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Systems

OS/VS SYS1.LOGREC Error Recording

VS1 Release 2
VS2 Release 1

IBM

Second Edition (December, 1972)

This is a major revision of, and obsoletes, GC28-0638-0. Changes or additions to the text and illustrations are indicated by a vertical bar to the left of the change. Consult the Summary of Amendments for a list of the new or changed information.

This edition applies to release 2 of OS/VS1 and release 1 of OS/VS2 and to all subsequent releases until otherwise indicated in new editions or Technical Newsletters. Changes are continually made to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest **IBM System/360 and System/370 Bibliography,** Order No. GA22-6822, and the current SRL Newsletter, Order No. GN20-0360, for the editions that are applicable and current.

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Preface

This publication is intended for system operators, programmers, and administrators involved in using the information on the SYS1.LOGREC data set.

This publication describes:

- Why and how the different types of error records are built and recorded on SYS1.LOGREC.
- The service aid programs that can be used to maintain and retrieve information from SYS1.LOGREC.

This publication contains 4 parts:

- "Part 1: Introduction" describes error recording on the SYS1.LOGREC data set.
- "Part 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.
- "Part 3: Error Recording on SYS1.LOGREC" explains the reasons for the different types of error records and describes their record formats.
- "Part 4: Retrieving and Writing the Records on the SYS1.LOGREC Data Set" shows how to use the IFCEREP0 service aid to edit, summarize, and print error information on the SYS1.LOGREC data set.

Note: Any information in this publication for IBM 3670 and 3705 devices is for VS2 planning purposes only. They are supported by VS1.

Prerequisite Publications:

- **OS/VS Utilities**, GC35-0005 -- describes how to use utility programs to print certain types of service aid output and to allocate data sets with the IEHPROGM utility.
- **OS/VS JCL Reference**, GC28-0618 -- describes how to use job control statements to override default parameters, use cataloged procedures, allocate space for data sets, and code job control statements.

Associated Publications:

- **OS/VS Recovery Management Support Logic**, SY27-7239 -- describes the function and logic of the Machine Check Handler, the Channel Check Handler, and Dynamic Device Reconfiguration.
- **OS/VS SYS1.LOGREC Error Recording Logic**, SY28-0639 -- describes the internal logic of IFCDIP00, IFCEREP0, and the error recording routines: Outboard recorder, Miscellaneous Data recorder, SVC 76, SVC 91, and 3330 DDR recorder.
- **OS/VS Message Library: Service Aids and OLTEP Messages**, GC38-1006 -- describes the messages issued by the IFCDIP00 and IFCEREP0 service aid programs.

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MDR Recording

- Whenever the IEHDASDR utility program detects two IBM 3330 volumes with the same VOLID online, the most recently mounted volume is made not ready. SVC 91 is used by IEHDASDR to create MDR records documenting these demounts.
- The Miscellaneous Data Recording routine creates MDR records for IBM 2305 and 3330 devices only when a buffer overflow condition occurs.

OBR Recording

- The Deferred Incident recorder creates long OBR records to document paging errors that occur on direct access devices and issues SVC 76 to write the records on SYS1.LOGREC.
- When the RES option has been specified at system generation time, unit check errors on RES supported control units and remote devices are documented by an RTAM subroutine. The RTAM subroutine issues SVC 76 to write long OBR records on SYS1.LOGREC. (RTAM is an access method available only when the RES option has been specified at system generation time.)

Reallocating SYS1.LOGREC

When the SYS1.LOGREC data set has been scratched and reallocated, the system must be reinitialized since the data set has a different physical location on the system residence volume.

3670 and 3705 Support

The IBM 3670 and 3705 devices are supported in this release.

TCAM Level II

Level II of TCAM will not run under release 2 of VS1. The TCAM information in this book relative to release 2 VS1 is included for planning purposes until availability of TCAM Level IV.

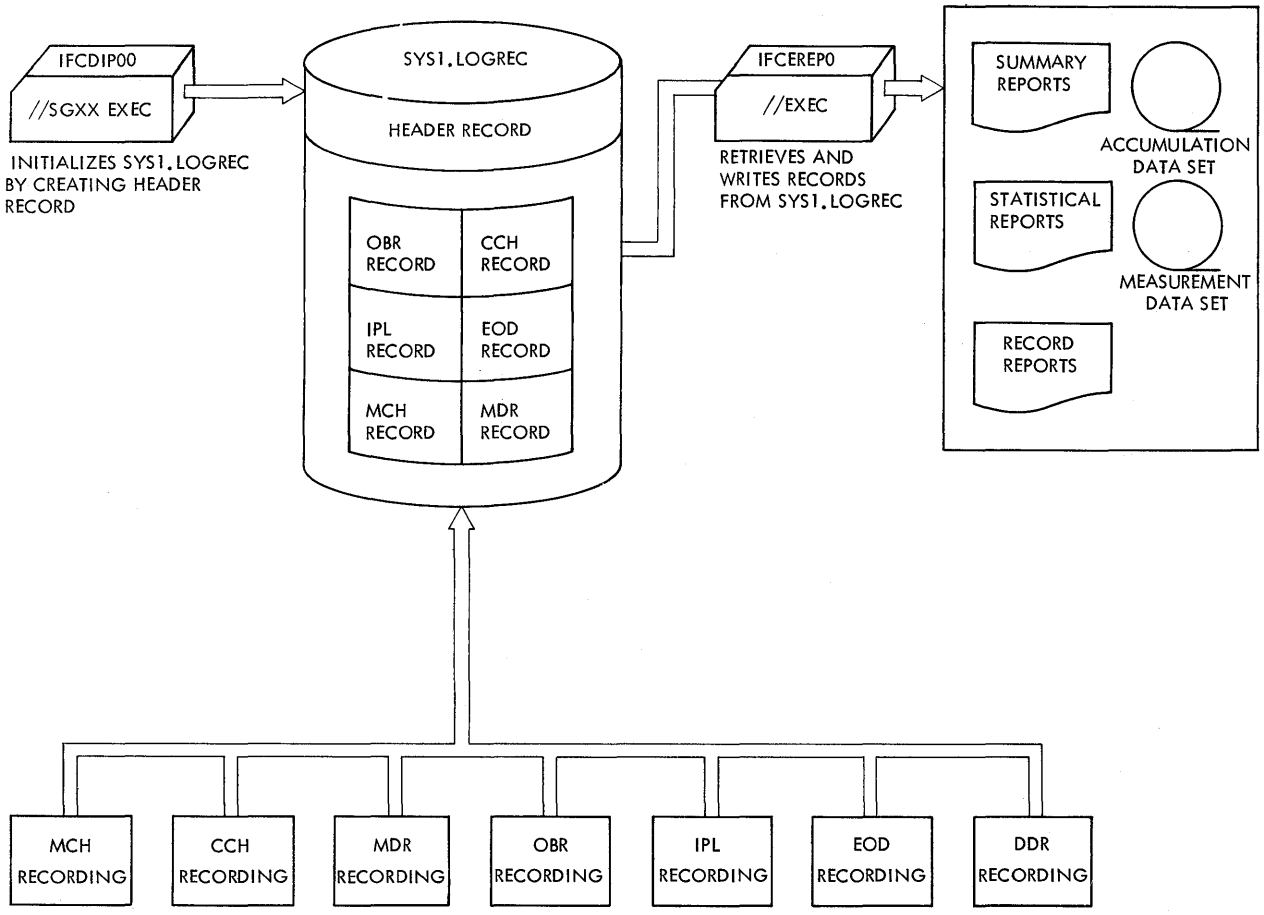


Figure 1. SYS1.LOGREC Error Recording Overview

Part I: Introduction

The purpose of error recording on the SYS1.LOGREC data set is to provide a record of (1) all failures involving CPUs, channels, storage, and I/O devices, and (2) system conditions involving end-of-day, system initialization, or demount requests. Information related to each incident is written onto SYS1.LOGREC by the system error recording routines and can be retrieved by using the IFCEREP0 service aid.

Two types of data are produced to record the failures: error statistics and environmental data. Error statistics are counts of the number of times failures have occurred on devices and channels. Environmental data records the time and circumstances of all failures. The data is recorded on SYS1.LOGREC as variable length records and, in general, each record will contain:

- 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.

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

- Initialization of SYS1.LOGREC by the IFCDIP00 service aid.
- Recording error records on SYS1.LOGREC.
- Retrieval of the information on SYS1.LOGREC by using the IFCEREP0 service aid.

Initialization of SYS1.LOGREC

The SYS1.LOGREC data set resides on the system residence volume and is initialized during system generation by the IFCDIP00 service aid. SYS1.LOGREC contains all of the environmental and statistical data recorded by the error recording routines. See the publication **OS/VS1 Storage Estimates**, GC24-5094, or **OS/VS2 Storage Estimates**, GC28-0604, for the information required to calculate the size of SYS1.LOGREC.

For information about IFCDIP00, see Part 2 of this publication.

Error Recording on SYS1.LOGREC

Seven types of records can be recorded on SYS1.LOGREC:

- CCH records for channel failures.
- EOD records for information related to end-of-day conditions whenever the RDE option has been included during system generation.
- IPL records for information related to system initializations whenever the RDE option has been included during system genration.
- MCH records for CPU and storage failures.
- MDR records for failures on the IBM 2715, 3211, 3670, and 3705 devices, for demounts (EOD, CLOSE/EOV, and deallocate) on IBM 2305 and 3330 devices, for buffer log overflow on IBM 2305 and 3330 devices, and for IEHDASDR demounts between IBM 3330 disk drives.
- MDR-type records with DDR information describing operator and system swaps between IBM 3330 disk drives.
- OBR records for temporary I/O device failures on IBM 2305 and 3330 devices, for permanent failures on channels and I/O devices, for counter overflow, for statistical recording, for demounts (EOD, CLOSE/EOV, deallocate, and DDR swap) on IBM 3400 devices, for unit check errors on RES supported control units and remote devices, and for paging errors on direct access devices.

Each record on SYS1. LOGREC contains complete information that is specific for the device and type of failure, or statistical condtion that caused it to be written. See Part 3 of this publication for a complete description of error recording and the formats of the records on SYS1.LOGREC.

Retrieving the Information on SYS1.LOGREC

You can use the IFCEREP0 service aid to edit the records on SYS1.LOGREC and write the edited records to any output device that you specify. Using IFCEREP0 enables you to examine the data on SYS1.LOGREC in the form of edited records and/or summaries to determine the reasons for repeated system initializations and hardware failures. See Part 4 of this publication for a complete description of IFCEREP0.

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

The IFCDIP00 service aid program has three applications:

1. Initializing the SYS1.LOGREC data set during system generation. This application is discussed in the publication **OS/VS1 System Generation Reference**, GC26-3791, or **OS/VS2 System Generation Reference**, GC26-3792.
2. Reinitializing the SYS1.LOGREC data set. The SYS1.LOGREC header can be destroyed if an uncorrectable channel error occurs while re-writing the header record onto the SYS1.LOGREC data set. You can then run IFCDIP00 to restore the header and reinitialize the data set.
3. Modifying the space allocation for the SYS1.LOGREC data set. In some situations, the SYS1.LOGREC data set may be too large or too small for the system using it; you can then use IFCDIP00 to increase or decrease the space allocation for SYS1.LOGREC.

SYS1.LOGREC Header Record Format

The IFCDIP00 service aid creates a header record on the SYS1.LOGREC data set. The header record (Figure 2) is used to find existing environment record entries and to determine where new entries are to be written; it contains:

- Information used by the system recording routines to record CPU, storage, channel, and device errors.
- Information used by the IFCEREP0 service aid as parameters.
- The first recording address used by the environment recording routines for writing records onto SYS1.LOGREC.

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)	Field 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. The track address of the first extent of SYS1.LOGREC in the form CCHH.
6	(6)	4	UPLIMIT	Address of high extent. The track address of the last extent of SYS1.LOGREC in the form CCHH.
10	(A)	1		Not used.
11	(B)	7	RESTART	Address of environment record entry area. The track address of the start of the recording area on SYS1.LOGREC in the form BBCCHHR.
18	(12)	2	BYTSREM	Remaining bytes on track. The number of bytes remaining on the track upon which the last record entry was written.
20	(14)	2	TRKCAP	Total bytes on track. The number of bytes which can be written on a track of the volume containing SYS1.LOGREC.
22	(16)	7	LASTTR	Address of the last record written. The track address of the last record written on SYS1.LOGREC in the form BBCCHHR.
29	(1D)	2	TRKSPER	Highest track address for any cylinder.
31	(1F)	2	EWMCNT	Warning count. The number of bytes remaining on the early warning message track of SYS1.LOGREC when the 90% full point of the data set is reached.
33	(21)	1	DEVCODE	Device code. A code indicating the type of device that SYS1.LOGREC is resident on. **Code** **Device** 01 2311 02 2301 03 2303 04 2302 06 2305 MOD I 07 2305 MOD II 08 2314 09 3330
34	(22)	4	EWMTRK	Early warning message track. The track address in the form CCHH on which the 90% full point of the data set exists.
38	(26)	1 1xxx xxxx	EWMSW	Switch byte: The 90% full message has been issued.
39	(27)	1	SFTYBYTS	Check byte. This field is used to check the header record identifier; each bit is set to 1.

Figure 2. SYS1.LOGREC Header Record Format

Reinitializing SYS1.LOGREC

Figure 3 is an example of the job control statements needed to reinitialize the SYS1.LOGREC data set using IFCDIP00.

```
//INSERLOG   JOB
//STEP1      EXEC   PGM=IFCDIP00
//SERERDS    DD     DSNAME=SYS1.LOGREC,UNIT=2314,DISP=(OLD,KEEP),
//                  VOL=SER=111111
```

Figure 3. Reinitializing the SYS1.LOGREC Data Set

Control Statements for Figure 3:

The JOB statement initiates the job; the job name INSERLOG has no signifigance.

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

The SERERDS DD statement specifies the output (SYS1.LOGREC) data set (which must be on the system residence volume, VOL=SER=111111 in this example); the DDNAME must be SERERDS.

