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Program Product

MVS/Extended Architecture SYS1.LOGREC Error Recording Logic

MVS/System Product - JES3 Version 2 5665-291
MVS/System Product - JES2 Version 2 5740-XC6

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First Edition (January, 1983)

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PREFACE

This publication is intended for the IBM programming service representative, installation programmer, and others involved in maintaining or using the SYS1.LOGREC data set. This publication does not replace the program listings; it supplements them and intends to make the information in them more accessible. This book describes:

- The internal logic and organization of the IFCDIP00 service aid program.
- The internal logic and organization of the system recording routines which build and write incident records on SYS1.LOGREC.

Contents

This publication has three parts, preceded by a general Introduction and followed by an Index for the entire book. Each part has its own Table of Contents.

The Contents Directory is a directory to the different parts of the publication.

Part I: The **Introduction** describes the purpose and function of the SYS1.LOGREC data set and briefly tells how the SYS1.LOGREC data set is created, how routines write records on it, and how information is retrieved from it.

Part II: Initializing SYS1.LOGREC (IFCDIP00) describes the logic and internal organization of the IFCDIP00 service aid program which initializes and re-allocates the SYS1.LOGREC data set.

Part III: Recording Records on SYS1.LOGREC (System Recording Routines) describes the logic and internal organization of the system recording routines which build and write records on the SYS1.LOGREC data set.

Organization

This publication has three parts followed by an Index for the entire book. Each part has its own Table of Contents, and each part is divided into the following sections:

- **Introduction** – a description of the programs with some discussion of external characteristics.
- **Method of Operation** – a functional approach to the program using both diagrams and text.
- **Program Organization** – a description of program loading, module calling sequences, and the modules themselves.
- **Directory** – a cross-reference using module and label names in the source code and in the method of operation (MO) diagrams.
- **Data Areas** – a description of the major data areas used by the program modules.
- **Diagnostic Aids** – information that can be useful for diagnosing errors in the programs.

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How to Use This Publication

Before using this publication, read the "Introduction" to understand the function and purpose of SYS1.LOGREC error recording. Then, read the Introduction to the part being referenced and scan the remaining sections of that part to become familiar with its contents. This should save time because the sections in each part provide, in addition to specific types of information, cross-references to the other sections in each part of the publication or to the program or microfiche listings.

For example, in each part the Method of Operation section shows the program functions at a high (less detailed) level; therefore, some of the system recording functions are not shown. However, the Directory in each part lists the entry points and other module names for the modules whether or not they are included in the method of operation (MO) diagrams.

Associated Publications

- **MVS/Extended Architecture JCL,** GC28-1148 – describes how to use job control statements to override default parameters, use cataloged procedures, allocate space for data sets, code job control statements, and how to use JES2 control statements with other JCL statements.
- **MVS/Extended Architecture System Logic Library** – describes the function and the logic of the channel check handler, dynamic device reconfiguration, the machine check handler, the missing interruption handler, recovery termination manager, and alternate CPU recovery.
- **MVS/Extended Architecture System Programming Library: SYS1.LOGREC Error Recording,** GC28-1162 – describes how to use the IFCDIP00 service aid program and how records of different incidents are built and recorded on SYS1.LOGREC.
- **Environmental Recording Editing and Printing (EREP) Program,** GC28-1178 – describes how to use EREP.
- **OS/VS Mass Storage System (MSS) System Data Analyzer,** GC35-0027 – describes the ISDASDA0 support for the IBM 3850 Mass Storage System.
- **MVS/Extended Architecture Message Library: System Messages,** GC23-1156 – describes the system messages.
- **EREP Messages,** GC28-1179 – describes the messages issued by EREP.
- **Debugging Handbook,** LC28-1164 through 1168 – describes detailed format of the SDWA.
- **System Generation Reference,** GC26-4009 – provides information for system programmers who are to plan for and install a Control Program and a JES2 Job Entry Subsystem.

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Introduction

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

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

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

Initializing the SYS1.LOGREC Data Set

The IFCDIP00 service aid initializes the SYS1.LOGREC data set on the system residence volume during system generation. IFCDIP00 creates a header record and a time stamp record for the SYS1.LOGREC data set and allocates space for the data set, which must reside on the system residence volume. IFCDIP00 can also be used to re-allocate and reinitialize SYS1.LOGREC.

After the first IPL or an engineering change, IFCDIP00 is used to place "frames" – editing instructions for MCH and CCH records – on SYS1.LOGREC. This process is only applicable on systems which have a Service Record File (7443-1 device type).

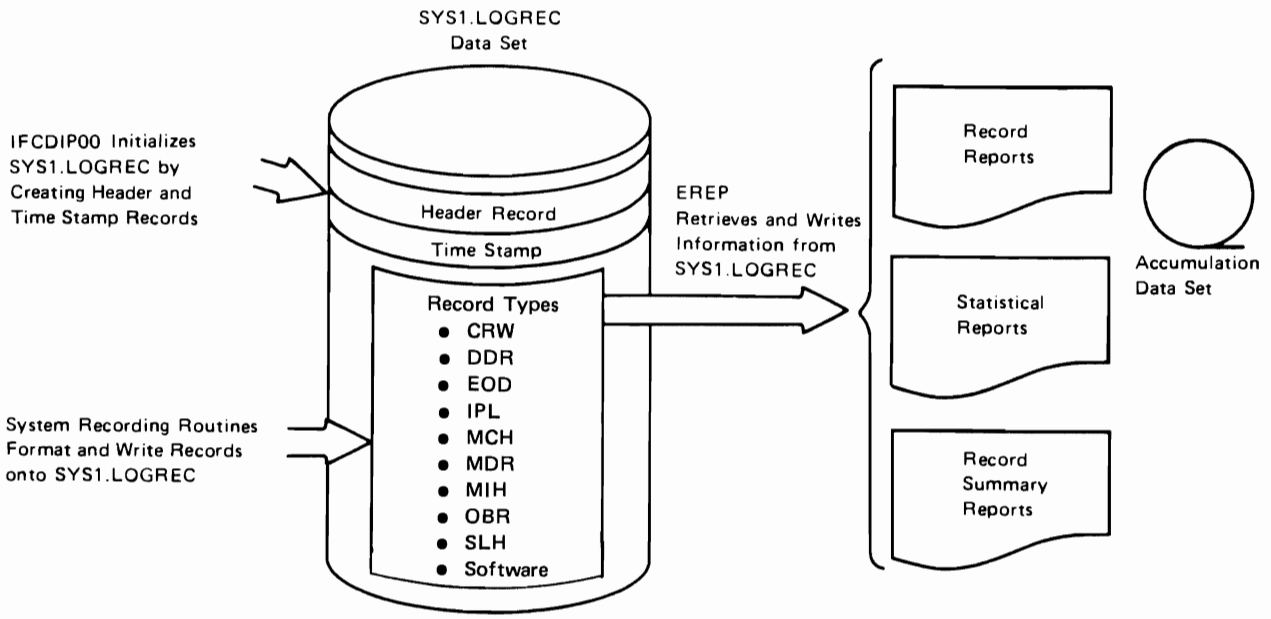

Figure I-1. SYS1.LOGREC Error Recording Overview

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For information about how to use IFCDIP00, see System Programming Library: SYS1.LOGREC Error Recording. For information about IFCDIP00 logic, see "Part II: Initializing SYS1.LOGREC (IFCDIP00)" of this publication.

Recording Records on SYS1.LOGREC

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

- CRW records for channel path, subchannel, and monitoring facility errors.
- DDR records for information describing operator and system swaps between direct access and magnetic tape devices and for operator swaps on unit record devices.
- EOD records for information related to end-of-day conditions whenever the RDE option has been included in the system.
- IPL records for information related to system initializations whenever the RDE option has been included in the system.
- MCH records for CPU, storage, storage key, and timer failures.
- MDR records for buffer overflow and device failures on buffered log devices, for demounts on direct access devices with buffered logs, for demounts by the DFDSS program product between direct access devices having buffered logs and removable disk packs, for device failures on teleprocessing devices connected to an IBM 3704 or 3705 device, and for statistical recording by EREP on direct access devices with buffered logs.
- MIH records for information describing missing interruption of all devices except the teleprocessing devices.
- OBR records for counter overflow statistics and device failures on devices supported by the teleprocessing access methods, for end-of-day requests, for paging I/O errors, for permanent channel and I/O device failures, for statistic counter overflow, for temporary or intermittent I/O device failures, for demounts on the IBM 3420 type magnetic tape devices, and for statistical recording by EREP on direct access devices with in-core counters.
- SLH records for subchannel failures.
- SOFTWARE records for software detected software errors such as routines affected by programs issuing the CALLRTM or ABEND (SVC 13) macros, for hardware detected software errors such as program checks, for operator detected errors such as pressing the restart key, and for hardware detected hardware errors such as software recovery attempts for hard machine failures.
- TIME STAMP record for measuring approximate time interval between termination and re-initialization of the operating system.

Each record on SYS1.LOGREC contains complete and specific information for the device, type of failure or system condition that caused it to be written. For complete information about the system recording routines and the RDE option, see **System Programming Library: SYS1.LOGREC Error Recording.** For information about the logic of the routines which format and write the various records on SYS1.LOGREC, see "Part III: Recording Records on SYS1.LOGREC (System Recording Routines)" of this publication.

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Retrieving Information on SYS1.LOGREC

The Environmental Recording Editing and Printing (EREP) program enables you to examine the data recorded on SYS1.LOGREC and/or Accumulation data sets in the forms of system overview reports, edited records and record summaries.

EREP can perform the following functions:

- Create an Accumulation data set from the SYS1.LOGREC data set and clear SYS1.LOGREC.
- Copy an Input Accumulation data set to an Output Accumulation data set.
- Merge data from an Accumulation data set and SYS1.LOGREC.
- Print a detailed description of the hardware and software error records.
- Summarize and print statistics for device failures.

See **Environmental Recording Editing and Printing (EREP) Program** for information on using EREP.

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PART II: Initializing SYS1.LOGREC (IFCDIP00)

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Introduction

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

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

The system generation process selects the IFCDIP00 module and puts it in the system's link library (SYS1.LINKLIB). IFCDIP00 is a standard service aid program of the system control program. For a complete description of how to run IFCDIP00, see **System Programming Library: SYS1.LOGREC Error Recording.**

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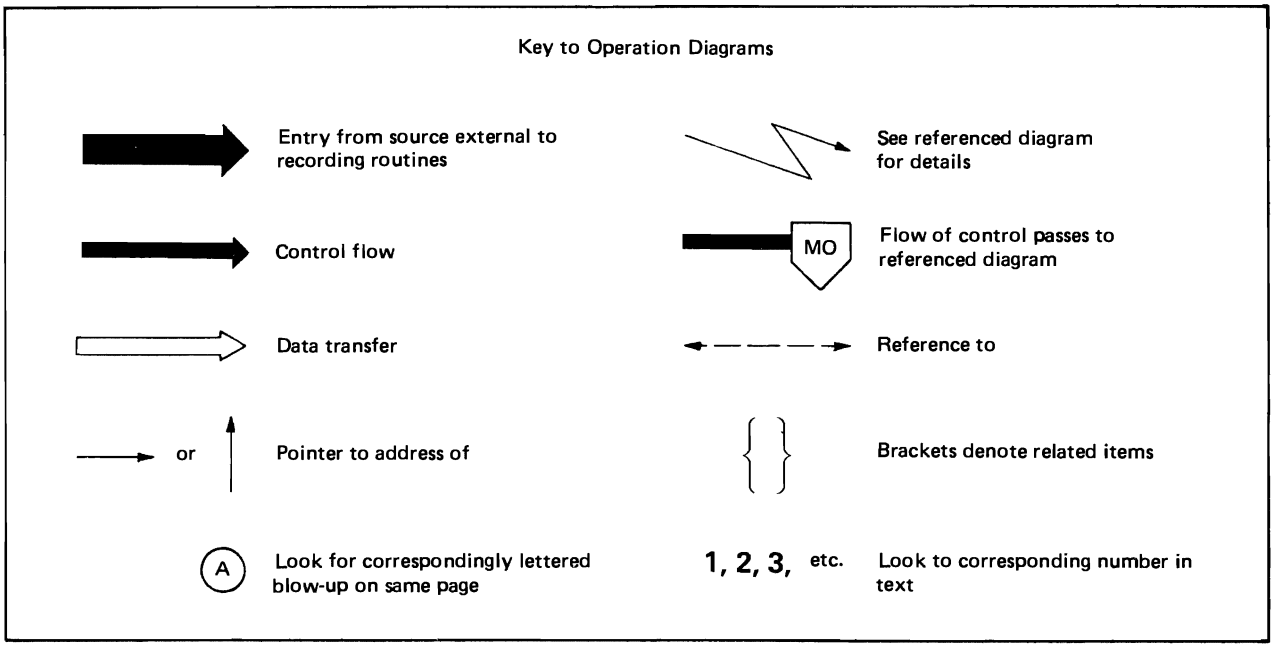
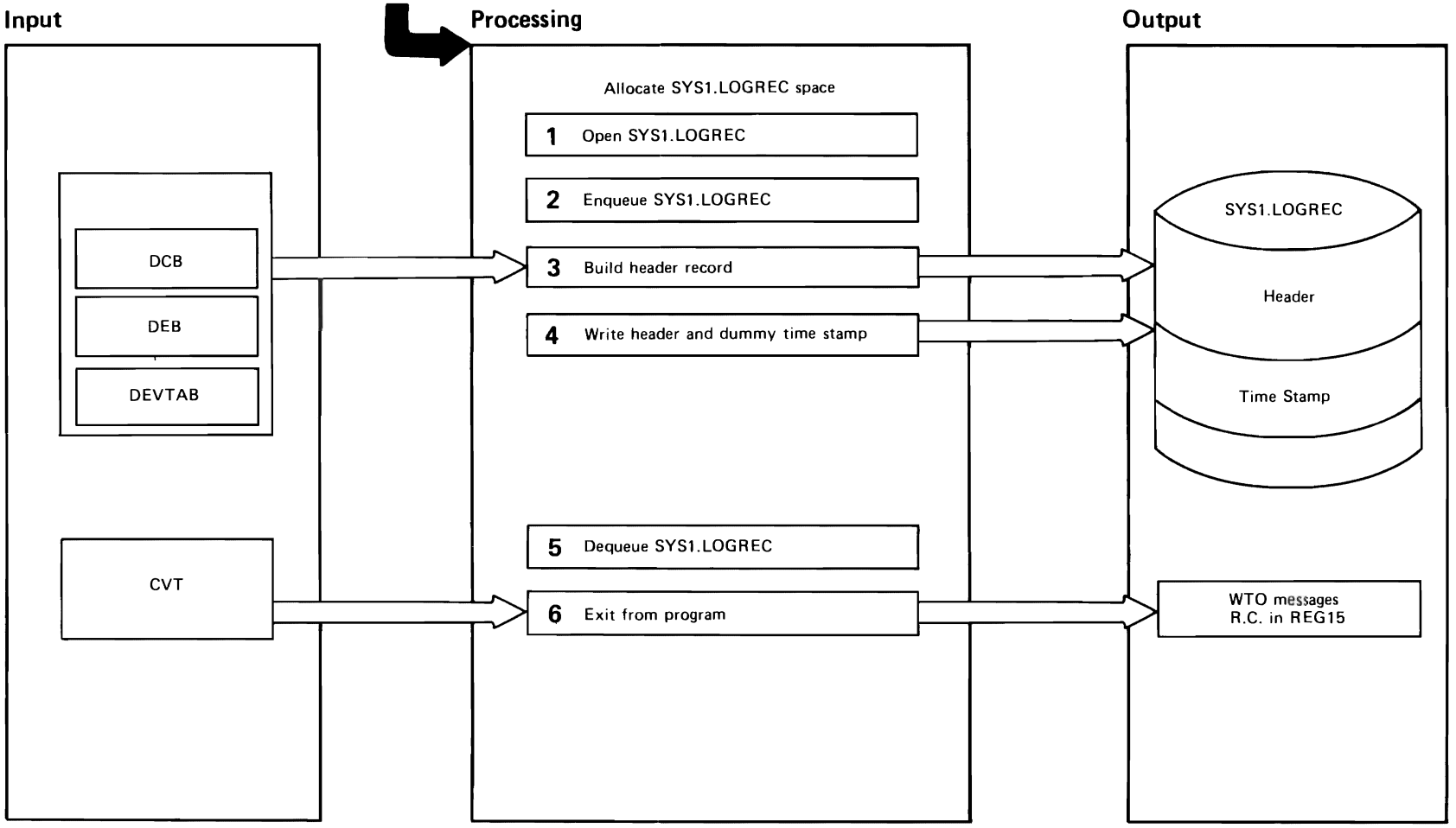
Method of Operation

