

4. CHANGES TO INTERLISP-D IN LYRIC/MEDLEY

NOTE: Chapter 4 is organized to correspond to the original *Interlisp-D Reference Manual*, and explains changes that have occurred in Interlisp-D with the Lyric and Medley releases. To make it easy to use this chapter with the *IRM*, information is organized by *IRM* volume and section numbers. Section headings from the *IRM* are maintained to aid in cross-referencing.

Lyric information as well as Medley release enhancements are included. Medley additions are indicated with revision bars in the right margin.

VOLUME I—LANGUAGE

Chapter 3 Lists

Section 3.2 Building Lists From Left To Right

(I:3.7)

The functions **DOCOLLECT** and **ENDCOLLECT** are no longer supported.

(I:3.8)

The description of the **ADDTOSCRATCHLIST** function has been revised to read:

(ADDTOSCRATCHLIST VALUE) [Function]

For use inside a **SCRATCHLIST** form. *VALUE* is added on to the end of the value being collected by **SCRATCHLIST**. When the **SCRATCHLIST** returns, its value is a list containing all of the things that **ADDTOSCRATCHLIST** has added.

Section 3.10 Sorting Lists

(I:3.17)

(SORT DATE COMPAREFN) [Function]

There is no safe interrupt to **SORT**—if you abort a call to **SORT** by *any* means the possibility exists for losing elements from the list being sorted.

Chapter 6 Hash Arrays

(I:6.1)

(HASHARRAY	MINKEYS OVERFLOW HASHBITSFN EQUIVFN RECLAIMABLE	
REHASH-THRESHOLD)		[Function]

The function **HASHARRAY** has two new optional arguments, *RECLAIMABLE* and *REHASH-THRESHOLD*. If *RECLAIMABLE* is true, then entries in the hash table are considered "reclaimable" in the sense that the system is permitted to remove any key and its associated value from the hash table at any time. In practice, the contract is less severe: the system only removes keys when a hash table fills and is about to be rehashed, and then it only removes keys whose reference count is one, and to which there are thus no pointers outstanding except possibly from the stack (local variables). This is useful for hash tables that serve to cache information about Lisp objects to avoid recomputation; for example, the system hash table **CLISPARRAY** is now reclaimable. Discarding keys keeps the table from necessarily needing to grow, and potentially allows the storage consumed by both the key and value to be reclaimed.

Section 6.1 Hash Overflow

(I:6.3)

You should note changes to the wording of two of the possibilities for the overflow method:

The first sentence for **NIL** should read: The array is automatically enlarged by *at least* a factor of 1.5 every time it overflows.

The explanation for "a positive integer N" should read: The array is enlarged to include *at least* N more slots than it currently has.

Chapter 7 Integer Arithmetic

(I:7.5)

The variables **MIN.INTEGER** and **MAX.INTEGER** have been removed from the *Interlisp-D Reference Manual*. Therefore, calling **(MIN)** and **(MAX)** is an error.

(I:7.7)

(FIXR N)	[Function]
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When N is exactly half way between two integers, **FIXR** rounds it to the even number. For example **(FIXR 1.5)** \Rightarrow 2 and **(FIXR 2.5)** \Rightarrow 2.

Section 7.3 Logical Arithmetic Functions

The function **INTEGERLENGTH** does *not* coerce floating point numbers to integers; rather, it signals an error, "Arg not Integer". (This was true in Koto as well.)

Section 7.5 Other Arithmetic Functions

(I:7.13)

The algorithms for **SIN**, **COS**, and other trigometric functions have been tuned and are now accurate to at least six significant figures.

Chapter 8 Record Package

(I:8.11)

When using **BLOCKRECORD**, it is an error to try to declare a record with a zero-length field. Previously, the system would go into an infinite loop. In the Medley release, the system will now detect this and signal an error.

Chapter 9 Conditionals and Iterative Statements

Section 9.2 Equality Predicates

(I:9.3)

(EQUALALL X Y)

[Function]

Add the following NOTE to the **EQUALALL** function:

Note: In general, **EQUALALL** descends all the way into all datatypes, both those defined by the user and those built into the system. If you have a data structure with fonts and pointers to windows, **EQUALALL** will descend into those also. If the data structures are circular, as windows are, **EQUALALL** can cause a Stack Overflow error.

Section 9.8.3 Condition I.s. oprs

UNTIL N (N a number)

[I.S. Operator]

REPEATUNTIL N (N a number)

[I.S. Operator]

These descriptions were included in the *Interlisp-D Reference Manual* in error and should be removed. **UNTIL** and **REPEATUNTIL** work *only* with predicate expressions, not numbers.

Chapter 10 Function Definition, Manipulation , and Evaluation

Section 10.2 Defining Functions

(I:10.11)

In the definition of the **MOVD** function, the sentence "**COPYDEF** is a higher-level function that only moves expr definitions, but..." should be revised to read:

COPYDEF is a higher-level function that not only moves expr definitions, but also works for variables, records, etc.

Section 10.5 Functional Arguments

(I:10.19)

FUNARG functionality (non-**NIL** second argument to **FUNCTION**) has been withdrawn. Most of the uses for Interlisp **FUNARG**'s are better written using the lexical closure functionality of Common Lisp.

Section 10.6.2 Interpreting Macros

The variables **SHOULDCOMPILEMACROATOMS** and **UNSAFEMACROATOMS** no longer exist.

Chapter 11 Variable Bindings and the Interlisp Stack

(II:11.2)

In Lisp there is a fixed amount of space allocated for the stack. When this space is exhausted, the **STACK OVERFLOW** error occurs. However, if the system waited until the stack were *really* exhausted, there wouldn't be room to run the debugger. Thus, a portion of the stack space is reserved; when the stack intrudes into the reserved area, it causes a stack overflow interrupt, and subsequently a call to the debugger.

In order not to get a **STACK OVERFLOW** error while inside the debugger, this intrusion into the reserved area is only noted once. If the reserved area is exhausted, then a "hard" stack overflow occurs (a 9319 MP halt), from which the only recourse is a hard reset via **STOP** (or Ctrl-D from TeleRaid). Following a hard reset, the stack is cleared, stack overflow detection is reenabled, and all processes are restarted.

The implications of this are that you should not attempt any deep computations while inside the debugger for a stack overflow error, and you should call (**HARDRESET**) as soon as possible in order that subsequent stack overflows can again be caught in the debugger before they advance to the MP halt. In order to make this more convenient, the system automatically calls (**HARDRESET**) if you exit the debugger via the **^** or **OK** commands, or abort with a Ctrl-D. The only way to exit the debugger without having a

(HARDRESET) occur is by using the **RETURN** command. You can disable this feature by setting **AUTOHARDRESETFLG** to **NIL**, in which case you must be sure to perform the **(HARDRESET)** yourself if you want the next stack overflow to be detected early enough to enter the debugger.

Section 11.2.1 Searching the Stack

(STKPOS FRAMENAME N POS OLDPOS)	[Function]
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(STKPOS 'STKPOS) does not cause an error; it merely returns NIL. (This was true in Koto as well.) It is still not permissible to create a pointer to the active frame; however, **STKPOS** never attempts to, as it starts searching for the specified frame by looking first at its caller.

Section 11.2.2 Variable Bindings in Stack Frames

(I:11.7)

(STKARG N POS —)	[Function]
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(STKNARGS POS —)	[Function]
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The functions **STKARG** and **STKNARGS** will now return the number of arguments supplied to a Lambda Nospread when there is a break. The **?=** command will show all the arguments.

(SETSTKARGNAME N POS NAME)	[Function]
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The function **SETSTKARGNAME** does not work for interpreted frames.

Section 11.2.5 Releasing and Reusing Stack Pointers

(CLEARSTK FLG)	[Function]
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(CLEARSTK NIL) is a no-op—the ability to clear all stack pointers is inconsistent with the modularity implicit in a multi-processing environment.

CLEARSTKLST	[Variable]
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NOCLEARSTKLST	[Variable]
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The variables **CLEARSTKLST** and **NOCLEARSTKLST** are no longer used. (More precisely, they are used only by the Old Interlisp Executive, which means that programs can no longer depend on them.)