Changing Space Allocation for SYS1.LOGREC

IFCDIP00 may be used in conjunction with the IEHPROGM utility to increase or decrease the space allocated for the SYS1.LOGREC data set. First the SYS1.LOGREC data set is scratched and uncataloged, using IEHPROGM; then, using IFCDIP00, the data set is reallocated with increased or decreased space specifications; and, finally, the newly allocated data set is reinitialized. **Caution:** After scratching and reallocating the data set, the system must be reinitialized because the data set now has a different physical location on the system residence volume.

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 will be terminated and the system will be marked ineligible for IPL procedures. To solve this problem, do one of the following:

- Use the IBCDMPRS utility to restore the system and thereby restore the SYS1.LOGREC data set. After the SYS1.LOGREC data set has been restored, you can reinitialize the system and reallocate SYS1.LOGREC.
- Execute the reallocate operation on another operating system, if one is available.

Figure 4 is an example of reallocating the SYS1.LOGREC data set.

```
//RELGREC    JOB
//SCR        EXEC   PGM=IEHPROGM
//DD1        DD     UNIT=2314,VOLUME=SER=111111,DISP=OLD
//SYSIN      DD     *
   SCRATCH           DSNAME=SYS1.LOGREC,VOL=2314=111111
   UNCATLG           DSNAME=SYS1.LOGREC
/*
//R          EXEC   PGM=IFCDIP00
//SERERDS    DD     DSNAME=SYS1.LOGREC,UNIT=2314,DISP=(NEW,CATLG),
//                  VOL=SER=111111,SPACE=(allocation,CONTIG)
```

Figure 4. Changing the Space Allocation for SYS1.LOGREC

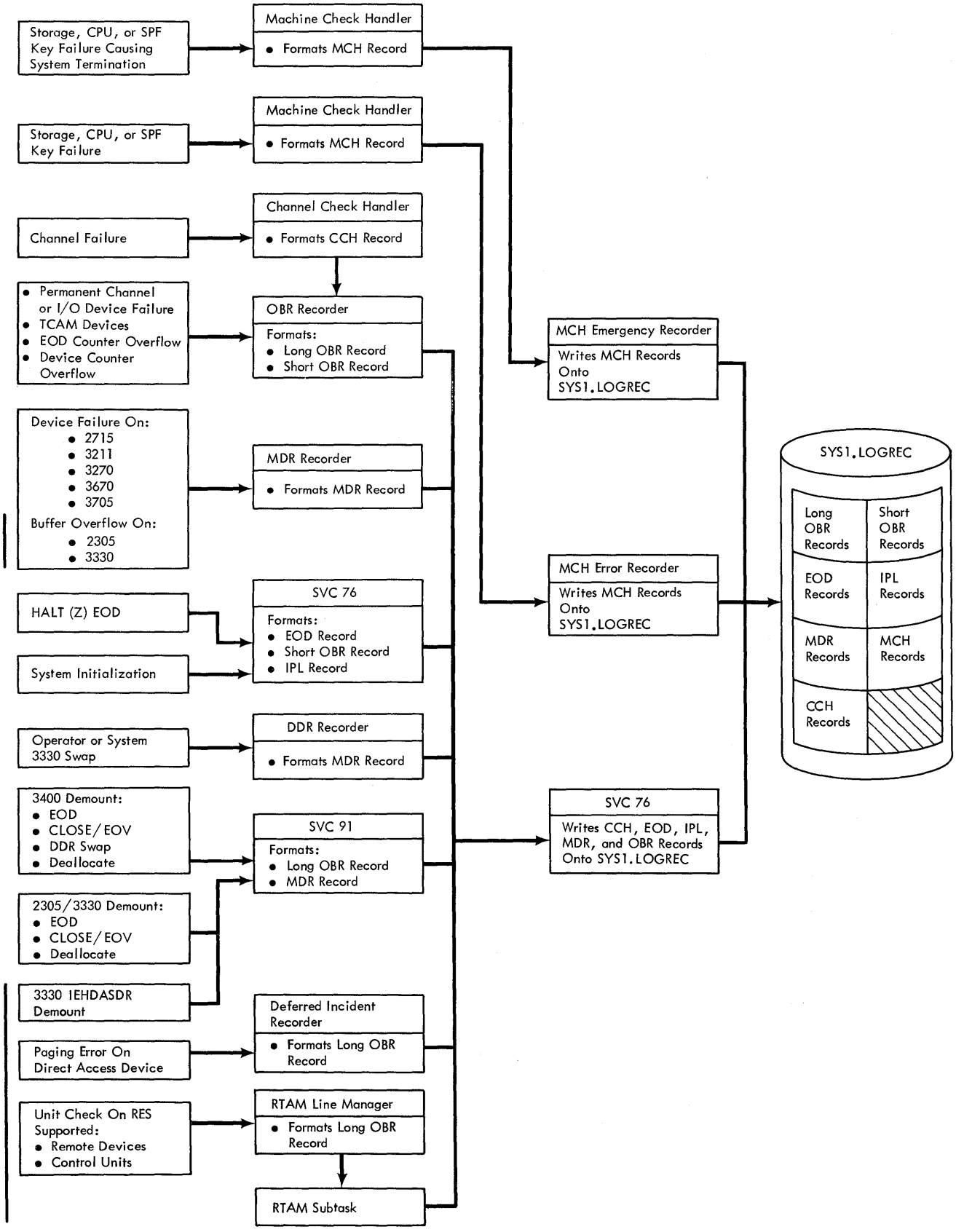


Figure 5. Writing Records on SYS1.LOGREC

Part 3: Error Recording on SYS1.LOGREC

The SYS1.LOGREC data set resides on the system residence volume and contains: a header record, one environment record for every failure and system condition that has an associated recording routine, and statistical records that contain counts of the number of times devices have failed.

As shown in Figure 5, seven types of records are recorded on SYS1.LOGREC:

- CCH records -- which are recorded by the Outboard Recording routines to document channel failures.
- EOD records -- which are recorded by SVC 76 to document end-of-day conditions. EOD records are recorded only when the RDE option is specified during system generation.
- IPL records -- which are recorded by SVC 76 to document the reasons for system initializations. IPL records are only recorded when the RDE option has been specified during system generation.
- MCH records -- which are recorded by the Machine Check Error recorder or the Machine Check Emergency recorder to document storage or CPU failures.
- MDR records -- which are recorded (1) by the Miscellaneous Data recorder to document failures on IBM 2715, 3211, 3270, and 3705 devices and to document buffer overflow conditions on IBM 2305 and 3330 devices, and (2) by SVC 91 to document demounts (EOD, CLOSE/EOV, and deallocate conditions) on IBM 2305 and 3330 devices and to document IEHDASDR demounts between IBM 3330 disk drives.
- MDR-type records -- which are recorded by DDR using SVC 76 to document operator or system initiated swaps between IBM 3330 disk drives.
- OBR records -- which are recorded (1) by the Outboard Recording routines to document temporary I/O device failures for IBM 2305 and 3330 devices, permanent channel and I/O device failures, temporary and permanent TCAM device failures, statistical information, and device counter overflow; (2) by SVC 76 to document EOD statistics for all devices except the IBM 2305, 3330, and 3400 devices (MDR records describe EOD statistics for IBM 2305 and 3330 devices); (3) by SVC 91 to document EOD statistics, DDR swaps, CLOSE/EOV, and deallocate conditions for IBM 3400 devices; (4) by the RTAM subroutines to document unit check errors on RES supported control units and remote devices; (5) by the Deferred Incident recorder to document paging errors that occur on direct access devices containing page data sets.

Environment Record Header Format

All environment records on SYS1.LOGREC contain a standard 24-byte header followed by data that is specific for the record type. The header (Figure 6) provides the information necessary to identify the type and origin of the record. The origin information includes: the operating system the record was generated on, the generating program, the CPU identity, and the CPU serial number.

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Record class:
		1..1	...1		MDR record.
		1...	....		EOD record.
		.1.1	....		IPL record.
		..11	....		OBR record.
		..1.	....		CCH record.
		...1	....		MCH record.
1	(1)	1		SYSREL	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release 0-31.
2	(2)	4		SWITCHES	Record switches.
		Byte	0		Record independent bit settings:
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-day clock.
		..1.	....		Reserved.
		....	1...		TIME macro instruction used.
		...x	.xxx		Unassigned.
		Byte	1		Record dependent bit settings for MCH records:
		1.xx	xxxx		Short form of record.
		01.x	xxxx		Record incomplete.
		001x	xxxx		System terminated.
		bits	3-7		Not used.
		Byte	1		Record dependent bit settings for CCH records.
		1...	...x		Operator message required.
		.1..	...x		Record incomplete.
		..1.	...x		System terminated.
		...1	...x		Channel unsupported or failed to log.
		....	1..x		Illegal channel/unit address.
		....	.1.x		Portion of data overlaid.
		....	..1x		Error recovery procedure in progress.
		Byte	1		Record dependent bit settings for OBR records:
		1..x	xxxx		Counter overflow or EOD.
		.1.x	xxxx		Temporary error.
		..1x	xxxx		Short OBR record.
		bits	3-7		Not used.
		Byte	2		Record dependent bit settings for MDR records:
		0000	0001		Record for IBM 3330 device.
		0000	0010		Record for IBM 2305-2 device.
		0000	0100		Record for IBM 3211 device.
		0000	1000		Record for IBM 2715 device.
		0001	0010		Record for IBM 2305-1 device.
		0000	0101		Record for IBM 3705 device.
		0000	0110		Record for IBM 3670 device.
		Byte	3		Not used.
6	(6)	1		RCDCNT	Record count:
		bits	0-3		Contain the sequence number of physical records.
		bits	4-7		Contain the total number of physical records in this logical record.

Figure 6. SYS1.LOGREC Environment Record Header Format (Part 1 of 2)

Offset Dec	Hex	Size(bytes) Alignment(bits)		Field Name	Description
7	(7)	1			Not used.
8	(8)	4		DATE	The date that the record was recorded onto SYS1.LOGREC.
12	(C)	4		TIME	The time that the record was recorded onto SYS1.LOGREC.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUID	CPU identifier.
22	(16)	2		MCELLNG	Maximum machine check extended logout area length.

Figure 6. SYS1.LOGREC Environment Record Header Format (Part 2 of 2)

Recording Channel Inboard (CCH) Records

CCH records are recorded on SYS1.LOGREC for every channel failure that does not terminate system operation. If a channel failure occurs during execution of a command or on the interruption following command execution, normal processing is suspended while the failure is handled by the I/O Supervisor. The I/O Supervisor passes control to the Channel Check Handler to analyze the failure and construct a data block containing the error information. This data block is put into a record buffer (holding three records) for recording on SYS1.LOGREC and control is returned to the I/O Supervisor.

If the failure is too severe to be handled by an error recovery procedure (ERP), only the initial data block will be put into the record buffer documenting the failure.

If the failure can be handled by an ERP, the initial data block and any data blocks that describe unsuccessful error recovery attempts by the ERP will be put into the record buffer to document the failing condition. When the Outboard Recorder gains control from the I/O Supervisor and there are any records in the buffer, it issues SVC 76 to write the data blocks onto SYS1.LOGREC as CCH records (Figure 6).

Channel Inboard (CCH) Record

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)	Field Name	Description
0	(0)	1	CLASRC	Class/Source:
		..1.		Channel Check Record.
		..1. 1...		SER1.
		..1. 1..1		SER0.
1	(1)	1	SYSREL	System/Release level:
		000x xxxx		OS.
		001x xxxx		DOS.
		010x xxxx		VS.
		011x xxxx		CP67.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	4	SWITCHES	Record switches:
		Byte 0		
		1...		More records follow.
		0...		Last record.
		.1..		Time-of-Day clock.
		..1.		EC mode.
		.... 1...		TIME macro used.
		...x .xxx		Unassigned.
		Byte 1		
		1...		Operator message required.
		.1..		Record incomplete.
		..1.		System terminated.
		...1		Channel unsupported or failed to log.
		.... 1...		Illegal channel and unit address.
		.... .1..		Portion of data overlaid.
		.... ..1.		ERP in progress.
		x		Unassigned.
		Bytes 2 and 3		Unassigned.
6	(6)	1	RCDCNT	Record count:
		bits 0-3		Contain the sequence number of physical record.
		bits 4-7		Contain the total number of physical records in this logical record.
7	(7)	1		Not used.
8	(8)	4	DATE	Date record was made. System date when failure occurred.
12	(C)	4	TIME	Time record was made. System time when failure occurred.
16	(10)	1	VERNO	Machine version code:
		xxxx xxx0		Version I CPUs.
		xxxx xxx1		Version II CPUs.
17	(11)	3	CPUSER	CPU serial number.
20	(14)	2	CPUID	CPU identifier.
22	(16)	2	MCELLNG	Maximum MCEL length. Maximum machine check extended logout area length.
24	(18)	8	JOBID	Job identification. Job name assigned to the job that was being executed at the time of the failure.
32	(20)	16	ACTIO	Active I/O units. A list of addresses of up to eight devices on the failing channel that were found to be busy (Device End outstanding). The list may include the address of the device associated with the failure.
48	(30)	8	CCW	Failing CCW. The CCW that was being executed at the time of the failure.

Figure 7. CCH Record Format (Part 1 of 2)

Offset Dec	Hex	Size(bytes) Alignment(bits)	Field Name	Description
56	(38)	8	CSWLWB	Contents of the CSW. The contents of the CSW that was stored following the detection of the I/O failure.
64	(40)	4	ECSW	The contents of the Extended Channel Status word or ERPIB for 28xx devices.
68	(44)	4	DEVTYPE	Device type. The type of device associated with the failure.
72	(48)	1	CHANID	Channel identity. The type of channel associated with the failure.
73	(49)	3	CUA	Channel and unit address. The channel and unit address of the I/O device associated with the failure.
76	(4C)	4	MPINFO	Multi-system information: Byte 0 xxx. .... Unassigned. ...1 .... Multi-system feature present. .... x... Identity of failing CPU (0 = 1,1 = 2). .... .x.. Unassigned. .... ..00 CPU status - normal multi-system shared status. .... ..01 CPU status - partitioned mode. .... ..10 CPU status - 65 mode. Byte 1 Not used. Bytes 2 and 3 Byte 2 - CPU 1. Byte 3 - CPU 2. In each byte, there is one bit for each of the 7 possible channels.
80	(50)	4	TIOADDR	Unit address as stored by system in location 184. See 'Note' for CHNLOG field.
84	(54)	variable	CHNLOG	Machine dependent channel log. The channel logout associated with the failure that caused the channel check. Logout size is model and channel dependent: **Channel** **Length (bytes)** 2860 24 2870 24 2880 112 135 24 145 96 155 0 **Note:** For the 2860, 2870, and 2880 channels there is no TIOADDR field. The CHNLOG field begins at displacement 80.

