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Program Product

MVS/Extended Architecture System Programming Library: SYS1.LOGREC Error Recording

MVS/System Product:

JES3 Version 2	**5665-291**
JES2 Version 2	**5740-XC6**

IBM

Third Edition (June, 1987)

This is a major revision of, and obsoletes, GC28-1162-1 and Technical Newsletters GN28-1101 and GN28-0863. See the Summary of Amendments following the Contents for a summary of the changes made to this manual. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

This edition applies to Version 2 Release 2.0 of MVS/System Product 5665-291 or 5740-XC6 until otherwise indicated in new editions or Technical Newsletters. Changes are made periodically to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370 Bibliography*, GC20-0001, for the editions that are applicable and current.

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Preface

This publication describes how different errors and system conditions are recorded on the SYS1.LOGREC data set and how SYS1.LOGREC is initialized and maintained. It discusses why and how the different types of records are built and recorded on SYS1.LOGREC, and how to use the service aid programs that maintain the SYS1.LOGREC data set.

Contents

This publication contains three chapters:

- *Chapter 1: Introduction* - describes the overall error recording function as it applies to the SYS1.LOGREC data set.
- *Chapter 2: Initializing and Reallocating the SYS1.LOGREC Data Set* - shows how to use the IFCDIP00 service aid to initialize and maintain the SYS1.LOGREC data set.
- *Chapter 3: Error Recording on SYS1.LOGREC* - explains the error and system condition recording functions, the conditions documented by each type of record, and the format of each record on SYS1.LOGREC.

Prerequisite Publication

- *MVS/Extended Architecture Utilities*, GC26-4018, describes how to use utility programs to print certain types of service aid output and to allocate data sets with the IEHPROGM utility.

Associated Publications

- *MVS/Extended Architecture JCL User's Guide*, GC28-1351, and *MVS/Extended Architecture JCL Reference*, GC28-1352, describe how to use job control statements to override default parameters, use cataloged procedures, allocate space for data sets, code job control statements, and how to use JES control statements with other JCL statements.
- *MVS/Extended Architecture SYS1.LOGREC Error Recording Logic*, LY28-1187, describes the internal logic of IFCDIP00, and the system recording routines: asynchronous recording facility, OBR/MDR recorder, SVC 76, and SVC 91.
- *Environmental Record Editing and Printing (EREP) User's Guide and Reference*, GC28-1378, describes how to use EREP.

- *OS/VS Mass Storage System (MSS) System Data Analyzer*, GC35-0027, describes the ISDASDA0 support for the IBM 3850 Mass Storage System.

- *MVS/Extended Architecture System Logic Library Input/Output Supervisor*, LY28-1705 and LY28-1706 describes the function and logic of the missing interruption handler and the subchannel logout handler.

- *MVS/Extended Architecture System Logic Library Machine Check Handler*, LY28-1715 describes the function and logic of the machine check handler.

- *MVS/Extended Architecture System Logic Library Dynamic Device Reconfiguration*, LY28-1675 describes the function and logic of the dynamic device reconfiguration recorder.

- *MVS/Extended Architecture: Debugging Handbook, Volume 5*, LC28-1168, describes the detailed format of the SDWA.

- *MVS/Extended Architecture SPL: System Generation Reference*, GC26-4009, provides information for system programmers who are to plan for and install an MVS/XA control program.

- *IBM System/370 Extended Architecture Principles of Operation*, SA22-7085, explains in detail the machine functions of the System/370-XA processors.

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Summary of Amendments

Summary of Amendments
for GC28-1162-2
MVS/SP Version 2 Release 2.0

This edition, which supports MVS/System Product Version 2 Release 2.0, contains changes to the software record. These changes include:

- The addition of the symptom record to the software record

Summary of Amendments
for GC28-1162-1
as Updated January 3, 1986
by Technical Newsletter GN28-1101

This Technical Newsletter, which supports MVS/System Product Version 2 Release 1.3 Vector Facility Enhancement, contains changes to the machine check (MCH) record for the Vector Facility.

Summary of Amendments
for GC28-1162-1
MVS/SP Version 2 Release 1.3

The changes in this publication reflect the SYS1.LOGREC modifications to provide support for RAS enhancements in the Machine Check Handler for MVS/System Product Version 2 Release 1.3.

Also, miscellaneous editorial and maintenance changes are made throughout the publication and Chapter 3 is reorganized to put the records in alphabetic order.

Chapter 1. Introduction

The purpose of error recording on the SYS1.LOGREC data set is to provide a record of all hardware failures, selected software errors, and system conditions. Information about each incident is written onto SYS1.LOGREC by the system recording routines and can be retrieved by using EREP. The EREP output can be used for diagnostic and/or measurement purposes to maintain the devices and support the system control program of a computer system.

Error recording on SYS1.LOGREC, as shown in Figure 1-1 on page 1-2, involves:

- Initialization of SYS1.LOGREC by the IFCDIP00 service aid.
- Recording records of different incidents on SYS1.LOGREC.
- Retrieval of the information on SYS1.LOGREC by using EREP.

Initializing the SYS1.LOGREC Data Set

The IFCDIP00 service aid initializes the SYS1.LOGREC data set on the system residence or a user-specified volume during system generation. IFCDIP00 creates a header record and a time stamp record for the SYS1.LOGREC data set and allocates space for the data set. IFCDIP00 can also be used to reallocate and re-IPL SYS1.LOGREC. IFCDIP00 is described in "Chapter 2: Initializing and Reallocating the SYS1.LOGREC Data Set (IFCDIP00)."

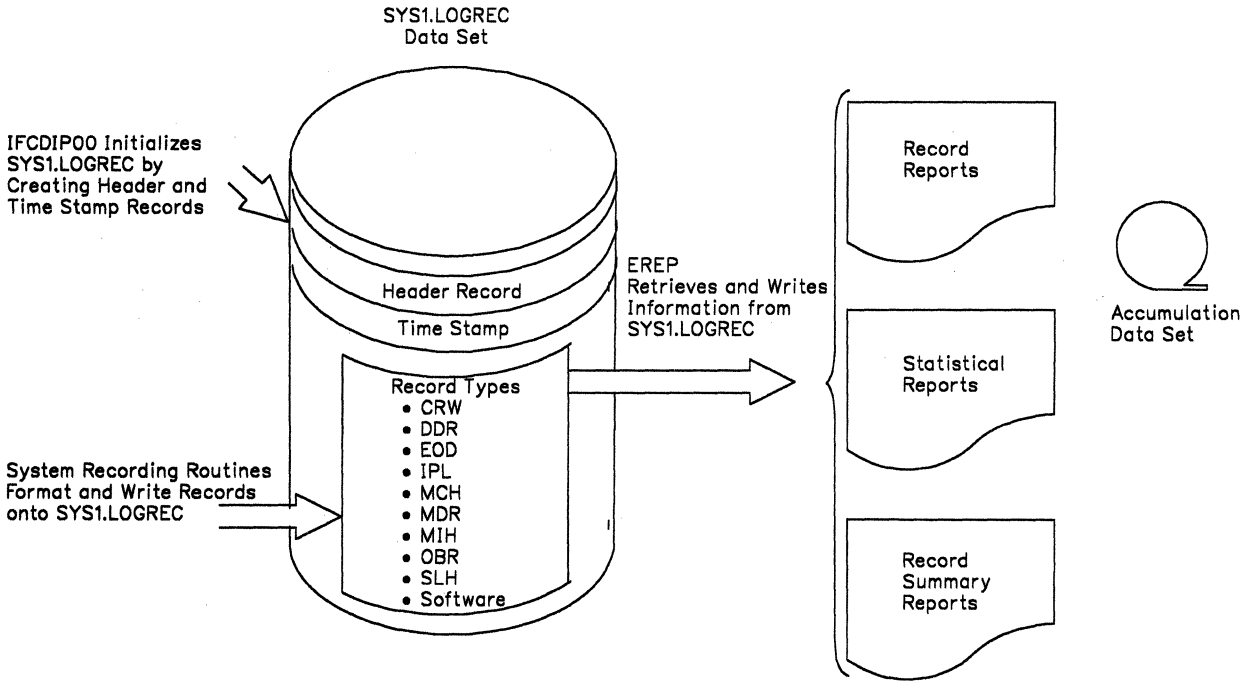

Figure 1-1. SYS1.LOGREC Error Recording Overview

Recording Records on SYS1.LOGREC

Eleven types of records, containing device- or incident-dependent information, can be recorded on SYS1.LOGREC:

- **CRW** (channel report word) records for channel path, subchannel, configuration alert, and monitoring facility errors.
- **DDR** (dynamic device reconfiguration) records for information describing operator and system swaps between direct access and magnetic tape devices and for operator swaps on unit record devices.
- **EOD** (end-of-day) records for information related to end-of-day and system termination conditions.
- **IPL** (initial program load) records for information related to system initializations.
- **MCH** (machine check) records for CPU, storage, storage key, timer failures.
- **MDR** (miscellaneous data) records for buffer overflow and device failures on buffered log devices, for demounts on direct access devices with buffered logs, for demounts by the DFDSS program between direct access devices having buffered logs and removable disk packs, for device failures on teleprocessing devices connected to an IBM 3704 or 3705 device, and for statistical recording by EREP on direct access devices with buffered logs.

- **MIH** (missing interruption handler) records for information describing missing I/O interruptions, specified time intervals, recovery actions required, and recovery actions performed.

- **OBR** (outboard) records for counter overflow statistics and device failures on devices supported by the teleprocessing access methods, for end-of-day requests, for paging I/O errors, for permanent channel and I/O device failures, for statistic counter overflow, for temporary or intermittent I/O device failures, for demounts on the IBM 3420 series of magnetic tape devices, for devices that have their own diagnostic buffers, and for statistical recording by EREP on direct access devices with buffered logs.

- **SLH** (subchannel logout handler) records for channel errors.

- **SOFTWARE** records for software-detected software errors such as routines affected by the issuing of the CALLRTM or ABEND (SVC 13) macros, or symptom records issued by routines detecting ABEND or non-ABEND errors; for hardware-detected software errors such as program checks, for operator-detected errors such as pressing the restart key, and for hardware-detected hardware errors such as software recovery attempts for hard machine failures.

- **TIME STAMP** record for measuring the approximate time interval between termination and re-initialization of the operating system.

Each record on SYS1.LOGREC contains complete and specific information for the device, and type of failure or system condition that caused it to be written. "Chapter 3: Error Recording on SYS1.LOGREC" describes SYS1.LOGREC recording and the record formats on SYS1.LOGREC.

Retrieving Information from SYS1.LOGREC

The Environmental Record Editing and Printing (EREP) program enables you to examine the data recorded on SYS1.LOGREC and/or accumulation (history) data sets in the form of system and summary reports, edited records and record summaries.

EREP can perform the following functions:

- Create an accumulation (history) data set from the SYS1.LOGREC data set and clear SYS1.LOGREC.

- Copy an input accumulation data set to an output accumulation data set.

- Merge data from an accumulation data set and SYS1.LOGREC.

- Print a detailed description of selected hardware and software error records.

- Summarize and print statistics for device failures.

See *Environmental Record Editing and Printing (EREP) User's Guide and Reference* for information on using EREP.

Chapter 2. Initializing and Reallocating the SYS1.LOGREC Data Set (IFCDIP00)

The disk initialization program (IFCDIP00), controlled by job control language statements, runs as a problem program under MVS/XA, and has three applications:

- During system generation to initialize the SYS1.LOGREC data set. Initializing SYS1.LOGREC creates a header record and a time stamp record on the data set and allocates space for the data set. See *System Generation Reference* for a discussion of this application.
- As a service aid to reinitialize the SYS1.LOGREC data set. The SYS1.LOGREC header record can be destroyed if an uncorrectable channel error occurs while EREP or a system recording routine is rewriting the header record onto the SYS1.LOGREC data set. Use IFCDIP00 to reinitialize the data set.
- As a service aid to modify the space allocation for the SYS1.LOGREC data set. If you need to change the size of the SYS1.LOGREC data set as created by the system generation process, use IFCDIP00 to increase or decrease the space allocation for SYS1.LOGREC.

The system generation process selects the IFCDIP00 module and puts it in the control program's link library (SYS1.LINKLIB).

SYS1.LOGREC Header Record

The IFCDIP00 service aid creates a header record on the SYS1.LOGREC data set. The SYS1.LOGREC header record (Figure 2-1 on page 2-2) includes:

- Information that the system recording routines can use to determine where to write new record entries on SYS1.LOGREC.
- Information that EREP can use to find existing record entries on SYS1.LOGREC.
- Information that the system recording routines can use to issue a warning message when the SYS1.LOGREC data set is 90% full.