Section 11.2.7 Other Stack Functions

(II:11.13)

In the **REALFRAMEP** function, the **INTERPFLG** argument description has been corrected to read:

If **INTERPFLG=T** returns **T** if **POS** is not a dummy frame. For example, if **(STKNAME POS)=COND**, **(REALFRAMEP POS)** is **NIL**, but **(REALFRAMEP POST)** is **T**.

Chapter 12 Miscellaneous

Section 12.2 Idle Mode

The following properties in **IDLE.PROFILE** are new or have meanings different from the documentation in the *Interlisp-D Reference Manual*:

ALLOWED.LOGINS

The authentication aspects of this property have been separated into the **AUTHENTICATE** property. The value of this property now speaks specifically to who is allowed to exit idle mode: If the value is **NIL** (or any other non-list), no login at all is required to exit Idle mode. Otherwise, the value is a list composed of any of the following:

***** Require login, but let anyone exit idle mode. This will overwrite the previous user's name and password each time idle mode is exited.

T Let the previous user (as determined by **USERNAME**) exit idle mode. If the user name has not been set, this is equivalent to *****.

A user name Let this specific user exit idle mode.

A group name Allow any members of this group (an NS Clearinghouse group name) to exit idle mode.

The initial value for **ALLOWED.LOGINS** is **(T *)**, i.e., anyone is allowed to exit idle mode.

AUTHENTICATE

The value of this property determines what mechanism is used to check passwords. If **T**, use the NS authentication protocol (requires the presence of an NS Authentication server accessible via the network). If **NIL**, do not check the password at all—accept any password. This is only particularly useful if **ALLOWED.LOGINS** contains *****.

The initial value of **AUTHENTICATE** is **T**.

FORGET

If this is the symbol **FIRST**, the user's password will be erased when idle mode is entered. Otherwise, this property is relevant only when **ALLOWED.LOGINS** is **NIL** (if **ALLOWED.LOGINS** is a list, then some sort of login is required, which will have the effect of erasing any previous login): If **FORGET** is non-**NIL**, the user's password will be erased when idle mode is exited. Initial value is **T** (erase password on exit).

Note: If the password is erased on *entry* to Idle mode (value **FIRST**), any program left running when idle mode is entered may fail if it tries doing anything requiring passwords (such as accessing file servers).

LOGIN.TIMEOUT

Value is a number indicating how many seconds Idle's prompt for a login should remain up before timing it out and resuming Idle mode. Initial value is 30. This feature avoids the problem of having an Idle machine "freeze up" indefinitely (stop running the idle pattern) just because someone brushed against the keyboard.

RESETVARS

This property is no longer used; rather, the value of the global variable **IDLE.RESETVARS** is used instead.

SUSPEND.PROCESS.NAMES

This property is no longer used; rather, the value of the global variable **IDLE.SUSPEND.PROCESS.NAMES** is used instead.

Section 12.3 Saving Virtual Memory State

AROUNDEXITFNS

[Variable]

This variable provides a way to "advise" the system on cleanup and restoration activities to perform around **LOGOUT**, **SYSOUT**, **MAKESYS** and **SAVEVM**; it subsumes the functionality of **BEFORESYSOUTFORMS**, **AFTERLOGOUTFORMS**, etc. Its value is a list of functions (names) to call around every "exit" of the system. Each function is called with one argument, a symbol indicating which particular event is occurring:

BEFORELOGOUT

The system is about to perform a **LOGOUT**. The event function might want to save state, notify a network connection that it is about to go away, etc.

BEFORESYSOUT
BEFOREMAKESYS
BEFORESAVEVM

The system is about to perform a **SYSOUT**, **MAKESYS**, or **SAVEVM**. Often these three events are treated equivalently; however, sometimes the distinction is interesting. For example, a program might want to perform a much more extensive tidying-up before **MAKESYS** than if it is merely doing a routine **SAVEVM**.

AFTERLOGOUT
AFTERSYSOUT
AFTERMAKESYS
AFTERSAVEVM

The system is starting up a virtual memory image that was saved by performing a **LOGOUT**, **SYSOUT**, etc. Ordinarily, the event function should treat all of these the same—in all four cases, some arbitrary amount of time has passed, remote files may have come and gone, a different user may be logged in, or the virtual memory image might even be running on a different workstation.

AFTERDOSYSOUT
AFTERDOMAKESYS
AFTERDOSAVEVM

The system is continuing in the same virtual memory image following a **SYSOUT**, **MAKESYS**, or **SAVEVM** (as opposed to having just booted the same virtual memory image). Ordinarily, these events are uninteresting; they exist solely so that actions taken by the **BEFORExxx** events can be compensated for after the event. For example, if the before event cleared a cache, the after event might initiate refilling it. There is, of course, no event **AFTERDOLOGOUT**, as **LOGOUT** does not "continue".

Section 12.4 System Version Information

(I:12.13)

In the description of the **MACHINETYPE** function, add another machine, the **DOVE** (for the Xerox 1186).

VOLUME II—ENVIRONMENT

Chapter 13 Interlisp Executive

(I:23.37)

(**READLINE** *RD_TBL* — —)

[Function]

The *Interlisp-D Reference Manual* states:

The description on p 13.37 of **READLINE**'s behavior when one or more spaces precede the carriage return applies only when **LISPXREADFN** is **READ**. **LISPXREADFN** is initially **TTYINREAD**, which ignores spaces before the carriage return, and thus will never prompt you with "..." for an additional line. Also, the new Executive does not use **READLINE** at all, so you will never see this behavior in a new Executive, independent of the setting of **LISPXREADFN**.

Chapter 14 Errors and Breaks

Section 14.5 Break Window Variables

(II:14.15)

Setting the variable **BREAKREGIONSPEC** to **NIL** no longer creates problems if there is a subsequent break.

Section 14.8 Catching Errors

(II:14.22)

The **Nlambda** functions **ERSETQ** and **NLSETQ** now allow evaluation of an arbitrary number of forms, rather than only one.

(II:14.26)

For Medley, the Interlisp interpreter's handler for **RESETFORM** has been fixed (in Lyric, it worked only from the Common Lisp interpreter, or compiled) .

Chapter 17 File Package

Note: The File Package is now known as the File Manager.

Section 17.8.1 Functions for Manipulating Typed Definitions

(II:17.26)

(HASDEF NAME TYPE SOURCE SPELLFLG) [Function]

Clarification: **HASDEF** for type FNS (or NIL) indicates that *NAME* has an editable source definition, not that *NAME* is defined at all. Thus if *NAME* exists on a file for which you have loaded only the compiled version but not the source, **HASDEF** returns **NIL**.

Section 17.8.2 Defining New File Package Types

(II:17.31)

In the **WHENCHANGED** File Package Type Property the *REASON* argument passed to **WHENCHANGED** no longer is **T** or **NIL**. The Note has been revised as follows:

Note: The *REASON* argument passed to **WHENCHANGED** functions is either **CHANGED** or **DEFINED**.

(II:17.32)

The Nospread Function **FILEPKGTYPE** returns a property list rather than an alist.

Section 17.9.2 Variables

(II:17.36)

In the Lyric release, **HORRIBLEVARS** did not preserve common substructures across several variables.

In Lyric, you could not dump an **UGLYVARS** or **HORRIBLEVARS** whose printed representation required more than *ARRAY-TOTAL-SIZE-LIMIT* characters. This is no longer the case with the Medley release.

Section 17.9.8 Defining New File Package Commands

(II:17.47)

The Nospread Function **FILEPKGCOM** returns a property list rather than an alist.

Section 17.11 Symbolic File Format

(PRETTYDEF PRTTYFNS PRTTYFILE PRTTYCOMS REPRINTFNS SOURCEFILE CHANGES) [Function]

PrettyDEF accepts only a symbol for its file argument.

In Lyric and Medley, **SYSPRETTYFLG** is ignored in Interlisp exec and does not pretty-print values in the executive.

(LISPSOURCEFILE FILE)[Function]

LISPSOURCEFILE is more specifically defined to mean that the file is in File Manager format *and* has a file map.

Section 17.11.3 File Maps

File maps are no longer stored on the FILEMAP property. See **GET-ENVIRONMENT-AND-FILEMAP** in the section entitled "Programmer's Interface to Reader Environments" in chapter 3.

Chapter 18 Compiler

CAUTION: Files compiled in Medley cannot be loaded back into Lyric. Medley-compiled .LCOM and .DFASL files will produce an error message when loaded into Lyric. (Lyric-compiled .LCOM and .DFASL files can be loaded and run in Medley.) If you need to run a Medley file in Lyric, load the source file and use the Lyric compiler.