Figure 7. CCH Record Format (Part 2 of 2)

Recording Dynamic Device Reconfiguration (DDR) Information

DDR information is recorded on SYS1.LOGREC for each operator or system initiated swap between IBM 3330 disk drives. The system requests DDR after a permanent I/O error has occurred. The operator may request DDR at any time by issuing the SWAP command.

DDR invokes the 3330 DDR Recorder to build a complete record using the sense and statistical data from the 3330 record buffer for each IBM 3330 disk drive involved in the swap. After the record is built, the 3330 DDR Recorder issues SVC 76 to write an MDR-type record (Figure 8) onto SYS1.LOGREC.

MDR-Type Record Formatted by DDR

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)	Field Name	Description
0	(0)	1	KEY	Record key:
		1..1		Miscellaneous data record formatted by DDR.
1	(1)	1	RELEASE	System/Release level:
		000x xxxx		OS.
		001x xxxx		DOS.
		010x xxxx		VS.
		011x xxxx		CP67.
		bits 3-7		
		0-1F		Release level 0-31.
2	(2)	2		Not used.
4	(4)	1	RECORDID	Record identification switch:
		1		IBM 3330.
5	(5)	1	TIMESW	Time switch:
		.... 1...		TIME macro used.
6	(6)	1		Not used.
7	(7)	1	RECENTRY	Record type identifier.
8	(8)	4	DATE	Date record was made. System date when incident occurred.
12	(C)	4	TIME	Time record was made. System time when incident occurred.
16	(10)	1	VERNO	Machine version code:
		xxxx xxx0		Version I CPUs.
		xxxx xxx1		Version II CPUs.
17	(11)	3	CPUSER	CPU serial number.
20	(14)	2	CPUID	CPU identifier.
22	(16)	2	MCELLNG	Maximum machine check extended logout area length.
24	(18)	2	CUA	CUA associated with swap.
26	(1A)	6	VOLSER	Volume serial identifier of volume on swap device.
32	(20)	24	SENSE1	Sense data. Sense and statistical information supplied by the 3330 record buffer.

Figure 8. MDR-Type Record Format

Recording Machine Check (MCH) Records

MCH records are recorded on SYS1.LOGREC whenever a machine failure occurs in the CPU, main storage, or control storage. When a machine failure occurs, the Machine Check Handler will get control via a machine-check interrupt.

If the machine-check interrupt is for a "soft" failure (one that was corrected by the hardware retry features), the Machine Check Handler collects and formats the information describing the failure. When the information is formatted, control is passed to the Machine Check Error Recorder which writes the information to the SYS1.LOGREC as an MCH record (Figure 9).

If the machine-check interrupt is for a "hard" failure (one that could not be corrected by the hardware retry features), the Machine Check Handler analyzes the failure to determine if it should result in system termination.

If the failure will result in system termination, the Machine Check Handler collects and formats the information describing the failure. When the information is formatted, control is passed to the Emergency Machine Check Recorder which writes the record on SYS1.LOGREC (Figure 9). Byte 3 of the record indicates that the failure resulted in system termination.

If the failure will not result in system termination, the Machine Check Handler treats it like a "soft failure".

Machine Check (MCH) Record

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Class/Source:
		...1	....		MCH record.
		...1	..1.		Converted MCH.
		...1	1...		SER1.
		...1	1..1		SER0.
		...1	1.1.		Converted SER1.
		...1	1.11		Converted SER0.
1	(1)	1		SYSREL	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release level 0-31.
2	(2)	4		SWITCHES	Record switches:
		Byte	0		
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-Day clock and IBM System/370.
		..1.	....		Reserved.
		....	1...		TIME macro used.
		....	...1		EC mode for PSW.
		...x	xxxx		Unassigned.
		Byte	1		
		1...	....		Short form of record.
		.1..	....		Record incomplete.
		..1.	....		System terminated.
		...1	....		First record of two record recording.
		....	1...		Channel record included.
		....	.1..		Portion of data overlaid.
		....	..1.		External machine check.
		....	...x		Unassigned.
		Bytes	2 and 3		Unassigned.
6	(6)	1		RCDCNT	Record count:
		bits	0-3		Contain the sequence number of a physical record.
		bits	4-7		Contain the total number of physical records in this logical record.
7	(7)	1			Not used.
8	(8)	4		DATE	The system date when the failure occurred.
12	(C)	4		TIME	Time record was made. System time when failure occurred.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUID	CPU identifier.
22	(16)	2		MCELLNG	Maximum machine check extended logout area length.
24	(18)	8		PROGID	The module name of the program being processed and/or requesting service at the time of the failure.
32	(20)	8		JOBID	The name assigned to the job being executed at the time of the failure.
40	(28)	8		PSW	The machine check old PSW.
48	(30)	variable		LOGOUT	Register contents and hardware logout information. Logout size and format is machine dependent.
		variable		DAMAGE	Recovery Management Support's assessment of damage to the system.

Figure 9. MCH Record Format

Recording Miscellaneous Data (MDR) Records

MDR records are recorded on SYS1.LOGREC whenever the following conditions occur:

- Device failures on IBM 2715, 3211, 3270, 3670, and 3705 devices.
- Buffer overflow on IBM 2305 and 3330 devices.
- Demounts (EOD, CLOSE/EOV and deallocate) involving IBM 2305 and 3330 devices.
- Demounts between IBM 3330 disk drives by the IEHDASDR utility program.

Device Failures and Buffer Overflow: If the failure or buffer overflow occurs on an IBM 2305, 3211, 3270, 3330, 3670, or 3705 device, the I/O Supervisor passes control to a device-dependent error recovery procedure (ERP) which analyzes the failure, attempts to recover from it, and builds a complete record describing the failure in the device's record buffer. After the ERP builds the record, it passes control to the Miscellaneous Data Recorder which re-formats the record and issues SVC 76 to write it to SYS1.LOGREC as an MDR record (Figure 9).

If the failure or buffer overflow occurs on an IBM 2715 device, the I/O Supervisor passes control to a device-dependent ERP which analyzes the failure, attempts to recover from it, and builds an incomplete record describing the failure in its own buffer. After the ERP builds the record, it passes control to the Miscellaneous Data Recorder. The Miscellaneous Data Recorder adds the information found at bytes 6 to 24 in the record (Figure 9), reformats the record, and issues SVC 76 to write it to SYS1.LOGREC as an MDR record.

Demounts: An EOD, CLOSE/EOV, or deallocate demount involving an IBM 2305 or 3330 device causes the master scheduler or I/O Supervisor to invoke SVC 91. SVC 91 formats the sense data from the 2305 or 3330 record buffer into a record and issues SVC 76 to write it on SYS1.LOGREC as an MDR record.

When the IEHDASDR utility program detects two 3330 volumes with the same VOLID online, the one mounted last is made not ready, and SVC 91 is issued to document the event. SVC 91 formats the sense data from the 3330 record buffer into an MDR record and issues SVC 76 to write it on SYS1.LOGREC.

Miscellaneous Data (MDR) Record

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Class/Source:
		1..1	....		MDR record formatted by DDR or SVC 91.
		1..1	...1		Converted miscellaneous data record.
1	(1)	1		SYSREL	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release level 0-31.
2	(2)	4		SWITCHES	Record switches:
		Byte	0		
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-Day clock.
		..1.	....		Reserved.
		....	1...		TIME macro used.
		...x	.xxx		Unassigned.
		Byte	1		Not used.
		Byte	2		
		....	...1		IBM 3330.
		....	..1.		IBM 2305-2.
		....	.1..		IBM 3211.
		....	..11		IBM 3270.
		....	1...		IBM 2715.
		...1	..1.		IBM 2305-1.
		....	.1.1		IBM 3705.
		....	.11.		IBM 3670.
		Byte	3		Not used.
6	(6)	1		RCDCNT	Record count:
		bits	0-3		Contain the sequence of a physical record.
		bits	4-7		Contain the total number of physical records in this logical record.
7	(7)	1			Not used.
8	(8)	4		DATE	Date record was made. System date when incident occurred.
12	(C)	4		TIME	Time record was made. System time when incident occurred.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUID	CPU identifier.
22	(16)	2		MCELLNG	Maximum machine check extended logout area length.
24	(18)	variable		DEVDEP	Device dependent information. The device dependent data supplied by the ERP for error recording.

Figure 10. MDR Record Format

Recording Outboard (OBR) Records

OBR records are recorded on SYS1.LOGREC for:

- Paging errors on direct access devices with page data sets.
- Statistical counter overflows and end-of-day requests.
- TCAM device failures and TCAM statistics counter overflow.
- Temporary failures on IBM 2305 and 3330 devices.
- Unit check errors on RES supported devices.
- 3400 demount requests (CLOSE/EOV, EOD, deallocate, and DDR swap).

Device and Channel Failures

Permanent Failures: If a channel or device failure occurs during execution of a command, or on the interruption following command execution, normal processing is suspended while the failure is handled by the I/O Supervisor. The I/O Supervisor passes control to the Channel Check Handler to analyze the failure and construct a data block containing the information in the record that will be written on SYS1.LOGREC.

If the Channel Check Handler determines that a system termination condition does not exist, it returns control to the I/O Supervisor. The I/O Supervisor then passes control to an ERP to retry the failure.

If the ERP cannot retry the channel or device failure (because the failure is not retryable or because it has already been tried the specified number of times), it passes control sequentially to the following routines: The WTO routine to issue a message declaring the error to be permanent (uncorrectable). The Statistics Update routine to update the statistics counter for the device. The Outboard Recording routine to format a long OBR record (Figure 12) and issue SVC 76 to write the record to SYS1.LOGREC.

Temporary failures: If a temporary failure (bus out, equipment check, or overrun condition) occurs on an IBM 2305 or 3330 device, the I/O Supervisor schedules a device dependent ERP to retry the error. The ERP passes control the the Outboard Recording routine to format a long OBR record (Figure 12) and to issue SVC 76 to write the record to SYS1.LOGREC.

Overflow and End-of-Day Recording

Counts of the number of times I/O devices have failed are not maintained directly on the SYS1.LOGREC data set. Instead, intermediate counters are used. The intermediate counters are contained in a main storage table called the device statistics table. (Intermediate counters for IBM 2305 and 3330 devices are kept in the device's error recording buffer, and are updated by the device. An overflow condition causes the information to be recorded on SYS1.LOGREC as an MDR record.) There is one entry in the statistics table for every I/O device in the system. When an I/O error recovery procedure (ERP) determines that a device failure has occurred, it stores the sense bit settings it obtains in the statistics table entry for the failing device. After the ERP has corrected the error, or determined that it is permanent, it passes control to the Statistics Update routine. The Statistics Update routine examines the sense bit settings and increments the appropriate counter in the statistics table.

When any counter in the statistics table reaches its maximum setting (usually 15), the Outboard Recording routine is called. The Outboard Recording routine formats a short OBR record (Figure 11) and issues SVC 76 to write the record to SYS1.LOGREC. Byte 3 of the short OBR record indicates that the record was written because of counter overflow.

Whenever the operator issues a HALT EOD command, the master scheduler invokes SVC 76 to search for non-zero statistic counters describing all devices except the IBM 2305, 3330, and 3400 devices (MDR records describe EOD statistics for IBM 2305 and 3330 devices). The value in each non-zero statistic counter is formatted into a record, and SVC 76 writes the record onto SYS1.LOGREC as a short OBR record. For IBM 3400 tape devices SVC 76 issues a SVC 91 to format the environmental and statistical information describing each available tape device into a record. SVC 91 issues SVC 76 to write the record onto SYS1.LOGREC as a long OBR record (Figure 12). Byte 3 of the OBR record indicates that the record was written because of an end-of-day request.

Paging Errors

When a failure occurs while paging to the page data set contained on a direct access device, the I/O Supervisor schedules a direct access ERP to retry the error and document the failure. The data is formatted into a long OBR record (Figure 12) and SVC 76 is issued to write the record to SYS1.LOGREC.

RES Recording

When a system includes RES (Remote Entry Services), records are written describing unit check conditions that occur on RES supported control units and remote devices (for example, IBM System/3, Model 1130, and 2770). RTAM, the Remote Terminal Access Method for RES, builds a long OBR record for SYS1.LOGREC and a WTO message for the central operator. When the RTAM Subtask subroutine gains control from the operating system, it issues the WTO message to the central operator and issues SVC 76 to write the record on SYS1.LOGREC for RES.

TCAM Recording

For each terminal in a system, TCAM provides two 2-byte counters. The first counter keeps track of the number of SIO commands issued to the terminal. The second counter provides a count of all failing incidents at the terminal and a count of selective failures. Both counters are updated by the terminal ERPs. Whenever one of the counters reaches its maximum value, the Outboard Recording routine is called. The Outboard Recorder formats an OBR record indicating that counter overflow occurred for TCAM and issues SVC 76 to write the record to SYS1.LOGREC.

Whenever a permanent or temporary device failure occurs on a TCAM terminal, the TCAM ERP will give control to the Outboard Recording routine. The Outboard Recording routine will format an OBR record describing the error, and issue SVC 76 to write the record to SYS1.LOGREC.

3400 Demount Recording

For every operator or system initiated DDR swap, CLOSE/EOV, or deallocate condition involving IBM 3400 tape devices, a record describing the demount tape drive is made. DDR invokes SVC 91 to format the environmental and statistical data describing the device into a record. SVC 91 then issues SVC 76 to write the record onto SYS1.LOGREC as a long OBR record.

