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DL CSCI (4)**

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1 INTRODUCTION : DATA LOGGER CSCI DESCRIPTION

1.1 Background

The Data Logger is a network management tool that captures the events of an exercise run over the network by recording the SIMNET Protocol Data Units (PDU) that were sent by all of the participants. One of the principles of distributed simulation is that individual participants in an exercise receive all the relevant data about other participants via the network. In addition, each participant is responsible for providing local state information to others via the network. Therefore, by saving the network traffic of an exercise it is possible to recreate the activity of the exercise by playing back the recorded events. This allows observers and participants to move freely through the logged exercise and re-evaluate their performance.

By analyzing the logged events, a post exercise evaluation can be performed. This data analysis activity uses the file saved by the data logger to perform off line processing on the network traffic and produce generic and tailored reports. The generic report typically attributes battlefield victories by individual participants in summary form. A tailored report could take any format, but is typically used to evaluate the detailed status and performance of an individual vehicle in the exercise.

The data logger control can be via a standard terminal interface, or remote via a client on the network. Control options include record, playback, fast-forward, rewind, and storage media (i.e. record to disk or tape).

This document is intended to provide a "roadmap" through the Data Logger code. It is divided into four sections. Section 1 will provide a high level functional description of the Data Logger CSCI. It will describe the interfaces of this CSCI with other CSCI's in the system as well as the internal structure of the Data Logger CSCI.

Section 2 will describe each of the CSC's which make up the Data Logger CSCI. Each CSC is broken down into its component CSU's based on the functionality of the code. Section 2.1 describes the libraries which contain tools and utilities that are used to interact with SIMNET. Section 2.2 contains information about the code that runs the Data Logger including the facilities that allow the person running the Data Logger to playback, record, etc.

Section 3 will describe the resources which are utilized by the Data Logger, and Section 4 will contain the source code listings.

1.2 External Interfaces

The data logger processes all external communications via the SIMNET network. The standard procedure for the logger is to be recording the data on the network, or to be playing recorded data back in a time sequenced manner. The logger can be controlled by a client, typically the Plan View Display (PVD) using a protocol specifically designed for this purpose.

When the Data Logger is used in stand alone mode, data is received from SIMNET when recording, and data is sent through SIMNET when playing back. When the Data Logger is used in server mode, data is received through SIMNET when recording, and data is sent to the client (usually the PVD) through SIMNET when playing back. Communications

between the client and the Data Logger are sent exclusively through SIMNET using a special protocol described in Table 1.2-1. This communications scheme is shown in Figure 1.2-1.

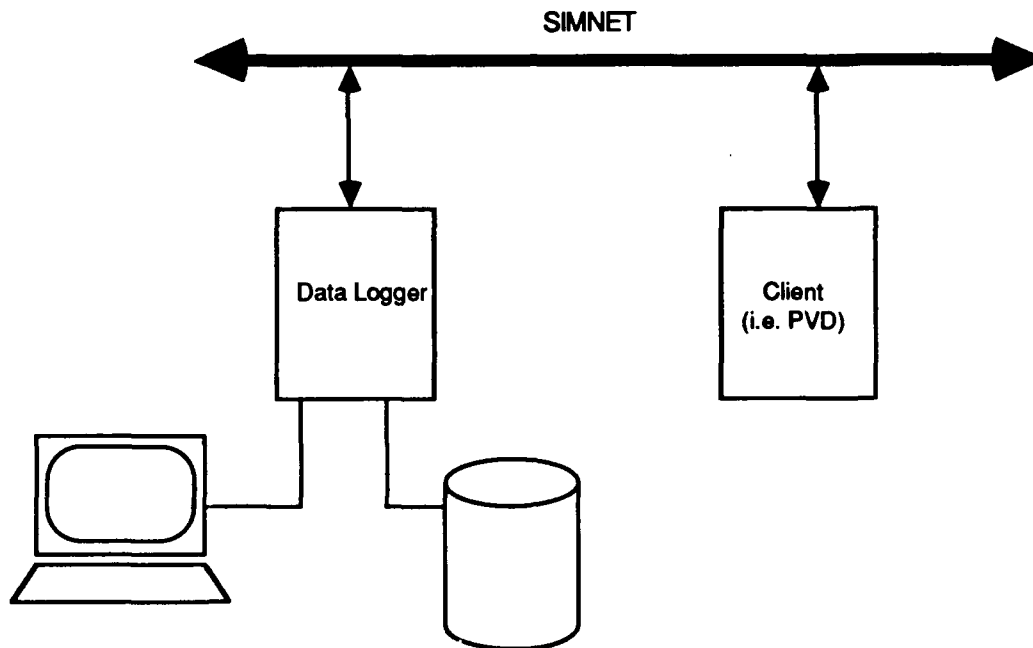


Figure 1.2-1: Communications Scheme

PDU Protocol Data Unit	CSCI Received From	CSCI Sent To	In Response To	Protocol Type	Transaction Type
loggerAvail RequestPDU Kind	Client (PVD)	Data Logger	Searching for an available Data Logger	Logger	Broadcast Datagram
logger Connect RequestPDU Kind	Client (PVD)	Data Logger	Requesting connection with specific Data Logger	Logger	ptpDatagram
logger Command Request PDUKind	Client (PVD)	Data Logger	Specifying runtime commands	Logger	ptpDatagram
loggerStatusRequest PDUKind	Client (PVD)	Data Logger	Gathering information about current operating status	Logger	ptpDatagram
logger Disconnect Request PDUKind	Client (PVD)	Data Logger	Terminate Connection of Data Logger	Logger	ptpDatagram
loggerAckPDU Kind	Data Logger	Client (PVD)	Reply to successful client requests	Logger	ptpDatagram
loggerNak PDUKind	Data Logger	Client (PVD)	Reply to Failed client requests	Logger	ptpDatagram
loggerAvail Reply PDUKind	Data Logger	Client (PVD)	Reply to client availability requests	Logger	ptpDatagram
loggerStatus Reply PDUKind	Data Logger	Client (PVD)	Reply to client status requests	Logger	ptpDatagram
logger Information PDUKind	Data Logger	Client (PVD)	Communicate unsolicited information to the client	Logger	ptpDatagram
loggerClock TickPDUKind	Data Logger	Client (PVD)	Communicate timing information to client	Logger	ptpDatagram
loggerLast PDUKind	Data Logger	Client (PVD)		Logger	ptpDatagram

Table 1.2-1: PDU's Used by the Data Logger

1.3 Internal Structure

When the Data Logger application is run it first interprets command line switches and allocates the system resources needed to execute. The resources vary depending on whether the exercise is being logged (or played back from) a tape or a disk file. The logger then enters a command mode where it interprets client commands such as record, play, or fast forward.

A standard 'fast input/output' library was developed to enable the logger application to service the disk or the tape in a transparent manner. This allows the same entry points to be used by the logger application regardless of the media that is accessed.

In systems that have a 9-track tape drive, a second CPU is often used to handle the tape drive processing. This allows the main process to service the network in a timely manner and not be tied up pending on the relatively slow tape device.

The structure of the Data Logger is shown in Figure 1.3-1. The Data Logger software consists of a set of shared libraries and the Data Logger files.

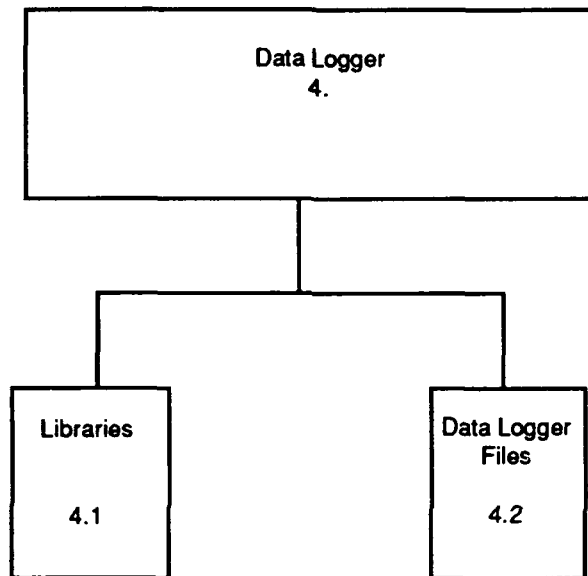


Figure 1.3-1: Data Logger CSCI Structure

The following two (2) CSC's are associated with this CSCI:

Libraries
Data Logger Files

1.4 Configuration and Configuration Management

The Data Logger program host is an MC 5600 MASSCOMP™ computer. The software for the Data Logger functions is written in C.

1.5 Terminology and Documentation

The following documents provide additional information about the Data Logger system:

- SIMNET Data Collection/Data Review, October 1989
- The SIMNET Network and Protocols, Arthur R. Pope, July, 1989

2 CSC DESCRIPTIONS

2.1 Libraries

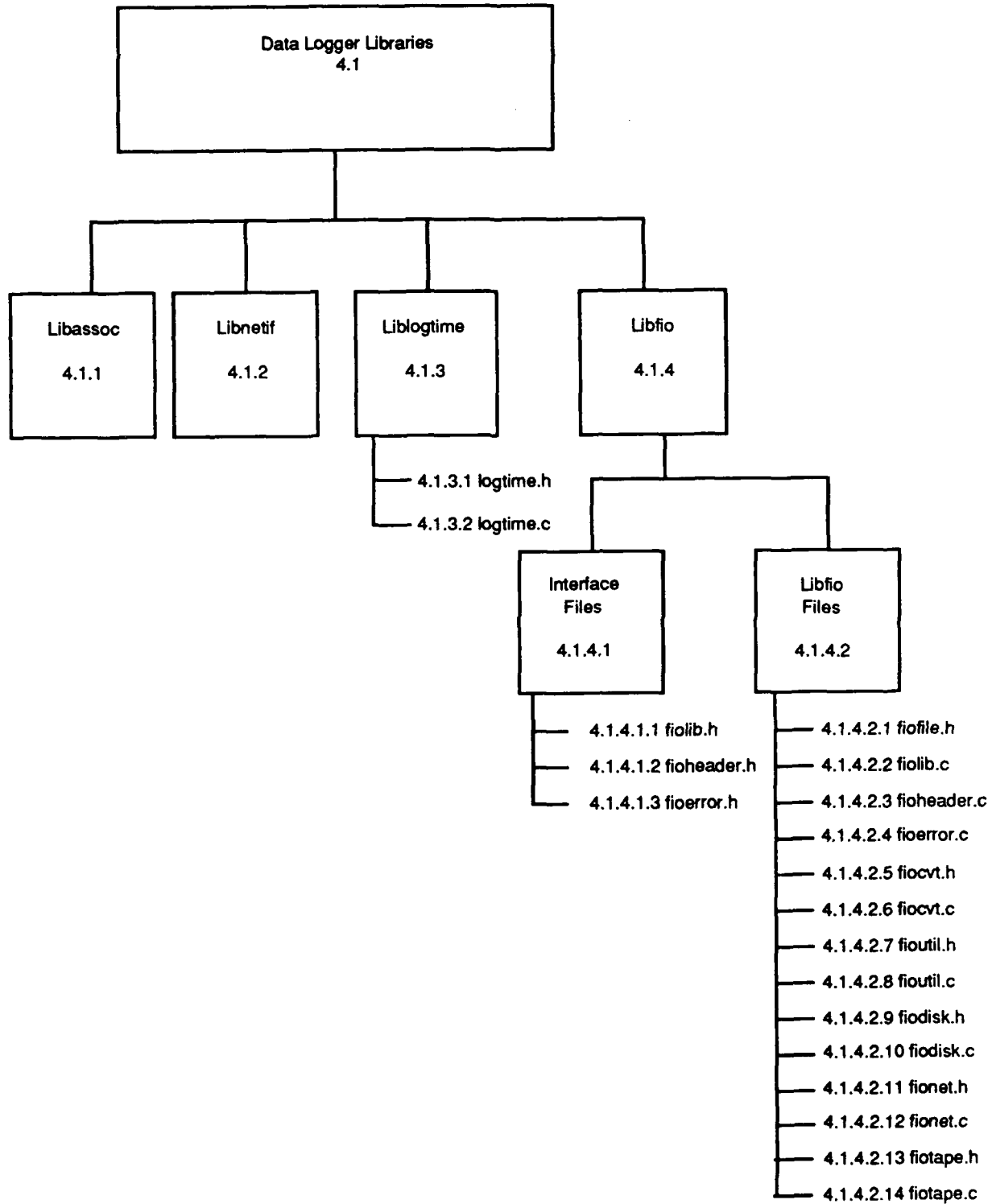


Figure 2.1-1: Data Logger Libraries Software Structure

2.1.1 libassoc

Association Layer

The SIMNET Association Layer provides network services to send/receive datagrams, and exactly once (xo) transactions. It also provides a subscription service to multicast addresses on the network, allowing an individual application to selectively accept/reject network traffic from different SIMNET exercises, and different protocols within an exercise. Libassoc communicates with the network through libnetif to provide these services. Reference Section 2.20.1 of the MCC CSCI (1) documentation.

The Data Logger does NOT use the Association Layer to handle sending/receiving datagrams. Rather it communicates directly with the layer of network services provided by the libnetif. However, it uses the Association Layer to aid in the construction of packets belonging to a special purpose protocol. The server Data Logger uses this protocol to communicate with its clients (e.g. the PVD). Reference Appendix B.

2.1.2 Network Interface Access: libnetif

Libnetif provides a high performance pathway to an unreliable datagram transport service such as that provided by an IEEE 802.3 network. Libnetif also provides several miscellaneous functions for controlling the network adapter unit. The miscellaneous functions allow applications to take advantage of adapter specific capabilities such as multicast addressing, high granularity timers, and intelligent on-board processors. Reference Section 2.20.2 of the MCC CSCI (1) documentation.

2.1.3 Logger Time Library: liblogtime

This library provides functions for converting logger timing information to and from human readable form.

2.1.3.1 logtime.h

External Procedure Declarations:

```
strings_to_datetime()
datetime_to_strings()
get_datetime()
offset_datetime()
```

2.1.3.2 logtime.c

This file defines a set of routines for handling the communication and display of logger timing information.

Includes:

```
<sys/types.h>
<sys/timeb.h>
<time.h>
<stdio.h>
"p_logger.h"
"logtime.h"
```

Imported Procedure Declarations:

timer()
strncpy()
strcpy()
strchr()

Static Procedure Declarations:

itoa()
monthtoi()

Defines:

UNKNOWN_TIMEZONE

Static Variable Declaration:

month_table[13]

2.1.3.2.1 itoa

This routine converts an integer *i* to an ASCII character *s*.

Parameters		
Parameter	Type	Where Typedef Declared
s	pointer to char	Standard
i	int	Standard

Table 2.1-1: itoa Information.

2.1.3.2.2 monthtoi

This routine converts a month *m* (of the format JAN, FEB, MAR, etc.) to an integer *i*.

Parameters		
Parameter	Type	Where Typedef Declared
m	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
i	int	Standard
Return Values		
Return Value	Type	Meaning
i	int	The integer value of the month (1-12)
Called By		
Function	Where Described	
get_datetime	Sec. 2.1.3.2.6	

Table 2.1-2: monthtoi Information.

2.1.3.2.3 string_to_seconds

This routine converts a time string *time_string* (of the format: HH:MM:SS) to seconds.

Parameters		
Parameter	Type	Where Typedef Declared
time_string	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
buffer[16]	char	Standard
s	pointer to char	Standard
t	pointer to char	Standard
hours	int	Standard
minutes	int	Standard
seconds	int	Standard
Return Values		
Return Value	Type	Meaning
3600hours + 60minutes + seconds	int	The time in seconds
-1	int	Procedure failed
Called By		
Function	Where Described	
collect racial time info	Sec. 2.2.2.7.1	
scan handler	Sec. 2.2.2.5.12	

Table 2.1-3: string_to_seconds Information.

2.1.3.2.4 strings_to_datetime

This routine converts a UNIX syle date/time passed in *date_string* and *time_string* (of DD-MM:YY/HH:MM:SS format) to a LoggerTime format (year, month, day, hour, minute, second, timezone, daylight savings time) in *timeptr*.

Parameters		
Parameter	Type	Where Typedef Declared
timeptr	pointer to LoggerTime	p_logger.h
date_string	pointer to char	Standard
time_string	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
buffer[4]	char	Standard
Called By		
Function	Where Described	
logger_start	Sec. 2.2.2.2.29	

Table 2.1-4: strings_to_datetime Information.

2.1.3.2.5 datetime_to_strings

This routine converts a time from LoggerTime format in *timeptr* to a UNIX style format in *date_string* and *time_string*.

Parameters		
Parameter	Type	Where Typedef Declared
timeptr	pointer to LoggerTime	p logger.h
date_string	pointer to char	Standard
time_string	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
buffer[4]	char	Standard
Called By		
Function	Where Described	
logger start	Sec. 2.2.2.2.29	
init logger for copying	Sec. 2.2.2.2.7	

Table 2.1-5: datetime_to_strings Information.

2.1.3.2.6 get_datetime

This routine gets the current local date/time from Unix in *unix_time_string* and converts it to internal LoggerTime.

Parameters		
Parameter	Type	Where Typedef Declared
ctime	pointer to array of char	Standard
unix time string	pointer to char	Standard
clock	long	Standard
buffer	array of char	Standard
Calls		
Function	Where Described	
monthtoi	Sec. 2.1.3.2.2	
Called By		
Function	Where Described	
init logger for copying	Sec. 2.2.2.2.7	
init logger for recording	Sec. 2.2.2.2.9	

Table 2.1-6: get_datetime Information.

2.1.3.2.7 offset_datetime

This routine adds the specified number of *seconds* to the supplied LoggerTime (*timeptr*).

Parameters		
Parameter	Type	Where Typedef Declared
timeptr	pointer to LoggerTime	p_logger.h
seconds	unsigned	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
sec	int	Standard
min	int	Standard
hr	int	Standard
dy	int	Standard
carry	int	Standard

Table 2.1-7: offset_datetime Information.

2.1.4 Fast IO Library: libfio

libfio is a high performance, packet-oriented Input/Output library for reading and writing SIMNET data files. It is based on the UNIX file Input/Output library "open", "read", "write", and "close" level. The libfio provides a unified interface for handling SIMNET simulation and voice packets on diverse mediums including the SIMNET network, disk, or 9-track tape. It provides commands for opening, reading, writing, seeking, and closing SIMNET data files. In addition, it provides a function for concatenating disk or tape files into a single logical unit. This is particularly useful with the dual tape Data Logger. Tape concatenation enables the recording of long exercises where the amount of data is expected to exceed the capacity of a single tape reel.

The fiolib provides real time I/O at data rates on the order of 225 Kbytes per second (about 1300 packets per second). The fiolib is able to support I/O either in blocking or non-blocking mode.

2.1.4.1 Libfio Interface files

The libfio interface files constitute the set of header files which must be included in applications using the libfio. One of the functions provided by these header files is the definitions of the SIMNET data file components. Reference Appendix A for a mapping of the SIMNET data file structure.

2.1.4.1.1 fiolib.h

This file defines the interface to the Fast I/O Library SIMNET data file structure. Reference Appendix A for a mapping of the SIMNET data file structure.

Procedural entry point declarations:

```
fio_file_type()
fio_open()
fio_concat()
fio_read()
fio_write()
fio_seek()
fio_getrawfd()
fio_flush()
fio_close()
```

Flags, parameter values, and macros for the procedural entry points are defined:

Defines for fio_file_type:

FIO_CMC_NETWORK	-network file
FIO_NINETRACK_TAPE	-nine-track tape file
FIO_CARTRIDGE_TAPE	-Not Supported
FIO_FLOPPY_TAPE	-Not Supported
FIO_DISK	-disk file
FIO_NULL_TYPE	-NULL file

Flags and Macros for `fio_open`:

<code>FIO_APPEND</code>	-disk files must be contiguous for efficiency during recording (disk files only)
<code>FIO_CTG</code>	-for debugging purposes
<code>FIO_LOOP</code>	-non-blocking mode
<code>FIO_NBLOCK</code>	-pay attention to everything on the network
<code>FIO_PROMISCUOUS</code>	-read only
<code>FIO_RDONLY</code>	-read, write mode (net files only)
<code>FIO_RDWR</code>	-rewind off-line
<code>FIO_REWOFFL</code>	-for conversion purposes; this is a version 1 file
<code>FIO_VERSION1</code>	-for conversion purposes; this is a version 2 file
<code>FIO_VERSION2</code>	-write only
<code>FIO_WRONLY</code>	
<code>ES_CONTINUOUS()</code>	
<code>ES_LOOPING()</code>	
<code>ES_NBLOCKING()</code>	
<code>ES_READABLE()</code>	
<code>ES_VERSION1()</code>	
<code>ES_VERSION2()</code>	
<code>ES_VERSION()</code>	
<code>ES_WRITABLE</code>	

For `fio_open size` parameter:

<code>FIOSIZE_600</code>	-600' 9-track tape
<code>FIOSIZE_1200</code>	-1200' 9-track tape
<code>FIOSIZE_2400</code>	-2400' 9-track tape
<code>FIOSIZE_TINY</code>	-for debugging purposes
<code>FIOSIZE_SMALL</code>	-for debugging purposes

For `fio_flush flags` parameter:

`FIOFLUSH_RECEIVE`
`FIOFLUSH_TRANSMIT`

For `fio_seek whence` parameter:

`FIOSEEK_SET`
`FIOSEEK_CUR`
`FIOSEEK_END`

For `fio_seek` and `fio_getrawfd vol` parameter:

`FIO_CURRENT_FD`

2.1.4.1.2 `fioheader.h`

This is the interface file for routines accessing `fio_header` type abstractions. Every SIMNET data file consists of a `fio_header` followed by an arbitrary number of fixed length file records. The `fio_header` contains information to be used by DataProbe while collecting statistical information. In addition, it contains a count of the number of file records in the file, various version information fields, and a table of `fio_packet` time stamps for seeking in the file by time. Reference Appendix A for a mapping of the SIMNET data file and header. This file defines the structure of the header record for SIMNET data files as well as declares the external procedures for manipulating the header.

2.1.4.1.3 fioerror.h

This file provides an error handling capability for applications using the fiolib. It defines a set of error conditions and declares the set of procedures to access the associated error messages. This file declares the procedures defined in "fioerror.c", **fio_error()**, **fio_error_string()**, and lists the fiolib error definition codes.

2.1.4.2 Libfio files

These files make up the libfio.

2.1.4.2.1 fiofile.h

This file contains definitions of the data types of the SIMNET data file and header structures and declares certain variables as these types.

Version 1 files contain no fio header and have fixed length packets.

Version 2 files contain an fioheader, use variable length packets, and use Ethernet version 2 protocol.

Version 3-5 files contain no changes

Version 6 files use Ethernet 802.3 Ethernet protocol.

FIO_SLOT_E	fio_slot_e
PHYS_TYPE_E	phys_e
FIO_FILE_INFO	file_info
FIO_FILE	fio_file_t, fio_file_p
FIO_RECORD_HEADER	fio_record_header
FIO_RECORD	fio_record

Defines of constants and macros:

FIOLIB_VERSION2_CHKSUM	-- Version 2 file.
FIOLIB_VERSION6_CHKSUM	-- Version 6 file.
FIOLIB_VERSION_CHKSUM	
FIOLIB_MAJOR_REVNUM	-- Major revision number of libfio.
FIOLIB_MINOR_REVNUM	-- Minor revision number of libfio
FIO_RECORD_BYTES	
FIO_RECORD_BYTES_VERSION1_DISK	
FIO_RECORD_BYTES_VERSION1_TAPE	
FIO_RECORD_PACKET_BYTES	
BLOCK_SIZE	
FIO_RECORD_BLOCKS	
FIO_RECORD_PACKETS ()	
FIO_RECORD_BYTE_COUNT ()	

2.1.4.2.2 fiolib.c

This file along with "fioerror.c" and "fioheader.c" contain the set of external procedures which constitute the interface to the libfio. They dispatch specific routines to media depending on the type of the specified file handle.

Includes:

```

<stdio.h>
<errno.h>
<sys/types.h>
"fiolib.h"
"fierror.h"
"fiofile.h"
"fiheader.h"
"fiotape.h"
"fionet.h"
"fiodisk.h"

```

Declarations:

```

fio_volume_number
fio_seek_volume
fio_seek_time
fio_file_t
device_types
fio_lib_initialized

```

Static procedure declarations:

```

ini_fiolib()

```

External procedure declarations:

```

fopen()

```

Constant and Macro defines:

```

FIO_MAX_OPEN
FIOPTR_OF()
IS_VALID_FD()
CONTIGUOUS()
FIOTYPE()
FIO_DEVICE_NAMES_FILE

```

2.1.4.2.2.1 ini_file_slots

ini_file_slots initializes the `open_files` array. Each of the 25 files (the value of `FIO_MAX_OPEN`, which is defined externally) is initialized with the following characteristics:

```

state: FIO_SLOT_AVAIL
type: FIO_NULL_TYPE
open_flags: 0
curvol: -1
info.iptr: NULL

```

Internal Variables		
Variable	Type	Where Typedef Declared
<code>fdptr</code>	<code>fio file_p</code>	Sec. 2.1.4.2.1 <code>fiofile.h</code>
<code>fd</code>	<code>fio desc</code>	Sec. 2.1.4.1.1 <code>fiolib.h</code>

Called By	
Function	Where Described
ini_fiolib	Sec. 2.1.4.2.2.13

Table 2.1-8: ini_file_slots Information.

2.1.4.2.2.2 find_file_slot

find_file_slot finds an available slot in the open files array and returns the index of the first available open file descriptor. This procedure checks for the the lowest indexed file with a state of FIO_SLOT_AVAIL, changes the state to FIO_SLOT_UNAVAIL, and returns the file index in *fd*.

Internal Variables		
Variable	Type	Where Typedef Declared
fdptr	fio file_p	Sec. 2.1.4.2.1 fiofile.h
fd	fio_desc	Sec. 2.1.4.1.1 fiolib.h
Return Values		
Return Value	Type	Meaning
fd	fio_desc	The index of the first available member of the open file array.
Called By		
Function	Where Described	
fio_open	Sec. 2.1.4.2.2.5	

Table 2.1-9: find_file_slot Information.

2.1.4.2.2.3 free_file_slot

The first available slot in the open_files array was determined in **find_file_slot()** and returned in *fd*. **free_file_slot()** frees the file slot passed in *fd* by giving it the following file characteristics:

state: FIO_SLOT_AVAIL
 type: FIO_NULL_TYPE
 open_flag: 0
 curvol: -1
 info.iptr: NULL

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_desc	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
fdptr	register fio file_p	Sec. 2.1.4.2.1 fiofile.h

Calls	
Function	Where Described
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)

Table 2.1-10: free_file_slot Information.

2.1.4.2.2.4 fio_file_type

This procedure checks the path name of the file to determine the file type. The device name choices are:

"cmc" -network
 "9tp" -nine track tape
 "ctp" -cartridge tape (not supported)
 "ftp" -floppy tape (not supported)
 "dsk" -disk
 NULL

This procedure defines BUFFER_SIZE as 32.

Parameters		
Parameter	Type	Where Typedef Declared
path	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
buffer [BUFFER_SIZE]	char array	Standard
devname [BUFFER_SIZE]	char array	Standard
devtype [BUFFER_SIZE]	char array	Standard
fd	pointer to FILE	Standard
i	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_DISK	int	The integer code for the disk device type
i	int	The integer code for a device other than disk
FIO_ERROR	int	The procedure failed
Errors		
Error	Reason for Error	
FIO_DEVICE_FILE_ERROR	The devices file '/simnet/data/fiodevs' is missing	
FIO_DEVICE_TYPE_ERROR	Error in '/simnet/data/fiodevs' for the specified file	
FIO_DEVICE_NAME_ERROR	The specified device name is an unsupported UNIX device	
Called By		
Function	Where Described	
fio open	Sec. 2.1.4.2.2.5	

Table 2.1-11: fio_file_type Information.

2.1.4.2.2.5 fio_open

`fio_open` returns the file descriptor, *fd*, for a named file which can then be used by the calling process for input/output operations. The *path* argument points to a null terminated string containing the pathname of the file to be opened. The path can refer to a tape drive, a disk file, or a network name. The *oflag* argument specifies the file status flags associated with the file descriptor and can be constructed by *oring* together flags from the following list. Exactly one from the first two flags must be specified:

- FIO_RDONLY** Open for reading only.
- FIO_WRONLY** Open for writing only.
- FIO_CREATE** If the file exists, this flag has no effect. Otherwise, this flag causes `fio_open()` to create a new file.
- FIO_CTG** Verify or create a contiguous disk file. This flag requires that the optional *size* argument be supplied. The specified file is verified to be contiguous and at least the specified number of `fio_packets`. If a new file is being created (the **FIO_CREATE** flag is set), *size* `fio_packets` of continuous space are allocated to it. Any call to `fio_write()` which would result in the file growing larger than *size* `fio_packets` will fail and return an error. This flag need not be set to open an existing contiguous file unless the file size is to be verified.
- FIO_BLOCK** Specify synchronous I/O.
- FIO_APPEND** `fio_write()` will append the file.

For disk files, the *size* argument is required only when the **FIO_CTG** flag is used. In this instance, the *size* parameter refers to the minimum size of the file in bytes. For 9-track tape files, the *size* argument is required using one of the following defines:

- FIO_SIZE_600** -- 600' 9-track tape
- FIO_SIZE_1200** -- 1200' 9-track tape
- FIO_SIZE_2400** -- 2400' 9-track tape

Upon successful completion, a non-negative file descriptor *fd* is returned. In the event of an error, **FIO_ERROR** is returned.

Parameters		
Parameter	Type	Where Typedef Declared
<code>path</code>	pointer to char	Standard
<code>oflag</code>	int	Standard
<code>size</code>	unsigned long	Standard
<code>header</code>	pointer to <code>fio_header</code>	Sec. 2.1.4.1.2 <code>fioheader.h</code>

Internal Variables		
Variable	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
type	int	Standard
status	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_descr	An error is returned
fd	fio_descr	<i>fd</i> is the new file descriptor for a named file which can be used by the calling process for input/output operations
Errors		
Error	Reason for Error	
FIO_MAX_OPEN_ERROR	The maximum number of open files has been exceeded.	
FIO_INVALID_RDWR_FLAGS_ERROR	The file has invalid FIO_RDONLY and FIO_WRONLY flags	
FIO_INVALID_VERSION_FLAG_ERROR	Data file has invalid version id; cannot be opened for writing	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
FIO_DEVICE_FILE_ERROR	The devices file 'simnet/data/fiodevs' is missing	
Calls		
Function	Where Described	
ini fiolib	Sec. 2.1.4.2.2.13	
find file slot	Sec. 2.1.4.2.2.2	
FIOPTR OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
fio file type	Sec. 2.1.4.2.2.4	
IS_READABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
Called By		
Function	Where Described	
open fio files	Sec. 2.2.2.2.10	
logger init cmc	Sec. 2.2.2.2.11	

Table 2.1-12: fio_open Information.

2.1.4.2.2.6 fio_concat

This procedure concatenates the two disk files or two tape files into a single logical file entity. By using two tape drives and switching tapes as soon as the end of each physical tape is reached, these commands can be used to handle fio_packet sequences of arbitrary length. If this is done, however, it will cause some special problems for fio_seek() since it may not be possible to seek to the logical beginning or end of the concatenated file without operator intervention. Therefore, in the case of concatenated tape files

FIOSEEK_SET and FIOSEEK_END are relative to the mounted portion of the concatenated file.

fio_concat() concatenates the file represented by *path* to the open file descriptor, *fd*. **fio_concat()** accepts only tape files or disk files, and both component files must be of the same type. The file represented by *path* inherits all its characteristics except *size* from the open file. **fio_concat()** returns a new file descriptor upon successful completion. If for some reason the concat fails, the procedure returns FIO_ERROR.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
path	pointer to a char	Standard
size	unsigned long	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
type	int	Standard
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_descr	The procedure failed
fd	fio_descr	the new file descriptor for the concatenated file
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_CONFLICTING_FILE_TYPES_ERROR	The file descriptors are not of the same type	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOTYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
tape concat	Sec. 2.1.4.2.14.17	
disk concat	Sec. 2.1.4.2.10.6	
Called By		
Function	Where Described	
open_fio_files	Sec. 2.2.2.2.10	

Table 2.1-13: fio_concat Information.

2.1.4.2.2.7 fio_read

fio_read() attempts to read a data packet *pkt* from the object referenced by the descriptor *fd* to an internal buffer. *pkt* is a pointer to a pointer to an FIO_PACKET. If *copy* is TRUE then **fio_read** assumes *pkt* is a pointer to a buffer which is large enough for the largest simulation packet, and copies the next packet in the specified SIMNET data file. If *copy* is FALSE, **fio_read** merely assigns the address of the next simulation packet to *pkt*. This pointer is guaranteed to be valid until the next time **fio_read** is called. This routine returns FIO_OK upon successful completion and FIO_ERROR in the event of an error.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
pkt	pointer to a pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
copy	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_descr	The procedure failed
FIO_OK	fio_descr	The procedure was successful
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_NOT_READABLE_ERROR	The file is not open for reading	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4. 2.1 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIO_TYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
IS_READABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
fnet_read	Sec. 2.1.4.2.12.3	
tape_read	Sec. 2.1.4.2.14.18	
disk_read	Sec. 2.1.4.2.10.7	
Called By		
Function	Where Described	
logger_get_remote_rtc	Sec. 2.2.2.2.13	
logger_copying_state	Sec. 2.2.2.2.16	
logger_playback_state	Sec. 2.2.2.2.18	
logger_record_state	Sec. 2.2.2.2.19	

Table 2.1-14: fio_read Information.

