IMS Diagnosis via Log Records

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Agenda

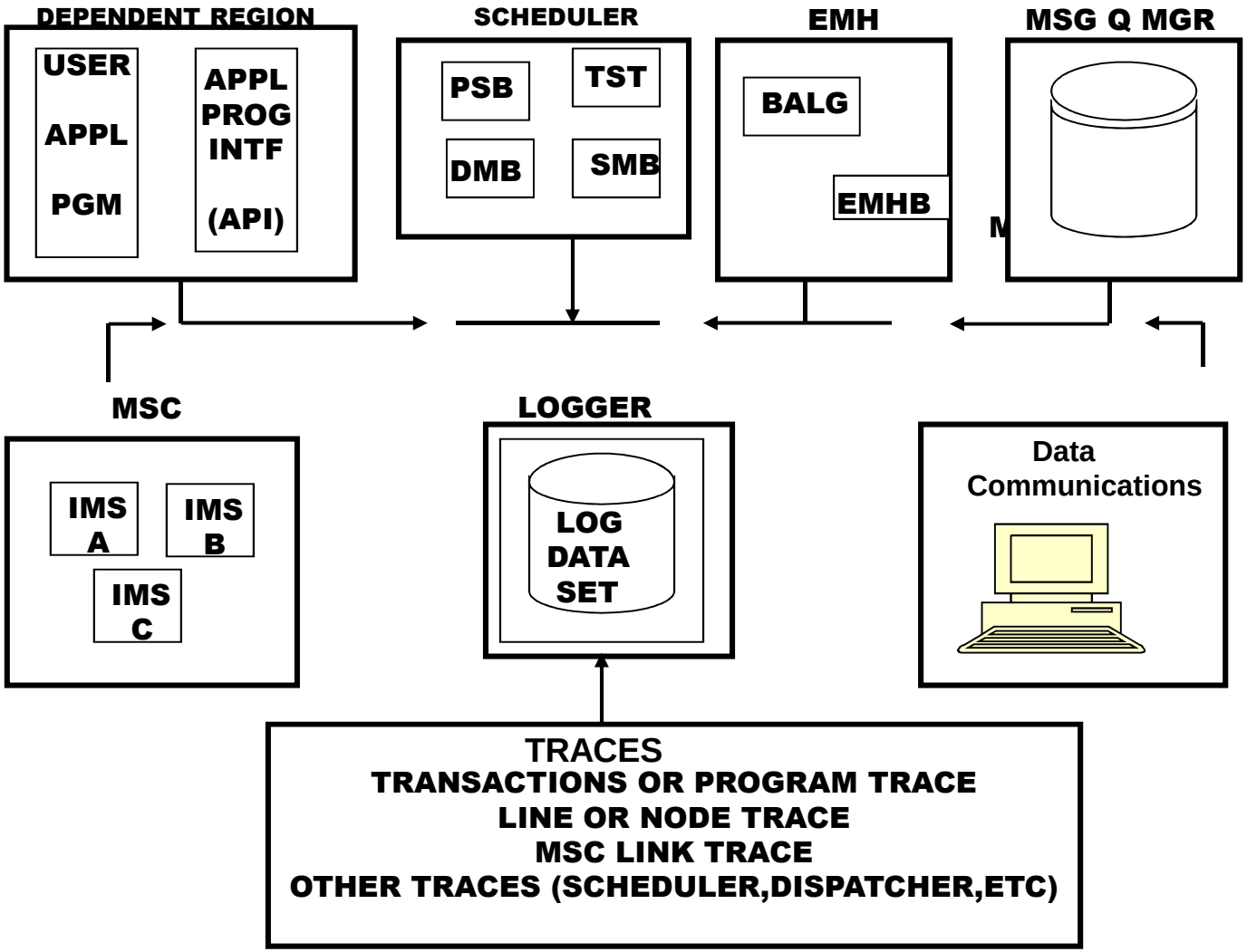
- What is covered
- Purpose of Logging
- Log Analysis Basics
  - DSECTS, UOWID, Recovery Tokens
- Log Analysis
  - Follow a transaction through IMS via Logs
  - Records Descriptions
  - Tying Logs records together
- Questions
- Reference (DFSERA10 – Printing Logs)

What is Covered

- IMS Log Record Analysis
- Follow a transaction through IMS via Log Records
- Records described
  - 01/03 Message record
  - 35 Enqueue record
  - 08 Application Start record
  - 31 Message GU record
  - 5050 Database update record
  - 37 Cross over record
  - 56 Two-phase commit record
  - 33 Free DRRN record
  - 35 Dequeue record
- Other record types NOT covered
- Sample logs used are at an IMS 8 level

Purpose of Logging

Everybody Logs



Why Log ?

- Recovery / Restart
- Audit Trail
- Diagnostic Analysis
  - Failure in IMS
  - Performance problems
- Great learning facility
  - Can follow a transaction through the system using log records

Log Analysis Basics

To Analyze Logs:

1. Understand Log Types and their contents
2. Understand how logs are tied together
3. Select, print and analyze the logs

Log Record Types and Contents

- Documented in the manuals. Info Center link:

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=%2Fcom.ibm.ims12.doc.dgr%2Fims_log_records.htm
(IMS Version 12 > Troubleshooting for IMS > Diagnosis > SYS - System service aids)

  - Or Assemble the DSECTS:

```
//        EXEC  PGM=ASMA90
//SYSPRINT DD SYSOUT =*
//SYSLIB DD DISP=SHR,DSN=IMS.SDFSMAC
            DD DISP=SHR,DSN=SYS1.MACLIB
//SYSIN DD *
          ILOGREC RECID=01
          ILOGREC RECID=35
            …
          END
/*
```

    - Or use **ILOGREC RECID=ALL**

How Logs are tied together:

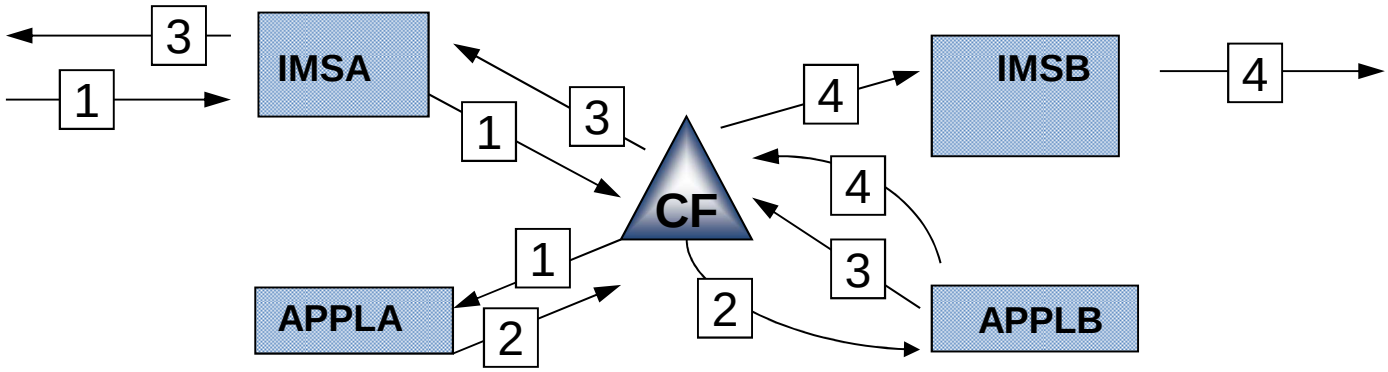
- Unit of Work ID (UOWID)
- Recovery Token

Unit of Work ID (UOWID)

ORIGINATING SYSTEM MESSAGE ID		PROCESSING SYSTEM MESSAGE ID		FLG
ORIGINATING IMSID (8)	TOKEN (8) (STCK)	PROCESSING IMSID (8)	TOKEN (8) STCK)	(2)

- UOWID added to Log Records starting in IMS 6
  - Whether shared or non-shared Queues are used
  - 34 bytes long
- Originating system message id does not change during the life of the transaction
  - Including for all messages created as a result of this original transaction
- UOWID appears in message related Log Records

UOW ID Example

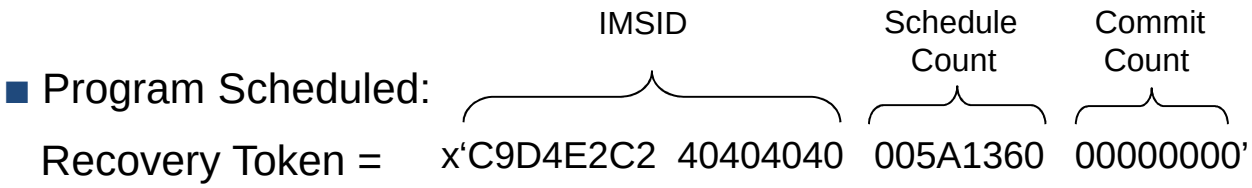


MSG	UOW IDs				
1	IMSA	T1			P
1	IMSA	T1			R
2	IMSA	T1	IMSA	T2	P
2	IMSA	T1	IMSA	T2	R
3	IMSA	T1	IMSB	T3	P
4	IMSA	T1	IMSB	T4	P
3	IMSA	T1	IMSB	T3	R
4	IMSA	T1	IMSB	T4	R

Recovery Token

- Represents work performed within a commit interval
- Log Records within a commit interval are tied together via Recovery Token
- Recovery token is 16 bytes
  - 8 bytes IMS ID
  - 4 bytes schedule count
  - 4 bytes commit count
- Commit count is zero when application is scheduled and incremented every time program commits

Recovery Token Example



- Program Scheduled:

  Recovery Token = x‘C9D4E2C2 40404040 005A1360 00000000’

- Program commits:

  Recovery Token = x‘C9D4E2C2 40404040 005A1360 00000001’

- Program commits:

  Recovery Token = x‘C9D4E2C2 40404040 005A1360 00000002’

- Program Terminates:

  Recovery Token = x‘C9D4E2C2 40404040 005A1360 00000003’