Outboard (OBR) Record -- (Short form)

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Class/Source:
		..11	....		OBR (Unit Check) record.
		..11	..1.		Converted OBR.
		..11	.1..		TP access method (TCAM).
1	(1)	1		SYSREL	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release level 0-31.
2	(2)	4		SWITCHES	Record switches:
		Byte	0		
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-day clock.
		..1.	....		Reserved.
		....	1...		TIME macro used.
		...x	.xxx		Unassigned.
		Byte	1		
		1...	....		EOD record.
		.1..	....		Temporary error (counter overflow).
		..1.	....		Short record.
		...1	....		MP system.
		....	1...		CPU B (MP system).
		....	.1..		Volume demount.
		....	..x.		Reserved.
		....	...x		Unassigned.
		Bytes	2 and 3		Unassigned.
6	(6)	1		RCDCNT	Record count:
		bits	0-3		Contain the sequence number of a physical record.
		bits	4-7		Contain the total number of physical records in this logical record.
7	(7)	1			Not used.
8	(8)	4		DATE	Date record was made. System date when failure occurred.
12	(C)	4		TIME	Time record was made. System time when failure occurred.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUID	CPU identifier.
22	(16)	2		SDRCNT	Number of bytes of statistical data starting at offset 32.
24	(18)	4		DEVTYPE	Device type. The device associated with the failure.
28	(1C)	1			Not used.
29	(1D)	3		CUA	Channel and unit address. The address of the channel and unit being used when the failure occurred.
32	(20)	variable		SDRINF	Statistical counters from the device statistics table.

Figure 11. Short OBR Record Format

Outboard (OBR) Record -- (Long form)

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Class/Source:
		..11	....		OBR (Unit Check) record.
		..11	..1.		Converted method (TCAM).
		..11	.1..		TP access method (TCAM).
1	(1)	1		SYSREL	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release level 0-31.
2	(2)	4		SWITCHES	Record Switches:
		Byte	0		
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-day clock.
		..1.	....		Reserved.
		....	1...		TIME macro used.
		...x	.xxx		Not used.
		Byte	1		
		1...	....		EOD recording.
		.1..	....		Temporary error.
		..1.	....		Short record.
		...1	....		MP system.
		....	1...		CPU B (MP system).
		....	.1..		Volume demount.
		....	..x.		Reserved.
		....	...x		Unassigned.
		Bytes	2 and 3		Unassigned.
6	(6)	1		RCDCNT	Record count:
		bits	0-3		Contain the sequence number of a physical record.
		bits	4-7		Contain the total number of physical records in this logical record.
7	(7)	1			Not used.
8	(8)	4		DATE	Date record was made. System date when failure occurred.
12	(C)	4		TIME	Time record was made. System time when failure occurred.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUID	CPU identifier.
22	(16)	2		MCELLNG	Maximum machine check extended logout area length.
24	(18)	8		JOBID	Job identification. Jobname assigned to the job at the time of failure.
32	(20)	8		FAILCCW	Failing CCW. The CCW that was being executed at the time of the failure.
40	(28)	8		CSW	Contents of CSW. The contents of the CSW that was stored following the detection of the I/O error.

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

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)	Field Name	Description
48	(30)	1	DEVDEPC	Data count. The count of doublewords that are used in the record for device dependent data.
49	(31)	3	SECUA	Secondary channel and unit address. The address of the I/O device associated with the final retry.
52	(34)	4	DEVTYPE	Device type. The device associated with the failure.
56	(38)	1	SDRCNT	Number of SDR bytes in record.
57	(39)	3	PCUA	Primary channel and unit address. The addresses of the channel and unit being used when the failure occurred. If the unit is an IBM 2314 or 3330, this field contains physical addresses.
60	(3C)	2	IORETRY	I/O retries. The number of I/O retries attempted for this failure.
62	(3E)	2	SENSCNT	Sense byte count. The length of the sense byte field.
64	(40)	variable	DEVDEP	Device dependent information and data.
		variable	SDRINF	Statistical data counter area. The area containing statistical counter data from the device statistics table.
		variable	SENSE	Sense data. The sense information that was obtained as a result of the failure.

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

System Initialization (IPL) and System Termination (EOD) Recording

IPL and EOD records are recorded on SYS1.LOGREC only if the Reliability Data Extractor (RDE) option has been included during system generation. The IPL record is recorded for each master scheduler initialization of the system and contains information related to the initialization. The EOD record is recorded whenever the operator issues a HALT EOD command.

Specifying RDE During System Generation

To include the RDE option in your system, specify the keyword RDE in the OPTIONS= parameter of the system generation CTRLPROG macro instruction as follows:

```
CTRLPROG ...,OPTIONS=( ...,RDE,... )
```

See the publications **OS/VS1 System Generation Reference**, GC26-3791, or **OS/VS2 System Generation Reference**, GC26-3792, for a complete description of the CTRLPROG macro instruction.

IPL Recording

IPL records are formatted and recorded on SYS1.LOGREC by SVC 76 during master scheduler initialization of the operating system. SVC 76 formats the record from information supplied by the operator when he replies to the 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 device or program (subsystem) that was responsible for the restart.

The operator should reply to message IFB010D by entering the REPLY command as follows:

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

id

The identifier of the message IFB010D.

rr

The IPL reason codes; the reason for starting or restarting the system (Figure 13).

ss

The subsystem ID codes used with the IPL reason codes IE, IM, CE, and ME (Figure 14). The subsystem code for all other IPL reason codes is 00.

Code	Reason	Description
NM	Normal	Normal system initialization.
IE	IBM hardware/programming problem, CE/SE not required.	System restarted after a stop caused by a hardware failure or IBM programming problem, and a CE/SE was not required.
IM	IBM hardware/programming problem, CE/SE required.	System restarted after a stop caused by hardware failure or IBM programming problem, and it was necessary for a CE/SE to perform corrective maintenance.
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 system control program or programming product failed in such a way as to cause a system restart.
EN	Environmental	A failure other than hardware/software or operational caused the system to be restarted (power failure, air conditioning, etc.).
CE	CE/SE has the system	System restarted at the request of the CE/SE to perform corrective maintenance.

Figure 13. IPL Reason Codes

ID	Subsystem Name	Components
00	Null	Subsystem is unkown or the subsystem code is not required by the reason code.
10	Processor	CPU, channels (for example, IBM 2860, 2870, 2880), storage units, operator consoles (for example IBM 1052, 2150).
20	Direct access	For example: IBM 2314 or 3330.
30	Other	All devices other than those specified under other subsystem IDs (for example IBM 2911, 2914, paper tape).
40	Tape	IBM 24XX, 2803, 2816, 3420, 3803.
50	Card/Print	IBM 2821, 1403, 1442, 2540, 2520, 2501, 3811, 3211.
60	MICR/OCR	IBM 1419, 1287, 1288.
70	Teleprocessing	IBM 2701, 2702, 2703.
80	Graphics/Display /Audio	IBM 2840, 2250, 2848, 2260, 7770, 7772.
90	IBM System Control Program	IBM programming system.
91	IBM Programming Product	IBM programming products such as FORTRAN, COBOL, or RPG.

Figure 14. Subsystem ID Codes

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

```
IFB020I  INVALID REPLY TO IFB010D
```

The message IFB010D will then be repeated and the operator can enter the REPLY command with the proper codes, or he can enter the REPLY command as follows:

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

id

The identifier of the message IFB010D.

U

Assume the default values.

Restart will continue after either a valid or 'U' reply; in the case of a 'U' reply, the IPL record will be formatted with zeros in the subsystem ID field and a X'DF' in the IPL reason field.

IPL Record Format

When the operator's reply to message IFB010D is accepted, an IPL record containing the information supplied by the operator and additional information supplied by SVC 76 is written to SYS1.LOGREC. Figure 15 shows the format of the IPL record on SYS1.LOGREC.

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Class/Source:
		.1.1	....		IPL Record.
1	(1)	1		OPSYS	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release level 0-31.
2	(2)	4		SWITCHES	Record switches:
		Byte	0		
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-Day clock.
		..1.	....		Reserved.
		....	1...		TIME macro used.
		...x	.xxx		Unassigned.
		Bytes	1 and 2		Not used for IPL record.
		Byte	3		Incremental release number.
6	(6)	2			Not used.
8	(8)	4		DATE	The date the record was made.
12	(C)	4		TIME	The time the record was made.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUMODEL	CPU identifier.
22	(16)	2		MCELLNG	Maximum machine check extended logout area length.
24	(18)	1		SUBSYSID	The type of device or program that caused the restart. See Figure 14.
25	(19)	3			Not used.
28	(1C)	2		REASON	The reason for the IPL. See Figure 13.
30	(1E)	2			Not used.
32	(20)	7		CHANASSN	The channel types in the system.
39	(27)	1		RDESWTICH	RDE switch:
		xxxx	xxx1		RDE in system.
40	(28)	4		HIGHADDR	The address of the last valid byte of storage found at IPL time.
44	(2C)	4			Not used.

Figure 15. IPL Record Format

EOD Recording

The EOD record is formatted and recorded on SYS1.LOGREC by SVC 76 when the operator enters the HALT EOD command. The HALT EOD command is usually issued before the following conditions:

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

Figure 16 shows the format of the EOD record on SYS1.LOGREC.

Offset Dec	Offset Hex	Size(bytes) Alignment(bits)		Field Name	Description
0	(0)	1		CLASRC	Class/Source:
		1...	....		EOD Record.
1	(1)	1		OPSYS	System/Release level:
		000x	xxxx		OS.
		001x	xxxx		DOS.
		010x	xxxx		VS.
		011x	xxxx		CP67.
		bits	3-7		
		0-1F			Release level 0-31.
2	(2)	4		SWITCHES	Record switches:
		Byte	0		
		1...	....		More records follow.
		0...	....		Last record.
		.1..	....		Time-of-Day clock.
		..1.	....		Reserved.
		....	1...		TIME macro used.
		...x	.xxx		Unassigned.
		Bytes	1 and 2		Not used for EOD record.
		Byte	3		Incremental release number.
6	(6)	2			Not used.
8	(8)	4		DATE	The date the record was made.
12	(C)	4		TIME	The time the record was made.
16	(10)	1		VERNO	Machine version code:
		xxxx	xxx0		Version I CPUs.
		xxxx	xxx1		Version II CPUs.
17	(11)	3		CPUSER	CPU serial number.
20	(14)	2		CPUMODEL	CPU identifier.
22	(16)	2		MCELLNG	Maximum machine check extended logout area length.

Figure 16. EOD Record Format

Part 4: Retrieving and Writing the Records on the SYS1.LOGREC Data Set (IFCEREP0)

You can retrieve and examine the records on the SYS1.LOGREC data set by using the environment recording, edit, and print service aid (IFCEREP0). You can use IFCEREP0 to perform the following functions:

- Edit records on the SYS1.LOGREC data set and write the edited records to a specified output device.
- Summarize the records on the SYS1.LOGREC data set and write the summaries to a specified output device.
- Collect records from the SYS1.LOGREC data set and write the collected records onto an accumulation data set to provide comprehensive error statistics.
- Edit records on the accumulation data set and write edited records to a specified output device.
- Collect records from the SYS1.LOGREC data set and write the collected records onto a measurement data set; the measurement data set is used as input for the IFCEREP0 summary function.
- Use the IFCEREP0 summary function to process the records on the measurement data set to produce an IPL report - containing comprehensive information on the reasons for system initializations - and an error data report - containing error statistics for device failures.
- Process the records on the SYS1.LOGREC data set to produce error statistics for the IBM 3410 and 3420 tape devices.

Running and Controlling IFCEREP0

You run and control IFCEREP0 by job control statements and by specifying keyword parameters on the EXEC statement of your IFCEREPO procedure; no user or utility control statements are needed.

Job Control Statements

Figure 17 shows the job control statements necessary for running IFCEREP0.

Statement	Usage
JOB Statement	This statement initiates the job.
EXEC Statement	This statement specifies the program name and keyword parameters necessary to control the function of the program.
SERLOG DD Statement	This statement defines the input data set as being the SYS1.LOGREC data set. Either a SERLOG DD statement or the ACCIN DD statement must be included for each application of the IFCEREP0 program.
ACCIN DD Statement	This statement defines the input data set as being an accumulation data set. Either an ACCIN DD statement or the SERLOG DD statement must be included for each application of the IFCEREP0 program.
EREPPT DD Statement	This statement defines the edited output data set. It must be included whenever edited output is needed.
ACCDEV DD Statement	This statement defines an accumulated output data set. The accumulated data set can reside on a magnetic tape or a direct access device. Space must be allocated for a new output data set that is to reside on a direct access volume. Space cannot be allocated for an existing output data set.
MEASURE DD Statement	This statement defines the measurement data set as being input to the IFCEREP0 Summary function.

Notes:

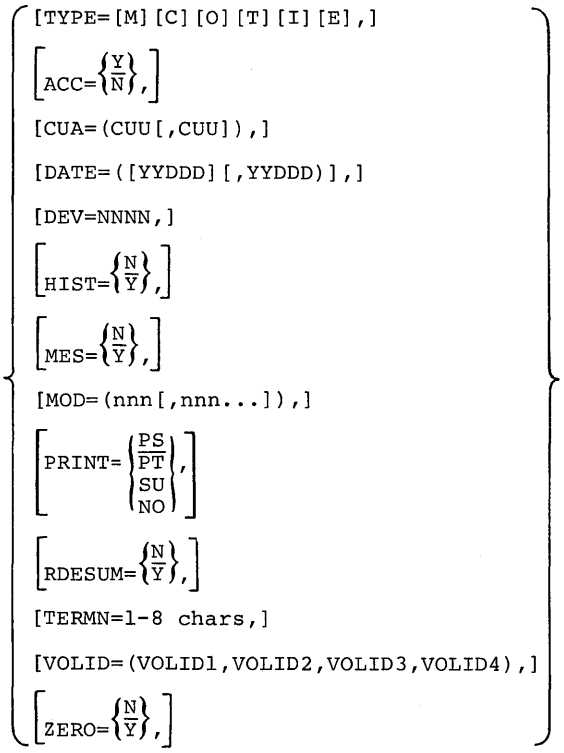
The SERLOG, ACCIN, EREPPT, MEASURE, and ACCDEV DD statements define sequential data sets.