SYS1.LOGREC Header Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	2	CLASRC	Header record identifier. Each bit in this field is set to 1 unless critical data has been destroyed.
2	(2)	4	LOWLIMIT	Address of low extent. Track address (in CCHH format) of first extent of SYS1.LOGREC.
6	(6)	4	UPLIMIT	Address of high extent. Track address (in CCHH format) of last extent of SYS1.LOGREC.
10	(A)	1	MSGCNT	Count of the number of times IFB040I has been issued.
11	(B)	7	RESTART	Address of record entry area. Starting track address (in BBCCHHR format) for recording area on SYS1.LOGREC.
18	(12)	2	BYTSREM	Remaining bytes on track. Number of bytes remaining on track upon which last record entry was written.
20	(14)	2	TRKCAP	Total bytes on track. Number of bytes which can be written on a track of volume containing SYS1.LOGREC.
22	(16)	7	LASTTR	Address of last record written. Track address (BBCCHHR format) of last record written on SYS1.LOGREC.
29	(1D)	2	TRKSPER	Highest addressable track for each cylinder on volume containing SYS1.LOGREC.
31	(1F)	2	EWMCNT	Warning count. Number of bytes remaining on early warning message track of SYS1.LOGREC when 90% full point of data set is reached. When this is detected by a recording routine, it issues a message and turns on early warning message switch at displacement 38.
33	(21)	1	DEVCODE	Device code. Code indicating device type of volume on which SYS1.LOGREC resides: **Code** **Device** 07 2305 MOD II 09 3330 and 3333 MOD I or 3350 operating in 3330-1 compatibility mode. 0A 3340 and 3344 0B 3350 native mode 0C 3375 0D 3330 and 3333 MOD II or 3350 operating in 3330-II compatibility mode. 0E 3380 0F Fixed block device.
34	(22)	4	EWMTRK	Early warning message track. Track address (in CCHH format) on which 90% full point for data set exists.
38	(26)	1 1...	EWMSW	Switch byte: 90% full point message has been issued. This switch is turned on by recording routine detecting 90% full point and is turned off by EREP when clearing SYS1.LOGREC to hexadecimal zeros.
		.xxx xxxx		Reserved.
39	(27)	1	SFTYBYTS	Check byte. Each bit in this field is set to 1 and is used to check validity of header record identifier.

Figure 2-1. SYS1.LOGREC Header Record Format

Time Stamp Record

The IFCDIP00 service aid creates a time stamp record on the SYS1.LOGREC data set in the first record space following the SYS1.LOGREC header record. The time stamp record (Figure 2-2) provides current date and time information for the IPL record. This allows the user to measure the approximate time interval, recorded in the IPL records, between the termination and reinitialization of the operating system.

At pre-set time intervals, the master scheduler invokes the IPL/outage recorder (IOSROUTG), which issues SVC 76. SVC 76 obtains the current date and time and writes this information on the time stamp record, overlaying the previous date and time.

During a subsequent initialization of the operating system, the master scheduler invokes IOSROUTG, which issues SVC 76 to format an IPL record. SVC 76 obtains the date and time from the time stamp record and adds it to the IPL record.

Note: If the IFCDIP00 service aid is used to reinitialize the SYS1.LOGREC data set, the information in the time stamp record is overlaid with hexadecimal zeros until SVC 76 again writes the current date and time.

Time Stamp Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1 1... ..11	CLASRC	Class/Source: Time stamp record.
1	(1)	1 100. .... bits 3-7 0-1F	OPSYS	System/Release level: OS/VS2. Release level 0-31.
2	(2)	4 Byte 0 1... .... 0... .... .x.. .... ..1. ....1 .... 1... .... .xxx Bytes 1 and 2 Byte 3	SW1	Record switches: More records follow. Last record. Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12. Record truncated. (Not used for time stamp record.) Record created by 370-XA. TIME macro used. Reserved. Not used for time stamp record. Incremental release number (alphameric) of operating system.
6	(6)	2		Not used for time stamp record.
8	(8)	4	DATE	System date for IPL records (updated by IOS outage recorder at 3 minute time intervals).
12	(C)	4	TIME	System time for IPL records (updated by IOS outage recorder at 3 minute time intervals).
16	(10)	1 xxxx xxx. 0 1	VERNO	Machine version code: Reserved. Version I CPUs. Version II CPUs.
17	(11)	3	CPUSER	CPU serial number.
20	(14)	2	CPUMODEL	CPU machine model number (for example, 3081).
22	(16)	2	MCELLNG	Not used for time stamp record.
24	(18)	16		Reserved.

Figure 2-2. Time Stamp Record Format

Reinitializing SYS1.LOGREC

You can use IFCDIP00, controlled by job control language statements, to reinitialize the SYS1.LOGREC data set. IFCDIP00 resets the SYS1.LOGREC header record field that indicates that the entire data set can be used and clears the time stamp record to hexadecimal zeros.

Example 1: Reinitializing the SYS1.LOGREC Data Set

In this example:

- The SYS1.LOGREC data set is reinitialized.

```
//INSERLOG  JOB
//STEP1     EXEC  PGM=IFCDIP00
//SERERDS   DD    DSNAME=SYS1.LOGREC,UNIT=3330,
//                VOL=SER=111111,DISP=(OLD,KEEP)
```

Control Statements for Example 1

The JOB statement initiates the job; the jobname INSERLOG has no significance.

The EXEC statement specifies the program name (PGM = IFCDIP00).

The SERERDS DD statement specifies the re-IPLed output (SYS1.LOGREC) data set, which must be on a permanently mounted volume (VOL = SER = 111111 in this example); the ddname must be SERERDS.

Changing Space Allocation for SYS1.LOGREC

The system generation process determines the size of the SYS1.LOGREC data set according to the system configuration. If you need to change the size of the SYS1.LOGREC data set, you can use IFCDIP00 in conjunction with the IEHPROGM utility program to increase or decrease the space allocation for the SYS1.LOGREC data set.

Note: After scratching and reallocating the data set, the system must be re-IPLed because the data set now has a different physical location on the volume.

Example 2: Changing Space Allocation for SYS1.LOGREC

In this example:

- The SYS1.LOGREC data set is scratched and uncataloged using the IEHPROGM utility program.
- The SYS1.LOGREC data set is reinitialized and reallocated with new space specifications using IFCDIP00.

```
//RELGREC   JOB
//SCR       EXEC  PGM=IEHPROGM
//SYSPRINT  DD    SYSOUT=A
//DD1       DD    UNIT=3330,VOLUME=SER=111111,DISP=OLD
//SYSIN     DD    *
   SCRATCH        DSNAME=SYS1.LOGREC,VOL=3330=111111
   UNCATLG        DSNAME=SYS1.LOGREC
/*
//R         EXEC  PGM=IFCDIP00
//SERERDS   DD    DSNAME=SYS1.LOGREC,UNIT=3330
//                VOL=SER=111111,SPACE=(TRK,(10),,CONTIG),
//                DISP=(NEW,CATLG)
```

Control Statements for Example 2

The **first** EXEC statement specifies the program name (PGM = IEHPROGM).

The SYSPRINT DD statement defines the output (printer assumed) data set.

The DD1 DD statement defines a permanently mounted volume (the volume, VOL = SER = 111111, is considered permanently mounted). The ddname DD1 is arbitrary.

The SYSIN DD statement indicates that input in the form of control statements follows.

The SCRATCH control statement defines the data set (SYS1.LOGREC) and the direct access volume (VOL = 3330 = 111111) where the data set is to be scratched.

The UNCATLG statement indicates that the data set name (SYS1.LOGREC) is to be removed from the lowest index level of the catalog.

The **second** EXEC statement specifies the program name (PGM = IFCDIP00).

The SERERDS DD statement specifies (1) the location and (2) the size of the reinitialized output (SYS1.LOGREC) data set (requesting contiguous tracks); the ddname must be SERERDS.

Note: If you use the preceding procedure and an uncorrectable channel error occurs after the SYS1.LOGREC data set has been scratched but before it has been reallocated, the IFCDIP00 job is terminated, and the system is marked ineligible for IPL procedures. To solve this problem, do one of the following:

- Use the DFDSS program to restore the system and thereby restore the SYS1.LOGREC data set. After the SYS1.LOGREC data set has been restored, you can re-IPL the system and reallocate SYS1.LOGREC (as shown in Example 2).

  or

- If available, execute the reallocate operation on the data set while running under another operating system.

Chapter 3. Error Recording on SYS1.LOGREC

Records are recorded on SYS1.LOGREC for every hardware or software failure and system condition that has an associated recording request or recording routine. The records can contain two types of data that document failures and system conditions:

- Error statistics - counts of the number of times that channels, machine models, and I/O devices have failed.
- Environmental data - time and circumstances for each failure or system condition.

The records are recorded, in chronological order, on SYS1.LOGREC as undefined length records. In general, each record contains:

- Relevant system information at the time of the failure.
- Device hardware status at the time of the failure.
- Results of any device/control unit recovery attempt.
- Results of any software system recovery attempt.
- Statistical data.

The recording routines are included as standard programs of the operating system by the system generation process.

Types of Records on SYS1.LOGREC

The SYS1.LOGREC data set, a non-sharable system data set, is a permanent data set. The SYS1.LOGREC data set contains:

- A header record.
- A time stamp record.
- Environmental records for each failure and system condition that has an associated recording routine.
- Statistical records that contain counts of the number of times devices have failed.

Figure 3-1 on page 3-2 shows the recording routines that format and write each type of record on SYS1.LOGREC. Figure 3-2 on page 3-4 lists the incidents and the types of records that can be recorded on SYS1.LOGREC for each incident.