Selecting and Printing Logs

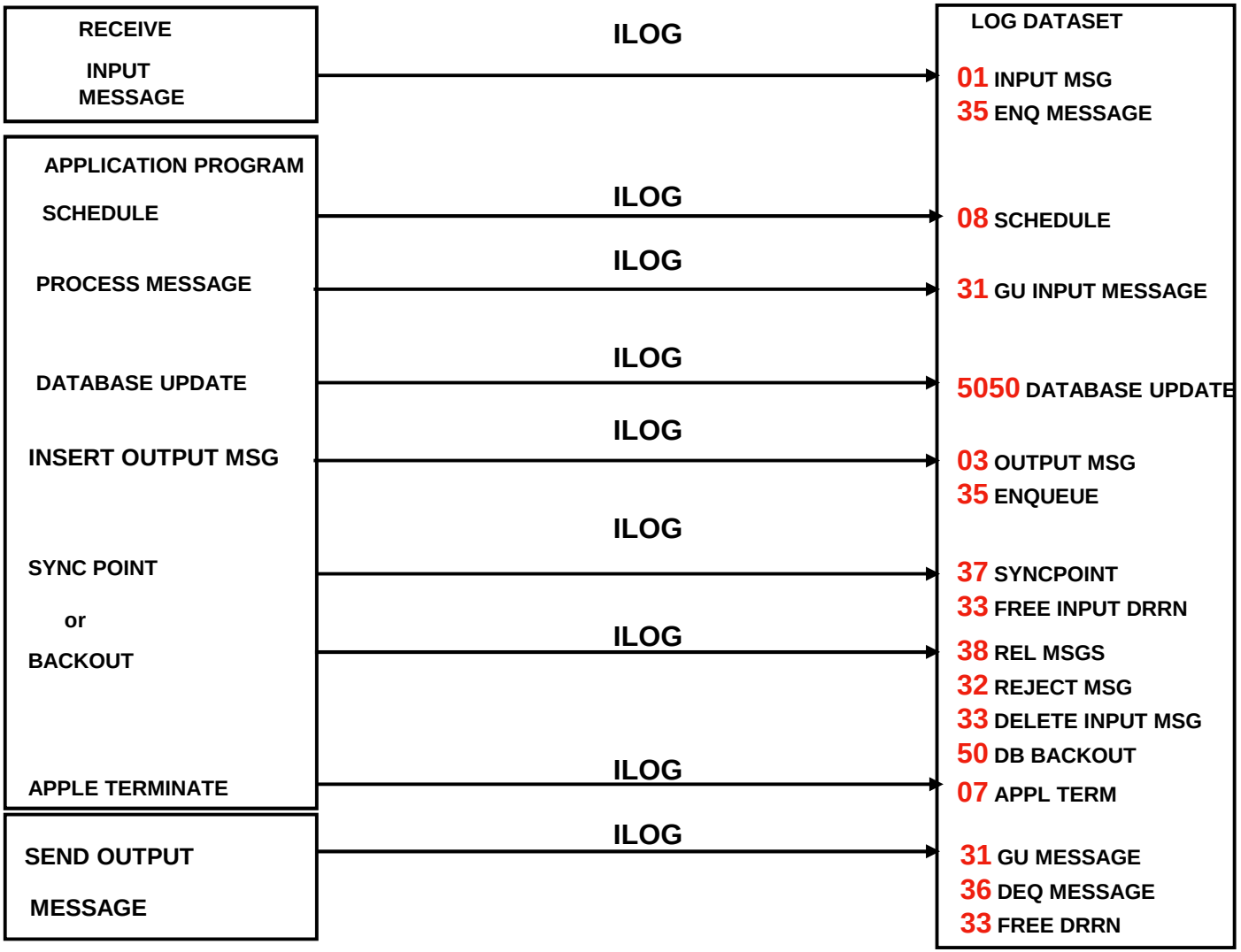
- File Select and Formatting Print Utility (DFSERA10)
- Documented in *IMS System Utilities* topic in the Info Center:

http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=%2Fcom.ibm.ims11.doc.sur%2Fims_dfsera__exitroutines.htm

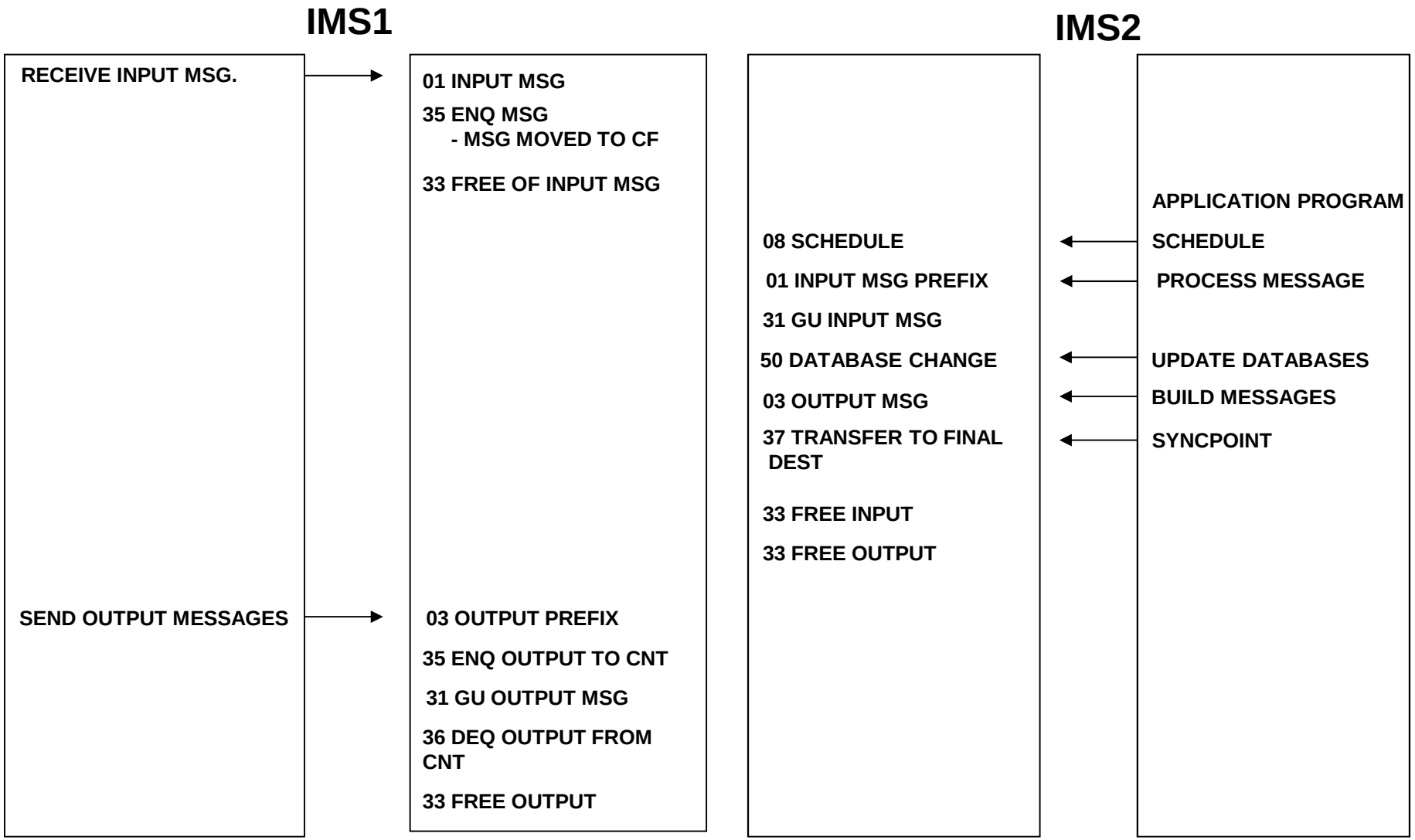
- The Reference section at the end of this Presentation has:
  - JCL
  - Sample control cards

Log Analysis

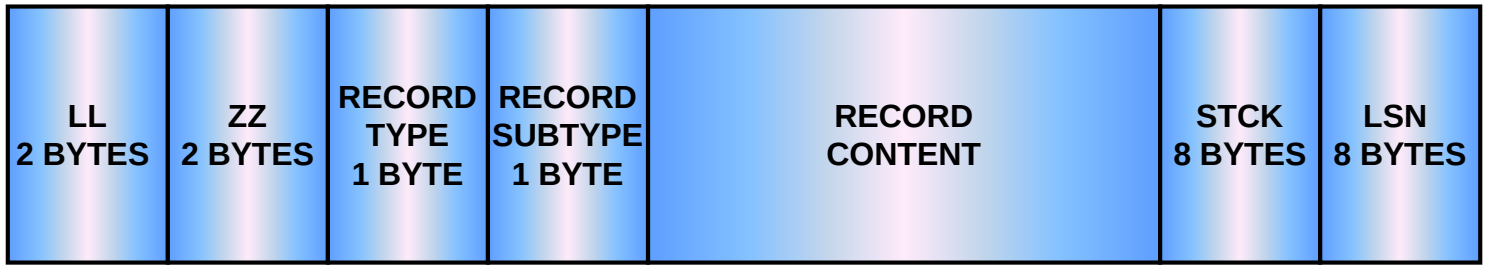
Logging in a single IMS System



Logging in Shared Queues Environment



Log Record Format



- **Variable Length**
- **LL = length field**
  - The value includes the 2 byte length of the LL field
- **ZZ = this field usually contains zeroes**
- **STCK = binary value from hardware clock**
- **LSN = log sequence number**

Sample Logs

- Logs from an IMS 8 system
- System uses Shared Queues
- Logs selected were for the processing of one transaction:

  01, 35, 08, 5607,31, 5616, 5050, 03, 35, 37, 33, 36, 5612, 07

01/03 Log Records

- Message Records
- X‘01’ – Input message
- X‘03’ – Output message
- Layout

LL 2 bytes	ZZ 2 bytes	Log code (01 or 03)	Prefix (multiple segments)	Message data	T/S	LSN#

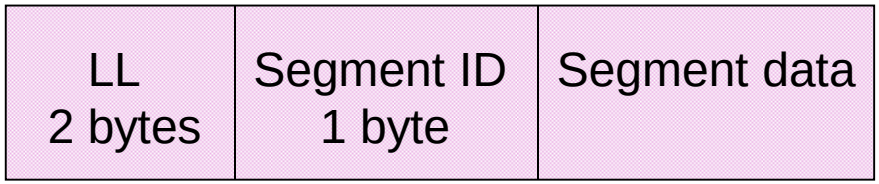
- Mapping Macro: ILOGREC RECID=01

01/03 Message Prefix

- Prefix made up of several segments
- Base Prefix segment :
  - X ‘40’ bytes long and starts at X‘40’ in the log record
  - always present
  - Field MSGPRFLL (+x ‘10’) has total prefix length
- Other message prefix segments are optional

01/03 Other Prefix Segments

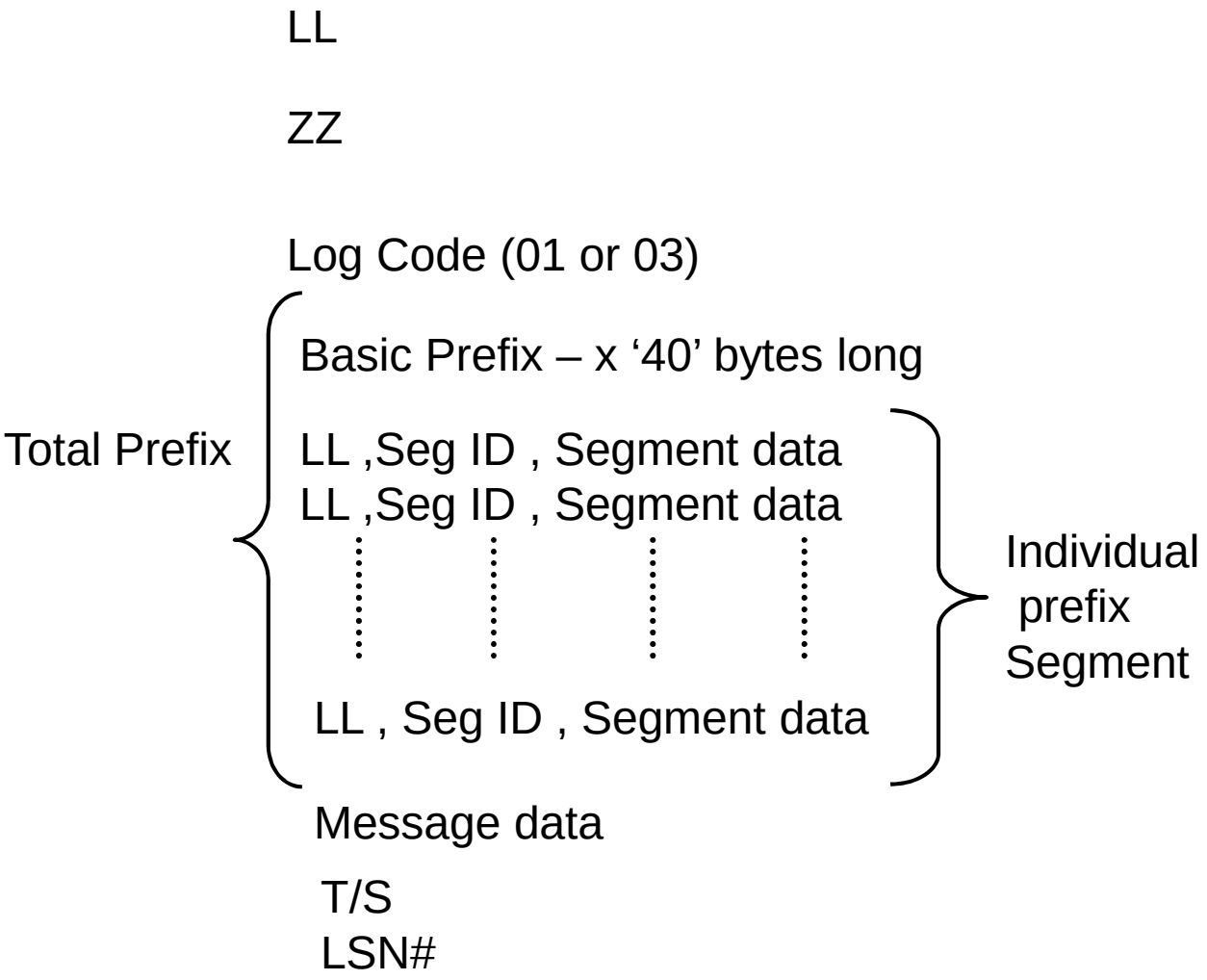
- Optional
  - Dependent on message characteristics
- Segment layouts