Note that you should not attempt to compile a file containing a function named **STOP**. The format of the .LCOM file produced by **BCOMPL** or **TCOMPL** admits an unfortunate ambiguity in the treatment of the symbol **STOP—LOAD** prefers to treat it as the token signifying the end of the file, rather than as starting the definition of the function **STOP**.

There is no such restriction for the .DFASL files produced by **CL:COMPILE-FILE**.

Chapter 21 CLISP

Section 21.8 Miscellaneous Functions and Variables

(CLEARCLISPARRAY NAME — —)[Function]

Macro and CLISP expansions are cached in CLISPARRAY, the system's CLISP hash array. When anything changes that would invalidate an expansion, it needs to be removed from the cache. CLEARCLISPARRAY removes from the CLISP hash array any key whose CAR is NAME. The system does this automatically whenever you edit a clisp or macro form, or when you redefine a clisp word or macro definition. However, you may need to call CLEARCLISPARRAY explicitly if you change something in a more subtle way, e.g., you redefine a function used by a macro. If your change invalidates an unknown set of expansions, you might prefer to take the performance penalty of calling (CLRHASH CLISPARRAY) to invalidate the entire cache, just to make sure no incorrect expansions are kept around.

Chapter 22 Performance Issues

Section 22.1 Storage Allocation and Garbage Collection

The following should be appended to the description of garbage collection in Interlisp-D:

Another limitation of the reference-counting garbage collector is that the table in which reference counts are maintained is of fixed size. For typical Lisp objects that are pointed to from exactly one place (e.g., the individual conses in a list), no burden is placed on this table, since objects whose reference count is 1 are not explicitly represented in the table. However, large, "rich" data structures, with many interconnections, backward links, cross references, etc, can contribute many entries to the reference count table. For example, if you created a data structure that functioned as a doubly-linked list, such a structure would contribute an entry (reference count 2) for each element.

When the reference count table fills up, the garbage collector can no longer maintain consistent reference counts, so it stops doing so altogether. At this point, a window appears on the screen with the following message, and the debugger is entered:

```
Internal garbage collector tables have overflowed, due
to too many pointers with reference count greater than 1.
*** The garbage collector is now disabled. ***
Save your work and reload as soon as possible.
```

[This message is slightly misleading, in that it should say "count not equal to 1". In the current implementation, the garbage collection of a large pointer array whose elements are not otherwise pointed to can place a special burden on the table, as each element's reference count simultaneously drops to zero and is thus added to the reference count table for the short period before the element is itself reclaimed.]

If you exit the debugger window (e.g., with the RETURN command), your computation can proceed; however, the garbage collector is no longer operating. Thus, your virtual memory will become cluttered with objects no longer accessible, and if you continue for long enough in the same virtual memory image you will eventually fill up the virtual memory backing store and grind to a halt.

Section 22.5 Using Data Types Instead of Records

(II:22.13)

The note in this section states that "pages for datatypes are allocated one page at a time." The note should read:

Space for datatypes is allocated two pages at a time. Thus, each datatype for which any instances at all have been allocated has at least two pages assigned to it.

Chapter 23 Processes

Section 23.1 Creating and Destroying Processes

(III:23.2)

ADD.PROCESS no longer coerces the process name to a symbol. Rather, process names are treated as case-insensitive strings. Thus, you can use strings for process names, and when typing process commands to an exec, you need not worry about getting the alphabetic case correct.

Section 23.2 Process Control Constructs

The Medley release fixes the **PROCESS.EVAL** and **PROCESS.APPLY** functions. In **PROCESS.EVAL** and **PROCESS.APPLY**, with argument **WAITFORRESULT = T**, if the computation in the other process aborts (or the process is killed), then **PROCESS.EVAL** and **PROCESS.APPLY** return **:ABORTED** instead of hanging.

Section 23.6 Typein and the TTY Process

BACKGROUNDFN

[Variable]

A list of functions to call "in the background". The system runs a process (called "BACKGROUND") whose sole task is to call each of the functions on the list **BACKGROUNDFN** repeatedly. Each element is the name of a function of no arguments. This is a good place to put cheap background tasks that only do something once in a while and hence do not want to spend their own separate process on it. However, note that it is considered good citizenship for a background function with a time-consuming task to spawn a separate process to do it, so that the other background functions are not delayed.

TTYBACKGROUNDFN

[Variable]

This list is like **BACKGROUNDFN**, but the functions are only called while in a tty input wait. That is, they always run in the tty process, and only when the user is not actively typing. For example, the flashing caret is implemented by a function on this list. Again, functions on this list should spend very little time (much less than a second), or else spawn a separate process.

Section 23.8 Process Status Window

The Medley release modifies the way in which the Process Status Window can be reshaped and refreshed.

The Process Status Window is now created in such a way that reshaping the window reshapes **ONLY** the backtrace window, not the main window.

The process status window now refreshes itself automatically following a KILL command.

VOLUME III—INPUT/OUTPUT

Chapter 24 Streams and Files

Section 24.7 File Attributes

(**GETFILEINFO** *FILE ATTRIB*)

[Function]

NS file servers implement the following additional attributes for **GETFILEINFO** (neither of these attributes is currently settable with **SETFILEINFO**):

READER	The name of the user who last read the file.
PROTECTION	A list specifying the access rights to the file. Each element of the list is of the form (<i>name nametype . rights</i>), where <i>name</i> is the name of a user or group or a name pattern, and <i>rights</i> is one or more of the symbols ALL READ WRITE DELETE CREATE MODIFY. For servers running Services release 10.0 or later, <i>nametype</i> is the symbol "--"; in earlier releases it is either INDIVIDUAL or GROUP, to distinguish the type of name. For example, the value ((Jane Jones: -- ALL) (*: -- READ)) means that user Jane Jones has full access to the file, while all members of the default domain only have read access to the file.

Section 24.9 Local Hard Disk Device

(III:24.22)

In the Medley release, the {DSK} device now accepts a wider range of characters in file names. Almost any character in char set 0 is acceptable. Previously, if you tried to create a file whose name included, for example, an underscore, you would see a "FILE NOT FOUND" error.

Section 24.10 Floppy Disk Device

(III:24.26)

As of the Lyric release, CPM-format floppy disks are no longer supported.

Section 24.12 Temporary Files and CORE Device

(III:24.30)

In Medley, (**GETFILEINFO** xx 'LENGTH) works for both opened and closed **NODIRCORE** streams.

A closed **NODIRCORE** stream can be reopened.

Section 24.18.1 Pup File Server Protocols

UNIXFTPFLG

[Variable]

When the Leaf protocol was first implemented for the Vax Unix operating system, its use was inconsistent with the operation of the Pup FTP server on the same host: the Leaf server supported versions, but the Ftp server knew only about the native, versionless file system. Thus, Lisp could not use the two protocols interchangeably. For example, if it used Ftp to write a file FOO, the Ftp server would, in versionless style, overwrite the versionless file FOO, rather than create a new version FOO;6 to supersede the highest version FOO;5 created by the Leaf server.

Lisp thus makes the conservative assumption that the Ftp server is unusable for anything other than directory enumeration on a host of type UNIX. This is unfortunate, since it is often the case that Ftp is more efficiently implemented than Leaf, since one need only tune the performance of sequential access.

More recent versions of the Unix Pup software have a Leaf and Ftp server more in agreement with each other. Setting **UNIXFTPFLG** to true (it is initially NIL) informs Lisp that all the Unix servers accessible on your internetwork that possess Ftp servers are safe to use in parallel with their Leaf servers.

Section 24.18.1 and 24.18.2 Use of BREAKCONNECTION with File Servers

(III:24.37)

In Medley, the function **BREAKCONNECTION** can be used equally well with NS servers and Leaf servers. Formerly, it only worked on Leaf servers, and there was a separate function (BREAK.NSFILING.CONNECTION *HOST*) to handle NS servers.

(BREAKCONNECTION *HOST FAST*)

[Function]

Breaks the file server connection to *HOST*. If *HOST* = T, breaks connections to all file servers that understand the **BREAKCONNECTION** method (currently Leaf and NS). **BREAKCONNECTION** returns the server name, or if *HOST* = T, returns a list of all hosts that responded to the **BREAKCONNECTION** request.