The Method of Operation section contains a method of operation (MO) diagram that shows the function of IFCDIP00 and is also a guide to the program listing. To do this effectively, the MO diagram is shown at a high (less detailed) level; thus, some functions of the IFCDIP00 routine are not shown. Use the directory and program organization sections for this part of the publication to find any module information and labels in the program listing for this routine that are not included in the MO diagram in this section.

DIP00 Diagram 1 shows the function of the IFCDIP00 program.



DIP00 Diagram 1. Function of the IFCDIP00 Program (Part 1 of 2)



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DIP00 Diagram 1. Function of the IFCDIP00 Program (Part 2 of 2)

Explanation	Module	CSECT	Label
1 Opens SYS1.LOGREC	IFCDIP00	IFCDIP00	IFCDIP00
2 ENQUEUE SYS1.LOGREC			OLDDIP
3 a. Find appropriate DEVTABLE entry for SYSRES			
b. Get device code from DCB.			
c. Get allocation information from DEB.			
d. Calculate record entry address.			
e. Calculate 90% full point.			RECSTRT
f. Get high extent.			
g. Set track balance from DEVTABLE.			
4 Use BSAM to write HEADER and TIME STAMP.			
5 DEQUEUE SYS1.LOGREC			
6 Close SYS1. LOGREC. Issue WTO end of job message.			DIPEND
R15 = 0 if success			
R15 = 16 if SYS1.LOGREC not initialized.			

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Program Organization

The Program Organization section describes the program organization (object module) of the IFCDIP00 service aid. It contains the following information:

- **Module description** – which describes the logic of the IFCDIP00 module.

The module description provides a direct reference to the module directory in this part of the publication and to the object module name in the program listing.

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Module Description

IFCDIP00 – SYS1.LOGREC Initialization Module

Entry From: Control program to entry point IFCDIP00.

Registers at Entry: REG1 points to address of address of PARAMETER Field.

Operation: The SYS1.LOGREC data set is enqueued. The SYS1.LOGREC data set is opened and the data is located in the Device Table (DEVTAB) entry associated with system residence volume. Information about the SYS1.LOGREC data set is obtained, which is on the system residence volume, for the SYS1.LOGREC header from the following areas:

- Device code from DCB + 17.
- Device information from DEVTAB.
- Allocation information from DEB.

The low extent address is used to compute the beginning of the record entry area, located following the header and time stamp records. The 90% full point of the data set is calculated. BSAM is used to write the header and the time stamp place holder to the SYS1.LOGREC data set.

All error messages are issued to the system console via the WTO macro. At the end of the job, SYS1.LOGREC is closed and a WTO is issued to signal completion. The following return codes are issued in REG15:

1. 0 = Successful completion.
2. 16 = SYS1.LOGREC has not been initialized.

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Data Areas Defined:

1. SYS1.LOGREC header.
2. Dummy Time Stamp Record.
3. Communications vector table overlay.

Data Areas Referenced: DEVTAB, CVT.

Data Areas Updated: None.

Routines Called: None.

Macros Used:

1. EXCP –Retrieve CPU serial number.
2. READ –Read the partially built record header.
3. WRITE –Write via BSAM to SYS1.LOGREC.
4. OPEN –Open SYS1.LOGREC
5. CLOSE –Close SYS1.LOGREC
6. TIME –Retrieve date and time for inclusion in header portion of the time stamp.
7. ENQ –Make SYS1.LOGREC unavailable to other users.
8. DEQ –Make SYS1.LOGREC available to other users.
9. MODESET –Enter supervisor state to issue STIDP.

Size: 8828 bytes

Exit: To the control program with return code in register 15.

Registers at Exit:

R 14 -- Return address.
R 15 -- Return codes:

0 = Successful completion.
16 = SYS1.LOGREC has not been initialized.

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Directory

The Directory section provides the cross-reference lists necessary to quickly identify important names in the program listings and in the other sections of this part of the publication.

This section contains the module directory – a list of different names for the IFCDIP00 module. The list contains:

- The distribution library (DLIB) or microfiche (fiche) name.
- The module name and module name alias(es) in SYS1.LINKLIB.
- A brief description of the function of each module.
- The CSECT, entry point, and load module names.

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Module Directory

DLIB/ Fiche	Entry Point	Load Module	CSECT	SYS1.LINKLIB Name	SYS1.LINKLIB Alias	Function
IFCDIP00	START	IFCDIP00	IFCDIP00	IFCDIP00		SYS1.LOGREC initialization module.

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Data Areas

The Data Areas section provides information about the IFCDIP00 data areas. The information in the data areas can assist in interpreting storage dumps and in determining the program and system status at the time of a failure.

Consult System Programming Library: SYS1.LOGREC Error Recording for the detailed format of the major IFCDIP00 data areas that are listed in this section.

This section provides information about the following major data areas that are defined by the IFCDIP00 module:

- SYS1.LOGREC Header Record.
- Time Stamp Record.

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SYS1.LOGREC Header Record

Acronym: None.

Full Common Name: SYS1.LOGREC Header Record.

Macro ID: None.

MO Diagrams: 1.

Created by: IFCDIP00.

Referenced by: IFCIOHND, IGC0007F or IGFPEMER.

Updated by: IFCIOHND, IGC0007F or IGFPEMER.

Size: 40 bytes.

Pointed to by: Located as first record on SYS1.LOGREC data set as follows: CVT address + X'75' = ↑ SYS1.LOGREC DCB; DCBDEBAD = ↑ DEB. (DEB contains extents of SYS1.LOGREC data set on system residence volume.)

Function:

- Used by IGC0007F and IGFPEMER to determine where to write new record entries on SYS1.LOGREC.
- Used by IFCIOHND to retrieve information from existing record entries on SYS1.LOGREC.
- Used by IGC0007F to determine when to issue a warning message that the SYS1.LOGREC data set is 90% full.

Time Stamp Record

Acronym: None.

Full Common Name: Time Stamp Record.

Macro ID: None.

MO Diagrams: 1.

Created by: IFCDIP00.

Referenced by: IGC0007F (SVC 76).

Updated by: IGC0007F.

Size: 40 bytes.

Pointed to by: Record immediately following SYS1.LOGREC header record on SYS1.LOGREC data set.

Function: Contains time and date information for the IPL record. This information allows the user to measure the approximate time interval, recorded in the IPL record, between the termination and reinitialization of the operating system.

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Diagnostic Aids

The Diagnostic Aids section provides cross-references between the diagnostic information in this section to the related sections in this part of the publication and to the program or microfiche listings.

This section contains the following lists of information about the IFCDIP00 module:

- **Messages** – a summary of the messages, their message IDs, and the issuing module.
- **Return codes** – a summary of the return codes, their meanings, and the related MO diagram. All return codes are in register 15.
- **System completion codes** – IFCDIP00 **does not** issue any system completion codes. (No list provided.)
- **Wait state codes** – IFCDIP00 **does not** issue any wait state codes. (No list provided.)

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IFCDIP00 Messages

Consult the following publication for explanations, system actions, and appropriate programmer responses to IFCDIP00 messages:

Message Library: System Messages.

All message texts are in module IFCDIP00.

Message ID	Message Text	Issuing Module
IFC001I	D = devtyp N = X F = trck L = trck S = recd DIP COMPLETE	IFCDIP00
IFC002I	SYS1.LOGREC CANNOT BE OPENED	IFCDIP00
IFC003I	SYS.1LOGREC HEADER WRITE ERROR	IFCDIP00
IFC009I	INVALID SYSRES DEVICE	IFCDIP00
IFC156I	INVALID PARM FIELD	IFCDIP00
IFC157I	VERBAGE FAILURE	IFCDIP00

IFCDIP00 Return Codes

Module	Return Code (Hex)	Meaning	MO(s)
IFCDIP00	00	Normal exit to control program	1
	16	SYS1.LOGREC not initialized	1

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PART III: RECORDING RECORDS ON SYS1.LOGREC (SYSTEM RECORDING ROUTINES)

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Introduction

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

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

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

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

The system generation process selects the recording modules and puts them in the appropriate system library. See the module directory in this part of the publication for a list with each module in its appropriate system library.

The recording routines are standard programs of the system control program. For a complete description of how records are built and recorded on SYS1.LOGREC, see **System Programming Library: SYS1.LOGREC Error Recording.**

Types of Records on SYS1.LOGREC

The SYS1.LOGREC data set, a non-sharable system data set, is a permanent data set that resides on the system residence volume. The SYS1.LOGREC data set contains:

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

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

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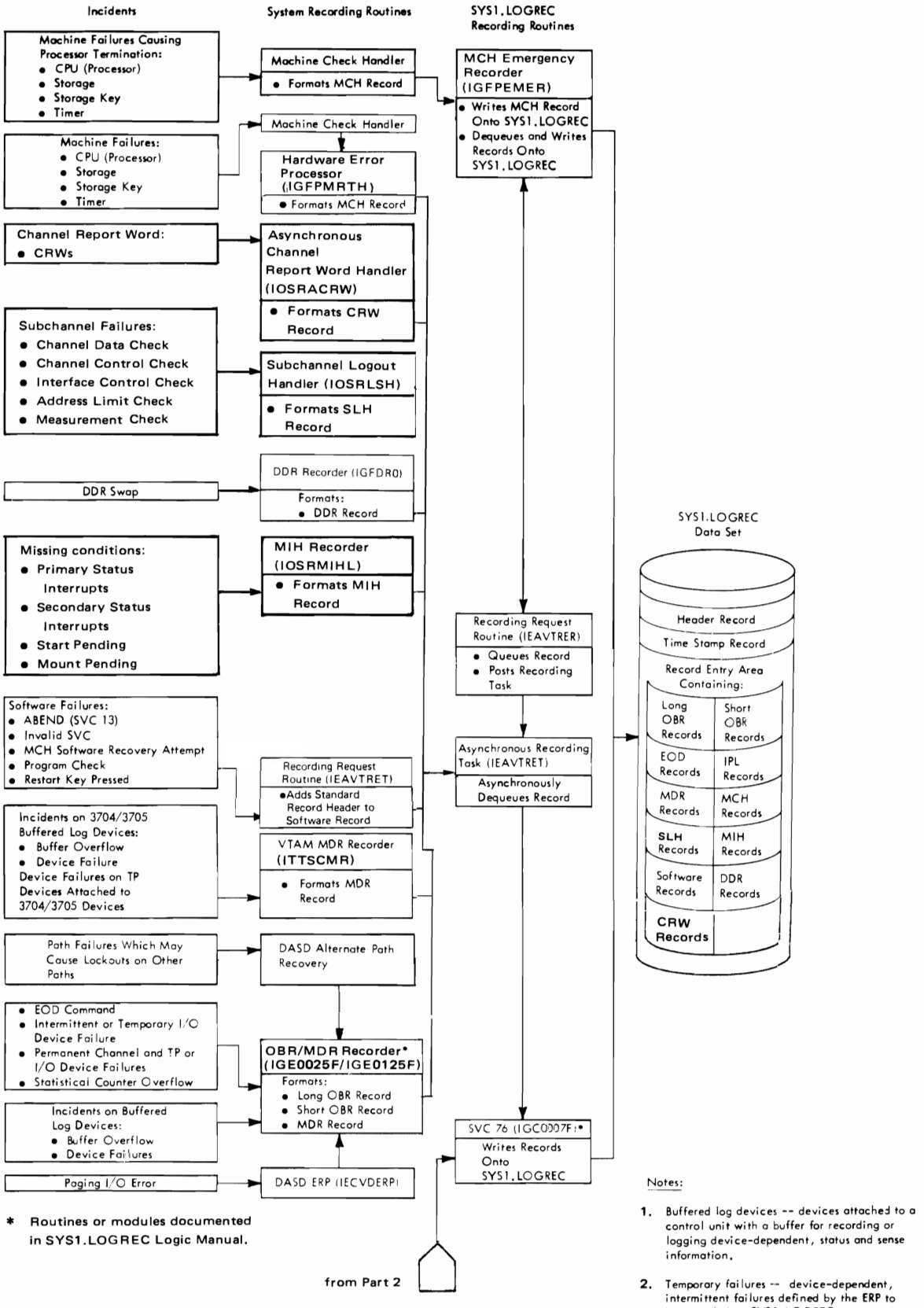

Recording Figure III-1. Writing Records Onto SYS1.LOGREC (Part 1 of 2)

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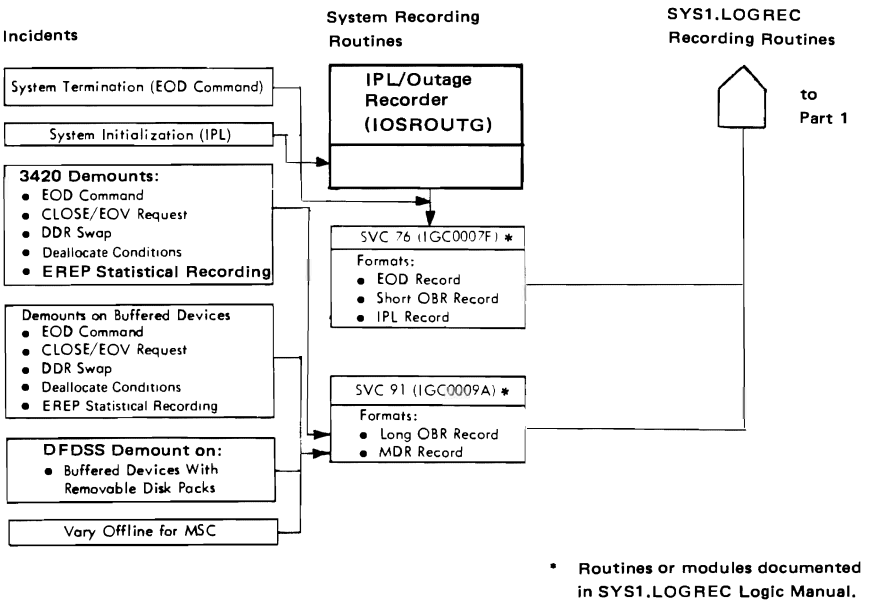

Recording Figure III-1. Writing Records Onto SYS1.LOGREC (Part 2 of 2)

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

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

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

Numbers in boxes (reading horizontally) indicate:

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

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

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

Letters in boxes indicate the following:

A. Created one SLH record if buffer space is available. Otherwise, no record is built. Also, more than one record can describe the same incident before it becomes permanent (uncorrectable).