2.1.4.2.2.8 fio_write

fio_write() attempts to write a data fio_packet *pkt* to the object referenced by the descriptor *fd*.

If the file was opened with the FIO_APPEND flag set, the file pointer will be set to the end of the file prior to each write. This routine returns FIO_OK upon successful completion, and FIO_ERROR in the event of an error.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_descr	The procedure failed
FIO_OK	fio_descr	The procedure was successful
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_NOT_WRITABLE_ERROR	The file is not open for writing	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOTYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
IS_WRITABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
fnet_write	Sec. 2.1.4.2.12.4	
tape_write	Sec. 2.1.4.2.14.24	
disk_write	Sec. 2.1.4.2.10.11	
Called By		
Function	Where Described	
logger_put_remote_rtc	Sec. 2.2.2.2.14	
logger_copying_state	Sec. 2.2.2.2.16	
logger_playback_state	Sec. 2.2.2.2.18	
logger_record_state	Sec. 2.2.2.2.19	

Table 2.1-15: fio_write Information.

2.1.4.2.2.9 fio_seek

This routine seeks to a specified location. *fd* is a file descriptor returned from an *fio_open()* for a disk file or a tape file. *fio_seek* is valid for disk and tape files only. *fio_seek()* sets the file pointer associated with *fd* to the packet specified by the *offset* and *whence* arguments. Symbolic constants for *whence* are defined as follows:

FIOSEEK_SET Set the file pointer to *offset* seconds in the exercise

FIOSEEK_CUR Set the file pointer to current location plus *offset* seconds

FIOSEEK_END Set the file pointer to End-Of-File minus *offset* seconds

fio_seek() returns FIO_OK upon successful completion, and FIO_ERROR in the event of an error.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
offset	int	Standard
whence	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
fdptr	fio_file p	Sec. 2.1.4.2.1 fiofile.h
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_desc	The procedure failed
FIO_OK	fio_desc	The procedure was successful
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_SEEK_WRITABLE_FILE_ERROR	Seeking is not allowed in files opened for writing	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOTYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
IS_WRITABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
tape seek	Sec. 2.1.4.2.14.30	
tape seek time	Sec. 2.1.4.2.14.31	
disk seek	Sec. 2.1.4.2.10.15	
disk seek time	Sec. 2.1.4.2.10.16	

Called By	
Function	Where Described
logger_seek_relative	Sec. 2.2.2.2.26

Table 2.1-16: fio_seek Information.

2.1.4.2.2.10 fio_getrawfd

This routine gets the UNIX file descriptor associated with the fiolib file descriptor *fd*. The returned file descriptor can then be used in Simnet Network Library calls such as **net_filter()**. In the event of an error, **fio_getrawfd()** returns **FIO_ERROR**. Extreme care should be taken when using these calls since they are taking place outside the scope and therefore outside the control of the fiolib. Using UNIX system calls is particularly risky. This command is intended to supply the user with an escape to the more esoteric Simnet network commands which are not supported by the fiolib. If you find it necessary to call UNIX commands, then either the fiolib interface should be expanded, or you should not be using fiolib.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
vol_offset	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_descr	The procedure failed
retval	int	The raw tape or disk file descriptor
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOTYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
tape_getrawfd	Sec. 2.1.4.2.14.35	
disk_getrawfd	Sec. 2.1.4.2.10.20	

Table 2.1-17: fio_getrawfd Information.

2.1.4.2.2.11 fio_flush

fio_flush() is valid for network files only. **net_flush** in the libnetif is called to flush the transmit or receive buffers. The *flags* argument is used to specify which of these buffers is to be affected: FIOFLUSH_TRANSMIT or FIOFLUSH_RECEIVE. *flags* is a bit vector.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h
flags	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
status	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_ERROR	fio_desc	The procedure failed
FIO_OK	int	The procedure was successful
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_INTERNAL_ERROR	fio flush is not supported for tape files	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOTYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
fnet flush	Sec. 2.1.4.2.12.5	
disk_getrawfd	Sec. 2.1.4.2.10.20	
Called By		
Function	Where Described	
logger continue	Sec. 2.2.2.2.24	
logger seek relative	Sec. 2.2.2.2.26	
logger start	Sec. 2.2.2.2.29	

Table 2.1-18: fio_flush Information.

2.1.4.2.2.12 fio_close

This routine closes the file specified by *fd*.

Parameters		
Parameter	Type	Where Typedef Declared
fd	fio_descr	Sec. 2.1.4.1.1 fiolib.h

Internal Variables		
Variable	Type	Where Typedef Declared
fdptr	fio file_p	Sec. 2.1.4.1.1 fiofile.h
status	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_ERROR	int	An error is returned
FIO_OK	int	The procedure was successful
Errors		
Error	Reason for Error	
FIO_INVALID_FD_ERROR	The file descriptor does not correspond to an OPEN file	
FIO_DEVICE_FILE_TYPE_ERROR	The specified UNIX device file type is not supported in this version	
Calls		
Function	Where Described	
IS_VALID_FD	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOPTR_OF	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
FIOTYPE	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
fnet_close	Sec. 2.1.4.2.12.6	
tape_close	Sec. 2.1.4.2.14.36	
disk_close	Sec. 2.1.4.2.10.21	
Called By		
Function	Where Described	
open fio files	Sec. 2.2.2.2.10	
logger reset	Sec. 2.2.2.2.20	

Table 2.1-19: fio_close Information.

2.1.4.2.2.13 ini_fiolib

This routine initializes an available slot in the open files array.

Calls	
Function	Where Described
ini file slots	Sec. 2.1.4.2.2.1
ini disk	Sec. 2.1.4.2.10.4
ini fnet	Sec. 2.1.4.2.12.1
ini tape	Sec. 2.1.4.2.14.15
Called By	
Function	Where Described
fio_open	Sec. 2.1.4.2.2.5

Table 2.1-20: ini_fiolib Information.

2.1.4.2.3 fioheader.c

Every SIMNET data file starts with a 24K byte header block. The file provides routines for accessing the information in that header. This file contains external procedures for manipulating SIMNET data file headers. Reference Appendix A for a more detailed mapping of the SIMNET data header structure.

Includes:

```
<stdio.h>
"fiofile.h"
"fioerror.h"
"fioheader.h"
"p_logger.h"
```

Standard procedure declarations:
strncpy()

Static procedure declarations:
construct_dphdr()
set_frame_size_fiohdr()
find_info()

2.1.4.2.3.1 fio_is_null_header

This procedure returns a TRUE if the header specified by *file_hdr* is NULL.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
Return Values		
Return Value	Type	Meaning
TRUE	int	The header is NULL
FALSE	int	The header is not NULL
Called By		
Function	Where Described	
fio_is_null_header	Sec. 2.1.4.2.3.1	

Table 2.1-21: fio_is_null_header Information.

2.1.4.2.3.2 fio_convert_header

This procedure is used only when converting Version 1 style SIMNET data files to the latest format. It converts old-style headers to the style for Version 2 and later data files.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
frame_size	int	Standard
file_id	pointer to char	Standard
command_str	pointer to char	Standard

Calls	
Function	Where Described
set frame size fiohdr	Sec. 2.1.4.2.3.18
fio insert info	Sec. 2.1.4.2.3.6
Called By	
Function	Where Described
init logger for copying	Sec. 2.2.2.2.7

Table 2.1-22: fio_convert_header Information.

2.1.4.2.3.3 fio_file_header

This routine constructs an fio_header in the *file_hdr* buffer provided.

file_id, *num_exercises*, *exercises*, *command_str*, *tape_type*, *run_number*, *project_id*, *comment*, *date_of_run*, *tape_number*, *bits_per_word*, *frame_size*, *header_size*, *date_of_copy*, *time_of_run*, and *time_of_launch* are the fio_header fields passed in.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
file_id	pointer to char	Standard
num_exercises	short	Standard
exercises	pointer to char	Standard
command_str	pointer to char	Standard
tape_type	pointer to char	Standard
run_number	int	Standard
project_id	pointer to char	Standard
comment	pointer to char	Standard
date_of_run	pointer to char	Standard
tape_number	int	Standard
bits_per_word	int	Standard
frame_size	int	Standard
header_size	int	Standard
date_of_copy	pointer to char	Standard
time_of_run	pointer to char	Standard
time_of_launch	int	Standard
Calls		
Function	Where Described	
create_dphdr	Sec. 2.1.4.2.3.4	
fio_insert_info	Sec. 2.1.4.2.3.6	
Called By		
Function	Where Described	
init_logger_for_copying	Sec. 2.2.2.2.7	
logger_start	Sec. 2.2.2.2.29	

Table 2.1-23: fio_file_header Information.

2.1.4.2.3.4 create_dphdr

This routine combines the passed arguments to form an ASCII string suitable for use as a DataProbe label (reference DataProbe manual). Note that according to the version 8.0 manual, only the following fields are used by DataProbe: *tape_type*, *run_number*, *frame_size*, *header_size*, *time_of_launch*, and *tape_number* (tape files only). This procedure performs error checking, and the label is cleared out to the passed length.

Parameters		
Parameter	Type	Where Typedef Declared
dp_header	pointer to char	Standard
tape_type	pointer to char	Standard
run_number	int	Standard
project_id	pointer to char	Standard
comment	pointer to char	Standard
date_of_run	pointer to char	Standard
tape_number	int	Standard
bits_per_word	int	Standard
frame_size	int	Standard
header_size	int	Standard
date_of_copy	pointer to char	Standard
time_of_run	pointer to char	Standard
time_of_launch	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
field_string[132]	char	Standard
error_string	pointer to char	Standard
lptr	pointer to char	Standard
i	int	Standard
Calls		
Function	Where Described	
construct_dphdr	Sec. 2.1.4.2.3.5	
Called By		
Function	Where Described	
fio file header	Sec. 2.1.4.2.3.3	

Table 2.1-24: create_dphdr Information.

2.1.4.2.3.5 construct_dphdr

This routine adds a field to a DataProbe label. The string to be written, *field_string*, is copied to *field*. If *field_string* is longer than the maximum number of characters allowed in the field, *max_field_length*, it is truncated and a warning message is printed. The item is left justified in its field if the argument *left_justify* is TRUE, and right justified if *left_justify* is FALSE.

Parameters		
Parameter	Type	Where Typedef Declared
error_string	pointer to char	Standard
max_field_length	int	Standard
field	pointer to char	Standard
field_string	pointer to char	Standard
left_justify	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
string_length	int	Standard
Errors		
Error	Reason for Error	
error_string	If <i>field_string</i> exceeds <i>max_field_length</i> , <i>field_string</i> is truncated and a warning message (<i>field</i> is too long for DataProbe label) is printed.	
Called By		
Function	Where Described	
create_dphdr	Sec. 2.1.4.2.3.4	
set_tape_number fiohdr	Sec. 2.1.4.2.3.16	

Table 2.1-25: construct_dphdr Information.

2.1.4.2.3.6 fio_insert_info

fio_insert_info() inserts a new field specified by *keyword* in the user info buffer of the *fio_header* specified by *file_hdr*. The *user_info* field of the *fio_header* allows the user to store user-defined information in the *fio_header*. The user info buffer consists of a series of fields each having the following format:

keyword_name char	ifo_bytes short	info... char
----------------------	--------------------	-----------------

The following procedures (Sections 2.1.4.2.3.6-10) are provided to manipulate the *user_info* portion of the *fio_header*.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
keyword	pointer to char	Standard
info	pointer to char	Standard
info_bytes	short	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
ptr	pointer to char	Standard
req_bytes	int	Standard
keylen	int	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	if retval = FIO_ERROR, the procedure failed; if retval = FIO_OK, the procedure was successful
Errors		
Error	Reason for Error	
FIO_HEADER_INFO_BYTES_FULL_ERROR	There is not enough room in the header for the specified information	
FIO_HEADER_DUPLICATE_KEYWORD_ERROR	The specified keyword is already in the header.	
Calls		
Function	Where Described	
find info	Sec. 2.1.4.2.3.8	
Called By		
Function	Where Described	
fio convert header	Sec. 2.1.4.2.3.2	
fio file header	Sec. 2.1.4.2.3.3	
set fileid fiohdr	Sec. 2.1.4.2.3.11	
set command fiohdr	Sec. 2.1.4.2.3.13	
disk close	Sec. 2.1.4.2.10 .21	

Table 2.1-26: fio_insert_info Information.

2.1.4.2.3.7 info_field_bytes

This routine returns the length in bytes of the info field pointed to by *fldptr*.

Parameters		
Parameter	Type	Where Typedef Declared
fldptr	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
info_bytes	short	Standard
keylen	int	Standard
Return Values		
Return Value	Type	Meaning
keylen + sizeof(short) + info_bytes	int	The length of the info field pointed to by <i>fldptr</i>

Called By	
Function	Where Described
fio delete info	Sec. 2.1.4.2.3.9
find info	Sec. 2.1.4.2.3.8

Table 2.1-27: info_field_bytes Information.

2.1.4.2.3.8 find_info

This routine finds a field *keyword* in the user info buffer of the fio_header, *file_hdr*, and returns a pointer to it, *ptr*.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
keyword	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
ptr	pointer to char	Standard
ui_end	pointer to char	Standard
Return Values		
Return Value	Type	Meaning
ptr	pointer to char	The pointer to the specified field in the user info buffer is returned.
NULL	pointer to char	The field is null
Calls		
Function	Where Described	
info field bytes	Sec. 2.1.4.2.3.7	
Called By		
Function	Where Described	
fio insert info	Sec. 2.1.4.2.3.6	
fio delete info	Sec. 2.1.4.2.3.9	
fio retrieve info	Sec. 2.1.4.2.3.10	

Table 2.1-28: find_info Information.

2.1.4.2.3.9 fio_delete_info

This routine deletes the field specified by *keyword* from the user info buffer in *file_hdr*.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
keyword	pointer to char	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
s	pointer to char	Standard
t	pointer to char	Standard
nbytes	int	Standard
fldbytes	int	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	if retval = FIO_OK, the procedure was successful; if retval = FIO_ERROR, the procedure failed
Errors		
Error	Reason for Error	
FIO_HEADER_KEYWORD_NOT_FOUND_ERROR	The specified keyword cannot be found in the header	
Calls		
Function	Where Described	
find info	Sec. 2.1.4.2.3.8	
info field bytes	Sec. 2.1.4.2.3.7	
Called By		
Function	Where Described	
set fileid fiohdr	Sec. 2.1.4.2.3.11	

Table 2.1-29: fio_delete_info Information.

2.1.4.2.3.10 fio_retrieve_info

This routine searches for the field *keyword* in the user info buffer of *file_hdr*, and returns a pointer to it.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
keyword	pointer to char	Standard
info	pointer to pointer to char	Standard
info_bytes	pointer to short	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
ptr	pointer to char	Standard
retval	int	Standard

Return Values		
Return Value	Type	Meaning
retval	int	if retval = FIO_OK, the procedure was successful if retval = FIO_ERROR, the procedure failed.
Errors		
Error	Reason for Error	
FIO_HEADER_KEYWORD_NOT_FOUND_ERROR	The specified keyword cannot be found in the header	
Calls		
Function	Where Described	
find info	Sec. 2.1.4.2.3.8	
Called By		
Function	Where Described	
get fileid fiohdr	Sec. 2.1.4.2.3.12	
get command fiohdr	Sec. 2.1.4.2.3.14	
fio print fiohdr	Sec. 2.1.4.2.3.22	
disk open	Sec. 2.1.4.2.10.5	

Table 2.1-30: fio_retrieve_info Information.

The following procedures (Sections 2.1.4.2.3.11-21) are convenience functions for getting and setting standard fields in the fio_header.

2.1.4.2.3.11 set_fileid_fiohdr

This routine sets the *file_id* keyword of the specified fio_header, *file_hdr*. The *file_id* is the name of the data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
file_id	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	The procedure was successful
Errors		
Error	Reason for Error	
FIO_HEADER_DUPLICATE_KEYWORD_ERROR	The specified keyword is already in the header	
FIO_HEADER_KEYWORD_NOT_FOUND_ERROR	The specified keyword cannot be found in the header	

Calls	
Function	Where Described
fio_insert_info	Sec. 2.1.4.2.3.6
fio_delete_info	Sec. 2.1.4.2.3.9
fio_error	Sec. 2.1.4.2.4.1

Table 2.1-31: set_fileid_fiohdr Information.

2.1.4.2.3.12 get_fileid_fiohdr

This procedure gets the *file_id* keyword field of the specified fio_header, *file_hdr*. The *file_id* is the name of the data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
info	pointer to char	Standard
info_bytes	short	Standard
Return Values		
Return Value	Type	Meaning
info	pointer to char	The <i>fileid</i> keyword field of the specified fio_header
Errors		
Error	Reason for Error	
FIO_HEADER_KEYWORD_NOT_FOUND_ERROR	The specified keyword cannot be found in the header	
Calls		
Function	Where Described	
fio_retrieve_info	Sec. 2.1.4.2.3.10	
Called By		
Function	Where Described	
fio_print_fiohdr	Sec. 2.1.4.2.3.22	
init_logger_for_copying	Sec. 2.2.2.2.7	

Table 2.1-32: get_fileid_fiohdr.

2.1.4.2.3.13 set_command_fiohdr

This routine sets the *command* keyword field of the specified *fio_header*, *file_hdr*. The *command* is the the UNIX command used to create the data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
command	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retv al	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	The procedure was successful
Errors		
Error	Reason for Error	
FIO_HEADER_DUPLICATE_KEYWORD_ERROR	The specified keyword is already in the header	
FIO_HEADER_KEYWORD_NOT_FOUND_ERROR	The specified keyword cannot be found in the header	
Calls		
Function	Where Described	
fio insert info	Sec. 2.1.4.2.3.6	
fio delete info	Sec. 2.1.4.2.3.9	
fio error	Sec. 2.1.4.2.4.1	

Table 2.1-33: set_command_fiohdr Information.

2.1.4.2.3.14 get_command_fiohdr

This routine gets the *command* keyword of the specified *fio_header*, *file_hdr*. The *command* is the the UNIX command used to create the data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
info	pointer to char	Standard
info_bytes	short	Standard
Return Values		
Return Value	Type	Meaning
info	pointer to char	The COMMAND keyword field of the specified fio_header

Errors	
Error	Reason for Error
FIO_HEADER_KEYWORD_NOT_FOUND_ERROR	The specified keyword cannot be found in the header
Calls	
Function	Where Described
fio_retrieve_info	Sec. 2.1.4.2.3.10
Called By	
Function	Where Described
fio_print_fiohdr	Sec. 2.1.4.2.3.22

Table 2.1-34: get_command_fiohdr Information.

2.1.4.2.3.15 get_start_date_fiohdr

This procedure returns the start date of the specified fio_header in *date_str*. The *start_date* is the date the exercise was recorded.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
date_str	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dp_ptr	pointer to char	Standard
Called By		
Function	Where Described	
logger_start	Sec. 2.2.2.2.29	

Table 2.1-35: get_start_date_fiohdr Information.

2.1.4.2.3.16 set_tape_number_fiohdr

This file sets the *tape_number* of the specified fio_header, *file_hdr*. The *tape_number* is the volume number of this file or tape reel within the larger logical data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
tape_number	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dp_ptr	pointer to char	Standard
error_string	pointer to char	Standard
field_string[132]	char	Standard

Calls	
Function	Where Described
construct_dphdr	Sec. 2.1.4.2.3.5
Called By	
Function	Where Described
write_controller	Sec. 2.1.4.2.10.14
write_controller	Sec. 2.1.4.2.14.28

Table 2.1-36: set_tape_number_fiohdr Information.

2.1.4.2.3.17 get_tape_number_fiohdr

This procedure returns the *tape_number* of the specified fio_header, *file_hdr*. The *tape_number* is the volume number of this file or tape reel within the larger logical data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
dp_ptr	pointer to char	Standard
field_string[132]	char	Standard
tape_number	int	Standard
Return Values		
Return Value	Type	Meaning
tape_number	int	The tape number of the specified header
Called By		
Function	Where Described	
read_controller	Sec. 2.1.4.2.10.10	
disk_open	Sec. 2.1.4.2.10.5	
tape_open	Sec. 2.1.4.2.14.16	
read_ast_handler	Sec. 2.1.4.2.14.23	
tvolume_available	Sec. 2.1.4.2.14.32	
tvolume_starttime	Sec. 2.1.4.2.14.33	

Table 2.1-37: get_tape_number_fiohdr Information.

2.1.4.2.3.18 set_frame_size_fiohdr

This procedure sets the *frame_size* of the specified *fio_header*, *file_hdr*. The *frame_size* is the data probe frame size.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
frame_size	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dp_ptr	pointer to char	Standard
error_string	pointer to char	Standard
field_string[132]	char	Standard
Calls		
Function	Where Described	
construct_dphdr	Sec. 2.1.4.2.3.5	
Called By		
Function	Where Described	
fio_convert_header	Sec. 2.1.4.2.3.2	

Table 2.1-38: set_frame_size_fiohdr Information.

2.1.4.2.3.19 get_start_time_fiohdr

This procedure points to the start_time of the specified *fio_header* in *time_str*. The *start_date* is the date the exercise was recorded.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
time_str	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dp_ptr	pointer to char	Standard
Called By		
Function	Where Described	
logger_start	Sec. 2.2.2.2.29	

Table 2.1-39: get_start_time_fiohdr Information.

2.1.4.2.3.20 set_version_chksum_fiohdr

This procedure sets the *version_chksum* of the specified *fio_header*, *file_hdr*. The *version_chksum* is the checksum identifying which version of the libfio was used to create this data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
version_chksum	int	Standard
Called By		
Function	Where Described	
tape_open	Sec. 2.1.4.2.14.16	

Table 2.1-40: set_version_chksum_fiohdr Information.

2.1.4.2.3.21 get_version_chksum_fiohdr

This procedure returns the *fiolib_version_chksum* of the specified *fio_header*, *file_hdr*. The *version_chksum* is the checksum identifying which version of the libfio was used to create this data file.

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
Return Values		
Return Value	Type	Meaning
file_hdr-> fiolib_version_chksum	int	The version chksum of the specified fio_header is returned
Called By		
Function	Where Described	
disk_open	Sec. 2.1.4.2.10.5	
read_controller	Sec. 2.1.4.2.10.10	
read_ast_handler	Sec. 2.1.4.2.14.23	
tvolume_available	Sec. 2.1.4.2.14.32	
tvolume_starttime	Sec. 2.1.4.2.14.33	

Table 2.1-41: get_version_chksum_fiohdr Information.

2.1.4.2.3.22 fio_print_fiohdr

This procedure prints the following fields from the specified *fio_header*, *file_hdr*:

SIMNET data file header info

File Name

Exercise ID's

Project ID

Comment

Date of Run

Time of Run

Volume Number

Command String

Looping mode bof

Fiolib Version

Parameters		
Parameter	Type	Where Typedef Declared
file_hdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
buffer[DP_HEADER_BYTES]	char	Standard
ptr	pointer to char	Standard
i	int	Standard
size	short	Standard
tapenum	int	Standard
Calls		
Function	Where Described	
get_fileid_fiohdr	Sec. 2.1.4.2.3.12	
fio_retrieve_info	Sec. 2.1.4.2.3.10	
get_command_fiohdr	Sec. 2.1.4.2.3.14	
Called By		
Function	Where Described	
logger_start	Sec. 2.2.2.2.29	
init_logger_for_copying	Sec. 2.2.2.2.7	

Table 2.1-42: fio_print_fiohdr.

2.1.4.2.3.23 null_fiohdr

This procedure sets the specified `fio_header`, `file_hdr`, to NULL.

Parameters		
Parameter	Type	Where Typedef Declared
<code>file_hdr</code>	pointer to <code>fio_header</code>	Sec. 2.1.4.1.3 <code>fioheader.h</code>
Called By		
Function	Where Described	
<code>init_logger_variables</code>	Sec. 2.2.2.2 <code>logger.c</code>	
<code>disk_open</code>	Sec. 2.1.4.2.10 <code>fiodisk.c</code>	

Table 2.1-43: null_fiohdr.

The file "error.c" includes:

```
<stdio.h>
"fioerror.h"
```

External procedure declarations:

```
perror()
errno()
```

Variable declarations:

```
fio_err
err_msgs[NUM_FIO_ERRORS+1]
sys_errlist[]
```

2.1.4.2.4.1 fio_error

This routine prints out the error message for the last error logged in `fio_err`.

Parameters		
Parameter	Type	Where Typedef Declared
<code>msg</code>	pointer to char	Standard
Calls		
Function	Where Described	
<code>fio_error_string</code>	Sec. 2.1.4.2.4.2	

Called By	
Function	Where Described
set fileid fiohdr	Sec. 2.1.4.2.3.11
set command fiohdr	Sec. 2.1.4.2.3.13
fiofile records	Sec. 2.1.4.2.10.3
read dbuffer	Sec. 2.1.4.2.10.9
read controller	Sec. 2.1.4.2.10.10
write dbuffer	Sec. 2.1.4.2.10.13
write controller	Sec. 2.1.4.2.10.14
disk seek	Sec. 2.1.4.2.10.15
volume starttime	Sec. 2.1.4.2.10.17
volume endtime	Sec. 2.1.4.2.10.18
disk close	Sec. 2.1.4.2.10.21
fnet open	Sec. 2.1.4.2.10.2
fnet write	Sec. 2.1.4.2.10.4
eotv phase action	Sec. 2.1.4.2.14.3
ini tbuffers	Sec. 2.1.4.2.14.12
tape open	Sec. 2.1.4.2.14.16
tape concat	Sec. 2.1.4.2.14.17
read fiofile header	Sec. 2.1.4.2.14.19
read tbuffer	Sec. 2.1.4.2.14.20
read stream	Sec. 2.1.4.2.14.21
read controller	Sec. 2.1.4.2.14.22
read ast handler	Sec. 2.1.4.2.14.23
write fiofile header	Sec. 2.1.4.2.14.25
write stream	Sec. 2.1.4.2.14.27
write controller	Sec. 2.1.4.2.14.28
write ast handler	Sec. 2.1.4.2.14.29
tape seek	Sec. 2.1.4.2.14.30
tvolume available	Sec. 2.1.4.2.14.32
tvolume starttime	Sec. 2.1.4.2.14.33
backup past target	Sec. 2.1.4.2.14.34
logger init cmc	Sec. 2.2.2.2.11
logger put remote rtc	Sec. 2.2.2.2.14

Table 2.1-44: fio_error Information.

2.1.4.2.4.2 fio_error_string

fio_error_string() returns the error message string for the last error logged in fio_err.

Parameters		
Parameter	Type	Where Typedef Declared
msg	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
msgbuf	array of char	Standard

Return Values		
Return Value	Type	Meaning
msgbuf	char	the error message string in error msg[<i>fio_err</i>]
Called By		
Function	Where Described	
open_error_string	Sec. 2.2.2.2 logger.c (macro definition)	
logger_playback_state	Sec. 2.2.2.2.18	
logger_record_state	Sec. 2.2.2.2.19	
fio_error	Sec. 2.1.4.2.4.1	

Table 2.1-45: fio_error_string Information.

2.1.4.2.5 fiocvt.h

This file declares the procedure, `cvt_fio_packet()`, defined in "fiocvt.c".

2.1.4.2.6 fiocvt.c

This file is used in converting files recorded using old versions of libfio.

Includes:

```
<stdio.h>
<errno.h>
<sys/types.h>
"network.h"
"fiolib.h"
"fiofile.h"
```

Typedefs:

```
FIO_PACKET_HEADER_V2    fio_packet_header_v2
FIO_PACKET_V2           fio_packet_v2
```

Define:

```
FIO_PACKET_SIZE_V2
```

2.1.4.2.6.1 cvt_fio_packet

This procedure converts an input `fio_packet`, *inpkt*, from the Version2 to the latest format and points to the packet in *outpkt*.

Parameters		
Parameter	Type	Where Typedef Declared
flags	int	Standard
outpkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
inpkt	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
pkt	pointer to fio_packet_v2	Sec. 2.1.4.2.6 fiocvt.c

Calls	
Function	Where Described
IS VERSION	Sec. 2.1.4.1.1 fiolib.h (macro definition)
COPY FIO_PACKET	Sec. 2.1.4.1.1 fiolib.h (macro definition)
Called By	
Function	Where Described
disk_read	Sec. 2.1.4.2.10.7
tape_concat	Sec. 2.1.4.2.14.17

Table 2.1-46: cvt_fio_pkt Information.

2.1.4.2.6.2 fio_packet_size

This procedure returns the fio_packet_size of the specified fio_packet, *pkt*.

Parameters		
Parameter	Type	Where Typedef Declared
flags	int	Standard
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	retval equals the size of the fio_packet
Errors		
Error	Reason for Error	
MAX_FIO_PACKET_SIZE	The fio_packet exceeds the maximum allowable size	
Calls		
Function	Where Described	
IS_VERSION1	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
IS_VERSION2	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
FIO_PACKET_SIZE_V2	Sec. 2.1.4.2.6 fiocvt.c (macro definition)	
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	

Table 2.1-47: fio_packet_size Information.

2.1.4.2.7 fioutil.h

This file declares the following procedures defined in "fioutil.c":

```

fio_alloc()
fio_free()

```

2.1.4.2.8 fioutil.c

These files contain low level utilities.

Standard procedure declarations:

malloc()
free()

2.1.4.2.8.1 fio_alloc

This procedure allocates and initializes to zero a block of memory by using Standard procedure **malloc()**.

Parameters		
Parameter	Type	Where Typedef Declared
num	unsigned	Standard
size	unsigned	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
ptr	pointer to char	Standard
Return Values		
Return Value	Type	Meaning
ptr	pointer to char	ptr points to the allocated block of memory
Called By		
Function	Where Described	
disk open	Sec. 2.1.4.2.10.5	
fnet open	Sec. 2.1.4.2.12.2	
new tbq	Sec. 2.1.4.2.14.7	
ini tbuffers	Sec. 2.1.4.2.14.12	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-48: fio_alloc Information.

2.1.4.2.8.2 fio_free

This procedure frees a block of memory using Standard procedure **free()**.

Parameters		
Parameter	Type	Where Typedef Declared
ptr	pointer to char	Standard

Called By	
Function	Where Described
disk close	Sec. 2.1.4.2.10.21
fnet open	Sec. 2.1.4.2.12.2
tape open	Sec. 2.1.4.2.14.16
tape close	Sec. 2.1.4.2.14.36
write_controller	Sec. 2.1.4.2.14.28

Table 2.1-49: fio_free Information.

2.1.4.2.9 fioidisk.h

This file declares the procedural entry points for `ini_disk()`, `disk_open()`, `disk_concat()`, `disk_read()`, `disk_write()`, `disk_seek()`, and `disk_close()`.

2.1.4.2.10 fioidisk.c

The file "fioidisk.c" contains the procedures used to handle disk based SIMNET data files.

Includes:

Standard libraries:

`<stdio.h>`
`<errno.h>`
`<fcntl.h>`
`<unistd.h>`
`<sys/types.h>`
`<sys/stat.h>`
`<ustat.h>`

fio files:

"fiolib.h"
"fiocvt.h"
"fiocvt.h"
"fiocvt.h"
"fiocvt.h"
"fiocvt.h"
"fiocvt.h"
"fiocvt.h"

Constant and Macro defines:

`MAX_DISK_VOLUMES`
`DISK_MODE`
`MAX_FIO_RECORDS`
`DISKINFO_PTR()`
`CONTIGUOUS()`
`VOLUME_UFD()`
`READ_BYTES()`

Typedefs:

`LINT_T` `lint_t`
`FIO_DISK_FILE` `disk_t`

External procedure declarations:

lseek()

Static procedure declarations:

next_disk volume()
open_UNIX_disk_file()
fiofile_records()
fio_record_endtime()
read_dp_dbuffer()
read_dbuffer()
read_controller()
write_dp_dbuffer()
write_dbuffer()
write_controller()

The routines for writing input *fio_packets* from *fio_files* are called from the "fiolib.c" routine **fio_write()**. **fio_write()** calls the disk routine **disk_write()** to write a single data packet into a buffer. When the buffer is filled, the routine **write_dbuffer()** is called to write the full buffer of *fio_packets* to the specified disk-based data file. If the disk file is full, the routine **write_controller()** is called to change the current disk file volume.

The routines for reading input *fio_packets* from *fio_files* are called from the "fiolib.c" routine **fio_read()**. **fio_read()** calls the disk routine **disk_read()**. **disk_read()** reads a single data packet from the current buffer. When the disk buffer is empty, the routine **read_dbuf()** is called to read another buffer of *fio_packets*. When the end of volume is reached, the routine **read_controller()** is called to change the current disk file volume.

2.1.4.2.10.1 next_disk_volume

This procedure returns a TRUE if there is a next volume for the disk file *fdptr* and a FALSE if the current volume is the last volume. The index of the next disk volume is pointed to by *ufd*.