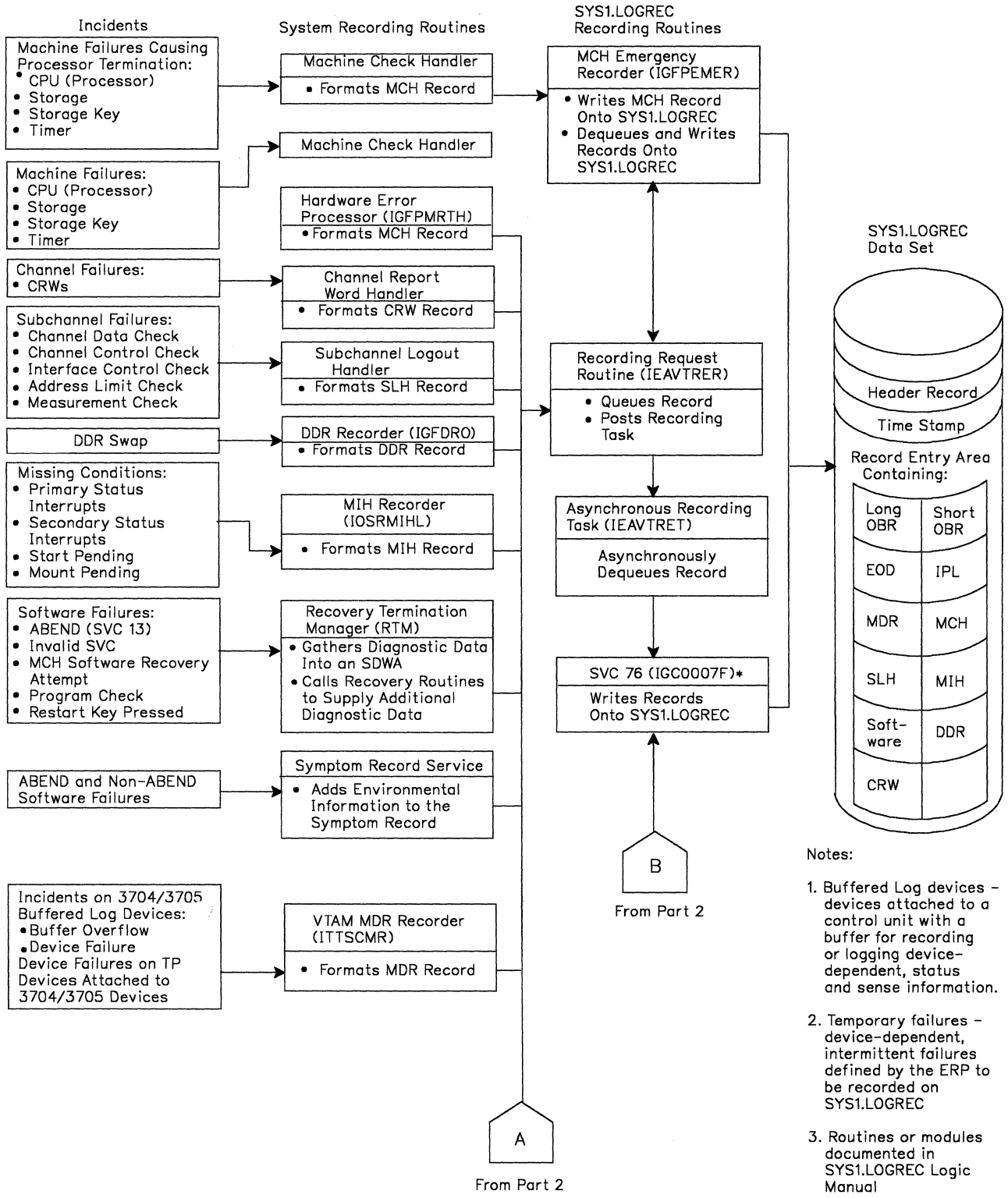

Figure 3-1 (Part 1 of 2). Writing Records Onto SYS1.LOGREC

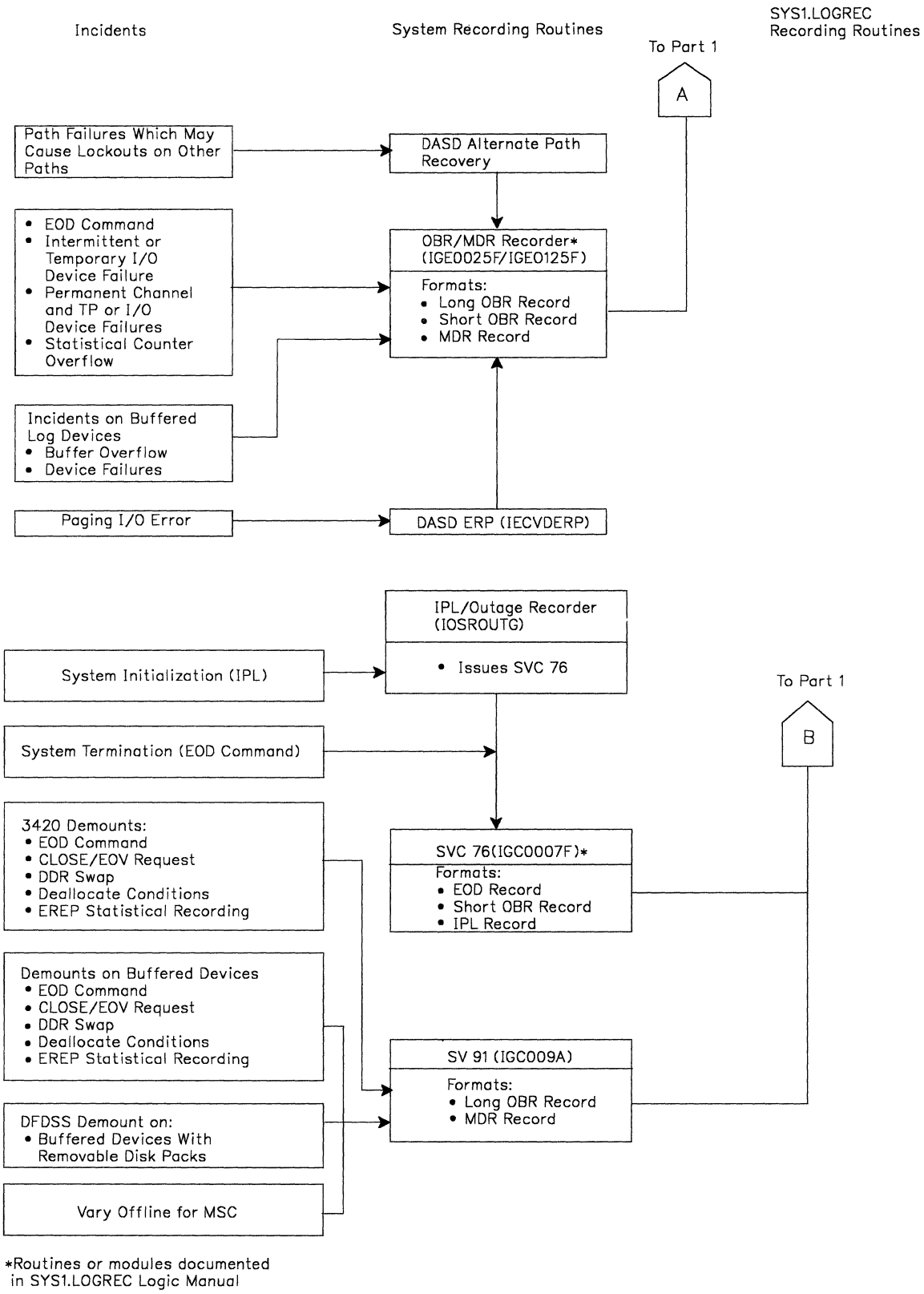

Figure 3-1 (Part 2 of 2). Writing Records Onto SYS1.LOGREC

Incidents	Record Types										
	CRW	DDR	EOD	IPL	MCH	MDR	MIH	OBR, Long	OBR, Short	Soft-ware	SLH
ABEND										1	
Address Limit Check											1(A)
Buffer Overflow						1					
Channel Control Check								2(B)			1(A)
Channel Data Check								2(B)			1(A)
Channel End (missing)							1(F)				
Channel Report Word	1										
CLOSE Request (Demount)						1*(E)		1*(D)			
CPU Failure					1					2	
DDR Swap (Demount)		2				1*(E)		1*(D)			
Deallocate Condition (Demount)						1*(E)		1*(D)			
Device End (missing)							1(F)				
DFDSS Demount						1(C)					
EOD Command (Demount or System Termination)			4			3(E)		2(D)	1(H)		
EOV Request (Demount)						1*(E)		1*(D)			
Hot I/O Conditions			1								
Interface Control Check								2(B)			1(A)
Intermittent Failure - I/O Devices						1*(G)		1*(G)			
Invalid SVC Issued										1	
IPL (System Initialization)				1							
Lost Records										1	
Measurement Check											1
Non-ABEND Software Failure										1	
Paging I/O Error								1		2(I)	
Path Failures								1			
Permanent Failure - I/O and TP Devices						1*		1*			
Program Check										1	
Restart Key Pressed										1	
Statistic Counter Overflow									1		
Statistic Counter Overflow - TP Devices and Variable Length Table Entries								1			
Storage Failure					1					2(I)	
Storage Key Failure					1					2(I)	
System Restartable Wait			1								
Temporary Device Failure						1*(G)		1*(G)			

Figure 3-2 (Part 1 of 2). Incident/Record Table

Incidents	Record Types										
	CRW	DDR	EOD	IPL	MCH	MDR	MIH	OBR, Long	OBR, Short	Soft-ware	SLH
Timer Failure					1						
Vary Offline						1*(G)					

Numbers in boxes (reading horizontally) indicate:

- That a specific record type is created for the incident.
- The approximate chronological creation of the record types, if required, on SYS1.LOGREC.

For example, a permanent channel control check incident generates SLH records (Note A) before generating a long OBR record (Note B).

*Asterisk denotes mutually exclusive, device-dependent records. For example, an EOV request on an IBM 3420 magnetic tape device generates a long OBR record (Note D). The MDR record is ignored (Note E).

Letters in boxes indicate the following:

A. Created one SLH record for each ERP retry attempt for same incident before considering error to be permanent.

B. Created only if condition is permanent (uncorrectable).

C. Created only for devices with a buffered log and removable disk packs (such as the IBM 3330, 3340, 3344, and 3850).

D. Created only for the IBM 3420 magnetic tape devices. For EOD command, created randomly and can precede short OBR records or follow MDR records.

E. Created only for devices with buffered logs (such as the IBM 2305, 3330, 3340, 3344, 3350, 3375, 3380, and 3850). For EOD command, created randomly and can precede or follow short and long OBR records.

F. Not created for teleprocessing devices other than the local 3704/3705 and 3791.

G. Created only for those devices having an ERP that records certain intermittent or permanent incidents. (Such as the ERPs for the IBM 2305, 3330, 3340, 3344, 3350, 3375, 3380, and 3850.)

H. Created randomly; MDR and long OBR records can precede short OBR records.

I. Created only for hard machine failures which indicate recording on SYS1.LOGREC.

Figure 3-2 (Part 2 of 2). Incident/Record Table

Record Header

All records on SYS1.LOGREC contain a standard 24-byte header followed by data that is specific for the record type and the device type or machine model. The header provides the information necessary to identify the type and origin of the record.

- *Type* information - which defines the specific type of record, the specific source of the record, the general reason the record was made, and any special record-dependent attributes (such as record length, content, hardware features, format).

- *Origin* information - which includes the operating system the record was generated on, the generating program, the time and date the record was generated, the CPU identity, and the CPU serial number on which the record was generated (for a multiprocessing system this may not be the CPU on which the incident occurred).

Record Type

The following list identifies the valid record types or classes (the first hexadecimal digit, bits 0-3, of the record) and specific record sources (second digit, bits 4-7).

1x	Machine Check (MCH record)
	10 MCH.
	13 MCH in MVS.
2x	Channel Subsystem records
	23 SLH.
	25 CRW.
3x	Unit Check (OBR record)
	30 OBR (unit check).
	34 TCAM OBR.
	36 VTAM OBR.
	3A DPA OBR.
4x	Software Error (software record)
	40 Software-detected software error.
	42 Hardware-detected software error.
	44 Operator-detected error.
	48 Hardware-detected hardware error.
	4C Symptom Record.
	4F Lost record summary.
5x	System Initialization (IPL record)
	50 IPL.
6x	Reconfiguration (DDR record)
	60 DDR.
7x	Missing Interruption (MIH record)
	71 MIH.
8x	System Termination (EOD record)
	80 EOD.
	81 MVS/XA-initiated termination. (Restart not possible).
	84 EOD from IOS. (Restart possible.)
9x	Non-Standard (MDR record)
	90 SVC 91.
	91 MDR.

Record Format

The format of the data areas represented in this chapter is:

Offset Dec Hex	Size (Bytes) Alignment (Bits)	Field Name	Description
Offset	The numeric address of the field relative to the beginning of the data area.		
Dec Hex	The first number is the offset in decimal, followed by the hexadecimal equivalent in parentheses. Example: 16 (10).		
Size	The field size in bytes.		
Alignment	This column also shows the bit settings of switch fields; the alignment or state of the bits in a byte is as follows: .... The eight bit positions (0-7) in a byte. For ease of scanning, the high-order (left-hand) four bits are separated from the low-order four bits. x... .... A reference to bit 0. 1... .... Bit zero is on. 0... .... Bit zero is off. .... ..xx A reference to bits 6 and 7. Significant bit settings are shown and described. Reserved bits describe bit settings that are not significant for this release. (Users should not use the reserved bits because the program may use them in future releases.)		
Field Name	A symbol that identifies the field.		
Description	The use of a field. Where the field's use relates directly to a value coded by a user, the coded value is shown. Where the hexadecimal code for a particular bit setting would be helpful, it is shown separated from the rest of the description.		

Recording Channel Report Word (CRW) Records

CRW records (Figure 3-3) are recorded on SYS1.LOGREC for all software- and hardware-generated channel report words. Software-generated CRWs are created by IOS modules to invoke channel path recovery. Hardware-generated CRWs are created by the channel to provide information describing a machine malfunction affecting a specific, or a collection of, channel subsystem facilities.

Consult *System Logic Library, Input/Output Supervisor* for a detailed description of channel recovery.

Channel Report Word (CRW) Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
0	(0)	1	CRWKEY1	Class/Source:
		..1. .1.1		CRW Record.
1	(1)	1	CRWKEY2	System/Release level:
		100.		OS/VS2.
		...x xxxx		Release level 0-31.
2	(2)	1	CRWSMS	Record-independent switches:
		1... ...		More records follow.
		0...		Last record.
		.1..		TOD clock instruction issued (0 = IBM System/360, 1 = IBM System/370).
		..1.		Record truncated.
		...1		Record created by 370-XA.
		.... 1...		TIME macro issued.
		xxx		Reserved.
3	(3)	3		Record-dependent switches:
		Byte 0	CRWBYTE1	Reserved.
		Byte 1	CRWBYTE2	Reserved.
		Byte 2	CRWBYTE3	Reserved.
6	(6)	1	CRWRCDCT	Record count:
		xxxx	CRWRCSEQ	Record sequence number.
		 xxxx	CRWFZREC	Total number of physical records in this logical record.
7	(7)	1		Reserved.
8	(8)	4	CRWDATE	System date of incident.
12	(C)	4	CRWTIME	System time of incident.
16	(10)	1	CRWVER	Machine version code.
17	(11)	3	CRWSER	CPU serial number.
20	(14)	2	CRWMOD	CPU machine model number.
22	(16)	2	CRWCEL	Reserved.
24	(18)	8	CRWMODUL	CSECT name of module doing recording.

Figure 3-3 (Part 1 of 2). CRW Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
32	(20)	1	CRWRECCD	CRW recording code: identifies the format of the variable portion of the record.
33	(21)	1	CRWFLAG1	Flag byte 1.
		1...	CRWHARD	Hardware-stored CRW.
		.1..	CRWSOFT	Software-created CRW.
		..xx xxx.		Reserved.
		1	CRWINVAL	Invalid CRW recording.
34	(22)	1	CRWFLAG2	Flag byte 2.
35	(23)	1	CRWCODE	CRW origin code.
		0000 0000		CRW origin unknown.
		0000 0001		CRW pending machine check.
		0000 0010		System damage machine check.
		0000 0011		Alternate CPU recovery.
		0000 0100		Reserved.
		0000 0101		Reserved.
		0000 0110		Hot I/O recover channel path.
		0000 0111		Hot I/O remove channel path.
		0000 1000		Vary channel path - forced.
		X'09'-X'FF'		Reserved.
36	(24)	2	CRWCP	Processor address CRW retrieved on.
38	(26)	2		Reserved.
40	(28)	4	CRWCRW	Channel report word (CRW).
44	(2C)	2	CRWDEV	Binary device number.
46	(2E)	2		Reserved.
48	(30)	4	CRWSEQNO	CRW sequence number.
52	(34)	4	CRWASEQN	Associated CRW sequence number.
56	(38)	2	CRWDEVST	UCB device status flags, or zero if UCB not available.
58	(3A)	2	CRWPMCW	Path management control word, or zero if UCB not available.
60	(3C)	1	CRWCHPCT	Channel path recovery count, or zero if UCB not available.
61	(3D)	2		Reserved.
63	(3F)	1	CRWLEVEL	UCB level value, or zero if UCB not available.
64	(40)	4	CRWLVMSK	UCB level bit mask, or zero if UCB not available.
68	(44)	4	CRWSCHRC	UCB subchannel recovery anchor, or zero if UCB not available.
72	(48)	1		Reserved.
73	(49)	1	CRWICHPT	ICHPT flags associated with the CRW channel path ID.
74	(4A)	8	CRWISDT	Copy of the IOS interrupt subclass definition table.

Figure 3-3 (Part 2 of 2). CRW Record Format

Recording Dynamic Device Reconfiguration (DDR) Records

DDR records (Figure 3-4) are recorded on SYS1.LOGREC for each operator- or system-initiated swap between direct access and magnetic tape devices and for each operator-initiated swap on a unit record device. The system requests DDR after a permanent (uncorrectable) I/O error has occurred. The operator can request DDR at any time by issuing the SWAP command.

DDR invokes the DDR recorder to document the devices involved in a DDR swap. The DDR recorder obtains such information to format a DDR record as the 'FROM' and 'TO' device numbers, the device type, and, for direct access devices, the physical address of each disk drive involved in the swap. After formatting the information, the DDR recorder passes control to the recording request routine which queues the DDR record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

Consult *System Logic Library, Dynamic Device Reconfiguration* for a detailed description of dynamic device reconfiguration.