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

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

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

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

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

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

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

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

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

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Method of Operation

The Method of Operation section contains method of operation (MO) diagrams that show the functions for recording record entries on SYS1.LOGREC and are also a guide to the program listings. To do this effectively, the MO diagrams are at a high (less detailed) level; thus, some functions of the system recording routines are not shown. Use the directory and program organization sections for this part of the publication to find the modules and labels in the program listings for any routines that are not shown in the MO diagrams in this section.

Recording Figure III-3 provides an overview which shows the symbols used in the MO diagrams and the following functions of SYS1.LOGREC record entry recording:

Diagram 1: **SYS1.LOGREC record entry recording overview** – which shows what type of record entry is created for certain conditions.

Diagram 2: **OBR/MDR recording** – which shows the recording functions of the OBR/MDR recorder (IGE0025F).

Diagam 2.1: **OBR/MDR recording (new interface)** – which shows the recording functions for new interface (IGE0125F).

Diagram 3: **SVC 76 recording** – which shows the recording functions of SVC 76 (IGC0007F).

Diagram 3.1: **SVC 76 recording (NDPA Processing)** – which shows the recording functions of NPDA.

Diagram 4: **SVC 91 recording** – which shows the recording functions of SVC 91 (IGC0009A).

See **System Logic Library** for a detailed description of the channel check handler, dynamic device reconfiguration, the machine check handler, and the missing interruption handler.

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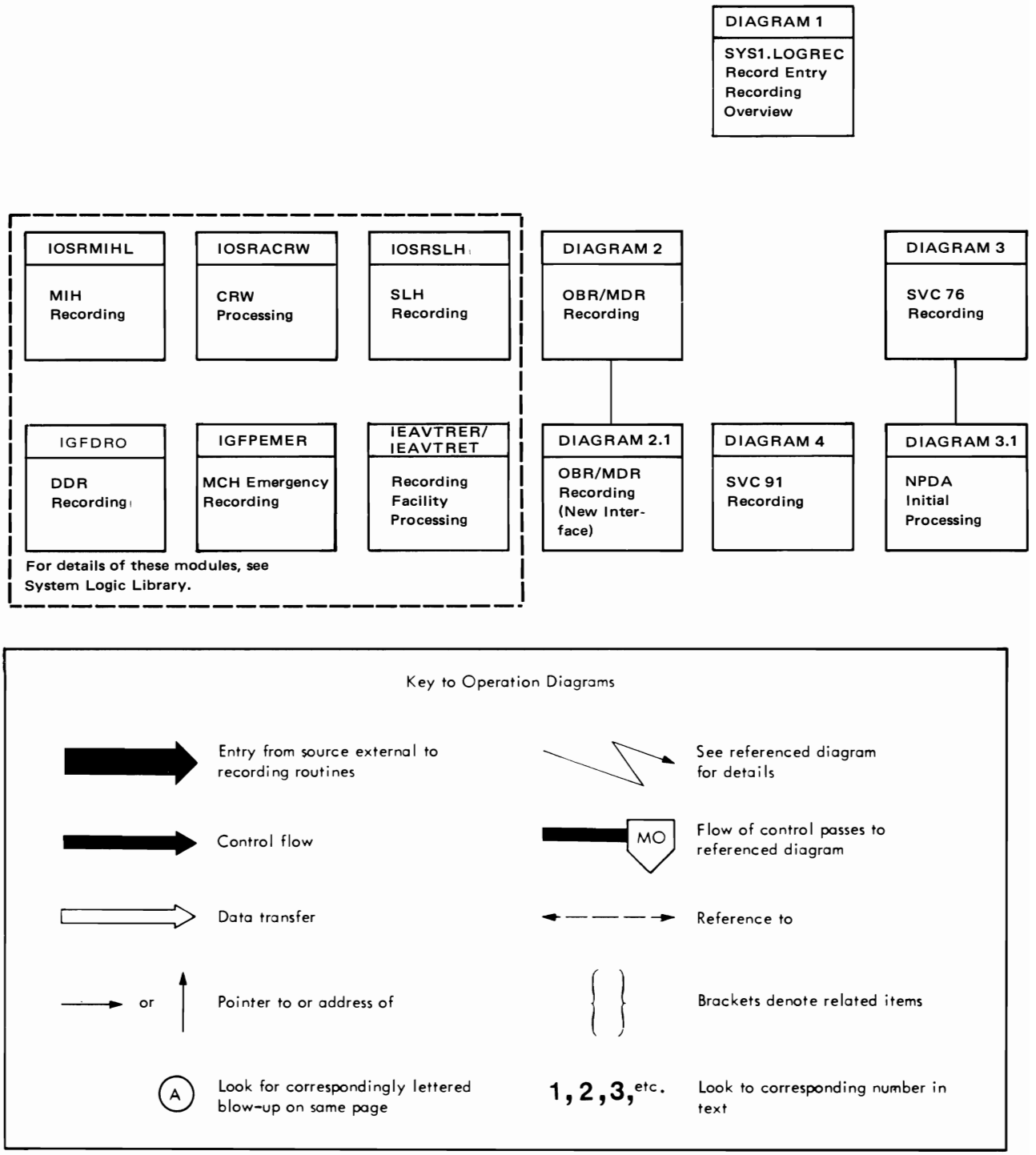
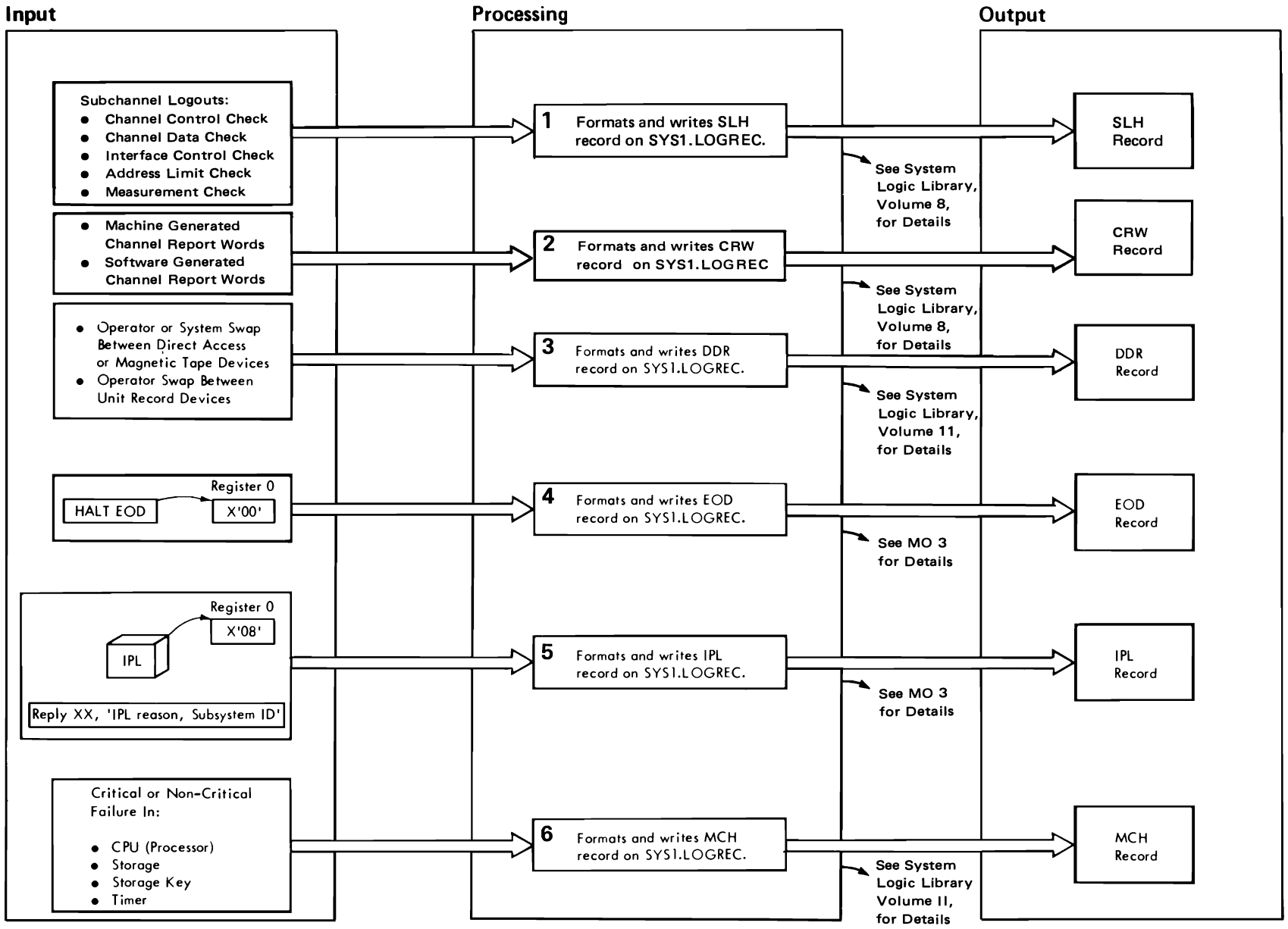


Recording Figure III-3. SYS1.LOGREC Recording Overview

Recording Diagram 1. SYS1.LOGREC Record Entry Recording Overview (Part 1 of 4)



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Recording Diagram 1.SYS1.LOGREC Record Entry Recording Overview (Part 2 of 4)

Explanation
1 A channel failure causes an SLH record to be built by the subchannel logout handler (SLH). After formatting the record, SLH invokes the recording request routine (IEAVTRET) which queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC. Control returns to the control program.
2 The hardware generates a channel report word (CRW) to describe a machine malfunction affecting one or more channel subsystem facilities. The software generates a CRW to simulate a machine malfunction affecting one or more channel subsystem facilities. The CRW processor formats the CRW into a CRW record and writes that record on SYS1.LOGREC.
3 The DDR recorder (IGFDR0) uses DDR swap information to build DDR records which describe system or operator initiated swaps on direct access or magnetic tape devices and which describe operator initiated swaps on unit record devices. IGFDR0 creates a record describing each device involved in the swap unless it detects an error condition or offline status. After formatting the record, IGFDR0 invokes the recording request routine (IEAVTRER) which queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC.
4 The master scheduler invokes the DDR recorder (IGFDR0) to issue SVC 76 (IGC0007F) with register 0 containing a zero to indicate EOD record processing. SVC 76 builds the record by adding date and time values to the other standard record header information and then writes the record on SYS1.LOGREC. Control returns to the master scheduler.
5 As part of the initialization, IOSROUTG issues SVC 76 with register 0 containing an eight to indicate IPL record processing. SVC 76 formats the IPL record by adding: • Environmental and statistical information to the standard record header. • Date and time values from the SYS1.LOGREC time stamp record. • An IPL reason code and a subsystem ID code from a WTOR message if the RDE option is in the system. After formatting the record, SVC 76 writes the record on SYS1.LOGREC and returns control to IOSROUTG.

Explanation
6 A non-critical hardware failure (CPU or processor, storage, storage key or timer failure), corrected by either the hardware or software recovery routines, causes the machine check handler (MCH) to build a MCH record and pass control to the recovery termination manager (RTM). RTM invokes the recording request routine (IEAVTRER) which queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC. Control returns to the control program. A critical hardware failure (one that causes processor termination), not corrected by either the hardware or software recovery routine, causes MCH to build a MCH record and invoke the MCH emergency recorder (IGFPEMER). IGFPEMER writes this record on SYS1.LOGREC and also attempts to write any records for SYS1.LOGREC on the asynchronous output queue onto SYS1.LOGREC before passing control to IGFPTSIG. IGFPTSIG then places the system in a disabled wait state.

