 (412) 362-3117

PROGRAMMING LANGUAGES

Product Name: **OBJECTIVE-C**

Function: **Adds object-oriented programming to C**

Description:

Objective-C is a compiler which accepts the full C language plus message and object extensions developed by Productivity Products International.

Objective-C operates between the pre-processor and the additional compiler passes available in C. It adds to C the run-time semantics of Smalltalk-80 including dynamic messaging, objects, classes, inheritance and encapsulation. The effect is a language which combines the outstanding productivity of message/object programming with the efficiency and portability of C. Since full access to the C language is retained, the programmer is free to mix object-oriented and conventional concepts within the same program.

Programmers currently developing code in the C language can gracefully evolve to Objective-C and maintain complete compatibility with the past.

Availability Date:	August, 1985
Source Language:	C
Source Available?	No
Support:	YES, via Productivity Products International
Price:	\$3000
Contact Information:	Productivity Products International 27 Glen Road Sandy Hook, CT 06482 (203) 426-1875
	or
	Unit-C Dominion Way West Broadwater Worthing West Sussex BN148NT Worthing: (0903) 205233

PROGRAMMING LANGUAGES

Product Name: **REDUCE**

Function: **Language for symbolic and algebraic computation.**

Description:

REDUCE is an interactive software system designed for general mathematical computations of interest to physicists, mathematicians and engineers. REDUCE includes facilities for exact integer and arbitrary precision real arithmetic, and the evaluation, substitution, expansion, simplification, factorization, differentiation and integration of polynomials, rational functions and general algebraic expressions. Built-in matrix algebra includes evaluation of determinants and inverses, resultants, and the solution of linear equations with algebraic coefficients. Facilities for calculations of interest to high energy physicists, including Dirac gamma matrix algebra, are also provided.

REDUCE on the Tektronix 4404 has a visual interface that displays input and output expressions in pretty printed, two-dimensional format. The visual interface includes facilities for horizontal as well as vertical scrolling of expressions, collapsing large expressions to outline their structure, and reentry of expressions to compose new inputs by using the 4404's mouse to select parts of already displayed expressions.

REDUCE has been applied to a variety of problems in many different research areas, including quantum electrodynamics and quantum chromodynamics, electrical network analysis, plasma physics, celestial mechanics, numerical analysis and a variety of engineering problems such as turbine and ship hull design.

Availability Date:	August, 1985
Source Language:	Franz Lisp
Source Available?	Sources of algebraic modules are available.
Support?	No - available "as is"
Price:	\$450
Contact Information:	Tektronix, Inc.

EDITORS AND TEXT PROCESSORS

Product Name: **EMACS**

Function: **Document Editor**

Description:

The version of EMACS used on the 4400 Series of AI Systems is the Emacs screen editor, version 264, from Unipress Software, Inc., with minor changes and additions.

There are two major editors called Emacs. The first was written at MIT for their ITS systems as an extension to TECO. This editor is the spiritual father of all Emacs-like editors; its principal author was Richard Stallman. The other editor called Emacs was also written at MIT, but it was written in MacLisp for Multics by Bernie Greenberg. This editor picked up where the ITS Emacs editor left off in terms of extension facilities.

The Unipress Software, Inc., Emacs and thus the 4400 Series Emacs are modeled on these two versions of Emacs, but may include some features those do not have and leave out others they do have. Almost all of the commands from the original versions of Emacs are included in the 4400 Series Emacs.

Availability Date:	August, 1985
Source Language:	C
Source Available?	No
Support:	YES, by Tektronix, Inc.
Price:	\$500
Contact Information:	Tektronix, Inc.

PROGRAMMING LANGUAGES

Product Name: **Lisp Intelligent Tutoring System**

Function: **Computer-based training on Lisp**

Description:

The Lisp Intelligent Tutor is a computer-based tutor designed to be as effective in teaching Lisp as a human tutor. Based on artificial intelligence techniques, Lisp Intelligent Tutor provides effective instruction in problem solving the way a human tutor does, an approach known as intelligent tutoring.

The Lisp Intelligent Tutor provides a friendly environment for the student working on a problem. Whenever the student makes a planning or coding error or asks for help, the Lisp Intelligent Tutor provides helpful information to guide them back to a correct path to the solution. The Lisp Intelligent Tutor has an ideal model containing programming knowledge ideal students use in solving problems. This allows the Lisp Intelligent Tutor to monitor a student's progress and discover and instruct about errors.

If the student is having difficulty, the Lisp Intelligent Tutor will provide guidance by hinting toward the correct solution. Hints take the form of queries and reminders about current goals or if necessary, the next piece of code so that the student may continue.

A structured editor is also provided which balances parentheses and provides placeholders for function arguments. The student is relieved of the burden of balancing parentheses and checking syntax, enabling them to focus on the more conceptually difficult aspects of Lisp.

The Lisp Intelligent Tutor provides 10 or more lessons in Lisp, each taking from one to four hours to complete. A good review of the Lisp Intelligent Tutor can be found in the April, 1985 issue of Byte Magazine.

