Burroughs

Computer Management System (CMS) B 1000 Program Dump Analysis

USER'S GUIDE

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SECTION 1
INTRODUCTION

THIS MANUAL IS RELATIVE TO THE B 1000 CMS SYSTEM SOFTWARE RELEASE LEVEL 3.04

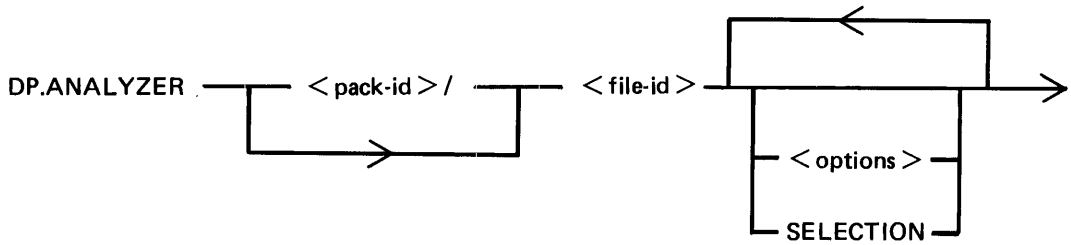
Execution of a program may lead to a DS/DP condition. When a program is DP'ed (either by the operator or by the COBOL interpreter if the "NO USE PROCEDURE" condition is encountered after an error), a dump file is created on the same disk as the program file. The name of the dump file is DMFILnn, where nn is the mix number.

In addition, the DM command can be used to force the creation of a dump file for an executing program (that is, a program which is not in the DS/DP state). The program will be suspended when the DM command is given and a dump file will be created in the same manner as if a DP was issued. The program will then require the GO command to be issued by the operator before resuming processing.

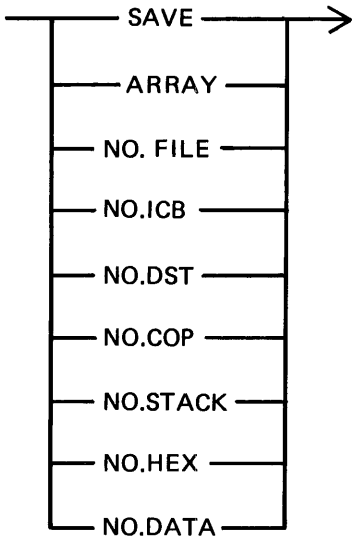
The program dump analyzer, named DP.ANALYZER, analyzes this dump file, in relation to the program file itself, giving a listing which contains information about the program parameters, the files, the segments and so on.

A glossary of the terms used in this manual appears in Appendix 'A' at the end of this book.

SECTION 2
OPERATING INSTRUCTIONS



Options



< pack-id > when not specified defaults to the system disk

< file-id > is the name of a dump file.

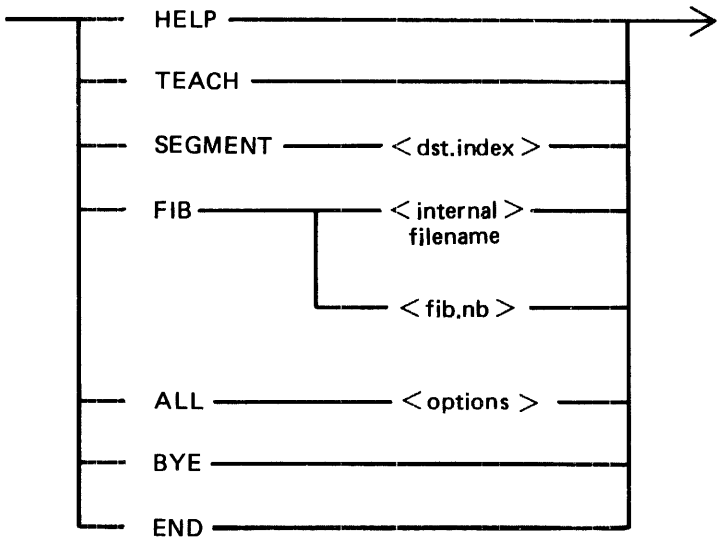
1. If no parameter is specified, all the dump file is analyzed. The dump file is then removed.
2. The options, entered in any order, have the following effect:

SAVE	This will cause DP.ANALYZER to retain the input dump file rather than remove it after analysis (which is the default).
ARRAY	This is applicable only to COBOL/RPG dump files. It will cause all elements of all arrays to be printed. The default is to print a maximum of twenty elements of each array.
NO.FILE	This will suppress printing of any file information.
NO.ICB	This will suppress printing of any ICB information.
NO.DST	This will suppress the DST and PST analysis.

