

Preface

This set of system design notes ships with each Explorer System, but is not expected to be of use to every user. It is provided for the benefit of system programmers who need more detailed understanding of the system structure and low-level interfaces than is documented in the user manuals, for the purpose of modifying, extending, or interfacing with the system at a lower level than the normal user interfaces, for low level debugging, or for performance analysis.

These notes include a simple description of the Explorer hardware, a description of elements of the Explorer Lisp machine virtual architecture, and several sets of material useful to systems programmers.

The following sections are included in this document:

Section 1 -- Hardware Overview - Covers high level information about the system hardware. More detail can be found in the hardware documents that ship with each system.

Section 2 -- Bootstrap Loading - Describes the various types of system loads and the related structures.

Section 3 -- Interrupts - Discusses the handling of interrupts.

Section 4 -- Device Handling - Explains the handling of I/O requests for various types of devices.

Section 5 -- Virtual Memory - Describes how the virtual memory mapping scheme works on the Explorer.

Section 6 -- Paging and Disk Management - Describes the demand paging scheme on the Explorer.

Section 7 -- Internal Storage Formats - Details the formats used for representing Lisp data items.

Section 8 -- Arrays - Details the formats used for representing arrays.

Section 9 -- Storage Management - Explains how memory is organized into areas and regions, and describes several specific areas used by the system software.

Section 10 -- Garbage Collection - Describes the techniques and structures used by the Explorer for handling garbage collection and for implementing Temporal Garbage Collection (TGC).

Section 11 -- Function Calling - Details the mechanisms used for function calling and the internal formats of compiled code.

Section 12 -- Closures - Describes how dynamic and lexical closures are implemented on the Explorer.

Section 13 -- Flavors - Discusses the data structures used for handling flavors.

Section 14 -- Stack Groups - Describes the stack group data structure and the special push down list.

Section 15 -- Storage Subprimitives - Explains the functionality and lists the arguments for low-level storage manipulating subprimitives and explains new semantics imposed on some of them by TGC.

Section 16 -- Other Subprimitives, Variables, and Counters - Explains the functionality and lists the arguments for non-storage-related low-level system functions, and documents all special microcode variables and counters.

Section 17 -- Error Handling - Describes microcode error handling and explains the various error conditions that can arise.

Section 18 -- Crash Handling - Explains how crash records are organized and how you can examine them from Lisp.

Section 19 -- Compiler Notes - Supplements section 21, Compiler Operations, of the Explorer Lisp Reference manual.

Section 20 -- Macro-Instructions - This section describes the macroinstruction set.

Appendix A -- Data Structures - Details the content of the non-volatile RAM and the disk partition structures, and describes the micro-load partition format specification for the Explorer II processor.

Appendix B -- Acronyms - List of acronyms used in this manual.