If records produced on different machine models and operating systems are to be processed, a JOBLIB DD statement is required to define the different system's link library. Each system's link library will contain the needed IFCEREP0 modules for processing the record produced by the system.

Figure 17. IFCEREP0 Job Control Statements

Keyword Parameters for IFCEREP0

You can specify the following keyword parameters to control the functions of the IFCEREP0 program.



TYPE

specifies the type of records to be processed.

Code	Meaning
M	Machine-check records
C	Channel inboard records
O	I/O outboard records
T	T-type (miscellaneous data) records
I	IPL records
E	EOD records

A combination of records can be specified. For example, PARM='TYPE=MC,...' If no record type is specified, all record types are processed.

ACC

indicates whether selected records are to be accumulated in a accumulation data set. If ACC=Y is coded, ZERO=Y must be coded if the input data set is SYS1.LOGREC.

CUA (maximum of two)

indicates that the selected record types that are related to the specific channel(s) and unit(s) are to be processed.

DATE (maximum of one set)

indicates that all of the selected record types generated within a specifiec period of calendar time are to be processed. The date is written yyddd yyddd where the first yyddd represents the year and the day (of the year) when the time period begins and the second yyddd represents the year and day when the period ends.

If no date is specified, all selected records are processed regardless of when they are generated.

DEV (maximum of one)

indicates that selected record types that are related to a specific device type are to be processed.

If DEV is not specified, all selected records (as specified in the TYPE subparameter) are processed regardless of the device type.

If DEV=3410 or DEV=3420 is specified, both devices will be included in the report.

HIST

indicates whether the input data set is an accumulation data set. If HIST=Y is coded, the input data must be defined with an ACCIN DD statement.

If HIST is not coded, HIST=N is assumed and the input data set will be the SYS1.LOGREC data set.

MES

indicates that error statistics for specific volume/serials are to be summarized and printed. This parameter is valid only for the IBM 3410 and 3420 tape subsystems, when "TYPE=O" is coded, or when no record type is specified.

MOD

indicates that all records created on the model or models specified are to be processed. The operand is to be right justified and may be up to three digits in length.

PRINT

indicates how records are to be processed and written.

Code	Meaning
SU	Suppress full printing (print summary only).
PT	Suppress summary printing (print full record only).
NO	Suppress full printing and summary printing.
PS	Print full record and summary.

RDESUM

indicates that the IFCEREP0 summary function for RDE records is to be run. The summary function produces an IPL report and a hardware error report. This parameter can be coded only if RDE has been selected during system generation. For a complete explanation of RDE see Part 3 of this publication.

TERMN

indicates that OBR and TCAM records are to be selected by terminal name. Up to eight characters may be specified.

If TERMN is not coded, all terminal names are selected.

VOLID

indicates specific volumes for media error statistics (MES) processing. A maximum of four volumes can be specified. If this parameter is not coded and MES=Y is coded, all volumes will be processed.

If no model numbers are specified, all models are accepted for processing.

ZERO

indicates whether input records in the SYS1.LOGREC data set are to be cleared with hexadecimal zeros after they are processed. Records cannot be cleared to zeros in the accumulation set.

Note: It is possible to use the same operating system on several machines. Before moving the system packs to another machine, the operator must use the IFCEPEP0 program to copy the SYS1.LOGREC data set to tape so that the environmental data can later be related to the system that generated it.

Keyword Parameter and Job Control Statements Conflicts

The following keyword parameter specifications and job control statements will not be accepted by the IFCEREP0 program.

- Coding ZERO=Y and PRINT=SU without supplying an ACCDEV DD statement to build or update the accumulation data set.
- Coding ZERO=Y when the device specified on the ACCIN DD statement is the accumulation data set.
- Specifying a starting date that is more recent than the ending date in the DATE= keyword field.
- Coding ACC=Y and not coding ZERO=Y when the input data set is SYS1.LOGREC.
- Coding HIST=Y and not defining the input data set with an ACCIN DD statement.

Editing and Writing Records Collected on SYS1.LOGREC

You can use IFCEREP0 to retrieve selected records from SYS1.LOGREC, edit them, and write them to a specified output device. After the record is written to the specified output device, it is cleared to zeros if you specify ZERO=Y on the IFCEREP0 EXEC statement. IFCEREP0 will process any record type or combination of record types.

Example 1: Printing all Records on SYS1.LOGREC

In this example:

- All records on SYS1.LOGREC are edited and written to the printer in a full record format.
- The records on SYS1.LOGREC are zeroed to clear SYS1.LOGREC.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='PRINT=PT,ZERO=Y,ACC=N'
//SERLOG    DD    DSNAME=SYS1.LOGREC,DISP=(OLD,KEEP)
//EREPPT    DD    SYSOUT=A
```

Control Statements for Example 1

The EXEC statement specifies (1) that all records are to be processed, (2) the type of printout (full record), (3) the records that were processed are to be zeroed, and (4) that no accumulation is to take place.

The SERLOG DD statement defines the input (SYS1.LOGREC) data set.

The EREPPT DD statement defines the edited output (tape) data set.

Example 2: Writing Machine Check Records onto a 9-Track Magnetic Tape

In this example:

- Date-dependent machine check records are edited and written onto a 9-track magnetic tape, in full record format at a density of 800 bits per inch.
- The machine check records on SYS1.LOGREC are zeroed.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='TYPE=M,PRINT=PT,
//                DATE=(62110,62117),ZERO=Y,ACC=N'
//SERLOG    DD    DSNAME=SYS1.LOGREC,DISP=(OLD,KEEP)
//EREPPT    DD    DSNAME=ERRDATA,UNIT=2400,LABEL=(,NL),
//                DCB=(DEN=2),DISP=(NEW,CATLG)
```

Control Statements for Example 2

The EXEC statement specifies (1) that machine check records are to be processed, (2) the type of printout (full record), (3) the date of the machine check records to be processed, (4) machine check records on SYS1.LOGREC are to be zeroed, and (5) no accumulation is to take place.

The SERLOG DD statement defines the input (SYS1.LOGREC) data set.

The EREPPT DD statement defines the edited output (tape) data set.

Summarizing the Records Collected on SYS1.LOGREC

You can use IFCEREP0 to extract data from selected records on SYS1.LOGREC and print the data in the form of a summary. The summary will contain error statistics by device for each particular record type that you specify.

Example 3: Printing Summaries of MCH and IPL Records from SYS1.LOGREC

In this example:

- Error statistics for machine check and IPL records are printed in a summary format.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='TYPE=MI,PRINT=SU,ACC=N'
//SERLOG    DD    DSNAME=SYS1.LOGREC,DISP=(OLD,KEEP)
//EREPPT    DD    SYSOUT=A
```

Control Statements for Example 3

The EXEC statement specifies (1) that machine check and IPL records are to be processed, (2) the type of printout (summary only), and (3) no accumulation is to take place.

The SERLOG DD statement defines the input (SYS1.LOGREC) data set.

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

Accumulating Records Collected on SYS1.LOGREC

You can use IFCEREP0 to select records from the SYS1.LOGREC data set or an existing accumulation data set and write them to an accumulation data set. Any record type or combination of record types can be accumulated; this allows you to use the accumulation data set to provide error statistics for specific types of records. In addition, the SYS1.LOGREC data set can be cleared to zeros by writing its contents to the accumulation data set and by then zeroing the records on SYS1.LOGREC.

Example 4: Accumulating CCH Records

In this example:

- Channel inboard records on the SYS1.LOGREC data set are written to an accumulation data set.
- The inboard records on SYS1.LOGREC are zeroed.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='TYPE=C,PRINT=NO,ZERO=Y'
//SERLOG    DD    DSNAME=SYS1.LOGREC,DISP=(OLD,KEEP)
//ACCDEV    DD    DSNAME=HISTRYIN,DISP=(OLD,CATLG)
```

Control Statements for Example 4

The EXEC statement specifies (1) that channel inboard records are to be processed, (2) the records should not be printed or summarized, (3) the records should be accumulated, and (4) the inboard records on SYS1.LOGREC are to be zeroed.

The SERLOG DD statement defines the input (SYS1.LOGREC) data set.

The ACCDEV DD statement defines the output (accumulation) data set.

Example 5: Accumulating MCH Records from an Accumulation Data Set

In this example:

- Machine check records in an accumulation data set are moved to a second accumulation (output) data set.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='TYPE=M,PRINT=NO,HIST=Y'
//ACCIN     DD    DSNAME=HISTRYIN,DISP=(OLD,CATLG)
//ACCDEV    DD    DSNAME=EXISTACC,DISP=(MOD,CATLG)
```

Control Statements for Example 5

The EXEC statement specifies (1) that machine check records are to be processed, (2) the records should not be printed or summarized, (3) the records should be accumulated, and (4) an accumulation data set is the input data set.

The ACCIN DD statement defines the input (accumulation) data set.

The ACCDEV DD statement defines the output (accumulation) data set.

Editing and Writing Records Collected on an Accumulation Data Set

You can use IFCEREP0 to retrieve selected records from the accumulation data set, edit the records, and write them to a selected output device. IFCEREP0 will process any record type or combination of record types on the accumulation data set.

Example 6: Printing IPL and EOD Records from an Accumulation Data Set

In this example:

- IPL and EOD records on an accumulation data set are edited and written in a full record and summary format.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='TYPE=IE,HIST=Y'
//ACCIN     DD    DSNAME=HISTRYIN,DISP=(OLD,CATLG)
//EREPPT    DD    SYSOUT=A
```

Control Statements for Example 6

The EXEC statement specifies (1) that IPL and EOD records are to be processed, (2) the type of printout (full record and summary), and (3) that an accumulation data set is the input data set.

The ACCIN DD statement specifies the input (accumulation) data set.

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

Writing Records from SYS1.LOGREC to a Measurement Data Set

If you have specified RDE as a system generation option, you can use IFCEREP0 to write records from SYS1.LOGREC to a measurement data set; the measurement data set is used as input to the IFCEREP0 summary function. Records should always be written to the measurement data set, in time order sequence, on the same magnetic tape volume. To clear the SYS1.LOGREC data set, when RDE is in the system, you must first write the records on SYS1.LOGREC to the measurement data set and then write the records on SYS1.LOGREC to the printer or to your accumulation data set.

Example 7: Updating the Measurement Data Set

In this example:

- All records on SYS1.LOGREC are written to the measurement data set.
- All records on SYS1.LOGREC are summarized and written to the printer.
- The SYS1.LOGREC data set is cleared.

```
//JOBA       JOB
//STEP1      EXEC   PGM=IFCEREP0,PARM='ACC=N,ZERO=Y'
//SERLOG     DD     DSNAME=SYS1.LOGREC,DISP=(OLD,KEEP)
//EREPPT     DD     SYSOUT=A
//MEASURE    DD     DSNAME=EREPTAPE,UNIT=2400,LABEL=(,SL),
//                  DISP=(MOD,KEEP),VOL=SER=EREPTP
```

Control Statements for Example 7

The EXEC statement specifies (1) that all records on SYS1.LOGREC are to be processed, (2) the type of printout (full record and summary), (3) no accumulation is to take place, and (4) the records that were processed are to be zeroed.

The SERLOG DD statement defines the input (SYS1.LOGREC) data set.

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

The MEASURE DD statement defines the measurement data set.

Printing a Summary of the Information on the Measurement Data Set

You can print a summary of the IPL and error records on the measurement data set by specifying the summary function of the IFCEREP0 service aid. IFCEREP0 will process the records on the measurement data set and print the following reports for any time period that you specify.

- An IPL report that contains each IPL in sequence, with the date and time of the IPL, the reason for the IPL, and the subsystem, if any, that was responsible for the IPL. In addition, the average time between IPLs will be printed on the report.
- A hardware error report that contains a count of the errors for each device, CPU, and channel in the system. The error count is divided into two types: severe errors -- errors that caused the system to be stopped and reinitialized -- and non-severe errors -- errors that affected system performance, but did not cause the system to be reinitialized.

Specifying the Summary Function

Specify the summary function in the IFCEREP0 service aid. Specifying the summary function, requires:

- Coding PARM='RDESUM=Y' on the EXEC statement.
- Adding a control card after the SYSIN DD statement.

When you specify the summary function, IFCEREP0 will not perform any other function within the same job step; it will only produce IPL and error reports.

Example 8: Printing IPL and Error Reports from the Measurement Data Set

In this example the records on the measurement data set are processed to produce IPL and error reports.

```
//JOBA        JOB
//STEP1       EXEC   PGM=IFCEREP0,PARM='RDESUM=Y'
//EREPPT      DD     SYSOUT=A
//RDETP       DD     DSNAME=EREPTAPE,UNIT=2400,LABEL=(,SL),
//                   DISP=(OLD,KEEP),VOL=SER=EREPTP
//SYSIN       DD     *
(Control  Card)
/*
```

Control Statements for Example 8

The EXEC statement specifies that the summary function of IFCEREP0 is to be run (the default is 'RDESUM=N'). If any additional parameters are specified, they will be ignored.

The EREPPT DD statement defines the edited output data set. The output records are written on the system output device (printer assumed).

The RDETP DD statement defines the input (measurement) data set.

The SYSIN DD statement indicates that input in the form of a control card will follow.

The **Control Card** is necessary to initiate processing of the summary function.

The format of the control card is:

Field	Length	Position	Comments	Default
Identification	6	1-6	Control Card Identifier 'CTLCRD'	None - You must specify 'CTLCRD'
Report Starting Date	5	11-15	The date specified as YYDDD that you want the report to begin on. This date must be within 30 days of the date of the first record on the measurement data set.	None - You must specify the date.
Report Ending Date	5	17-21	The date specified as YYDDD that you want the report to end on.	Last available data on the measurement data set.
IPL Clustering Interval (See note)	2	23-24	The numeric clustering interval specified in minutes.	No clustering.
Company name	55	26-80	EBCDIC characters	Blanks.

Note: IPL clustering will indicate how often the system was initialized within the clustering interval that you specify on the control card. For example: If you specify a clustering interval of 30 minutes, the IPL report will print all groups of IPLs that occurred within 30 minutes of each other.