Dynamic Device Reconfiguration (DDR) Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
0	(0)	1 .11.	LRBHTYPE	Record key: DDR record.
1	(1)	1 100. .... bits 3-7 0-1F	LRBHSYS	System/Release level: OS/VS2. Release level 0-31.
2	(2)	1 1... .... 0... .... .x.. .... ..1. ....1 .... 1... xxx	LRBHSWO	Record-independent switches: More records follow. Last record. Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12. Record truncated. (Not used for DDR record.) Record created by 370-XA. TIME macro used. Reserved.
3	(3)	3 Byte 0 1... .... .1.. .... ..1. ....1 .... xxxx Bytes 1 and 2	LRBHSW1	Record-dependent switches: Primary storage reconfiguration. Secondary storage reconfiguration. Operator requested reconfiguration. Permanent error caused reconfiguration. Reserved. Reserved.

Figure 3-4 (Part 1 of 2). DDR Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
6	(6)	1 bits 0-3 bits 4-7	LRBHCNT	Record count: Sequence number of this physical record. Total number of physical records in this logical record.
7	(7)	1		Reserved.
8	(8)	4	LRBHDATE	System date of incident.
12	(C)	4	LRBHTIME	System time of incident.
16	(10)	1	LRBHCPID	Machine Version Code.
17	(11)	3	LRBHCSER	CPU serial number.
20	(14)	2	LRBHMDL	CPU machine model number (for example, 3081).
22	(16)	2	LRBHMCEL	Not used for DDR record.
24	(18)	8	LRBRJOB	Name of job using 'FROM' device. Field valid only if system initiated swap for permanent error or for operator initiated tape swaps.
32	(20)	6	LRBRVOL1	VOLSER of volume mounted on 'FROM' swap device.
38	(26)	6	LRBRVOL2	VOLSER of volume mounted on 'TO' swap devices. Field is zero if no volume is mounted on 'TO' device.
44	(2C)	1	LRBRPH1	Physical ID of 'FROM' device (not address). DASD only.
45	(2D)	3	LRBRCUA1	Device number of 'FROM' device.
48	(30)	4	LRBRDEV1	Device type of 'FROM' device.
52	(34)	1	LRBRPH2	Physical ID of 'TO' device. DASD only.
53	(35)	3	LRBRCUA2	Device number of 'TO' device.
56	(38)	4	LRBRDEV2	Device type of 'TO' device.

Figure 3-4 (Part 2 of 2). DDR Record Format

Recording System Termination (EOD) Records

EOD records (Figure 3-5 on page 3-13) are recorded on SYS1.LOGREC when:

- The system operator enters the HALT EOD command to terminate the operating system. The system operator usually issues the HALT EOD command before the following conditions:

  - When the power is turned off.
  - When the system is going to enter a long wait state.

  Each HALT EOD command invokes the master scheduler to record one EOD record on SYS1.LOGREC by issuing SVC 76. SVC 76 formats the system environmental information and writes it on SYS1.LOGREC as an EOD record.

- An abnormal termination occurs because of a serious error that requires operator intervention (such as hot I/O). SVC 76 formats the system environmental information and writes it on SYS1.LOGREC as an EOD record.

For a normal termination, the record consists of the 24-byte header. For an abnormal termination, the header is followed by fields containing data related to the error.

System Termination (EOD) Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1	CLASRC	Class/Source:
		1...		EOD record.
		1... ...1		System termination (non-restartable).
		1... .1..		EOD from IOS (restartable wait state).
1	(1)	1	OPSYS	System/Release level:
		100.		OS/VS2.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	4	SW1	Record switches:
		Byte 0		
		1...		More records follow.
		0...		Last record.
		.x..		Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12.
		..1.		Record truncated. (Not used for EOD record.)
		...1		Record created by 370-XA.
		.... 1...		TIME macro used.
		xxx		Reserved.
		Bytes 1 and 2		Not used for EOD record.
		Byte 3		Incremental release number (alphameric) of operating system.
6	(6)	2		Not used for EOD record.
8	(8)	4	DATE	System date of condition.
12	(C)	4	TIME	System time of condition.
16	(10)	1	VERNO	Machine version code.
17	(11)	3	CPUSER	CPU serial number.
20	(14)	2	CPUMODEL	CPU machine model number (for example, 3081).
22	(16)	2	MCELLNG	Not used for EOD records.
24	(18)	40		EOD extension (see note).
24	(18)	4		Length of user data plus 8.
28	(1C)	4		Wait state code.
32	(20)	32		User data.
				Note: If the wait state code is 110, 111 or 112, Hot I/O recovery processing writes this termination record. The 32-byte user data field contains the SCD entry for the channel with the "Hot" condition (see the *Debugging Handbook* for a detailed description of the SCD).
				For other wait state codes that use the EOD extension, the length of the data field and the extension may vary.

Figure 3-5. EOD Record Format

Recording System Initialization (IPL) Records

IPL records (Figure 3-6) are recorded on SYS1.LOGREC to document system initializations. Each master scheduler initialization of the operating system creates one IPL record. The IPL record also provides the user with a way to measure the approximate time interval between the termination and reinitializing of the operating system.

When the system operator initializes the operating system, the master scheduler invokes the IPL/outage recorder which issues the SVC 76. SVC 76 obtains system environmental information and the date/time values from the time stamp record, formats this information, and writes it on SYS1.LOGREC as an IPL record.

System Initialization (IPL) Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1 .1.1	CLASRC	Class/Source: IPL Record.
1	(1)	1 100. .... bits 3-7 0-1F	OPSYS	System/Release level: OS/VS2. Release level 0-31.
2	(2)	4 Byte 0 1... .... 0... .... .x.. .... ..1. ....1 .... 1... .... .xxx Bytes 1 and 2 Byte 3	SW1	Record switches: More records follow. Last record. Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12. Record truncated. (Not used for IPL record.) Record created by 370-XA. TIME macro used. Reserved. Not used for IPL record. Incremental release number (alphameric) of operating system.
6	(6)	2		Not used for IPL record.
8	(8)	4	DATE	System date when system was initialized.
12	(C)	4	TIME	System time when system was initialized.
16	(10)	1	CPUSER	Machine version code.
17	(11)	3	CPUSER1	CPU serial number.
20	(14)	2	CPUMODEL	CPU machine model number (for example, 3081).
22	(16)	2	MCELLNG	Not used for IPL record.
24	(18)	1	SUBSYSID	Device type or program that caused restart. See Figure 3-8 on page 3-16.
25	(19)	3		Not used for IPL record.
28	(1C)	2	REASON	Alphameric reason for IPL. See Figure 3-7 on page 3-16.
30	(1E)	2		Not used for IPL record.
32	(20)	8	CHANASSN	Reserved.
40	(28)	4	HIGHADDR	Address of last valid byte of storage found at IPL time.
44	(2C)	4		Reserved.
48	(30)	8	LASTACT	Last activity time and date from the time stamp record.

Figure 3-6. IPL Record Format

IPL Recording

During initialization of the operating system, the master scheduler invokes the IPL/outage recorder (IOSROUTG), which issues SVC 76 to issue an operator message (WTOR). SVC 76 formats the IPL reason code and subsystem ID code supplied by the operator, the environmental information, and the time stamp record values and writes the information on SYS1.LOGREC as an IPL record.

SVC 76, to obtain the operator information, issues the following system message:

```
id  IFB010D ENTER 'IPL REASON, SUBSYSTEM ID' or 'U'
```

Message IFB010D requests the operator to provide: (1) the reason for the IPL, and (2) the subsystem (device or program) responsible for the restart. The operator replies to message IFB010D by entering the REPLY command as follows:

```
{ REPLY }    id,'rr,ss'
{  R    }
```

id

The identifier of message IFB010D.

rr

The IPL reason code, which must be entered in *capital* letters; that is, the reason for starting or restarting the system (Figure 3-7 on page 3-16).

ss

The subsystem ID code used with IPL reason codes IE, IM, CE, and ME (Figure 3-8 on page 3-16). The subsystem ID code for all other IPL reason codes is 00.

Invalid reply to IFB010D: If the operator's reply to IFB010D is incorrect, the system issues the message:

```
id  IFB020I  INVALID REPLY TO IFB010D
```

The message IFB010D is then repeated, and the operator enters either the REPLY command with the proper codes or the REPLY command as follows:

```
{ REPLY }     id, 'U'
{  R    }
```

id

The identifier of message IFB010D.

U

Assume the default values.

Restart continues after either a valid or 'U' reply. In the case of a 'U' reply, the IPL record is formatted with zeros in the subsystem ID field and a DF (default values) in the IPL reason field.

Code	Reason	Description
NM	Normal	Normal system initialization.
IE	IBM hardware/programming problem, CE/PSR not required.	System restarted after a stop caused by a hardware failure or IBM programming problem, and a CE/PSR was not required.
IM	IBM hardware/programming problem, CE/PSR required.	System restarted after a stop caused by a hardware failure or IBM programming problem, and it was necessary for a CE/PSR to correct problem.
ME	Media	An IBM hardware unit failed because of faulty or damaged media (such as a damaged tape or disk).
UN	Unknown	An undetermined hardware or software failure.
OP	Operational	An operator error or procedural problem.
UP	User program	A program other than an IBM supplied control program or programming product failed in such in a way as to cause a system restart.
EN	Environmental	A failure other than hardware/software or operational caused system to be restarted (power failure, air conditioning, etc.).
CE	CE/PSR has system.	System restarted at CE/PSR request to correct problem.

Figure 3-7. IPL Reason Codes

ID	Subsystem Name	Components
00	Null	Subsystem is unknown or subsystem code is not required by reason code.
10	Processor	CPU, channels, storage units, operator consoles.
20	Direct Access (DASD)	Direct access storage devices (for example: IBM 2305, 3330, 3340, 3350, 3850 and their control units).
30	Other	All devices other than those specified under other subsystem IDs (for example: IBM 2914 paper tape).
40	Tape	Tape devices and their control units (for example: IBM 3420, 3803).
50	Card/Print	Card (unit record) and printing devices (for example: IBM 1403, 2501, 2540, 3203, 3211, 3800).
60	MICR/OCR	Magnetic ink (MICR) and optical (OCR) character recognition devices (for example: IBM 3890).
70	Teleprocessing	Teleprocessing devices and their control units (for example: IBM 2701, 3705).
80	Graphics/Display/Audio	Graphic, display, and audio devices (for example: IBM 3250).
90	IBM System Control Program	IBM programming system.
92	IBM Programming Product	IBM programming products such as FORTRAN or COBOL.

Figure 3-8. Subsystem ID Codes

Recording Machine Check Handler (MCH) Records

MCH records (Figure 3-9 on page 3-19) are recorded on SYS1.LOGREC when the following machine failures occur:

- CPU (processor)
- Storage
- Storage key
- Timer

When a machine failure occurs, the machine check handler (MCH) receives control via a machine check interruption for a *soft* failure (one that was corrected by the hardware retry features: hardware instruction retry (HIR) or error checking and correction (ECC)), or for a *hard* failure (one that could not be corrected by HIR and ECC).

Soft Failures

If the machine check interruption is for a soft failure, MCH uses the environmental and model-independent information describing the failure to build an MCH record. MCH then invokes the recording request routine, which queues the MCH record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

Note: The MODE command can be used to limit the number of MCH records that are recorded on SYS1.LOGREC. This command allows some records to be recorded on SYS1.LOGREC for diagnostic purposes, but prevents SYS1.LOGREC from becoming filled with records which describe failures that have already been detected and corrected by HIR and ECC.

Hard Failures

If the machine check interruption is for a hard failure, MCH analyzes the information in the model independent logout area and isolates the error. MCH then invokes the recording request routine, which queues the MCH record on the asynchronous output queue and posts the asynchronous recording task. This task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

Before the records are written, RTM inserts an error identifier (errorid) at the end of each record. RTM inserts the same errorid in the software record(s) and SVC dump output (if any) associated with this particular error. The errorid also appears in the console message that indicates an SVC dump was taken. (See *Debugging Handbook, Volume 1* for information on SVC dumps; see *System Messages* for information on console messages.) Because the same errorid appears in various pieces of diagnostic data, the diagnostician can correlate all available information that pertains to a particular error.

The error identifier has the form:

```
SEQxxxxx   CPUyy   ASIDzzzz   TIMEhh.mm.ss.t
```

where:

xxxxx	sequence number
yy	logical CPU identifier
zzzz	address space identifier
hh.mm.ss.t	time stamp (hours, minutes, seconds, tenths of seconds)

With each IPL, the system begins a sequential count of errors. The sequence number is therefore unique for each software error or machine failure. It indicates which number this is since the most recent IPL. The sequence number remains constant for subsequent software records associated with the same error, although the time stamp may change.

Note: If a SYS1.LOGREC record has no associated error identifier, the message NO ERRORID ASSOCIATED WITH THIS RECORD is printed where the error identifier normally would be found.

If the failure is going to cause processor (CPU) termination and the system has only one CPU, MCH collects environmental, model-independent, and model-dependent information to describe the failure. After formatting the information, MCH passes control to the MCH emergency recorder to write this information on SYS1.LOGREC as an MCH record and issues a message to the system operator. Then, before the system enters a wait state, the MCH emergency recorder scans the asynchronous output queue and writes any records on that queue to SYS1.LOGREC. Byte 3 of the MCH record format indicates that the failure resulted in system termination.

If, in a multiprocessing system, a processor termination failure occurs in one CPU, MCH invokes the alternate CPU recovery routine (ACR) on another CPU. ACR stores the status of the failing CPU and initiates RTM to process and record the error as a hard failure that does not cause processor termination.

Note: System damage will be recorded as a hard error (byte 33 bit 3) and not a terminating error (byte 32 bit 6).

Consult *System Logic Library, Machine Check Handler* for a detailed description of the machine check handler. Consult *IBM System/370-XA Principles of Operation* for a detailed description of the machine check interruption code shown in the MCH record format.