This function may be useful if Lisp and the server disagree about what files are open, or if the Lisp system is caching something that you do not want it to; e.g., if you get a file busy error from another workstation for a file that you may have touched on this workstation.

The behavior of **BREAKCONNECTION** is server-specific. On an NS server, **BREAKCONNECTION** releases any locks that Lisp may have on recently-accessed files, including those for open files, but does not close any files from Lisp's point of view--any subsequent access to an open file will quietly reestablish the connection. Most NS servers have a short timeout on the order of 10 minutes after which an implicit **BREAKCONNECTION** occurs if you have no files open.

On a Leaf server, **BREAKCONNECTION** first closes any files. If the argument *FAST* is true, it marks the files closed without attempting to close them cleanly. Leaf connections ordinarily do not timeout if any files at all are open.

Section 24.18.2 NS File Server Protocols

(III:24.37)

Medley incorporates the random access capability on NS servers provided by the NSRANDOM LispUsers module in Lyric.

The Medley release also supports NS file names containing characters other than character set 0 (e.g., Greek characters).

Section 24.18.3 Operating System Designations

DEFAULT.OSTYPE

[Variable]

If a host's name is not found in **NETWORKOSTYPES**, its operating system type is assumed to be the value of **DEFAULT.OSTYPE**. This variable may be of use to sites with many servers all of the same type. Its default value (IFS) is, unfortunately, inappropriate for most sites. It is recommended you set **DEFAULT.OSTYPE** in the initialization file that lives on the local disk (*not* in an init file on a file server, since Lisp needs to know the operating system type before talking to the server).

Chapter 25 Input/Output Functions

Section 25.2 Input Functions

(LASTC FILE)

[Function]

The function **LASTC** can return an incorrect result when called immediately following a **PEEKC** on a file that contains run-coded NS characters.

Section 25.3.2 Printing Numbers

(III:25.15)

In the **PRINTNUM** function, the **FLOAT** format option (**FLOAT 7 2 NIL T**) is illegal; change the option to (**FLOAT 7 2 NIL 0**).

Section 25.3.4 Printing Unusual Data Structures

(HPRINT EXPR FILE UNCIRCULAR DATATYPESEEN)

[Function]

Using **HPRINT** to save structures that include pointers to raw storage will cause stack overflows. This includes dumping things using the **VARS**, **UGLYVARS**, or **HORRIBLEVARS** filemanager commands.

For example, a font descriptor points to raw storage, and cannot be dumped; for that reason, other system data types (e.g. windows) that point to fonts also cannot be dumped.

Section 25.4 Random Access File Operations

(III:25.20)

The first argument in the **FILEPOS** function should be called *STR* not *PATTERN*.

(III:25.20)

In the Medley release, the function **COPYBYTES** now accepts *START* and *END* arguments even when the input stream is not random access. This caused an error in earlier releases.

Section 25.6 PRINTOUT

(III:25.27)

The PRINTOUT command **.FONT** changes the **DSPFONT** font permanently, that is, even after printout finishes.

Section 25.8.3 READ Macros

(III:25.42-43)

These **READMACROS** appear only in the OLD-INTERLISP-T readtable. (See Section 2 for a description of Lyric readtables.)

Chapter 26 User Input/Output Packages

Section 26.3 ASKUSER

(ASKUSER WAIT DEFAULT MESS KEYLST TYPEAHEAD LISPXPRNTFLG
OPTIONSLST FILE)

[Function]

ASKUSER does not accept a string to mean a stream open on the string; you must call **OPENSTRINGSTREAM** if that's what you mean.

Section 26.4 TTYIN Display Typein Editor

(III:26.22)

The following fixes have been made to TTYIN in the Medley release:

- TTYIN now respects the **DSPLEFTMARGIN** of the ttydisplaystream, rather than assuming it is zero.
- You can now assign the keyaction 194 (octal 302--acute accent in the NS character set) to a key and TTYIN will not treat it like the UNDO key (except on the 1132, where this functionality is still on blank-middle).

- TTYIN correctly handles prompts that are wider than the window.
- TTYIN now handles NS characters correctly when you are using a fixed-width font into which you have coerced, say, Classic characters for the non-zero character sets.
- TTYIN now handles Escape completion much more efficiently. If the completion is ambiguous, it completes the unambiguous prefix (as it did in Koto but not Lyric); it also correctly interprets escape characters. For example, in an exec with Common Lisp readtable, it correctly completes symbols that start with \, or a mixed-case symbol written with vertical bars. Also, Escape completion computes character widths correctly when it lowercases an upper case string, rather than leave some garbage bits on the display.
- The off-by-the-descent bug wherein TTYIN sometimes left stray bits at the bottom of the window has been fixed.

Section 26.4.3 Display Editing Commands

(III:26.25)

?= and Meta-P no longer hang if you had an unbalanced string quote in the input.

?, Meta-P, and the **FIX** command now work correctly when there are NS characters in the input.

The printout for ?= is now improved; it respects *print-case*, matches up keywords better, and prints abstract syntax descriptions (such as for cl:do) a bit more clearly.

SMARTARGLIST fetches the argument lists of cl:compiled functions, so ?= now works in more cases.

The Ctrl-X command, when the caret is already positioned at the end of the input and everything but parentheses are balanced (i.e., no unbalanced string quotes or vertical bars), types as many closing parentheses as necessary to complete the input and then returns, much as if you had typed right bracket ("]") in Interlisp. Thus, if the cursor is somewhere in the middle of the input, typing two Ctrl-X's is sufficient to complete (assuming all you needed to type were some more parens).

TTYIN can now be used as a substitute for PROMPTFORWARD. The new function TTYINPROMPTFORWARD takes the same set of arguments as PROMPTFORWARD. In the most common cases it then calls TTYIN in "promptforward" mode, so that you can use the mouse and other TTYIN commands on the input. For cases it can't handle, it calls the old PROMPTFORWARD. These cases are: DONTCHOTYPEIN.FLG or KEYBD.CHANNEL is non-NIL; ECHO.CHANNEL is not a displaystream; or TERMINCHARS.LST contains a character other than cr, space or ^X and you have set the variable TTYIN.USE.EXACT.CHARS (initially NIL) to T. TTYIN saves the old definition of PROMPTFORWARD, so you can either have your program explicitly call TTYINPROMPTFORWARD instead of PROMPTFORWARD, or you can have all calls to

PROMPTFORWORD changed by doing a (MOVD 'TTYINPROMPTFORWORD 'PROMPTFORWORD).

Section 26.4.5 Useful Macros

(III:26.29)

CTRLUFLG is no longer supported by default. To use this feature, turn it on explicitly: (**INTERRUPTCHAR (CHARCODE ^U) 'CTRLUFLG**).

Chapter 27 Graphic Output Operations

Section 27.1.3 Bitmaps

Note: The printed representation of bitmaps has changed. Please see release notes Chapter 3, Integration of Interlisp-D/Common Lisp, "Bitmap Syntax."

(III:27.4)

The following function has been added to Bitmap Operations between the functions **EXPANDBITMAP** and **SHRINKBITMAP**:

(ROTATE-BITMAP BITMAP) [Function]

Given an m-high by n-wide bitmap, this function returns an n-high by m-wide bitmap. The returned bitmap is the image of the original bitmap, rotated 90 degrees clockwise.

(III:27.4)

In the Medley release, the **EDITBM** function is substantially faster with the inclusion of **FASTEDITBM** (a former LispUsers module) in the sysout.

Section 27.3 Accessing Image Stream Fields

The following functions were not documented in the Koto release of the *Interlisp-D Reference Manual*:

(DSPCLEOL XPOS YPOS HEIGHT) [Function]

"Clear to end of line". Clears a region from (XPOS,YPOS) to the right margin of the display, with a height of HEIGHT. If XPOS and YPOS are **NIL**, clears the remainder of the current display line, using the height of the current font.

(DSPRUBOUTCHAR DS CHAR X Y TTBL) [Function]

Backs up over character code CHAR in the display stream DS, erasing it. If X, Y are supplied, the rubbing out starts from the position specified. **DSPRUBOUTCHAR** assumes CHAR was printed with the terminal table TTBL, so it knows to handle control characters, etc. TTBL defaults to the primary terminal table.