Message Prefix Segment IDs

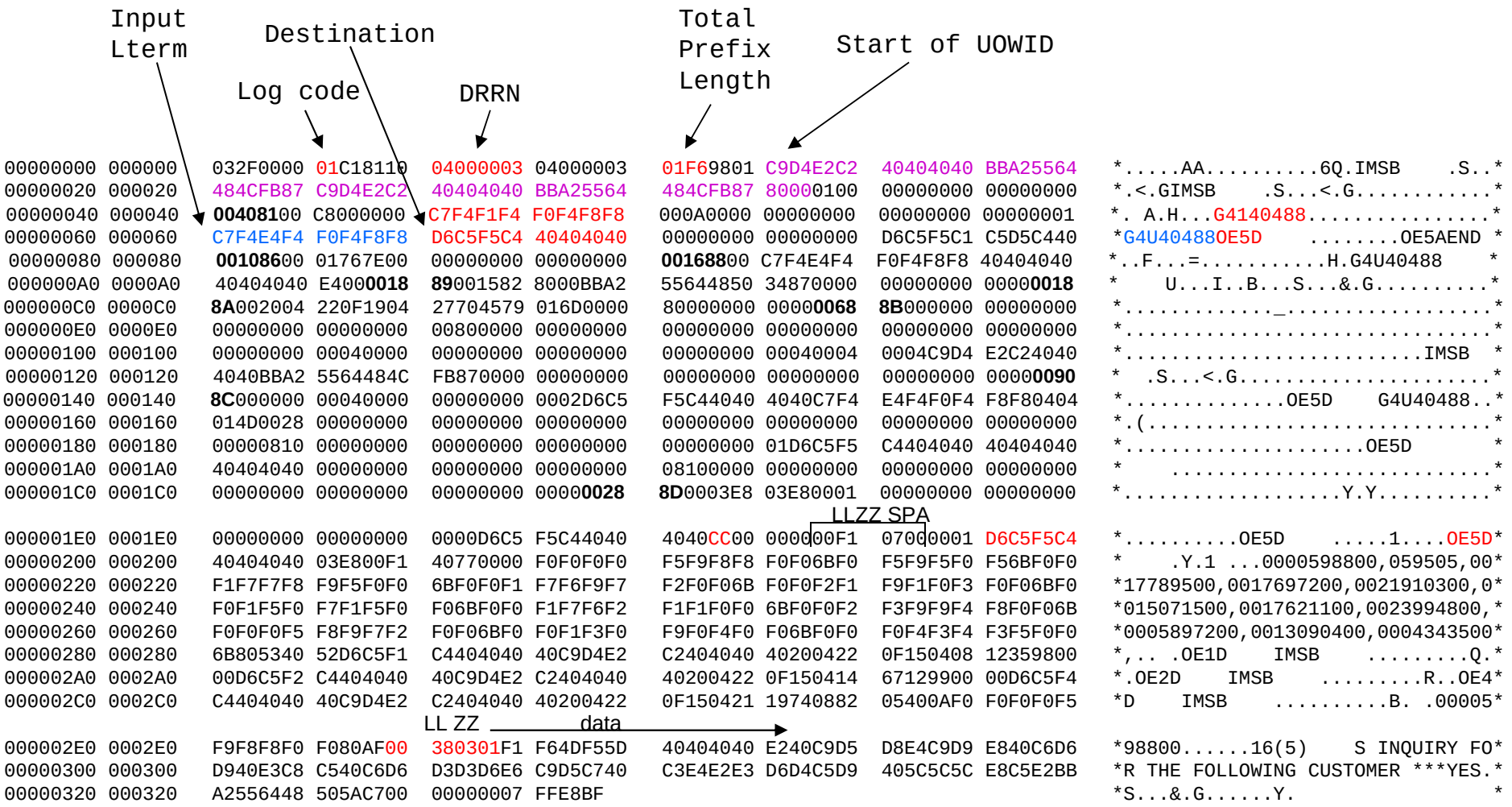
```
MSGSIID      DS      X        SEGMENT ITEM ID
MSGSIPEX     EQU     X‘81’    SEGMENT ITEM IS PREFIX EXTENSION
MSGSOMSC EQU     X‘82’    SEGMENT ITEM IS MSC PRIOR 5.2
MSGSORAC EQU     X‘83’    SEGMENT ITEM IS RACF PRIOR 5.1
MSGSILU6     EQU     X‘84’    SEGMENT ITEM IS LU6
MSGSOAPP EQU     X‘85’    SEGMENT ITEM IS MVS APPC PRIOR 51
MSGSIEPH     EQU     X‘86’    SEGMENT ITEM IS EXTENDED PREFIX
MSGSIAPP     EQU     X‘87’    SEGMENT ITEM IS MVS APPC
MSGSISEC     EQU     X‘88’    SEGMENT ITEM IS SECURITY
MSGSIWLM     EQU     X‘89’    SEGMENT ITEM IS WORK LOAD MANAGER
MSGSISEX     EQU     X‘8A’    SEGMENT ITEM IS SYSTEM EXTENSION
MSGSIMEX     EQU     X‘8B’    SEGMENT ITEM IS MSC EXTENSSION
MSGSITMR     EQU     X‘8C’    SEGMENT ITEM IS TMR
MSGSICON     EQU     X‘8D’    SEGMENT ITEM IS CONVERSATION EXTENSION
MSGSIUPR     EQU     X‘8E’    SEGMENT ITEM IS USER PREFIX SEG.
MSGSIIPR     EQU     X‘8F’    SEGMENT ITEM IS INTERNAL USER PRE
```

01/03 Layout Summary



Sample x‘01’ Log Record

Input Message Received (Transaction OE5D)




```
00000000 000000  032F0000 01C18110  04000003 04000003  01F69801 C9D4E2C2  40404040 BBA25564  *.....AA.........6Q.IMSB    .S..*
00000020 000020  484CFB87 C9D4E2C2  40404040 BBA25564  484CFB87 80000100  00000000 00000000  *.<.GIMSB    .S...<.G...........*
00000040 000040  00408100 C8000000  C7F4F1F4 F0F4F8F8  000A0000 00000000  00000000 00000001  *. A.H...G4140488..............*
00000060 000060  C7F4E4F4 F0F4F8F8  D6C5F5C4 40404040  00000000 00000000  D6C5F5C1 C5D5C440  *G4U40488OE5D    ........OE5AEND *
00000080 000080  00108600 01767E00  00000000 00000000  00168800 C7F4E4F4  F0F4F8F8 40404040  *..F...=...........H.G4U40488    *
000000A0 0000A0  40404040 E4000018  89001582 8000BBA2  55644850 34870000  00000000 00000018  *    U...I..B...S...&.G.........*
000000C0 0000C0  8A002004 220F1904  27704579 016D0000  80000000 00000068  8B000000 00000000  *............_.................*
000000E0 0000E0  00000000 00000000  00800000 00000000  00000000 00000000  00000000 00000000  *................................*
00000100 000100  00000000 00040000  00000000 00000000  00000000 00040004  0004C9D4 E2C24040  *.........................IMSB  *
00000120 000120  4040BBA2 5564484C  FB870000 00000000  00000000 00000000  00000000 00000090  *  .S...<.G.....................*
00000140 000140  8C000000 00040000  00000000 0002D6C5  F5C44040 4040C7F4  E4F4F0F4 F8F80404  *............OE5D    G4U40488..*
00000160 000160  014D0028 00000000  00000000 00000000  00000000 00000000  00000000 00000000  *.(................................*
00000180 000180  00000810 00000000  00000000 00000000  00000000 01D6C5F5  C4404040 40404040  *.....................OE5D       *
000001A0 0001A0  40404040 00000000  00000000 00000000  08100000 00000000  00000000 00000000  *    ..............................*
000001C0 0001C0  00000000 00000000  00000000 00000028  8D0003E8 03E80001  00000000 00000000  *...................Y.Y.........*

000001E0 0001E0  00000000 00000000  0000D6C5 F5C44040  4040CC00 000000F1  07000001 D6C5F5C4  *.........OE5D    .....1....OE5D*
00000200 000200  40404040 03E800F1  40770000 F0F0F0F0  F5F9F8F8 F0F06BF0  F5F9F5F0 F56BF0F0  *    .Y.1 ...0000598800,059505,00*
00000220 000220  F1F7F7F8 F9F5F0F0  6BF0F0F1 F7F6F9F7  F2F0F06B F0F0F2F1  F9F1F0F3 F0F06BF0  *17789500,0017697200,0021910300,0*
00000240 000240  F0F1F5F0 F7F1F5F0  F06BF0F0 F1F7F6F2  F1F1F0F0 6BF0F0F2  F3F9F9F4 F8F0F06B  *015071500,0017621100,0023994800,*
00000260 000260  F0F0F0F5 F8F9F7F2  F0F06BF0 F0F1F3F0  F9F0F4F0 F06BF0F0  F0F4F3F4 F3F5F0F0  *0005897200,0013090400,0004343500*
00000280 000280  6B805340 52D6C5F1  C4404040 40C9D4E2  C2404040 40200422  0F150408 12359800  *,.. .OE1D    IMSB    .........Q.*
000002A0 0002A0  00D6C5F2 C4404040  40C9D4E2 C2404040  40200422 0F150414  67129900 00D6C5F4  *.OE2D    IMSB    .........R..OE4*
000002C0 0002C0  C4404040 40C9D4E2  C2404040 40200422  0F150421 19740882  05400AF0 F0F0F0F5  *D    IMSB    .........B. .00005*

000002E0 0002E0  F9F8F8F0 F080AF00  380301F1 F64DF55D  40404040 E240C9D5  D8E4C9D9 E840C6D6  *98800......16(5)    S INQUIRY FO*
00000300 000300  D940E3C8 C540C6D6  D3D3D6E6 C9D5C740  C3E4E2E3 D6D4C5D9  405C5C5C E8C5E2BB  *R THE FOLLOWING CUSTOMER ***YES.*
00000320 000320  A2556448 505AC700  00000007 FFE8BF                                          *S...&.G......Y.                 *
```

Information From x‘01’