Parameters		
Parameter	Type	Where Typedef Declared
<i>fdptr</i>	<i>fio_file_p</i>	Sec. 2.1.4.1.1 <i>fiofile.h</i>
<i>ufd</i>	pointer to int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
<i>dptr</i>	pointer to disk_t	Standard
Return Values		
Return Value	Type	Meaning
TRUE	BOOL	There is a next volume for this disk file
FALSE	BOOL	This is the last volume for this disk file
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 <i>fiodisk.c</i> (macro definition)	
IS_LOOPING	Sec. 2.1.4.1.1 <i>fiolib.h</i> (macro definition)	

Called By	
Function	Where Described
read_controller	Sec. 2.1.4.2.10.10
write_controller	Sec. 2.1.4.2.10.14

Table 2.1-50: next_disk_volume Information.

2.1.4.2.10.2 open_UNIX_disk_file

This routine opens the UNIX disk file specified in *path* and returns its UNIX file descriptor in *ufd*.

Parameters		
Parameter	Type	Where Typedef Declared
path	pointer to char	Standard
fio_flags	int	Standard
size	unsigned long	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
UNIX_flags	int	Standard
ufd	int	Standard
Return Values		
Return Value	Type	Meaning
ufd	int	The file is opened properly according to its fio_flags and UNIX_flags designations
Called By		
Function	Where Described	
disk_concat	Sec. 2.1.4.2.10.6	
disk_open	Sec. 2.1.4.2.10.5	

Table 2.1-51: open_UNIX_disk_volume Information.

2.1.4.2.10.3 fiofile_records

This routine returns the number of fio_records for the file specified in *path*.

Parameters		
Parameter	Type	Where Typedef Declared
path	pointer to char	Standard
is_contiguous	BOOL	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
ustat_buf	struct ustat	Standard
stat_buf	struct stat	Standard
blocks	int	Standard
retval	int	Standard

Return Values		
Return Value	Type	Meaning
retval	int	The number of fio_records for this file. If this value exceeds the max value, an error is returned.
Errors		
Error	Reason for Error	
FIO_WARNING ERROR	fiolib error: exceeded the max number of records for this file.	
Calls		
Function	Where Described	
fio_error	Sec. 2.1.4.2.2.2	
Called By		
Function	Where Described	
disk_open	Sec. 2.1.4.2.10.5	
disk_concat	Sec. 2.1.4.2.10.6	

Table 2.1-52: fiofile_records Information.

2.1.4.2.10.4 ini_disk

This routine initializes the disk package. This function does not take any parameters, does not return any values, does not make any calls, and does not generate any errors.

Called By	
Function	Where Described
ini fiolib	Sec. 2.1.4.2.2.13

Table 2.1-53: ini_disk Information.

2.1.4.2.10.5 disk_open

This routine opens a disk file for reading or writing. `disk_open()` is able to handle file flags for previous versions of the fio_file data format.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
path	pointer to char	Standard
size	unsigned long	Standard
header	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h

Internal Variables		
Variable	Type	Where Typedef Declared
dp _{tr}	pointer to register disk_t	Sec. 2.1.4.2.10 fi _o disk.c
uf _d	int	Standard
curr _{fd}	int	Standard
ret _{val}	int	Standard
ptr	pointer to char	Standard
cur _{loc}	long	Standard
bytes	short	Standard
space	lint_t	Sec. 2.1.4.2.10 fi _o disk.c
Return Values		
Return Value	Type	Meaning
ret _{val}	int	if ret _{val} = FIO_OK, the procedure was successful; if ret _{val} = disk_close(fd _{ptr}), the procedure has failed and closed the disk file
FIO_OPEN_UNIX_ERROR	int	procedure failed and disk file is closed
FIO_ALLOC_UNIX_ERROR	int	procedure failed and disk file is closed
FIO_VERSION2_ERROR	int	procedure failed and disk file is closed
Errors		
Error	Reason for Error	
FIO_OPEN_UNIX_ERROR	Unable to open specified file due to a UNIX error.	
FIO_ALLOC_UNIX_ERROR	Unable to allocate space for fiolib buffers.	
FIO_WARNING_ERROR	Unable to lock in disk buffer.	
FIO_VERSION1_ERROR	This fio file volume has an invalid version ID (Version 1)	
FIO_VERSION2_ERROR	This fio volume has an invalid version ID (Version 2)	
FIO_SEEK_UNIX_ERROR	Disk open: Seek to logical bol _f	

Calls	
Function	Where Described
open UNIX disk file	Sec. 2.1.4.2.10.2
fio_alloc	Sec. 2.1.4.2.8.1
DISKINFO PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
fiofile records	Sec. 2.1.4.2.10.3
CONTIGUOUS	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
disk_close	Sec. 2.1.4.2.10.21
IS_READABLE	Sec. 2.1.4.1.1 fiofile.h (macro definition)
IS_VERSION1	Sec. 2.1.4.1.1 fiofile.h (macro definition)
IS_VERSION2	Sec. 2.1.4.1.1 fiofile.h (macro definition)
read fiofile header	Sec. 2.1.4.2.10.8
COPY FIOHDR	Sec. 2.1.4.1.3 fioheader.h (macro definition)
get version chksum fiohdr	Sec. 2.1.4.2.2 .21
fio_retrieve info	Sec. 2.1.4.2.3.10
VOLUME UFD	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
null fiohdr	Sec. 2.1.4.2.3.23
read dbuffer	Sec. 2.1.4.2.10.9
write fiofile header	Sec. 2.1.4.2.10.12
FIO_RECORD_PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)
get tape number fiohdr	Sec. 2.1.4.2.3.17

Table 2.1-54: disk_open Information.

2.1.4.2.10.6 disk_concat

This routine concatenates the disk file specified by *path* to the previously opened disk file specified by *fdptr*. The procedure checks for consistency; disk files may only be concatenated to other disk files. This procedure is able to handle file flags for previous versions of the fio_file data format.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
path	pointer to char	Standard
size	unsigned long	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to register disk t	Sec. 2.1.4.2.10 fiodisk.c
vol	int	Standard
ufd	int	Standard

Return Values		
Return Value	Type	Meaning
FIO_OK	int	Procedure was successful
FIO_LOOPING_CONCAT_ERROR	int	Procedure failed; disk files cannot be concatenated when in LOOPING mode
FIO_MAX_VOLUMES_ERROR	int	Procedure failed; maximum number of file volumes exceeded
FIO_OPEN_UNIX_ERROR	int	Procedure failed due to a UNIX OPEN error
Errors		
Error	Reason for Error	
FIO_OPEN_UNIX_ERROR	Unable to open specified file due to a UNIX error.	
FIO_ALLOC_UNIX_ERROR	Unable to allocate space for fiolib buffers.	
FIO_WARNING_ERROR	Unable to lock in disk buffer.	
FIO_VERSION1_ERROR	This fio file volume has an invalid version ID (Version 1)	
FIO_VERSION2_ERROR	This fio volume has an invalid version ID (Version 2)	
FIO_SEEK_UNIX_ERROR	Seek to logical bolt error	
Calls		
Function	Where Described	
IS_LOOPING	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
DISKINFO_PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
open UNIX disk file	Sec. 2.1.4.2.10.2	
fiofile_records	Sec. 2.1.4.2.10.3	
Called By		
Function	Where Described	
fio_concat	Sec. 2.1.4.2.2.6	

Table 2.1-55: disk_concat Information.

2.1.4.2.10.7 disk_read

disk_read reads one data packet from the specified *fio_file*. The user can get either a pointer to the packet or a copy of the packet by using the *copy* argument. If the proper open flags have been used, the packet will be converted to the latest format before being returned. This routine is called from the "fiolib.c" routine **fio_read**.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
pkt	pointer to pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
copy	BOOL	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to register disk_t	Sec. 2.1.4.2.10 fiodisk.c
status	int	Standard
cvt_buffer [MAX_FIO_PACKET_SIZE]	static char	Standard
Return Values		
Return Value	Type	Meaning
status	int	if status = FIO_OK, the procedure was successful; if status = an error message, the procedure failed
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
read_dbuffer	Sec. 2.1.4.2.10.9	
IS_VERSION	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
cvt_fio_packet	Sec. 2.1.4.2.6.1	
FIO_PACKET_PTR	Sec. 2.1.4.2.2 fiolib.c (macro definition)	
Called By		
Function	Where Described	
fio_read	Sec. 2.1.4.2.2.7	

Table 2.1-56: disk_read Information.

2.1.4.2.10.8 read_fiofile_header

read_fiofile_header reads the fiofile_header from the specified fio file. This procedure is able to handle file flags for previous versions of the fio_file data format.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to register disk_t	Sec. 2.1.4.2.10 fiodisk.c
ufd	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	Procedure was successful
FIO_VERSION1_ERROR	int	Procedure failed
Errors		
Error	Reason for Error	
FIO_VERSION1_ERROR	This fio file volume has an invalid version ID	

Calls	
Function	Where Described
DISKINFO_PTR	Sec. 2.1.4.2.10 fioidisk.c (macro definition)
VOLUME_UFD	Sec. 2.1.4.2.10 fioidisk.c (macro definition)
Called By	
Function	Where Described
disk_open	Sec. 2.1.4.2.10.5
read_controller	Sec. 2.1.4.2.10.10

Table 2.1-57: read_fiofile_header Information.

2.1.4.2.10.9 read_dbuffer

read_dbuffer reads a full fio_record of fio_packets into a disk buffer. This procedure is able to handle file flags for previous versions of the fio_file data format. This routine is called by **disk_read()** when the current disk buffer is exhausted.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file_p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to register disk_t	Sec. 2.1.4.2.10 fioidisk.c
ufd	int	Standard
nbytes	int	Standard
bptr	pointer to char	Standard
curloc	long	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	Procedure was successful.
FIO_VERSION1_ERROR	int	Procedure failed.
Errors		
Error	Reason for Error	
FIO_EOF_ERROR	End of file reached.	
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 fioidisk.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.10 fioidisk.c (macro definition)	
IS_LOOPING	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
FIO_RECORD_PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)	
FIO_RECORD_BYTE_COUNT	Sec. 2.1.4.1.1 fiofile.h (macro definition)	
read controller	Sec. 2.1.4.2.10.10	
fio error	Sec. 2.1.4.2.4.1	

Called By	
Function	Where Described
disk open	Sec. 2.1.4.2.10.5
disk read	Sec. 2.1.4.2.10.7

Table 2.1-58: read_dbuffer Information.

2.1.4.2.10.10 read_controller

read_controller changes the current disk file volume. This procedure is able to handle file flags for previous versions of the fio_file data format. This routine is called by **read_dbuffer()** when the current volume is depleted.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to register disk t	Sec. 2.1.4.2.10 fioidisk.c
header	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
dfd	int	Standard
ufd	int	Standard
volume number	int	Standard
curloc	long	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	Procedure was successful.
retval	int	if retval = 0, the procedure was successful; if retval = an error code, the procedure failed
Errors		
Error	Reason for Error	
FIO SEEK UNIX ERROR	Read controller: seek to first dbuffer	
FIO VERSION2 ERROR	Ignoring tape volume with invalid format	
FIO VERSION1 ERROR	Ignoring tape volume with invalid format	
FIO WARNING ERROR	Volume is out of sequence	
FIO EOVS ERROR	End of Volume	
FIO EOF ERROR	End of File	

Calls	
Function	Where Described
DISKINFO PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
IS LOOPING	Sec. 2.1.4.1.1 fiolib.h (macro definition)
VOLUME UFD	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
next disk volume	Sec. 2.1.4.2.10.1
IS VERSION1	Sec. 2.1.4.1.1 fiolib.h (macro definition)
read fiofile header	Sec. 2.1.4.2.10.8
get version chksum fiohdr	Sec. 2.1.4.2.3.21
IS VERSION2	Sec. 2.1.4.1.1 fiolib.h (macro definition)
get tape number fiohdr	Sec. 2.1.4.2.3.17
fio error	Sec. 2.1.4.2.4.1
Called By	
Function	Where Described
read dbuffer	Sec. 2.1.4.2.10.9

Table 2.1-59: read_controller Information.

2.1.4.2.10.11 disk_write

disk_write writes an *fio_packet*, *pkt*, from a specified *fio_file*, to a buffer, *dptr*. This routine calls **write_dbuffer()**. This routine is called from the rest of the DataLogger code through the "libfio.c" routine **fio_write()**.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.1.1 fiofile.h
pkt	pointer to fio packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk_t	Sec. 2.1.4.2.10 fiodisk.c
status	int	Standard
Return Values		
Return Value	Type	Meaning
status	int	if status = FIO_OK, the procedure was successful; if status = an error code, the procedure failed
Calls		
Function	Where Described	
DISKINFO PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
write_dbuffer	Sec. 2.1.4.2.10.13	
FIO_RECORD_PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)	
COPY_FIO_PACKET	Sec. 2.1.4.1.1 fiolib.h (macro definition)	

Called By	
Function	Where Described
fio_write	Sec. 2.1.4.2.2.8

Table 2.1-60: disk_write Information.

2.1.4.2.10.12 write_fiofile_header

This routine writes out the fiofile header to the specified data file.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk t	Sec. 2.1.4.2.10 fioidisk.c
ufd	int	Standard
hbytes	unsigned	Standard
Return Values		
Return Value	Type	Meaning
FIO OK	int	Procedure was successful
FIO WRITE UNIX ERROR	int	Procedure failed
Errors		
Error	Reason for Error	
FIO WRITE UNIX ERROR	Write failed due to UNIX error.	
Calls		
Function	Where Described	
DISKINFO PTR	Sec. 2.1.4.2.10 fioidisk.c (macro definition)	
VOLUME UFD	Sec. 2.1.4.2.10 fioidisk.c (macro definition)	
CONTIGUOUS	Sec. 2.1.4.2.10 fioidisk.c (macro definition)	
Called By		
Function	Where Described	
write controller	Sec. 2.1.4.2.10.14	
disk close	Sec. 2.1.4.2.10.21	
disk open	Sec. 2.1.4.2.10.5	

Table 2.1-61: write_fiofile_header Information.

2.1.4.2.10.13 write_dbuffer

This routine writes a full disk buffer of fio_packets to a disk data file. This routine is called by disk_write() when the current disk buffer is full.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk_t	Sec. 2.1.4.2.10 fiodisk.c
ufd	int	Standard
nbytes	int	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful; If retval = an error code, the procedure failed
Errors		
Error	Reason for Error	
EFBIG	UNIX error	
FIO INTERNAL ERROR	Premature end of contiguous file	
FIO EOF ERROR	End of file	
FIO WRITE UNIX ERROR	Write failed due to UNIX error	
Calls		
Function	Where Described	
DISKINFO PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
FIO RECORD PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)	
FIO RECORD BYTE COUNT	Sec. 2.1.4.1.1 fiofile.h (macro definition)	
VOLUME UFD	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
write controller	Sec. 2.1.4.2.10.14	
CONTIGUOUS	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
Called By		
Function	Where Described	
disk write	Sec. 2.1.4.2.10.11	
disk close	Sec. 2.1.4.2.10.21	

Table 2.1-62: write_dbuffer Information.

2.1.4.2.10.14 write_controller

write_controller() changes the current disk file volume. This routine is called by **write_dbuffer()** when the current volume is full.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk_t	Sec. 2.1.4.2.10 fiodisk.c
dfd	int	Standard
ufd	int	Standard
curloc	long	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful; If retval = an error code, the procedure failed
FIO EOY ERROR	int	procedure failed
Errors		
Error	Reason for Error	
FIO SEEK UNIX ERROR	Write controller: seek to first dbuffer	
FIO EOY ERROR	End of volume	
FIO EOF ERROR	End of file	
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
IS_LOOPING	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
next disk volume	Sec. 2.1.4.2.10.1	
set tape number fiohdr	Sec. 2.1.4.2.3.16	
write fiofile header	Sec. 2.1.4.2.10.12	
Called By		
Function	Where Described	
wirte dbuffer	Sec. 2.1.4.2.10.13	

Table 2.1-63: write_controller Information.

2.1.4.2.10.15 disk_seek

disk_seek seeks to a specified location in a disk file. First the time *offset* parameter is translated into an absolute time to seek. Then the routine checks to see if the seek time is outside the beginning or end of the file. If the seek time is within the *fio_file*, the file pointer, *ufd*, is set to the correct disk volume. Then the seek tries to find the correct packet, returning FIO_OK if successful or an error message if unsuccessful. This routine interfaces with the rest of the DataLogger code through the "libfio.c" routine **fio_seek()**.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.1.1 fiofile.h
offset	int	Standard
whence	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk t	Sec. 2.1.4.2.10 fiodisk.c
ptr	pointer to char	Standard
buffer [READ_BYTES]	char	Standard
ofs	long	Standard
i	int	Standard
ufd	int	Standard
retval	int	Standard
status	int	Standard
abstime	int	Standard
curtime	int	Standard
starttime	int	Standard
endtime	int	Standard
distance	long	Standard
remainder	long	Standard
Return Values		
Return Value	Type	Meaning
status	int	procedure failed due to a starttime or endtime error
retval	int	procedure was successful (retval equals FIO_OK)
FIO_SEEK_INVALID_WHENCE_VALUE_ERROR	int	procedure failed due to an invalid whence parameter
FIO_READ_UNIX_ERROR	int	procedure failed due to a UNIX READ error
FIO_SEEK_UNIX_ERROR	int	procedure failed due to a UNIX SEEK error
Errors		
Error	Reason for Error	
FIO_SEEK_UNIX_ERROR	Seek failed due to UNIX error	
FIO_SEEK_INVALID_WHENCE_VALUE_ERROR	Seek called with an invalid parameter for the whence parameter	
FIO_SEEK_PAST_BOF_ERROR	Attempting to seek past the beginning of the specified file	
FIO_SEEK_PAST_EOF_ERROR	Attempting to seek past the end of the specified file	
FIO_INTERNAL_ERROR	- Distance of seek to file end is 0 - Curvol < 0 - Ran off the end of the dbuffer without packet.	
FIO_READ_UNIX_ERROR	Read failed due to UNIX error	

Calls	
Function	Where Described
DISKINFO PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
VOLUME UFD	Sec. 2.1.4.2.10 fiodisk.c (macro definition)
fio record endtime	Sec. 2.1.4.2.10.19
FIO PACKET TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)
volume starttime	Sec. 2.1.4.2.10.17
volume endtime	Sec. 2.1.4.2.10.18
fio error	Sec. 2.1.4.2.4.1
FIO RECORD PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)
FIO RECORD BYTE COUNT	Sec. 2.1.4.1.1 fiofile.h (macro definition)
FIO PACKET SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)
Called By	
Function	Where Described
fio_seek	Sec. 2.1.4.2.2.9

Table 2.1-64: disk_seek Information.

2.1.4.2.10.16 disk_seek_time

disk_seek_time returns the time stamp of the current fio_packet.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk t	Sec. 2.1.4.2.10 fiodisk.c
Return Values		
Return Value	Type	Meaning
FIO_PACKET_TIME	int	the time stamp of the specified fio_packet
0	int	the procedure failed
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
FIO_PACKET_TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
Called By		
Function	Where Described	
fio_seek	Sec. 2.1.4.2.2.9	

Table 2.1-65: disk_seek_time Information.

2.1.4.2.10.17 volume_starttime

This routine sets a pointer, *time*, to the timestamp of the first fio_packet in the file volume specified in *ufd*.

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
time	pointer to int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
ptr	pointer to char	Standard
buffer[READ_BYTES]	char	Standard
ofs	long	Standard
oldloc	long	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	procedure was sucessful
FIO_SEEK_UNIX_ERROR	int	procedure failed due to UNIX SEEK error
FIO_READ_UNIX_ERROR	int	procedure failed due to UNIX READ error
Errors		
Error	Reason for Error	
FIO SEEK UNIX ERROR	Procedure failed due to UNIX error	
FIO INTERNAL ERROR	Volume start time < 0	
FIO READ UNIX ERROR	Procedure failed due to UNIX error	
Calls		
Function	Where Described	
FIO_RECORD_PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)	
FIO_PACKET_TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
Called By		
Function	Where Described	
disk seek	Sec. 2.1.4.2.10 .15	

Table 2.1-66: volume_starttime Information.

2.1.4.2.10.18 volume_endtime

This routine sets a pointer, *time*, to the timestamp of the last fio_packet in the file volume specified in *ufd*.

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
time	pointer to int	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
buffer[FIO_RECORD_BYTES]	char	Standard
frcd	pointer to fio_record	Sec. 2.1.4.1.1 fiofile.h
ofs	long	Standard
oldloc	long	Standard
newloc	long	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	procedure was successful
FIO_SEEK_UNIX_ERROR	int	procedure failed due to UNIX SEEK error
FIO_READ_UNIX_ERROR	int	procedure failed due to UNIX READ error
Errors		
Error	Reason for Error	
FIO SEEK UNIX ERROR	Procedure failed due to UNIX error	
FIO INTERNAL ERROR	Volume end time < 0	
FIO READ UNIX ERROR	Procedure failed due to UNIX error	
Calls		
Function	Where Described	
fio_error	Sec. 2.1.4.2.4.1	
Called By		
Function	Where Described	
disk seek	Sec. 2.1.4.2.10.15	

Table 2.1-67: volume_endtime Information.

2.1.4.2.10.19 fio_record_endtime

This procedure sets a pointer, *time*, to the last fio_packet in the fio_record specified in *frcd*.

Parameters		
Parameter	Type	Where Typedef Declared
frcd	pointer to fio_record	Sec. 2.1.4.1.1 fiofile.h
time	pointer to int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
current_packet	pointer to char	Standard
eo_packets	pointer to char	Standard
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h

Calls	
Function	Where Described
FIO_RECORD_PACKETS	Sec. 2.1.4.1.1 fiofile.h (macro definition)
FIO_RECORD_BYTE_COUNT	Sec. 2.1.4.1.1 fiofile.h (macro definition)
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)
FIO_PACKET_TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)
Called By	
Function	Where Described
disk_seek	Sec. 2.1.4.2.10.15

Table 2.1-68: fio_record_endtime Information.

2.1.4.2.10.20 disk_getrawfd

This routine returns the raw UNIX file descriptor for the current volume specified in *fdptr*.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file_p	Sec. 2.1.4.1.1 fiofile.h
vol_offset	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk_t	Sec. 2.1.4.2.10 fioidisk.c
tvol	int	Standard
Return Values		
Return Value	Type	Meaning
dptr->volume_ufds[tvol]	pointer to disk_t	The raw UNIX file descriptor
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 fioidisk.c (macro definition)	
Called By		
Function	Where Described	
fio_getrawfd	Sec. 2.1.4.2.2.10	
fio_flush	Sec. 2.1.4.2.2.11	

Table 2.1-69: disk_getrawfd Information.

2.1.4.2.10.21 disk_close

This routine closes the specified disk file. The disk buffer is freed, the FIO_DISK_FILE is freed, and the header is freed. This routine is called from the rest of the libfio code through the fiolib.c routine fio_close().

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.1.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
dptr	pointer to disk_t	Sec. 2.1.4.2.10 fiodisk.c
ufd	int	Standard
i	int	Standard
offset	long	Standard
retval=FIO_OK	int	Standard
Return Values		
Return Value	Type	Meaning
FIO_OK	int	procedure was successful
FIO_SEEK_UNIX_ERROR	int	procedure failed due to UNIX SEEK error
FIO_READ_UNIX_ERROR	int	procedure failed due to UNIX READ error
Errors		
Error	Reason for Error	
FIO_INTERNAL_ERROR	- No room for LOOPING pointer - Write of header failed	
FIO_CLOSE_UNIX_ERROR	UNIX CLOSE error	
Calls		
Function	Where Described	
DISKINFO_PTR	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.10 fiodisk.c (macro definition)	
IS_WRITABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
write_dbuffer	Sec. 2.1.4.2.10.13	
IS_LOOPING	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
fio_insert_info	Sec. 2.1.4.2.3.6	
fio_error	Sec. 2.1.4.2.4.1	
write_fiofile_header	Sec. 2.1.4.2.10.8	
fio_free	Sec. 2.1.4.2.8.2	
Called By		
Function	Where Described	
fio_close	Sec. 2.1.4.2.2.12	
disk_open	Sec. 2.1.4.2.10.5	

Table 2.1-70: disk_close Information.

2.1.4.2.11 fionet.h

This file declares the procedural entry points for `ini_fnet()`, `fnet_open()`, `fnet_read()`, `fnet_write()`, `fnet_flush()`, and `fnet_close()`.

2.1.4.2.12 fionet.c

The file "fionet.c" contains the procedures used to handle network based SIMNET data files.

Includes:

standard library:
 <stdio.h>

fio files:

 "fiolib.h"
 "fioerror.h"
 "fiofile.h"
 "fioheader.h"
 "fioutil.h"
 "fionet.h"

Typedefs:

 LINT_T lint_t
 FIO_NET_FILE fnet_t

Static Variable Declarations:

 errmsg

Constant and Macro Defines:

 PACKETS_PER_LATE_CHECK
 LATE_MARGIN
 FNETINFO_PTR

This file provides the routines for SIMNET (CMC) Network based fio_packet input/output operations. No attempt is made to buffer fio_packets being read or written to a network file. Note that it may be undesirable for an application built on the fiolib to BLOCK on reads and writes. As a result, NON_BLOCKING mode can be specified for network files.

2.1.4.2.12.1 ini_fnet

This procedure initializes the fnet package. This procedure takes no parameters, returns no values, and has no errors or internal parameters. `ini_fnet()` is called from the "fiolib.c" function `ini_fiolib()`.

Called By	
Function	Where Described
ini_fiolib	Sec. 2.1.4.2.2 fiolib.c

Table 2.1-71: ini_fnet Information.

2.1.4.2.12.2 fnet_open

This routine opens and initializes the specified network file. It initializes the network in the appropriate modes.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
path	pointer to char	Standard
header	pointer to fio_header	Sec. 2.1.4.1.1 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
nptr	pointer to fnet_t	Sec. 2.1.4.2.12 fionet.c
nfd	int	Standard
scrap_net_address	int	Standard
space	lint_t	Sec. 2.1.4.2.12 fionet.c
Return Values		
Return Value	Type	Meaning
FIO_OK	int	procedure was successful
FIO_ALLOC_UNIX_ERROR	int	procedure failure due to inability to allocate space for fiolib buffers
FIO_NET_OPEN_ERROR	int	procedure failure due to inability to open network device card
Errors		
Error	Reason for Error	
FIO NET OPEN ERROR	Unable to open network device card	
FIO_ALLOC_UNIX_ERROR	Unable to allocate space for fiolib buffers	
FIO WARNING ERROR	Unable to lockin network file buffer	
FIO NET PROMISCUOUS MODE ERROR	Unable to activate promiscuous mode	
FIO NET NORMAL MODE ERROR	Unable to activate normal mode	
FIO NET ALIVE ERROR	Network device is not alive	
FIO_NET_STAMP_ENABLE_ERROR	Unable to enable timestamping on network device	
FIO_NET_SETTIME_ERROR	Unable to reset card statistics on network device	
FIO NET FLUSH ERROR	Unable to flush network device rings	
FIO NET ZERO STATISTICS ERROR	Unable to zero CMC card time	

Calls	
Function	Where Described
net_open	Sec. 2.20.2 in MCC CSCI SDD
fio_alloc	Sec. 2.1.4.2.8.1
fio_error	Sec. 2.1.4.2.4.1
FNETINFO_PTR	Sec. 2.1.4.2.12 fionet.c (macro definition)
FIO_PACKET_PTR	Sec. 2.1.4.1.1 fiolib.h (macro definition)
net_stop	Sec. 2.20.2 in MCC CSCI SDD
net_prom	Sec. 2.20.2 in MCC CSCI SDD
net_norm	Sec. 2.20.2 in MCC CSCI SDD
net_alive	Sec. 2.20.2 in MCC CSCI SDD
net_init_mca	Sec. 2.20.2 in MCC CSCI SDD
net_stamp_enable	Sec. 2.20.2 in MCC CSCI SDD
net_settime	Sec. 2.20.2 in MCC CSCI SDD
net_flush	Sec. 2.20.2 in MCC CSCI SDD

Table 2.1-72: fnet_open Information.

2.1.4.2.12.3 fnet_read

The routine reads a single PDU from the network into an fio_packet along with addressing, timestamp, and type information. It passes back either a pointer to this fio_packet or a copy, depending on the *copy* argument. This routine is called from the rest of the DataLogger code through fio_read() in the file "fiolib.c".

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
pkt	pointer to pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
copy	BOOL	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
pptr	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
nptr	pointer to fnet_t	Sec. 2.1.4.2.12 fionet.c
nfd	int	Standard
retval	int	Standard
flags	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful; If retval = an error code, the procedure failed
Errors		
Error	Reason for Error	
FIO_NO_PACKETS_AVAIL_ERROR	No fio_packets available for reading	

Calls	
Function	Where Described
FNETINFO_PTR	Sec. 2.1.4.2.12 fionet.c (macro definition)
IS_NBLOCKING	Sec. 2.1.4.1.1 fiolib.h (macro definition)
net_rcv	Sec. 2.20.2 in MCC CSCI SDD
net_get_timestamp	Sec. 2.20.2 in MCC CSCI SDD
net_get_rcv_from_addr	Sec. 2.20.2 in MCC CSCI SDD
net_get_rcv_to_addr	Sec. 2.20.2 in MCC CSCI SDD
net_get_rcv_type	Sec. 2.20.2 in MCC CSCI SDD
Called By	
Function	Where Described
fio_read	Sec. 2.1.4.2.2.7

Table 2.1-73: fnet_read Information.

2.1.4.2.12.4 fnet_write

This routine gets an fio_packet and writes its PDU out to the network. Normally, this routine call will block until a packet is transmitted, however, if the file is opened using the FIO_NBLOCK flag, the call will return immediately. This routine interfaces with the rest of the DataLogger code through fio_write() in the file "fiolib.c".

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
nptr	pointer to fnet_t	Sec. 2.1.4.2.12 fionet.c
nfd	int	Standard
flags	int	Standard
now	int	Standard
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful If retval equals an error message, the procedure failed
Errors		
Error	Reason for Error	
FIO_INVALID_PACKET_TIMESTAMP_ERROR	Invalid fio_packet timestamp	
FIO_INVALID_PACKET_SIZE_ERROR	Invalid fio_packet size	
FIO_NET_WRITE_ERROR	Unable to write packet to network device	
FIO_LATE_PACKET_TO_NET_ERROR	Late packet to net	

Calls	
Function	Where Described
FNETINFO_PTR	Sec. 2.1.4.2.12 fionet.c (macro definition)
IS_NBLOCKING	Sec. 2.1.4.1.1 fiolib.h (macro definition)
fio_error	Sec. 2.1.4.2.4.1
net_put_timestamp	Sec. 2.20.2 in MCC CSCI SDD
net_set_snd_from_addr	Sec. 2.20.2 in MCC CSCI SDD
net_set_snd_type	Sec. 2.20.2 in MCC CSCI SDD
net_snd	Sec. 2.20.2 in MCC CSCI SDD
net_gettime	Sec. 2.20.2 in MCC CSCI SDD
Called By	
Function	Where Described
fio_write	Sec. 2.1.4.2.2.8

Table 2.1-74: fnet_write Information.

2.1.4.2.12.5 fnet_flush

This routine flushes the network transmit or receive buffer files. This routine interfaces with the rest of the DataLogger code through `fio_flush` in the file "fiolib.c".

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
flags	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
net_flags	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful If retval equals an error message, the procedure failed
Errors		
Error	Reason for Error	
FIO NET FLUSH ERROR	Unable to flush network device rings	
Calls		
Function	Where Described	
net_flush	Sec. 2.20.2 in MCC CSCI SDD	

Called By	
Function	Where Described
fio flush	Sec. 2.1.4.2.2.11

Table 2.1-75: fnet_flush Information.

2.1.4.2.12.6 fnet_close

This routine closes the network fio_file. This routine interfaces with the rest of the DataLogger code through fio_close in the file "fiolib.c".

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
scrap_net_address	int	Standard
nfd	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful If retval equals an error message, the procedure failed
Errors		
Error	Reason for Error	
FIO NET NORMAL MODE ERROR	Unable to activate normal mode	
FIO NET CLOSE ERROR	Unable to close network device	
Calls		
Function	Where Described	
net_stop	Sec. 2.20.2 in MCC CSCI SDD	
net_norm	Sec. 2.20.2 in MCC CSCI SDD	
net_close	Sec. 2.20.2 in MCC CSCI SDD	
Called By		
Function	Where Described	
fio_close	Sec. 2.1.4.2.2.12	

Table 2.1-76: fnet_close Information.

2.1.4.2.14 fiotape.h

This file declares the procedural entry points for ini_tape(), tape_open(), tape_read(), tape_write(), tape_seek(), and tape_close().

2.1.4.2.14 fiotape.c

The key to fast I/O using 9-track tape is to keep the tape drive streaming as much as possible. To do this requires that the tape records be of constant size. Reading from and writing to 9-track tape-based data files requires that these requirements be met.

On the MASSCOMP, streaming is handled using asynchronous I/O via the AST (Asynchronous Software Trap) which is a proprietary extension to UNIX in the MASSCOMP version of UNIX RTU.