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

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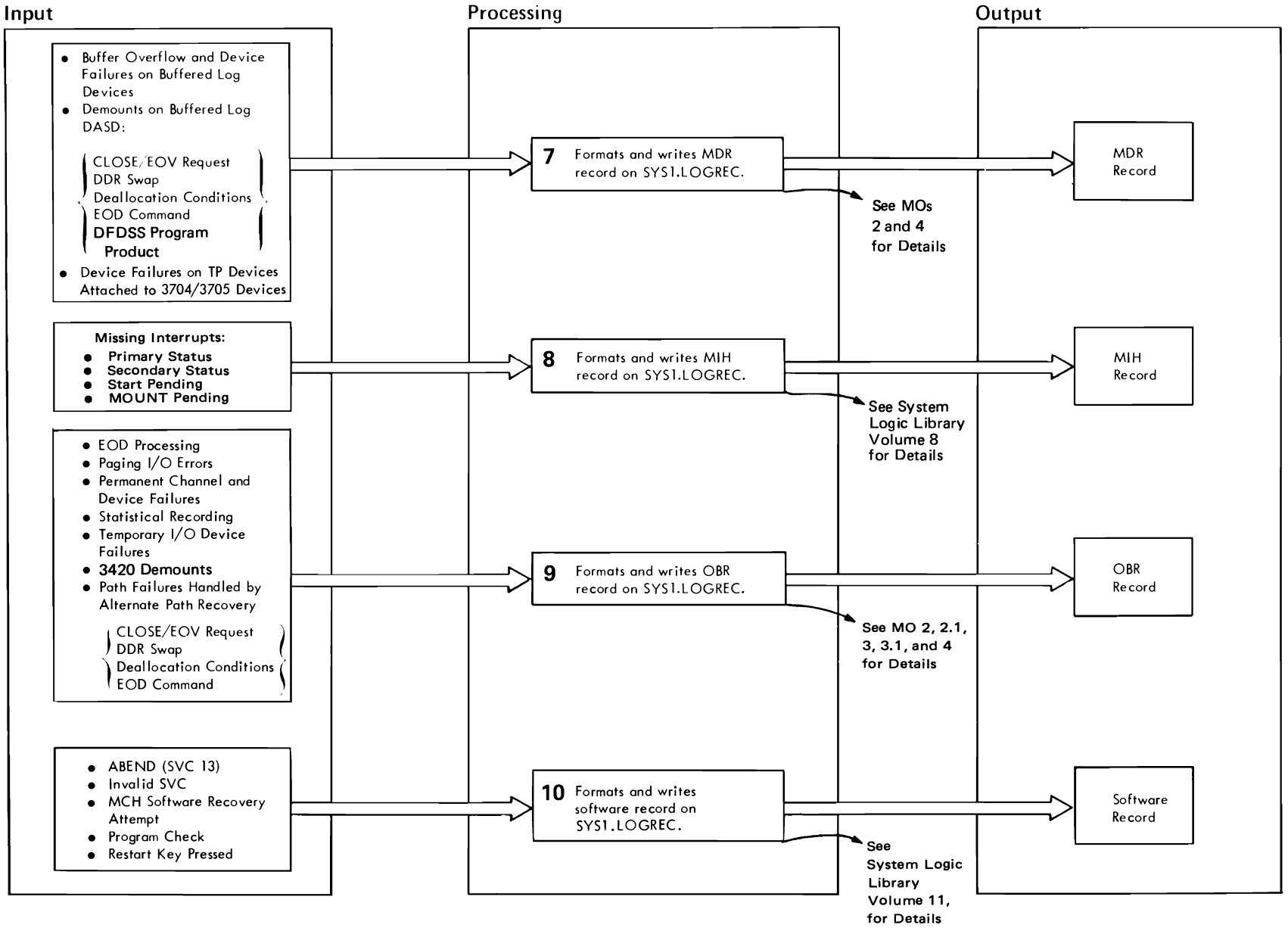
Recording Diagram 1. SYS1.LOGREC Record Entry Recording Overview (Part 3 of 4)



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Recording Diagram 1. SYS1.LOGREC Record Entry Recording Overview (Part 4 of 4)

Explanation

7 A device failure or buffer overflow on a buffered log device causes a device dependent error recovery procedure (ERP) to store error data in that device's record buffer. The OBR/MDR recorder (IGE0025F) formats that data into an MDR record and invokes the recording request routine (IEAVTRER) which queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC. Control returns to the control program or to the XCTL routine (IECXTLER).

A device failure or buffer overflow on an IBM 3704 or 3705 buffered device or a device failure on a TP device connected to an IBM 3704 or 3705 device causes the device-dependent ERP to either store the data in the device's record buffer or transfer the error information to VTAM (virtual telecommunications access method). When the VTAM MDR recorder (ITTSCMR) receives control, it adds environmental and statistical information to that data to format an MDR record and invokes the recording request routine (IEAVTRER). This routine queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC. Control returns to the calling routine.

Demounts (CLOSE/EOV requests, DDR swaps, deallocation conditions, and EOD command) involving buffered log DASD and demounts by the DFDSS program product on buffered log DASD with removeable disk packs invoke SVC 91 (IGC0009A). SVC 91 determines that recording is for a buffered log DASD, formats the sense data from the device's record buffer into an MDR record, and issues SVC 76 to write the record on SYS1.LOGREC. Control returns to the calling routine.

8 The MIH recorder (IOSRMIHL) uses MIH information which describes missing interrupts to build an MIH record. IOSRMIHL creates a record for each missing interrupt and invokes the recording request routine (IEAVTRER). IEAVTRER queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC. Control returns to the calling routine.

9 The OBR/MDR recorder (IGE0025F/IGE0125F) builds OBR records to describe the following conditions:

- Paging I/O errors.
- Permanent (uncorrectable or unit check) channel and device failures.
- Statistical counter values.
- Temporary or intermittent I/O device failures.
- Path failures handled by alternate path recovery.

IGE0025F, when invoked by a device-dependent ERP or the statistics update routine (IGE0025D), obtains environmental and/or statistical data about the failure or counter overflow condition and constructs an OBR record. After formatting the record, IGE0025F invokes the recording request routine (IEAVTRER)

Explanation

which queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC. Then, IGE0025F scans the asynchronous OBR queue, contructs an OBR record for each queued paging I/O error, and invokes IEAVTRER again.

SVC 76 (IGC0007F), when invoked by the master schedule for EOD processing (operator issuing a HALT EOD command), searches the counters in the device statistics table. For each counter with a non-zero value, SVC 76 builds OBR record. For each IBM 3420 type tape device, SVC 76 issues SVC 91 to build a record describing that device's statistical information. SVC 91 issues SVC 76 to write the OBR record on SYS1.LOGREC. (No OBR records are built for buffered log devices such as the IBM 2305, 3340, and 3850 devices. An MDR record built by SVC 91, describes the statistical information for those devices during EOD processing.) Control returns to the master scheduler.

SVC 91 when invoked by other demounts (CLOSE/EOV requests, deallocation conditions, and DDR swaps) for the IBM 3420 type tape devices, also creates an OBR record to describe that event.

10 The operating system uses functional recovery routines (FRRs) and ESTAE/ESTAI services to attempt recovery and record software records for the following conditions:

- Hardware detected hardware errors such as recovery attempts for hard machine failures.
- Hardware detected software errors such as program checks.
- Operator detected errors such as pressing the restart key.
- Software detected software errors such as ABTERM (CALLRTM macro) or programs issuing an invalid SVC.

FRRs provide recovery for locked, SRB (service request block), and supervisor control mode functions. ESTAE/ESTAI services provide recovery for enabled, non-locked task mode functions.

For error recording purposes, FRR and ESTAE/ESTAI services collect error data in the system diagnostic work area (SDWA) to assist the FRR or ESTAE/ESTAI service in identifying the SCP error. If indicated, they invoke RTM to format a software record. RTM formats the record using standard record header information, the SDWA information, and variable information supplied by the FRR or ESTAE/ESTAI services. RTM then invokes the recording request routine (IEAVTRER) which queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write records on SYS1.LOGREC.

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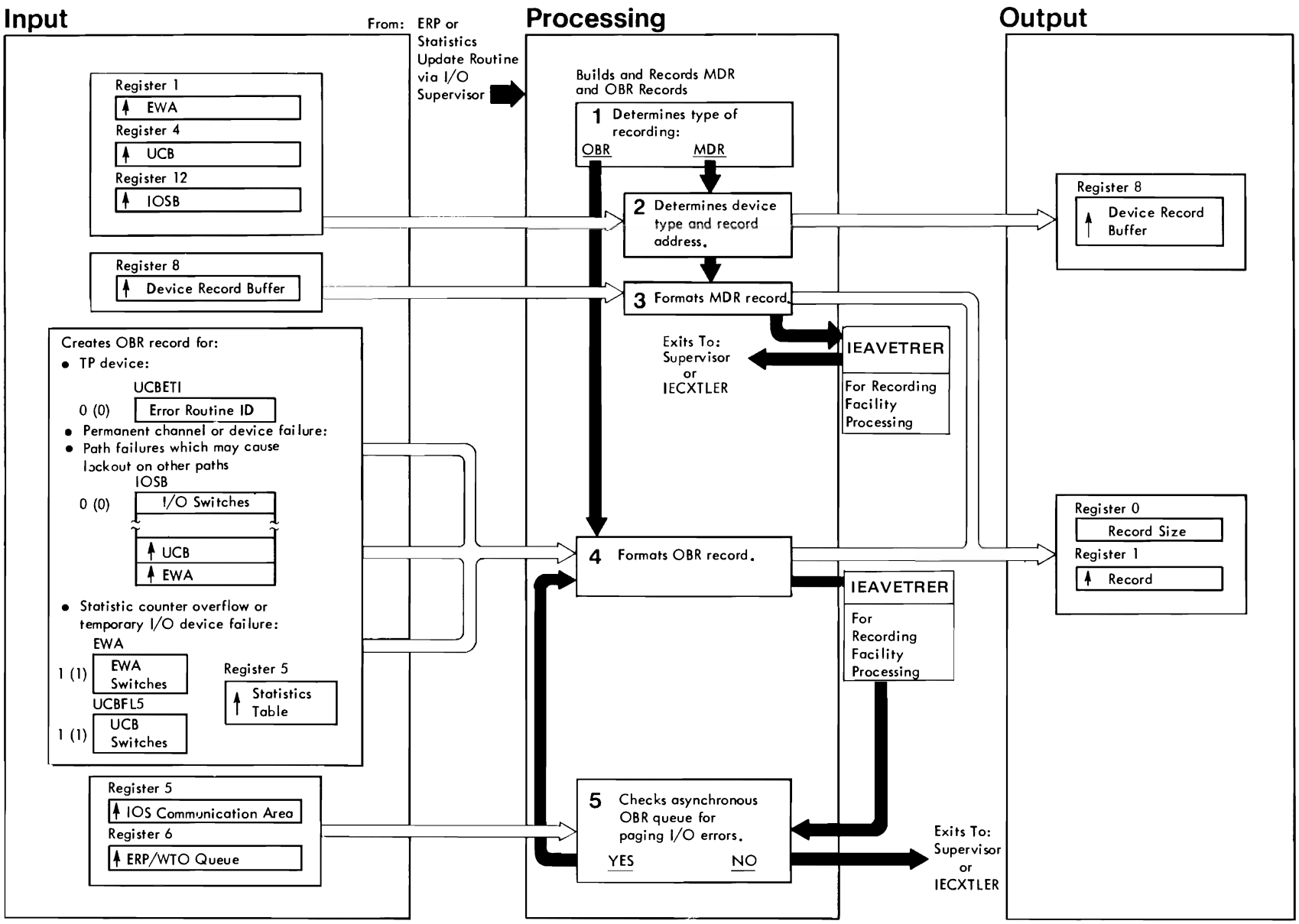
Recording Diagram 2. OBR/MDR Recording (Part 1 of 2)



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Recording Diagram 2. OBR/MDR Recording (Part 2 of 2)

	Explanation	Module	CSECT	Label
	A device-dependent ERP or the statistics update routine (IGE0025D), via the I/O supervisor, invokes the OBR/MDR recorder (IGE0025F) to perform either MDR or OBR recording: • MDR recording — builds an MDR record to describe: buffer overflow or device failures on buffered log devices. • OBR recording — builds an MDR record to describe: paging I/O errors, permanent (uncorrectable or unit check) channel and device failures, statistical counter values or temporary (intermittent) I/O device failures, path failures handled by alternate path recovery.			
1	Register 1 points to the IOSB. Puts EWA address from the IOSB in register 1, UCB address from the IOSB in register 4, and the IOSB address in register 12.	IGE0025F	IGE0025F	OBRSTART
	Checks EWA switch, offset 1, whether entry is for MDR recording: • Yes — MDR processing continues. See step 3. • No — OBR processing begins. See step 4.			
2	Tests UCB to determine which buffered log device has data for an MDR record. Places device's record buffer address in register 8.			MDR
3	Obtains formatted record from device's buffered log.			
	If record is not formatted in the device's buffer, such as for the IBM 3270 (BTAM-supported) devices, formats record in GETMAIN area.			NOTFORM
	Initializes the record header with system environmental information.			INITHDR
	Puts record size in register 0 and record address in register 1 before invoking the recording request routine (IEAVTRER). This routine, part of the recording facility, queues the record on the asynchronous output queue and posts the asynchronous recording task (IEAVTRET) to write the records on this queue on SYS1.LOGREC.			SETIME
	Returns to supervisor when value in register 13 is zero. or Returns to DDR if error is permanent and DDR is in system or to TCAM ERP for TCAM EOD condition by loading binary equivalent of module name into register 13 and branching to XCTL routine IECXTLER.			NOMAIN EXIT1
4	Formats OBR record according to type of incident: • TP device: Checks UCBETI field, offset 0, of UCB extension for record describing incident on teleprocessing device.			LABL2

	Explanation	Module	CSECT	Label
	Tests EWA switch, offset 42, for EOD or counter overflow to be made for a TP device.			TCREC ATCMREC
	Completes short OBR record for TCAM/VTAM EOD or counter overflow condition.			TAMOFL
	Builds long OBR record with environmental and statistical information to describe device failure on a TP device.			FULLREC
	Puts record size in register 0 and record address in register 1 to setup record for recording on SYS1.LOGREC.			WRTTCAM
	• Permanent channel or device failure:			
	Tests IOSB switch, offset 0, for permanent error.			TSTPERM
	Builds long OBR record to describe incident.			FULLREC
	Puts record size in register 0 and record address in register 1 to setup record for recording on SYS1.LOGREC.			SVCPRE SETADR
	• Statistic counter overflow or temporary I/O device failure:			
	After building record header, adds statistical information from device's entry in the statistics table. (Short OBR record for devices without variable length entries; long OBR record for those with variable length entries.)			LOOP2 NEWSTAT
	Moves sense information from EWA for long OBR record.			SENSE
	Puts record size in register 0 and record address in register 1 to setup record for recording on SYS1.LOGREC.			NEWSTAT3 SETADR
	Invokes recording request routine, part of the recording facility, which queues the record on the asynchronous output queue and posts the asynchronous recording task to write the records on this queue on SYS1.LOGREC.			
5	Checks ERP/WTO queue, offset 4, for IOSB address. If located, the DASD ERP (IECVDERP) has queued an IOSB and an associated EWA describing a paging I/O error on the asynchronous OBR queue.			DIRCHK
	Formats long OBR record for each queued paging I/O error using IOSB and EWA information.			DIRENTRY
	Adds environmental and statistical information and sets up record for recording on SYS1.LOGREC as in step 4 for permanent channel or device failure.			FULLREC SVCPRE
	Returns to supervisor when value in register 13 is zero. or Loads binary equivalent of module name into register 13 and branches to XCTL routine IECXTLER.			EXIT3 EXIT1