Machine Check Handler (MCH) Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
0	(0)	1	LRBHTYPE	Class/Source:
		...1 ..11	LRBHMCH	MCH record recorded in MVS environment.
1	(1)	1	LRBHSYS	System/Release level:
		100.		OS/VS2.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	1	LRBHSW0	Record-independent switches:
		1...		More records follow.
		0...		Last record.
		.x..		Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12.
		..1.		Record truncated. (Not used for MCH record.)
		...1	LRBHEAB	Extended addressing hardware.
		.... 1...		TIME macro used.
		xxx		Reserved.
3	(3)	3	LRBHSW1	Record-dependent switches:
		Byte 0		
		1...	LRBMNOIO	IOS (IOSRMCH) informing IGFPTSIG not to perform any I/O.
		.1..	LRBMNVF	LRB may not be valid.
		..1.	LRBMSYST	System terminated by MCH.
		...1	LRBTRACE	Set to 1 by IGFPMCIH before ALTRTRC suspend and set to 0 after.
		.... 1...	LRBDAT	Set to 1 by IGFPMICH before loading a DATON PSW to go to IGFPMAIN. Set to 0 when IGFPMAIN receives control.
		.... .1..	LRBMRECV	Set to 1 when an error is totally recovered.
		xx		Not used by MCH record.
		Byte 1	LRBMACT	Buffer contains a record to be recorded on SYS1.LOGREC or moved to another buffer.
		Byte 2	LRBMCLB	MCH SYS1.LOGREC record buffer overlaid with another record. If this byte is X'FF', SVC 76 does not record this record on SYS1.LOGREC.
6	(6)	1	LRBHCNT	Record count:
		bits 0-3		Sequence number of this physical record.
		bits 4-7		Total number of physical records in this logical record.
7	(7)	1		Reserved.
8	(8)	4	LRBHDATE	System date of incident.
12	(C)	4	LRBHTIME	System time of incident.
16	(10)	1	LRBHCPID	Machine version code.
17	(11)	3	LRBHCSER	CPU serial number.
20	(14)	2	LRBHMDL	CPU machine model number (for example, 3081).
22	(16)	2	LRBHMCEL	Zero for 308X.
24	(18)	4	LRBMLNH	Length of record for SYS1.LOGREC.
28	(1C)	4	LRBMWSC	Wait state code.
		1...	LRBMAMOD	If the remaining bits in this byte are non-zero, then this bit must be zero; otherwise a program check will result when a PSW containing this bit in its address part is loaded.

Figure 3-9 (Part 1 of 4). MCH Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
32	(20)	4	LRBMCEIA	Machine check error indication area.
		Byte 0	LRBMTERM	Terminal error switches:
		1... ...	LRBMTIOS	IOSRMCH has requested that this processor be terminated.
		.x..		Reserved.
		..1.	LRMMTTHR	Hard error threshold flag.
		...1	LRBMTSEC	Secondary error.
		.... 1...	LRBMTCKS	Check stop.
		.... .1..	LRBMTWRN	Warning.
		.... ..1.	LRBMTDMG	System damage.
		1	LRBMTINV	Invalid logout.
		Byte 1	LRBMHARD	Hard machine error switches:
		1...	LRBMHHRD	Hard error assumed.
		.1..	LRBMHIO	IOSRMCH has examined the MCIC and determined that a hard I/O error has occurred.
		..1.	LRBMHVS	Vector Facility source.
		...1	LRBMHSD	System damage.
		.... 1...	LRBMHINV	Register or PSW invalid.
		.... .1..	LRBMHSTO	Hard storage error.
		.... ..1.	LRBMHSPF	Hard storage protection key error.
		1	LRBMHIPD	Instruction processing damage.
		Byte 2	LRBMINTM	Intermediate error switches:
		xxxx		Reserved.
		.... 1...	LRBMITOD	TOD clock error.
		.... .1..	LRBMICKC	Clock comparator error.
		.... ..1.	LRBMICTM	CPU timer error.
		1	LRBMIVTE	Vector Facility threshold exceeded.
		Byte 3	LRBMSOFT	Soft machine error switches:
		1...	LRBMSSFT	Soft error assumed.
		.1..	LRBMSSPD	Service processor damage.
		..1.	LRBMSVF	Vector Facility failure.
		...1	LRBMDBSE	Double bit storage error correction flag.
		.... x...		Reserved.
		.... .1..	LRBMSECC	ECC corrected storage error.
		.... ..1.	LRBMSHIR	HIR corrected processor (CPU) error.
		1	LRBMSDG	DG machine check.
36	(24)	1	LRBMPDAR	PDAR (program damage assessment and repair) data supplied by RTM:
		xxx.		Reserved.
		...1	LRBMINVP	Storage reconfigured - page invalidated.
		.... 1...	LRBMRSRC	Storage reconfiguration status available at displacement 37.
		.... .1..	LRBMRSRF	Storage reconfiguration not attempted.
		xx		Reserved.
37	(25)	2	LRBMRSRS	Status returned to IGFPMRTH by IARXMCKS, the status and key error storage routine. The details of the bits are described by IEERSRRB.
39	(27)	1	LRBMPWL	Length of checking block used by machine model.
40	(28)	8	LRBMMOSW	Machine check old PSW from storage locations 48-55.

Figure 3-9 (Part 2 of 4). MCH Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
48	(30)	8	LRBMCIC	Machine check interruption code (from storage locations 232-239) as stored by hardware routines at time of machine check:
		Byte 0		
		1...	LRBMFSD	System damage.
		.1..	LRBMFPD	Processing damage.
		..1.	LRBMFSR	System recovery.
		...x		Reserved.
		.... 1...	LRBMFCD	Clock damage.
		.... .1..	LRBMFED	External damage.
		.... ..1.	LRBMFVF	Vector Facility failure.
		1	LRBMFDG	Degradation.
		Byte 1		
		1...	LRBMFWM	Warning.
		.1..	LRBMFLP	Available CRW is pending.
		..1.	LRBMFSPD	Service processor damage.
		...1	LRBMFCK	Channel subsystem damage.
		.... x...		Reserved.
		.... .1..	LRBMFVS	Vector Facility source.
		.... ..1.	LRBMIBU	Backed up indicator.
		1	LRBMIDY	Delayed.
		Byte 2		
		1...	LRBMFSE	Storage error.
		.1..	LRBMFSC	Storage error corrected.
		..1.	LRBMFKE	Key error.
		...1	LRBMDFDS	Double bit storage error.
		.... 1...	LRBMVWP	PSW EMWP is valid.
		.... .1..	LRBMVMS	PSW masks and key are valid.
		.... ..1.	LRBMVPM	Program masks and condition code are valid.
		1	LRBMVIA	Instruction address is valid.
		Byte 3		
		1...	LRBMVFA	Failing storage address is valid.
		.x..		Reserved.
		..1.	LRBMVED	External damage code is valid.
		...1	LRBMVFP	Floating point register is valid.
		.... 1...	LRBMVGR	General purpose register is valid.
		.... .1..	LRBMVCR	Control register is valid.
		.... ..x.		Not used by MVS/XA.
		1	LRBMVST	Storage logical is valid.
		Byte 4		
		xx..		Reserved.
		..1.	LRBMDAE	Delayed access exception.
		...x xxxx		Reserved.
		Byte 5		
		xxxx xx..		Reserved.
		.... ..1.	LRBMVPT	Processor timer is valid.
		1	LRBMVCC	Clock comparator is valid.
		Bytes 6 and 7		Not used by MVS/XA.

Figure 3-9 (Part 3 of 4). MCH Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
56	(38)	4		Data from storage locations 240-243.
60	(3C)	4	LRBMEDCD	Data from storage locations 244-247 - External damage code.
		Byte 0	LRBMEDC	Reserved.
		Byte 1	LRBMEDC1	Data from storage location 245.
		1...	LRBMEDXN	Extended (expanded) storage not operational.
		.1..	LRBMEDXF	Extended (expanded) storage control failure.
		..xx xxxx		Reserved.
		Bytes 2 and 3		Reserved.
64	(40)	4	LRBMFSA	Failing storage address from storage locations 248-251.
68	(44)	260		Data from storage locations 252-511.
328	(148)	4		Reserved.
332	(14C)	variable	LRBMCEL	Not used by MVS/XA.
variable		10	ERRORID	RTM-generated error identifier consists of: 2-byte sequence number 2-byte CPU identifier 2-byte ASID 4-byte time stamp

Figure 3-9 (Part 4 of 4). MCH Record Format

Recording Miscellaneous Data (MDR) Records

MDR records (Figure 3-10 on page 3-24) are recorded on SYS1.LOGREC for buffered log devices when the following conditions occur:

- Buffer overflow
- Demount
- Device failures

MDR records are also recorded on SYS1.LOGREC for device failures on teleprocessing devices connected to an IBM 3704 or 3705 device.

The buffered log devices (devices attached to a control unit with a buffer for recording or logging device-dependent, status and sense information) are listed in byte four of the MDR record format (Figure 3-10 on page 3-24).

Buffer Overflow

If a buffer overflow occurs, the I/O supervisor passes control to a device-dependent error recovery procedure (ERP). The ERP analyzes the incident and records the device-dependent counter information in the device's error buffer. Control passes to the OBR/MDR recorder to reformat the buffered information and to invoke the recording request routine. This routine queues the record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

If a buffer overflow occurs in an IBM 3704 or 3705 device, the device-dependent ERP receives control. (This ERP resides in the device, which is a programmable control unit, as part of the network control program.) The ERP then obtains and

analyzes information about the incident before asynchronously transferring it to VTAM. When VTAM asynchronously passes control to the VTAM MDR recorder, it formats this 3704/3705 information into an MDR record and invokes the recording request routine. This routine queues the record on the asynchronous output queue and posts the asynchronous recording task. This task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

Demounts

If a demount (DDR swap, EOD command, CLOSE/EOV request or deallocate condition) occurs on an online device with a buffered log (such as the IBM 2305, 3330, or 3850), the master scheduler or I/O supervisor invokes SVC 91. SVC 91 formats the sense data from the device's error buffer and issues SVC 76 to write the information on SYS1.LOGREC as an MDR record.

If a demount by the DFDSS program product occurs, the program has detected two disk packs with the same VOLID online on a direct access device with a buffered log and removable disk packs (such as the IBM 3330 or 3340). The program causes the one mounted last to be made not ready and issues SVC 91 to document the event. SVC 91 formats the sense data from the device's error buffer and issues SVC 76 to write the information to SYS1.LOGREC as an MDR record.

If a DASD demount by the JES3 verify function occurs, then JES3 (because it has already marked the device as "not ready") does not create an MDR demount record on SYS1.LOGREC.

Device Failures

If a device failure occurs, the I/O supervisor passes control to a device-dependent ERP to analyze the failure, attempt recovery, and store the device-dependent, status and sense information in the device's error buffer. After storing the information, the ERP passes control to the OBR/MDR recorder to reformat the information from the device's error buffer and to invoke the recording request routine. This routine queues the record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

If a device failure occurs on a teleprocessing device connected to an IBM 3704 or 3705 device or on an IBM 3704 or 3705, the respective device-dependent 3704 or 3705 ERP receives control. The ERP analyzes the incident and asynchronously transfers information to ACF/VTAM, which asynchronously passes control to the VTAM MDR recorder. This recorder formats the information into an MDR record before invoking the recording request routine. This routine queues the record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

Note: If the device-dependent ERP does not define the failure to be recorded by the OBR/MDR recorder as an MDR record, the ERP causes the OBR/MDR recorder to record the failure as an OBR record.

Miscellaneous Data (MDR) Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
0	(0)	1 1..1 .... 1..1 ...1	MCLASRC	Class/Source: MDR record formatted by SVC 91. MDR record.
1	(1)	1 100. .... bits 3-7 0-1F	MSYSREL	System/Release level: OS/VS2. Release level 0-31.
2	(2)	4 Byte 0 1... .... 0... .... .x.. .... ..1. ....1 .... 1... .... .xxx Byte 1 x... .... .1.. .... ..xx xxxx	MSWITCHS	Record switches: More records follow. Last record. Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12. Record truncated. (Not used for MDR record.) Record created by 370-XA TIME macro used. Reserved. Not used by MDR record. Record incomplete. Not used by MDR record.

Figure 3-10 (Part 1 of 2). MDR Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
		Byte 2		
		1		IBM 3330.
		.... ..1.		IBM 2305 MOD II.
		11		IBM 3277.
		.... .1..		IBM 3211.
		.... .1.1		IBM 3705.
		.... .11.		IBM 3670.
		.... 1..1		IBM 3340, and 3344.
		.... 1.1.		IBM 3330 MOD II.
		.... 1.11		IBM 3270 dial.
		.... 11..		IBM 3800 Mod 1.
		.... 11.1		IBM 3895.
		.... 111.		IBM 3850.
		...1 ...1		IBM 3350.
		...1 ..11		IBM 3277.*
		...1 .1..		IBM 3380. *Device types used to indicate symbolic
		...1 .1.1		IBM 3705.* names of devices added to record.
		...1 1...		IBM 3375.
		..1. .1.1		IBM 3725
		..1.		IBM 3800 Mod 3,8.
		.1.. ...1		IBM 3480
		Byte 3		
		1...		Variable length sub-ID field used by record.
		.xxx		Reserved.
		bits 4-7		Number of characters in sub-ID field of device identified at displacement 26.
6	(6)	1	MRCDCNT	Record count:
		bits 0-3		Sequence number of this physical record.
		bits 4-7		Total number of physical records in this logical record.
7	(7)	1	MCHPID	Channel path identifier.
8	(8)	4	MDATE	System date of incident.
12	(C)	4	MTIME	System time of incident.
16	(10)	1	MVERNO	Machine version code.
17	(11)	3	MCPUSER	CPU serial number.
20	(14)	2	MCPUMOD	CPU machine model number (for example, 3081).
22	(16)	2	MCELLNG	Not used for MDR record.
24	(18)	2	BUFRECID	Device address of data identified in this record.
26	(1A)	variable	BUFSUBID	Identification field (2-15 bytes) to identify device at displacement 24. Length of this field (2-15 bytes) is defined at displacement 5. **Note:** Depending on device, field can denote serial number or CUA of unit.
		variable	BUFINFO	Device-dependent information supplied by ERP that detected error.
		2	MRCTWD	Flag bytes from the RCT used to create this record if the new OBR/MDR interface was used.