The "fiotape.c" routines make use of the AST for writing as follows: individual `fio_packets` are written into a `fio_record` buffer using calls to `tape_write`. When the buffer is full it is placed on the end of a list of buffers by a call to `write_buffer`. When enough buffers are full, `write_buffer` calls `write_stream` to start the tape device streaming. This is done asynchronously using `IOCTL` calls and multiple AST's.

The AST handler `write_ast_handler` checks for error conditions and attempts to keep the drive streaming if there are still full buffers available. Once a particular tape volume (tape reel) has been filled, `write_stream` calls `write_controller` to switch to another volume (tape device, tape reel, or both).

The process for reading from a 9-track tape data file is similar, except that buffers are being emptied instead of filled. Also, the limiting factor on the streaming is the amount of memory available for buffers, not the number of full buffers. In exercises that have very high data rates, having sufficient amounts of internal memory allows the transitions between tape volumes (tape reels) to proceed smoothly.

Includes:

standard libraries:

- `<stdio.h>`
- `<fcntl.h>`
- `<errno.h>`
- `<ast.h>`
- `<sys/types.h>`
- `<sys/mtio.h>`
- `<sys/ioctl.h>`

fio files:

- `"fiolib.h"`
- `"fiocvt.h"`
- `"fioerror.h"`
- `"fiofile.h"`
- `"fioheader.h"`
- `"fioutil.h"`
- `"fiotape.h"`

Constant and Macro Defines:

EOTV_PHASE_DELAY
EOTV_NULL_VOLUME
NULL_TAPE_NUMBER
NULL_STARTTIME
MAX_TAPE_DRIVES
MAX_TAPE_VOLUMES
MAX_VOLUME_STARTTIME
TOO_BIG_2MB_5600
OK_2B_5600_NO_EXCELAN
OK_2MB_5600
MAX_BUFFER_MEMORY
TBUFFERS_PER_600_FOOT_TAPE
TBUFFERS_PER_1200_FOOT_TAPE
TBUFFERS_PER_2400_FOOT_TAPE
TBUFFERS_PER_TINY
TBUFFERS_PER_SMALL
TBUFFERS_PER_VERSION1_TAPE
TAPE_READ_THRESHOLD
MAX_SIMULTANEOUS_OPS
TOTAL_TBUFFERS
FIO_HEADER_OF_TBUFFER
FIO_RECORD_OF_TBUFFER
FIO_RECORD_STARTTIME
VOLUME_NUMBER
VOLUME_STARTTIME
SET_VOLUME_STARTTIME
OPS_AVAILABLE
TBUFS_AVAILABLE
VOLUME_UFD
ZYLOGICS_472_EOT_ERROR
XYLOGICS_472_DRIVE_READY
XYLOGICS_472_DRIVE_ONLINE
TAPE_AST_PRIORITY
DISABLE_AST
RESTORE_AST
WAIT_FOR_AST
MIN
TAPEINFO_PTR
QUEUE_COUNT()
QUEUE_HEAD()
QUEUE_TAIL()

Typedefs:

TBUFFER_Q	tbuffer_q
T_BUFFER_T	tbuffer_t
LINT_T	lint_t
EOTV_E	eotv_e
EOTV_PHASE_E	eotv_phs_e
LLSTATE_E	llstat_e
VOLUME_INFO	tapevol_info
FIO_TAPE_FILE	tape_t

Global Variable Declarations:

```
errmsg
free_t bq
```

External procedure declarations:

```
exit()
```

Static procedure declarations:

```
do_eotv_action()
init_eotv_action()
eotv_phase_action()
unix_tape_action()
promote_status_info()
is_next_tape_volume()
read_fiofile_header()
read_tbuffer()
read_stream()
read_controller()
read_ast_handler()
write_fiofile_header()
write_tbuffer()
write_stream()
write_controller()
write_ast_handler()
backup_past_target()
tvolume_starttime()
tvolume_available()
```

The following routines (Sections 2.1.4.2.14.1-3) handle the transitioning from one tape volume on one tape drive to another tape volume on another tape drive in the case of a concatenated tape file.

2.1.4.2.14.1 init_eotv_action

This routine initializes the end of tape volume action, setting the *volume*, *phase*, and *delay* characteristics from the input parameters.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
volume	int	Standard
phase	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
delay	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	

Called By	
Function	Where Described
read_controller	Sec. 2.1.4.2.14.22
write_controller	Sec. 2.1.4.2.14.28

Table 2.1-77: init_eotv_action Information.

2.1.4.2.14.2 do_eotv_action

This performs the end of tape volume action. The choices are:

- 1) To do nothing
- 2) To rewind off-line
- 3) To rewind on-line

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
delay	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
vol	int	Standard
ufd	int	Standard
phase	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
action	eotv_e	Sec. 2.1.4.2.14 fiotape.c
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
eotv_phase_action	Sec. 2.1.4.2.14 .3	
Called By		
Function	Where Described	
write_tbuffer	Sec. 2.1.4.2.14.26	
read_tbuffer	Sec. 2.1.4.2.14.20	

Table 2.1-78: do_eotv_action Information.

2.1.4.2.14.3 eotv_phase_action

This routine performs the action specified by *eotv_action* on the Unix file descriptor specified in *ufd*. Rewinding the tape is a phased action; since the rewind takes a long time, the action is broken up into phases so the tape streaming can continue. The phases are:

- 1) Backup a small amount
- 2) Write the End-of-Tape marker
- 3) Execute the End-of-Tape action
- 4) Clear the status

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
eotv_phase	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
eotv_action	eotv_e	Sec. 2.1.4.2.14 fiotape.c
Internal Variables		
Variable	Type	Where Typedef Declared
op	struct mtop	Standard
status	struct mtget	Standard
retval	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
retval	eotv_ph_e	The End_of_Tape_Volume phase action.
Calls		
Function	Where Described	
fio_error	Sec. 2.1.4.2.4.1	
XYLOGICS 472 DRIVE READY	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
eotv_phase action	Sec. 2.1.4.2.14.3	
Called By		
Function	Where Described	
tvolume available	Sec. 2.1.4.2.14.32	
do eotv action	Sec. 2.1.4.2.14.2	
read controller	Sec. 2.1.4.2.14.22	
tape seek	Sec. 2.1.4.2.14.30	
write controller	Sec. 2.1.4.2.14.28	
tvolume starttime	Sec. 2.1.4.2.14.33	

Table 2.1-79: eotv_phase_action Information.

2.1.4.2.14.4 unix_tape_action

This routine performs the specified *action* on the specified Unix file descriptor, *ufd*.

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
action	int	Standard
count	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
op	struct mtop	Standard

Return Values		
Return Value	Type	Meaning
-1	int	action cannot be performed: outstanding ioctl
0	int	procedure was successful
Called By		
Function	Where Described	
backup_past target	Sec. 2.1.4.2.14.34	

Table 2.1-80: unix_tape_action Information.

2.1.4.2.14.5 promote_status_info

This routine promotes the ll_status to the appropriate hl_status.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to tape t	Sec. 2.1.4.2.14 fiotape.c
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-81: promote_status_info Information.

2.1.4.2.14.6 is_next_tape_volume

This routine returns a pointer to the index of the next tape volume in *vol*. This routine returns a TRUE if there is a next volume for this tape file.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
vol	pointer to int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to tape t	Sec. 2.1.4.2.14 fiotape.c

Return Values		
Return Value	Type	Meaning
TRUE	BOOL	there is a next tape volume
FALSE	BOOL	this is the last tape volume
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
IS_CONTINUOUS	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
write_tbuffer	Sec. 2.1.4.2.14.26	
write_controller	Sec. 2.1.4.2.14.28	
write_ast_handler	Sec. 2.1.4.2.14.29	
read_ast_handler	Sec. 2.1.4.2.14.23	
read_controller	Sec. 2.1.4.2.14.22	
read_stream	Sec. 2.1.4.2.14.21	

Table 2.1-82: is_next_tape_volume Information.

Tape buffers and tape buffer queues

The following routines handle tape buffers so that the tape device can be kept streaming.

2.1.4.2.14.7 new_tbq

This routine allocates and initializes an empty tbuffer_q, *tbq*.

Internal Variables		
Variable	Type	Where Typedef Declared
space	lint t	Sec. 2.1.4.2.14 fiotape.c
tbq	pointer to tbuffer q	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
tbq	pointer to tbuffer_q	a pointer to the new tbuffer_q
Calls		
Function	Where Described	
fio_alloc	Sec. 2.1.4.2.5.1	
Called By		
Function	Where Described	
tape_open	Sec. 2.1.4.2.14.16	
concat_tbs	Sec. 2.1.4.2.14.10	

Table 2.1-83: new_tbq Information.

2.1.4.2.14.8 enqueue_tb

This routine adds a tbuffer, *tbq*, to the end of a tbuffer_q and sets a pointer, *tbuf*, to the number of buffers in the list.

Parameters		
Parameter	Type	Where Typedef Declared
tbq	pointer to tbuffer q	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
Called By		
Function	Where Described	
write tbuffer	Sec. 2.1.4.2.14.26	
write ast handler	Sec. 2.1.4.2.14.29	
tape seek	Sec. 2.1.4.2.14.30	
tape concat	Sec. 2.1.4.2.14.17	
ini tbuffer	Sec. 2.1.4.2.14.12	
tape close	Sec. 2.1.4.2.14.36	
read ast handler	Sec. 2.1.4.2.14.23	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-84: enqueue_tb Information.

2.1.4.2.14.9 dequeue_tb

This routine removes a tbuffer from the head of a tbuffer_q and returns a pointer to the former head of the tbuffer_q.

Parameters		
Parameter	Type	Where Typedef Declared
tbq	pointer to tbuffer q	Sec. 2.1.4.2.14 fiotape.c
Internal Variables		
Variable	Type	Where Typedef Declared
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
tbuf	pointer to tbuffer_t	the former head of the tbuffer q
Called By		
Function	Where Described	
write stream	Sec. 2.1.4.2.14.27	
next available tbuffer	Sec. 2.1.4.2.14.13	
tape seek	Sec. 2.1.4.2.14.30	
read tbuffer	Sec. 2.1.4.2.14.20	
tape close	Sec. 2.1.4.2.14.36	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-85: dequeue_tb Information.

2.1.4.2.14.10 concat_tbqs

This routine creates a new *tbuffer_q* which is the concatenation of the two specified queues, *tbq1* and *tbq2*, and returns a pointer to the new tape buffer queue.

Parameters		
Parameter	Type	Where Typedef Declared
tbq1	pointer to tbuffer_q	Sec. 2.1.4.2.14 fiotape.c
tbq2	pointer to tbuffer_q	Sec. 2.1.4.2.14 fiotape.c
Internal Variables		
Variable	Type	Where Typedef Declared
concat_tbq	pointer to tbuffer_q	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
concat_tbq	pointer to tbuffer_q	a pointer to the new, concatenated tape buffer queue.
Calls		
Function	Where Described	
new_tbq	Sec. 2.1.4.2.14.7	
Called By		
Function	Where Described	
write_controller	Sec. 2.1.4.2.14.28	

Table 2.1-86: concat_tbs Information.

2.1.4.2.14.11 null_tbq

This routine NULLs out the specified tape buffer queue by setting the *tbq* count field to 0 and the *tbq* head and tail to NULL.

Parameters		
Parameter	Type	Where Typedef Declared
tbq	pointer to <i>tbuffer_q</i>	Sec. 2.1.4.2.14 <i>fiotape.c</i>
Called By		
Function	Where Described	
write_controller	Sec. 2.1.4.2.14.28	

Table 2.1-87: null_tbq Information.

2.1.4.2.14.12 ini_tbuffers

This routine initializes the tape buffers abstraction. Tape buffers are "locked" into memory for performance reasons. The procedure returns FIO_OK if successful and an error message if unsuccessful.

Internal Variables		
Variable	Type	Where Typedef Declared
initialized	BOOL	Standard
i	int	Standard
space	lint_t	Sec. 2.1.4.2.14 fiotape.c
tbq	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
lockin failed	int	Standard
Return Values		
Return Value	Type	Meaning
FIO OK	int	procedure was successful
FIO_ALLOC_UNIX_ERROR	int	procedure failed due to error
FIO_WARNING_ERROR	int	procedure failed due to error
Errors		
Error	Reason for Error	
FIO_ALLOC_UNIX_ERROR	Unable to allocate space for fiolib buffers	
FIO_WARNING_ERROR	Unable to lockin tape buffers	
Calls		
Function	Where Described	
fio_alloc	Sec. 2.1.4.2.8.1	
enqueue tb	Sec. 2.1.4.2.14.8	
fio_error	Sec. 2.1.4.2.4.1	
Called By		
Function	Where Described	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-88: ini_tbuffers Information.

2.1.4.2.14.13 next_available_tbuffer

This routine gets and initializes an empty tbuffer for the specified *fio_file*, *fdptr*, from the stash of PRIVATE tbuffers, or if they are exhausted, from the free tbuffer pool. A pointer to an initialized tbuffer, *tbuf*, is returned.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to tape_t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
ast	int	Standard

Return Values		
Return Value	Type	Meaning
tbuf	pointer to tbuffer_t	the next available initialized tbuffer.
FIO_ALLOC_UNIX_ERROR	int	procedure failed due to error
FIO_WARNING_ERROR	int	procedure failed due to error
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
DISABLE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
QUEUE_COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
dequeue tb	Sec. 2.1.4.2.14.9	
IS_READABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
RESTORE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
tape write	Sec. 2.1.4.2.14.24	
read stream	Sec. 2.1.4.2.14.21	

Table 2.1-89: next_available_tbuffer Information.

2.1.4.2.14.14 bytes_to_trcds

Given the tape size in *bytes*, this routine returns the size in tbuffers.

Parameters		
Parameter	Type	Where Typedef Declared
bytes	unsigned long	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	the number of tbuffers in the specific tape size
Called By		
Function	Where Described	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-90: bytes_to_trcds Information.

2.1.4.2.14.15 ini_tape

This void routine initializes the tape package.

Called By	
Function	Where Described
ini_fiolib	Sec. 2.1.4.2.2.13

Table 2.1-91: ini_tape Information.

2.1.4.2.14.16 tape_open

This routine opens a tape file for reading or writing.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
path	pointer to char	Standard
size	unsigned long	Standard
header	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
fhdr	pointer to register fio_header	Sec. 2.1.4.1.2 fioheader.h
frcd	pointer to fio_record	Sec. 2.1.4.2.1 fiofile.h
i	int	Standard
ufd	int	Standard
num_private_tbuffers	int	Standard
retval	int	Standard
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
space	lint t	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
retval	int	procedure failed due to problem initializing tbuffers
FIO_OPEN_UNIX_ERROR	int	procedure failed due to Unix OPEN error
FIO_ALLOC_UNIX_ERROR	int	procedure failed due to inability to allocate space for fiolib buffers
FIO_NOT_ASYNC_ERROR	int	procedure failed: device does not support asynchronous I/O
FIO_OK	int	procedure was successful
Errors		
Error	Reason for Error	
FIO_OPEN_UNIX_ERROR	Unable to open specified file due to Unix error	
FIO_ALLOC_UNIX_ERROR	Unable to allocate space for fiolib buffers	
FIO_NOT_ASYNC_ERROR	Device does not support asynchronous I/O	
FIO_WARNING_ERROR	- Only some tape buffers available - Unable to lockin file header tbuffer	

Calls	
Function	Where Described
ini tbuffers	Sec. 2.1.4.2.14.12
IS READABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)
fio alloc	Sec. 2.1.4.2.8.1
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
bytes to trcds	Sec. 2.1.4.2.14.14
new tbq	Sec. 2.1.4.2.14.7
QUEUE COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)
fio error	Sec. 2.1.4.2.4.1
dequeue tb	Sec. 2.1.4.2.14.9
enqueue tb	Sec. 2.1.4.2.14.8
tape close	Sec. 2.1.4.2.14.36
fio free	Sec. 2.1.4.2.8.2
read fiofile header	Sec. 2.1.4.2.14.19
WAIT FOR AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
promote status info	Sec. 2.1.4.2.14.5
read stream	Sec. 2.1.4.2.14.21
FIO RECORD OF TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO RECORD PACKETS	Sec. 2.1.4.2.1 fiofile.h (macro definition)
COPY FIOHDR	Sec. 2.1.4.1.2 fioheader.h (macro definition)
set version chksum fiohdr	Sec. 2.1.4.2.3.20
write fiofile header	Sec. 2.1.4.2.14.25
VOLUME NUMBER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
get_tape_number fiohdr	Sec. 2.1.4.2.3.17

Table 2.1-92: tape_open Information.

2.1.4.2.14.17 **tape_concat**

This routine concatenates the tape file specified in *path* with the open file specified in *fdptr*, checking for consistency. **tape_concat()** is called from the "fiolib.c" routine, **fio_concat()**. This routine provides the basis for the dual tape logger. By concatenating two tape drives and swapping tape reels, the user can create arbitrarily long data files. Each tape reel corresponds to a data file volume.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
path	pointer to char	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
ufd	int	Standard

Return Values		
Return Value	Type	Meaning
FIO_OK	int	the procedure was successful
FIO_MAX_VOLUMES_ERROR	int	procedure failed: maximum number of file volumes exceeded
FIO_OPEN_UNIX_ERROR	int	unable to open specified file due to Unix error
Errors		
Error	Reason for Error	
FIO_MAX_VOLUMES_ERROR	Maximum number of file volumes exceeded	
FIO_OPEN_UNIX_ERROR	Unable to open specified file due to Unix error	
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
IS_READABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
Called By		
Function	Where Described	
fio_concat	Sec. 2.1.4.2.2.6	

Table 2.1-93: tape_concat Information.

2.1.4.2.14.18 tape_read

The routines for reading input fio_packets from fio_files are called from the "fiolib.c" routine **fio_read()**. **fio_read()** calls the tape routine **tape_read()** to read input data packets from the specified fio_file. The fio_packets are passed back to the user one at a time until the current tbuffer has been exhausted. When there are no more fio_packets left in the current tbuffer, **read_tbuffer()** is called to get another full tbuffer from the linked list of tbuffers. If the linked list of filled tbuffers has fallen below the **TAPE_READ_THRESHOLD**, the **read_stream()** routine is called. **read_stream()** takes advantage of the tape controller's ability to do multiple asynchronous read operations and reads a stream of fio_packets from the current tape drive into the linked list of tbuffers. When the end of the tape volume is reached, **read_stream()** calls **read_controller()** to swap tape volumes.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
pktptr	pointer to pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
copy	BOOL	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
cvt_buffer [MAX_FIO_PACKET_SIZE]	char	Standard
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
frcd	pointer to register fio_record	Sec. 2.1.4.2.1 fiofile.h
tbuf	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
nbytes	int	Standard
stat	int	Standard
Return Values		
Return Value	Type	Meaning
stat	int	if stat = FIO_OK, the procedure was successful, if stat = an error message, the procedure failed
FIO_NO_PACKETS_AVAIL_ ERROR	int	no fio_packets available for reading
Errors		
Error	Reason for Error	
FIO_EOF_ERROR	End of File	
FIO_DRIVE_NOT_READY_ERROR	Tape drive for continuous concatenated file is not ready	
FIO_NO_PACKETS_AVAIL_ERROR	No fio_packets available for reading	
FIO_INTERNAL_ERROR	Corrupt fio_record	
Calls		
Function	Where Described	
enqueue tb	Sec. 2.1.4.2.14.8	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
read tbuffer	Sec. 2.1.4.2.14.20	
IS_NBLOCKING	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
WAIT_FOR_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
IS_VERSION1	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
FIO_RECORD_OF_TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
FIO_RECORD_BYTE_COUNT	Sec. 2.1.4.2.1 fiofile.h (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
FIO_RECORD_PACKETS	Sec. 2.1.4.2.1 fiofile.h (macro definition)	
cvt fio_packet	Sec. 2.1.4.2.6.1	
IS_VERSION	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
FIO_PACKET_PTR	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
FIO_PACKET_TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
Called By		
Function	Where Described	
fio_read	Sec. 2.1.4.2.2.7	

Table 2.1-94: tape_concat Information.

2.1.4.2.14.19 read_fiofile_header

This routine makes an asynchronous IOCTL call to read in the first tape record, which contains the DataProbe record and the user defined header.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
ufd	int	Standard
ast	int	Standard
Errors		
Error	Reason for Error	
FIO_INTERNAL_ERROR	Read fio_file header error	
Calls		
Function	Where Described	
DISABLE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
RESTORE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
read controller	Sec. 2.1.4.2.14.22	
tape open	Sec. 2.1.4.2.14.16	
tape seek	Sec. 2.1.4.2.14.30	

Table 2.1-95: read_fiofile_header Information.

2.1.4.2.14.20 read_tbuffer

This routine attempts to get a full tbuffer of fio_packets. If successful, it returns a pointer to the tbuffer, if it fails it returns NULL. If there are less than TAPE_READ_THRESHOLD tbuffers, this routine calls read_stream() to get more. read_tbuffer() is called from tape_read() when no more fio_packets are in the current tbuffer. Note that this routine may have the effect of causing the high level status of the tape file to change.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h

Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
ast	int	Standard
Return Values		
Return Value	Type	Meaning
tbuf	pointer to tbuffer_t	if <i>tbuf</i> equals NULL, the routine failed; otherwise, <i>tbuf</i> points to the full tbuffer of fio packets read
Errors		
Error	Reason for Error	
FIO EOVS ERROR	End of file volume	
FIO INTERNAL ERROR	II status	
FIO EOF ERROR	End of file	
FIO_DRIVE_NOT_READY_ERROR	Tape drive for continous concatenated file is not ready	
Calls		
Function	Where Described	
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
QUEUE COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
dequeue tb	Sec. 2.1.4.2.14.9	
fio_error	Sec. 2.1.4.2.4.1	
do_eotv_action	Sec. 2.1.4.2.14.2	
read_stream	Sec. 2.1.4.2.14.21	
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
tape_concat	Sec. 2.1.4.2.14.17	
tape_seek	Sec. 2.1.4.2.14.30	

Table 2.1-96: read_tbuffer Information.

2.1.4.2.14.21 read_stream

This routine reads a stream of tbuffers from the current tape drive. It makes the IOCTL calls for an asynchronous tape read. Depending upon the fio_file state, **read_stream()** makes a variable number of IOCTL FIOAREAD calls. **read_stream()** is called when the linked list of filled tbuffers has fallen below the TAPE_READ_THRESHOLD.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h

Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
i	int	Standard
num_ops	int	Standard
ufd	int	Standard
ast	int	Standard
Errors		
Error	Reason for Error	
FIO_INTERNAL_ERROR		
Calls		
Function	Where Described	
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
MIN	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
TUBFS AVAILABLE	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
next available tbuffer	Sec. 2.1.4.2.14.13	
fio error	Sec. 2.1.4.2.4.1	
is next tape volume	Sec. 2.1.4.2.14.6	
read controller	Sec. 2.1.4.2.14.22	
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
read tbuffer	Sec. 2.1.4.2.14.20	
tape seek	Sec. 2.1.4.2.14.30	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-97: read_stream Information.

2.1.4.2.14.22 read_controller

This routine is called when read_stream() reaches the End of Tape Volume. read_controller() attempts to switch tapes. Once the new tape volume is mounted, this routine clears the drive status, allowing read_stream() to continue.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
status	struct mtget	Sec. 2.1.4.2.14 fiotape.c
vol	int	Standard
ufd	int	Standard
phase	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
ast	int	Standard

Errors	
Error	Reason for Error
RAW DRIVE NOT READY ERROR	
FIO_DRIVE_NOT_READY_ERROR	Tape drive for continuous concatenated file is not ready
FIO_INTERNAL_ERROR	No next tape volume
Calls	
Function	Where Described
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
is next tape volume	Sec. 2.1.4.2.14.6
XYLOGICS 472 DRIVE READY	Sec. 2.1.4.2.14 fiotape.c (macro definition)
init eotv action	Sec. 2.1.4.2.14.1
read fiofile header	Sec. 2.1.4.2.14.19
VOLUME UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)
eotv phase action	Sec. 2.1.4.2.14.3
fio error	Sec. 2.1.4.2.4.1
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
Called By	
Function	Where Described
read stream	Sec. 2.1.4.2.14.21

Table 2.1-98: read_controller Information.

2.1.4.2.14.23 read_ast_handler

This routine is the high level AST handler for FIOAREADs. The AST handler determines if the read operation was successful. If it was, the tbuffer is freed to be used again. If the operation was not successful, error status codes are set.

The argument *pc* is the pc at the start of this function. The argument *prio* is the priority of the AST that called.

Parameters		
Parameter	Type	Where Typedef Declared
tbuf	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
pc	int	Standard
prio	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
errno	exter int	Standard
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
asynch	pointer to register struct io	Standard
is_eotv	BOOL	Standard
fhdr	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
frcd	pointer to fio_record	Sec. 2.1.4.2.1 fiofile.h
i	int	Standard
ast	int	Standard

Errors	
Error	Reason for Error
RAW ABNORMAL EOVS ERROR	
RAW ABNORMAL EOF ERROR	
FIO_INTERNAL_ERROR	- Corrupt fio_record ignored - Volume is out of sequence - Unexpected End of Tape encountered while reading tape volume
RAW EOVS ERROR	
FIO_VERSION1_ERROR	This fio file volume has an invalid version ID (Version1)
FIO_VERSION2_ERROR	This fio file volume has an invalid version ID (Version2)
Calls	
Function	Where Described
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
IS VERSION1	Sec. 2.1.4.1.1 fiolib.h (macro definition)
FIO_RECORD OF TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO_RECORD BYTE COUNT	Sec. 2.1.4.2.1 fiofile.h (macro definition)
fio_error	Sec. 2.1.4.2.4.1
enqueue tb	Sec. 2.1.4.2.14.8
FIO_HEADER OF TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
get version chksum fiohdr	Sec. 2.1.4.2.3.21
IS VERSION2	Sec. 2.1.4.1.1 fiolib.h (macro definition)
VOLUME NUMBER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
get tape number fiohdr	Sec. 2.1.4.2.14.17
SET VOLUME STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO_RECORD STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)
is next tape volume	Sec. 2.1.4.2.14.6
QUEUE COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)

Table 2.1-99: read_ast_handler Information.

2.1.4.2.14.24 tape_write

The routines for writing input fio_packets are called from the "fiolib.c" routine **fio_write()**. **fio_write()** calls the tape routine **tape_write()** to write fio_packets. The fio_packets are stored in a tape buffer (tbuffer). When the current tbuffer is filled, **write_tbuffer()** is called to add the full tbuffer into the linked list of full tbuffers. When the TAPE_WRITE_THRESHOLD of tbuffers has been reached, the **write_stream()** routine is called. **write_stream()** takes advantage of the tape controller's ability to do multiple asynchronous write operations and writes a stream of tbuffers from the linked list of tbuffers to the tape drive. If the end of the tape volume is reached during **write_stream()**, the **write_controller()** routine is called to swap tapes.

Any buffers which get filled while the tape is streaming can be written immediately, however, once the tape stops streaming, nothing is written until the TAPE_WRITE_THRESHOLD of tbuffers is reached. In addition, there are complications at tape boundaries (i.e. End of Tape error recovery), especially in the case of continuous tape files.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
pkt	pointer to fio packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
frcd	pointer to fio record	Sec. 2.1.4.2.1 fiofile.h
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
nbytes	int	Standard
psize	int	Standard
stat	int	Standard
Return Values		
Return Value	Type	Meaning
stat	int	stat is equal to the high level status; if equal to FIO_OK, then procedure was successful; if equal to FIO_EOF_ERROR, then procedure failed due to end of file error.
FIO_NO_BUFFERS_ERROR	int	procedure failed; no buffers available for writing
Errors		
Error	Reason for Error	
FIO_EOF_ERROR	End of file	
FIO_DRIVE_NOT_READY	Tape drive for continuous concatenated file is not ready	
FIO_NO_BUFFERS_ERROR	No buffers available for writing	
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
FIO_RECORD_OF_TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
FIO_RECORD_BYTE_COUNT	Sec. 2.1.4.2.1 fiofile.h (macro definition)	
write tbuffer	Sec. 2.1.4.2.14.26	
next available tbuffer	Sec. 2.1.4.2.14.13	
FIO_RECORD_PACKETS	Sec. 2.1.4.2.1 fiofile.h (macro definition)	
IS_NBLOCKING	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
WAIT_FOR_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
write_stream	Sec. 2.1.4.2.14.27	
Called By		
Function	Where Described	
fio write	Sec. 2.1.4.2.2.8	

Table 2.1-100: tape_write Information.

2.1.4.2.14.25 write_fiofile_header

This routine makes an asynchronous IOCTL call to write the DataProbe record and the user defined header. The fio_file header should always be the first tbuffer on a tape reel.

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
ufd	int	Standard
ast	int	Standard
Errors		
Error	Reason for Error	
FIO INTERNAL ERROR	Write fio file header error	
Calls		
Function	Where Described	
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
VOLUME UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
write controller	Sec. 2.1.4.2.14.28	
tape open	Sec. 2.1.4.2.14.16	

Table 2.1-101: write_fiofile_header Information.

2.1.4.2.14.26 write_tbuffer

This routine puts a full tbuffer of fio_packets into the linked list of tbuffers. **write_tbuffer()** is called from **tape_write()** when the current tbuffer is filled. Note that this routine may have the effect of causing the high level status of the tape file to change.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file p	Sec. 2.1.4.2.1 fiofile.h
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
frcd	pointer to fio_record	Sec. 2.1.4.2.1 fiofile.h
ufd	int	Standard
ast	int	Standard

Errors	
Error	Reason for Error
FIO EOVS ERROR	End of fio file volume
RAW EOVS ERROR	
FIO EOF ERROR	End of fio file
RAW EOF ERROR	
Calls	
Function	Where Described
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO RECORD OF TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
SET VOLUME STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO RECORD STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)
enqueue tb	Sec. 2.1.4.2.14.8
do_eotv_action	Sec. 2.1.4.2.14.2
is_next_tape_volume	Sec. 2.1.4.2.14.6
write_stream	Sec. 2.1.4.2.14.27
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
Called By	
Function	Where Described
tape write	Sec. 2.1.4.2.14.24
tape close	Sec. 2.1.4.2.14.36

Table 2.1-102: write_tbuffer Information.

2.1.4.2.14.27 write_stream

This routine writes a stream of tbuffers from the current tape drive. `write_stream()` makes a variable number of `IOCTL FIOAWRITE` calls, depending upon the state of the tape file (e.g. are there any errors, is the tape drive streaming, how many buffers are filled, and how many write operations are still pending from the physical tape controller).

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to register tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
num_ops	int	Standard
max_ops	int	Standard
i	int	Standard
ufd	int	Standard
ast	int	Standard

Errors	
Error	Reason for Error
RAW EOF ERROR	
RAW ABNORMAL ERROR	
RAW EOV ERROR	
RAW ABNORMAL EOV ERROR	
RAW DRIVE NOT READY ERROR	
FIO_INTERNAL_ERROR	Write fio_file header error
Calls	
Function	Where Described
DISABLE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
MIN	Sec. 2.1.4.2.14 fiotape.c (macro definition)
QUEUE_COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)
write_controller	Sec. 2.1.4.2.14.28
dequeue_tb	Sec. 2.1.4.2.14.9
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)
fio_error	Sec. 2.1.4.2.4.1
RESTORE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
Called By	
Function	Where Described
tape_write	Sec. 2.1.4.2.14.24
write_tbuffer	Sec. 2.1.4.2.14.26
tape_close	Sec. 2.1.4.2.14.36
write_controller	Sec. 2.1.4.2.14.28

Table 2.1-103: write_stream Information.

2.1.4.2.14.28 write_controller

This routine is called to switch tapes when write_stream() reaches the End of Tape Volume. Note that the tapes cannot be switched until all IOCTL calls are returned.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
status	struct mtget	Standard
tbq	pointer to tbuffer_q	Sec. 2.1.4.2.14 fiotape.c
ffhdr	pointer to fio_header	Sec. 2.1.4.1.3 fioheader.h
phase	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
vol	int	Standard
ufd	int	Standard
ast	int	Standard

Errors	
Error	Reason for Error
RAW ABNORMAL EOVS ERROR	
RAW DRIVE NOT READY ERROR	
RAW ABNORMAL EOF ERROR	
FIO_DRIVE_NOT_READY_ERROR	Tape drive for continuous concatenated file is not ready
FIO_INTERNAL_ERROR	No next tape volume
FIO_ALLOC_UNIX_ERROR	Allocation error; lost packets
Calls	
Function	Where Described
DISABLE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
is_next_tape_volume	Sec. 2.1.4.2.14.6
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)
XYLOGICS_472_DRIVE_READY	Sec. 2.1.4.2.14 fiotape.c (macro definition)
init_eotv_action	Sec. 2.1.4.2.14.1
QUEUE_COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)
concat_tbqs	Sec. 2.1.4.2.14.10
fio_free	Sec. 2.1.2.2.8.2
null_tbq	Sec. 2.1.4.2.14.11
fio_error	Sec. 2.1.4.2.4.1
VOLUME_NUMBER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
set_tape_number_fiohdr	Sec. 2.1.4.2.3.16
write_fiofile_header	Sec. 2.1.4.2.14.25
write_stream	Sec. 2.1.4.2.14.27
eotv_phase_action	Sec. 2.1.4.2.14.3
RESTORE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
Called By	
Function	Where Described
write_stream	Sec. 2.1.4.2.14.27

Table 2.1-104: write_controller Information.