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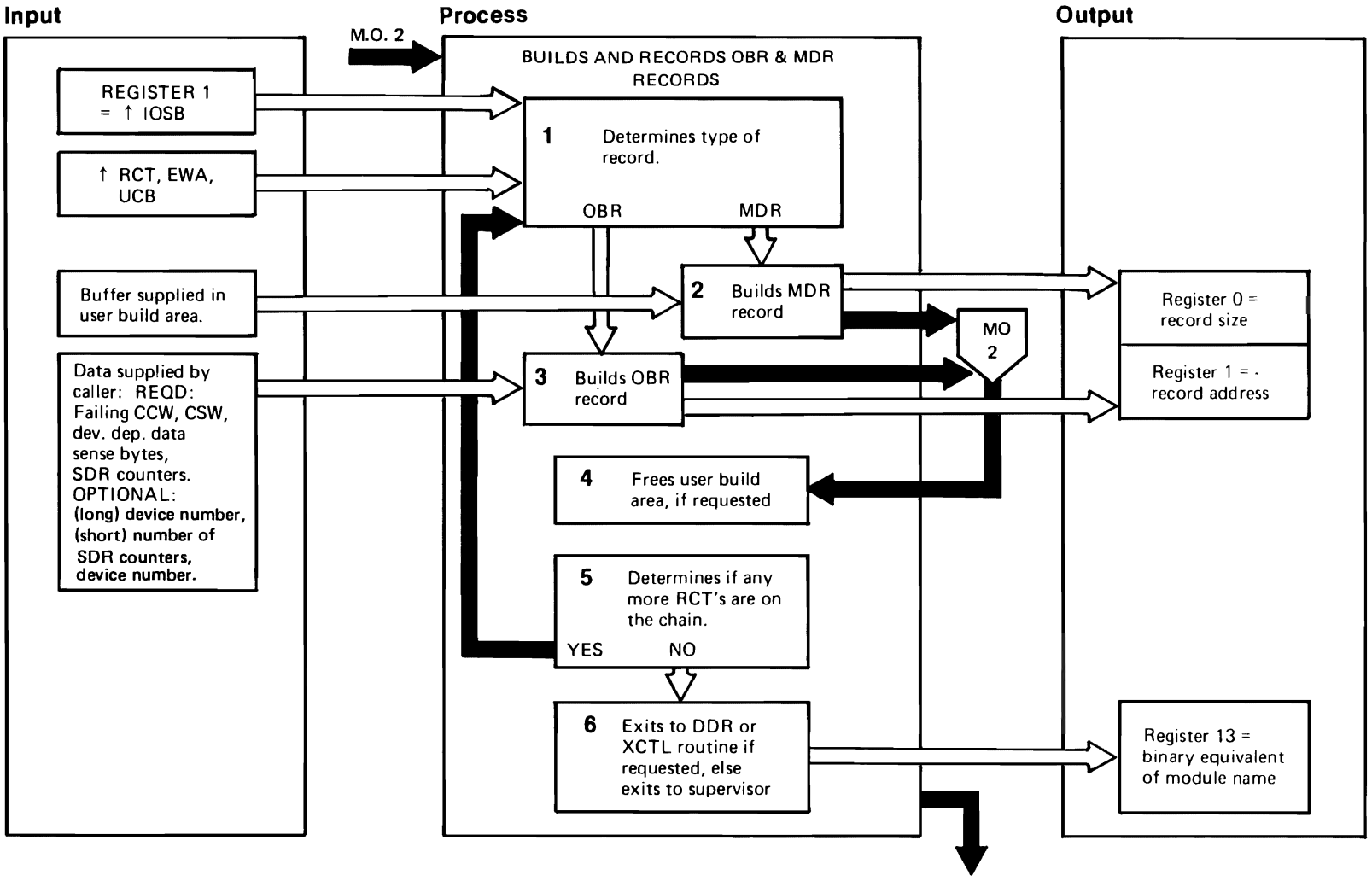
Recording Diagram 2.1 OBR/MDR Recording (New Interface) (Part 1 of 2)



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Recording Diagram 2.1 OBR/MDR Recording (New Interface) (Part 2 of 2)

Explanation	Module	CSECT	Label
The old OBR/MDR recorder (IGE0025F) invokes IGE0125F when use of the new interface is detected (EWARCBLT). • OBR–Builds an OBR record to describe: paging I/O errors, permanent channel and device failures, stat counter values, and temporary device failures. • MDR–Builds an MDR record to describe: buffer overflow or device failures on buffered log devices.			
1 Register 1 points to the IOSB. pointers to the EWA, RCT, and UCB may be obtained from there.	IGE0125F	IGE0125F	
Does a GETMAIN for a build area. If it fails, OBR/MDR terminates. Otherwise it checks EWA flag byte 2 (EWA +5) to determine whether an OBR or an MDR record is to be constructed.		YESGET	
• MDR - see (2)			
• OBR - see (3)			
2 Formats MDR record by filling in the header with system data and getting class/source, record dependent flags, and the device buffer from the caller. Records record and indicates success status. Proceeds to step 4.		MDR1	
3 Checks RCT flag byte 1 to decide if a short record is to be made.		OBRHDR	
• SHORT - formats short OBR record by getting the device number and count of SDR counters from the UCB or optionally from the caller.		SHORTOBR	
• LONG – formats long OBR record by getting the device number as for short.		LONGOBR	
4 Frees user build area if so requested (RCTRECGO and RCTRECFR).		FREEBLDA	
5 If any more RCT's are on the chain (RCTRECNX) then return to (1) - YESGET.		IGE0125F	

Explanation	Module	CSECT	Label
6 If DDR or XCTL exit was requested (RCTRECDR or RCTXCTLX) then take the appropriate exit, otherwise exit to the supervisor via SVC 3.			

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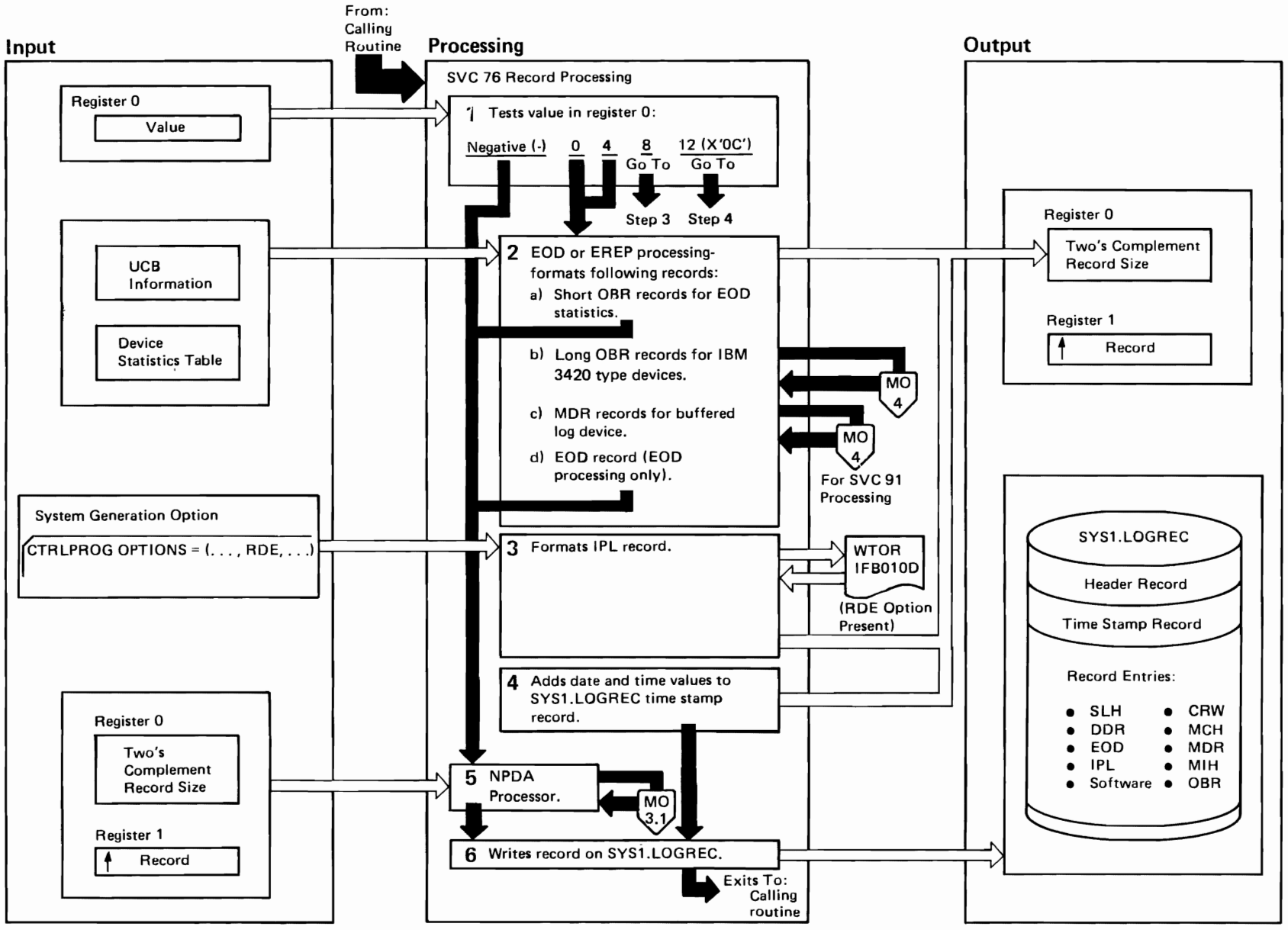
Recording Diagram 3. SVC 76 Recording (Part 1 of 2)



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Recording Diagram 3. SVC 76 Recording (Part 2 of 2)

Explanation	Module	CSECT	Label
SVC 76 performs the following functions. • Writes a formatted record on SYS1.LOGREC data set. • Performs EOD record processing during system termination. • Formats an IPL record during system initialization. • Adds date and time values to SYS1.LOGREC time stamp record for later use in IPL records.			
1 Tests register 0 to identify the function to be performed	IGC0007F	IGC0007F	WRTREC
Value *Meaning* negative Caller has a formatted record to be written.			STGAVAIL
0 EOD record processing.			STATUP
4 EREP record processing.			
8 IPL record processing			
12(X'0C') Add date and time values to SYS1.LOGREC time stamp record.			
2 EOD or EREP record processing, based on UCB information for each device in system, formats the following records. (Loops through device statistics table to obtain statistical counter information.)			STATLKUP
a. Formats short OBR records. Resets counters to zero. Puts record size in two's complement in register 0 and record address in register 1 to have record written on SYS1.LOGREC (see step 5).			NEWSTAT RECSET
b. Issues SVC 91 for each online IBM 3420 tape device to format a long OBR record. SVC 91 issues SVC 76 to write the record on SYS1.LOGREC (see step 5) and returns to EOD or EREP record processing.			ISNEWDEV
c. Issues SVC 91 for each online buffered log device to format an MDR record. SVC 91 issues SVC 76 to write the record on SYS1.LOGREC (see step 5) and returns to EOD or EREP record processing.			
When device statistics table has been searched and EOD record processing is being done, formats an EOD record.			

Explanation	Module	CSECT	Label
d. Formats EOD record from system environmental information. Puts record size in two's complement in register 0 and record address in register 1 to have record written on SYS1.LOGREC (see step 5).			MAKEREC
3 Formats IPL record. Obtains date and time values from SYS1.LOGREC time stamp record.			IPLEOD
Issues BLDL to check system for RDE option: • If present, issues WTOR message and adds IPL reason and subsystem ID code information from WTOR to corresponding fields in IPL record.			REISSUE
• If not present, adds default values to IPL reason code and subsystem ID code fields in IPL record.			REPLYOK
Adds system environmental information to complete record. Prepares to have record written on SYS1.LOGREC (see step 5) by putting record size in two's complement in register 0 and record address in register 1.			CONSTHDR PREPARE
4 Obtains date and time values to add to SYS1.LOGREC time stamp record. Prepares to have record written (see step 5) by putting two's complement of record size in register 0 and record address in register 1.			CONSTHDR PREPARE
5 If register 0 is negative, go to NPDA processing (MO 3.1).			DEMFROUT
6 Makes negative value in register 0 positive to obtain record size of record to be written on SYS1.LOGREC. Issues ENQUEUE instruction to serialize SYS1.LOGREC.			WRTSTAT
Writes record, using EXCP instruction, on SYS1.LOGREC from area pointed to by register 1.			ERR3B
Dequeues SYS1.LOGREC and returns to caller (instruction following SVC 76).			RTRN