DSECT Offset/Field	Explanation	Data
+x‘68’ MSGODSTN	Destination	Transaction: OE5D
+x‘60’ MSGIDSTN	Input CNT	From LTERM G4U40488
+x‘48 MSGINODE	Node Name	From Node G4140488
+x‘8’ MSGMDRRN	Message DRRN	DRRN=04000003
+x‘14’ MSGUOW	Originating UOW	IMSB BBA25564 484CFB87
8D prefix segment	Conversation extension reg.	Conversational msg.
+x‘24’ MSGCOFLI	Conversation Flag	x‘CC’ x‘80’ = SPA in message x‘40’ = Start Conversation

Statement:

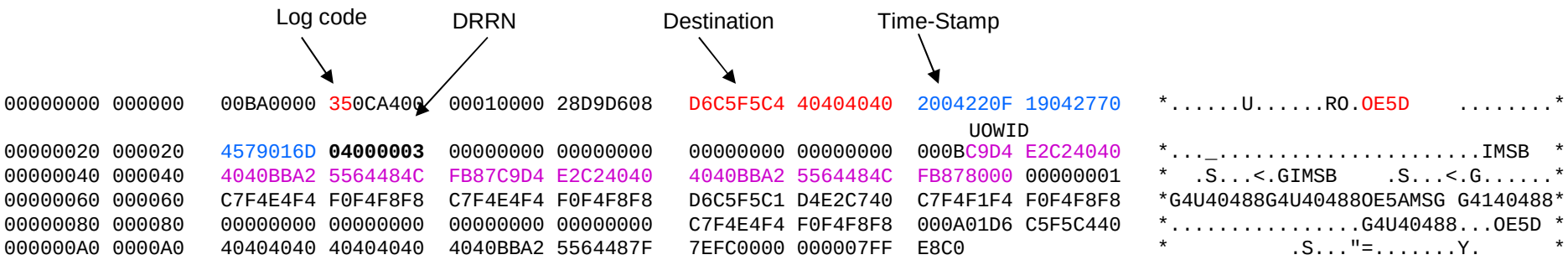
Conversational Transaction OE5D was entered from LTERM G4U40488 (Node G414088) at 2004.220 19:04:27 UTC time

x‘35’ Log Record

- Enqueue Record
- Message enqueued to its destination
- Follows the 01/03 record
- Tied to the 01/03 via DRRN and originating UOWID
- Mapping Macro: ILOGREC RECID=35

Sample x‘35’ Log Record

Enqueue message to Destination (Transaction OE5D)



Note:

DRRN = 04000003 This is the same as what was on the 01 record

Originating UOWID = C9D4E2C2 40404040 **BBA25564 484CFB87** same as the 01 log record

IMSB

Information extracted from x‘35’

DSECT offset/ Field	Explanation	Data
+x‘10’ QLNQDSTN	Destination name	OE5D
+x‘18’ QLNQDTTM	Time stamp of enqueue (same as 01 in this case)	2004.220F 19:04:27.7045 UTC
+x‘24’ QLNQDRRN	DRRN	DRRN=04000003
+x‘3A’ QLNQUOW	UOWID	IMSB BBA25564 484CFB87

Statement:

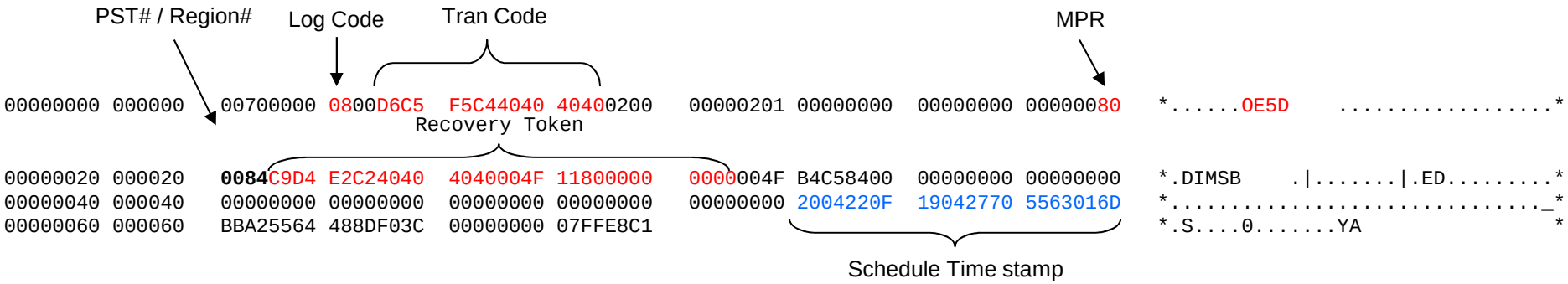
Transition OE5D was enqueued at 2004.220F 19:04:27.7045 UTC time

X‘08’ Log Record

- Application start log Record
- Cut at PSB/Program schedule time
- Mapping Macro: ILOGREC RECID=08

Sample X‘08’ Log Record

Program scheduled (into Region# x’84’)



Information from X‘08’

DSECT OFFSET/ FIELD	EXPLANATION	DATA
+x’60’ LINTSY1	Tran code (MPR schedule)	OE5D
+x’1F’ LINTTYPR	Region Type x’40’ - BMP x’10’ - IFP	x’80’(MPR)
+x’20’ LINTPSTN	PST # /Region#	PST# =x’84’
+x’54’ LINTUTC	Schedule Time Stamp	2004.220F 19:04:27.7055 UTC

Statement:

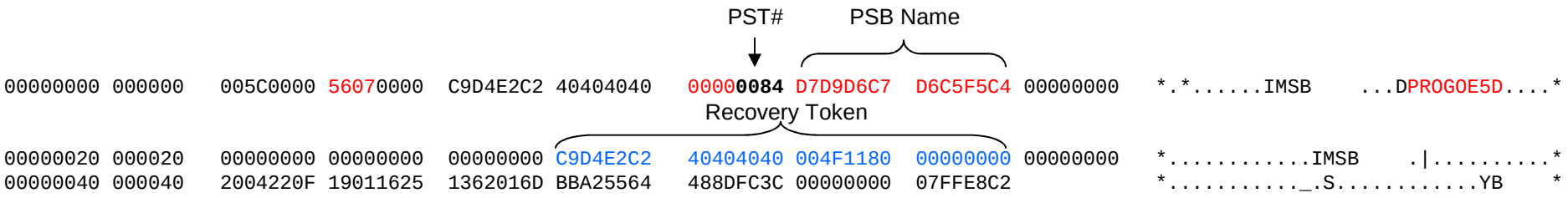
Program to process transaction OE5D scheduled in region # x’84’

X‘56’ Log Record

- External Subsystem support Log Records
- Several sub-types:
  - 5607, 5608, 5610, etc.
- Generally contain:
  - UOR information
  - Status of external subsystem transaction
  - Status of connection between IMS & CCTL
  - Stages of IMS Sync point processing
- Mapping Macro: ILOGREC RECID=56

Sample X‘5607’ Log Record

Start of a Unit of Recovery



Information From X‘5607’

DSECT FIELD	Explanation	DATA
+x’12’ TPCPSTN	PST Number	X’0084’
+x’14’ TPCPPSB	PSB Name	PROGOE5D
+x’2C’ TPCPRTKN	Recovery Token	C9D4E2C2 40404040 004F1180 00000000

Statement:

All work performed by program PROGOE5D in region# x’84’
will be identified by recovery token=C9D4E2C2 40404040 004F1180 00000000

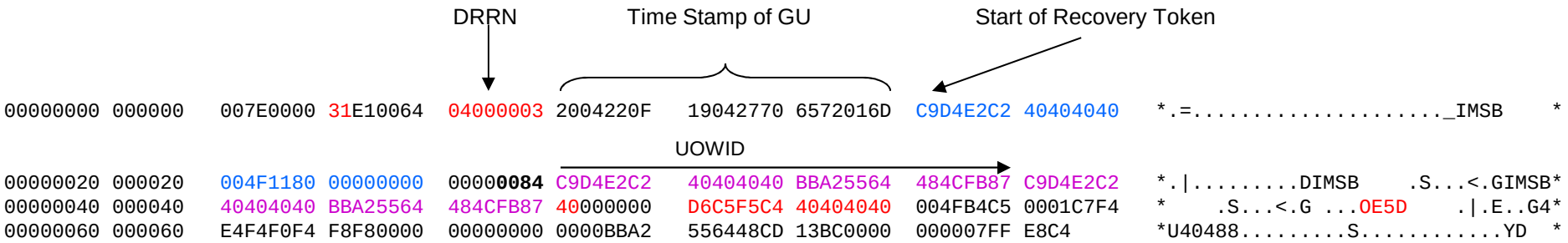
This work will either be committed or backed out.

X‘31’ Log Record

- Message Get – Unique Log Record
- Message GU (retrieval) was done
  - GU is done by application program
  - Also done by IMS to send outbound messages
- Tied to 01 via DRRN and originating UOWID
- Tied to 08 & 5607 via Recovery Token
- Mapping Macro: ILOGREC RECID=31

Sample X‘31’ Log Record

Get Unique (retrieval) of message (Transaction OE5D, DRRN=04000003)



Note:

DRRN = 04000003 This is the same as what was on the 01 record

Originating UOWID = C9D4E2C2 40404040 **BBA25564 484CFB87** - same as the 01 log record

IMSB

Recovery Token = C9D4E2C2 40404040 004F1180 00000000 – same as the 08 & 5607

Information from X‘31’

DSECT field/offset	Explanation	Data
+x'05’ QLGUFLGS	Flags describing GU	x'E1’ 80 + 40 + 20 + 1 80 = Initial GU 40 = Caller is DL/1
+x'08’ QLGUDRRN	Message DRRN	DRRN = 04000003
+x'18’ QLGURTKN	RECOVERY Token	C9D4E2C2 40404040 004F1180 00000000
+x'2A’ QLGUPST	PST# (if caller DL/I)	x’0084’
+x'2C’ QLGUORID	Originating UOWID	IMSB BBA25564 484CFB87
+x'0C’ QLGUDTME	GU Date & Time	2004.220F 19:04:27.7065 UTC
+x'50’ QLGUOPDN	Optional Destination	OE5D

Application program in region x'84’ did a GU (retrieval) of the message (tran OE5D) at 2004.220F 19:04:27.7065 UTC time

Performance Check 1

01 Input Message received
35 Message Enqueued T/S= 2004.200F 19:04:27.7045 ←——— TS1
08 Program scheduled T/S= 2004.200F 19:04:27.7055 ←——— TS2
31 GU Message T/S= 2004.200F 19:04:27.7065 ←——— TS3

Performance check:

TS2 – TS1 = Input Queue Time

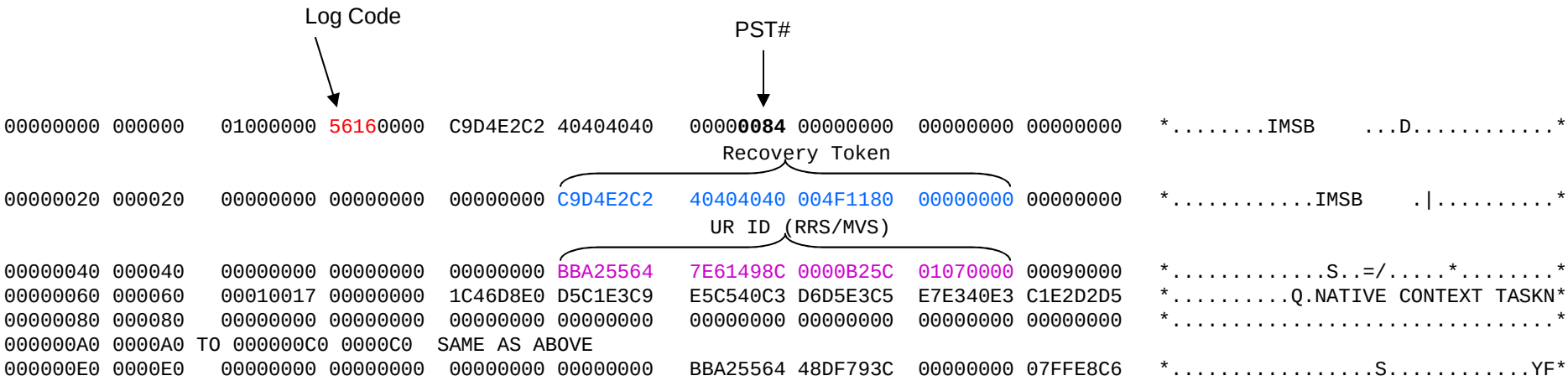
TS3 – TS2 = Schedule End to 1st DL/I = Program Load Time

X‘5616’ Log Record

- Start of a Protected UOR
- Protected UOR is used with distributed Sync Point
  - APPC or OTMA transactions
  - Requires RRS/MVS
- Note: x‘5616’ also cut for non-APPC and non-OTMA transactions as long as RRS/MVS is active.