Error Messages

Six errors can occur when you run the summary function of IFCEREP0:

- A sequence error on the measurement data set.
- A starting date error on the control card.
- An ending date error on the control card.
- A clustering error on the control card.
- A missing control card in the IFCEREP0 procedure.
- No IPL records on the measurement data set.

Each of the following error messages will be written on the output device specified in your IFCEREP0 procedure.

Sequence Error: When the measurement data set contains 16 or more consecutive records that are out of sequence, the message:

```
IFC020I  'ENCOUNTERED MORE THAN 16 SEQ ERRORS STOP RUN'
```

will be issued. The IPL report includes system initializations up to the point of the error, but does not include clusters or mean IPL time. The hardware error report is not printed. The IFCEREP0 job step is terminated.

Starting Date Error: When the report starting date specified on the control card is not numeric or is before January 1, 1960, the message:

```
IFC021I  'INVALID START DATE, CORRECT AND RESTART JOB'
```

is issued. The IFCEREP0 job step is terminated.

Note: The starting date specified on the control card must be completely numeric and within 30 days of the first record on the measurement data set.

Ending Date Error: When the end date specified on the control card is not completely numeric, the message:

```
IFC022I  'INVALID END DATE, CORRECT AND RESTART THE JOB'
```

will be issued. The IFCEREP0 job step is terminated.

Clustering Error: When the IPL clustering interval specified on the control card is not all numeric, the message:

```
IFC023I  'INVALID CLUSTER VALUE; CORRECT AND RERUN JOB'
```

will be issued. The IFCEREP0 job step is terminated.

Control Card Error: When the control card is missing from the IFCEREP0 procedure for running the summary function, the message:

```
IFC024I  'SUPPLY AN RDE CONTROL CARD AND RERUN THE JOB'
```

will be issued. The IFCEREP0 job step is terminated.

IPL Record Error: If there are no IPL records on the measurement data set, the message:

```
IFC025I  'NO IPL RECORDS PROCESSED'
```

will be issued. IFCRDESM processing will continue, but no IPL and error reports are produced.

Printing Media Error Statistics for IBM 3410 and 3420 Tape Devices

You can use IFCEREP0 to edit IBM 3410 and 3420 tape device records located on SYS1.LOGREC and print four types of media error statistics (MES) from the edited records:

- A one line detailed printout of error statistics for every record grouped by CUA.
- A one line summary printout of error statistics for every CUA grouped by day.
- A one line detailed printout of error statistics for every record grouped by volume/serial.
- A one line summary printout of error statistics for every volume/serial.

Specifying MES Processing

You specify MES processing in the IFCEREP0 procedure by:

- Coding MES=Y on the EXEC statement.
- Specifying the devices and the channel unit addresses of the devices that you want error statistics for.

Example 9: Printing Media Error Statistics

In this example:

- Error statistics for the IBM 3410 and 3420 tape devices are written to the printer.

```
//JOBA      JOB
//STEP1     EXEC  PGM=IFCEREP0,PARM='TYPE=0,MES=Y,CUA=(484),
//                DEV=3410'
//SERLOG    DD    DSNAME=SYS1.LOGREC,DISP=(OLD,KEEP)
//EREPPT    DD    SYSOUT=A
```

Control Statements for Example 9

The EXEC statement specifies (1) that OBR records are to be processed, (2) no records or summaries are to be printed, (3) media error statistics are to be printed, (4) the specific channel/unit address of the device that the statistics are wanted for, and (5) the device type.

The SERLOG DD statement defines the input (SYS1.LOGREC) data set.

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

IFCEREP0 Output

You can use IFCEREP0 to write output to any device supported by the basic sequential access method (BSAM). The output is written as 121-byte records with a control character as the first character of each record. Figures 18 through 30 show the following types of output:

- CCH record and CCH record summary (Figures 18 and 19).
- EOD record and EOD record summary (Figure 20).
- IPL record and IPL record summary (Figure 21).
- MCH record and MCH record summary (Figures 22 and 23).
- MDR record and MDR record summary (Figure 24).
- MES record and MES record summary (Figure 25).
- OBR record and OBR record summary (Figure 26).
- Error report produced by IFCEREP0 summary function (Figure 27).
- IPL report produced by IFCEREP0 summary function (Figure 28).

```
MODEL   0165                    SERIAL NO.   010185

--- RECORD SOURCE - CCH         TYPE - INBOARD

AOS REL. 1

JOB NAME

       DAY  YEAR                          HH MM SS.TH
DATE _ 034   72                    TIME _ 02 44 32 86

CHANNEL/UNIT ADDRESS  000000

             CC   DA    FL     CT
FAILING CCW  00 000000  00 00 0000

             K    CA    US CS  CT
CSW          00 000000  00 04 0000

 UNIT STATUS                          CHANNEL STATUS
  ATTENTION         0                  PRGM-CTLD IRPT   0
  STATUS MODIFIER   0                  INCORRECT LENGTH 0
  CONTROL UNIT END  0                  PROGRAM CHECK    0
  BUSY              0                  PROTECTION CHECK 0
  CHANNEL END       0                  CHAN DATA CHECK  0
  DEVICE END        0                  CHAN CTRL CHECK  1
  UNIT CHECK        0                  I/F CTRL CHECK   0
  UNIT EXCEPTION    0                  CHAINING CHECK   0

I/O UNIT FOUND BUSY
 CHANNEL/UNIT ADDR   0009 001C 001F 0021 0022 0023 0024 0025

--- CHANNEL TYPE ---
       2870

HEADER SENSE SWITCHES FOUND ON
 SYSTEM TERMINATED

*******************************************************************************

                          CHANNEL  ERROR  ANALYSIS
  CSW STORED BY  INTERRUPT
  TERMINATION BY  -- SYSTEM RESET- CODE 3
  TIME CHANNEL DETECTED ERROR -  COULD NOT BE ASSESSED
                                 RETRY CODE  7
  VALIDITY OF RECORDED DATA
           COUNT               = VALID
           SENSE DATA          = STORED
           UNIT STATUS         = VALID
           COMMAND ADDRESS     = VALID
           CHANNEL ADDRESS     = VALID
           DEVICE ADDRESS      = VALID
  PROBABLE SOURCE OF ERROR-  CHANNEL
*******************************************************************************

2870 MPX CHANNEL

                     KEY-CCW              0
                     DATA ADR        000000
                     FLAGS          0000000
                     BYTE COUNT        0000
                     KEY-CAW              0
                     COMMAND ADR     000000
                     UCW PARITY           00
                     RESID CMND ADR  000000
                     CHANNEL ADD          0
                     UNIT ADD            00

 OPS

INCORRECT LEN   0   HALT I-O BIT    0   OPERATION CODE 00

 STATUS

PREFETCH        0   PRG CHK         0   BYTE CT (MSC)   0
DT ADR PRG CHK  0   PROT CHK        0   COUNT PO (SSC)  0
CTRL CHK        1   DATA CHK        0   COUNT 7 (SSC)   0

 CONTROL TRIGGERS

CAW             0   TEST I/O        0   MODE 3          0   MODE 10         0
CCW REQD        0   HALT I/O        0   MODE 4          0   MODE 11         0
CCW IN CHAN     0   PSEUDO SIO      0   MODE 6          0   MC BC PARITY    0
DATA REQ        0   MODE 1          0   MODE 7          0
START I/O       0   MODE 2          0   MODE 9          0
```

Figure 18. CCH Record (Part 1 of 2)

```
MAIN CHANNEL CHECKS

WORD 0 UCW      0   LS ADR          0   BYTE CT         0   PRIORITY       1
WORD 2 UCW      0   STOR            0   TIME OUT        0

 SUB CHANNEL

UNIT ADR        0   BYTE CT (SSC)   0   NO RESPONSE     0   AD-I           0
CMND            0   ICRCT SELN      0   ICRCT TAG SEQ   0   ST-I           0

 SELECTOR SUB CHANNEL

BC P            0   BC 2            0   ILI             0   CHAIN CHK      0
BC 4            0   BC 1            0   DATA CHK        0
   HEX DUMP OF RECORD
   HEADER    20140C20    00000000    0072034F    02443286        00000000    00650000

       0000  00000000    00000000    0009001C    001F0021        00220023    00240025    00000000    00000000
       0020  00000000    00040000    46401FC7    00000000        06000000    00000000    00000000    00400000
       0040  00000000    00000000    00000000    00020000        00000000    00000000    00000000    00000000
       0060  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       0080  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       00A0  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       00C0  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       00E0  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       0100  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       0120  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       0140  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       0160  00000000    00000000    00000000    00000000        00000000    00000000    00000000    00000000
       0180  00000000    00000000
```

Figure 18. CCH Record (Part 2 of 2)

```
                      DAY YEAR      DAY YEAR
INBOARD DATE RANGE    231  72  TO   231  72
                                    ---MODEL---        0145          ---SERIAL---  456789

                                    ---CHANNEL NUMBER--01

                                    CHANNEL INBOARD SUMMARY FOR INTEGRATED CHANNELS

                                    NUMBER OF RECORDS EXAMINED =      00001

--------TITLE--------                   TOTAL

DEVICE ADDRESS SUMMARY (MAX- 10 VALUES)

          0101                      00001

FAILING CCW SUMMARY(MAX-10 VALUES)

         CMND CODE

           01                       00001
--------TITLE--------               TOTAL          --------TITLE--------        TOTAL

 CHAN DATA CHK                      00000
 CHAN CTRL CHK                      00000
 IF CTRL CHK                        00000
```

Figure 19. CCH Record Summary

```
SUMMARY OF EOD RECORDS                                          MODEL 135
                                    DAY YEAR     DAY YEAR     CPU SERIAL  123456
                    DATE RANGE  FROM  101  72   TO 101  72

                    NO. OF RECORDS  002

                    XXXXXXX END OF EOD SUMMARY XXXXXX
```

```
EOD RECORD EDIT AND PRINTING SECTION


     DAY  YEAR                              HH MM SS TH
DATE -101   71                        TIME -08 09 10 11

  MODEL - 0135       CPU SERIAL NO. -  123456

  AOS  REL.   1


    HEX DUMP OF RECORD
    HEADER    80150800    00000000    0071101F    08091011      00123456    01301010

        0000
```

Figure 20. EOD Record and EOD Record Summary

```
SUMMARY OF IPL RECORDS                                                MODEL 145
                                    DAY YEAR      DAY YEAR       CPU SERIAL  123456
                     DATE RANGE  FROM  101  72   TO  102  72

                     NO. OF RECORDS  002



XXXX  SUBSYSTEM NAME AND NUMBER OF OCCURENCES XXXX

NULL              000          PROCESSOR                    000
TAPE              000          TELEPROCESSING               000
MICR/OCR          000          GRAPHIX/DISPLAY/AUDIO        000
CARD/PRINT        000          IBM SYSTEM CONTROL PROGRAM   000
DIRECT ACCESS     000          IBM PROGRAMMING PRODUCT      000
OTHER             000

XXXX IPL REASON CODE AND NUMBER OF OCCURENCES XXX

NORMAL            000          MEDIA                        000
UNKNOWN           000          OPERATIONAL                  000
USER PROGRAM      000          ENVIRONMENTAL                000
IBM HARDWARE PROGRAMMING PROBLEM-CE/SE NOT REQUIRED  000
IBM HARDWARE PROGRAMMING PROBLEM-CE/SE REQUIRED      000
CE/SE HAS THE SYSTEM     000
DEFAULT -U-              000
INVALID IPL REASON CODE  002


       XXXXXXX END OF IPL SUMMARY XXXXXXX
```

```
IPL RECORD EDIT AND PRINTING SECTION


      DAY  YEAR                              HH MM SS TH
DATE -102   72                        TIME -08 09 10 11

  MODEL -  145      CPU SERIAL NO. - 123456

   AOS REL. 1


--CHANNEL TYPE--
   CHANNELS 0-14

UNATT     MPX     UNATT     MPX     UNATT     MPX     UNATT     MPX

UNATT     MPX     UNATT     MPX     UNATT     MPX     UNATT

          IPL REASON CODE -     THE IPL REASON CODE IS INVALID

          SUBSYSTEM ID - 09                    SUBSYSTEM NAME - NULL

          HIGHEST STORAGE ADDRESS  09090909


END OF  IPL RECORD

   HEX DUMP OF RECORD
   HEADER    50150800    00000000    0071102F    08091011      00123456    01300909

       0024  09090909    09090909    09090909    09090909      09090909    09090909
```

Figure 21. IPL Record and IPL Record Summary

```
MODEL  155                          SERIAL NO.   237912

AOS  REL. 1

--- RECORD SOURCE - MCH ---         TYPE - CPU

MCK OLD PSW   FF 00 00 05 00 3A EF F1

JOB NAME            NUMBER05

PROGRAM NAME        CPUC0165

       DAY  YEAR                                HH MM SS.TH
DATE _ 071   71                          TIME _ 11 02 23 14

    --- MACHINE CHECK INTERRUPT CODE ---
    SUB CLASS
SYSTEM DAMAGE (SD)     0                  CLOCK DAMAGE (CD)      0
PROC DAMAGE (PD)       0                  EXTERNAL DAMAGE (CD)   0
SYSTEM RECOVERY (SR)   0                  AUTO-CONFIG (AC)       0
TIMER DAMAGE           0                  WARNING (W)            0

--- INTERRUPT TENSE CODES ---
BACK-UP (B)            0                  DELAYED (D)            0

--- STORAGE AND PROTECTION ERROR CODES ---
UNCORRECTED STORAGE ERRORS (SE)          0          UNCORRECTED PROTECTION ERROR (PE)       0
CORRECTED STORAGE ERRORS (SC)            0

--- PSW VALIDITY CODES
AMWP BITS OF M.C. OLD ARE VALID (WP)     0          SYSTEM MASK OF M.C. OLD IS VALID (MS)   0
PROGRAM MASK OF M.C. OLD IS VALID (PM)   0          INSTR ADDR OF M.C. OLD IS VALID (IA)    0

--- MISC VALIDITY CODES ---
FAILING STORAGE ADDR IS VALID (FA)       0          REGION CODE VALID (RC)                  0
FP REGS STORED ARE VALID (FP)            0          GP REGS STORED ARE VALID (GP)           0
CONTROL REGS STORED ARE VALID (CR)       0          EXTENDED LOGOUT AREA VALID (LG)         0
INSTR MODIFIED STORAGE VALID (ST)        0
EXTENDED LOGOUT LENGTH                00 00
FAILING STORAGE ADDRESS            00 00 00
REGION CODE                     00 00 00 00

    --- FLOATING POINT REGISTERS ---
FP REGS 0,2    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
FP REGS 4,6    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00

    --- GENERAL PURPOSE REGISTERS ---
GP REGS 0-3    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
GP REGS 4-7    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
GP REGS 8-B    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
GP REGS C-F    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00

    --- CONTROL REGISTERS ---
CR REGS 0-3    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
CR REGS 4-7    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
CR REGS 8-B    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
CR REGS C-F    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
```