Section 27.6 Drawing Lines

(III:27.17)

The non-**NIL** value of the *DASHING* argument of **DRAWLINE** uses **LINEWITHBRUSH**. **LINEWITHBRUSH** is a width-by-width brush which draws then lifts.

In the Medley release, when using the color argument, Interpress **DRAWLINE** treats 16x16 bitmaps or negative numbers as shades/textures. Positive numbers continue to refer to color maps, and so cannot be used as textures. To convert an integer shade into a negative number use **NEGSHADE** (e.g. (**NEGSHADE** 42495) is -23041).

(III:27.18)

The **RELDRAWTO** function has been corrected so that it no longer draws a spot if the *DX* and *DY* arguments are 0.

Section 27.7 Drawing Curves

(III:27.18)

For the brush width value of **NIL**, the previous default value (**ROUND 1**) has been changed. The default value for the brush width value **NIL** is the **DSPSCALE** of the stream (that is, 1 printer's point wide).

(III:27.19)

A new image stream function, **DRAWARC**, follows **DRAWCIRCLE** in the *InterLisp-D Reference Manual*.

(DRAWARC <i>CENTERX</i> <i>CENTERY</i> <i>RADIUS</i> <i>STARTANGLE</i> <i>NDEGREES</i> <i>BRUSH</i> <i>DASHINGSTREAM</i>)	[Function]
--	------------

Draws an arc of the circle whose center point is (*CENTERX* *CENTERY*) and whose radius is *RADIUS* from the position at *STARTANGLE* degrees for *NDEGREES* number of degrees. If *STARTANGLE* is 0, the starting point will be (*CENTERX* (*CENTERY* + *RADIUS*)). If *NDEGREES* is positive, the arc will be counterclockwise. If *NDEGREES* is negative, the arc will be clockwise. The other arguments are interpreted as described in **DRAWCIRCLE**.

Section 27.8 Miscellaneous Drawing and Printing Operations

(III:27.20)

To have a filled polygon print correctly, set the global variable **PRINTSERVICE** to floating point value 9.0 for printers running Services 9.0 or later.

When using **FILLPOLYGON** to be sent to Xerox 8044 Interpress printers, the global variable **PRINTSERVICE** must be set to the same value as the Print Service installed on your printer, currently either 8.0, 9.0 or 10.0. Thus, if your printer is running Print Service 9.0, you must set the global variable **PRINTSERVICE** to the floating

point value 9.0. This works around an incompatible change in the Xerox 8044 Interpress implementation.

In Medley, Interpress curves are now rendered at a lower accuracy, allowing faster hardcopy. The spline is now rendered at 1/150 inch; in Lyric it was 1/300 inch.

The following function was omitted from previous version of the *Interlisp-D Reference Manual*:

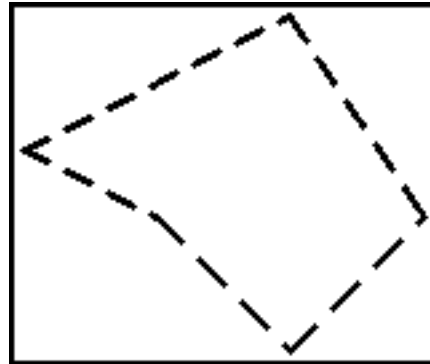
(DRAWPOLYGON POINTS CLOSED BRUSH DASHING STREAM) [Function]

Draws a polygon on the image stream *STREAM*. *POINTS* is a list of positions to which the figure will be fitted (the vertices of the polygon). If *CLOSED* is non-NIL, then the starting position is specified only once in *POINTS*. If *CLOSED* is NIL, then the starting vertex must be specified twice in *POINTS*. *BRUSH* and *DASHING* are interpreted as described in Chapter 27 of the *Interlisp-D Reference Manual*.

For example,

```
(DRAWPOLYGON ' ((100 . 100) (50 . 125)
                (150 . 175) (200 . 100) (150 . 50))
              T ' (ROUND 3) ' (4 2) XX)
```

would draw a polygon like the following on the display stream XX.



(III:27.20)

The function **FILLPOLYGON** contains two new arguments, *OPERATION* and *WINDNUMBER*. The new form for the function, and definitions for added arguments, follow.

(FILLPOLYGON POINTS TEXTURE OPERATION WINDNUMBER STREAM) [Function]

OPERATION is the **BITBLT** operation (see page 27.15 in the *Interlisp-D Reference Manual*) used to fill the polygon. If the *OPERATION* is **NIL**, the *OPERATION* defaults to the *STREAM* default *OPERATION*.

WINDNUMBER is the number for the winding rule convention. This number is either 0 or 1; 0 indicates the "zero" winding rule, 1 indicates the "odd" winding rule.

When filling a polygon, there is more than one way of dealing with the situation where two polygon sides intersect, or one polygon is fully inside the other. Currently, **FILLPOLYGON** to a display stream uses the "odd" winding rule, which means that intersecting polygon sides define areas that are filled or not filled somewhat like a checkerboard. For example,

```
(FILLPOLYGON ' ((125 . 125) (150 . 200) (175 . 125)
                (125 . 175) (175 . 175))
  GRAYSHADE WINDOW)
```

would produce a display something like this:



This fill convention also takes into account all polygons in *POINTS*, if it specifies multiple polygons.

Section 27.12 Fonts

A revised set of font printing metrics is a part of the Lyric release of Lisp. Note that Koto font files are still available to users who request them.

With the revised font set the interline spacing (line leading) is now consistent across all fonts within a point size. Previously, text with multiple fonts (but with the same point size, i.e., if a word were made bold or italic, or if the family were changed) would have different leading on different lines. The new .WD files clean up document appearance.

Note that these printer metric changes affect only hardcopy, not the display. The contents of the display fonts are essentially unchanged in Lyric.

Generally, line leading in the Lyric font files is tighter than in previous releases of the fonts. The default line leading is now the same as the font's nominal point size. As a consequence of the above, any text file (one not already formatted for Interpress) which is printed after installation of the new fonts will be formatted to a different length. This means that decisions regarding TEdit line leading, widows and orphans, left/right pages, references to page numbers, etc. will need to change. Koto documentation produced by users may need to be reformatted with different line leading, using the new fonts.

All of the font files now have a new naming scheme, which allows **FONTSAVAILABLE** to be able to do more accurate pattern matching. For example, the display font file for modern 8 bold italics used to be named:

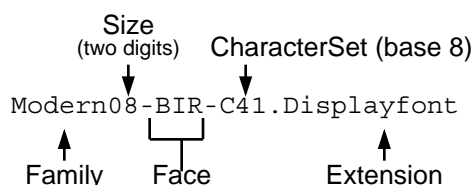
```
Modern8-B-I-C41.Displayfont
```

The file is now named:

```
Modern08-BIR-C41.Displayfont
```

In general font files use the following format:

The family name (e.g., Modern); a two digit size (e.g., 08); a three letter Face (e.g., BIR, for Bold Italic Regular); the letter C followed by the font's character set in base 8 (e.g., C41); and finally an extension (e.g., Displayfont).



The old file naming convention is still supported, however, with the exception of the old Strike file naming convention. In Lyric, **FONTCREATE** will first search for fonts using the new font naming convention, and if the desired font is not found it will search using the Koto convention.

Compatibility considerations You can continue using the old printer metrics (.WD files) in Lyric, thus preserving document looks between Koto and Lyric. If you choose to do so, it is recommended that you rename your old .WD files to the new naming scheme (see above), so that you benefit from the changes to the font searching mechanisms. However, we strongly urge you to use the new .WD files. Otherwise, if you exchange TEdit documents with a site that is using the new files, the documents will print differently at the two sites. The creation date, rather than the naming convention, determines whether a .WD file represents the old or new format.

If, after installing the new .WD files, you wish to print a document using the old Koto formatting, make the font variable **INTERPRESSFONTDIRECTORIES** point to a directory containing the Koto font files. Also any Lyric printer font file information must be uncached from the sysout. To uncache the fonts, perform

```
(for INFO in (FONTSAVAILABLE '* '* '* '* '*
                  'INTERPRESS)
  do (APPLY 'SETFONTDIRECTORIES INFO))
```

(III:27.30)

(STRINGWIDTH STR FONT FLG RDTBL)

[Function]

In Lyric **STRINGWIDTH** observes ***PRINT-LEVEL*** and ***PRINT-LENGTH***.