Sample X‘5616’ Log Record

Start of a Protected UOR



Information from X‘5616’

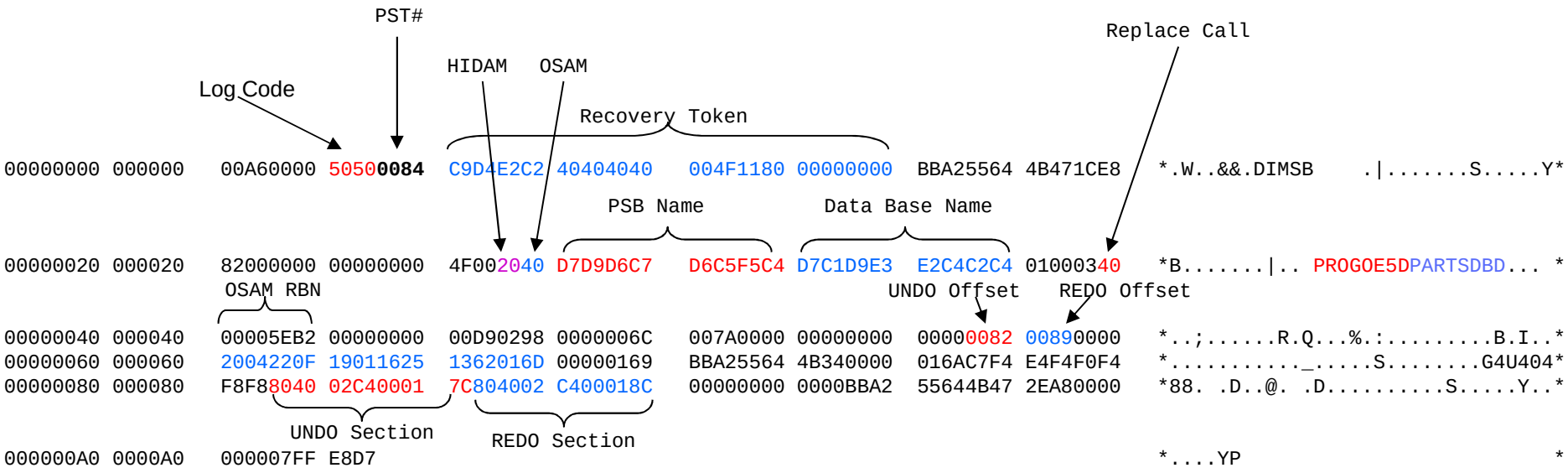
DSECT offset/Fieldname	Explanation	Data
+x‘12’ TPCPSTN	PST#	x‘0084’
+x‘2C’ TPCPRTKN	Recovery Token	**C9D4E2C2 40404040 004F1180 00000000**
+x‘4C’ TPCPURID	UR ID	**BBA25564 7E61498C 0000B25C 01070000**

X‘5050’ Log Record

- Database update Log Record
- Contains:
  - UNDO Data (Before Image)
  - REDO Data (After Image)
- Mapping Macro: ILOGREC RECID=50

Sample X‘5050’ Log Record

Database Update



Information from x‘5050’

DSECT offset/Field	Explanation	Data
+x‘06 DLOGPSTN	PST#	x‘0084’
+x‘08’ DLOGRTKN	Recovery Token	**C9D4E2C2 40404040 004F1180 00000000**
+x‘2A’ DLOGDBOR	DB Organization x‘40’=HDAM	x‘20’ = HIDAM
+x‘2B’ DLOGDSOR	Data Set Organization x‘80’=VSAM	x‘40’ = OSAM
+x‘2C’ DPGMNAME	PSB NAME	PROGOE5D
+x‘34’ DDBDNAME	Data Base Name	PARTSDBD
+x‘3F’ DLOGCALL	DL/1 call x‘80’=INSERT x‘20’=DELETE	x‘40’ = Replace call
+x‘40’ DLOGRBA	OSMA RBN or VSAM RBA	x‘5EB2’
+x‘5A’ DLOGUNOF	UNDO offset	x‘82’
+x‘5C’ DLOGREOF	REDO offset	x‘89’

Information from X‘5050’ (*cont.*)

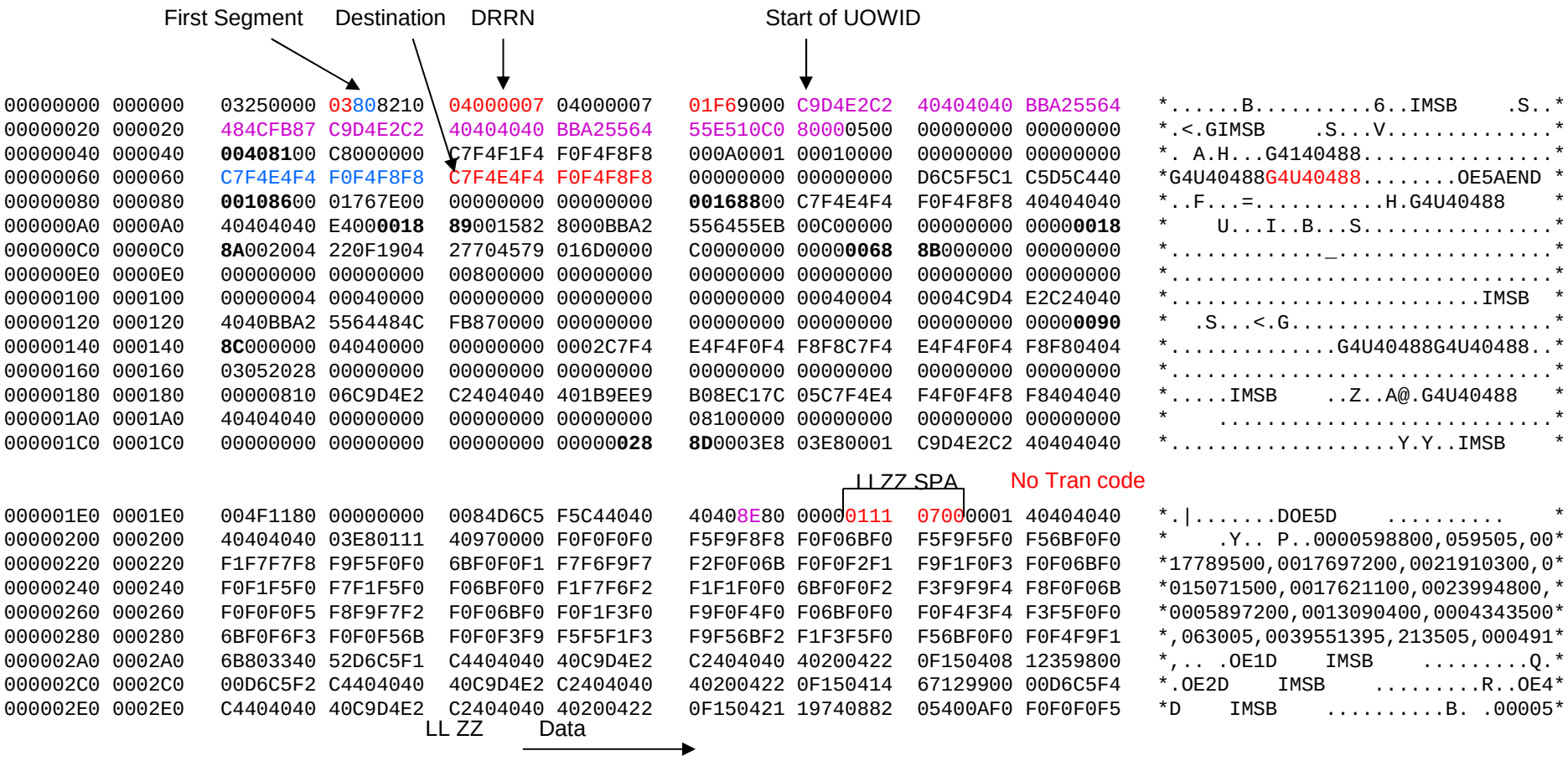
UNDO/REDO Section:

DSECT offset/Field	**Explanation**	**Data**
+x‘02 DLOFOFF	Offset in Block/CI	x‘02C4’
+x‘04’ DLOGDLEN	Length of Data	x‘0001’
+x‘06’ DLOGDDAT	Data	x‘7C’ ⟶ x‘8C’

Program PROGOE5D updated Database PARTSDBD (HIDAM,OSAM)