2.1.4.2.14.29 write_ast_handler

This routine is the high level AST handler for FIOAWRITEs. The AST handler determines if the write operation was successful. If it was, the tbuffer is freed to be used again. If the operation was not successful, error status codes are set.

The argument *pc* is the pc at the start of this function. The argument *prio* is the priority of the AST that called.

Parameters		
Parameter	Type	Where Typedef Declared
tbuf	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
pc	int	Standard
prio	int	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
errnc	extern int	Standard
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
tptr	pointer to register tape_t	Sec. 2.1.4.2.14 fiotape.c
asynch	pointer to register struct_io	Standard
ufd	int	Standard
ast	int	Standard

Errors	
Error	Reason for Error
FIO_INTERNAL_ERROR	- Unexpected End of Tape encountered while WRITING tape volume; or a write error due to bad tape - Unexpected Result; write only partly succeeded, but there was no error message.

Calls	
Function	Where Described
DISABLE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
enqueue_tb	Sec. 2.1.4.2.14.8
fio_error	Sec. 2.1.4.2.4.1
is_next_tape_volume	Sec. 2.1.4.2.14.6
RESTORE AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)

Table 2.1-105: write_ast_handler Information.

2.1.4.2.14.30 tape_seek

This routine seeks to a specified location in a tape file. The seeking is accomplished in terms of network time ticks. First, the time offset is translated into an absolute exercise time. Then, a check is made to see that all IOCTL calls are returned. An attempt is made to find the volume on which the seek time is most likely to be found. A check is made to see if the volume is actually mounted. Then, streaming is started. A search is made for the correct buffer, being careful about reaching the End of File. Then, the routine backs up to an appropriate point to start the seek forward (avoiding backing up past the fio_header) and checks for the correct tbuffer.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
offset	int	Standard
whence	int	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to tape_t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer_t	Sec. 2.1.4.2.14 fiotape.c
frcd	pointer to fio_record	Sec. 2.1.4.2.1 fiofile.h
i	int	Standard
tgtvol	int	Standard
tgttime	int	Standard
curtime	int	Standard
starttime	int	Standard
tgt_ufd	int	Standard
cur_ufd	int	Standard
tgt_status	struct mtget	Standard
cur_status	struct mtget	Standard
retval	int	Standard
hbound	int	Standard
lasttime	int	Standard
total backed up	int	Standard
trcds to start	int	Standard
bot	BOOL	Standard
volume	int	Standard
phase	eotv_phs_e	Sec. 2.1.4.2.14 fiotape.c
action	eotv_e	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
FIO_SEEK_RELATIVE_TAPE_END_ERROR	int	the fio_seek_end whence value is invalid for tape files
FIO_SEEK_INVALID_WHENCE_VALUE_ERROR	int	seek called with an invalid value for the whence parameter
FIO_SEEK_PAST_EOF_ERROR	int	attempt to seek past the end of the specified file volume
retval	int	if retval = FIO_OK, the procedure was successful; if retval = an error message, the procedure failed

Errors	
Error	Reason for Error
FIO_SEEK_PAST_BOF_ERROR	Attempt to seek past the beginning of the specified file volume
FIO_SEEK_RELATIVE_TAPE_END_ERROR	The fio_seek_end whence value is invalid for tape files
FIO_SEEK_INVALID_WHENCE_VALUE_ERROR	Seek called with an invalid value for the whence parameter
FIO_SEEK_VOLUME_NOT_AVAILABLE_ERROR	Cannot seek to the specified exercise time. Volume is not available
FIO_INTERNAL_ERROR	- Invalid eotv_phase - eotv_volume not tgtvol - tgtime<curtime and tgtvol>curvol - eotv_volume is tgt volume - ll_status - Starting the search after the target time - filled tbq is unexpectedly empty
FIO_DRIVE_NOT_READY_ERROR	Tape drive for continuous concatenated tape files is not ready
FIO_SEEK_PAST_EOF_ERROR	Attempt to seek past the end of the specified file volume
Calls	
Function	Where Described
TAPEINFO PTRR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
VOLUME STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)
WAIT FOR AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
tvolume starttime	Sec. 2.1.4.2.14.33
fio error	Sec. 2.1.4.2.4.1
IS CONTINUOUS	Sec. 2.1.4.1.1 fiolib.h (macro definition)
tvolume available	Sec. 2.1.4.2.14.32
VOLUME NUMBER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
enqueue tb	Sec. 2.1.4.2.14.8
QUEUE COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)
dequeue tb	Sec. 2.1.4.2.14.9
FIO RECORD OF TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO PACKET TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)
FIO RECORD PACKETS	Sec. 2.1.4.2.1 fiofile.h (macro definition)
VOLUME UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)
XYLOGICS 472 DRIVE READY	Sec. 2.1.4.2.14 fiotape.c (macro definition)
eotv phase action	Sec. 2.1.4.2.14.3
XYLOGICS 472 DRIVE ONLINE	Sec. 2.1.4.2.14 fiotape.c (macro definition)
backup past target	Sec. 2.1.4.2.14.34
read fiofile header	Sec. 2.1.4.2.14.19
read stream	Sec. 2.1.4.2.14.21
WAIT FOR AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
read tbuffer	Sec. 2.1.4.2.14.20
FIO RECORD BYTE COUNT	Sec. 2.1.4.2.1 fiofile.h (macro definition)
FIO RECORD STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)
QUEUE HEAD	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO PACKET SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)

Called By	
Function	Where Described
fio_seek	Sec. 2.1.4.2.2.9

Table 2.1-106: tape_seek Information.

2.1.4.2.14.31 tape_seek_time

This routine returns the time of the current packet.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio_file_p	Sec. 2.1.4.2.1 fiofile.h
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to tape_t	Sec. 2.1.4.2.14 fiotape.c
Return Values		
Return Value	Type	Meaning
FIO_PACKET_TIME (tptr->current_packet)	long	the time of the current packet
0	int	procedure failed
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
FIO_PACKET_TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
Called By		
Function	Where Described	
fio_seek	Sec. 2.1.4.2.2.9	

Table 2.1-107: tape_seek_time Information.

2.1.4.2.14.32 tvolume_available

This routine returns TRUE when the desired volume is mounted. Note that this procedure should only be called for CONTINUOUS files.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
vol	int	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
fhdr	fio header	Sec. 2.1.4.1.3 fioheader.h
tptr	pointer to tape t	Sec. 2.1.4.2.14 fiotape.c
status	struct mtget	Standard
ufd	int	Standard
volnum	int	Standard
phase	eotv phs e	Sec. 2.1.4.2.14 fiotape.c
retval	BOOL	Standard
Return Values		
Return Value	Type	Meaning
retval	BOOL	retval = TRUE if the volume specified in vol is mounted; retval = FALSE if the volume is not mounted
Errors		
Error	Reason for Error	
FIO INTERNAL ERROR	Read of fio_header failed	
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
XYLOGICS_472_DRIVE_READY	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
fioerror	Sec. 2.1.4.2.4.1	
get_version_chksum_fiohdr	Sec. 2.1.4.2.3.21	
get_tape_number_fiohdr	Sec. 2.1.4.2.3.17	
VOLUME_NUMBER	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
eotv_phase_action	Sec. 2.1.4.2.14.3	
XYLOGICS_472_DRIVE_ONLINE	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
tape_seek	Sec. 2.1.4.2.14.30	

Table 2.1-108: tvolume_available Information.

2.1.4.2.14.33 tvolume_starttime

This routine sets a pointer to the *starttime* of the volume specified in *vol*..

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file_p	Sec. 2.1.4.2.1 fiofile.h
vol	int	Standard
starttime	int	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
fhdr	fio header	Sec. 2.1.4.2.1 fiofile.h
frcd	fio record	Sec. 2.1.4.2.1 fiofile.h
tptr	pointer to tape_t	Sec. 2.1.4.2.14 fiotape.c
ufd	int	Standard
volnum	int	Standard
retval	int	Standard
phase	eotv phs e	Sec. 2.1.4.2.14 fiotape.c
status	struct mtget	Standard
Return Values		
Return Value	Type	Meaning
FIO_SEEK_VOLUME_NOT_AVAILABLE_ERROR	int	The procedure failed
retval	int	If retval = FIO_OK, the procedure was successful; If retval = an error message, the procedure failed
Errors		
Error	Reason for Error	
FIO_INTERNAL_ERROR	- Read of fhdr failed - Read of frcd failed	
FIO_SEEK_VOLUME_NOT_AVAILABLE_ERROR	Cannot seek to the specified exercise time; volume is not available	
FIO_DRIVE_NOT_READY	Tape drive for continuous concatenated file is not ready	
Calls		
Function	Where Described	
TAPEINFO PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
VOLUME UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
XYLOGICS 472 DRIVE READY	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
get version chksum error	Sec. 2.1.4.2.3.21	
get tape number fiohdr	Sec. 2.1.4.2.3.17	
eotv phase action	Sec. 2.1.4.2.14.1	
Called By		
Function	Where Described	
tape seek	Sec. 2.1.4.2.14.30	

Table 2.1-109: tvolume_starttime Information.

2.1.4.2.14.34 backup_past_target

This backs up the specified drive past the specified time, sets the fio_file pointer and returns the total number of records backed up.

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
starttime	int	Standard
tgtime	int	Standard
lasttime	int	Standard
trcds to start	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
ms to start	int	Standard
ms to tgt	int	Standard
trcds backed up	int	Standard
frcd	pointer to fio_record	Sec. 2.1.4.2.1 fiofile.h
Return Values		
Return Value	Type	Meaning
trcds_backed_up	int	The total number of fio records backed up
Errors		
Error	Reason for Error	
FIO_INTERNAL_ERROR	Backup_to target: negative backup Backup_past_target: large MTBSR failed Backup_past_target: small MTBSR failed Backup_to_target read failed	
Calls		
Function	Where Described	
fio_error	Sec. 2.1.4.2.4.1	
unix tape action	Sec. 2.1.4.2.14.4	
FIO_RECORD_STARTTIME	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
tape seek	Sec. 2.1.4.2.14.30	

Table 2.1-110: backup_past_target Information.

2.1.4.2.14.35 tape_getrawfd

This routine returns the raw Unix file descriptor for the volume specified in *volume_offset*.

Parameters		
Parameter	Type	Where Typedef Declared
fdptr	fio file p	Sec. 2.1.4.2.1 fiofile.h
volume_offset	int	Standard

Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to tape t	Sec. 2.1.4.2.14 fiotape.c
vol	int	Standard
Return Values		
Return Value	Type	Meaning
VOLUME_UFD(tptr, vol))	int	the raw Unix file descriptor
Calls		
Function	Where Described	
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)	
Called By		
Function	Where Described	
fio_getrawfd	Sec. 2.1.4.2.2.10	

Table 2.1-111: tape_getrawfd Information.

2.1.4.2.14.36 tape_close

This routine closes an open tape file. The state of the file is checked. If the file is opened for writing, all IOCTL calls must have been executed. The remaining filled_tbq tbuffers, the remaining private_tbq tbuffers, and the current_tbuffer are freed and memory allocations are cleaned up. This routine is called from the "fiolib.c" routine fio_close().

Parameters		
Parameter	Type	Where Typedef Declared
ufd	int	Standard
Internal Variables		
Variable	Type	Where Typedef Declared
tptr	pointer to register tape t	Sec. 2.1.4.2.14 fiotape.c
tbuf	pointer to tbuffer t	Sec. 2.1.4.2.14 fiotape.c
frcd	pointer to fio_record	Sec. 2.1.4.2.1 fiofile.h
write_rcds	BOOL	Standard
ufd	int	Standard
i	int	Standard
retval	int	Standard
ast	int	Standard
Return Values		
Return Value	Type	Meaning
retval	int	If retval = FIO_OK, the procedure was successful; If retval = an error message, the procedure failed

Errors	
Error	Reason for Error
FIO_CLOSE_UNIX_ERROR	Error closing file
FIO_INTERNAL_ERROR	Tape_close: filled_tbq is not empty
Calls	
Function	Where Described
TAPEINFO_PTR	Sec. 2.1.4.2.14 fiotape.c (macro definition)
DISABLE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
IS_WRITABLE	Sec. 2.1.4.1.1 fiolib.h (macro definition)
FIO_RECORD_OF_TBUFFER	Sec. 2.1.4.2.14 fiotape.c (macro definition)
FIO_RECORD_PACKETS	Sec. 2.1.4.2.1 fiofile.h (macro definition)
FIO_RECORD_BYTE_COUNT	Sec. 2.1.4.2.1 fiofile.h (macro definition)
write_tbuffer	Sec. 2.1.4.2.14.26
enqueue_tb	Sec. 2.1.4.2.14.8
QUEUE_COUNT	Sec. 2.1.4.2.14 fiotape.c (macro definition)
write_stream	Sec. 2.1.4.2.14.27
WAIT_FOR_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
RESTORE_AST	Sec. 2.1.4.2.14 fiotape.c (macro definition)
VOLUME_UFD	Sec. 2.1.4.2.14 fiotape.c (macro definition)
dequeue_tb	Sec. 2.1.4.2.14.9
fio_free	Sec. 2.1.4.2.5.2
Called By	
Function	Where Described
tape_open	Sec. 2.1.4.2.14.16
fio_close	Sec. 2.1.4.2.2.12

Table 2.1-112: tape_close Information.

2.2 Data Logger Files

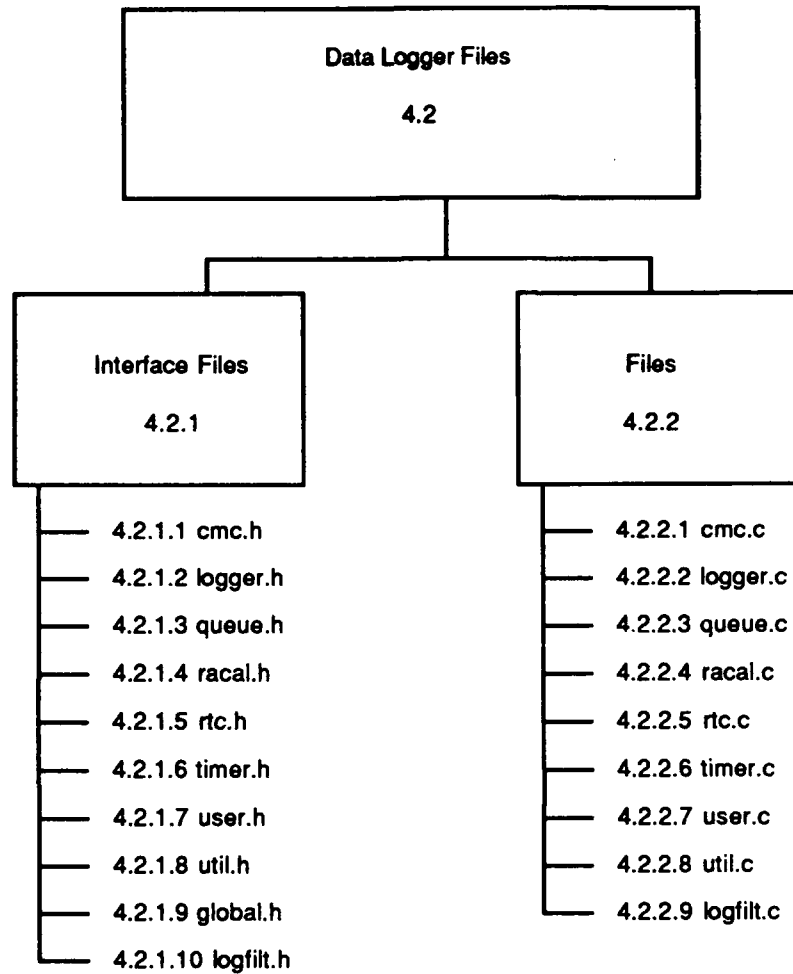


Figure 2-2: Data Logger Files Software Structure

2.2.1 Data Logger Header Files

2.2.1.1 cmc.h

cmc.h defines some cmc network specific routines.

Defines:

```
CMC_PATH
ACCEPT_ALL
REG_SHFT
REG_MASK
BPB
NUM_EXERCISE_IDS
NUM_EXERCISE_REGISTERS
ACCEPT_EXERCISE
NUM_PROTOCOL_REGISTERS
```

NUM_PROTOCOL_IDS
ACCEPT_PROTOCOL
proprietaryProtocolNumbers

Accounting Macros:

INC_SENDPVD_COUNT()
INC_RCVDPVD_COUNT()
INC_SEND_COUNT()
INC_RCVDPVD_COUNT()
INC_LATE_COUNT()
INC_LATE_MARGIN()
INC_DROP_COUNT()
INC_FILTER_COUNT()

Global Variable Declarations:

sendpvd_count
rcvdpvd_count
send_count
rcvd_count
late_count
late_margin
drop_count
filter_count

External procedure declarations:

cmc_init()
cmc_term()
cmc_accept()
cmc_protocol_types()
cmc_zero_status()
cmc_report_status()
cmc_gettime16()
cmc_gettime32()
cmc_settime()

2.2.1.2 logger.h

This file defines the interface to the logger finite state machine. This file exports a number of global variables which act as flags for the finite state machine.

Includes "p_logger.h"

External procedure declarations:

logger_op_error()
logger_connect()
logger_disconnect()
logger_seek_relative()
logger_speed()
logger_stop()
logger_start()
logger_suspend()
logger_status()
logger_get_state()
logger_get_activity()

2.2.1.3 queue.h

"queue.h" is a low level module which provides a general purpose queueing facility.

Defines:

```
FREE_QUEUE
IN_QUEUE
OUT_QUEUE
```

External procedure definitions:

```
init_queues()
reinit_queues()
enqueue()
dequeue()
queue_count()
```

2.2.1.4 racal.h

The racal.h file defines the following:

```
CMC_MILLI_THRESH
WAIT_INIT_CHAR
GET_N_CHARS
GET_TERM_CHAR_1
GET_TERM_CHAR_2
```

External procedure declarations:

```
racal_close()
racal_open()
reset_racal_time()
racal_start_recording()
racal_start_playing()
racal_stop()
racal_seek_to_time()
```

2.2.1.5 rtc.h

This file handles the Run-Time Commands. When the logger is in interactive mode, run-time commands will be coming from STDIN. When the logger is in Server mode, run-time commands will be coming from the client over the CMC network.

Includes:

```
"p_assoc.h"
"p_logger.h"
"network.h"
"fiolib.h"
```

External Procedure Declarations:

```
init_rtc()
free_rtc()
logger_message_location()
logger_msg()
logger_error()
protocol_of()
rtc_size()
```

```
handle_rtc()
handle_remote_rtc()
new_rtc()
send_clock_tick()
```

2.2.1.6 timer.h

This file declares the external interface to "timer.c".

```
on_time()
set_fast_time_factor()
get_fast_time_factor()
set_time()
get_time()
freeze_time()
unfreeze_time()
time_string()
```

2.2.1.7 user.h

This file declares the interface to the User Interface file, "user.c".

External procedure declarations:

```
collect_racal_time_info()
collect_fiofile_info()
collect_cmcsu_bscribe_info()
collect_fioheader_info()
collect_playback_info()
continue_or_quit()
yes_or_no()
```

2.2.1.8 util.h

Defines:

```
MAX_VOLUMES
DISK_FILE
NET_FILE
TAPE_FILE
```

Typedefs:

```
FIOLE_INFO file_info
```

External Procedure Declaration:

```
init_file_info()
```

2.2.1.9 global.h

This file defines some global macros:

```
MIN
MAX
ABS
```

2.2.1.10 logfilt.h

This file defines **logger_filter()**, an external procedure used by the CMC logger filter routine and the exercise filtering mechanism of the logger.

2.2.2 Data Logger Files

2.2.2.1 cmc.c

This file provides an interface to services provided by the SIMNET network interface library (libnetif). The services used include the timer, statistics about the number of packets handled, and the downloadable filter, a mechanism for filtering out PDU's.

Includes:

```
<stdio.h>
<fcntl.h>
<sys/types.h>
"sim_defines.h"
"network.h"
"netfilter.h"
"nettab.h"
"enpioctl.h"
"global.h"
"rtc.h"
"cmc.h"
```

Standard Procedure Declarations:

```
free()
malloc()
perror()
time()
```

External Procedure Declaration:

```
cmc_filter_init()
```

Exported Global Variables:

sendpvd_count	--the number of RTC packets sent on the logger's client
rcvdpvd_count	--the number of RTC packets received from the logger's client
send_count	--the number of packets sent on the CMC network
rcvd_count	--the number of packets received from the CMC network
late_count	--the number of packets sent late
late_margin	--the margin by which packets are sent late
drop_count	--the number of packets dropped
filter_count	--the number of packets filtered
cmc_base_time	--used in conjunction with the 16-bit clock, the base time from which the 16-bit network clock is an offset.
cmcfid	--the UNIX file descriptor for dealing with CMC network.
msgbuf[256]	--the buffer for messages.

The next few routines, (2.2.2.1.1 through 2.2.2.1.4) constitute the interface to the downloadable filter. This filter (see logfilt.c) is loaded onto the ethernet card by a separate program (netstart). These routines provide a mechanism for the logger to communicate

with the filter during runtime. The filter is used to weed out unwanted packets at the board level when the logger is recording. The filter is written to filter out packets based on ExerciseID and on Protocol.

Defines:

ACCEPT_ALL_IDS
CMC_FILTER

2.2.2.1.1 cmc_filter_init

This routine initializes the filter on the CMC card. The filter is initialized to accept only logger RTC packets.

Internal Variables		
Variable	Type	Where Typedef Declared
i	int	standard
Calls		
Function	Where Described	
net_flush	Sec. 2.20.1 See MCC CSCI SDD	
net_reg_write	Sec. 2.20.1 See MCC CSCI SDD	
cmc_accept	Sec. 2.2.2.1.3	
Called By		
Function	Where Described	
cmc_init	Sec. 2.2.2.1.5	

Table 2.2-1: cmc_filter_init Information.

2.2.2.1.2 cmc_protocol_types

This routine initializes the list of protocol types which the logger will accept. Currently the logger will accept only simulation type, or voice type, or both.

Parameters		
Parameter	Type	Where Typedef Declared
sim_protocol	BOOL	standard
voice_protocol	BOOL	standard
Calls		
Function	Where Described	
net_init_type	Sec. 2.20.1 See MCC CSCI SDD	
net_add_type	Sec. 2.20.1 See MCC CSCI SDD	
Called By		
Function	Where Described	
logger_start	Sec. 2.2.2.2.29	

Table 2.2-2: cmc_protocol_types Information.

2.2.2.1.3 cmc_accept

This routine adds an exercise/protocol ID to the list to be accepted by the logger's CMC filter. Passing a value of ACCEPT_ALL is an indication that all exercise/protocol ID's should be accepted. This routine returns a 1 on successful completion and 0 if the operation fails.

Parameters		
Parameter	Type	Where Typedef Declared
id	int	standard
is_exercise	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
reg_index	register int	standard
last_id	int	standard
num_reg	int	standard
reg_value	int	standard
i	int	standard
Return Values		
Return Value	Type	Meaning
0	int	The procedure failed
1	int	The procedure was successful
Errors		
Error	Reason for Error	
logger_error	Invalid ID value	
Calls		
Function	Where Described	
logger_error	Sec. 2.2.2.5.3	
net_reg_write	Sec. 2.20.1 See MCC CSCI SDD	
net_reg_read	Sec. 2.20.1 See MCC CSCI SDD	
Called By		
Function	Where Described	
cmc_filter_init	Sec. 2.2.2.1.1	
logger_accept_pdus	Sec. 2.2.2.2.12	

Table 2.2-3: cmc_accept Information.

2.2.2.1.4 cmc_reject

This routine removes an exercise/protocol ID from the list to be accepted by the logger's CMC filter. This routine returns 1 on successful completion and 0 if the operation fails.

Parameters		
Parameter	Type	Where Typedef Declared
id	int	standard
is exercise	int	standard

Internal Variables		
Variable	Type	Where Typedef Declared
reg_index	register int	standard
last_id	int	standard
reg_value	int	standard
Return Values		
Return Value	Type	Meaning
0	int	The procedure failed
1	int	The procedure was successful
Errors		
Error	Reason for Error	
logger_error	Invalid ID value	
Calls		
Function	Where Described	
logger_error	Sec. 2.2.2.5.3	
net_reg_write	Sec. 2.20.1 See MCC CSCI SDD	
net_reg_read	Sec. 2.20.1 See MCC CSCI SDD	
Called By		
Function	Where Described	
logger_accept_pdus	Sec. 2.2.2.2.12	

Table 2.2-4: cmc_reject Information.

2.2.2.1.5 cmc_init

This routine initializes the CMC network in the appropriate modes:

```

sendpvd_count = 0
rcvpvd_count = 0
send_count = 0
rcvd_count = 0
late_count = 0
drop_count = 0
filter_count = 0
cmc_base_time = 0

```

Parameters		
Parameter	Type	Where Typedef Declared
id	int	standard
is_exercise	int	standard
Return Values		
Return Value	Type	Meaning
0	int	The procedure failed
1	int	The procedure was successful

Calls	
Function	Where Described
cmc filter init	Sec. 2.2.2.1.1
logger init cmc	Sec. 2.2.2.2.11

Table 2.2-5: cmc_init Information.

2.2.2.1.6 cmc_term

This routine terminates the CMC network in the appropriate modes. The routine returns 1 on successful completion and 0 if the operation fails.

Return Values		
Return Value	Type	Meaning
0	int	The procedure failed
1	int	The procedure was successful

Table 2.2-6: cmc_term Information.

2.2.2.1.7 cmc_zero_status

This routine zeroes the statistics about the network which are being kept by the network library (libnetif). The routine returns 1 on successful completion and 0 if the operation fails.

Calls	
Function	Where Described
net zero_statistics	Sec. 2.20.1 See MCC CSCI SDD
Called By	
Function	Where Described
logger_continue	Sec. 2.2.2.2 logger.c

Table 2.2-7: cmc_zero_status Information.

2.2.2.1.8 cmc_report_status

This routine reports the statistics about the network which the network library has been keeping.

Parameters		
Parameter	Type	Where Typedef Declared
recording	BOOL	standard
play_time	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
status_buffer[N_STATS]	int	standard
seconds	float	standard
status_string[80]	char	standard
stat	int	standard

Calls	
Function	Where Described
net_get_characteristics	Sec. 2.20.1 See MCC CSCI SDD
logger_msg	Sec. 2.2.2.5.2
net_stat_string	Sec. 2.20.1 See MCC CSCI SDD
Called By	
Function	Where Described
ccatcher	Sec. 2.2.2.2.34
logger_stop	Sec. 2.2.2.2.28

Table 2.2-8: cmc_report_status Information.

The next few routines (2.2.2.1.9 through 2.2.2.1.11) are low level routines for getting and setting the clocks on the ethernet card.

2.2.2.1.9 cmc_gettime16

This routine gets the value of the 16 bit timer from the CMC card.
One count = 998.26 microseconds.

Return Values		
Return Value	Type	Meaning
net_current_time(cmfd) + cmc_base_time	int	The value of the 16 bit timer from the CMC card
Calls		
Function	Where Described	
net_current_time	Sec. 2.20.1 See MCC CSCI SDD	
Called By		
Function	Where Described	
on time	Sec. 2.2.2.6.10	

Table 2.2-9: cmc_gettime16 Information.

2.2.2.1.10 cmc_gettime32

This routine gets the value of the 32 bit timer from the CMC card.
One count = 998.26 microseconds.

Return Values		
Return Value	Type	Meaning
net_gettime(cmfd)	int	The value of the 32 bit timer from the CMC card
Calls		
Function	Where Described	
net_gettime	Sec. 2.20.1 See MCC CSCI SDD	

Called By	
Function	Where Described
get time	Sec. 2.2.2.6.7
unfreeze time	Sec. 2.2.2.6.9
freeze time	Sec. 2.2.2.6.8

Table 2.2-10: `cmc_gettime32` Information.**2.2.2.1.11 `cmc_settime`**

This routine sets the values of both the 16-bit and 32-bit timers from the CMC card. One count = 998.26 microseconds. The parameter *ntime* is the new value for the 32-bit timer on the CMC card.

Parameters		
Parameter	Type	Where Typedef Declared
ntime	int	standard
Calls		
Function	Where Described	
net_init time	Sec. 2.20.1 See MCC CSCI SDD	
net_settime	Sec. 2.20.1 See MCC CSCI SDD	
Called By		
Function	Where Described	
reset time	Sec. 2.2.2.6.5	
set time	Sec. 2.2.2.6.6	
set fast time factor	Sec. 2.2.2.6.3	

Table 2.2-11: `cmc_settime` Information.**2.2.2.2 `logger.c`**

This is the primary file for the Data Logger. The basic structure of the Data Logger involves an initialization phase during which the Data Logger is placed in either stand-alone or server mode and then initialized for recording, playback, or copying. The Data Logger then enters the main loop of the program. In the main loop, the Data Logger takes care of two primary functions: (1) to acquire and process packets, and (2) to respond to run-time commands.

Includes:

```
<signal.h>
<stdio.h>
<sys/ioctl.h>
<sys/types.h>
<sys/timeb.h>
<sys/times.h>
<time.h>
```

"fiolib.h"
"fioheader.h"
"fioerror.h"
"network.h"
"p_num.h"
"p_logger.h"
"global.h"
"cmc.h"
"logger.h"
"logtime.h"
"queue.h"
"racal.h"
"rtc.h"
"timer.h"
"user.h"
"util.h"

Standard Procedures:

perror()
exit()
strcat()
strncpy()

Static Procedures:

process_parms()
init_state_variables()
init_logger_variables()
logger_init()
init_logger_for_server()
init_logger_for_copying()
init_logger_for_playback()
init_logger_for_recording()
open_fio_files
logger_accept_pdus()
logger_init_cmc()
logger_get_remote_rtc()
logger_put_remote_rtc()
logger_fsm()
logger_copying_state()
logger_playback_state()
logger_recording_state()
logger_reset()
logger_clock_tick()
print_advice()
ccatcher()
bells()
print_command_line_help()

Defines:

Alarm Level:
NOTE
ALARM
PANIC

DataProbe Header:

TAPE_TYPE
RUN_NUM
START_TAPE_NUM
BPW
HDR_SIZE
DATE_OF_COPY

CYCLES_PER_RTC_MASK
LATE_MARGIN
DRIVE_NOT_READY_CRISIS_BOUND
MAX_FAILED_READS
MAX_DNR_ERRORS
CLOCKTICK_INTERVAL

Declarations:

Logger State Variables:

logger_state
logger_activity
logger_operation
logger_activity_started

Static Variables:

control_c
debug
maxprio
query_all
racal

Global File Variables:

rd_files
wr_files
fio_hdr
readfd
writefd
cmcfid

Fio_header String Defines and Variables:

FILEID_SZ
file_id
command_str
dp_comment
dp_project
start_date_str
start_time_str

Time on Racal clock (translated to CMC msec) when CMC clock reads 0 Variables:

racal_time_at_start
start_datetime
current_timestamp
copied_count

msgbuf
saved_packet
write_packet

Filtering on Playback Macros and Variables:

playback_stealth_protocol
InitPlaybackFilter()
FilterProtocol()

2.2.2.2.1 main

main() is the entry point of the Data Logger program.

Parameters		
Parameter	Type	Where Typedef Declared
argc	int	standard
argv[]	pointer to char	standard
Return Values		
Return Value	Type	Meaning
0	int	The operation was successful
Calls		
Function	Where Described	
init state variables	Sec. 2.2.2.2.3	
init queues	Sec. 2.2.2.3.4	
init rtc	Sec. 2.2.2.5.6	
init user	Sec. 2.2.2.7.13	
logger message location	Sec. 2.2.2.5.1	
process parms	Sec. 2.2.2.2.2	
logger msg	Sec. 2.2.2.5.2	
yes or no	Sec. 2.2.2.7.9	
init logger variables	Sec. 2.2.2.2.4	
logger init	Sec. 2.2.2.2.5	
logger fsm	Sec. 2.2.2.2.15	
logger reset	Sec. 2.2.2.2.20	

Table 2.2-12: main Information.

2.2.2.2.2 process_parms

This routine processes the command-line flags.

Parameters		
Parameter	Type	Where Typedef Declared
argc	int	standard
argv[]	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
progname	pointer to char	standard
i	int	standard

Errors	
Error	Reason for Error
logger_error	- Specifying activity not allowed in LoggerServer mode - Cannot copy and record simultaneously - Cannot copy and play simultaneously - Cannot play and record simultaneously - Cannot play and copy simultaneously - Cannot record and play simultaneously - Cannot record and copy simultaneously - Unknown switch - Logger must copy, play, or record
Calls	
Function	Where Described
logger_msg	Sec. 2.2.2.5.2
print_command_line_help	Sec. 2.2.2.2.36
logger_error	Sec. 2.2.2.5.3
Called By	
Function	Where Described
main	Sec. 2.2.2.2.1

Table 2.2-13: process_parms Information.

2.2.2.2.3 init_state_variables

This routine initializes the state variables as follows:

logger_activity:	loggerNoActivity
logger_operation:	loggerInteractive
logger_state:	LoggerDisconnected
logger_activity_started:	FALSE
control_c:	FALSE
debug:	FALSE
maxprio:	FALSE
query_all:	FALSE
racal:	FALSE

Called By	
Function	Where Described
main	Sec. 2.2.2.2.1

Table 2.2-14: init_state_variables.