In Medley, **STRINGWIDTH** with a NIL argument no longer returns the string width of the string with ***STANDARD-OUTPUT*** font. It now uses **DEFAULTFONT**.

Some new font manipulation functions have been added to Lisp. They are:

(WRITESTRIKEFONTFILE FONT CHARSET FILENAME)

[Function]

Takes a display font font descriptor and a character set number, and writes that character set into a file suitable for reading in again. Note that the font descriptor's current state is used (which was perhaps modified by **INSPECT**ing the datum), so this provides a mechanism for creating/modifying new fonts.

For example:

```
(WRITESTRIKEFONTFILE (FONTCREATE 'GACHA 10) 0
  '{DSK}Magic10-MRR-C0.DISPLAYFONT)
```

writes a font file which is identical in appearance to the current state of Gacha 10 charset 0.

If your DISPLAYFONTDIRECTORIES includes {DSK}, then a subsequent (FONTCREATE 'MAGIC 10) will create a new font descriptor whose appearance is the same as the old Gacha font descriptor.

However, the new font is identical to the old one in appearance only. The individual datatype fields and bitmap may not be the same as those in the old font descriptor, due to peculiarities of different font file formats.

Section 27.13 Font Files and Font Directories

(III:27.31)

Press fonts are not part of the sysout since PRESS is now a Library module.

Section 27.14 Font Classes

(III:27.32-27.48)

This section has been expunged from the *InterLisp-D Reference Manual*. Renumber the sections which followed the old Section 27.14 as

SECTION 27.15 ⇒ SECTION 27.14 Font Profiles

SECTION 27.16 ⇒ SECTION 27.15 Image Objects

SECTION 27.17 ⇒ SECTION 27.16 Implementation of Image Streams

Section 27.14 Font Profiles

(III:27.34)

The variable **FONTCHANGEFLG** has an additional value, **ALL**. **FONTCHANGEFLG=ALL** indicates that all calls to **CHANGEFONT** are executed.

(III:27.33-34)

The function **FONTNAME** no longer exists. This function was previously used in Interlisp-D to collect the names and values of variables on **FONTDEFSVARS**. The variable **FONTDEFSVARS** is no longer used; it was appropriate when most output devices were fixed-pitch, "line-printer" style devices, but is not suitable for use when most output devices are laser printers.

Chapter 28 Windows and Menus

Section 28.4 Windows

(III:28.13, 28.38)

The **ADDMENU** function will change a window's **RESHAPEFN** and also will change the window's **REPAINTFN**.

Section 28.4.5 Reshaping Windows

(III:28.17)

The Lisp window system allows the following minimum window sizes:

When creating a new window, the width and height specified must be at least 9, or else you will get an error "region too small to use as a window"

When reshaping a window, the smallest shape you can get is width = 26 and height = height of the font to be used in the window. If you specify a smaller region, **SHAPEW** will simply adjust it to fit these limits.

Section 28.4.8 Shrinking Windows Into Icons

(III:28.22)

SHRINKFN

[Window property]

In previous releases, there was a bug in the attached window system such that if an attached window had a **SHRINKFN** of the single symbol DON'T, attempting to shrink the window resulted in a break with the message "UNDEFINED FUNCTION DON'T." For this case in Lyric, all windows that can be shrunk will be, while those windows with a **SHRINKFN** of the symbol DON'T will be left open.

To facilitate the management of window regions, the window property **EXPANDREGIONFN** has been added to Lisp. This feature allows applications to arrange for reshaping a window when it is expanded.

EXPANDREGIONFN

[Window property]

EXPANDREGIONFN, if non-NIL, should be the function to be called (with the window as its argument) before the window is actually expanded.

The **EXPANDREGIONFN** must return **NIL** or a valid region, and must not do any window operations (e.g., redisplaying). If **NIL** is returned, the window is expanded normally, as if the **EXPANDREGIONFN** had not existed. The region returned specifies the new region for the main window only, not for the group including any of its attached windows. The window will be opened in its new shape, and any attached windows will be repositioned or rejustified appropriately. The main window must have a **REPAINTFN** which can repaint the entire window under these conditions.

As with expanding windows normally, the **OPENFN** for the main window is not called.

Also, the window is reshaped without checking for a special shape function (e.g., a **DOSHAPEFN**).

(III:28.23)

Add the variable **DEFAULTICONFN** to the Icon section of the *InterLisp-D Reference Manual*:

DEFAULTICONFN

[Variable]

Changes how an icon is created when a window having no **ICONFN** is shrunk or when **SHRINKW**, with a *TOWHAT* argument of a string, is called. The value of **DEFAULTICONFN** is a function of two arguments (window text); text is either **NIL** or a string. **DEFAULTICONFN** returns an icon window.

The initial value of **DEFAULTICONFN** is **MAKETITLEBARICON**. It creates a window that is a title bar only; the title is either the text argument, the window's title, or "Icon made <date>" for titleless windows. **MAKETITLEBARICON** places the title bar at some corner of the main window.

An alternative behavior is available by setting **DEFAULTICONFN** to be **TEXTICON**. **TEXTICON** creates a titled icon window from the text or window's title. It is described further in Appendix B (ICONW).

(III:28.23)

You can now copy-select titled icons such as those used by FileBrowser, SEdit, TEdit, Sketch. The default behavior is that the icon's title is unread (via **BKSYSBUF**), but if the icon window has a **COPYFN** property, that gets called instead, with the icon window as its argument. For example, if the name displayed in an icon is really a symbol, and you want copy selection to cause the name to be unread correctly with respect to the package and read table of the exec you are copying into, you could put the following **COPYFN** property on the icon window:

```
(lambda (window)
  (il:bksysbuf <fetch symbolic name from window> t))
```

Section 28.4.11 Terminal I/O and Page Holding

(III:28.29)

TTYDISPLAYSTREAM has been fixed so that it can be successfully used with non-windows.

Section 28.5 Menus

Two features have been added to this section, **ICONW** for creating icons, and **FREE MENU**, for creating and using free menus. Both features were formerly part of the Lisp Library.

The description for **ICONW** is in Appendix C. The **FREE MENU** description is in Appendix D.

The Lyric version of Free Menu differs in some respects from the Koto version of Free Menu. Following is a description of the incompatible feature changes from the old version to the new version of Free Menu. Some of the terminology used in these

notes is introduced in the Free Menu documentation found in Appendix B. Please reference Appendix B before reading the following notes.

- The function **FREEMENU** is used to create a Free Menu, replacing and combining the functions **FM.MAKEMENU** and **FM.FORMATMENU**.

The description of Free Menu has these changes:

1. There is no longer a **WINDOWPROPS** list in the Free Menu Description. Instead, the window properties **TITLE** and **BORDER** that were previously set in the **WINDOWPROPS** list can now be passed to the function **FREEMENU**. Other window properties (like **FM.PROMPTWINDOW**) can be set directly after Free Menu returns the window using the system function **WINDOWPROP**. See Appendix B, Section 28.7.14, Free Menu Window Properties.
2. Setting the initial state of an item is now done with the item property **INITSTATE** in the item description, rather than the **STATE** property.

Free Menu Items has been modified as follows:

1. **3STATE** items now have states **OFF**, **NIL**, and **T** (instead of a **NEUTRAL** state). They appear by default in the **NIL** state.
2. **STATE** items are general purpose items which maintain state, and replace the functionality of **NCHOOSE** items. To get the functionality of **NCHOOSE** items, specify the property **MENUITEMS** (a list of items to go in a popup menu), which instructs the **STATE** item to popup the menu when it is selected. **STATE** items do not display their current state by default, like **NCHOOSE** items used to. Instead, if you want the state displayed in the Free Menu, you have to link the **STATE** item to a **DISPLAY** item using a Free Menu Item Link named "DISPLAY". The current state of the **STATE** item will then automatically be displayed in the specified **DISPLAY** item. The item properties **MENUFONT** and **MENUTITLE** also apply to the popup menu.
3. **NWAY** items are declared slightly differently. There is now the notion of an NWay Collection, which is a collection of items acting as a single nway item. The Collection is declared by specifying any number of NWay items, each with the same **COLLECTION** property. NWay Collections have properties themselves, accessible by the macro **FM.NWAYPROPS**. These properties can be specified in property list format as the value of the **NWAYPROPS** Item Property of the first NWay item declared for each Collection. NWay Collections by default cannot be deselected (a state in which no item selected). Setting the Collection property **DESELECT** to any non-nil value changes this behavior. The state of the NWay Collection is maintained in its **STATE** property.
4. **EDIT** items no longer will stop at the edge of the window. Editing is either restricted by the **MAXWIDTH** property, or else it is not restricted at all. The **EDITSTOP** property is obsolete.