Sample X'03' Log Record

Insert Output Message



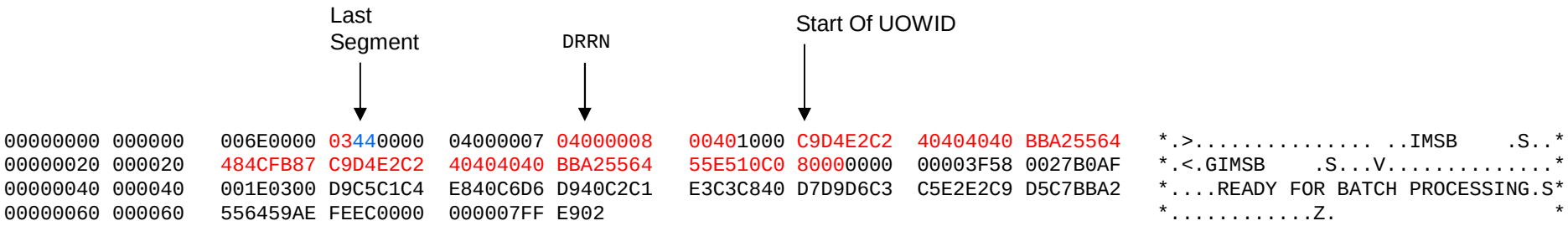

```
00000000 000000   03250000 03808210  04000007 04000007   01F69000 C9D4E2C2  40404040 BBA25564   *......B..........6..IMSB    .S..*
00000020 000020   484CFB87 C9D4E2C2  40404040 BBA25564   55E510C0 80000500  00000000 00000000   *.<.GIMSB    .S...V..............*
00000040 000040   00408100 C8000000  C7F4F1F4 F0F4F8F8   000A0001 00010000  00000000 00000000   *. A.H...G4140488................*
00000060 000060   C7F4E4F4 F0F4F8F8  C7F4E4F4 F0F4F8F8   00000000 00000000  D6C5F5C1 C5D5C440   *G4U40488G4U40488........OE5AEND *
00000080 000080   00108600 01767E00  00000000 00000000   00168800 C7F4E4F4  F0F4F8F8 40404040   *..F...=...........H.G4U40488    *
000000A0 0000A0   40404040 E4000018  89001582 8000BBA2   556455EB 00C00000  00000000 00000018   *    U...I..B...S................*
000000C0 0000C0   8A002004 220F1904  27704579 016D0000   C0000000 00000068  8B000000 00000000   *............_..................*
000000E0 0000E0   00000000 00000000  00800000 00000000   00000000 00000000  00000000 00000000   *................................*
00000100 000100   00000004 00040000  00000000 00000000   00000000 00040004  0004C9D4 E2C24040   *.........................IMSB  *
00000120 000120   4040BBA2 5564484C  FB870000 00000000   00000000 00000000  00000000 00000090   *  .S...<.G.....................*
00000140 000140   8C000000 04040000  00000000 0002C7F4   E4F4F0F4 F8F8C7F4  E4F4F0F4 F8F80404   *..............G4U40488G4U40488..*
00000160 000160   03052028 00000000  00000000 00000000   00000000 00000000  00000000 00000000   *................................*
00000180 000180   00000810 06C9D4E2  C2404040 401B9EE9   B08EC17C 05C7F4E4  F4F0F4F8 F8404040   *.....IMSB    ..Z..A@.G4U40488   *
000001A0 0001A0   40404040 00000000  00000000 00000000   08100000 00000000  00000000 00000000   *    ............................*
000001C0 0001C0   00000000 00000000  00000000 00000028   8D0003E8 03E80001  C9D4E2C2 40404040   *...................Y.Y..IMSB    *

000001E0 0001E0   004F1180 00000000  0084D6C5 F5C44040   40408E80 00000111  07000001 40404040   *.|.......DOE5D    ..........    *
00000200 000200   40404040 03E80111  40970000 F0F0F0F0   F5F9F8F8 F0F06BF0  F5F9F5F0 F56BF0F0   *    .Y.. P..0000598800,059505,00*
00000220 000220   F1F7F7F8 F9F5F0F0  6BF0F0F1 F7F6F9F7   F2F0F06B F0F0F2F1  F9F1F0F3 F0F06BF0   *17789500,0017697200,0021910300,0*
00000240 000240   F0F1F5F0 F7F1F5F0  F06BF0F0 F1F7F6F2   F1F1F0F0 6BF0F0F2  F3F9F9F4 F8F0F06B   *015071500,0017621100,0023994800,*
00000260 000260   F0F0F0F5 F8F9F7F2  F0F06BF0 F0F1F3F0   F9F0F4F0 F06BF0F0  F0F4F3F4 F3F5F0F0   *0005897200,0013090400,0004343500*
00000280 000280   6BF0F6F3 F0F0F56B  F0F0F3F9 F5F5F1F3   F9F56BF2 F1F3F5F0  F56BF0F0 F0F4F9F1   *,063005,0039551395,213505,000491*
000002A0 0002A0   6B803340 52D6C5F1  C4404040 40C9D4E2   C2404040 40200422  0F150408 12359800   *,.. .OE1D    IMSB    .....Q.*
000002C0 0002C0   00D6C5F2 C4404040  40C9D4E2 C2404040   40200422 0F150414  67129900 00D6C5F4   *.OE2D    IMSB    .....R..OE4*
000002E0 0002E0   C4404040 40C9D4E2  C2404040 40200422   0F150421 19740882  05400AF0 F0F0F0F5   *D    IMSB    .....B. .00005*

00000300 000300   F9F8F8F0 F080AF00  0E0300C9 D5E560F3   F3F4F540 40BBA255  6455EB4C 40000000   *98800......INV-3345  .S....< ...*
00000320 000320   0007FFE8 FC                                                                  *...Y.                          *
```

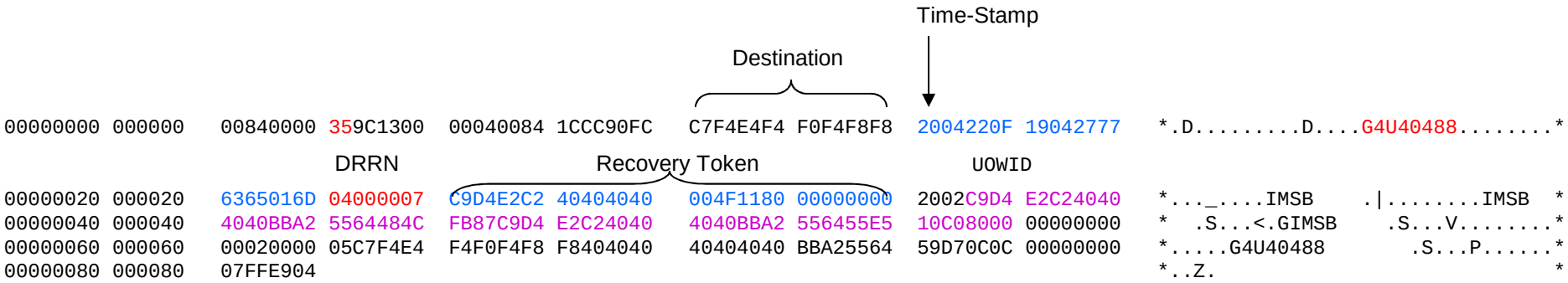
Sample X‘03’ Log Record

Insert Output message (second and last segment)



Sample X‘35’ Log record

Enqueue the message



Information from X‘03’ and X‘35’(for Output)

- Outbound message has 2 segments
- Outbound message DRRNs: 04000007 04000008
- Message destined for LTERM G4U40488
- Conversation is ended
  - Transcode in SPA blanked out
- Outbound message enqueued at: 2004.220F 19:04:27:7763 UTC Time

Performance Check 2

```
01  Input Message received
35  Message Enqueued          T/S= 2004.220F  19:04:27.7045  <-------  TS1
08  Program scheduled         T/S= 2004.220F  19:04:27.7055  <-------  TS2
31  GU Message                T/S= 2004.220F  19:04:27.7065  <-------  TS3
03  Output Message – Segment 1
03  Output Message – Segment 2
35  Enqueue Output Message    T/S= 2004.220F  19:04:27.7763  <-------  TS4
```

Performance check:

TS2 – TS1 = Input Queue Time

TS3 – TS2 = Schedule End to 1st DL/I = Program Load Time

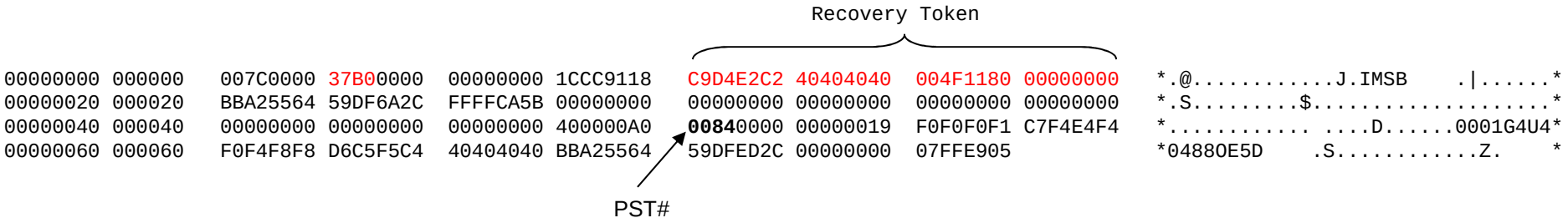
TS4 – TS1 = Q to Q time

X‘37’ Log Records

- Produced at Sync Point
- x‘3730’ or x‘37B0’ for Sync Point Phase 1 complete
  - Cross over record
- x‘3701’ for transfer of messages to permanent destination
  - Transfer (XFER) record
- Note: “Free” Input message log records (x‘33’) will follow x‘3701’
- Note: x‘5612’ indicates end of Sync Point Phase 2

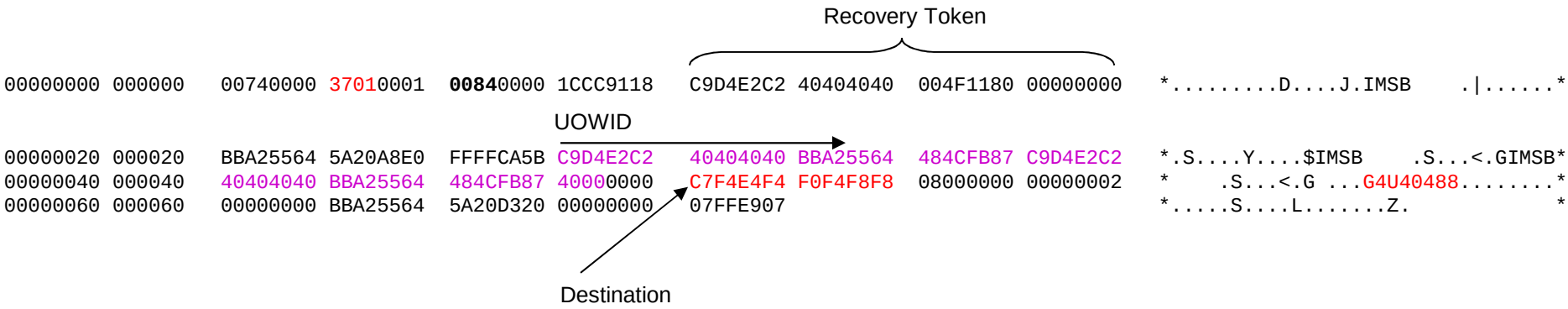
Sample X‘37B0’ Log Record

Sync Point Phase 1 Complete



Sample X‘3701’ Log Record

Transfer Message to Permanent Destination



Information from x‘3701’

DSECT offset/Field	Explanation	Data
+x‘08 QLXFRPST	PST#	x‘0084’
+x‘10’ QLXFRTKN	Recovery Token	**C9D4E2C2 40404040 004F1180 00000000**
+x‘2C’ QLXFUOW	UOWID	**IMSB BBA25564 484CFB87**
+x‘50’ QLXFDSTN	Destination	G4U40448

Statement:

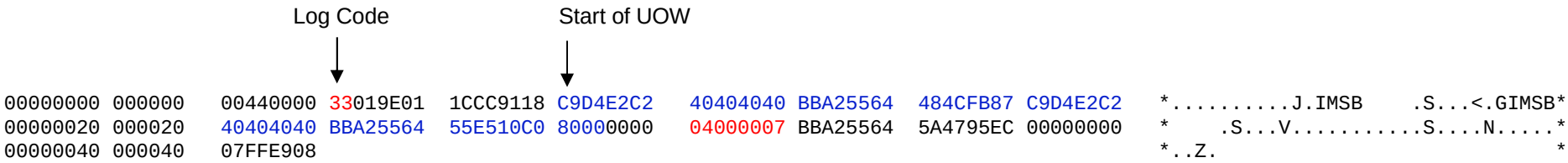
Program has reached a sync point

X‘33’ Log Record

- ‘Free’ of DRRNs
- Mapping Macro: ILOGREC RECID=33

Sample X‘33’ Log Record

Free DRRN 04000007 after placing message on Shared Queues



Information from X‘33’