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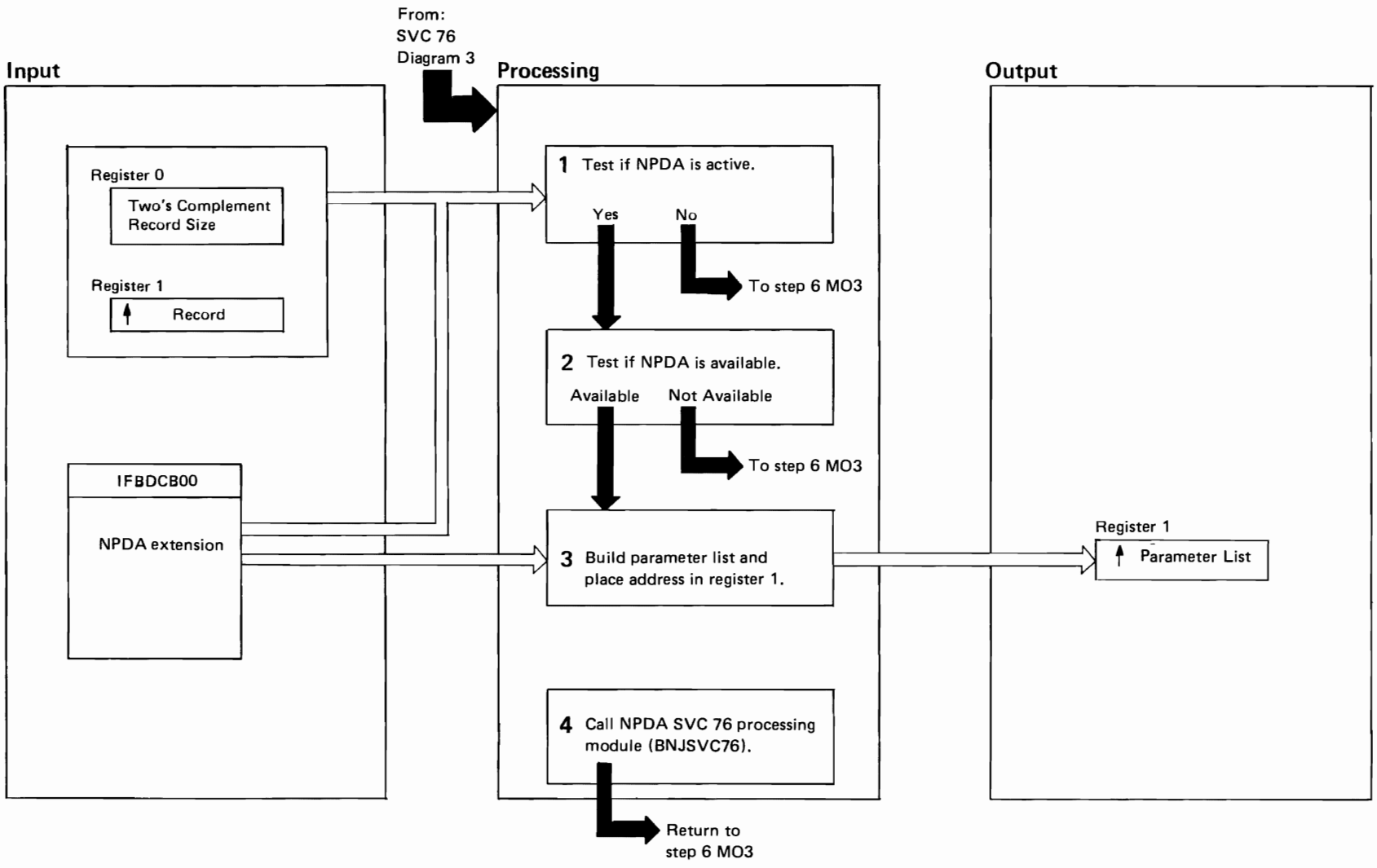
Recording Diagram 3.1 SVC 76 Recording (NPDA Processing) (Part 1 of 2)



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Recording Diagram 3.1. SVC 76 Recording (NPDA Processing) (Part 2 of 2)

Explanation	Module	CSECT	Label
The NPDA subroutine will get control only when register 0 is negative.			
1 Addressability to IFBDCB00 to get the NPDA extension is established, and the 'NPDA active' flag is tested. If not active, control is returned to SVC 76 processing.	IGC0007F	IGC0007F	NPDAROUT
2 If the NPDA SVC 76 processing module is not available (the NPDA module address has been set to X' 0'), return to SVC 76 processing.			
3 Otherwise, build a parameter list for NPDA and place its address in register 1.			
4 Issue a branch and link to NPDA SVC 76.			
Upon return from NPDA, control is returned to SVC 76 for normal processing.			CONTINUE

Explanation	Module	CSECT	Label

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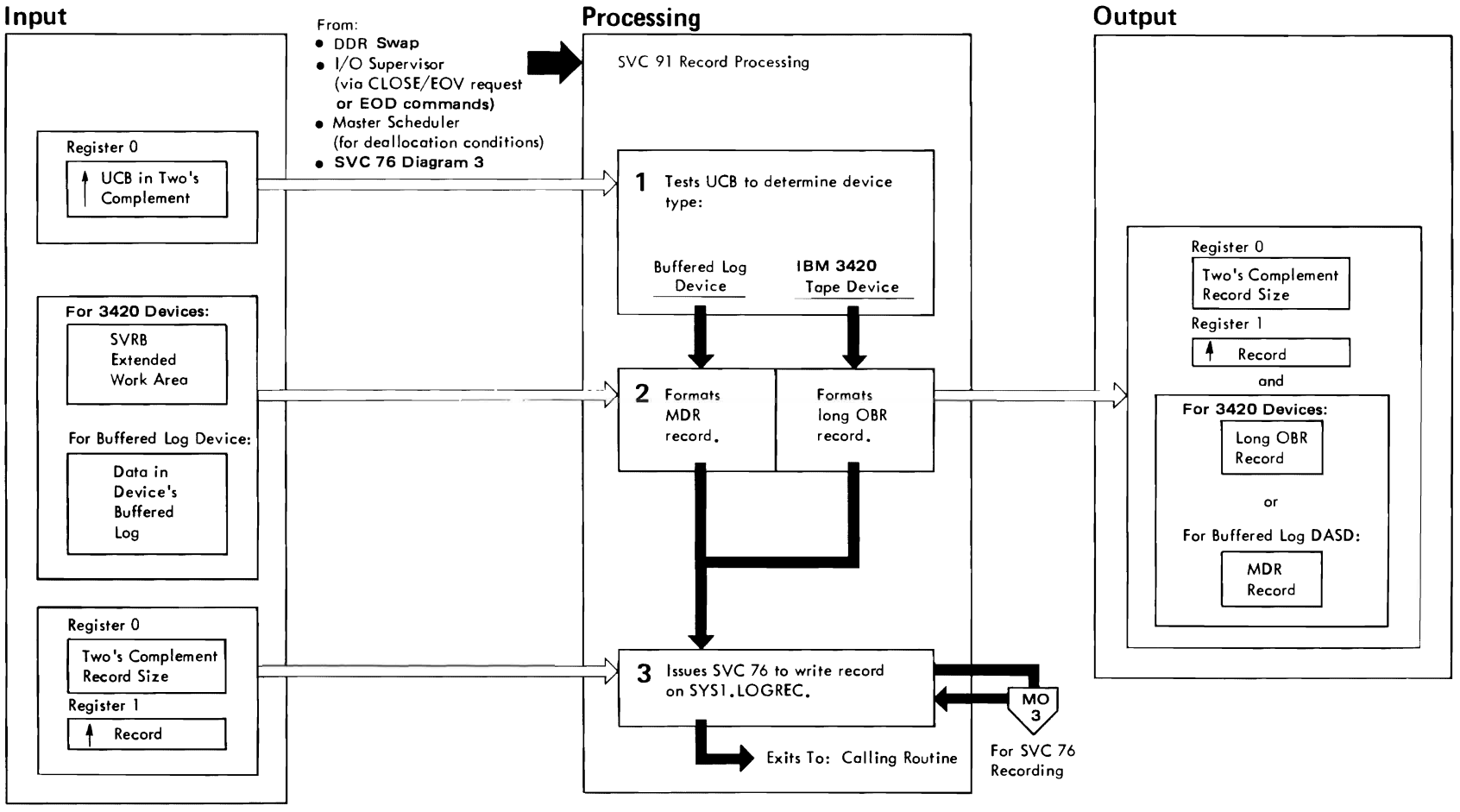
Recording Diagram 4. SVC 91 Recording (Part 1 of 2)



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Recording Diagram 4. SVC 91 Recording (Part 2 of 2)

Explanation	Module	CSECT	Label
SVC 91 documents demounts (CLOSE/EOV requests, DDR swaps, deallocation conditions, and EOD command) by performing the following functions:			
• Formatting long OBR records for the IBM 3420 tape devices.			
• Formatting MDR records for buffered log device.			
1 Tests the UCB to determine the device type.	IGC0009A	IGC0009A	BEGIN
2 For IBM 3420 devices: Formats date, time, device type, CPU ID, release number, device number information, and other device-dependent data into a long OBR record.			OBR
For buffered log device:			PART2
• Issues EXCP instruction to obtain device-dependent information in buffered log.			
Mass Storage Control (MSC) passes the SSID of the current lower device in the Mass Storage System (MSS).			
• Formats buffered log information and standard record header information (such as date, time, device number, release number, and CPU ID) into an MDR record.			
3 Puts long OBR record size in two's complement in register 0 and record address in register 1. Issues SVC 76 to write the record on SYS1.LOGREC.			A215
or			B340
Puts MDR record size in two's complement in register 0 and record address in register 1. Issues SVC 76 to write the record on SYS1.LOGREC.			
The MSC passes the SSID of the current device until an SSID of FFFF is passed, which tells SVC 91 to terminate looping read function.			
Control returns to calling routine.			

Explanation	Module	CSECT	Label

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Program Organization

The Program Organization section describes the program organization (object modules) of the system recording routines. It contains the following information:

- **Record processing overview (Recording Figure III-4)** – which shows the calling sequences used by the various recording routines to format and write the various types of records onto SYS1.LOGREC.
- **Module descriptions** – which describe the logic of each system recording module.

The module descriptions provide direct references to the module and label directories in this part of the publication and to the object module names in the program listings.

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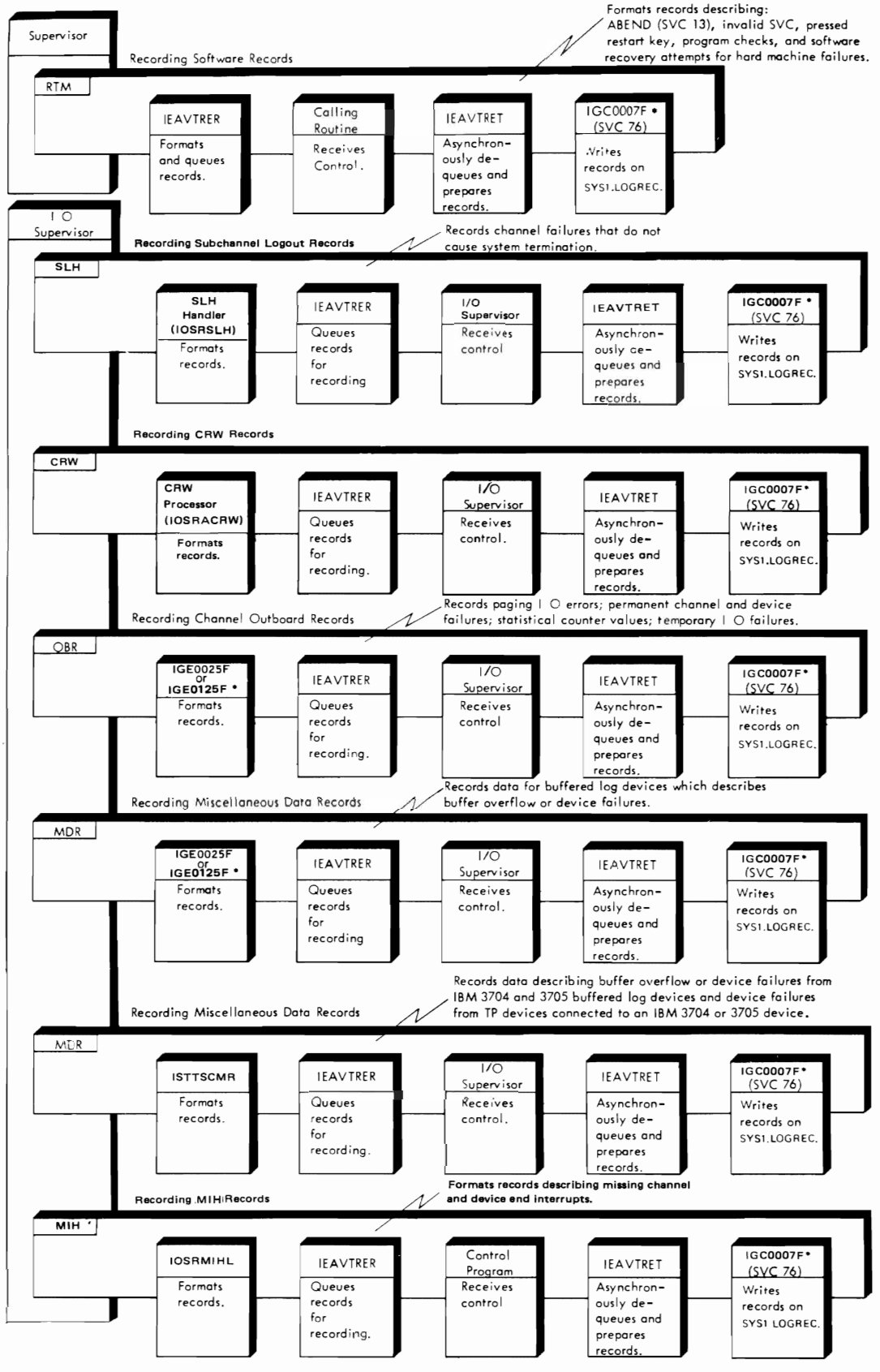

Recording Figure III-4. Record Processing Overview (Part 1 of 3)

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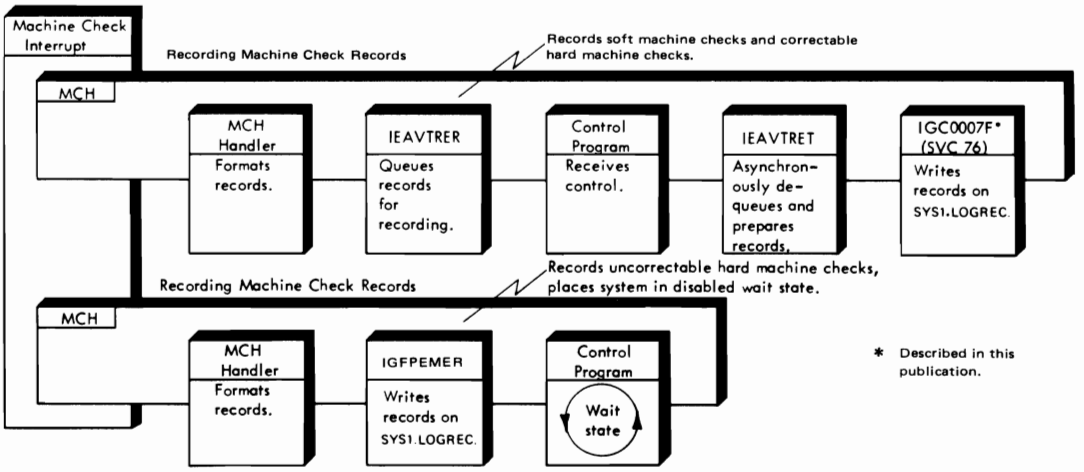

Recording Figure III-4. Record Processing Overview (Part 2 of 3)