Figure 3-10 (Part 2 of 2). MDR Record Format

Recording Missing Interruption Handler (MIH) Records

MIH records (Figure 3-11 on page 3-27) are recorded on SYS1.LOGREC for missing interruptions on all devices except TP devices attached via a 3704/3705 in EP mode. The master scheduler, invoked at time intervals specified by the user or by the system, invokes the missing interruption handler (MIH) to check the UCBs for pending conditions. If MIH detects a pending condition for the first time, it sets an indicator in the device's UCB. If MIH detects a condition that is still pending in the device's UCB, it considers the interrupt to be missing and does the following:

- Attempts to clear the failing device or subchannel.
- Issues a message to the system operator.
- Obtains information about the missing interruption (such as the device number, recovery actions, and time interval used by MIH) to build an MIH record.
- Invokes the recording request routine to queue the MIH record on the asynchronous output queue and post the asynchronous recording task.

The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

See the IOS section of *System Logic Library* for a detailed description of the missing interruption handler.

Missing Interruption Handler (MIH) Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
0	(0)	1	LRBHTYPE	Type of Record:
		.111 ...1		MIH record.
1	(1)	1	LRBHREL	System/Release level:
		100.		OS/VS2.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	1	LRBHSW0	Record independent switches:
		1...		More records follow.
		0...		Last record.
		.x..		TOD clock instruction issued (0 = IBM System/360, 1 = IBM System/370).
		..1.		Record truncated.
		...1		370-XA mode record.
		.... 1...		TIME macro issued.
		xxx		Reserved.
3	(3)	1	LRBHSW1	Reserved.
4	(4)	1	LRBHSW2	Reserved.
5	(5)	1	LRBHSW3	Reserved.
6	(6)	1	LRBHSW4	Reserved.
7	(7)	1	LRBHCNT	Record count:
		bits 0-3	LRBSEQ	Record sequence number.
		bits 4-7	LRBNUM	Total number of physical records in this logical record.
8	(8)	4	LRBHDATE	System date of incident.
12	(C)	4	LRBHTIME	System time of incident.
16	(10)	1	LRBHCPID	Machine version code.
17	(11)	3	LRBHCSER	CPU serial number.
20	(14)	2	LRBHMDL	CPU machine model number.
22	(16)	2	LRBHMCEL	Reserved.
24	(18)	8	MIRJOBNM	Jobname from ASID.
32	(20)	52	MIRSCHIB	Subchannel information block.
32	(20)	4	MIRPMCW0	Interruption parameter.
36	(24)	4	MIRPMCW1	Path manage control word 1.
40	(28)	1	MIRLPM	Logical path mask.
41	(29)	1	MIRPNOM	Path not operational mask.
42	(2A)	1	MIRLPUM	Last path used mask.
43	(2B)	1	MIRPIM	Path installed mask.
44	(2C)	2	MIRMBI	Measurement block index.
46	(2E)	1	MIRPOM	Path operational mask.
47	(2F)	1	MIRPAM	Path available mask.
48	(30)	8	MIRCHPID	CHPIDs 0-7.
56	(38)	4	MIRPMCW6	Path manage control word 6.
60	(3C)	12	MIRSCSW	Subchannel status words.
72	(48)	12	MIRMDEP	Model dependent area.
84	(54)	8	MIRINTVL	Interval used for detection.
92	(5C)	1	MIRTYPE	Type of missing interrupt.
		1...		Missing CSCH interrupt.
		.1..		Missing HSCH interrupt.
		..1.		Idle device with work queued.
		...1		Start pending in subchannel.
		.... x...		Reserved.
		.... .1..		Mount pending.
		.... ..1.		Missing primary status.
		1		Missing secondary status.

Figure 3-11 (Part 1 of 2). MIH Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
93	(5D)	1	MIRACTND	Default actions to attempt.
94	(5E)	1	MIRACTNA	Actions to be attempted.
95	(5F)	1	MIRACTNS	Actions actually tried.
		1...		Halt or Clear subchannel.
		.1..		Simulated interrupt.
		..1.		Redrive device.
		...1		Requeue I/O request.
		.... 1...		Issue message.
		.... .1..		Log the condition (always on).
		xx		Reserved.
96	(60)	4	MIRPSID	Subchannel ID number.
100	(64)	2	MIRPPMCW	Path management control word from UCBPMCW1.
102	(66)	1	MIRPLPM	Logical path mask from UCBLPM.
103	(67)	1	MIRPLPUM	Last path used mask from UCBLPUM.
104	(68)	1	MIRPPIM	UCBPIM.
105	(69)	8	MIRPCHPS	CHPIDs from UCBCHPID.
113	(71)	1	MIRPLEVL	UCB level byte.
114	(72)	1	MIRPIOSF	IOS flags.
115	(73)	4	MIRPLVMS	Level mask from UCBLVMSK.
119	(77)	1	MIRPMIHT	MIH flag proc. (UCBMIHTI).
120	(78)	1	MIRFLAG1	Flag byte.
		1...		UCBALTCU.
		.xxx xxxx		Reserved.
121	(79)	1	MIRUFLC	Flag byte from UCBFLC.
122	(7A)	2	MIRUCHAN	Device number from UCBCHAN.
124	(7C)	2	MIRUSFLS	Flag bytes from UCBSFLS.
126	(7E)	4	MIRUTYPE	UCB device class/type.
130	(82)	6	MIRDVOL1	Volume serial.
136	(88)	1	MIRFLAG4	Flag byte.
		1...	MIRDMOUN	UCBMOUNT.
		.xxx xxxx		Reserved.
137	(89)	1	MIRDFL5	Flag byte from UCBFL4 (DASD only).
138	(8A)	1	MIRFLG1	MIH record flags.
		1...	MIRADDL1	MIH record additional data flag bit 1.
		.xxx xxxx	MIRRSVF1	Reserved.
139	(8B)	1	MIRFLG2	Reserved
140	(8C)	1	MIRRSNC	Reason code associated with MIRTYPE.
141	(8D)	3	MIRRSV1	Reserved
144	(90)	1	MIRHLTRC	Halt request return code from IOSVHSCH.
145	(91)	1	MIRCLRRC	Clear request return code from IOSVHSCH.
146	(92)	1	MIRSTRC1	Store subchannel request return code from IOSVSTSQ.
147	(93)	1	MIRSTRC2	Store subchannel request return code from IOSVSTSQ.
148	(94)	4	MIRCIRB1	CSCH IRB word 1.
152	(98)	4	MIRSIRB1	STSCH SCHIB IRB word 1.
156	(9C)	8	MIRRSV2	Reserved.

Figure 3-11 (Part 2 of 2). MIH Record Format

Recording Outboard (OBR) Records

OBR records (Figure 3-12 on page 3-33 and Figure 3-13 on page 3-35) are recorded on SYS1.LOGREC for:

- Permanent (uncorrectable or unit check) device failures.
- Path failures handled by alternate path recovery.
- Temporary or intermittent I/O device failures.
- Paging I/O errors.
- Counter overflow statistics for I/O devices.
- End-of-day requests.
- Statistical Recording by EREP.
- Counter overflow statistics and device failures on teleprocessing devices.
- Demount conditions on IBM 3420 tape devices.

Device Failures

If a device failure (unit check) occurs during the execution of a command or on the interruption following command execution, the I/O supervisor suspends normal processing and passes control to a device-dependent ERP. The ERP sets error indicator bits on in the ERP work area (EWA), examines the sense and SCSW status bits in the EWA to determine the type of error, and attempts to recover from the error, if possible, by retrying the channel program.

Permanent Failures

If the ERP cannot retry the failure (because the failure is not retryable or because it has already been retried the specified number of times), it passes control sequentially to the following routines:

- The WTO routine, which issues a message declaring the error to be permanent (uncorrectable).
- The statistics update routine, which updates the device's statistic counter entry in the device statistics table (except for direct access devices with buffered logs, such as the IBM 2305, 3330, and 3850).
- The OBR/MDR recorder, which formats the device-dependent environmental and statistical information.
- The recording request routine, which queues the long OBR record on the asynchronous output queue and posts the asynchronous recording task.

The recording task asynchronously scans the output queue and issues SVC 76 to write any records on the queue to SYS1.LOGREC.

Temporary Failures

If the ERP is defined to detect and record certain temporary or intermittent device-dependent failures (such as the ERP for the IBM 2305 and 3330 devices, which records intermittent bus out, equipment check, and overrun conditions), it documents the incident on SYS1.LOGREC. The ERP invokes the OBR/MDR recorder to format the device-dependent statistical and environmental information describing the failure.

After formatting the information, the OBR/MDR recorder invokes the recording request routine, which queues a long OBR record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC. Byte 3 of the OBR record format indicates that the record was written because of a temporary failure.

See the IOS section in *System Logic Library* for a detailed description of the device-dependent error recovery procedures.

Paging I/O Errors

If a paging I/O error occurs, the I/O supervisor schedules the DASD ERP to retry the error. If this ERP requires either an operator message or a record for SYS1.LOGREC or both, it builds a copy of the IOSB (input output supervisor block) in error and the associated EWA (ERP work area) before returning control to the I/O supervisor with a permanent error, corrected error or retry indication. The IOSB and EWA contain information from the I/O supervisor and the ERP associated with the error that the OBR/MDR recorder uses in formatting a long OBR record.

Depending upon the DASD ERP requirements for the error, this ERP queues the duplicated IOSB and EWA as follows:

- Operator message - queued onto the asynchronous ERP/WTO queue.
- SYS1.LOGREC record entry - queued onto the asynchronous OBR queue.
- Operator message and SYS1.LOGREC record entry - queued onto the asynchronous ERP/WTO queue first. After the WTO routine issues the message, queued onto the asynchronous OBR queue.

When the OBR/MDR recorder receives control for an OBR recording, it scans the OBR queue, formats a long OBR record for each queued paging error, and invokes the recording request routine. This routine queues the long OBR record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

Note: If the paging I/O error also invokes software recovery processing, a software record can, if indicated, be recorded on SYS1.LOGREC for the same incident.

Statistical Recording

Statistics (counts of the number of times I/O devices have failed for specific device-dependent failures) are kept in a main storage table called the device statistics table. The device's ERP updates the table. (**Note:** Intermediate counters for buffered log devices, such as the IBM 2305, 3330, and 3850 devices, are kept in the device's error recording buffer and are updated by the device's ERP. An overflow condition or end-of-day (EOD) request on these devices causes the information to be recorded on SYS1.LOGREC as an MDR record).

Counter Overflow

When a counter for a device with a 10-byte entry in the statistics table reaches its device-dependent maximum setting or threshold, the statistics update routine calls the OBR/MDR recorder. The OBR/MDR recorder formats the statistical information from the device's entry in the table into a short OBR record (Figure 3-13 on page 3-35).

When a counter for a device with a variable-length statistics table entry (such as the IBM 3420 device, which has more than one 10-byte field in its entry) reaches its threshold, the device-dependent ERP calls the OBR/MDR recorder. The OBR/MDR recorder formats the statistical information from the device's entry in the table and from the other environmental information about the device into a long OBR record.

After formatting the record, the OBR/MDR recorder invokes the recording request routine, which queues either a long or short OBR record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC. Byte 3 of the OBR record format indicates that the record was written because of counter overflow.

End-of-Day Request

When the operator issues a HALT EOD command, the master scheduler invokes SVC 76 to search the device statistics table for any counters with a nonzero value. SVC 76 formats a short OBR record for each nonzero statistics table entry and writes the record to SYS1.LOGREC. For the IBM 3420 series of tape devices, SVC 76 issues SVC 91 to format the environmental and statistical information that describes each available (online) tape device. SVC 91 then issues SVC 76 to write the information for each tape device to SYS1.LOGREC as a long OBR record. Byte 3 of the OBR record format indicates that the record was written because of an end-of-day request.

EREP Recording

When SYS1.LOGREC is the input data set for EREP, EREP may issue SVC 76 before doing its own processing. SVC 76 records statistical information on SYS1.LOGREC by:

- Creating a long OBR record for each nonzero counter for each device with a variable-length entry (10-byte multiples) in the device statistics table.

- Creating a short OBR record for each nonzero counter for each device with a 10-byte length entry in the device statistics table.
- Issuing SVC 91 for each IBM 3420 magnetic tape device to create a long OBR record.
- Issuing SVC 91 for each buffered log DASD to create an MDR record.

Teleprocessing Device Recording

For each device in a teleprocessing (TP) system supported by ACF/VTAM, and for each device in a TP system supported by ACF/VTAM Version 2 where the device is connected by a channel path to a processor, the access method provides two counters. TCAM maintains the two counters in the terminal-table entry. One of these is a two-byte counter that saves the count of the approximate number of Start Subchannel (SSCH) commands issued for the device or communications line (SSCH commands issued as a result of retrying during TCAM's I/O error-recovery procedures are not reflected in the total count). The other is a one-byte counter that contains the number of temporary errors (defined errors occurring during SSCH operations for which retry was successful) that have occurred since the last error record was written on SYS1.LOGREC.