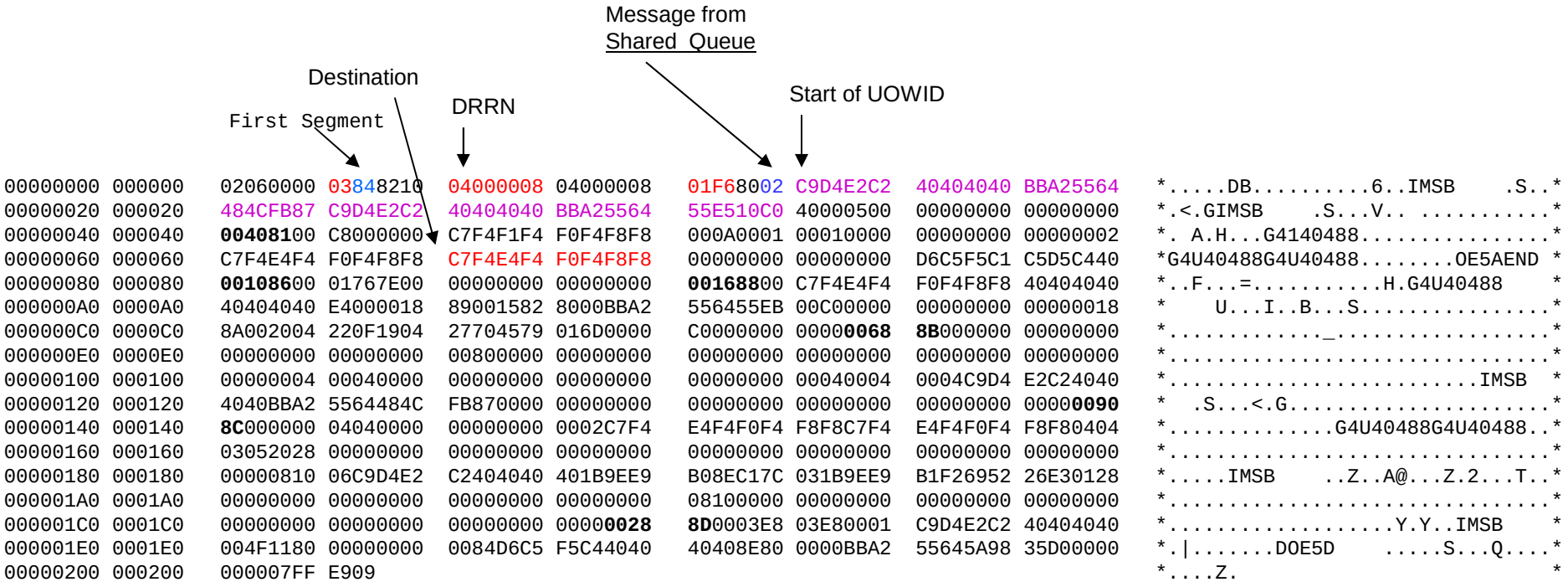
DSECT offset/field	Explanation	Data
+x‘0C’ QLFRUOW	UOWID	**IMSB BBA25564 484CFB87**
+x‘30’QLFVNDR	DRRNs freed	04000007

Where are we?

- Program has reached Sync Point
  - Database updates made permanent.
  - Outbound messages queued to permanent destination (in our case msg on shared queues).
- Next Step ?

Sample X‘03’ Log Record

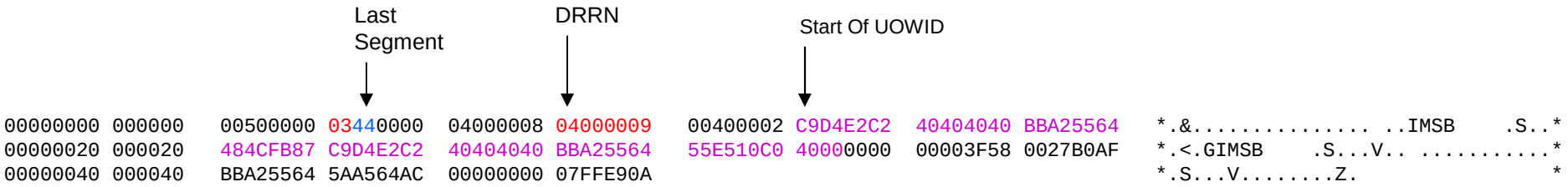
Output message retrieved from Shared Queues – first segment




```
00000000 000000   02060000 03848210  04000008 04000008   01F68002 C9D4E2C2  40404040 BBA25564   *.....DB.........6..IMSB    .S..*
00000020 000020   484CFB87 C9D4E2C2  40404040 BBA25564   55E510C0 40000500  00000000 00000000   *.<.GIMSB    .S...V.. ..........*
00000040 000040   00408100 C8000000  C7F4F1F4 F0F4F8F8   000A0001 00010000  00000000 00000002   *. A.H...G4140488................*
00000060 000060   C7F4E4F4 F0F4F8F8  C7F4E4F4 F0F4F8F8   00000000 00000000  D6C5F5C1 C5D5C440   *G4U40488G4U40488........OE5AEND *
00000080 000080   00108600 01767E00  00000000 00000000   00168800 C7F4E4F4  F0F4F8F8 40404040   *..F...=...........H.G4U40488    *
000000A0 0000A0   40404040 E4000018  89001582 8000BBA2   556455EB 00C00000  00000000 00000018   *    U...I..B...S................*
000000C0 0000C0   8A002004 220F1904  27704579 016D0000   C0000000 00000068  8B000000 00000000   *............_..................*
000000E0 0000E0   00000000 00000000  00800000 00000000   00000000 00000000  00000000 00000000   *................................*
00000100 000100   00000004 00040000  00000000 00000000   00000000 00040004  0004C9D4 E2C24040   *.........................IMSB  *
00000120 000120   4040BBA2 5564484C  FB870000 00000000   00000000 00000000  00000000 00000090   *  .S...<.G.....................*
00000140 000140   8C000000 04040000  00000000 0002C7F4   E4F4F0F4 F8F8C7F4  E4F4F0F4 F8F80404   *.............G4U40488G4U40488..*
00000160 000160   03052028 00000000  00000000 00000000   00000000 00000000  00000000 00000000   *................................*
00000180 000180   00000810 06C9D4E2  C2404040 401B9EE9   B08EC17C 031B9EE9  B1F26952 26E30128   *.....IMSB    ..Z..A@...Z.2...T..*
000001A0 0001A0   00000000 00000000  00000000 00000000   08100000 00000000  00000000 00000000   *................................*
000001C0 0001C0   00000000 00000000  00000000 00000028   8D0003E8 03E80001  C9D4E2C2 40404040   *...................Y.Y..IMSB    *
000001E0 0001E0   004F1180 00000000  0084D6C5 F5C44040   40408E80 0000BBA2  55645A98 35D00000   *.|.......DOE5D    .....S...Q....*
00000200 000200   000007FF E909                                                               *....Z.                         *
```

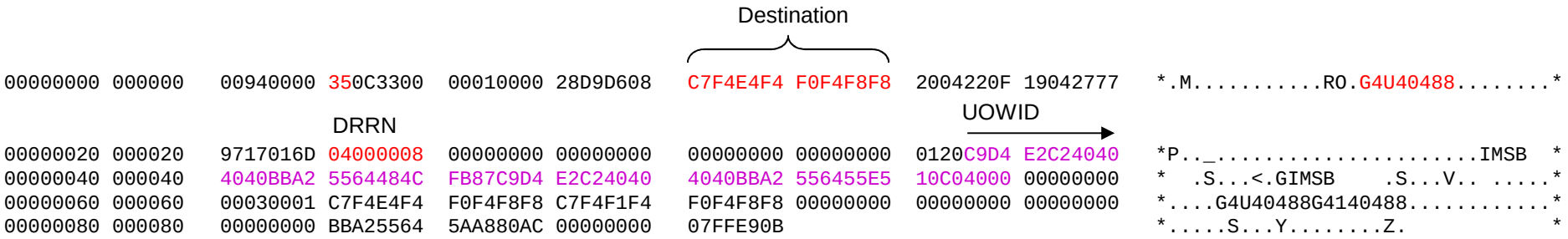
Sample X‘03’ Log Record

Output Message retrieved from Shared Queues – second segment



Sample X‘35’ Log Record

ENQ Retrieved Message to LTERM (G4U40488)



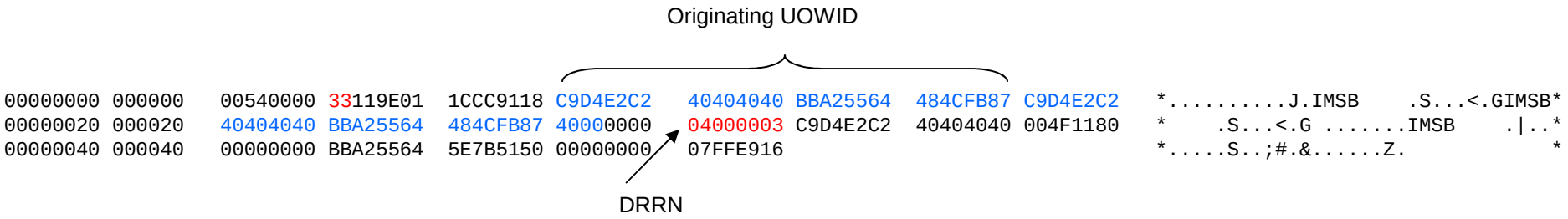
Sample X‘31’ Log Record

Get Unique issued by IMS (DFSICIO0) to retrieve and send the message to LTERM

```
00000000 000000   00780000 31A40000  04000008 2004220F   19042777 9740016D  00000000 00000000   *.....U..............P ._........*
                                                UOWID
00000020 000020   00000000 00000000  00000100 C9D4E2C2   40404040 BBA25564  484CFB87 C9D4E2C2   *............IMSB    .S...<.GIMSB*
00000040 000040   40404040 BBA25564  55E510C0 40000000   C7F4E4F4 F0F4F8F8  C7F4E4F4 F0F4F8F8   *    .S...V.. ...G4U40488G4U40488*
00000060 000060   D6C5F5C1 C5D5C440  BBA25564 5AA9DDAC   00000000 07FFE90C                     *OE5AEND .S...Z........Z.       *
```

Sample X‘33’ Log Record

Free Input DRRN = 04000003

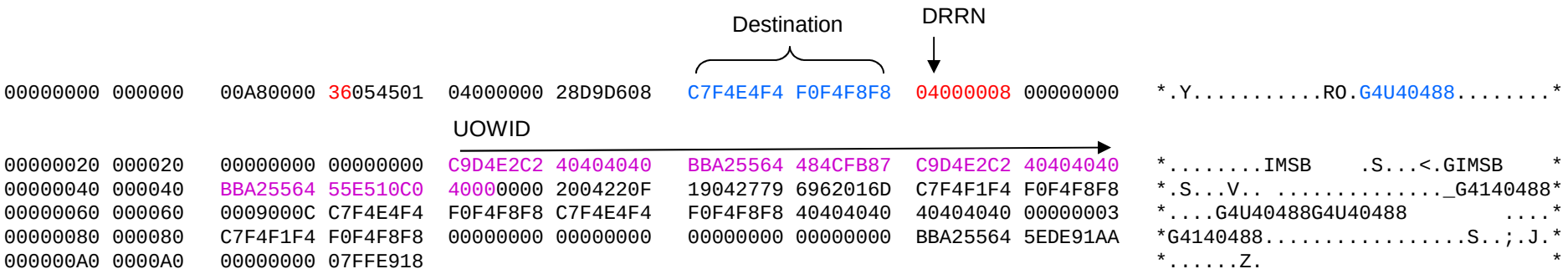


X‘36’ Log Record

- Dequeue of a message
- Mapping Macro: ILOGREC RECID=36

Sample X‘36’ Log Record

Dequeue of Message (after sending it to LTERM=G4U40499)