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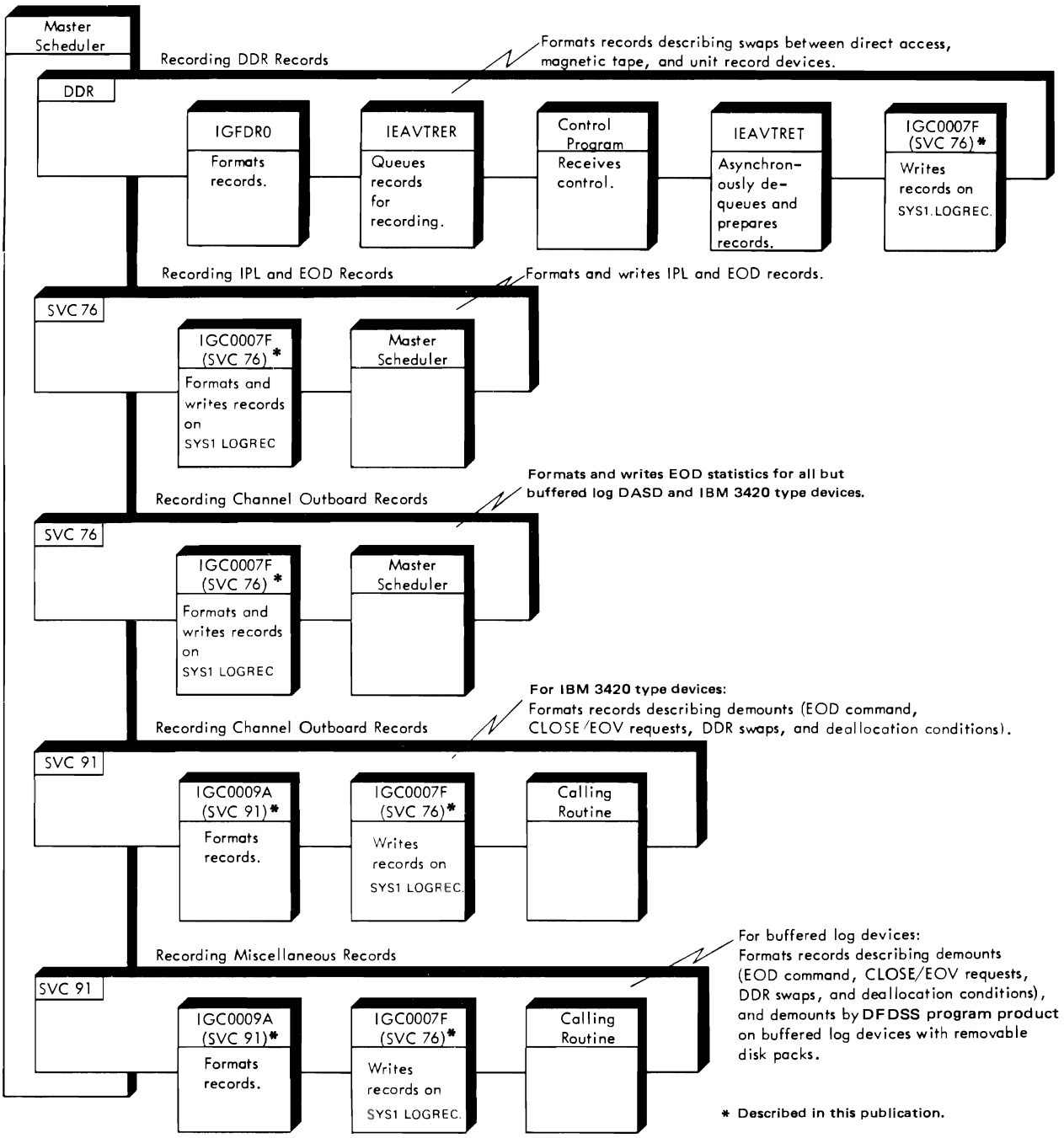

Recording Figure III-4. Record Processing Overview (Part 3 of 3)

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Module Descriptions

IGC0007F – SYS1.LOGREC Recorder (IFBSVC76)

Entry From: Routine issuing SVC 76 to entry point IGC0007F.

Registers at Entry:

R0 -- Two's complement of number of bytes to be recorded onto SYS1.LOGREC.
or
Positive input parameter value.
R1 -- ↑ record to be written onto SYS1.LOGREC.
R5 -- ↑ SVRB.

Operation: This module is divided into five major processing sections.

SYS1.LOGREC Recording (WRTREC)

Tests register 0 for a positive value.

If negative, branches to NPDA processing (NPDAROUT). Upon return from the NPDA routine, issues EXCP which writes a record on the SYS1.LOGREC data set by:

- Reading a copy of the SYS1.LOGREC header record into the 360 byte work area in subpool 245.
- Using the header information to locate the necessary space on SYS1.LOGREC for the record.
- Constructing the CCWs to write the record in the work area.
- Issuing the EXCP to write the record on SYS1.LOGREC.
- Updating the header record to show the address of the last record entry and how much unused space remains on SYS1.LOGREC.
- Writing the header record back onto the SYS1.LOGREC data set.

If positive, branches to the statistical recording section of SVC 76.

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Statistical Recording (STATUP)

Tests the validity of the input parameter in register 0. If invalid, exits to the calling routine.

If the input value was zero or four:

- Builds a short OBR record for each non-zero statistical counter.
- Resets each non-zero statistical counter to zero.
- Branches to the SYS1.LOGREC recording section of SVC 76 to write each record on SYS1.LOGREC.
- Issues SVC 91 for each buffered log DASD to create an MDR record or for each IBM 3420 tape device to create a long OBR record.
- Branches, when all statistical recording is completed, to the IPL/EOD recording section of SVC 76.

If the input value was eight, branches to the IPL/EOD recording section of SVC 76.

If the input value was twelve (X'0C'):

- Sets a switch indicating that the SYS1.LOGREC time stamp record is to be updated with new data and time values.
- Branches to the IPL/EOD recording section of SVC 76.

IPL/EOD Recording (IPLEOD)

If the input value in register 0 was zero, builds an EOD record containing the date, time, and system identification.

If the input value in register 0 was eight, builds an IPL record by:

- Adding the date, time, and system identification to the record header.
- Leaving, if the RDE option is not specified at system generation, the reason code and subsystem ID code fields in the IPL record blank.

Note: If the RDE option is specified (determined by issuing a BLDL to check the system for the RDE option), issues a WTOR message to obtain an IPL reason code and a subsystem ID code for the IPL record.

If the input value in register 0 was twelve, adds new date and time values to the SYS1.LOGREC time stamp record.

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SYS1.LOGREC Message Recording (MESS)

Accesses and converts the time into EBCDIC as part of the message. Uses the message code value in register 12 to index a branch table to issue the appropriate WTO message. Sets the return code in register 15 and returns control to the calling routine. Branch table subroutines are:

Code	Subroutine	Message Text	Return Code
00	ERROR1M	SYS1.LOGREC area is full.	12 (X'0C')
04	ERROR2M	SYS1.LOGREC format error.	16 (X'10')
08	ERROR4M	SYS1.LOGREC I/O access error.	16 (X'10')
0C	MSGEWM	SYS1.LOGREC near full.	0 (X'00')

Note: When a permanent I/O error (code '08') or invalid header record (code '04') is detected while processing, no further recording is attempted. Issues appropriate WTO warning message and sets appropriate return code. When an end of data set condition (code '00') is first detected, the LOGREC full message is issued, via the WTO. Subsequently, every 30th end of data set condition results in the LOGREC full message being issued. All LOGREC recording requests are lost until the data set is reinitialized or cleared.

NPDA Processing (NPDAROUT)

Sets up addressability to the NPDA extension in IFBDCB00 CSECT of the nucleus.

Tests if NPDA is available (NPDA is not available if the NPDA module address in the DCB is zero). If NPDA is not available, control is returned to normal SVC 76 processing.

If the NPDA module address in the DCB is not zero, an NPDA parameter list is built and the NPDA SVC 76 processing module is called.

Data Areas Defined: 360 byte work area in subpool 245.

Data Areas Referenced: CVT, and NPDA extension in IFBDCB00.

Data Areas Updated: None.

Routines Called: None.

Size: 3496 bytes.

Exit: Returns to calling routine (instruction following SVC 76).

Registers at Exit:

R15 -- return codes:

- 00 Normal exit.
- 08 Storage not available (no recording attempted).
- 0C No space available (no recording attempt).
- 10 Permanent I/O error while attempting to write record on SYS1.LOGREC.
  or
  Format error in SYS1.LOGREC header record.

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IGC0009A – 3420/DASD Statistical Recorder

Entry From:

- Routine issuing SVC 91 to entry point IGC0009A to format and record a long OBR record describing a 3420 demount (DDR swap, EOD command, CLOSE/EOV requests, and deallocation conditions).
- Routine issuing SVC 91 to entry point IGC0009A to format and record an MDR record describing:
  - Demounts (EOD command, CLOSE/EOV requests, and deallocation conditions) for DASD with buffered logs, such as the IBM 2305, 3330, 3330 MOD 11, 3850 and 3380 devices.

    or
  - Demounts by the DFDSS program product between the disk drives on DASD having buffered logs and removable disk packs, such as the IBM 3330 MOD 11 and 3340 devices.

Registers at Entry:

R0 -- ↑ DCB when SVC 91 is called by CLOSE/EOV.
or
↑ UCB in two's complement when SVC 91 is called by DDR, deallocation, DFDSS or SVC 76.
R1 -- EOD flag.
R3 -- ↑ CVT.
R4 -- ↑ TCB.
R5 -- ↑ SVRB.
R14 -- return address.

Operation: This module, when invoked, performs one of two major processing functions:

3420 Recording (BEGIN)

Locates the IBM 3420 device involved in a demount operation. Uses the specific environmental and statistical information describing that unit to format a long OBR record. Issues SVC 76 to write the record on SYS1.LOGREC.

Buffered Log Recording (PART2)

Determines the device involved in the demount operation and locates its record buffer. Builds CCWs to read the data in the buffer and puts them in the IOB. Issues EXCP to read the data into a GETMAIN work area.

Formats the information into an MDR record and issues SVC 76 to write the record on SYS1.LOGREC.

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Data Areas Defined: Long OBR record, MDR record.

Data Areas Referenced: Device statistics table, long OBR record, MDR record, UCB.

Data Areas Updated: Device statistics table, long OBR record, MDR record, UCB.

Routines Called: SVC 76.

Size: 2932 bytes.

Exit: Returns to calling routine (instruction following SVC 91).

Registers at Exit:

R15 -- return codes:
- 00 MDR record not written onto SYS1.LOGREC.
- 01 Device not ready.
- 04 No storage available.

IGE0025F – OBR/MDR Recorder

Entry From:

- An error recovery procedure (ERP) to entry point OBRSTART to format and request recording for an OBR record.
- A device-dependent ERP to entry point OBRSTART to format and request recording for an MDR record for:
  - Device failures on buffered log devices.

    or
  - Buffer log overflow on buffered log devices.

Registers at Entry: R1 -- ↑ IOSB.

Operation: Tests EWA switch EWAFLG2. If on, calls IGE0125F. Tests EWA (ERP work area) switch, EWAFLG2, and performs one of two major processing functions. If switch is on, does MDR recording; if off, does OBR recording.

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OBR Recording

Issues GETMAIN to obtain work area storage and constructs an OBR record according to the type of condition detected by the ERP:

- TCAM/VTAM permanent error: Builds long OBR record with environmental and statistical data.
- TCAM/VTAM counter overflow or EOD: Builds long OBR record with statistical data.
- Permanent or temporary I/O error: Builds long OBR record.
- Counter overflow: Builds long or short OBR record.

Invokes the recording request routine which queues the OBR record onto the asynchronous output queue and posts the asynchronous recording task.

Scans the asynchronous OBR queue for any paging I/O errors that were put on the queue by the DASD ERP (IECVDERP) and formats a long OBR record for each error on that queue. Then, invokes the recording request routine which queues the OBR record onto the asynchronous output queue and posts the asynchronous recording task.

Note: *The recording task does the actual recording by asynchronously scanning this output queue and issuing SVC 76 to write any records on this queue to SYS1.LOGREC.*

MDR Recording

Locates the error data in the device's record buffer. Formats the data depending upon the device:

- For all buffered log devices except the IBM 3270 (BTAM-supported) devices, formats the MDR record in the device's record buffer.

- For the IBM 3270 (BTAM-supported) devices, formats the MDR record in the GETMAIN area because the record heading is not a standard 24 bytes. Formatting is done in two steps: (1) moves the first six bytes of the record to the work area to update the header area to 24 bytes, and (2) adds the remaining device-dependent information to complete the record.

After formatting the record, places the following exit information in the device's record buffer:

- 'TPR' in EBCDIC in the first three bytes. (This information is omitted if the record was not recorded successfully.)

- Success symbol in the fourth byte:

  00 Successful recording.
  0F Size of header record field is 24 bytes or less (unsuccessful recording).
  FF Unsuccessful recording.

- Places XCTL load name value from device's record buffer in register 13.

Invokes the recording request routine which queues the MDR record onto the asynchronous output queue and posts the asynchronous recording task. Exits.

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Notes:

- *XCTL load name comes from the third and fourth bytes of the device's record buffer.*
- *Buffered log devices (devices attached to a control unit with a buffer for recording or logging device-dependent, status and sense information) are listed in byte four of the MDR record format.*
- *If the device-dependent ERP does not define a device failure to be recorded as an MDR record, the ERP causes the failure to be recorded as an OBR record.*

Data Areas Defined: 328 byte work area in subpool 255.

Data Areas Referenced: ASCB, asynchronous OBR queue, device statistics table, EWA, IOSB, long OBR record, MDR record, short OBR record, UCBs.

Data Areas Updated: Asynchronous OBR queue, device statistics table, long OBR record, MDR record, short OBR record, 3211 UCBERCNT.

Routines Called: ESTAE, GETMAIN.

Size: 2200 bytes.

Exit:

From OBR recording section:

- Returns to supervisor when value in register 13 is zero.
  or
- Returns to DDR if error is permanent and DDR is in system or to TCAM ERP for TCAM EOD condition; loads binary equivalent of module name into register 13 and branches to XCTL routine IECXTLER.

From MDR recording section:

- Returns to supervisor when value in register 13 is zero.
  or
- Loads binary equivalent of module name into register 13 and branches to XCTL routine IECXTLER.

Registers at Exit:

When returning to supervisor:

R13 -- ↑ IOSB.

When returning to IEXCTLER:

R13 -- XCTL load name value.
R14 -- ↑ IEXCTLER.

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IGE0125F - OBR/MDR Recorder (New Interface)

Entry From:

- IGE0025F to entry point IGE0125F to format and request recording for an OBR or an MDR record.