If the device for which an SSCH operation is being performed is known, the counters in the terminal-table entry for that device are updated. The counters in a line entry in the terminal table are updated only if the station for which the SSCH operation is being performed is not known; the counters are reset to zero each time their contents are recorded on SYS1.LOGREC. Both counters are updated by the TCAM ERPs and, when one of these counters reaches its maximum value, the ERP calls the OBR/MDR recorder.

VTAM also maintains two counters. One is a two-byte counter that saves the count of the approximate number of SSCH commands issued for the device. The other is a one-byte counter that saves the count of temporary errors (errors corrected by the VTAM ERPs). The counters are reset to zero each time their contents are recorded on SYS1.LOGREC. Both counters are updated by the VTAM ERPs and, when one of these counters reaches its maximum value, the ERP calls the OBR/MDR recorder. (**Note:** Other counters for these devices are also kept in the device statistics table and are recorded on SYS1.LOGREC as described under "Statistical Recording" in this publication.)

The OBR/MDR recorder formats a long OBR record and invokes the recording request routine. This routine queues the record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC. Bytes 1 and 3 of the OBR record format indicate that the record was written because of counter overflow on a device supported by a TP access method.

Device Failures

If a permanent or temporary device failure (unit check) occurs on a TP device supported by TCAM or VTAM, and the device is connected to the CPU by a channel path, the appropriate access method ERP gives control to the OBR/MDR recorder. The OBR/MDR recorder formats a long OBR record to describe the error and invokes the recording request routine. This routine queues the record on the asynchronous output queue and posts the asynchronous recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC. Bytes 1 and 3 of the OBR record format indicate that the record was written because of a temporary failure on a device supported by a TP access method.

3420 Demount Recording

A demount (DDR swap, CLOSE/EOV request, EOD command or deallocation condition) involving the IBM 3420 magnetic tape devices causes a record to be made that describes the device having the tape demounted. DDR, CLOSE/EOV, EOD, and UNALLOCATE invoke SVC 91 to format the environmental and statistical data that describes the tape drive having the tape demounted. SVC 91 then issues SVC 76 to write the information to SYS1.LOGREC as a long OBR record. Byte 3 of the OBR record format indicates that the record was written because of a volume demount.

Note: For 3420 demounts, the sense information, failing CCW, and SCSW fields of the OBR record formats are not valid.

Outboard (OBR) Record Format - (Long Form)

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1	CLASRC	Class/Source:
		..11		OBR (unit check) record.
		..11 .1..		TP access method (TCAM) OBR record.
		..11 .11.		TP access method (VTAM) OBR record.
		..11 1.1.		Dynamic pathing availability (DPA) OBR record.
1	(1)	1	SYSREL	System/Release level:
		100.		OS/VS2.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	4	SWITCHES	Record switches:
		Byte 0		
		1...		More records follow.
		0...		Last record.
		.x..		Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12.
		..1.		Record truncated.
		...1		Record created by 370-XA.
		.... 1...		TIME macro used.
		xxx		Reserved.

Figure 3-12 (Part 1 of 2). Long OBR Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
		Byte 1		
		1...		SDR counters dumped at EOD.
		.1..		Temporary error.
		..1.		Short record (0 for long record).
		...1		MP system.
		.... 0...		CPU A issued last SSCH.
		.... 1...		CPU B issued last SSCH.
		.... .1..		Volume demount.
		.... ..x.		Not used by MVS/XA.
		1		SECUA contains polling characters (instead of CUA). Only set for TP records (BTAM/TCAM).
		Byte 2		Not used for OBR record.
		Byte 3		Not used by MVS/XA.
6	(6)	1	RCDCNT	Record count:
		bits 0-3		Sequence number of this physical record.
		bits 4-7		Total number of physical records in this logical record.
7	(7)	1		Reserved.
8	(8)	4	DATE	System date of incident.
12	(C)	4	TIME	System time of incident.
16	(10)	1	VERNO	Machine version code.
17	(11)	3	CPUSER	CPU serial number.
20	(14)	2	CPUMOD	CPU machine model number (for example, 3081).
22	(16)	2	MCELLNG	Not used for OBR record.
24	(18)	8	JOBID	Alphameric name assigned to job (as identified, for example, by a jobname on a JCL job statement) being executed and/or requesting service at time of failure.
32	(20)	8	FAILCCW	CCW being executed at time of failure.
40	(28)	8		Reserved.
48	(30)	1	DEVDEPC	Count of double words for device-dependent data.
49	(31)	1	CHPID	Channel path identifier of path that encountered the error.
50	(32)	1		Low order two digits of device number.
51	(33)	1	DEVUA	Reserved
52	(34)	4	DEVTYPE	Device type associated with failing device.
56	(38)	1	SDRCNT	Number of bytes of statistical data recorded in the statistical data recorder (SDR) work area.
57	(39)	3	DEVNUM	Device number of device being used when failure occurred. For IBM 3330, 3340, 3375, or 3380 series of devices, field contains physical location (not address) of failing unit.
60	(3C)	2	IORETRY	Number of I/O retries attempted for this error incident.
62	(3E)	2	SENSCNT	Number of bytes of data in SENSE field.
64	(40)	variable	DEVDEP	Device dependent information.
		variable	SDRINF	SDR counter area that contains statistical counter/indicator data from device statistics table.
		variable	SENSE	Device-dependent sense information that was received on first sense command to failing device.
		16	IRB	Interrupt request block stored at time of error.
		2	RCTWD	Flag bytes from the RCT used to create this record if the new OBR/MDR interface was used.

Figure 3-12 (Part 2 of 2). Long OBR Record Format

Outboard (OBR) Record Format - (Short Form)

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1	CLASRC	Class/Source:
		..11		OBR (unit check) record.
		..11 .1..		TP access method (TCAM) OBR record.
		..11 .11.		TP access method (VTAM) OBR record.
1	(1)	1	SYSREL	System/Release level:
		100.		OS/VS2.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	4	SWITCHES	Record switches:
		Byte 0		
		1...		More records follow.
		0...		Last record.
		.x..		Time-of-Day clock instruction issued (0 = IBM System/360, 1 = IBM System/370). Used in conjunction with date and time values at displacements 8 and 12.
		..1.		Record truncated.
		...1		Record created by 370-XA.
		.... 1...		TIME macro used.
		xxx		Reserved.
		Byte 1		
		1...		SDR counters dumped at EOD.
		.1..		Temporary error.
		..1.		Short record (0 for long record).
		...1		MP system.
		.... 0...		CPU A issued last SSCH.
		.... 1...		CPU B issued last SSCH.
		.... .1..		Volume demount.
		.... ..x.		Not used by MVS/XA.
		x		Reserved.
		Byte 2		Not used for OBR record.
		Byte 3		Not used by MVS/XA.
6	(6)	1	RCDCNT	Record count:
		bits 0-3		Sequence number of this physical record.
		bits 4-7		Total number of physical records in this logical record.
7	(7)	1		Reserved.
8	(8)	4	DATE	System date of incident.
12	(C)	4	TIME	System time of incident.
16	(10)	1	VERNO	Machine version code.
17	(11)	3	CPUSER	CPU serial number.
20	(14)	2	CPUMOD	CPU machine model number (for example, 3081).
22	(16)	2	MCELLNG	Not used for OBR record.
24	(18)	4	SDEVTYP	Device type associated with failing device.
28	(1C)	1	SSDRCNT	Number of bytes of statistical data to be recorded from SDR work area at displacement 32.
29	(1D)	3	SCUA	Device number being used when failure occurred.
32	(20)	variable	SSDR	SDR counter area containing statistical counter/indicator data from device statistics table.

Figure 3-13. Short OBR Record Format

Recording Subchannel Logout Handler (SLH) Records

SLH records (Figure 3-14 on page 3-37) are recorded on SYS1.LOGREC by the subchannel logout handler (SLH). The SLH is called by the I/O Supervisor interrupt response block (IRB) analysis routines to process a logout when the IRB indicates that the extended status word (ESW) contains logout information. The following channel-detected errors are recorded on SYS1.LOGREC by the SLH.

- Channel control check
- Interface control check
- Channel data check
- Address limit check
- Measurement check

The SLH performs the following functions:

- Analyzes the failure from information in the IRB.
- Invokes the real storage manager for hardware-caused key or storage errors.
- If the IRB indicates an interface control check, or indicates a channel control check and does not indicate a CCW, IDAW, or address limit check, SLH issues a message to the operator stating that the channel detected an error.
- If the IRB indicates a channel control check, interface control check or channel data check, SLH builds the error recovery procedure information block (ERPIB) for the device dependent error recovery procedures (ERPs).
- Builds the SLH record and records it on SYS1.LOGREC.
- If the IRB indicates an address limit check or measurement check, SLH schedules an SRB to inform the facility owner of the error.
- If the IRB indicates an error other than a measurement check, SLH interfaces with the unconditional reserve routine.

Consult *System Logic Library*, IOS Section (Module IOSRSLH), for a detailed description of the subchannel logout handler.

Subchannel Logout Handler (SLH) Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
0	(0)	1	SLHHTYPE	Class/Source:
		..1. ..11		SLH Record.
1	(1)	1	SLHHSYS	System/Release level:
		100.		OS/VS2.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	1	SLHHSW0	Record-independent switches:
		1...		More records follow.
		0...		Last record.
		.x..		TOD Clock instruction issued (0 = IBM System/360, 1 = IBM System/370).
		..1.		Record truncated.
		...1		Record created by 370-XA
		.... 1...		TIME macro issued.
		xxx		Reserved.
3	(3)	3		Record-dependent switches:
		Byte 0	SLHHSW1	Reserved.
		Byte 1	SLHHSW2	Reserved.
		Byte 2	SLHHSW3	
		bits 0-5		Reserved.
		bits 6&7		'01' - hard error - failure not recovered by the system. One or more jobs, or the operating system, may be lost or impacted. Hardware resources may be lost. '02' - degrade mode - failure was successfully recovered by the system. However, hardware resources may be lost, performance may be degraded, or a time-dependent application may be impacted. '03' - soft error - failure was successfully recovered by the system. A time-dependent application may be impacted.
6	(6)	1	SLHHCNT	Record count:
		bits 0-3		Record sequence number.
		bits 4-7		Total number of physical records in this logical record.
7	(7)	1		Reserved.
8	(8)	4	SLHHDATE	System date of incident.
12	(C)	4	SLHHTIME	System time of incident.
16	(10)	1	SLHHCPID	Machine Version code.
17	(11)	3	SLHHSER	CPU serial number.
20	(14)	2	SLHHMDL	CPU machine model number.
22	(16)	2	SLHHMCEL	Max length of machine-dependent machine check extended logout.
24	(18)	8	SLHJOBNM	Jobname or Userid.
32	(20)	8	SLHCCW	Last executed CCW.
40	(28)	4	SLHDEVT	Device type.
44	(2C)	8	SLHERPIB	ERP Information block.
44	(2C)	1	SLHESW01	First byte of ESW.
45	(2D)	3	SLHRSVD1	Reserved.
48	(30)	1	SLHFLG1	Flag byte.
		0...	SLHSSCH	No status stored after SSCH.
		.1..	SLHINT	Status stored after I/O interruption.
		..0.	SLHTSCH	No status stored after TSCH.
		...0	SLHHSCH	No status stored after HSCH.
		.... x...		Reserved.
		.... .1..	SLHSENSE	Sense data was stored.
		.... ..1.	SLHCSWCT	CSW count is valid.
		1	SLHRETRY	If on, operation cannot be retried.
49	(31)	1	SLHLPUM	Last path used mask.
50	(32)	1	SLHVALID	Validity indicators.
		x...		Reserved.
		.1..	SLHVLPUM	LPUM consistent with log indicators.
		..1.	SLHVTERM	Termination code validity.
		...1	SLHVSEQC	Sequence code validity.
		.... 1...	SLHVDVST	Device status validity.
		.... .1..	SLHVCCW	CCW address validity.
		.... ..1.	SLHVDVNO	Device number validity.
		1	SLHVDVNU	Device number validity.

Figure 3-14 (Part 1 of 2). Subchannel Logout (SLH) Record Format

Offset		Size (bytes)	Field	
Dec	Hex	Alignment (bits)	Name	Description
51	(33)	1	SLHTRMSQ	Termination and sequence codes:
		xx..	SLHTRMCD	Termination code:
		00..		Interface disconnect.
		01..		Stop, stack or normal termination.
		10..		Selective reset.
		..xx		Reserved.
		.... x...	SLHIOALT	I/O error alert.
		xxx	SLHSEQCD	Sequence code:
		.... .000		Reserved.
		.... .001		Command sent but status not analyzed.
		.... .010		Command accepted by device but no data transferred.
		.... .011		At least one byte of data has been transferred.
		.... .100		Command not sent or sent but not yet accepted.
		.... .101		Command accepted but data transfer unpredictable.
		.... .110		Reserved.
		.... .111		Reserved.
52	(34)	64	SLHIRB	IRB; includes the SCSW (Subchannel Status Word) and the ESW (Extended Status Word). See the *Debugging Handbook* for the detailed format of the IRB.
116	(74)	4	SLHUCBAD	UCB or RDEV address.
120	(78)	2	SLHDEVNO	Device number.
122	(7A)	6	SLHVOLSR	Volume serial number.
128	(80)	5	SLHUCBLV	UCB level byte and mask.
133	(85)	2		Reserved.
135	(87)	1	SLHCHPID	Channel path id.
136	(88)	4	SLHSID	Subchannel ID number.
140	(8C)	4	SLHRSMAD	Absolute address of storage or key error if available.
144	(90)	2	SLHRSMRC	RSM return code for storage or key error.
146	(92)	2	SLHRSMER	Error type
		Byte 1		Reserved.
		Byte 2		
		xxxx xx..		Reserved.
		00		Other.
		01		Storage error.
		10		Key error.
148	(94)	4	SLHRSMST	RSM status information.