2.2.2.2.4 init_logger_variables

This routine initializes the logger variables.

Calls	
Function	Where Described
init_file_info	Sec. 2.2.2.8.1
null_fiohdr	Sec. 2.1.4.2.3.23

Called By	
Function	Where Described
main	Sec. 2.2.2.2.1

Table 2.2-15: `init_logger_variables` Information.2.2.2.2.5 `logger_init`

This routine calls different initialization routines depending on the logger activity: recording, playback, or copying.

Calls	
Function	Where Described
reinit queues	Sec. 2.2.2.3.5
init logger for server	Sec. 2.2.2.2.6
init logger for copying	Sec. 2.2.2.2.7
init logger for playback	Sec. 2.2.2.2.8
init logger for recording	Sec. 2.2.2.2.9
Called By	
Function	Where Described
main	Sec. 2.2.2.2.1

Table 2.2-16: `logger_init` Information.2.2.2.2.6 `init_logger_for_server`

This routine initializes the logger for server mode.

Calls	
Function	Where Described
logger init cmc	Sec. 2.2.2.2.11
logger message location	Sec. 2.2.2.5.1
logger get remote rtc	Sec. 2.2.2.2.13
handle remote rtc	Sec. 2.2.2.5.13
logger put remote rtc	Sec. 2.2.2.2.14
Called By	
Function	Where Described
logger init	Sec. 2.2.2.2.5

Table 2.2-17: `init_logger_for_server` Information.

2.2.2.2.7 init_logger_for_copying

This routine initializes the logger for copying. It collects information about files to be copied and opens them.

Internal Variables		
Variable	Type	Where Typedef Declared
start_dt	LoggerTime	p_logger.drm (Appendix A)
start_dstr [DATE OF RUN_SZ + 1]	char	standard
start_tstr [TIME OF RUN_SZ + 1]	char	standard
comment_str [COMMENT_SZ + 1]	char	standard
project_str [PROJECT_ID_SZ + 1]	char	standard
file_nm	pointer to char	standard
ex_ids [loggerMaxExerciseIDs + 1]	char	standard
i	int	standard
j	int	standard
open	BOOL	standard
Errors		
Error	Reason for Error	
FIO_VERSION1_ERROR	Fio file volume has an invalid version ID (Version1)	
FIO_VERSION2_ERROR	Fio file volume has an invalid version ID (Version2)	
logger_error	File was specified for both reading and writing	
Calls		
Function	Where Described	
yes or no	Sec. 2.2.2.7.9	
logger_msg	Sec. 2.2.2.5.2	
collect_fiofile_info	Sec. 2.2.2.7.2	
open_fio_files	Sec. 2.2.2.2.10	
fio_is_null_header	Sec. 2.1.4.2.3.1	
get_fileid_fiohdr	Sec. 2.1.4.2.3.12	
logger_error	Sec. 2.2.2.5.3	
get_datetime	Sec. 2.1.3.2.6	
datetime_to_strings	Sec. 2.1.3.2.5	
fio_file_header	Sec. 2.1.4.2.3 .3	
fio_convert_header	Sec. 2.1.4.2.3.2	
fio_print_fiohdr	Sec. 2.1.4.2.3.22	
Called By		
Function	Where Described	
logger_init	Sec. 2.2.2.2.5	

Table 2.2-18: init_logger_for_copying Information.

2.2.2.2.8 init_logger_for_playback

This routine initializes the logger for playback. Information is collected about the SIMNET data files to be played back. The network is initialized.

Internal Variables		
Variable	Type	Where Typedef Declared
play_stealth_protocol	BOOL	standard
files	file_info	Sec. 2.2.1.8 util.h
Calls		
Function	Where Described	
logger_init_cmc	Sec. 2.2.2.2.11	
init_file_info	Sec. 2.2.2.8.1	
logger_msg	Sec. 2.2.2.5.2	
collect_fiofile_info	Sec. 2.2.2.7.2	
collect_playback_info	Sec. 2.2.2.7.7	
yes_or_no	Sec. 2.2.2.7.9	
logger_start	Sec. 2.2.2.2.29	
Called By		
Function	Where Described	
logger_init	Sec. 2.2.2.2.5	

Table 2.2-19: init_logger_for_playback Information.

2.2.2.2.9 init_logger_for_recording

This routine initializes the logger for recording. The routine collects information about the CMC Network initialization, the start time of the exercise, and the SIMNET file and file header.

Internal Variables		
Variable	Type	Where Typedef Declared
sim_protocol	BOOL	standard
voice_protocol	BOOL	standard
num_exercises	short	standard
exercises [loggerMaxExerciseIDs+1]	char	standard
std_protocols	short	standard
nstd_protocols	short	standard
start_dt	LoggerTime	p_logger.h
files	file_info	Sec. 2.2.1.8 util.h
comment_str [COMMENT_SZ + 1]	char	standard
project_str [PROJECT_ID_SZ + 1]	char	standard

Calls	
Function	Where Described
logger init cmc	Sec. 2.2.2.2.11
logger msg	Sec. 2.2.2.5.2
collect cmcsubscribe info	Sec. 2.2.2.7.5
get datetime	Sec. 2.1.3.2.6
init file info	Sec. 2.2.2.8.1
collect fiofile info	Sec. 2.2.2.7.2
collect fioheader info	Sec. 2.2.2.7.6
yes or no	Sec. 2.2.2.7.9
logger_start	Sec. 2.2.2.2.29
Called By	
Function	Where Described
init logger	Sec. 2.2.2.2.5

Table 2.2-20: init_logger_for_recording Information.

2.2.2.2.10 open_fio_files

This routine opens the specified files for the Data Logger.

Parameters		
Parameter	Type	Where Typedef Declared
fls	pointer to file info	Sec. 2.2.1.8 util.h
fhdr	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
i	int	standard
oflags	int	standard
opstr	pointer to char	standard
fd	fio_desc	Sec. 2.1.4.1.1 fiolib.h
Return Values		
Return Value	Type	Meaning
fd	fio_descr	The file descriptor for the opened file
FIO_ERROR	int	The procedure failed due to an error
Errors		
Error	Reason for Error	
FIO_ERROR	No files specified	

Calls	
Function	Where Described
logger_error	Sec. 2.2.2.5.3
fio open	Sec. 2.1.4.2.2.5
logger msg	Sec. 2.2.2.5.2
fio concat	Sec. 2.1.4.2.2.6
fio close	Sec. 2.1.4.2.2.12
fio error string	Sec. 2.1.4.2.4.2
Called By	
Function	Where Described
logger_start	Sec. 2.2.2.2.29
init logger for copying	Sec. 2.2.2.2.7

Table 2.2-21: open_fio_files Information.

2.2.2.2.11 logger_init_cmc

This routine opens and initializes the CMC network.

Internal Variables		
Variable	Type	Where Typedef Declared
cmc_oflags	int	standard
Errors		
Error	Reason for Error	
logger_error	- Unable to initialize CMC network - Failed to initialize the CMC filter	
Calls		
Function	Where Described	
fio_open	Sec. 2.1.4.2.2.5	
logger_error	Sec. 2.2.2.5.3	
fio_error	Sec. 2.1.4.2.4.1	
cmc_init	Sec. 2.2.2.1.5	
Called By		
Function	Where Described	
init_logger_for_server	Sec. 2.2.2.2.6	
init_logger_for_playback	Sec. 2.2.2.2.8	
init_logger_for_recording	Sec. 2.2.2.2.9	

Table 2.2-22: logger_init_cmc Information.

2.2.2.2.12 logger_accept_pdus

This routine sets up the CMC filter. It accepts PDU's of standard protocol (if requested) and non-standard protocol (if requested). Logger run-time commands (RTC) always accepted.

Parameters		
Parameter	Type	Where Typedef Declared
num_exercises	short	standard
exercises[]	char	standard
num_stdprotocols	short	standard
num_nstdprotocols	short	standard
Internal Variables		
Variable	Type	Where Typedef Declared
i	int	standard
Errors		
Error	Reason for Error	
logger_error	- Failed to accept exerciseID - Failed to accept protocols - Failed to reject protocols	
Calls		
Function	Where Described	
cmc accept	Sec. 2.2.2.1.5	
logger error	Sec. 2.2.2.5.3	
cmc reject	Sec. 2.2.2.1.4	
Called By		
Function	Where Described	
logger start	Sec. 2.2.2.2.29	

Table 2.2-23: logger_accept_pdus Information.

2.2.2.2.13 logger_get_remote_rtc

This routine reads a run time command from the CMC network and places it on the IN command queue.

Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Errors		
Error	Reason for Error	
logger_error	Unexpected fio_read error	
Calls		
Function	Where Described	
fio_read	Sec. 2.1.4.2.2.7	
protocol of	Sec. 2.2.2.5.4	
INC RCVPD COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
new rtc	Sec. 2.2.2.5.14	
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
IN_QUEUE	Sec. 2.2.1.3 queue.h (macro definition)	

Called By	
Function	Where Described
logger_fsm	Sec. 2.2.2.2.15
init_logger_for_server	Sec. 2.2.2.2.6

Table 2.2-24: logger_get_remote_rtc Information.

2.2.2.2.14 logger_put_remote_rtc

This routine reads a run time command from the OUT command queue and places it on the CMC Network.

Internal Variables		
Variable	Type	Where Typedef Declared
pktbuf [MAX_FIO_PACKET_SIZE]	char	standard
rtc available	BOOL	standard
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Errors		
Error	Reason for Error	
FIO_NET_WRITE_ERROR	Unable to write packet to network device	
fio_error	Unexpected error on playback	
Calls		
Function	Where Described	
queue_count	Sec. 2.2.2.3.8	
dequeue	Sec. 2.2.2.3.7	
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
free_rtc	Sec. 2.2.2.5.15	
fio_write	Sec. 2.1.4.2.2.8	
INC_RCVDPVD_COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
fio_error	Sec. 2.1.4.2.4.1	
Called By		
Function	Where Described	
logger_fsm	Sec. 2.2.2.2.15	

Table 2.2-25: logger_put_remote_rtc Information.

2.2.2.2.15 logger_fsm

This routine is the Finite State Machine. The logger spends most of its time here in an internal loop. In each cycle the logger acquires a packet and processes it. For example, during playback, the logger reads a packet from the logger file and writes it to the network. Every so many cycles, the logger checks for a run-time command and processes it if one is found.

Internal Variables		
Variable	Type	Where Typedef Declared
cycles	unsigned	standard
Errors		
Error	Reason for Error	
logger_error	- Failed to set to real-time priority - Running at real-time priority - Unknown activity - Unknown state - Failed to reset to real-time priority - Running at normal priority	
Calls		
Function	Where Described	
logger copying state	Sec. 2.2.2.2.16	
logger playback state	Sec. 2.2.2.2.17	
logger record state	Sec. 2.2.2.2.19	
logger get remote rtc	Sec. 2.2.2.2.13	
handle rtc	Sec. 2.2.2.5.7	
logger put remote rtc	Sec. 2.2.2.2.14	
logger clock tick	Sec. 2.2.2.2.21	
logger error	Sec. 2.2.2.5.3	
Called By		
Function	Where Described	
main	Sec. 2.2.2.2.1	

Table 2.2-26: logger_fsm Information.

2.2.2.2.16 logger_copying_state

This routine defines a single cycle in the Data Logger's copying state. It reads one packet from the source file and writes it to the destination file.

Internal Variables		
Variable	Type	Where Typedef Declared
done	BOOL	standard
newpkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Return Values		
Return Value	Type	Meaning
loggerConnected		Allows the logger to exit

Errors	
Error	Reason for Error
FIO_EOV_ERROR	- Copier finished writing packet # - Copier finished reading packet #
FIO_EOF_ERROR	- Successfully completed copying files - Write files ran out of space
FIO_DRIVE_NOT_READY	Tape drive is not ready for reading
logger_error	Error reading packet
Calls	
Function	Where Described
logger_msg	Sec. 2.2.2.5.2
fio_read	Sec. 2.1.4.2.2.7
logger_error	Sec. 2.2.2.5.3
fio_write	Sec. 2.1.4.2.2.8
continue_or_quit	Sec. 2.2.2.7.8
Called By	
Function	Where Described
logger_fsm	Sec. 2.2.2.2.15

Table 2.2-27: logger_copying_state Information.

2.2.2.2.17 init_logger_playback_state

This routine initializes state variables used by logger-playbackstate.

Called By	
Function	Where Described
logger_continue	Sec. 2.2.2.2.24

Table 2.2-28: init_logger_playback_state Information.

2.2.2.2.18 logger_playback_state

This routine defines a single cycle in the playback state. In the playback state, the Data Logger gets the next packet from the logger file, filtering out certain protocols (i.e. Stealth) if necessary, and attempts to write the packet out to the CMC Network.

Parameters		
Parameter	Type	Where Typedef Declared
peek	BOOL	standard
peek_pkt	pointer to pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h

Internal Variables		
Variable	Type	Where Typedef Declared
drive not ready count	int	standard
margin	int	standard
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
protocol number	int	standard
Return Values		
Return Value	Type	Meaning
LoggerSuspended	LoggerState	The logger is in the suspended state
logger_state	LoggerState	The current state of the logger
loggerActive	LoggerState	The logger is in the active state
Errors		
Error	Reason for Error	
FIO EOVS ERROR	Finished reading packet #	
FIO_EOF_ERROR	Ran out of packets during playback; logger is entering the suspended state	
FIO DRIVE NOT READY ERROR	Tape drive is not ready for playback	
logger_error	Error reading packet for playback	
FIO NET WRITE ERROR	Unexpected error on playback	
Calls		
Function	Where Described	
fio read	Sec. 2.1.4.2.2.7	
logger_msg	Sec. 2.2.2.5.2	
logger_suspend	Sec. 2.2.2.2.30	
logger_error	Sec. 2.2.2.5.3	
fio_error_string	Sec. 2.1.4.2.4.2	
protocol_of	Sec. 2.2.2.5.4	
on time	Sec. 2.2.2.6.10	
FIO PACKET TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
INC SEND COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
get fast time factor	Sec. 2.2.2.6.4	
INC LATE COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
INC LATE MARGIN	Sec. 2.2.1.1 cmc.h (macro definition)	
INC DROP COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
fio_write	Sec. 2.1.4.2.2.8	
Called By		
Function	Where Described	
logger_fsm	Sec. 2.2.2.2.15	
logger_continue	Sec. 2.2.2.2.24	

Table 2.2-29: logger_playback_state Information.

2.2.2.2.19 logger_record_state

This routine defines a single cycle in the data logger's recording state. It reads one packet from the network. If the packet is a run-time command, it is placed in the RTC queue. Otherwise, it is written out to the logger file.

Internal Variables		
Variable	Type	Where Typedef Declared
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
retval	int	standard
faile_reads	int	standard
advice_count	int	standard
drive_not_ready_count	int	standard
Return Values		
Return Value	Type	Meaning
loggerSuspended	LoggerState	The logger is in the suspended state
loggerActive	LoggerState	The logger is in the active state
Errors		
Error	Reason for Error	
FIO_NO_PACKETS_AVAIL_ERROR	Failing to receive packets	
logger_error	- Unexpected fio_read error - Error writing packet during record	
FIO_EOF_ERROR	Ran out of space while recording; suspended logger	
FIO_DRIVE_NOT_READY_ERROR	Tape drive is not ready for recording. New tape volume required; packets are being lost	
Calls		
Function	Where Described	
fio_read	Sec. 2.1.4.2.2.7	
bells	Sec. 2.2.2.2.35	
logger_error	Sec. 2.2.2.5.3	
print_advice	Sec. 2.2.2.2.37	
fio_error_string	Sec. 2.1.4.2.4.2	
protocol of	Sec. 2.2.2.5.4	
INC RCVDPVD COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
new rtc	Sec. 2.2.2.5.14	
FIO_PACKET_SIZE	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
enqueue	Sec. 2.2.2.3.6	
FIO_PACKET_TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)	
fio_write	Sec. 2.1.4.2.2.8	
INC DROP COUNT	Sec. 2.2.1.1 cmc.h (macro definition)	
logger_suspend	Sec. 2.2.2.2.30	
logger_msg	Sec. 2.2.2.5.2	

Called By	
Function	Where Described
logger_fsm	Sec. 2.2.2.2.15

Table 2.2-30: logger_record_state Information.

2.2.2.2.20 logger_reset

This routine resets the logger, closes all the files, and closes the RACAL if necessary.

Calls	
Function	Where Described
fio_close	Sec. 2.1.4.2.2.12
racal_close	Sec. 2.2.2.4.2
logger_message_location	Sec. 2.2.2.5.1
Called By	
Function	Where Described
ccatcher	Sec. 2.2.2.2.34
main	Sec. 2.2.2.2.1

Table 2.2-31: logger_reset Information.

2.2.2.2.21 logger_clock_tick

This routine communicates timing information to the client.

Internal Variables		
Variable	Type	Where Typedef Declared
last_clocktick	unsigned long	standard
Calls		
Function	Where Described	
send_clock_tick	Sec. 2.2.2.5.29	
Called By		
Function	Where Described	
logger_fsm	Sec. 2.2.2.2.15	

Table 2.2-32: logger_clock_tick Information.

2.2.2.2.22 logger_op_error

This routine performs a preliminary check for errors in the logger operation. It makes sure that the operation requested by the user is meaningful.

Parameters		
Parameter	Type	Where Typedef Declared
op	LoggerRTCType	/simnet/common/include/protocol/p_logger.h

Returns	
Returns pointer to char	
"Logger is not connected"	
"Logger has already been started"	
"Logger is already in active mode"	
"Can't activate logger which has not been started"	
"Can't suspend the logger while loggerCopying"	
"Logger has already been suspended"	
"Can't suspend logger which has not been started"	
"Seeking is allowed during loggerPlayback only"	
"Changing speed is allowed during loggerPlayback only"	
"Cannot change logger speed when using the Rcal"	
"Invalid logger runtime command"	
NULL	
Called By	
Function	Where Described
command request handler	Sec. 2.2.2.5.23
handle stdin handler	Sec. 2.2.2.5.8

Table 2.2-33: logger_op_error Information.

2.2.2.2.23 logger_connect

This procedure changes the logger's state to logger connected, meaning that the logger has connected to a client in server mode. This procedure takes no parameters, has no internal variables, returns no values, and has no errors.

Called By	
Function	Where Described
connect request handler	Sec. 2.2.2.5.21

Table 2.2-34: logger_connect Information.

2.2.2.2.24 logger_continue

This routine changes the logger's state to logger active, meaning the logger will continue to process packets. It also restarts the exercise clock if the logger is playing back.

Internal Variables		
Variable	Type	Where Typedef Declared
pkt	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
et	int	standard
ct	int	standard

Calls	
Function	Where Described
logger_msg	Sec. 2.2.2.5.2
unfreeze time	Sec. 2.2.2.6.9
exe to cmc time	Sec. 2.2.2.6.1
racal seek to time	Sec. 2.2.2.4.12
init logger playback state	Sec. 2.2.2.2.17
logger playback state	Sec. 2.2.2.2.18
set time	Sec. 2.2.2.6.6
FIO PACKET TIME	Sec. 2.1.4.1.1 fiolib.h (macro definition)
get time	Sec. 2.2.2.6.7
fio flush	Sec. 2.1.4.2.2.11
cmc zero status	Sec. 2.2.2.1.7
Called By	
Function	Where Described
handle_stdin_rtc	Sec. 2.2.2.5.8
command_request_handler	Sec. 2.2.2.5.23

Table 2.2-35: logger_continue Information.

2.2.2.2.25 logger_disconnect

This routine changes the logger's state to logger disconnected, meaning the logger is no longer connected to its client.

Calls	
Function	Where Described
logger_stop	Sec. 2.2.2.2.28
disconnect_handler	Sec. 2.2.2.5.22

Table 2.2-36: logger_disconnect Information.

2.2.2.2.26 logger_seek_relative

This routine sets the playback file pointer relative to its current location based on "ptime" and the current packet's timestamp.

Parameters		
Parameter	Type	Where Typedef Declared
ptime	int	standard
relative current location	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
cur time	int	standard
Errors		
Error	Reason for Error	
FIO_ERROR	Fio_seek failed	

Calls	
Function	Where Described
fio_flush	Sec. 2.1.4.2.2.11
fio_seek	Sec. 2.1.4.2.2.9
logger_error	Sec. 2.2.2.5.3
set time	Sec. 2.2.2.6.6
racal seek to time	Sec. 2.2.2.4.12
racal stop	Sec. 2.2.2.4.11
logger_msg	Sec. 2.2.2.5.2
Called By	
Function	Where Described
goto handler	Sec. 2.2.2.5.9
scan handler	Sec. 2.2.2.5.12
command request handler	Sec. 2.2.2.5.23

Table 2.2-37: logger_seek_relative Information.

2.2.2.2.27 logger_speed

This routine changes the playback speed of the logger. The playback speed is set to the factor of the parameter *factor*.

Parameters		
Parameter	Type	Where Typedef Declared
factor	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
ft	int	standard
Calls		
Function	Where Described	
set fast time factor	Sec. 2.2.2.6.3	
logger_msg	Sec. 2.2.2.5.2	
time_string	Sec. 2.2.2.6.11	
Called By		
Function	Where Described	
handle_stdin_rtc	Sec. 2.2.2.5.8	
command request handler	Sec. 2.2.2.5.23	

Table 2.2-38: logger_speed Information.

2.2.2.2.28 logger_stop

This routine stops the logger and places the finite state machine into the loggerConnected state.

Calls	
Function	Where Described
cmc_report_status	Sec. 2.2.2.1.8
get_time	Sec. 2.2.2.6.7
Called By	
Function	Where Described
logger_disconnect	Sec. 2.2.2.2.25
handle_stdin_rtc	Sec. 2.2.2.5.8
command_request_handler	Sec. 2.2.2.5.23

Table 2.2-39: logger_stop Information.

2.2.2.2.29 logger_start

This routine starts the Data Logger by opening the files for reading and writing, and getting the start time for the exercise and passing it back to the client. Finally, it places the logger in logger suspended state.

Parameters		
Parameter	Type	Where Typedef Declared
files	pointer to file_info	Sec. 2.2.1.8 util.h
start_dt	pointer to LoggerTime	p_logger.h
recording	BOOL	standard
projid	pointer to char	standard
comment	pointer to char	standard
is_racal	BOOL	standard
num_exercises	short	standard
exercises	pointer to char	standard
num_stdprotocols	short	standard
num_nstdprotocols	short	standard
record_voice	BOOL	standard
record_sim	BOOL	standard
play_stealth	BOOL	standard
Return Values		
Return Value	Type	Meaning
FALSE	BOOL	The procedure failed
TRUE	BOOL	The procedure succeeded; the logger is started
Errors		
Error	Reason for Error	
fio_error	- Failed to open files for loggerRecording - Failed to open files for loggerPlayback	

Calls	
Function	Where Described
cmc_protocol_types	Sec. 2.2.2.1.2
logger_accept_pdus	Sec. 2.2.2.2.12
datetime_to_strings	Sec. 2.1.3.2.5
fio_file_header	Sec. 2.1.4.2.3.3
open_fio_files	Sec. 2.2.2.2.10
logger_error	Sec. 2.2.2.5.3
racal_open	Sec. 2.2.2.4.1
collect_racal_time_info	Sec. 2.2.2.7.1
reset_racal_time	Sec. 2.2.2.4.8
racal_start_recording	Sec. 2.2.2.4.9
get_start_date_fiohdr	Sec. 2.1.4.2.3.15
get_start_time_fiohdr	Sec. 2.1.4.2.3.19
strings_to_datetime	Sec. 2.1.3.2.4
fio_print_fiohdr	Sec. 2.1.4.2.3.22
reset_time	Sec. 2.2.2.6.5
fio_flush	Sec. 2.1.4.2.2.11
logger_suspend	Sec. 2.2.2.2.30
Called By	
Function	Where Described
init_logger_for_recording	Sec. 2.2.2.2.9
init_logger_for_playback	Sec. 2.2.2.2.8
command_request_handler	Sec. 2.2.2.5.23

Table 2.2-40: logger_start Information.

2.2.2.2.30 logger_suspend

This routine places the finite state machine into the loggerSuspended state.

Calls	
Function	Where Described
bells	Sec. 2.2.2.2.35
logger_msg	Sec. 2.2.2.5.2
freeze_time	Sec. 2.2.2.6.8
racal_stop	Sec. 2.2.2.4.11
time_string	Sec. 2.2.2.6.11
get_time	Sec. 2.2.2.6.7
Called By	
Function	Where Described
logger_start	Sec. 2.2.2.2.29
logger_playback_state	Sec. 2.2.2.2.18
logger_record_state	Sec. 2.2.2.2.19
handler_stdin_rc	Sec. 2.2.2.5.8
command_request_handler	Sec. 2.2.2.5.23

Table 2.2-41: logger_suspend Information.

2.2.2.2.31 logger_status

This routine passes out information about the Data Logger's status.

Parameters		
Parameter	Type	Where Typedef Declared
activity	pointer to LoggerActivity	p_logger.h
operation	pointer to LoggerOperation	p_logger.h
state	pointer to LoggerState	p_logger.h
is_racal	pointer to int	standard
speed	pointer to int	standard
start	pointer to LoggerTime	p_logger.h
offset	pointer to int	standard
packets	pointer to int	standard
file	pointer to pointer to char	standard
project	pointer to pointer to char	standard
comment	pointer to pointer to char	standard
fio_head	pointer to pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
Internal Variables		
Variable	Type	Where Typedef Declared
ofs	double	standard
Calls		
Function	Where Described	
get fast time factor	Sec. 2.2.2.6.4	
get time	Sec. 2.2.2.6.7	
do_status_reply	Sec. 2.2.2.5.28	

Table 2.2-42: logger_status Information.

2.2.2.2.32 logger_get_state

This routine gets the current state of the Data Logger Finite State Machine.

Return Values		
Return Value	Type	Meaning
logger_state		The current state of the Logger Finite State Machine
Called By		
Function	Where Described	
avail_request_handler	Sec. 2.2.2.5.20	

Table 2.2-43: logger_get_state Information.

2.2.2.2.33 logger_get_activity

This routine gets the current activity of the Data Logger.

Return Values		
Return Value	Type	Meaning
logger_activity		The current activity of the Logger
Called By		
Function	Where Described	
help_handler	Sec. 2.2.2.5.10	

Table 2.2-44: logger_get_activity Information.

2.2.2.2.34 ccatcher

This routine controls operation of the Data Logger signal interrupt handler.

Calls	
Function	Where Described
logger_msg	Sec. 2.2.2.5.2
cmc report status	Sec. 2.2.2.1.8
get time	Sec. 2.2.2.6.7
logger reset	Sec. 2.2.2.2.20

Table 2.2-45: ccatcher Information.

2.2.2.2.35 bells

This routine prints bell sounds.

Parameters		
Parameter	Type	Where Typedef Declared
i	int	standard
Called By		
Function	Where Described	
logger_record_state	Sec. 2.2.2.2.19	
logger_suspend	Sec. 2.2.2.2.30	

Table 2.2-46: bells Information.

2.2.2.2.36 print_command_line_help

This routine prints help messages:

Must specify one of the following flags:

- c(copy or convert data files)
- p(lay tape of net traffic)
- r(ecord net traffic)

-h(elp)
 -s(erver mode standard control from PVD)
 -v(ersion information)
 -q(uary the full set of options)

Parameters		
Parameter	Type	Where Typedef Declared
progname	pointer to char	standard
Calls		
Function	Where Described	
logger_msg	Sec. 2.2.2.5.2	
Called By		
Function	Where Described	
process_parms	Sec. 2.2.2.2.2	

Table 2.2-47: print_command_line_help Information.

2.2.2.2.37 print_advice

This routine prints the following advice as necessary:

There are no vehicles on the net. If so, no problem.
 The Data Analysis net has become disconnected from the simulation network. Check the transceiver cable connections.
 The CMC card has died. Login as root
 Kill ringstart and then run netstart.

Calls	
Function	Where Described
logger_msg	Sec. 2.2.2.5.2
Called By	
Function	Where Described
logger_record_state	Sec. 2.2.2.2.19

Table 2.2-48: print_advice Information.

2.2.2.3 queue.c

This file handles the Run-Time Command Queues when the Data Logger is in server mode.

Incl des:

<stdio.h>
 "queue.h"

External procedure declarations:

malloc()

Typedefs:

queue_elt_type	QUEUE_ELT
queue_type	QUEUE

Global Variables:

QUEUE_ELT	free_elts
QUEUE	in_queue
QUEUE	out_queue

2.2.2.3.1 queue_of

This routine returns the address of the free_queue, out_queue, or in_queue for the specified queue_id.

Parameters		
Parameter	Type	Where Typedef Declared
queue_id	int	standard
Return Values		
Return Value	Type	Meaning
&free_queue	pointer to QUEUE	The address of free_queue
&out_queue	pointer to QUEUE	The address of out_queue
&in_queue	pointer to QUEUE	The address of in_queue
NULL	pointer to QUEUE	Invalid queue id
Called By		
Function	Where Described	
enqueue	Sec. 2.2.2.3.6	
dequeue	Sec. 2.2.2.3.7	
queue_count	Sec. 2.2.2.3.8	

Table 2.2-49: queue_of Information.

2.2.2.3.2 new_queue_elt

This routine creates a new queue element.

Internal Variables		
Variable	Type	Where Typedef Declared
qelt	pointer to QUEUE_ELT	Sec. 2.2.2.3 queue.c
Return Values		
Return Value	Type	Meaning
qelt	pointer to QUEUE_ELT	pointer to the new queue element
Called By		
Function	Where Described	
enqueue	Sec. 2.2.2.3.6	

Table 2.2-50: new_queue_elt Information.

2.2.2.3.3 free_queue_elt

This routine frees a queue element.

Parameters		
Parameter	Type	Where Typedef Declared
qelt	pointer to QUEUE_ELT	Sec. 2.2.2.3 queue.c
Called By		
Function	Where Described	
dequeue	Sec. 2.2.2.3.7	

Table 2.2-51: free_queue_elt Information.

2.2.2.3.4 init_queues

This routine initializes the queues with the following characteristics:

free_elts = NULL

free_queue.count = 0

free_queue.head = NULL

free_queue.tail = NULL

out_queue.count = 0

out_queue.head = NULL

out_queue.tail = NULL

in_queue.count = 0

in_queue.head = NULL

in_queue.tail = NULL

2.2.2.3.5 reinit_queues

This routine reinitializes the queues.

Internal Variables		
Variable	Type	Where Typedef Declared
ptr	pointer to char	standard
Calls		
Function	Where Described	
queue count	Sec. 2.2.2.3.8	
dequeue	Sec. 2.2.2.3.7	
enqueue	Sec. 2.2.2.3.6	
Called By		
Function	Where Described	
main	Sec. 2.2.2.2.1	
logger init	Sec. 2.2.2.2.5	

Table 2.2-52: reinit_queues Information.

2.2.2.3.6 enqueue

This routine makes an entry to the specified queue.

Parameters		
Parameter	Type	Where Typedef Declared
queue	int	standard
ptr	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
qptr	pointer to QUEUE	Sec. 2.2.2.3 queue.c
qelt	pointer to QUEUE ELT	Sec. 2.2.2.3 queue.c
Calls		
Function	Where Described	
queue of	Sec. 2.2.2.3.8	
new queue elt	Sec. 2.2.2.3.2	
Called By		
Function	Where Described	
logger record state	Sec. 2.2.2.2.19	
send rtc	Sec. 2.2.2.5.17	
free rtc	Sec. 2.2.2.5.15	

Table 2.2-53: enqueue Information.

2.2.2.3.7 dequeue

This routine removes an entry from the specified queue.

Parameters		
Parameter	Type	Where Typedef Declared
queue	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
qptr	pointer to QUEUE	Sec. 2.2.2.3 queue.c
qelt	pointer to QUEUE ELT	Sec. 2.2.2.3 queue.c
ptr	pointer to char	standard
Return Values		
Return Value	Type	Meaning
ptr	pointer to char	
Calls		
Function	Where Described	
queue of	Sec. 2.2.2.3.8	
free_queue_elt	Sec. 2.2.2.3.3	

Called By	
Function	Where Described
logger put remote rtc	Sec. 2.2.2.2.14
new rtc	Sec. 2.2.2.5.14
receive rtc	Sec. 2.2.2.5.16

Table 2.2-54: dequeue Information.

2.2.2.3.8 queue_count

This routine returns the queue count of the specified queue.

Parameters		
Parameter	Type	Where Typedef Declared
queue	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
qptr	pointer to QUEUE	Sec. 2.2.2.3 queue.c
Return Values		
Return Value	Type	Meaning
qptr->count	int	The queue count
Calls		
Function	Where Described	
queue of	Sec. 2.2.2.3.1	
Called By		
Function	Where Described	
logger put remote rtc	Sec. 2.2.2.2.14	
new rtc	Sec. 2.2.2.5.14	
receive rtc	Sec. 2.2.2.5.16	

Table 2.2-55: queue_count Information.