When you start editing with the right mouse button the item is first cleared.

5. **EDITSTART** items now specify their associated edit item (there can only be one, now) by a Free Menu Item Link named "EDIT" from the **EDITSTART** item to the **EDIT** item.
6. **TITLE** items are replaced by **DISPLAY** items, which work the same way.

With Free Menu, the item interface functions can take the actual item datatype, the item's *ID* or *LABEL*, or a list of the form (**GROUPID** *ITEMID*) specifying a particular item in a group, as the *ITEM* argument.

The description for **ICONW** is in Appendix B. The **FREE MENU** description is in Appendix C.

These changes have occurred in the Free Menu Interface functions:

(FREEMENU DESCRIPTION TITLE BACKGROUND BORDER) [Function]

Replaces **FM.MAKEMENU** and **FM.FORMATMENU**. The desired format is not specified as the value of the **FORMAT** property in the group's PROPS list.

(FM.GETITEM ID GROUP WINDOW) [Function]

Replaces **FM.ITEMFROMID**.

Searches within *GROUP* for an item whose ID property is *ID*.

ID is matched against the item ID and then the item **LABEL**. If *GROUP* is **NIL**, the entire menu is searched.

(FM.GETSTATE WINDOW) [Function]

Replaces **FM.READSTATE**.

Returns a property list of the selected item in the menu. This list now also includes the NWay Collections and their selected item.

(FM.CHANGELABEL ITEM NEWLABEL WINDOW UPDATEFLG) [Function]

Has a new argument order. Now works by rebuilding the item label from scratch, taking the original specification of **MAXWIDTH** and **MAXHEIGHT** into account. *NEWLABEL* can be an atom, string, or bitmap. If *UPDATEFLG* is set, then the Free Menu Group's regions are recalculated, so that boxed groups will be redisplayed properly.

(FM.CHANGESTATE X NEWSTATE WINDOW) [Function]

Has a new argument order.

X is either an item or an NWay Collection ID. *NEWSTATE* is an appropriate state to the type of item. If an NWay collection, *NEWSTATE* is the actual item to be selected, or **NIL** to deselect. Toggle items take either **T** or **NIL** as *NEWSTATE*, and **3STATE** items take **OFF**, **NIL**, or **T**, and **STATE** items take any atom, string, or bitmap as their new state. For **EDIT** items, *NEWSTATE* is the new label, and **FM.CHANGELABEL** is called to change the label of the **EDIT** item.

(FM.RESETSHAPE WINDOW ALWAYSFLG) [Function]

Replaces **FM.FIXSHAPE**

(FM.HIGHLIGHTITEM ITEM WINDOW)

[Function]

Replaces **FM.SHADEITEM** and **FM.SHADEITEMBM**.

FM.HIGHLIGHTITEM will programmatically highlight an item, as specified by its **HIGHLIGHT** property. The highlighting is temporary, and will be undone by a redisplay or scroll. To programmatically shade an item an arbitrary shade, use the new function **FM.SHADE**.

Section 28.6.2 Attached Prompt Windows

(GETPROMPTWINDOW MAINWINDOW #LINES FONT DONTCREATE

[Function]

In the Lyric release, the prompt window created by **GETPROMPTWINDOW** is *not* independently closeable, as it was in Koto. That is, selecting **Close** from the right-button window menu in the prompt window is the same as selecting it from the menu of any other window in the group—the entire window group is closed.

Section 28.6.3 Window Operations and Attached Windows

(III:28.51)

Communication of Window Menu Commands between Attached Windows is dependent on the name of function used to implement the window command, e.g., **CLOSEW** implements **CLOSE** (refer to **PASSTOMAINCOMS** documentation under Attached Windows). Consequently, if an application intercepts a window command by changing **WHENSELECTEDFN** for an item in the WindowMenu (for example, to advise the application that a window is being closed), windows may not behave correctly when attached to other windows.

To get around this problem, the Medley release provides the variable `*attached-window-command-synonyms*`. This variable is an ALIST, where each element is of the form (new-command-function-name . old-command-function-name).

For example, if an application redefines the WindowMenu to call `my-close-window` when **CLOSE** is selected, that application should:

```
(cl:push      '(my-close-window      .      il:closew)
il:*attached-window-command-synonyms*)
```

in order to tell the attached window system that `my-close-window` is a synonym function for **CLOSEW**.

Chapter 29 Hardcopy Facilities

(III:29.3)

The **HARDCOPYW** function now has an additional argument, **HARDCOPYTITLE**, which allows you to change or eliminate the

"Window Image" message on IP screen images. Moreover, **HARDCOPYW** function now allows you to print large images occupying more than one page.

**(HARDCOPYW WINDOW/BITMAP/REGION FILE HOST SCALEFACTOR ROTATION
PRINTERTYPE HARDCOPYTITLE)** [Function]

HARDCOPYTITLE is a string specifying a title to print on the page containing the screen image. If *NIL*, the string "Window Image" is used. To omit a title, specify the null string.

Chapter 30 Terminal Input/Output

Section 30.1 Interrupt Characters

(III:30.2)

- | | |
|-----------|--|
| Control-P | The Control-P (PRINTLEVEL) interrupt is no longer supported. The interrupt of that name still exists and is defaultly assigned to Control-P, but has no effect on printing. |
| Control-T | The Control-T interrupt flashes the window belonging to the tty process and prints its status information in the prompt window. This avoids disrupting the user typescript. |

(III:30.3)

(INTERRUPTCHAR CHAR TYP/FORM HARDFLG —) [Function]

If the argument *TYP/FORM* is a symbol designating a predefined system interrupt (**RESET**, **ERROR**, **BREAK**, etc), and *HARDFLG* is omitted or **NIL**, then the hardness defaults to the standard hardness of the system interrupt (e.g., **MOUSE** for the **ERROR** interrupt).

Section 30.2.3 Line Buffering

(III:30.11-12)

The **BKSYSBUF** function has been changed, for compatibility reasons. The description now reads as follows:

(BKSYSBUF X FLG RDTBL) [Function]

BKSYSBUF appends the **PRIN1**-name of *X* to the system input buffer. The effect is the same as though the user had typed *X*. Returns *X*.

If *FLG* is *T*, then the **PRIN2**-name of *X* is used, computed with respect to the readtable *RDTBL*. If *RDTBL* is **NIL** or omitted, the current readtable of the TTY process (which is to receive the characters) is used. Use this for copy selection functions that want their output to be a readable expression in an Exec.

Note that if you are typing at the same time as the **BKSYSBUF** is being performed, the relative order of the typein and the characters of *X* is unpredictable.

(III:30.12)

Add the function **BKSYSCHARCODE** used in line buffering:

(BKSYSCHARCODE CODE) [Function]

This function appends the character code *CODE* to the system input buffer. The function **BKSYSBUF** is implemented by repeated calls to **BKSYSCHARCODE**.

Section 30.4.1 Changing the Cursor Image

(III:30.14)

The **CURSOR** record has been changed to a DATATYPE, and its field names have changed in the following way:

<u>Old Field Name</u>	<u>New Field Name</u>
CURSORBITMAP	CUIMAGE
CURSORHOTSPOTX	CUHOTSPOTX
CURSORHOTSPOTY	CUHOTSPOTY

The **CURSORHOTSPOT** field no longer exists; its value can be fetched by composing **CUHOTSPOTX** and **CUHOTSPOTY** into a **POSITION**, or stored by destructuring a **POSITION** into those fields.

In Lyric, the **CURSORCREATE** function accepted as its argument bitmaps of any size, but caused an obscure error. In Medley, a bitmap that is bigger than 16 high or 16 wide will cause an ILLEGAL ARGUMENT error.