Figure 3-14 (Part 2 of 2). Subchannel Logout (SLH) Record Format

Recording Software Records

Software records are recorded on SYS1.LOGREC for:

- Hardware-detected hardware errors, such as software recovery attempts for hard machine failures.
- Hardware-detected software errors, such as program checks.
- Operator-detected errors, such as pressing the restart key.
- Software-detected software errors, such as ABTERM (CALLRTM macro), symptom records issued by routines detecting abend or nonabend errors, or programs issuing SVC 13 (ABEND) and programs issuing an invalid SVC.
- Records for hardware- or software-detected errors that were lost because they could not be written to SYS1.LOGREC.

The control program uses functional recovery routines (FRRs) and ESTAE/ESTAI services to attempt recovery from selected software errors. The FRRs provide recovery for locked SRB (service request block) and supervisor control mode functions. The ESTAE/ESTAI services provide recovery for enabled, non-locked task mode functions.

The three types of software records are:

- System diagnostic work area (SDWA) records
- Lost record summaries
- Symptom records

SDWA Records

For error recording purposes, the FRR and ESTAE/ESTAI services collect error data in the SDWA to assist in identifying the error and then invoke the recovery termination manager (RTM). When the FRR or ESTAE/ESTAI service requests error recording for a specific error condition, RTM formats an SDWA software record from the following information (Figure 3-15 on page 3-40):

- Standard record header information.
- SDWA information such as registers, PSW, locks held at the time of error, completion code, data describing reasons and conditions for entering the recovery exit routine, the CSECT in which the error occurred, module (microfiche) name, and FRR ID. Consult the *Debugging Handbook* for the detailed format of the SDWA.
- Variable information supplied by the FRR or ESTAE/ESTAI services that assists in isolating the specific error. A description of the specific FRR or ESTAE/ESTAI service-dependent information is in the program listing or program logic manual that documents the program issuing the FRR or ESTAE/ESTAI service.
- Error identifier (ERRORID) that is added to the record in order to correlate this software record with an associated machine check record or SVC dump.

RTM formats the record into a record parameter list and then invokes the recording request routine. This routine queues the software record on the output queue and posts the recording task. The recording task asynchronously scans the output queue and issues SVC 76 to write any records on this queue to SYS1.LOGREC.

SDWA Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1	HDRTYP	Class/Source:
		.1..		Software-detected software error.
		.1.. ..1.		Hardware-detected software error.
		.1.. .1..		Operator-detected error.
		.1.. 1...		Hardware-detected hardware error.
1	(1)	1	HDROPRN	System/Release level:
		100.		OS/VS2
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	1	HDRIS	Record-independent switches:
		x...		Reserved.
		.1..		Time-of-Day clock instruction issued. Used in conjunction with date and time values at displacement 8.
		..1.		Record truncated. (When EREP detects this bit being on, it does not edit record but prints it out in hexadecimal.)
		...1		Record created by 370-XA.
		.... 1...		TIME macro used.
		xxx		Reserved.
3	(3)	3	HDRDS	Record-dependent switches:
		Byte 0		
		x...		Reserved.
		.1..		Record incomplete. (Record truncated because of lack of buffer space.)
		..1.		Record contains an ERRORID.
		...x xxxx		Reserved.
		Byte 1		Reserved.
		Byte 2		Reserved.
6	(6)	1	HDRCNT	Not used for SDWA record.
7	(7)	1		Reserved.
8	(8)	8	HDRTM	Time-of-Day Clock.
16	(10)	1	HDRCPID	Machine version code.
17	(11)	3		CPU serial number.
20	(14)	2		CPU machine model number (for example, 3081).
22	(16)	2		Reserved.

Figure 3-15 (Part 1 of 2). SDWA Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
24	(18)	8	JOBID	Alphameric name assigned to job (as identified, for example, by a jobname on a JCL JOB statement) being executed and/or requesting service at time of failure.
32	(20)	400	SDWA	The SDWA is detailed by IHASDWA mapping macro. See the *Debugging Handbook* for detailed SDWA format.
432	(1B0)	264	SDWARA	Variable recording area.
435	(1B3)	1	SDWAURAL	Length of the variable recording area (SDWAVRA) containing recovery exit data.
436	(1B4)	variable	SDWAVRA	Contains FRR-dependent data such as damage assessment, recovery action information, and specific diagnostic information to assist in isolating or identifying problem. Consult the appropriate program listing or program logic manual describing program that issued FRR or recovery exit for a description of specific data supplied by a recovery exit routine.
variable		152	SDWARC1	First recordable extension of the SDWA. Contains additional serviceability data. See the *Debugging Handbook*.
variable		16	SDWARC2	Second recordable extension of the SDWA. Contains additional data concerning I/O machine checks. See the *Debugging Handbook*.
variable		32	SDWARC3	Third recordable extension of the SDWA. Contains additional data concerning locks to be freed by RTM. See the *Debugging Handbook*.
variable		10	ERRORID	Error identifier - not part of the SDWA, but located directly after the SDWA in the SYS1.LOGREC record. ERRORID consists of: 2-byte sequence number 2-byte CPU identifier 2-byte ASID 4-byte time stamp

Figure 3-15 (Part 2 of 2). SDWA Record Format

Lost Record Summaries

When the in-storage LOGREC buffer becomes filled before the recording task can be dispatched to write (via SVC 76) the stacked records to SYS1.LOGREC and remove them from the buffer, write-to-LOGREC requests (via the RECORD service) that occur during this time are lost and cannot be written to SYS1.LOGREC. This can happen for either hardware- or software-detected errors. Types of errors that often result in lost records are:

- Channel checks occurring continuously and so quickly that the recording task cannot keep up.
- Repetitive program checks in the supervisor.

In both these cases, the incidents occur so close together that records cannot be written to the buffer. A count of these lost records is accumulated and later written to SYS1.LOGREC in the lost record summary (Figure 3-16 on page 3-42).

The lost record summary record is 25 bytes long (Figure 3-16 on page 3-42). The first 24 bytes is the standard software record header; byte 25 contains a count (1 to 255) of the lost records that could not be written to SYS1.LOGREC since the last lost record summary was written.

Lost Record Summary Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1 .1.. 1111	HDRTYP	Class/Source: Lost record summary.
1	(1)	1 100. .... bits 3-7 0-1F	HDROPRN	System/Release level: OS/VS2 Release level 0-31.
2	(2)	1 x... .... .1.. .... ..1. ....1 .... 1... xxx	HDRIS	Record-independent switches: Reserved. Time-of-Day clock instruction issued. Used in conjunction with date and time values at displacement 8. Record truncated. (When EREP detects this bit being on, it does not edit record but prints it out in hexadecimal.) Record created by 370-XA. TIME macro used. Reserved.
3	(3)	3 Byte 0 1... .... .xxx xxxx Byte 1 Byte 2	HDRDS	Record-dependent switches: Short record. (Set for '4F' type records to indicate that record is not as long as other software records.) Reserved. Reserved. Reserved.
6	(6)	1	HDRCNT	Not used for Lost Record Summary.
7	(7)	1		Reserved.
8	(8)	8	HDRTM	Time-of-Day Clock.
16	(10)	1	HDRCPID	Machine version code.
17	(11)	3		CPU serial number.
20	(14)	2		CPU machine model number (for example, 3081).
22	(16)	2		Reserved.
24	(18)	1	RCBLCNT	Last field in the lost record summary. Contains the number of records that could not be written to SYS1.LOGREC.

Figure 3-16. Lost Record Summary Format

Symptom Record

When a module detects a programming failure, it constructs a symptom record containing a description of the failure.

A symptom record contains strings of symptoms that are written in the Problem Determination Language (PDL) of the Customer Software Support Facility of Info/Management.

The symptom string is valuable to problem determination. It can be used as a search argument to be compared with symptom strings from previous/concurrent failures to determine if the failure is a unique or duplicate error.

The record is processed by two macros:

- The ADSR macro, which maps the record.
- The SYMREC macro, which writes the completed record to SYS1.LOGREC.

Symptom Record Format

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	1 .1.. 11..	HDRTYP	Class/Source: Symptom record.
1	(1)	1 100. .... bits 3-7 0-1F	HDROPRN	System/Release level: OS/VS2 Release level 0-31.
2	(2)	1 x... .... .1.. .... ..1. ....1 .... 1... xxx	HDRIS	Record-independent switches: Reserved. Time-of-Day clock instruction issued. Used in conjunction with date and time values at displacement 8. Record truncated. (When EREP detects this bit being on, it does not edit record but prints it out in hexadecimal.) Record created by 370-XA. TIME macro used. Reserved.
3	(3)	3 Byte 0 x... .... .1.. ....x xxxx Byte 1 Byte 2	HDRDS	Record-dependent switches: Reserved. Record incomplete. (Record truncated because of lack of buffer space.) Reserved. Reserved. Reserved.
6	(6)	1	HDRCNT	Not used for symptom record.
7	(7)	1		Reserved.
8	(8)	8	HDRTM	Time-of-Day Clock.
16	(10)	1	HDRCPID	Machine version code.
17	(11)	3		CPU serial number.
20	(14)	2		CPU machine model number (for example, 3081).
22	(16)	2		Reserved.

Figure 3-17 (Part 1 of 7). Symptom Record Format

Section 1 of the Symptom Record

Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
24	(18)	2	ADSRID	'SR' symptom record id.
26	(1A)	4	ADSRCPM	CPU model number.
30	(1E)	6	ADSRCPS	CPU serial number.
36	(24)	4	ADSRGMT	Local time zone conversion factor.
40	(28)	4	ADSRTIME	Time stamp.
44	(2C)	8	ADSRTOD	Time stamp (HHMMSSTH).
52	(34)	6	ADSRDATE	Date (YYMMDD).
58	(3A)	8	ADSRSID	Customer assigned system/node name.
66	(42)	4	ADSRSYS	Product ID of BCP
70	(46)	8	ADSRCML	Feature and level of SYMREC macro.
78	(4E)	1 1... .... .1.. .... ..1. ....1 .... 1... .... .111	ADSRFL1 ADSRTRNC ADSRPMOD ADSRSGEN ADSRSMOD 	Record status flags. Reserved. Symptom record was truncated. The section 3 symptom string has been modified. No record from component. The section 4 symptom string has been modified. Reserved.
79	(4F)	1 1... .... .1.. .... ..11 1111	ADSRFL2 ADSRNOTD ADSRASYN 	Record status flags. ADSRTOD and ADSRDATE have not been computed. Record was created asynchronously from the error. Reserved.
80	(50)	8	ADSRDTP	Type of dump taken for this event.

Figure 3-17 (Part 2 of 7). Symptom Record Format

Section 2 of the Symptom Record				
Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
88	(58)	2	ADSRARID	Architectural level of the symptom record.
90	(5A)	2	ADSRL	Length of Section 2.
92	(5C)	2	ADSRCSL	Length of Section 2.1 (ADSRCMPS).
94	(5E)	2	ADSRCSO	Offset of Section 2.1 (ADSRCMPS).
96	(60)	2	ADSRDBL	Length of Section 3 (ADSRDBST).
98	(62)	2	ADSRDBO	Offset of Section 3 (ADSRDBST).
100	(64)	2	ADSRROSL	Length of Section 4 (ADSRROSD).
102	(66)	2	ADSRROSA	Offset of Section 4 (ADSRROSD).
104	(68)	2	ADSRRONL	Length of Section 5 (ADSR5ST).
106	(6A)	2	ADSRRONA	Offset of Section 5 (ADSR5ST).
108	(6C)	2	ADSRRISL	Reserved.
110	(6E)	2	ADSRRISA	Reserved.
112	(70)	8	ADSRSRES	System data.
120	(78)	16		Reserved.

Figure 3-17 (Part 3 of 7). Symptom Record Format

Section 2.1 of the Symptom Record (at offset ADSRCSO in ADSR)				
Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
0	(0)	100	ADSRCMPS	
0	(0)	4	ADSRC	Identifier for Section 2.1.
4	(4)	2	ADSRCRL	Architectural level of the symptom record.
6	(6)	9	ADSRCID	Component identifier.
15	(F)	1 1... .... .111 1111	ADSRFLC ADSRNIBM	Component status flags. Non IBM program. Reserved.
16	(10)	4	ADSRLVL	Component level.
20	(14)	8	ADSRPTF	PTF level.
28	(1C)	8	ADSRPID	PID level.
36	(24)	8	ADSRPIDL	PID release level.
44	(2C)	32	ADSRCDSC	Text description.
76	(4C)	4	ADSRRET	Return code.
80	(50)	4	ADSRREA	Reason code.
84	(54)	8	ADSRPRID	Problem identifier.
92	(5C)	8	ADSRSSID	Subsystem identifier.

Figure 3-17 (Part 4 of 7). Symptom Record Format

Section 3 of the Symptom Record (at offset ADSRDBO in ADSR)				
Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
ADSRDBO		variable	ADSRDBST	Primary symptom string.

Figure 3-17 (Part 5 of 7). Symptom Record Format

Section 4 of the Symptom Record (at offset ADSRROSA in ADSR)				
Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
ADSRROSA		variable	ADSRROSD	Secondary symptom string.

Figure 3-17 (Part 6 of 7). Symptom Record Format

Section 5 of the Symptom Record (at offset ADSRRONA in ADSR)				
Offset		Size (Bytes)	Field	
Dec	Hex	Alignment (Bits)	Name	Description
ADSRRONA		variable	ADSR5ST	Free format data.

Figure 3-17 (Part 7 of 7). Symptom Record Format

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