2.2.2.4 racal.c

This file provides the interface to the Racal audio recorder for recording the voice traffic received over CB radios. This capability has become obsolete with the advent of digital voice recording where voice traffic is digitized and then transmitted over the SIMNET network the same as all other vehicle simulator information.

Includes:

```
<sys/ioctl.h>
<stdio.h>
<fcntl.h>
<termio.h>
<ctype.h>
"cmc.h"
"racal.h"
```

Standard Procedures:

perror()
exit()
sleep()
strcat()

Defines:

TERMINAL_LINE
SEC_FIELD
MIN_FIELD
HOUR_FIELD
DAY_FIELD

File descriptor for terminal line to racal recorder declaration:

racal_fd

2.2.2.4.1 racal_open

This routine opens the racal, setting the line's baud rate to 4800 baud.

Parameters		
Parameter	Type	Where Typedef Declared
play	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
open_mask	int	standard
dev_name	pointer to char	standard
att_term_buffer	struct termio	standard
Errors		
Error	Reason for Error	
perror	- Failed to read terminal characteristics for device - Failed to read ATT style terminal characteristics - Failed to set output AON/XOFF control for device	
Calls		
Function	Where Described	
send to racal	Sec. 2.2.2.4.4	
Called By		
Function	Where Described	
logger_start	Sec. 2.2.2.2.29	

Table 2.2-56: racal_open Information.

2.2.2.4.2 racal_close

This routine closes the racal.

Called By	
Function	Where Described
logger reset	Sec. 2.2.2.2.20

Table 2.2-57: racal_close Information.

2.2.2.4.3 get_from_racal

This routine reads and returns a terminated line of text from the racal recorder. For efficiency, the NO_DELAY is open and reply is accumulated over several calls.

Internal Variables		
Variable	Type	Where Typedef Declared
in_char	char	standard
i	int	standard
reply[264]	char	standard
reply_ptr	pointer to char	standard
Return Values		
Return Value	Type	Meaning
reply_ptr	pointer to char	terminated line of text from the racal recorder
Called By		
Function	Where Described	
get racal time	Sec. 2.2.2.4.7	

Table 2.2-58: get_from_racal Information.

2.2.2.4.4 send_to_racal

This routine sends a command string to the racal recorder open on *fd*.

Parameters		
Parameter	Type	Where Typedef Declared
fd	int	standard
command_string	pointer to char	standard

Called By	
Function	Where Described
racal open	Sec. 2.2.2.4.1
get racal time	Sec. 2.2.2.4.7
reset racal time	Sec. 2.2.2.4.8
racal start recording	Sec. 2.2.2.4.9
racal start playing	Sec. 2.2.2.4.10
racal stop	Sec. 2.2.2.4.11
racal seek to time	Sec. 2.2.2.4.12

Table 2.2-59: send_to_racal Information.

2.2.2.4.5 racal_to_cmc

This routine accepts the time string returned by the racal and returns the corresponding time in cmc milliseconds. The string format is "001 RTyymmddhhmmss\015". Note that strings in the form "001 A\015" may need weeding out.

Parameters		
Parameter	Type	Where Typedef Declared
time_string	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
second	int	standard
minute	int	standard
hour	int	standard
day	int	standard
cmc msec	int	standard
Return Values		
Return Value	Type	Meaning
cmc_msec	int	<i>time_string</i> in corresponding cmc milliseconds
Called By		
Function	Where Described	
get_racal_time	Sec. 2.2.2.4.7	

Table 2.2-60: racal_to_cmc Information.

2.2.2.4.6 seconds_to_racal_string

This routine converts passed integer seconds into a string in the form yymmddhhmmss. Note that this routine will handle no more than 24 hours, and that the returned string will be destroyed on the next call to this routine.

Parameters		
Parameter	Type	Where Typedef Declared
seconds	int	standard

Internal Variables		
Variable	Type	Where Typedef Declared
time_string[14]	char	standard
years	int	standard
months	int	standard
days	int	standard
hours	int	standard
minutes	int	standard
Return Values		
Return Value	Type	Meaning
time_string	char	conversion of seconds into a time string.
Called By		
Function	Where Described	
racal seek to time	Sec. 2.2.2.4.12	

Table 2.2-61: seconds_to_racal_string Information.

2.2.2.4.7 get_racal_time

This routine returns immediately with the time in milliseconds.

Internal Variables		
Variable	Type	Where Typedef Declared
reply	pointer to char	standard
Return Values		
Return Value	Type	Meaning
racal to cmc(reply)	int	time in milliseconds
Calls		
Function	Where Described	
send to racal	Sec. 2.2.2.4.4	
get from racal	Sec. 2.2.2.4.3	
racal to cmc	Sec. 2.2.2.4.5	
Called By		
Function	Where Described	
racal seek to time	Sec. 2.2.2.4.12	

Table 2.2-62: get_racal_time Information.

2.2.2.4.8 reset_racal_time

This routine sets the racal's real-time clock to 0. Note that the racal's clock continues to run.

Calls	
Function	Where Described
send to racal	Sec. 2.2.2.4.4
Called By	
Function	Where Described
logger_start	Sec. 2.2.2.2.29

Table 2.2-63: reset_racal_time Information.

2.2.2.4.9 racal_start_recording

This routine starts the racal recording.

Calls	
Function	Where Described
send to racal	Sec. 2.2.2.4.4

Table 2.2-64: racal_start_recording Information.

2.2.2.4.10 racal_start_playing

This routine starts the racal playing.

Calls	
Function	Where Described
send to racal	Sec. 2.2.2.4.4

Table 2.2-65: racal_start_playing Information.

2.2.2.4.11 racal_stop

This routine stops the racal.

Calls	
Function	Where Described
send to racal	Sec. 2.2.2.4.4
Called By	
Function	Where Described
logger_suspend	Sec. 2.2.2.2.30
logger_seek_relative	Sec. 2.2.2.2.26

Table 2.2-66: racal_stop Information.

2.2.2.4.12 racal_seek_to_time

This routine searches and waits until racal time exceeds passed time. Note that this assumes that CMC time is not advancing; CMC time is in Freeze state.

Parameters		
Parameter	Type	Where Typedef Declared
seek time	int	standard
racal time at start	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
offset	int	standard
logger time	int	standard
current racal time	int	standard
old racal time	int	standard
racal time string	pointer to char	standard
racal command[200]	char	standard
seconds to racal string()	pointer to char	standard
Calls		
Function	Where Described	
seconds to racal string	Sec. 2.2.2.4.6	
send to racal	Sec. 2.2.2.4.4	
get racal time	Sec. 2.2.2.4.7	
Called By		
Function	Where Described	
logger seek relative	Sec. 2.2.2.2.26	
logger continue	Sec. 2.2.2.2.24	

Table 2.2-67: racal_seek_to_time Information.

2.2.2.5 rtc.c

This file handles the processing of run-time commands from the user for both the stand-alone Data Logger and the server Data Logger.

Includes:

```
<stdio.h>
<sys/ioctl.h>
"fiolib.h"
"fioheader.h"
"network.h"
"p_logger.h"
"p_num.h"
"p_assoc.h"
"p_p2p.h"
"global.h"
"logger.h"
"queue.h"
"rtc.h"
"timer.h"
"util.h"
```

Standard Procedure Declarations:

```
malloc()
strncpy()
```

Static Procedure Declarations:

```
handle_stdin_rtc()
goto_handler()
help_handler()
info_handler()
scan_handler()
receive_rtc()
send_rtc()
init_pdu()
init_apdu()
avail_request_handler()
connect_request_handler()
disconnect_handler()
command_request_handler()
parse_start_file_info()
status_request_handler()
do_information()
do_status_reply
```

Defines:

```
CMC_MSECONDS_PER_SECOND
PDUKind()
STRING_LENGTH
```

Global Variable Declarations:

```
loggerMCA
logger_is_connected
clientSimAddr
loggerSimAddr
msgbuf[256]
send_to_network
logger_jump_table[loggerLastPDUKind]
```

Typedef:

```
jump_struct  JUMP_ENTRY
```

2.2.2.5.1 logger_message_location

This routine determines the place to send logger messages: stdout/stderr or network.

Parameters		
Parameter	Type	Where Typedef Declared
msg to net	BOOL	standard
Called By		
Function	Where Described	
main	Sec. 2.2.2.2.1	
logger_reset	Sec. 2.2.2.2.20	
init_logger_for_server	Sec. 2.2.2.2.6	

Table 2.2-68: logger_message_location Information.

2.2.2.5.2 logger_msg

This routine sends a message to the user.

Parameters		
Parameter	Type	Where Typedef Declared
msg	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
Calls		
Function	Where Described	
new_rtc	Sec. 2.2.2.5.14	
do_information	Sec. 2.2.2.5.26	
init_apdu	Sec. 2.2.2.5.18	
send_rtc	Sec. 2.2.2.5.17	

Called By	
Function	Where Described
cmc reprot status	Sec. 2.2.2.1.8
main	Sec. 2.2.2.2.1
process parms	Sec. 2.2.2.2.2
logger suspend	Sec. 2.2.2.2.30
print command line help	Sec. 2.2.2.2.36
print advice	Sec. 2.2.2.2.37
ccatcher	Sec. 2.2.2.2.34
logger seek relative	Sec. 2.2.2.2.26
logger speed	Sec. 2.2.2.2.27
logger playback state	Sec. 2.2.2.2.18
logger record state	Sec. 2.2.2.2.19
logger continue	Sec. 2.2.2.2.24
logger copying state	Sec. 2.2.2.2.16
init logger for playback	Sec. 2.2.2.2.8
init logger for recording	Sec. 2.2.2.2.9
open fio files	Sec. 2.2.2.2.10
init logger for copying	Sec. 2.2.2.2.7
handle stdin rtc	Sec. 2.2.2.5.8
help handler	Sec. 2.2.2.5.10
handle remote rtc	Sec. 2.2.2.5.13

Table 2.2-69: logger_msg Information.

2.2.2.5.3 logger_error

This routine sends an error message to the user.

Parameters		
Parameter	Type	Where Typedef Declared
msg	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
Calls		
Function	Where Described	
new rtc	Sec. 2.2.2.5.14	
do information	Sec. 2.2.2.5.26	
init apdu	Sec. 2.2.2.5.18	
send rtc	Sec. 2.2.2.5.17	

Called By	
Function	Where Described
cmc accept	Sec. 2.2.2.1.3
cmc reject	Sec. 2.2.2.1.4
process parms	Sec. 2.2.2.2.2
logger seek relative	Sec. 2.2.2.2.26
logger start	Sec. 2.2.2.2.29
logger playback state	Sec. 2.2.2.2.18
logger record state	Sec. 2.2.2.2.19
logger accept pdus	Sec. 2.2.2.2.12
logger fsm	Sec. 2.2.2.2.15
logger copying state	Sec. 2.2.2.2.16
open fio files	Sec. 2.2.2.2.10
init logger for copying	Sec. 2.2.2.2.7
handle stdin rtc	Sec. 2.2.2.5.8
command request handler	Sec. 2.2.2.5.23

Table 2.2-70: logger_error Information.

2.2.2.5.4 protocol_of

This routine returns the specified fio_packet's protocol

Parameters		
Parameter	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
get_root_protocol	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
apdu	pointer to AssociationPDU	p assoc.h
pdu	pointer to PointToPointPDU	p p2p.h
protocol_number	AssociationUserProtocol	p assoc.h
Return Values		
Return Value	Type	Meaning
protocol_number	AssociationUserProtocol	the protocol of the packet
Called By		
Function	Where Described	
logger record state	Sec. 2.2.2.2.19	
logger playback state	Sec. 2.2.2.2.18	
logger get remote rtc	Sec. 2.2.2.2.13	

Table 2.2-71: protocol_of Information.

2.2.2.5.5 rtc_size

This routine returns the size of the specified RTC APDU.

Parameters		
Parameter	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
apdu	pointer to AssociationPDU	p_assoc.h
Return Values		
Return Value	Type	Meaning
sizeof(AssociationPDU + (unsigned) apdu->dataLength)	unsigned	the size of the APDU
Called By		
Function	Where Described	
send rtc	Sec. 2.2.2.5.17	

Table 2.2-72: rtc_size Information.

2.2.2.5.6 init_rtc

This routine initializes the rtc module.

Calls	
Function	Where Described
AssocCreateMCA	Sec. 2.20.1 See MCC CSCI SDD
AssocGetSimAddress	Sec. 2.20.1 See MCC CSCI SDD
Called By	
Function	Where Described
main	Sec. 2.2.2.2.1

Table 2.2-73: init_rtc Information.

2.2.2.5.7 handle_rtc

This routine handles processing of input from the user, either from stdin or the network, during execution of the logger.

Parameters		
Parameter	Type	Where Typedef Declared
is_server	BOOL	standard
Calls		
Function	Where Described	
handle_remote rtc	Sec. 2.2.2.5.13	
handle_stdin rtc	Sec. 2.2.2.5.8	

Called By	
Function	Where Described
logger_fsm	Sec. 2.2.2.2.15

Table 2.2-74: handle_rtc Information.

2.2.2.5.8 handle_stdin_rtc

This routine handles processing of runtime messages from stdin (*i.e.*, the user) when the logger is in command-line mode.

c - Continue
 f - Forward scan
 g - Goto
 h - Help
 i - Information about logger status
 p - Pause
 r - Reverse scan
 s - Speed

Internal Variables		
Variable	Type	Where Typedef Declared
input[STRING_LENGTH + 1]	char	standard
next_char	char	standard
msg	pointer to char	standard
readfds	int	standard
writefds	int	standard
Errors		
Error	Reason for Error	
logger_error	Unrecognized command sequence	
Calls		
Function	Where Described	
logger_op_error	Sec. 2.2.2.2.22	
logger_error	Sec. 2.2.2.5.3	
logger_msg	Sec. 2.2.2.5.2	
logger_continue	Sec. 2.2.2.2.24	
scan handler	Sec. 2.2.2.5.12	
goto handler	Sec. 2.2.2.5.9	
help handler	Sec. 2.2.2.5.10	
info handler	Sec. 2.2.2.5.11	
logger stop	Sec. 2.2.2.2.28	
logger suspend	Sec. 2.2.2.2.30	
logger speed	Sec. 2.2.2.2.27	
Called By		
Function	Where Described	
handle rtc	Sec. 2.2.2.5.7	

Table 2.2-75: handle_stdin_rtc Information.

2.2.2.5.9 goto_handler

This routine handles processing of Goto runtime commands.

Parameters		
Parameter	Type	Where Typedef Declared
input	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
c	char	standard
buf[32]	char	standard
seconds	int	standard
dseconds	double	standard
Calls		
Function	Where Described	
logger seek relative	Sec. 2.2.2.2.26	
Called By		
Function	Where Described	
handle stdin rtc	Sec. 2.2.2.5.8	

Table 2.2-76: goto_handler Information.

2.2.2.5.10 help_handler

This routine handles processing of Help runtime commands.

Parameters		
Parameter	Type	Where Typedef Declared
input	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
str	pointer to char	standard
activity	int	standard
Calls		
Function	Where Described	
logger get activity	Sec. 2.2.2.2.33	
logger msg	Sec. 2.2.2.5.2	
Called By		
Function	Where Described	
handle stdin rtc	Sec. 2.2.2.5.8	

Table 2.2-77: help_handler Information.

2.2.2.5.11 info_handler

This routine handles processing of Info runtime commands.

Parameters		
Parameter	Type	Where Typedef Declared
input	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
activity	LoggerActivity	p logger.h
operation	LoggerOperation	p logger.h
state	LoggerState	p logger.h
is racal	int	standard
speed	int	standard
start	LoggerTime	p logger.h
offset	int	standard
packets	int	standard
file	pointer to char	standard
project	pointer to char	standard
comment	pointer to char	standard
fio_head	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
Called By		
Function	Where Described	
handle_stdin_rtc	Sec. 2.2.2.5.8	

Table 2.2-78: info_handler Information.

2.2.2.5.12 scan_handler

This routine handles processing of Forward and Reverse Scan runtime commands.

Parameters		
Parameter	Type	Where Typedef Declared
input	pointer to char	standard
forward	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
c	char	standard
buf[32]	char	standard
seconds	int	standard
dseconds	double	standard
Calls		
Function	Where Described	
string_to_seconds	Sec. 2.1.3.2.3	
logger_seek_relative	Sec. 2.2.2.2.26	

Called By	
Function	Where Described
handle_stdin_rtc	Sec. 2.2.2.5.8

Table 2.2-79: scan_handler Information.

2.2.2.5.13 handle_remote_rtc

This routine handles processing of runtime messages from the client when the logger is in server mode.

Internal Variables		
Variable	Type	Where Typedef Declared
(fnc) ()	void	standard
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
Calls		
Function	Where Described	
receive_rtc	Sec. 2.2.2.5.16	
logger_msg	Sec. 2.2.2.5.2	
free_rtc	Sec. 2.2.2.5.15	
Called By		
Function	Where Described	
init logger for server	Sec. 2.2.2.2.6	
handle rtc	Sec. 2.2.2.5.7	

Table 2.2-80: handle_remote_rtc Information.

2.2.2.5.14 new_rtc

This routine gets a new runtime commandbuffer.

Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Return Values		
Return Value	Type	Meaning
rtc	pointer to fio_packet	The new runtime command
Calls		
Function	Where Described	
queue_count	Sec. 2.2.2.3.8	
dequeue	Sec. 2.2.2.3.7	

Called By	
Function	Where Described
logger record state	Sec. 2.2.2.2.19
logger get remote rtc	Sec. 2.2.2.2.13
logger msg	Sec. 2.2.2.5.2
logger error	Sec. 2.2.2.5.3
avail request handler	Sec. 2.2.2.5.20
connect request handler	Sec. 2.2.2.5.21
disconnect handler	Sec. 2.2.2.5.22
command request handler	Sec. 2.2.2.5.23
status request handler	Sec. 2.2.2.5.25
send_clock_tick	Sec. 2.2.2.5.29

Table 2.2-81: new_rtc Information.

2.2.2.5.15 free_rtc

This routine frees a runtime commandbuffer.

Parameters		
Parameter	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Calls		
Function	Where Described	
enqueue	Sec. 2.2.2.3.6	
Called By		
Function	Where Described	
logger put remote rtc	Sec. 2.2.2.2.14	
handle remote rtc	Sec. 2.2.2.5.13	

Table 2.2-82: free_rtc Information.

2.2.2.5.16 receive_rtc

This routine gets the next runtime command, if there is one, from the IN_QUEUE.

Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Return Values		
Return Value	Type	Meaning
rtc	pointer to fio_packet	the next runtime command
Calls		
Function	Where Described	
queue count	Sec. 2.2.2.3.8	
dequeue	Sec. 2.2.2.3.7	

Called By	
Function	Where Described
handle remote rtc	Sec. 2.2.2.5.13

Table 2.2-83: receive_rtc Information.

2.2.2.5.17 send_rtc

This routine places the rtc response in the OUT_QUEUE so it can be written out on the net at the next available moment.

Parameters		
Parameter	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Calls		
Function	Where Described	
rtc size	Sec. 2.2.2.5.5	
enqueue	Sec. 2.2.2.3.6	
Called By		
Function	Where Described	
logger_msg	Sec. 2.2.2.5.2	
logger_error	Sec. 2.2.2.5.3	
avail request handler	Sec. 2.2.2.5.20	
connect request handler	Sec. 2.2.2.5.21	
disconnect handler	Sec. 2.2.2.5.22	
command request handler	Sec. 2.2.2.5.23	
status request handler	Sec. 2.2.2.5.25	
send clock tick	Sec. 2.2.2.5.29	

Table 2.2-84: send_rtc Information.

The following routines (2.2.2.5.18 through 2.2.2.5.29) handle run-time requests and replies from the client when the logger is in server mode. Run-time fio_packets have the following structure:

```
fio_packet_header
APDU header
Logger PDU
```

2.2.2.5.18 init_apdu

This routine initializes the APDU header portion of the run-time command fio_packets. All Logger PDU's are sent via Association datagram PDU's. The following characteristics will be constant for all Logger/Client PDU's.

```
version: loggerProtocolVersionCurrent
kind: datagramAPDUKind
dataLength: data_len
userProtocol: loggerProtocolNumber
```

Parameters		
Parameter	Type	Where Typedef Declared
apdu	pointer to AssociationPDU	p_assoc.h
data_len	unsigned	standard
Called By		
Function	Where Described	
logger_msg	Sec. 2.2.2.5.2	
logger_error	Sec. 2.2.2.5.3	
connect_request_handler	Sec. 2.2.2.5.21	
disconnect_handler	Sec. 2.2.2.5.22	
command_request_handler	Sec. 2.2.2.5.23	
status_request_handler	Sec. 2.2.2.5.25	
send_clock_tick	Sec. 2.2.2.5.29	
do_information	Sec. 2.2.2.5.26	

Table 2.2-85: init_apdu Information.

2.2.2.5.19 init_pdu

This routine initializes the Logger PDU's portion of the runtime command fio_packets with the following characteristics:

version: loggerProtocolVersionCurrent
kind: kind

Parameters		
Parameter	Type	Where Typedef Declared
pdu	pointer to LoggerPDU	p_logger.h
destination	pointer to SimulationAddress	address.h
kind	int	standard
Called By		
Function	Where Described	
avail_request_handler	Sec. 2.2.2.5.20	
connect_request_handler	Sec. 2.2.2.5.21	
disconnect_handler	Sec. 2.2.2.5.22	
command_request_handler	Sec. 2.2.2.5.23	
do_clock_tick	Sec. 2.2.2.5.27	
do_status_reply	Sec. 2.2.2.5.28	

Table 2.2-86: init_pdu Information.

2.2.2.5.20 avail_request_handler

This routine handles AvailRequest PDU's. The client sends out an AvailRequest PDU to find out which Data Loggers are available for connection in server mode. If available, the Data Logger must respond with an AvailReply PDU.

Parameters		
Parameter	Type	Where Typedef Declared
inrtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
Calls		
Function	Where Described	
new rtc	Sec. 2.2.2.5.14	
logger get state	Sec. 2.2.2.2.32	
init_pdu	Sec. 2.2.2.5.19	
init_apdu	Sec. 2.2.2.5.18	
send rtc	Sec. 2.2.2.5.17	

Table 2.2-87: avail_request_handler Information.

2.2.2.5.21 connect_request_handler

This routine handles ConnectRequest PDU's. The client sends out an ConnectRequest PDU to the particular Data Logger it wishes to connect to. The Data Logger must respond with either an Ack PDU or a Nak PDU.

Parameters		
Parameter	Type	Where Typedef Declared
inrtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
requester	pointer to SimulationAddress	address.h
Calls		
Function	Where Described	
new rtc	Sec. 2.2.2.5.14	
logger connect	Sec. 2.2.2.2.23	
init_pdu	Sec. 2.2.2.5.19	
init_apdu	Sec. 2.2.2.5.18	
send rtc	Sec. 2.2.2.5.17	

Table 2.2-88: connect_request_handler Information.

2.2.2.5.22 disconnect_handler

This routine disconnects the Data Logger from the client. The client sends out an DisconnectRequest PDU when preparing to terminate its Data Logger connection. The Data Logger responds with an Ack PDU and disconnects.

Parameters		
Parameter	Type	Where Typedef Declared
inrtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
Calls		
Function	Where Described	
new rtc	Sec. 2.2.2.5.14	
logger disconnect	Sec. 2.2.2.2.25	
init pdu	Sec. 2.2.2.5.19	
init apdu	Sec. 2.2.2.5.18	
send rtc	Sec. 2.2.2.5.17	

Table 2.2-89: disconnect_handler Information.

2.2.2.5.23 command_request_handler

This routine handles runtime command requests from the client. Currently defined are:

Start
Continue
Suspend
Stop
Seek_relative
Play_speed

Parameters		
Parameter	Type	Where Typedef Declared
inrtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
inpdu	pointer to LoggerPDU	p_logger.h
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
files	file info	Sec. 2.2.1.8 util.h
msg	pointer to char	standard
rcd	pointer to LoggerStartRTC pointer to LoggerSeekRTC pointer to LoggerSpeedRTC	p_logger.h
seconds	int	standard
dseconds	double	standard

Errors	
Error	Reason for Error
logger error	Failed to start the Logger
Calls	
Function	Where Described
new rtc	Sec. 2.2.2.5.14
logger op error	Sec. 2.2.2.2.22
init pdu	Sec. 2.2.2.5.19
init apdu	Sec. 2.2.2.5.18
send rtc	Sec. 2.2.2.5.17
init file info	Sec. 2.2.2.8.1
parse start file info	Sec. 2.2.2.5.24
logger start	Sec. 2.2.2.2.29
logger error	Sec. 2.2.2.5.3
logger continue	Sec. 2.2.2.2.24
logger suspend	Sec. 2.2.2.2.30
logger stop	Sec. 2.2.2.2.28
logger seek relative	Sec. 2.2.2.2.26
logger speed	Sec. 2.2.2.2.27

Table 2.2-90: command_request_handler Information.

2.2.2.5.24 parse_start_file_info

This routine translates logger PDU's containing start commands into file_info structures to be passed to logger_start.

Parameters		
Parameter	Type	Where Typedef Declared
rcd	pointer to LoggerStartRTC	p_logger.h
files	pointer to file_info	Sec. 2.2.1.8 util.h
Internal Variables		
Variable	Type	Where Typedef Declared
len	unsigned	standard
i	int	standard
Called By		
Function	Where Described	
command_request_handler	Sec. 2.2.2.5.23	

Table 2.2-91: parse_start_file_info Information.

2.2.2.5.25 status_request_handler

This routine passes back status information to the client in response to StatusRequest PDU's. The client sends out an StatusRequest PDU when requesting information about its current operating status. The Data Logger must respond with a StatusReply PDU.

Parameters		
Parameter	Type	Where Typedef Declared
inrtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
Calls		
Function	Where Described	
new rtc	Sec. 2.2.2.5.14	
do status reply	Sec. 2.2.2.5.19	
init apdu	Sec. 2.2.2.5.18	
send rtc	Sec. 2.2.2.5.17	

Table 2.2-92: status_request_handler Information.

2.2.2.5.26 do_information

This routine builds a logger PDU containing information to be passed back to the client. This information can either be about the results of some request for logger action (*i.e.*, an error message) or be some purely informational message.

Parameters		
Parameter	Type	Where Typedef Declared
pdu	pointer to LoggerPDU	p_logger.h
is_error	BOOL	standard
errmsg	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
var	pointer to LoggerInformationVariant	p_logger.h
Calls		
Function	Where Described	
init pdu	Sec. 2.2.2.5.19	
Called By		
Function	Where Described	
logger msg	Sec. 2.2.2.5.2	
logger error	Sec. 2.2.2.5.3	

Table 2.2-93: do_information Information.

2.2.2.5.27 do_clock_tick

This routine builds the ClockTick PDU that the logger uses to pass the current exercise time back to its client.

Parameters		
Parameter	Type	Where Typedef Declared
pdu	pointer to LoggerPDU	p_logger.h
sec_offset	unsigned long	standard
start_dt	pointer to LoggerTime	p_logger.h
Internal Variables		
Variable	Type	Where Typedef Declared
var	pointer to LoggerClockTickVariant	p_logger.h
Calls		
Function	Where Described	
init_pdu	Sec. 2.2.2.5.19	
Called By		
Function	Where Described	
send_clock_tick	Sec. 2.2.2.5.29	

Table 2.2-94: do_clock_tick Information.

2.2.2.5.28 do_status_reply

This routine builds the StatusReply PDU that the logger uses to reply to a client's request for status information.

Parameters		
Parameter	Type	Where Typedef Declared
start_dt	pointer to LoggerTime	p_logger.h
Internal Variables		
Variable	Type	Where Typedef Declared
activity	LoggerActivity	p_logger.h
operation	LoggerOperation	p_logger.h
state	LoggerState	p_logger.h
racal	int	standard
speed	int	standard
file_id	pointer to char	standard
project_id	pointer to char	standard
comment	pointer to char	standard
fio_head	pointer to fio_header	Sec. 2.1.4.1.2 fioheader.h
var	pointer to LoggerStatusReplyVariant	p_logger.h

Calls	
Function	Where Described
init_pdu	Sec. 2.2.2.5.19
logger_status	Sec. 2.2.2.2.31
Called By	
Function	Where Described
status_request_handler	Sec. 2.2.2.5.25

Table 2.2-95: do_status_reply Information.

2.2.2.5.29 send_clock_tick

This routine sends the clock tick to the client.

Parameters		
Parameter	Type	Where Typedef Declared
msec_offset	unsigned long	standard
start_dt	pointer to LoggerTime	p_logger.h
Internal Variables		
Variable	Type	Where Typedef Declared
rtc	pointer to fio_packet	Sec. 2.1.4.1.1 fiolib.h
apdu	pointer to AssociationPDU	p_assoc.h
pdu	pointer to LoggerPDU	p_logger.h
sec_offset	unsigned long	standard
dsec_offset	double	standard
Calls		
Function	Where Described	
new rtc	Sec. 2.2.2.5.14	
do clock tick	Sec. 2.2.2.5.27	
init apdu	Sec. 2.2.2.5.18	
send rtc	Sec. 2.2.2.5.17	
Called By		
Function	Where Described	
logger clock tick	Sec. 2.2.2.2.21	

Table 2.2-96: do_status_reply Information.

2.2.2.6 timer.c

This file handles the Data Logger's timer. It provides the speed-up and freeze functions of the Data Logger during playback. Note that there are three times:

- (1) Real time, *i.e.*, clock time
- (2) CMC time is the time on the CMC driver
- (3) Exercise time is the real time elapsed from the start of the exercise to the time stamp on the current packet (it may be adjusted by a certain factor)

Note also that it is only necessary that the time since the last change in rate be used to modify the exercise time, since the CMC time will be changed every time the rate changes.

There are several interactions between the procedures:

- **freeze_time()** and **unfreeze_time()** affect only **time_of_freeze**.
- **set_fast_time_factor()** affects **time_of_fast** and **fast_factor** and is dependent upon **time_of_freeze**
- **set_time()** affects **time_of_fast** and **time_of_freeze** if set.
- **get_time()** is affected by **time_of_fast**, **time_of_freeze**, and **fast_factor**.

It is important to note that **on_time()** depends upon the 16 bit Network clock for timekeeping purposes. According to Network Interface Library documentation, a call to get time must be made at least once every 60 seconds for the 16-bit network clock to remain accurate.

Includes:

```
<stdio.h>
"sys/types.h"
"global.h"
"cmc.h"
"timer.h"
```

Variable Declarations:

```
fast_factor
time_of_fast
time_of_freeze
```

2.2.2.6.1 exe_to_cmc_time

This routine converts the exercise time to CMC time.

Parameters		
Parameter	Type	Where Typedef Declared
exe_time	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
ct	int	standard
Return Values		
Return Value	Type	Meaning
ct	int	The cmc time of the specified exercise time.
Called By		
Function	Where Described	
logger_continue	Sec. 2.2.2.2.24	

Table 2.2-97: exe_to_cmc_time Information.

2.2.2.6.2 cmc_to_exe_time

This routine converts the CMC time to exercise time.

Parameters		
Parameter	Type	Where Typedef Declared
cmc time	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
et	int	standard
Return Values		
Return Value	Type	Meaning
et	int	The exercise time of the specified cmc time.
Called By		
Function	Where Described	
get time	Sec. 2.2.2.6.7	
freeze time	Sec. 2.2.2.6.8	
unfreeze time	Sec. 2.2.2.6.9	
on time	Sec. 2.2.2.6.10	

Table 2.2-98: cmc_to_exe_time Information.

2.2.2.6.3 set_fast_time_factor

This routine sets the CMC time to exercise time conversion factor.

Parameters		
Parameter	Type	Where Typedef Declared
factor	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
ect	int	standard
Return Values		
Return Value	Type	Meaning
ect	int	
Calls		
Function	Where Described	
get_time	Sec. 2.2.2.6.7	
cmc_settime	Sec. 2.2.2.1.11	
Called By		
Function	Where Described	
logger_speed	Sec. 2.2.2.2.27	

Table 2.2-99: set_fast_time_factor Information.

2.2.2.6.4 get_fast_time_factor

This routine gets the CMC time to exercise time conversion factor.

Called By	
Function	Where Described
logger_status	Sec. 2.2.2.2.31
logger_playback_state	Sec. 2.2.2.2.18

Table 2.2-100: get_fast_time_factor Information.

2.2.2.6.5 reset_time

This routine resets the CMC time to 0, the fast_factor to 1, the time_of_fast to 0, and the time_of_freeze to 0.

Calls	
Function	Where Described
cmc_settime	Sec. 2.2.2.1.11
Called By	
Function	Where Described
logger_start	Sec. 2.2.2.2.29

Table 2.2-101: reset_time Information.

2.2.2.6.6 set_time

This routine changes time to begin playing at the passed Exercise time.

Parameters		
Parameter	Type	Where Typedef Declared
exe_time	int	standard
Return Values		
Return Value	Type	Meaning
exe_time	int	the Exercise time; procedure was successful
Calls		
Function	Where Described	
cmc_settime	Sec. 2.2.2.1.11	
Called By		
Function	Where Described	
logger_seek_relative	Sec. 2.2.2.2.26	
logger_continue	Sec. 2.2.2.2.24	

Table 2.2-102: set_time Information.

2.2.2.6.7 get_time

This routine gets the current Exercise time.