Figure 22. MCH Record (Part 1 of 2)

```
                              MACHINE CHECK STATUS FIELD

                    MCSTATD FIELD LENGTH                        0000
                        --- SYSTEM STATUS ---
                    HARDWARE RECOVERY                  0        SOFTWARE RECOVERY              0
                    TASK ABORTED                       0        TASK SET NON-DISPATCHABLE      0
                    OPERATING SYSTEM TERMINATION       0        QUIET MODE IN EFFECT           0
                        --- DAMAGE AREA ---
                    MAIN STORAGE                       0        BUFFER                         0
                    CONTROL STORAGE                    0        INTERVAL TIMER                 0
                    PROCESSOR                          0        CHANNEL ERROR                  0
                    TOD CLOCK                          0        SYSTEM DAMAGE                  0
                        --- ERROR TYPE ---
                    INTERMITTENT                       0        SOLID                          0
                    DATA                               0        RESERVED                       0
                    RESERVED                           0        PROTECT                        0
                        --- RMS ACTION DATA ---
                    LOOP TIME OUT                      0        REPAIR                         0
                    STORAGE RECONFIGURE                0        BUFFER RECONFIGURE             0
                        --- RMS INFORMATION STATUS ---
                    INVALID LOGOUT                     0        INVALID MCI CODE               0
                    INVALID FAILING STORAGE ADDRESS    0        PROGRAM CHECK IN MCH           0
                        --- RMS WAIT STATE ---
                              A00
                        --- RECORD LOST SUMMARY ---
                             00 00 00 00 00 00

                        --- HISTORY OF TRANSIENT MODULES ---
                    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00
                    00 00 00 00    00 00 00 00    00 00 00 00    00 00 00 00

                        --- PDAR ACTION ---
                    TERMINATION OF CURRENT TASK        0        RETRY POSSIBLE                 0
                    BYPASS(AFFECTED TASK) POSSIBLE     0        REPAIR UNSUCCESSFUL            0
                    INDETERMINATE INSTRUCTION COUNTER  0        EXPRESS                        0
                        --- FAILURE TYPE ---
                    SOLID STORAGE DATA ERROR           0        INTERMITTENT STOR. DATA ERR    0
                    SOLID SPF KEY ERROR                0        INTERMITTENT SPF KEY ERROR     0
                        --- OPERATING SYSTEM STATUS ---
                    WAIT PSEUDO TASK                   0        PAGE SUPERVISOR TASK           0
                    MASTER SCHEDULER TASK              0        SYSTEM TASK                    0
                    PROBLEM PROGRAM TASK               0        CURRENT PSW DISABLED FOR I/O   0
                        --- LOCATION OF FAILURE ---
                    NUCLEUS                            0        SQA AREA                       0
                    LSQA AREA                          0        PQA                            0
                    PAGEABLE AREA                      0        FIXED PAGE AREA                0
                    V=R ADDRESS AREA                   0        CRITICAL AREA                  0
                        --- REQUESTED OPERATOR AWARENESS ---
                    SUPERVISOR DAMAGE MESSAGE          0        TASK ABNORM TERMINATION MSG    0
                    DAMAGED PAGE NOW UNAVAILABLE MSG   0        DAMAGED PAGE NOW DELETED MSG   0
                    TASK NON-DISPATCHABLE MESSAGE      0        SOFTWARE RECOVERY MESSAGE      0
                        --- FOOTPRINTS ---
                    CHANGE BIT ACTIVE                  0        KEY IN EXTERNAL PAGE TABLE     0
                    PAGE RECURSION                     0        RESERVED                       0
                    TRANSLATE ERROR                    0        NO PAGE EXISTS                 0
                    RELOCATE OFF                       0        LOW END INTERFACE ACTIVE       0


    --- FOOTPRINTS - INTERFACES ---
ABTERM INTERFACE ACTIVE          0     TRANSLATE INTERFACE ACTIVE   0
FIND PAGE INTERFACE ACTIVE       0     PAGE DEQUEUE INTERFACE ACT.  0
PAGE ENQUEUE INTERFACE ACTIVE    0     STAT FUNCTION INTERFACE ACT. 0
V=R RELEASE INTERFACE ACTIVE     0     POST INTERFACE ACTIVE

FAILING STORAGE REAL ADDRESS                  00000000
BEGINNING FAILING STORAGE VIRTUAL ADDRESS     00000000
ENDING FAILING STORAGE VIRTUAL ADDRESS        00000000
INSTRUCTION ADDRESS AT FAILURE                00000000

                                  ///////155 LOG EDIT/PRINT COMPLETE///////
   HEX DUMP OF RECORD
   HEADER    10147F7F    00000000    0071071F    11022314    01237912    015502A0    03D7E4C3    F0F1F6F5
             D5E4D4C2    C5D9F0F5    FF000005    003AEFF1

       0030  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0050  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0070  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0090  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       00B0  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       00D0  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       00F0  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0110  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0130  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0150  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
       0170  00000000    00000000    00000000    00000000    00000000    00000000    00000000    00000000
```

Figure 22. MCH Record (Part 2 of 2)

```
          MODEL 145 MACHINE CHECK RECORDS   DAY YEAR     DAY YEAR
                        DATE RANGE - FROM 301  72  TO  304  72

                                        SERIAL              234567

                                        NO.OF RECORDS       00004

                                - SUMMARY OF MODEL 145 MACHINE CHECK RECORDS -

                                        MACHINE CHECK REGISTER A
        BYTE 0                                                          BYTE 2

LOCAL STORAGE A SOURCE ADDR CHK     00004       ALU 2 HALF SUM CHK                  00004
LOCAL STORAGE B SOURCE ADDR CHK     00002       ALU 3 HALF SUM CHK                  00002
LOCAL STORAGE A DEST ADDR CHK       00002       ALU LOGICAL CHK                     00002
LOCAL STORAGE B DEST ADDR CHK       00003       B REG SHIFT CHK                     00003
DEST BYTE CTRL CHK                  00004       A REG PTY CHK                       00004
LOCAL STORAGE A-B DEST ADDR COMPARE 00002       B REG PTY CHK                       00002
LOCAL STORAGE CTRL ASSM CHK         00002       Z REG PTY CHK                       00002
CTRL REG PTY CH5                    00003       D REG PTY CHK                       00003

        BYTE 1                                                          BYTE 3

ADDR CHK BOUND REC CHK              00004       EXT REG DEST X COMP CHK             00004
LOCAL STORAGE COMP CHK              00002       EXT REG DEST Y COMP CHK             00002
FLUSH THRU CHK                      00002       EXT REG SOURCE Y CHK                00002
H REG PTY CHK                       00003       EXT CTRL ASSM PTY CHK               00003
BIT 4                               00004       INTERV TIMER PTY CHK                00004
P REG PTY CHK                       00002       S REC DUP CHK                       00002
T REG PTY CHK                       00002       TIME OF DAY CLOCK CHK               00002
L REG PTY CHK                       00003       CTRL STORAGE ADDR CHK               00003

                                        MACHINE CHECK REGISTER B

        BYTE 0                                                          BYTE 2

STORAGE ADD CHK                     00004       T CYCLE HARD ERROR                  00004
SDBI PTY CHK                        00002       DOUBLE ECC ERROR                    00002
SDBO PTY CHK                        00002       P21 CTRL LINE PTY CHK               00002
STORE PTY CHK                       00003       BUSY CHK                            00003
TIME OUT CHK                        00004       ECC HARDWARE CHK                    00004
STORAGE PROT STACK PTY CHK          00002       DOUBLE ECC ERROR                    00002
CLOCK SYN CHK A                     00002       SINGLE ECC ERROR                    00002
CLOCK SYN CHK B                     00003       SINGLE DATA BIT CORRCT              00003

        BYTE 1                                                          BYTE 3

M REG COMP A CHK                    00004       P2I CT ERROR CORRCT                 00004
M REG COMP B CHK                    00002       C32 DATA BIT CORRCT                 00002
M REG COMP C CHK                    00002       C16 DATA BIT CORRCT                 00002
M REG COMP D CHK                    00003       C8 DATA BIT CORRCT                  00003
NO ADR ADJ REG MTCH                 00004       C4 DATA BIT CORRCT                  00004
MULT ADR ADJ REG MTCH               00002       C2 DATA BIT CORRCT                  00002
ALR ADJ LRU INVALID                 00002       C1 DATA BIT CORRCT                  00002
ANY MACH CHK ON                     00003       C0 DATA BIT CORRCT                  00003


        RETRY REG 3 ERRORS  HMRTY                       RETRY REG 4 ERRORS  CPURTY

MACHINE CHECK TRAP                  00004       STORAGE 2 CYCLE ERROR               00004
RETRY TRAP                          00002       TYPE 1 ERROR                        00002
CPU HIGH TRAP                       00002       TYPE 2 ERROR                        00002
IFA OR SEL CHAN 1,2,3               00003       TYPE 3 ERROR                        00003
SEL CHANNEL 1,2 OR 3                00004       LOCAL OR EXT STORAGE DEST           00004
MPX TRAP                            00002       STORAGE WORD IN ERROR               00002
IFA TRAP                            00002       STOP WORD IN ERROR                  00002
STORE DISPLAY                       00003       UNTRYABLE ERROR                     00003

                                        SYSTEM REGISTER

        BYTE 0                                                          BYTE 2

MACHINE CHK INTERPT PENDING         00004       DOCUMENTARY CONSOLE 2               00004
RETRY ROUTINE                       00002       TMPL                                00002
MACHINE CHK ROUTINE                 00002       LOAD FILE WAIT                      00002
DOCUMENTARY CONSOLE                 00003       CE KEY IN CE MODE                   00003
LOG PRESENT                         00004       IPL                                 00004
SPARE                               00002       POWER ON RESET                      00002
I/O INSTN LATCH                     00002       SPARE                               00002
FORCE MODULE 0 TO LSCS              00003       INSTR PROC LATCH                    00003

        BYTE 1                                                          BYTE 3

ADDR CONTENTS                       00004       MACHINE CHECK TRAP                  00004
CPU INTRPT FORCE                    00002       RETRY TRAP                          00002
SAR INTRPT FORCE                    00002       CPU HIGH TRAP                       00002
PSW RESTART                         00003       SEL CHAN 1,2 OR 3                   00003
MDO MODE                            00004       SEL CHAN 2,3 OR 4                   00004
SYS CTRL INTRPT                     00002       MPX TRAP                            00002
TIMER INTRPT FORCE                  00002       INT FILE ADAPTR TRAP                00002
PRTY INTRUPT                        00003       STORE-DISPLAY                       00003
```

Figure 23. MCH Record Summary

MDR Record

```
2715 ERROR LOG DATA EDITING AND PRINTING SECTION

MODEL-UNIVERSAL

AOS  REL. 1

--RECORD ENTRY SOURCE - MDR    TYPE - TELEPROCESSING

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX


DISK ADAPTER ERROR LOG        CUA  0208     2715  ID   0001      DAY        TIME

    ERROR STATUS                         SECTOR ADDRESS            606
      READ CHECK                0
      CSBI PTY ERROR-DATA       0
      CSBI PTY ERROR-ADDR       0      READ/WRITE OP CODE STATUS
      DATA REG PARITY CK        0        READ LABEL                0
      ADDR REG PARITY           0        WRITE                     0
      OVERRUN                   1        READ CHECK                0
      WRITE SELECT CHECK        1        READ                      0
      MODULO 4/LENGTH CK        0

DISK ADAPTER ERROR LOG        CUA  0208     2715  ID   0001      DAY        TIME

    ERROR STATUS                         SECTOR ADDRESS            606
      READ CHECK                0
      CSBI PTY ERROR-DATA       0
      CSBI PTY ERROR-ADDR       0      READ/WRITE OP CODE STATUS
      DATA REG PARITY CK        0        READ LABEL                0
      ADDR REG PARITY           0        WRITE                     0
      OVERRUN                   1        READ CHECK                0
      WRITE SELECT CHECK        1        READ                      0
      MODULO 4/LENGTH CK        0

DISK ADAPTER ERROR LOG        CUA  0208     2715  ID   0001      DAY        TIME

    ERROR STATUS                         SECTOR ADDRESS            606
      READ CHECK                0
      CSBI PTY ERROR-DATA       0
      CSBI PTY ERROR-ADDR       0      READ/WRITE OP CODE STATUS
      DATA REG PARITY CK        0        READ LABEL                0
      ADDR REG PARITY           0        WRITE                     0
      OVERRUN                   1        READ CHECK                0
      WRITE SELECT CHECK        1        READ                      0
      MODULO 4/LENGTH CK        0

DISK ADAPTER ERROR LOG        CUA  0208     2715  ID   0001      DAY        TIME

    ERROR STATUS                         SECTOR ADDRESS            606
      READ CHECK                0
      CSBI PTY ERROR-DATA       0
      CSBI PTY ERROR-ADDR       0      READ/WRITE OP CODE STATUS
      DATA REG PARITY CK        0        READ LABEL                0
      ADDR REG PARITY           0        WRITE                     0
      OVERRUN                   1        READ CHECK                0
      WRITE SELECT CHECK        1        READ                      0
      MODULO 4/LENGTH CK        0
```