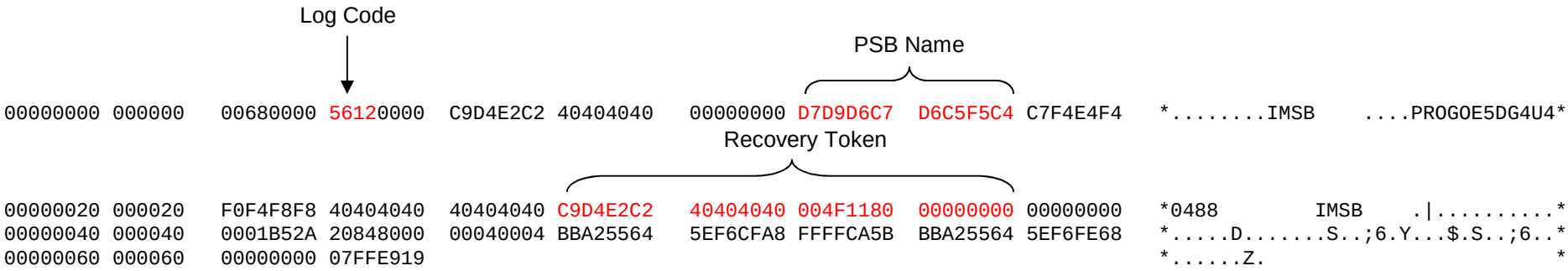


Information from X‘36’

DSECT offset/Field	Explanation	Data
+x‘10’ QLDQDSTN	Destination	G4440448
+x‘18’ QLDQDRRN	DRRN of MSG	04000008
+x‘28’ QLDDUOW	UOWID	**IMSB BBA25564 484CFB87**

Sample X‘5612’ Log Record

End of Phase 2 Sync Point



Sample X‘5607’ Log Record

Start of a Unit of Recovery

Slightly misleading (in this case). Notice commit count in Recovery Token

PST#

```
00000000 000000   005C0000 56070000  C9D4E2C2 40404040   00000084 D7D9D6C7  D6C5F5C4 00000000   *.*......IMSB    ...DPROGOE5D....*
```

Recovery Token

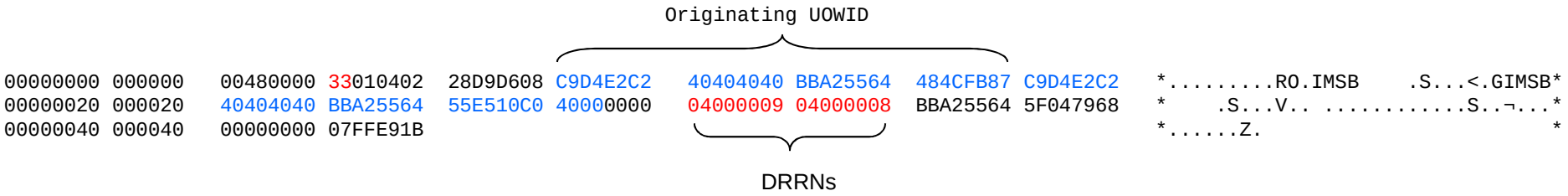
```
00000020 000020   00000000 00000000  00000000 C9D4E2C2   40404040 004F1180  00000001 00000000   *............IMSB    .|.........*
00000040 000040   2004220F 19011625  1362016D BBA25564   5EF703E8 00000000  07FFE91A            *..........._.S..;7.Y......Z.    *
```

Note: Recovery Token = C9D4E2C2 40404040 004F1180 **00000001**

Commit Count Incremented

Sample X‘33’ Log Record

Free of DRRNs 04000009 04000008 used for output message to LTERM G4U40488



Sample X‘5612’ Log Record

End of Phase 2 SYNCPOINT

PSB Name

```
00000000 000000   00680000 56120000  C9D4E2C2 40404040   00000000 D7D9D6C7  D6C5F5C4 C7F4E4F4   *........IMSB    ....PROGOE5DG4U4*
                                                                 Recovery Token
00000020 000020   F0F4F8F8 40404040  40404040 C9D4E2C2   40404040 004F1180  00000001 00000000   *0488        IMSB    .|.........*
00000040 000040   0001B52A 20848000  00040004 BBA25564   5F31E972 FFFFCA5B  BBA25564 5F321FF2   *.....D.......S..¬.Z....$.S..¬..2*
00000060 000060   00000000 07FFE91C                                                            *......Z.                        *
```

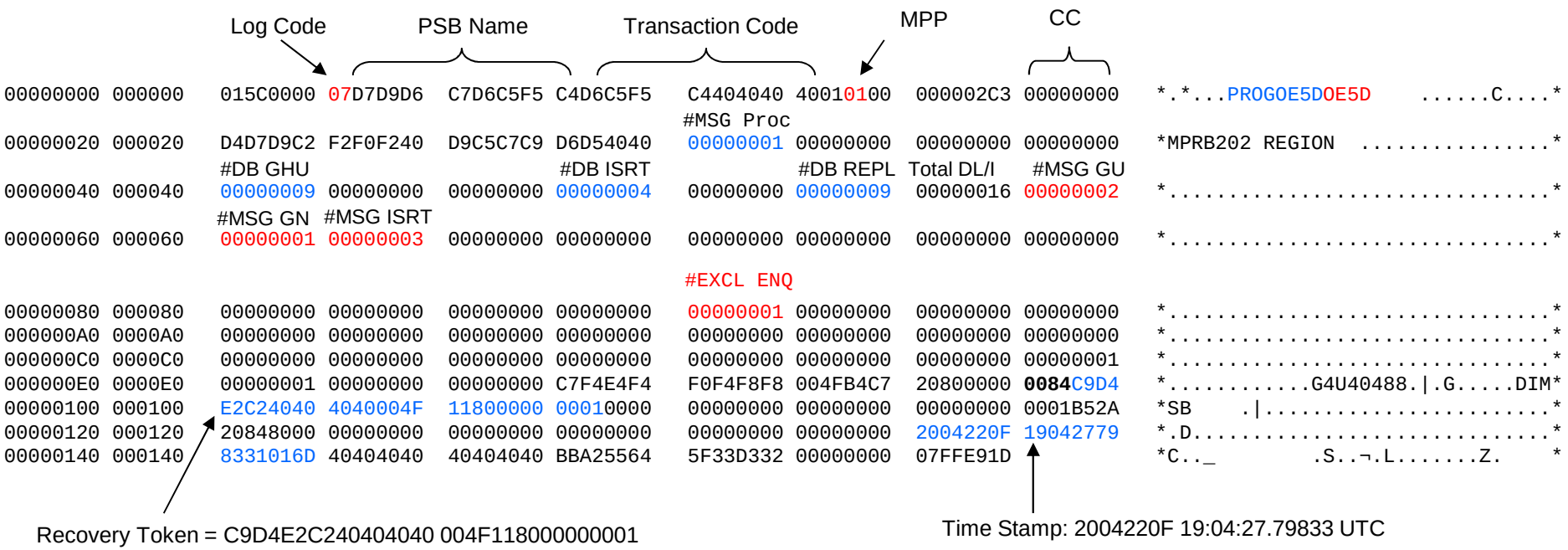
Note: Recovery Token = C9D4E2C2 40404040 004F1180 **00000001**

Commit Count Incremented

Sample X‘07’ Log Record

Application Program Terminates:

PSB=PROGOE5D TRANCODE=OE5D COMPLETION CODE=00000000 Region/PST=x’84’



Information from X‘07’

DSECT offset/field	Explanation	Data
+x‘05’ DLRNPSB	PSB Name	PROGOE5d
+x‘OD’ DLRTRNCD	TRANSACTION CODE	OESD
+x‘16’ DLRTYPE	Program Type X‘02’ = BMP	X‘01’= MPP
+x‘IC’ DLRCMP	System completion code	00000000
+x‘30’ DLRMCNT	Trans processed	00000001
+x‘34’ DLRACCT	DL/I call counts	
+x‘FC’ DLRPSTNR	PST#	X‘0084’
+X‘FE DLRTOKN	Recovery Token	**C9D4E2C2 40404040 004F1180 00000001**
+x‘138 DLRUTC	Time stamp	**2004220F 19:04:27.7983 UTC**

Statement:

Program PROGOESD in region# x‘84’ at completion code 00000000

Performance Check - Final

```
01  Input Message received
35  Message Enqueued          T/S= 2004.220F  19:04:27.7045  <-------  TS1
08  Program scheduled         T/S= 2004.220F  19:04:27.7055  <-------  TS2
31  GU Message                T/S= 2004.220F  19:04:27.7065  <-------  TS3
03  Output Message – Segment 1
03  Output Message – Segment 2
35  Enqueue Output Message    T/S= 2004.220F  19:04:27.7763  <-------  TS4
07  Application Program Ends  T/S= 2004.220F  19:04:27.7983  <-------  TS5
```

Performance check:

TS2 – TS1 = Input Queue Time

TS3 – TS2 = Schedule End to 1st DL/I = Program Load Time

TS4 – TS1 = Q to Q time

TS5 – TS2 = Program Elapsed Time

(TS5 – TS2)/DLRMCNT = Average Transaction Time

Relating Log Record - Summary

01	DRRN	UOWID	LTERM	TRANCODE
35	DRRN	UOWID		
08			REC TKN	PST#
31	DRRN	UOWID	REC TKN	PST#
5050			REC TKN	PST#
03	DRRN	UOWID	LTERM	
35	DRRN	UOWID	REC TKN	
37B0			REC TKN	PST#
3701		UOWID	RECTKN	PST#
31	DRRN	UOWID		
36	DRRN	UOWID		
07			REC TKN	

QUESTIONS?

REFERENCE

Sample DFSERA10 JCL

```
//DKERA10  JOB  (DEEPAKK ,A452 ,090,M31) ,'DEEPAKK' ,
//           MSGCLASS=H, TIME=(15), MSGLEVEL=(1,1) ,
//           NOTIFY=DEEPAKK, CLASS=A
//JOBLIB  DD DISP=SHR,DSN=IMSBLD.181STSA.CRESLIB
//ERA10    EXEC PGM=DFSERA10
//SYSPRINT  DD SYSOUT=*
//SYSUT1     DD DISP=SHR,DSN=DEEPAKK.CONF.LOGS
//SYSIN       DD  *
```

Sample DFSERA10 Control Cards

- **SELECT ALL MESSAGES THAT CONTAIN UOW ID:**

  x'C9D4E2C240404040BBA25564484CFB87'

```
CONTROL   CNTL   STOPAFT=EOF
OPTION       PRINT  E=DFSERA70
PARM=(DATA=x'C9D4E2C240404040BBA25564484CFB87')
END
```

- **Select Database update log records (x'5050) for database PARTSDBD & RBN=x'00005EB2'**

```
OPTION   PRINT   O=5,V=5050,L=2,C=M
OPTION   PRINT   O=53,V=PARTSDBD,L=8,T=C,C=M
OPTION   PRINT   O=65,V=00005EB2,L=4,T=X,C=E,E=DFSERA30
END
```

Sample DFSERA10 Control Cards

- **Select application program start & termination records**

```
CONTROL   CNTL
OPTION    PRINT  O=5,V=7,L=1,C=E,E=DFSERA30
OPTION    PRINT  O=5,V=07,L=1,C=E,E=DFSERA30
END
```

- **SELECT PSEUDO ABEND RECORDS**

```
CONTROL CNTL
OPTION    PRINT  O=5,V=67FF ,L=2,C=E,E=DFSERA30
END
```