Return Values		
Return Value	Type	Meaning
time of freeze	int	the time of freeze
cmc_to_exe_time (cmc_gettime32)	int	the current Exercise time
Calls		
Function	Where Described	
cmc_to_exe_time	Sec. 2.2.2.6.2	
cmc_gettime32	Sec. 2.2.2.1.10	
Called By		
Function	Where Described	
logger_suspend	Sec. 2.2.2.2.30	
logger_status	Sec. 2.2.2.2.31	
ccatcher	Sec. 2.2.2.2.34	
logger_stop	Sec. 2.2.2.2.28	
get_time	Sec. 2.2.2.2.7	
set_fast_time_factor	Sec. 2.2.2.6.3	

Table 2.2-103: get_time Information.

2.2.2.6.8 freeze_time

This routine freezes the Exercise time.

Return Values		
Return Value	Type	Meaning
time_of_freeze	int	the Exercise time at the time of freeze
Calls		
Function	Where Described	
cmc_to_exe time	Sec. 2.2.2.6.2	
cmc_gettime32	Sec. 2.2.2.1.10	
Called By		
Function	Where Described	
logger_suspend	Sec. 2.2.2.2.30	

Table 2.2-104: freeze_time Information.

2.2.2.6.9 unfreeze_time

This routine unfreezes the Exercise time.

Internal Variables		
Variable	Type	Where Typedef Declared
et	int	standard
Return Values		
Return Value	Type	Meaning
et	int	the Exercise time at the time of unfreezing
Calls		
Function	Where Described	
cmc settime	Sec. 2.2.2.1.11	
exe to cmc time	Sec. 2.2.2.6.1	
Called By		
Function	Where Described	
logger continue	Sec. 2.2.2.2.4	

Table 2.2-105: unfreeze_time Information.

2.2.2.6.10 on_time

This routine takes an Exercise time, converts it to CMC time, and returns TRUE if the resulting time has not passed.

Parameters		
Parameter	Type	Where Typedef Declared
time	pointer to int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
ct	int	standard
Return Values		
Return Value	Type	Meaning
time>ct	BOOL	if TRUE, the specified time has not passed; if FALSE, the specified time has passed
Calls		
Function	Where Described	
exe to cmc time	Sec. 2.2.2.6.1	
cmc_gettime16	Sec. 2.2.2.1.9	

Called By	
Function	Where Described
logger_playback_state	Sec. 2.2.2.2.18

Table 2.2-106: on_time Information.

2.2.2.6.11 time_string

This routine converts an integer time into a string.

Parameters		
Parameter	Type	Where Typedef Declared
msec	int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
time_buf[64]	char	standard
Return Values		
Return Value	Type	Meaning
time_buf	pointer to char	the time string
Called By		
Function	Where Described	
logger_suspend	Sec. 2.2.2.2.30	
logger_speed	Sec. 2.2.2.2.27	

Table 2.2-107: time_string Information.

2.2.2.7 user.c

This file provides the user interface and help functions for the stand-alone Data Logger.

Includes:

```
<stdio.h>
<ctype.h>
<sys/ioctl>
<sys/types.h>
<sys/stat.h>
"fiolib.h"
"p_logger.h"
"global.h"
"util.h"
"user.h"
```

Imported Procedure Declarations:

```
fopen()
free()
malloc()
perror()
strncpy()
strrchr()
```

strtok()**Variable Declarations:**

```
errno
sys_errlist[]
msgbuf[MAX_LINE_LEN+1]
helpbuf[MAX_LINE_LEN+1]
input[MAX_LINE_LEN+1]
help_stream
```

Static Procedure Declarations:

```
collect_diskfile_info()
collect_tapefile_info()
user_putstr()
prompt_user()
help_function()
can_access_file()
vlaunch()
```

Defines:**Formatting Strings:**

```
INDENT_STRING
PROMPT_INDENT
REPLY_INDENT
HELP_INDENT
```

Help Strings:

```
HELP_RACAL_STARTTIME_INFO
HELP_CONTIGUOUS_DISKINFO
HELP_FILENAME_DISKINFO
HELP_FILESIZE_DISKINFO
HELP_LOOPING_DISKINFO
HELP_CONTINUOUS_TAPEINFO
HELP_DRIVES_TAPEINFO
HELP_SIZE_TAPEINFO
HELP_MEDIUM_FILEINFO
HELP_CONTINUE_OR_QUIT
HELP_EXERCISEID_INFO
HELP_FIOHEADER_INFO
HELP_NUMEXERCISES_INFO
HELP_PROTOCOL_TYPE_INFO
HELP_YES_OR_NO
HELP_STRING_CHAR
VALID_EXAMPLE_CHAR
HELP_FILE_NAME
```

Tape Strings:

```
R625SMT0
R625SMT1
MAX_LINE_LEN
```

2.2.2.7.1 collect_racal_time_info

This collects information from the user about the racal recorder.

Parameters		
Parameter	Type	Where Typedef Declared
racal time	pointer to int	standard
Internal Variables		
Variable	Type	Where Typedef Declared
done	BOOL	standard
Calls		
Function	Where Described	
user_putstr	Sec. 2.2.2.7.10	
prompt user	Sec. 2.2.2.7.11	
string to seconds	Sec. 2.1.3.2.3	
Called By		
Function	Where Described	
logger start	Sec. 2.2.2.2.29	

Table 2.2-108: collect_racal_time_info Information.

2.2.2.7.2 collect_fiofile_info

This routine collects information from the user about the type of fiofile to open for reading or writing.

Parameters		
Parameter	Type	Where Typedef Declared
files	pointer to file_info	Sec. 2.2.1.8 util.h
dfltnm	pointer to char	standard
write	BOOL	standard
debug	BOOL	standard
query_all	BOOL	standard
Calls		
Function	Where Described	
prompt user	Sec. 2.2.2.7.11	
collect diskfile info	Sec. 2.2.2.7.3	
collect tapefile info	Sec. 2.2.2.7.4	
Called By		
Function	Where Described	
init logger for playback	Sec. 2.2.2.2.8	
init logger for recording	Sec. 2.2.2.2.9	
init logger for copying	Sec. 2.2.2.2.7	

Table 2.2-109: collect_fiofile_info Information.

2.2.2.7.3 collect_diskfile_info

This routine collects information from the user about the specified disk file.

Parameters		
Parameter	Type	Where Typedef Declared
files	pointer to file_info	Sec. 2.2.1.8 util.h
dfitnm	pointer to char	standard
write	BOOL	standard
debug	BOOL	standard
query_all	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
done	BOOL	standard
i	int	standard
nvolumes	int	standard
filesz	int	standard
filenm	pointer to char	standard
s	pointer to char	standard
Errors		
Error	Reason for Error	
Logger WARNING:	Specified file already exists	
Calls		
Function	Where Described	
prompt user	Sec. 2.2.2.7.11	
user_putstr	Sec. 2.2.2.7.10	
can access file	Sec. 2.2.2.7.14	
yes or no	Sec. 2.2.2.7.9	
Called By		
Function	Where Described	
collect fiofile info	Sec. 2.2.2.7.2	

Table 2.2-110: collect_diskfile_info Information.

2.2.2.7.4 collect_tapefile_info

This routine collects information from the user about the specified tape file.

Parameters		
Parameter	Type	Where Typedef Declared
files	pointer to file_info	Sec. 2.2.1.8 util.h
query_all	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
tape_drives	int	standard
tape_size	int	standard

Calls	
Function	Where Described
prompt user	Sec. 2.2.2.7.11
user putstr	Sec. 2.2.2.7.10
Called By	
Function	Where Described
collect fiofile info	Sec. 2.2.2.7.2

Table 2.2-111: collect_tapefile_info Information.

2.2.2.7.5 collect_cmcsunsubscribe_info

This routine collects information about the specified exercises from the user.

Parameters		
Parameter	Type	Where Typedef Declared
sim_protocol	pointer to BOOL	standard
voice_protocol	pointer to BOOL	standard
num_exercises	pointer to short	standard
exercises	pointer to char	standard
num_stdprotocols	pointer to short	standard
num_nstdprotocols	pointer to short	standard
debug	BOOL	standard
query_all	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
str[32]	char	standard
id	int	standard
i	int	standard
Calls		
Function	Where Described	
prompt user	Sec. 2.2.2.7.11	
user_putstr	Sec. 2.2.2.7.10	
Called By		
Function	Where Described	
init logger for recording	Sec. 2.2.2.2.9	

Table 2.2-112: collect_cmcsunsubscribe_info Information.

2.2.2.7.6 collect_fioheader_info

This routine collects information from the user for the DataProbe header in the fio_header.

Parameters		
Parameter	Type	Where Typedef Declared
file_id	pointer to char	standard
fileid_sz	int	standard
comment	pointer to char	standard
comment_sz	int	standard
project	pointer to char	standard
project_sz	int	standard
Calls		
Function	Where Described	
prompt_user	Sec. 2.2.2.7.11	
Called By		
Function	Where Described	
init_logger_for_recording	Sec. 2.2.2.2.9	

Table 2.2-113: collect_fioheader_info Information.

2.2.2.7.7 collect_playback_info

This routine collects information from the user about whether to play back the stealth protocol.

Parameters		
Parameter	Type	Where Typedef Declared
play_stealth	pointer to BOOL	standard
query_all	BOOL	standard
Calls		
Function	Where Described	
prompt_user	Sec. 2.2.2.7.11	
user_putstr	Sec. 2.2.2.7.10	
Called By		
Function	Where Described	
init_logger_for_playback	Sec. 2.2.2.2.8	

Table 2.2-114: collect_playback_info Information.

2.2.2.7.8 continue_or_quit

This routine asks the user whether they want to continue or quit.

Parameters		
Parameter	Type	Where Typedef Declared
str	pointer to char	standard
help_str	pointer to char	standard

Internal Variables		
Variable	Type	Where Typedef Declared
retval	BOOL	standard
Return Values		
Return Value	Type	Meaning
retval	BOOL	If retval = TRUE, user wants to continue; If retval = FALSE, user wants to quit
Calls		
Function	Where Described	
prompt_user	Sec. 2.2.2.7.11	
Called By		
Function	Where Described	
logger_copying_state	Sec. 2.2.2.2.16	

Table 2.2-115: continue_or_quit Information.

2.2.2.7.9 yes_or_no

This routine asks the user "yes or no".

Parameters		
Parameter	Type	Where Typedef Declared
str	pointer to char	standard
help_str	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
retval	BOOL	standard
Return Values		
Return Value	Type	Meaning
retval	BOOL	If retval = TRUE, user responded with YES; If retval = FALSE, user responded with NO
Calls		
Function	Where Described	
prompt_user	Sec. 2.2.2.7.11	

Called By	
Function	Where Described
main	Sec. 2.2.2.2.1
init logger for playback	Sec. 2.2.2.2.8
init logger for recording	Sec. 2.2.2.2.9
init logger for copying	Sec. 2.2.2.2.7
collect diskfile info	Sec. 2.2.2.7.3
help function	Sec. 2.2.2.7.12

Table 2.2-116: yes_or_no Information.

2.2.2.7.10 user_putstr

This routine formats output.

Parameters		
Parameter	Type	Where Typedef Declared
str	pointer to char	standard
indent level	int	standard
newline	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
i	int	standard
Called By		
Function	Where Described	
collect racial time info	Sec. 2.2.2.7.1	
collect tapefile info	Sec. 2.2.2.7.4	
collect cmcsubscribe info	Sec. 2.2.2.7.5	
collect playback info	Sec. 2.2.2.7.7	
prompt user	Sec. 2.2.2.7.11	
help function	Sec. 2.2.2.7.12	
collect diskfile info	Sec. 2.2.2.7.3	

Table 2.2-117: user_putstr Information.

2.2.2.7.11 prompt_user

This routine prompts the user.

Parameters		
Parameter	Type	Where Typedef Declared
prompt	pointer to char	standard
user response	pointer to char	standard
help_str	pointer to char	standard

Internal Variables		
Variable	Type	Where Typedef Declared
done	BOOL	standard
buffer[MAX_LINE_LEN+1]	char	standard
s	pointer to char	standard
Calls		
Function	Where Described	
user_putstr	Sec. 2.2.2.7.10	
help_function	Sec. 2.2.2.7.12	
Called By		
Function	Where Described	
collect_racial_time_info	Sec. 2.2.2.7.1	
collect_fiofile_info	Sec. 2.2.2.7.2	
collect_diskfile_info	Sec. 2.2.2.7.3	
collect_tapefile_info	Sec. 2.2.2.7.4	
collect_cmcs_subscribe_info	Sec. 2.2.2.7.5	
collect_playback_info	Sec. 2.2.2.7.7	
continue_or_quit	Sec. 2.2.2.7.8	
yes_or_no	Sec. 2.2.2.7.9	
collect_fioheader_info	Sec. 2.2.2.7.6	

Table 2.2-118: prompt_user Information.

2.2.2.7.12 help_function

This routine handles the on-line help function.

Parameters		
Parameter	Type	Where Typedef Declared
help_str	pointer to cnar	standard
Internal Variables		
Variable	Type	Where Typedef Declared
done	BOOL	standard
iof	BOOL	standard
s	pointer to char	standard
Calls		
Function	Where Described	
user_putstr	Sec. 2.2.2.7.10	
yes_or_no	Sec. 2.2.2.7.9	
Called By		
Function	Where Described	
prompt_user	Sec. 2.2.2.7.11	

Table 2.2-119: help_function Information.

2.2.2.7.13 init_user

This routine initializes the user.

Called By	
Function	Where Described
main	Sec. 2.2.2.2.1

Table 2.2-120: init_user Information.

2.2.2.7.14 can_access_file

This routine checks the path name of the file to find out if the specified file exists and returns TRUE if it does.

Parameters		
Parameter	Type	Where Typedef Declared
path	pointer to char	standard
Internal Variables		
Variable	Type	Where Typedef Declared
stat_buf	struct stat	standard
Return Values		
Return Value	Type	Meaning
msgbuf	pointer to char	the specified file exists
NULL	pointer to char	the specified file does not exist
Errors		
Error	Reason for Error	
Logger WARNING	- Can't access specified file - Specified file is a directory	
Called By		
Function	Where Described	
collect diskfile info	Sec. 2.2.2.7.3	

Table 2.2-121: can_access_file Information.

2.2.2.7.15 vlaunch

This routine is a method of executing a command to the UNIX shell; it is a fast version of launch. The first item in the command must be the complete pathname of a program. *ccmd[128]* is the mugified copy of cmd. *prog* is the file to be EXECed. *argv[128]* is the arguments to prog.

Parameters		
Parameter	Type	Where Typedef Declared
cmd	pointer to char	standard

Internal Variables		
Variable	Type	Where Typedef Declared
ccmd[128]	char	standard
prog	pointer to char	standard
argv[128]	pointer to char	standard
count	int	standard
Return Values		
Return Value	Type	Meaning
0	int	launch was successful
-1	int	launch failed

Table 2.2-122: vlaunch Information.

2.2.2.8 util.c

This file contains low level utilities used by the Data Logger.

Includes:

```
<stdio.h>
"global.h"
"util.h"
```

Imported procedure declarations:

```
free()
```

2.2.2.8.1 init_file_info

This routine sets the following file characteristics:

```
nvolumes = 0
curvol = 1
contig = FALSE
covert = 0
looping = FALSE
```

Parameters		
Parameter	Type	Where Typedef Declared
files	pointer to file_info	Sec. 2.2.1.8 util.h
free_mem	BOOL	standard
Internal Variables		
Variable	Type	Where Typedef Declared
i	int	standard
Called By		
Function	Where Described	
init logger for playback	Sec. 2.2.2.2.8	
init logger for recording	Sec. 2.2.2.2.9	
init logger variables	Sec. 2.2.2.2.4	
command request handler	Sec. 2.2.2.5.23	

Table 2.2-123: init_file_info Information.

2.2.2.9 logfilt.c

This file is used to direct the CMC driver card. It contains the filters that are downloaded to the CMC card while the logger is running. The following PDU's are allowed to pass through the filter:

- 1) All packets belonging to the 'protocolLogger' protocol.
- 2) All packets belonging to the 'protocolSim' protocol if the logger has explicitly asked for their MulticastGroupID (exercise ID).
- 3) All packets belonging to the current version of other standard or proprietary protocols if the logger has explicitly asked for that protocol.

Includes:

```
"p_All.h"
"enpif.h"
"network.h"
"netfilter.h"
"cmc.h"
```

2.2.2.9.1 do_init

This routine is called by the CMC card to initialize the link with the logger.

2.2.2.9.2 do_packet_from_host

This routine filters a packet from the host.

Parameters		
Parameter	Type	Where Typedef Declared
pkt	pointer to short	standard
Return Values		
Return Value	Type	Meaning
SEND_PACKET	int	PDU was accepted

Table 2.2-124: do_packet_from_host Information.

2.2.2.9.3 do_packet_from_network

This routine filters a packet from the network.

Parameters		
Parameter	Type	Where Typedef Declared
pkt	pointer to NetworkPacket	network.h
Internal Variables		
Variable	Type	Where Typedef Declared
apdu	pointer to register AssociationPDU	p_assoc.h
protocol	register int	standard
exercise	register int	standard
retval	int	standard

Return Values		
Return Value	Type	Meaning
retval	int	if retval = SEND_PACKET, the PDU was accepted; if retval = FREE_PACKET, the PDU was not accepted
Calls		
Function	Where Described	
GET_DATA_PTR	network.h	
ACCEPT_EXERCISE	Sec. 2.2.1.1 cmc.h (macro definition)	
ACCEPT_PROTOCOL	Sec. 2.2.1.1 cmc.h (macro definition)	

Table 2.2-125: do_packet_from_network Information.

APPENDIX A: FIO DATA FILE FORMAT

The data file is composed of a series of 24k blocks, as illustrated in Figure A-1. The first 24k block is called the `fio_file_header` and is defined in "fioheader.h". The next 24k blocks are the `fio_records`, also called the Data Blocks. A variable number of these 24k blocks are each formatted as shown in Figure A-2. Each record is comprised of a 4 byte header (consisting of a length field) and a variable number of fio packets, each of arbitrary length. The `fio_record` is declared in "fiofile.h".

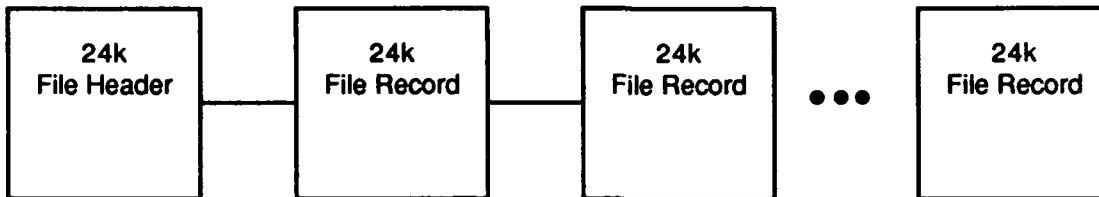


Figure A-1: SIMNET Data File Structure

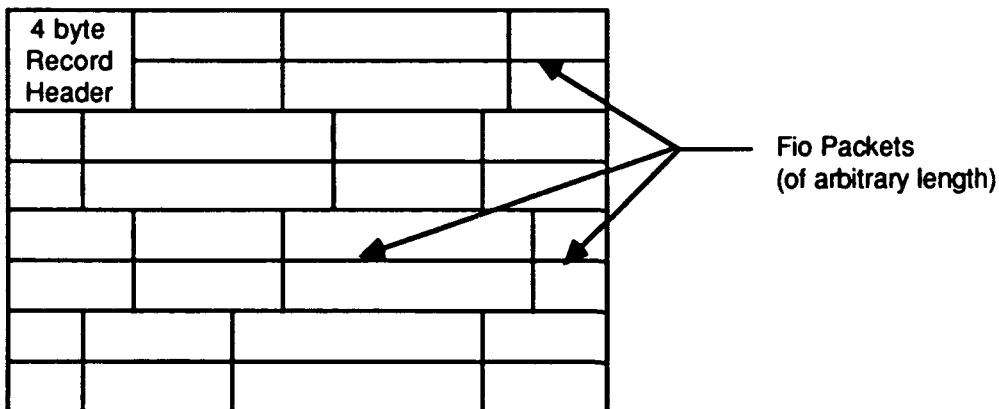


Figure A-2: File Record Structure

The `fio_header` includes the following fields:

```
fio_header
    dp_header
        tape_type
        run_number
        project_id
        comment
        date_of_run
        tape_number
        bits_per_word
        frame_size
        header_size
        date_of_copy
        time_of_run
        time_of_launch
    fiolib_version_chksum
    major_rev
    minor_rev
    user_info_offset
    user_info_bytes
    ui_heap
        file_id
        nexercise_ids
        exercise_ids
        command_str
```

-- Data Probe header consists of:
 -- ADP, SIM, etc.
 -- SIMNET, etc.
 -- String from user
 -- When created
 -- Volume number of tape

-- For checking compatability
 -- DataLogger version # used to record

-- The offset to the start of user defined area
 -- Number of bytes in user defined area
 -- 3rd to last block: user defined info
 -- The file id number
 -- The number of exercises
 -- Which exercises to record
 -- Char string typed to Unix prompt

The total number of remaining 24k blocks in the series varies from file to file and is defined in the variable `FIO_RECORD_BLOCKS`. Each of these data blocks is called an `fio_record`. The `fio_record` consists of enough variable length packets to fill the 24k data block. The `fio_record` is defined in "fiofile.h" and includes the following fields:

```
fio_record
    record_header
        -- 4 byte length field
```

-- The remainder of the record is filled with Packets of the following format:

```
    fio_packet_header
        time
        num_bytes
        from
        to
        type
    data
```

-- Packet header consists of:
 -- time stamp for play back
 -- # of bytes in data portion
 -- from NetworkAddress
 -- to NetworkAddress
 -- ethernet packet protocol type

-- Packet data

APPENDIX B: PVD DATA LOGGER COMMUNICATIONS PROTOCOL

This protocol is intended to handle the communication needs of the PVD and the Data Logger when the Data Logger is being controlled by from the PVD in 'server' mode. Logger/PVD PDUs share the CMC network with the standard simulation protocol PDUs. However, Logger/PVD communications take place on a unique multi-caste address consisting of the following:

MulticastGroupID	0
AssociationUserProtocol	loggerProtocolNumber

The three phases of Logger/PVD communications are:

- 1) Connect Phase
- 2) Command Phase
- 3) Disconnect Phase

During the first phase, the Logger will respond to all PDU's arriving on its Multi-cast group. Thereafter it responds only to PDU's which are explicitly directed to it.

In the discussion of the Logger/PVD protocol outlined below, it is assumed that the Logger and PVD will be using the services of the Association Protocol for their communications. All PDU's are assumed to be sent via the POINT_TO_POINT_DATAGRAM (ptp datagram) service unless otherwise stated.

constant	loggerAcceptAll	256
constant	loggerMaxCommentsSz	24
constant	loggerMaxErrorStringSz	128
constant	loggerMaxExerciseIDs	8
constant	loggerMaxFileNameSz	64
constant	loggerMaxFileVolumes	2
constant	loggerMaxHostNameSz	32
constant	loggerMaxProjIDSz	7
constant	loggerMulticastGroupID	0

PDUKIND loggerAvailRequestPDUKind

OVERVIEW

The loggerAvailRequestPDUKind is sent by the PVD while preparing to connect to a Logger. It is sent on the Logger/PVD multi-cast address using the broadcast Datagram (as opposed to the ptpDatagram) service.

All Loggers which are operating in server mode and which are not already connected to a PVD must respond with a 'loggerAvailReplyPDUKind' PDU. Both the Request and the Reply are sent using the ptpDatagram service. The PVD must wait a reasonable amount of time for the Loggers to respond before assuming no other Loggers are out there.

PDUKIND loggerConnectRequestPDUKind

OVERVIEW

The PVD sends a 'loggerConnectPDUKind' to the particular Logger to which it wants to connect using the ptpDatagram service of the Association Protocol.

The Logger responds with either a 'loggerAckPDUKind' or a 'loggerNakPDUKind' using the ptpDatagram service.

PDUKind loggerCommandRequestPDUKind
OVERVIEW

The PVD sends the loggerCommandRequestPDUKind to the Logger to which it is connected in order to specify runtime commands. The PVD uses the ptpDatagram service of the Association Protocol. The following runtime commands are currently defined in the PVD/Logger protocol:

- START
- CONTINUE
- SUSPEND
- STOP
- SEEK_RELATIVE
- PLAY_SPEED

PDUKind loggerStatusRequestPDUKind
OVERVIEW

The PVD sends a 'loggerStatusRequestPDUKind' to the Logger to which it is connected to gather information about its current operating status. The PVD uses the ptpDatagram service of the Association Protocol.

The Logger responds with a 'loggerStatusReplyPDUKind' using the ptpDatagram service.

PDUKind loggerDisconnectRequestPDUKind
OVERVIEW

The PVD sends a 'loggerDisconnectPDUKind' to the Logger to which it is connected to terminate its connection. The PVD uses the ptpDatagram service of the Association Protocol.

The Logger responds with a 'loggerAckPDUKind' using the ptpDatagram service.

PDUKind loggerAckPDUKind
OVERVIEW

The Logger uses this PDU to reply to successful PVD requests.

PDUKind loggerNakPDUKind
OVERVIEW

The Logger uses this PDU to reply to failed PVD requests.

PDUKind loggerAvailReplyPDUKind
OVERVIEW

The Logger uses this PDU to reply to PVD Availability Requests.

PDUKind loggerStatusReplyPDUKind
OVERVIEW

The Logger uses this PDU to reply to PVD Status Requests.

PDUKind loggerInformationPDUKind

OVERVIEW

The Logger uses this PDU to communicate unsolicited information to the PVD using the ptpDatagram service.

PDUKIND loggerClockTickPDUKind

OVERVIEW

The Logger uses this PDU to communicate timing information to the PVD using the ptpDatagram service.

Kinds of loggerProtocol PDUs:

-- loggerProtocol PDUs with which the PVD sends requests to the Logger.

```
type LoggerPDUKind enum (8) {
    loggerAvailRequestPDUKind    (1),
    loggerConnectRequestPDUKind,
    loggerCommandRequestPDUKind,
    loggerStatusRequestPDUKind,
    loggerDisconnectRequestPDUKind,
```

-- loggerProtocol PDUs with which the Logger replies to PVD requests:

```
    loggerAckPDUKind,
    loggerNakPDUKind,
    loggerAvailReplyPDUKind,
    loggerStatusReplyPDUKind,
```

-- loggerProtocol PDUs with which the Logger sends unsolicited information to the PVD:

```
    loggerInformationPDUKind,
    loggerClockTickPDUKind,
    loggerLastPDUKind
}
```

The following defines the set of possible file mediums for Logger files:

```
type LoggerMedium enum (3) {
    diskMedium (1),
    nineTrackTapeMedium,
    cassetteTapeMedium
}
```

```
type LoggerTime sequence {
    year      UnsignedInteger (8), -- Offset from 1900
    month     UnsignedInteger (8),
    day       UnsignedInteger (8),
    hour      UnsignedInteger (8),
    minute    UnsignedInteger (8),
    second    UnsignedInteger (8),
    tzone     UnsignedInteger (8), -- Hrs West of GMT (-1 if unknown)
```

```

    dstime    UnsignedInteger (8)  -- True if daylight savings time.
}

type LoggerStartRTC sequence {

    starttime    LoggerTime,      --Recording Only: Base time of an
                                exercise.

    contig       Boolean,         -- Recording to Disk Only: Use contiguous
                                disk files.

    looping      Boolean,         -- Recording to Disk: When the end of
                                file is reached, return to the start and
                                continue recording.
                                --Play back from Disk: Follow the loop
                                pointer to the logical start of file. When
                                the end of file is reached, go to the
                                beginning of the file and continue playing
                                back until the loop pointer is reached. (i.e.
                                the loop pointer marks the logical
                                beginning and end of file.
                                --Record and Play Back to Tape:
                                Swapping between available tape drives.

    recording    Boolean,         -- True => Recording;
                                -- False => Play back.

    promiscuous  Boolean,
    racal        Boolean,
    medium       LoggerMedium,
    nvolumes     UnsignedInteger(8), -- Count of the 'flnm' array entries used.

    num_exercises Integer(16),    -- Recording: exercise ids is an array of
                                1-byte integers in the range 1 .. 255. A
                                value of 'loggerAcceptAll' indicates that all
                                exercise ids are to be accepted.

    exercises    array(loggerMaxExerciseIDs) of Character (8),

    num_stdprotocols Integer (16),
                                --Recording: A value of 'loggerAcceptAll'
                                indicates that all standard or non-standard
                                protocols are to be accepted. A value of 0
                                indicates that none are to be accepted. Any
                                value other than 'loggerAcceptAll' will be
                                interpreted as 0.

    num_nstdprotocols Integer (16),
                                -- Recording to Contiguous Disk files:
                                size in bytes. Recording to Tape:
                                1=>600 ft 2=>1200 ft; 3=>2400 ft reels

    size         array(loggerMaxFileVolumes) of UnsignedInteger (32),

```

```

    flnm array(loggerMaxFileVolumes, loggerMaxFileNameSz) of
    Character (8),
        -- Disk: Names of separate Unix files
        concatenated to create the logical SIMNET
        data file. Max of 'loggerMaxFileVolumes'
        files can be involved.
        -- Tape: Names of tape drives being used.
        A max of 'loggerMaxFileVolumes' drives
        can be involved.

    projID array(loggerMaxProjIDSz) of Character (8),
        -- Header Information

    comment      array(loggerMaxCommentSz) of Character (8),

    rcdVoiceProtocolType Boolean,
        -- Used when the logger is being initialized
        for Recording. Controls whether packets
        belonging to the Voice Protocol Type are
        recorded.

    rcdSimProtocolType Boolean,
        --Used when the logger is being initialized
        for Recording. Controls whether packets
        belonging to the Simulation Protocol Type
        are recorded.

    playStealthProtocol Boolean,
        --Used when the logger is being initialized
        for Play Back. Controls whether packets
        belonging to the Stealth Protocol of the
        Simulation Protocol Type are recorded.

    unused (5)
}

type LoggerSeekRTC sequence {
    relative_curloc Integer (32),
    seconds Integer (32)
}

type LoggerSpeedRTC sequence {
    factor Integer (32)
}

```

The following defines the set of possible runtime commands which the PVD can send to the Data Logger.

```

type LoggerRTCType enum (8) {
    startRTCType (1),

```

```
        continueRTCType,
        suspendRTCType,
        stopRTCType,
        seekRelativeRTCType,
        playSpeedRTCType
    }

type LoggerCommandVariant sequence {
    command    LoggerRTCType,
    unused     (24),

    info choice (command) of {

        when (startRTCType)
            startInfo LoggerStartRTC,
        when (seekRelativeRTCType)
            seekInfo  LoggerSeekRTC,
        when (playSpeedRTCType)
            playInfo  LoggerSpeedRTC
    }
}

type LoggerActivity enum (2) {
    loggerNoActivity (1),
    loggerRecording,
    loggerPlayback,
    loggerCopying
}

type LoggerOperation enum (2) {
    loggerInteractive (1),
    loggerServer
}

type LoggerState enum (2) {
    loggerDisconnected (1),
    loggerConnected,
    loggerSuspended,
    loggerActive
}

type LoggerAvailReplyVariant sequence {
    available Boolean,
    unused     (7),
    loggerID   array(loggerMaxHostNameSz) of Character (8)
}

type LoggerStatusReplyVariant sequence {
    activity  LoggerActivity,
    oper      LoggerOperation,
    state     LoggerState,
    racal     Boolean,
    unused    (1),
}
```

```

    speed      UnsignedInteger (8),      -- Time factor
    unused      (16),
    start       LoggerTime,              -- Start time of the exercise

    offset      UnsignedInteger (32),     -- Time offset (in msec) from
                                         beginning

    packets     UnsignedInteger (32),     -- Number of packets handled
                                         since start

    file_id     array(loggerMaxFileNameSz) of Character (8),
    project_id  array(loggerMaxProjIDSz) of Character (8),
    comment     array(loggerMaxCommentSz) of Character (8),
    unused      (8)
}

type LoggerInformationVariant sequence {
    is_error    Boolean,
    unused      (7),
    error_string array(loggerMaxErrorStringSz) of Character
                (8)
}

type LoggerClockTickVariant sequence {
    starttime   LoggerTime,
    offset      UnsignedInteger (32)
}

type LoggerProtocolVersion enum (8) {
    loggerProtocolVersionAug89 (1),
    loggerProtocolVersionJan90 (2)
}

constant loggerProtocolVersionCurrent 2

type LoggerPDU sequence {
    version      LoggerProtocolVersion,
    kind         LoggerPDUKind,
    unused       (16),
    destination   SimulationAddress,

    variant      choice (kind) of {

        when (loggerCommandRequestPDUKind)
            commandReq      LoggerCommandVariant,

        when (loggerStatusReplyPDUKind)
            availReply       LoggerAvailReplyVariant,

        when (loggerStatusReplyPDUKind)
            statusReply       LoggerStatusReplyVariant,
    }
}

```

```
        when (loggerInformationPDUKind)
            information      LoggerInformationVariant,
        when (loggerClockTickPDUKind)
            clockTick        LoggerClockTickVariant
    }
}
```

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