MDR Summary

```
2715 ERROR LOG DATA SUMMARY

MODEL -135          SERIAL NO  123456

    TOTAL NUMBER OF RECORDS PROCESSED  00001


 DISK ADAPTER ERROR SUMMARY CUA  0208      2715 ID          DATA RANGE - FROM -      TO -

   ERROR STATUS                          TOTAL RECORDS PROCESSED  00042
    READ CHECK              00000
    CSBI PTY ERROR - DATA   00000
    CSBI PTY ERROR - ADDR   00000        READ/WRITE OP CODE STATUS
    DATA REG PARITY CK      00000         READ LABEL              00000
    ADDR REG PARITY CX      00000         WRITE                   00000
    OVERRUN                 00042         READ CHECK              00000
    WRITE SELECT CHECK      00042         READ                    00000
    MODULO 4/LENGTH CK      00000
```

Figure 24. MDR Record and MDR Record Summary

MES Record (Detail by Volume/Serial)

VOLUME SERIAL	DATE DAY	YR	TIME HH	MM	SS	TH	CUA	TU SERIAL	RD/ WRT	--PERM-- RDS	WRTS	--TEMP-- RDS	WRTS	SIO COUNT	BLOCK LENGTH	PROGRAM ID	---CPU--- ID	SERIAL	MOD NUMBER	DEN- SITY
DUMONE	001	70	00	35	54	84	000302	N/A	R	0002	0003	0004	0006	32767	00016	JOBONE	0155	111111	5	1600
DUMONE	001	70	00	35	54	84	000302	N/A	R	0002	0003	0004	0006	32767	00016	JOBONE	0155	111111	5	1600
DUMONE	001	70	00	35	54	84	000292	04096	R	0002	0003	0004	0006	32767	00016	JOBONE	0155	111111	8	1600
DUMONE	001	70	00	35	54	84	000292	04096	R	0002	0003	0004	0006	32767	00016	JOBONE	0155	111111	4	1600
DUMONE	074	71	00	07	12	32	000272	N/A	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	5	1600
DUMONE	074	71	00	07	12	32	000272	N/A	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	5	1600
DUMONE	074	71	00	07	12	32	000282	04096	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	8	1600
DUMONE	074	71	00	07	12	32	000282	04096	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	4	1600
TETT1	074	71	00	07	12	32	000282	04096	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	6	1600
TETT1	074	71	00	07	12	32	000282	04096	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	8	1600
TETT1	074	71	00	07	12	32	000272	N/A	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	3	1600
TETT1	074	71	00	07	12	32	000272	N/A	R	0002	0003	0004	0006	32767	00016	TEST3420	0155	111111	5	1600
TETT2	001	70	00	35	54	84	000272	N/A	R	0002	0003	0004	0006	61439	00016	JOBTWO	0155	111111	5	1600
TETT2	001	70	00	35	54	84	000272	N/A	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	5	1600
TETT2	001	70	00	35	54	84	000282	04096	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	4	1600
TETT2	001	70	00	35	54	84	000282	04096	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	6	1600
TETT3	001	70	00	35	54	84	000272	N/A	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	1	1600
TETT3	001	70	00	35	54	84	000272	N/A	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	5	1600
TETT3	001	70	00	35	54	84	000282	04096	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	4	1600
TETT3	001	70	00	35	54	84	000182	04096	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	6	1600
TETT4	001	70	00	35	54	84	000282	04096	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	6	1600
TETT4	001	70	00	35	54	84	000282	04096	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	8	1600
TETT4	001	70	00	35	54	84	000272	N/A	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	5	1600
TETT4	001	70	00	35	54	84	000272	N/A	R	0002	0003	0004	0006	32767	00016	JOBTWO	0155	111111	5	1600

MES Record (Summary by Volume/Serial)

SUMMARY--MAGNETIC TAPE ERROR STATISTICS BY VOLUME

VOLUME SERIAL	DATE-FROM- DAY	YR	-TO- DAY	YR	--PERM-- RDS	WRTS	--TEMP-- RDS	WRTS	SIO COUNT	NRZI NOISE	--- CPU --- ID	NUMBER	MOD NO	ERASE GAPS	CLEANER ACTIONS
DUMONE	001	71	074	72	0008	0012	0016	0024	131068	N/A	0155	111111	4	00024	00028
TETT1	074	72	074	72	0002	0003	0004	0006	032767	N/A	0155	111111	5	00006	00007
TETT2	001	71	001	71	0004	0006	0008	0012	094206	N/A	0155	111111	6	00012	00014
TETT3	001	71	001	71	0004	0006	0008	0012	065534	N/A	0155	111111	6	00012	00014
TETT4	001	71	001	71	0004	0006	0008	0012	065534	N/A	0155	111111	5	00012	00014

MES Record (Summary by CUA)

SUMMARY--MAGNETIC TAPE ERROR STATISTICS BY TAPE UNIT

CUA	DATE DAY	YR	TU SERIAL	SIO COUNT	--TEMP-- RDS	WRTS	--PERM-- RDS	WRTS	NRZI NOISE	EQUIP CHK	OVER RUN	EARLY END	WR TM CHECK	IBG DROP	FEED THRU	VEL RETRY	PART REC	SLOW BOR	EXC PAMB	START CHECK
000182	001	70	04096	000000	0000	0000	0000	0000	N/A	0001	0000	0001	0001	0001	0001	0001	0001	0001	0001	0001

MES Record (Detail by CUA)

CUA	TU SERIAL	DATE DAY	YR	VOLUME SERIAL	TIME HH	MM	SS.TH	--TEMP-- RDS	WRTS	SIO COUNT	DEN- SITY	NRZI NOISE	R/W VRC	WR TG VRC	LRC MTE	CRC EDC	ECC ENV	SKEW ERR	ERLY BOR	VEL CHG	TIE
000182	04096	001	70	TETT3	00	35	54 84	0004	0006	32767	1600	N/A	0001	0000	0001	0001	0001	0001	0001	0001	011111111

Figure 25. MES Record and MES Record Summary

OBR Record

```
---RECORD ENTRY TYPE - UNIT CHECK     SOURCE - OUTBOARD              MODEL- 145       SERIAL NO.   123456

   AOS  REL.1
                              DAY YEAR           HH MM SS.TH       JOB IDENTITY ABCDEFGH
                       DATE- 103  71      TIME- 08 09 10 11                    C1C2C3C4 C5C6C7C8

  DEVICE TYPE                    2703
  PRIMARY   CHANNEL UNIT ADDRESS 000003
  ALTERNATE CHANNEL UNIT ADDRESS 000103
  COMMUNICATION ADAPTER TYPE     IBM TERM I
  TERMINAL TYPE                  1050

                     CC   CA   FL     C1                K    CA   US CS  CT
     FAILING CCW     C9 004000 40 00 0088            CSW F0 03EFF8 DE BC 0008


     UNIT STATUS                CHANNEL STATUS            STATISTICAL DATA          STATISTICAL DATA

  ATTENTION         1          PRGM-CTLD TRPT   1        TEMPY READS      000      TEMPY WRITES     015
  STATUS MODIFIER   1          INCORRECT LENGTH 0        INTRVN REQD      000      BUS OUT CHK      015
  CONTROL UNIT END  0          PROGRAM CHECK    1        EQUIP CHK        000      OVERRUN          015
  BUSY              1          PROTECTION CHECK 1        LOST DATA        000      TIME OUT         015
  CHANNEL END       1          CHAN DATA CHECK  1        NOT USED         000      NOT USED         006
  DEVICE END        1          CHAN CTL CHECK   1        NOT USED         000      NOT USED         006
  UNIT CHECK        1          I/F CTL CHECK    0        NOT USED         000      NOT USED         006
  UNIT EXCEPTION    0          CHAINING CHECK   0        NOT USED         000      CHAN DATA CHK    006

  SENSE BYTE DATA

BYTE 0    06

CMND REJ  0
INTV REQD 0
BUS C CHK 0
EQUIP CHK 0
DATA CHK  0
OVERRUN   1
RECEIVING 1
TIME OUT  0


   HEX DUMP OF RECORD
   HEADER     30550800    00000000    0071103F    08091011        00123456    01300000

       0018   01020304    05060708    09004000    40000088        F003EFF8    DEB00008    00000103    01004013
       0038   00000003    0F0F0F0F    0F0F0F0F    06060606        06060606    06060606
```

OBR Summary

```
                          DAY YEAR   DAY YEAR       MODEL- 145            SERIAL NO.    123456
       OUTBOARD DATE RANGE - 103  72 TO 103  72
       SUMMARY OF I/O OUTBOARD ENVIRONMENT RECORDS FOR DEVICE 000003    DEVICE TYPE 2703
       TOTAL NUMBER OF RECORDS     002
       TOTAL OF OVERFLOW RECORDS   001

       CCW COMMAND CODES ENCOUNTERED(MAXIMUM OF 24)

         CMND  TOTAL
         09     001


       SENSE BYTE SUMMARY

       BYTE 0

       CMND REJ   000
       INTV REQD  000
       BUS O CHK  000
       EQUIP CHK  000
       DATA CHK   000
       OVERRUN    001
       RECEIVING  001
       TIMEOUT    000

       STATISTICAL DATA

       TEMPY READS        012        TEMPY WRITES       016
       INTRVN REQD        012        BUS OUT CHK        016
       EQUIP CHK          000        OVERRUN            021
       LOST DATA          000        TIME OUT           021
       NOT USED           000        NOT USED           012
       NOT USED           000        NOT USED           012
       NOT USED           000        NOT USED           012
       NOT USED           000        CHAN DATA CHK      012
```

Figure 26. OBR Record and OBR Record Summary

STATISTICS OF ERRORS FROM HARDWARE UNITS ON MODEL 145 SYSTEM
NON-TRANSPARENT ERRORS

SUBSYSTEM (1)	System Continued To Operate (Possible Partial Degradation) (2)	System Stopped Re-IPL Required (3)
PROCESSOR SUBSYSTEM		
CPU	1	2
STORAGE	3	1
CHANNELS		
1	2	1
2	0	1
3	1	0
TOTAL	3	2
UNKNOWN PROCESSOR	1	1
TOTAL	8	6
TAPE SUBSYSTEM		
180	5	3
181	1	0
280	3	0
281	1	2
282	1	0
UNKNOWN	0	1
TOTAL	11	6
DASD SUBSYSTEM		
336	0	1
337	2	0
UNKNOWN	0	1
TOTAL	2	2
UNKNOWN SUBSYSTEM	0	1

Figure 27. Error Report Produced by IFCEREP0 Summary Function

Notes on Figure 27.

(1) Subsystem

This column contains the equipment in your system that had an error recorded for it. It is divided into subsystems (processor, tape, DASD, and unknown), and the addresses are specified whenever possible.

(2) System Continued to Operate

This column contains the number of non-severe errors that occurred for each subsystem -- errors in this column are severe enough to degrade system performance, but not severe enough to force the system to be re-initialized. For errors of this type, the system has recovered by using the hardware or error recovery procedures. The recovery procedures may have cancelled the job associated with the error. An example of this type of error is a transmit error from tape to storage. This error results from the transfer invalid data and may be caused by a faulty tape drive or a bad tape. The system error recovery procedures will attempt to retry reading the tape. If it is impossible to read the section of invalid data, the error will be considered permanent and the associated error recovery program will be notified of the condition. If an error recovery program has not been provided for the faulty device, the job will be terminated.

(3) System Stopped

This column contains the number of severe errors that occurred for each of the subsystems -- errors in this column are severe enough to force the system to be re-initialized. This type of error occurs when the normal error recovery procedures fail to recover from the error.

```
                                XYZ CORPORATION

STATISTICS OF IPL'S DUE TO ALL CAUSES ON THE MODEL 145 SYSTEM

STARTING DATE OF REPORT = 70.313

                                    IPL RECORD (2)                  SUBSYSTEM (3)
SEQUENCE #  DATE    TIME      REASON FOR IPL*                       RESPONSIBLE*

 1  (1)     70.313 07.43.31 MM-Normal IPL                          00-Normal or
                                                                      Unknown
 2           70.313 09.12.51 IF-IBM Problem-No Ce/Se Reqd           20-DASD
 3           70.313 09.21.10 IF-IBM Problem-No Ce/Se Reqd           40-Tape
 4           70.313 09.25.13 IE-IBM Problem-No Ce/Se Reqd           40-Tape
 5           70.313 09.43.57 UN-Unknown                             00-Normal or
                                                                      Unknown
 6           70.313 13.27.01 IM-IBM Problem-CE/SE Reqd              70-Tele-
                                                                      processing
 7           70.313 19.33.41 OP-Operational Problem                 00-Normal or
                                                                      Unknown

* Please note this information was provided by operator.

ENDING DATE OF REPORT:  70.313

Average Running TIME/IPLS:  101 MINUTES. (4)

     IPL CLUSTERING, MULTIPLE IPL'S WITHIN 30 MINUTES: (5)

          GROUP 1 - 2-4
          GROUP 2 - 3-5

                                    END OF IPL REPORT
```

Figure 28. IPL Report Produced by IFCEREP0 Summary Function

Notes on Figure 28

(1) Sequence Number

The lowest sequence number is for the first IPL recorded during the report period you specified on the control card; the highest sequence number is for the last IPL recorded during the report period you specified on the control card.

(2) IPL Record Reasons for IPL

The IPL reason code provided by the operator in reply to system message IFB010D. The reason code is taken from the IPL record on the measurement data set. (See Figure 13)

(3) Subsystem Responsible

The subsystem ID provided by the operator in reply to system message IFB010D. The subsystem ID is taken from the IPL record on the measurement data set. (See Figure 14)

(4) Average Running Time/IPL

The total running time divided by the number of IPLs. This number cannot be larger than 4 decimal digits.

(5) IPL Clustering Multiple IPLs Within 30 Minutes

This field contains the groups, by sequence numbers, of IPLs that occurred within 30 minutes of each other. In this figure, 30 minutes was specified as the clustering interval. Group 1 contains the IPLs with sequence numbers 2, 3, and 4. Group 2 contains the IPLs with sequence numbers 3, 4, and 5. The Sequence numbers in this field cannot exceed 99. When 99 is reached, the next sequence number will be 1.

Index

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