Registers at Entry: R1--↑ IOSB.

Operation: Tests EWA (ERP work area) switch, EWAFLG2, and performs one of two major processing functions. If switch is on, does MDR recording; if off, does OBR recording.

OBR Recording

Issues GETMAIN to obtain work area storage and constructs an OBR record according to the type of condition detected by the ERP:

- RCTRECSH flag off: Builds long OBR record.
- RCTRECSH flag on: Builds short OBR record.

Invokes the recording request routine which queues the OBR record onto the asynchronous output queue and posts the asynchronous recording task.

Scans the asynchronous OBR queue for any paging I/O errors that were put on the queue by the DASD ERP (IECVDERP) and formats a long OBR record for each error on that queue. Then, invokes the recording request routine which queues the OBR record onto the asynchronous output queue and posts the asynchronous recording task.

Note: *The recording task does the actual recording by asynchronously scanning this output queue and issuing SVC 76 to write any records on this queue to SYS1.LOGREC.*

MDR Recording

Locates the error data in the caller's build area. Formats the data in the GETMAIN area.

- Places XCTL load name value from device's record buffer in register 13.

Invokes the recording request routine which queues the MDR record onto the asynchronous output queue and posts the asynchronous recording task. Exits.

Notes:

- *XCTL load name comes from the RCT.*
- *Buffered log devices (devices attached to a control unit with a buffer for recording or logging device-dependent, status and sense information) are listed in byte four of the MDR record format.*
- *If the device-dependent ERP does not define a device failure to be recorded as an MDR record, the ERP causes the failure to be recorded as an OBR record.*

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Data Areas Defined: Work Area in subpool 255 = 264 bytes plus length of record.

Data Areas Referenced: ASCB, CVT, SRB, IOC, PSA, asynchronous OBR queue, device statistics table, EWA, IOSB, long OBR record, MDR record, short OBR record, UCBs.

Data Areas Updated: Asynchronous OBR queue, device statistics table, long OBR record, MDR record, short OBR record.

Routines Called: GETMAIN (SVC120), ESTAE (SVC60), TIME (SVC11), IEAVTRER, SETLOCK, FREEMAIN (SVC120), IGE0660A.

Size: 2476 bytes.

Exit:

- Returns to supervisor when XCTL and DDR are not requested (RCTRECDR and RCTXCTLX are both off).

  or

- Returns to DDR if requested (RCTRECDR is on).
- If XCTL is requested (RCTXCTLX is on), loads the binary equivalent of the module name into register 13 and branches to XCTL routine (IECXTLER).

Registers at Exit:

When returning to supervisor:

R13 -- ↑IOSB.

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Directory

The Directory section provides the cross-reference lists necessary to quickly identify important names in the program listings and in the other sections of this part of the publication.

This section contains two types of directories:

Module directory – a list of all the modules involved in SYS1.LOGREC record entry recording. The list contains:

- The distribution library (DLIB) or microfiche (fiche) name.
- The module name and the module name alias(es) in the appropriate system library.
- A brief description of the function of each module.
- The CSECT, entry point, and load module names.

The list is organized alphamerically by system library and recording group; then alphamerically by module name within each group.

Label Directory – a list of the major labels in the system recording modules. The list contains:

- The module where the label is located.
- A brief description of the functions of the code associated with the label.
- The method of operation (MO) diagrams that contain or indicate the functions related to that label.

The list is organized alphamerically by module name and then alphamerically by label name within each module.

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Module Directory

DLIB Fiche	Entry Point	Load Module	CSECT	SYS1.LPALIB Name	Alias	Function
OBR/MDR Recording Module						
IFBOBR00	OBRSTART	IGE0025F	IGE0025F	IGE0025F	IGE0625F	OBR/MDR recorder.
IFBOBR01	IGE0125F	IGE0125F	IGE0125F	IGE0125F		OBR/MDR recorder.
SVC 76						
IFBSVC76	IGC0007F	IGC0007F	IGC0007F	IGC0007F		SYS1.LOGREC recorder.
SVC 91						
IGC0009A	IGC0009A	IGC0009A	IGC0009A	IGC0009A		3420/DASD statistical recorder.

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Label Directory

Label	MO(s)	Description
In Module IGC0007F		
CONSTHDR	3	Adds header data for either EOD or IPL record. Adds record type and length information to IPL record.
ERR3B	3	Issues EXCP macro to read and write records to SYS1.LOGREC including header record. Checks completion code in TPRECB.
EWMSG	3	Checks whether early warning message has been issued. Checks whether 90% of allocated tracks for SYS1.LOGREC have been used.
EXIT	3	Frees work area storage, sets return address, and returns to calling routine at instruction following SVC 76.
GETIME	N/A	Obtains and edits time for WTO messages.
INDEX	N/A	WTO message branch table.
INFORM	3	Issues WTO message indicating that WTOR message reply was invalid, and reissues IPL WTOR.
IPLEOD	3	Issues BLDL macro to check for RDE option in system.
ISNEWDEV	3	Checks online status of IBM 2305, 3330, 3340, 3375, 3380, 3420 and 3850 series of devices. If online, passes UCB address in two's complement in register 0 to SVC 91. Issues SVC 91.
LOOP3	3	Obtains address of entry in device statistics table. Checks for table entries having more than 10 bytes.
MAKEREC	3	Constructs EOD record.
NCLROPT	3	Adds counter overflow information to short OBR record.
NEWSTAT	3	Processes each entry in device statistics table.
NOT2314	3	Tests UCBs for IBM 3420 type magnetic tape devices. If in system, puts a value (51) indicating this in register 1 before issuing SVC 91.
PREPARE	3	Puts EOD record type and length into record area.
RECHECK1	3	Checks validity of reason code reply portion of IPL WTOR.
RECHECK2	3	Checks validity of subsystem reply portion of IPL WTOR.
RECSET	3	Puts short OBR record address in register 1. Puts two's complement of record length in register 0. Branches to WRTSTAT to write record onto SYS1.LOGREC.
REISSUE	3	Issues WTOR message for IPL record information.
REPLYOK	3	Puts IPL information from IPL WTOR into record area.
RTRN	3	Tests for error conditions, resets short OBR processing switch, branches to exit for issuing WTO message, and dequeues.
STATLKUP	3	Tests for valid UCB address and end of UCB list. Gets pointer from UCB to device's entry in device statistics table.

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Label	MO(s)	Description
In Module IGC0007F (Continued)		
STATUP	3	Tests positive input value from register 0 to determine type of recording to be done (zero – EOD and statistical, four – statistical, eight – IPL, 12 – update SYS1.LOGREC time stamp record).
STGAVAIL	3	Clears work area storage. Tests for short OBR entry before issuing enqueue. Fetches SYS1.LOGREC header record using an internal link to a channel program. Obtains buffer and builds CCWs to write record on SYS1.LOGREC.
WRTREC	3	Saves address of record to be recorded. Issues GETMAIN to obtain work area storage. Checks GETMAIN for successful completion. If GETMAIN was unsuccessful, sets condition code (x'08') in register 15.
WRTSTAT	3	Resolves address constants and other addresses not resolved by loader.
In Module IGC0009A		
A150	4	Issues GETMAIN macro to obtain 160 byte work area.
A215	4	Adds sense data to record. Puts two's complement of record size in register 0. Puts record address in register 1. Issues SVC 76 to write long OBR record on SYS1.LOGREC.
BEGIN	4	Puts UCB address in register 10, DEB address in register 11, and DCB address in register 13.
B100	4	Issues GETMAIN macro to obtain storage for work area. Builds CCWs in IOB for reading record buffer of a buffered log DASD.
B200	4	Issues EXCP SVC to read data from a buffered log DASD. Adds standard header information for MDR record.
B340	4	Converts record size in register 0 into two's complement. Issues SVC 76 to write MDR record onto SYS1.LOGREC. Issues FREEMAIN macro to free work area storage.
IGC0009A	4	Establishes addressability and saves passed value in register 1 in storage. Tests register 0 for a negative value; if so, makes it positive. Tests UCB for disk processing; if so, branches to PART2.
OBR	4	Adds standard header information for OBR record.
PART2	4	Establishes addressability and determines device type.
In Module IGE0025F		
ATCMREC	2	Sets VTAM device switch. Tests EWA for VTAM device EOD or VTAM overflow condition and builds a long OBR record if condition NOT=YES.
DIRENTRY	2	Uses IOSB and EWA information to format a long OBR record for each paging I/O error queued on asynchronous OBR queue.
DIRCHK	2	Obtains pointers to ERP/WTO queue, IOSB, and EWA. Sets switch to indicate that DASD ERP (IECVDERP) has queued any paging I/O error information on asynchronous OBR queue.
EXIT1	2	Uses address in register 14 to branch to SCTL routine (IECXTLER).
FULLREC	2	Puts 'PAGE ERR' jobname in long OBR record if recording is for any paging I/O errors on asynchronous OBR queue.
INITHDR	2	Formats error data from record buffer into an MDR record.
LOOP2	2	Checks statistic counters for specific devices (UCBs). Checks for variable length entries in device statistics table.

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Label	MO(s)	Description
In Module IGE0025F (Continued)		
NOMAIN	2	Frees IOSB pointer and returns control to supervisor.
NOT2314	2	Puts address of device statistics table from CVT in register 5.
SAVEADR	2	Saves record buffer address in register 11.
SENSE	2	Adds sense information to record.
SETADR	2	Invokes recording request routine to move OBR record onto asynchronous output queue.
SETIME	2	Adds time and date information to record. Invokes recording request routine to move MDR record onto asynchronous output queue. Tests result of write operation.
SVCPRE	2	Calculates OBR record size in register 0.
TAMOFL	2	Completes short OBR record for TCAM/VTAM EOD or counter overflow condition.
TCREC	2	Sets TCAM device switch. Tests EWA for TCAM device EOD or TCAM counter overflow condition and builds a long OBR record.
TERM1	2	Puts name of XCTL module (IECXTLER) in register 13 or, if register 13 is zero, returns controls to supervisor.
TSTPERM	2	Tests switches to determine type of OBR record to create: permanent error condition — long OBR record, counter overflow condition — short OBR record, variable length statistic counters — long OBR record. If none of these switches are on, sets temporary error switch to create a long OBR record.
In Module IGE0125F		
FREEBLDA	2.1	Frees the caller's build area using the length in the RCT and the address determined from the RCT.
FREECORE	2.1	Frees the recorder's build area and automatic storage at the end of processing.
FREEIOSB	2.1	Obtains a local lock, calls the core manager to free the IOSB, releases the local lock.
GETFAIL	2.1	If the GETMAIN for OBR's automatic data fails then this exit is taken. It XCTLs if that was requested, otherwise it exits normally.
HDRINFO	2.1	Fills in record independent information in the record: class/source, system/release level, record switches, time, date CPUID, reserved bytes in the header. Some of this data is obtained from the caller's build area and some is obtained from the system.
LONGOBR	2.1	Fills in information that is specifically needed for long OBR records: JOBID, CCW, CSW, device dependent data, SDR counters, sense bytes, I/O retry count, device number, device type.
MDR1	2.1	Fills in MDR specific information: BUFRECID, BUFSUBID, and the device buffer.

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Label	MO(s)	Description
In Module IGE0125F (Continued)		
SETADR	2.1	Sets up for and issues the RECORD macro (R0 = length of record, R1 = addr of record).
SETSDR	2.1	Places the SDR counters into the record and clears the statistics table entry for the failing device.
SHORTOBR	2.1	Fills in short OBR specific data: device type, device number.
YESGET	2.1	If GETMAINS for the recorder are successful, YESGET sets the ESTAE exit and calls the proper formatting procedure (LONGOBR, SHORTOBR, MDR1).

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Data Areas

The information in the data areas can assist in interpreting storage dumps and in determining the program and system status at the time of a failure.

Consult **System Programming Library: SYS1.LOGREC Error Recording** for the detailed format of the major system recording data areas that are listed below. Consult **Debugging Guide**, Volume 5, for the detailed format of the SDWA that is part of the software record.

The following major data areas are used by the system recording routines:

- Channel record word (CRW) record.
- Dynamic device reconfiguration (DDR) record.
- EOD record.
- IPL record.
- Machine check (MCH) record.
- Miscellaneous data (MDR) record.
- Missing interruption handler (MIH) record.
- Outboard (OBR) record – long form.
- Outboard (OBR) record – short form.
- Software record.
- Subchannel logout handler (SLH) record.

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Diagnostic Aids

The Diagnostic Aids section provides cross-references between the diagnostic information in this section to the related sections in this part of the publication and to the program or microfiche listings.

This section contains the following lists of information about the system recording modules:

- **Messages** – a summary of the messages, their message IDs, issuing modules, modules with the message text, detecting modules, and the related method of operation (MO) diagrams.
- **Return codes** – a summary of the return codes, their meanings, and the related MO diagrams. All return codes are in register 15.
- **System completion codes** – the system recording modules **do not** issue any system completion codes. (No list provided.)
- **Wait state codes** – None. (No list provided.)

Recording Messages

Consult **Message Library: System Messages** for more details about the recording messages:

Message ID	Message Text	Message Text and Issuing Module	Detecting Module(s)	MO(s)
IFB010D	ENTER "IPL REASON SUBSYSTEM ID" OR "U"	IG0007F	IGC0007F	3
IFB020I	INVALID REPLY TO IFB010D	IGC0007F	IGC0007F	3
IFB030I	SYS1.LOGREC I/O ACCESS ERROR, sens, stat, hh.mm.ss	IGC0007F	IGC0007F	3
IFB040I	SYS1.LOGREC AREA IS FULL, hh.mm.ss	IGC0007F	IGC0007F	3
IFB050I	SYS1.LOGREC FORMAT ERROR, hh.mm.ss	IGC0007F	IGC0007F	3
IFB060E	SYS1.LOGREC NEAR FULL	IGC0007F	IGC0007F	

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Return Codes

Module	Return Code (Hex)	Meaning	MO(s)
ICFBDF00	26	Successful completion of dump.	None
	27	Missing interrupt during I/O clear routine in the appendage, program check in the dump routine, or failure to complete the dump once the dump routine was entered.	None
IGC0007F	00	Normal exit.	3
	08	Storage not available (no recording attempted).	3
	0C	No space on SYS1.LOGREC available (no recording attempted).	3
	10	Permanent I/O error while attempting to write record on SYS1.LOGREC. or Format error in SYS1.LOGREC header record.	3
IGC0009A	00	MDR record not written onto SYS1.LOGREC.	4
	01	Device not ready.	4
	04	No storage available.	4

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