Section 30.5 Keyboard Interpretation

(III:30. 19–20)

(KEYDOWNP KEYNAME) [Function]

(KEYACTION KEYNAME ACTIONS —) [Function]

KEYNAME is interpreted differently in Lyric: If *KEYNAME* is a small integer, it is taken to be the *internal* key number. Otherwise, it is taken to be the name of the key. This means, for example, that the name of the "6" key is not the number 6. Instead, spelled-out names for all the digit keys have been assigned. The "6" key is named SIX. It happens that the key number of the "6" key is 2. Therefore, the following two forms are equivalent:

(KEYDOWNP 'SIX)

(KEYDOWNP 2)

Note: The key labeled HELP on the 1186 is named DBK-HELP for use in KEYACTION.

Section 30.6 Display Screen

(III:30.22-23)

(CHANGEBACKGROUND SHADE —) [Function]

The function **CHANGEBACKGROUND** treats the *SHADE* argument as a 4 X 4 texture. The **CHANGEBACKGROUND** function, on the other hand, treats the *SHADE* argument as a 2 X 8 texture.

Therefore, note that the same *SHADE* argument, when used by the two functions, will not necessarily produce the same background and border shades on the display screen.

(III:30.23)

The **VIDEORATE** function works only on the 1108. Append the following note to the **VIDEORATE** function description:

(VIDEORATE TYPE)

[Function]

Note: **VIDEORATE** does not work on the 1186.

Section 30.7 Miscellaneous Terminal I/O

(III:30.24)

(BEEPON FREQ)

[Function]

The argument *FREQ* is measured in hertz, not in **TICKS**.

Chapter 31 Ethernet

Section 31.3.1 Name and Address Conventions

(III:31.8-9)

Amend the first paragraph, describing **NSADDRESS**, to list, in order, the components of **NSADDRESS**:

Addresses of hosts in the NS world consist of three parts, a network number, a machine number, and a socket number. These three parts are embodied in the Interlisp-D data type **NSADDRESS**. The components of **NSADDRESS** are 32-bit network, 48-bit host, 16-bit socket.

Move the following sentence from page 31.9 of the *IRM* to the last paragraph of Name and Address Conventions on page 31.8:

If you wish to manipulate **NSADDRESS** and **NSNAME** objects directly you should load the Lisp Library Module **ETHERRECORDS**.

NS Address Format

In Medley, you can now specify NS addresses in decimal notation, the form presented by the Chat interface of Network Services software. In this notation, a decimal number is broken up by hyphens every 3 digits, much like commas in standard American numerical notation. You can also specify a full 48-bit host number in octal without breaking it into 16-bit segments.

An NS address is specified in the form:

net#host#socket

If the address contains a hyphen in any field, the entire address is interpreted in decimal; otherwise in octal. The field *socket* is optional, and is defaulted appropriately for the application; if specified, it is a single integer in the same radix as the rest of the address. The field *net* and its terminating # are optional, defaulting usually to the directly-connected network. The fields *net* and *host* are non-negative integers written in one of three forms:

- A sequence of 16-bit octal numbers, separated by periods.
- A single integer in octal radix.
- A sequence of 3-digit decimal numbers, separated by hyphens.

The special variable ***NSADDRESS-FORMAT*** specifies the form used whenever the system prints an NS address object. Its possible values are:

NIL Octal radix, with the host number in three 16-bit parts, the same as in Lyric.

:OCTAL Octal radix without separators.

:DECIMAL Decimal radix with hyphens.

For example, the following all represent the same address, in the three formats listed above:

1750#0.125000.76771#

1750#25200076771#

1-000#2-852-158-969#

The following functions exist for manipulating NS addresses:

(PARSE-NSADDRESS STR DEFAULTSOCKET) [Function]

Parses the string *STR* into an NS address by the rules listed above, or returns NIL if *STR* is not a well-formed address. If *DEFAULTSOCKET* is non-NIL and the string does not include a socket field, the socket of the resulting NS address is set to *DEFAULTSOCKET*.

(COERCE-TO-NSADDRESS HOST DEFAULTSOCKET) [Function]

Returns an NSADDRESS object corresponding to *HOST*, or NIL if it can't. This function should be called by any software wanting to convert a user-supplied NS host specification into a network address. *HOST* can be any one of the following:

- The name of a host, whose address is found by consulting the Clearinghouse data base.
- A symbol or string in the syntax of an NS address, as described above.
- An NSADDRESS object.
- A list of the form (NSHOSTNUMBER *a b c*), specifying the host number as three 16-bit values. In this case, the network number is omitted (zero).

If *DEFAULTSOCKET* is non-NIL and the socket is unspecified, the socket of the result is set to *DEFAULTSOCKET* (if *HOST* is an NSADDRESS object, it is copied in this case).

Network Routing Maintenance

The representation of Pup and NS routing tables has changed, and the background gateway listener processes have been tuned to significantly reduce their overhead.

The INFO command for the Pup and NS gateway listener processes in the process status window now display their routing tables. Clicking with the left button displays the table in random order, middle button displays the table sorted by network number (this takes a little longer).

Section 31.3.2 Clearinghouse Functions

(III:31.9)

The variable **AUTHENTICATION.NET.HINT** has been added to Clearinghouse Functions. It follows the **CH.NET.HINT** variable in the *Interlisp-D Reference Manual*.

AUTHENTICATION.NET.HINT

[Variable]

AUTHENTICATION.NET.HINT can be set to **CH.NET.HINT** to speed up the initial authentication connection. Its value is interpreted in the same manner as **CH.NET.HINT**.

Section 31.3.3 NS Printing

(III:31.12)

With the Medley release there is now a single Printer Watcher process for all NS printers. This means you won't get a stack overflow if you hardcopy many files in quick succession.

Section 31.3.5.3 Performing Courier Transactions

(III:31.20-21)

The **COURIER.OPEN** function requires that a courier server be running on the host machine.

Section 31.3.5.3.3 Using Bulk Data Transfer

(III:31.24-25)

The following is a correction and clarification to the description in the *Interlisp-D Reference Manual* of receiving values from a bulk data transfer:

It is possible for a Courier procedure to return both bulk data, in the form of a bulk data sink, and a single value (or list of values) as the normal result of the call. However, the Lisp function **COURIER.CALL** only returns one value, either the bulk data stream (when the bulk data sink argument is NIL) or the regular value. There are two principal ways in which a caller can obtain both values.

The usual way to get both values is to pass a function as the bulk data argument, have it retrieve the bulk data and process it as a side-effect (e.g., store it into a variable bound around the **COURIER.CALL**), then return NIL so that the procedure's returned value is returned from **COURIER.CALL**.

The other way, which is documented incorrectly in the *IRM*, is to pass NIL as the bulkdata argument, thus getting the bulk data stream back from **COURIER.CALL**, process the stream, and then get the procedure's returned value by closing the stream. Contrary to the *IRM*, however, you have to close the bulk data stream using its internal close function, **SPP.CLOSE**, rather than the user-level function **CLOSEF**, which consumes the value internally and returns only the stream.

Section 31.5 Pup Level One Functions

\10MBTYPE.PUP	[Variable]
\10MBTYPE.3TO10	[Variable]

The values of these variables are the 10MB Ethernet encapsulation types for PUP packets and Pup-to-10MB address translation packets, respectively. The initial values of these variables are 512 and 513, respectively. However, these values are illegal for an Ethernet conforming to IEEE 802.3 specifications.

New encapsulation types have been defined for IEEE 802.3 networks. To use them, set the variable **\10MBTYPE.PUP** to 2560 (decimal) and **\10MBTYPE.3TO10** to 2561. Then call either **(RESTART.ETHER)** or **(LOGOUT)**, so that the Ethernet code can reinitialize itself. It may be convenient for a site to smash these values directly into the standard sysout everyone fetches by using the function **READSYS** and its ^v command from the TeleRaid Library module (the sysout must be on disk or a random-access file server). Note that *all* pup hosts on a network (servers as well as workstations) must simultaneously choose to use the new values; those using different values will be unable to communicate with each other. The System Tool must also be upgraded at the same time.

Section 31.6.1 Creating and Managing XIPs

The function NSNET.DISTANCE was previously undocumented.

(NSNET.DISTANCE NET#)	[Function]
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Returns the "hop count" to network *NET#*, i.e., the number of gateways through which an XIP must pass to reach *NET#*, according to the best routing information known at this point. The local (directly-connected) network is considered to be zero hops away. Current convention is that an inaccessible network is 16 hops away. **NSNET.DISTANCE** may need to wait to obtain routing information from an Internetwork Router if *NET#* is not currently in its routing cache.

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