Availability Date:	August, 1985
Source Language:	Franz Lisp
Source Available?	No
Support:	YES, by Advanced Computer Tutoring, Inc. (90 day warranty)
Price:	\$9,000
Contact Information:	Advanced Computer Tutoring, Inc. 701 Amberson Avenue Pittsburgh, Pennsylvania 15232 (412) 578-2815

MISCELLANEOUS

Product Name: **UNIX Tools Library**

Function: **Programming Utilities**

Description:

The UNIX Tools Library offered for the Tek 4400 Family of AI Systems is an extensive set of utilities derived from Tektronix' 6000 Series UTEK Auxiliary Utilities and Programming Support packages. Built on years of experience using and providing UNIX-based products, the UNIX Tools Library offers compatibility with Berkeley's 4.2bsd and AT&T's System V.2 implementation of UNIX, and incorporates a number of key enhancements.

The UNIX Tools Library will include:

- shell command language: sh, for, case, if, while, eval, shift, break, continue, exit, export, set, etc.
- shell programming aids: echo, expr, getopt, test, xargs, line, etc.
- misc. utilities: diff, grep, ls, make, more, sed, sort, vi, find, tee, batch, lpr, lex, awk, tar
- text processing: nroff, troff, tbl, eqn, deroff, checknr

The above list is only a subset of all the utilities available, but this list does provide a good sampling of what will be provided.

Availability Date:	December, 1985
Source Language:	C
Source Available?	No
Support:	YES, by Tektronix, Inc.
Price:	\$500
Contact Information:	Tektronix, Inc.

MISCELLANEOUS

Product Name: **Demolmage.trbl**

Function: **Example expert system written in Smalltalk-80**

Description:

Demolmage.trbl is a Smalltalk-80 image file that contains a sample expert system developed at Tek Labs for troubleshooting a Tektronix function generator product called the FG502. Demolmage.trbl is strictly an example of how an expert system could conceivably be developed in Smalltalk-80 and is not designed as an expert system shell or generic expert system for troubleshooting products.

Demolmage.trbl makes extensive use of the 4400 Family's graphic display system, with multiple windows including: 1) an electronic components part list window, 2) a part description window, 3) a schematic diagram window, 4) a window containing a graphic representation of the primary circuit board used in the FG502, 5) a troubleshooting advice window, and 6) a window showing rules in effect during any diagnosis taking place.

All windows display information pertinent to a part under selection - as a part from the part list is selected, a relevant description is shown and the part's location on the schematic diagram and circuit board is highlighted.

During the diagnosis phase of the troubleshooter, a series of questions are answered by the technician using the system and a service diagnosis is generated.

Availability Date:	August, 1985
Source Language:	Smalltalk-80
Source Available?	No
Support:	No
Price:	No Charge
Contact Information:	Tektronix, Inc.

WARRANTY FOR SOFTWARE PRODUCTS

Tektronix warrants that this software product will conform to the specifications set forth herein, when used properly in the specified operating environment, for a period of three (3) months from the date of shipment, or if the program is installed by Tektronix, for a period of three (3) months from the date of installation. If this software product does not conform as warranted, Tektronix will provide the remedial services specified below. Tektronix does not warrant that the functions contained in this product will meet Customer's requirements or that operation of this software product will be uninterrupted or error-free or that all errors will be corrected.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for such service in accordance with instructions received from Tektronix. If Tektronix is unable, within a reasonable time after receipt of such notice, to provide the remedial services specified below, Customer may terminate the license for the software product and return this software product and any associated materials to Tektronix for credit or refund.

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4400 Series Software Survey

Tektronix is dedicated to providing software products for the 4400 Series so we can serve our customers better. Your input is necessary for us to make the right software available. Please take a moment to fill out the survey below.

Please review the following software offerings and rank (1,2,3,...) in order of preference, the products in each group according to the needs of your organization.

<u>Software Offering</u>	<u>Group Rank</u>
ZETALISP	_____
CPROLOG	_____
POPLOG	_____
FORTTRAN	_____
PASCAL	_____
ADA	_____
MAINSAIL	_____
FORTH	_____
MACSYMA (M.I.T.)	_____
SMP (Inference Corporation)	_____
MAPLE (Univ. of Waterloo, Canada)	_____
KEE (Intellicorp)	_____
TIMM (General Research Corporation)	_____
ART (Inference Corporation)	_____
K:BASE (Gold Hill Computers)	_____
EXPERT-EASE (Jeffrey Perrone & Assoc.)	_____
T.1 (Teknowledge)	_____
M.1 (Teknowledge)	_____
S.1 (Teknowledge)	_____
DUCK (Smart Systems Technology)	_____
Knowledge Craft (The Carnegie Group)	_____
Language Craft (The Carnegie Group)	_____
INATE (Automated Reasoning Corporation)	_____
Other (Please Specify)	_____

Your organization is a:

1. University
2. Research Department in a corporation
3. AI Software development company
4. Non-AI software development company
5. Other _____

Your application is: _____

What changes would you like to see made to the 4400 Series Software Catalog?

To provide the maximum benefit from our third party software products, we have established a voluntary mailing list which we will provide to our third party software vendors. With this list, our vendors will be able to contact you directly with information regarding new products. If you would like to be included on this mailing list, then fill out the section below.

Name _____ Title _____

Department _____

Company _____

Address _____ Mail Station _____

City _____ State _____ Zip _____

Telephone _____

Please return this two page Software Survey to:
Artificial Intelligence Machines
Tektronix, Inc.
P.O. Box 1000 M.S. 63-393
Wilsonville, Oregon 97070
Attention: Chuck Smith