NO.COP	This will suppress the COP table analysis (only for COBOL and RPG programs).
NO.STACK	This will suppress the Data Stack Analysis (only for MPL II programs).
NO.HEX	This will suppress the printing of the current code segment and locked slice.
NO.DATA	This will suppress the printing of data segments.

3. If SELECTION is specified, the PROGRAM and RUNNING PARAMETERS, the ICB, the CPA, the CONTROL STACK/PERFORM STACK, the PST, the DST and the IFNB are printed, except if otherwise specified in the initiating message.

   The user has the option to request for the analysis of specific parts of the dump file, via accepts.



HELP TEACH	The list of all the parameters which may be entered via accepts is displayed.
SEGMENT	The data segment whose index number is specified by "dst.index" is printed.
FIB	The FIB of the file specified either by its "internal filename" or its "fib.nb" is printed. "fib.nb" is the index number of the data segment which contains the FIB.
ALL	The sections of the dump file selected by the "options" are printed. The dump file is then removed (if not otherwise specified), and DP.ANALYZER goes to EOJ.
BYE END	DP.ANALYZER goes to EOJ. The dump file is not removed.

EXAMPLES

1. DP.ANALYZER DMFIL03 SAVE
   DP.ANALYZER will expect to find a dump file called DMFIL03 on the system disk, will print a formatted dump listing and will retain the dump file.
2. DP.ANALYZER USER/DMFIL02 NO.ICB NO.HEX
   DP.ANALYZER will expect to find a dump file called DMFIL02 on a disk labelled USER, will print a formatted listing omitting the Interface Control Block, current code segment and locked slice sections and will remove the file USER/DMFIL02 at the end of the job.
3. DP.ANALYZER DMFIL04 ARRAY SAVE
   DP.ANALYZER will expect to find a dump file called DMFIL04 on the system disk, will print a formatted listing including all the elements of all arrays and will retain DMFIL04 at the end of the job.
4. DP.ANALYZER DMFIL04 NO.ICB NO.DST SELECTION
   DP.ANALYZER will expect to find a dump file called DMFIL04 on the system disk, will print a formatted listing containing the program and running parameters, the CPA, the CONTROL STACK/ PERFORM STACK and the IFNB. Parameters may then be entered via accepts.

NOTE

Dumps submitted with a Field Communication Form (FCF) must be full dumps, that is, ARRAY must be specified and no other option may be specified.

Sometimes, due to the BIL interpreter, the contents of the end of an MPLII program's working stack is unpredictable. In this case, the printing will be limited to the analyzable portion.

SECTION 3
PROGRAM DUMP ANALYZER OUTPUT

The program dump analyzer output is described section by section, in the order it occurs in the DP.ANALYZER listing. In each section, differences and similarities for each of the three languages, MPL, COBOL and RPG are given.

The sections as they occur in a DP.ANALYZER listing are as follows:

TITLE

PROGRAM PARAMETERS

RUNNING PARAMETERS

INTERFACE CONTROL BLOCK (ICB)

COMMUNICATE PARAMETER AREA (CPA)

PERFORM STACK/CONTROL STACK

PROGRAM SEGMENT TABLE

DATA SEGMENT TABLE (DST)

INTERNAL FILE NAME BLOCK

FILE INFORMATION

DATA STACK ANALYSIS/CURRENT OPERAND (COP) TABLE

DATA SEGMENTS

CURRENT CODE SEGMENT

LOCKED SLICE

The sections PROGRAM PARAMETERS till DATA STACK ANALYSIS/CURRENT OPERAND (COP) TABLE give labelled information taken from the Internal Control Block, and/or the Locked Slice, and/or the Data Segments.

The sections DATA SEGMENTS till LOCKED SLICE contain the display of the corresponding memory area; these displays may be useful when some control information has been destroyed.

Note that the sections Interface Control Block, Code Segment and Locked Slice analysis require a good knowledge of the operating system; a good practice would be to specify, when calling the DP.ANALYZER program, the parameters NO.ICB NO.HEX.

HOW TO USE A PROGRAM DUMP

If a dump is requested because of I/O problems, the section to look at is the COMMUNICATE PARAMETER AREA. When the reason for the I/O problem has been determined, its location may be delimited using THE NEXT INSTRUCTION in the RUNNING PARAMETERS section.

More information, if required, can be found in the sections FILE INFORMATION, DATA STACK ANALYSIS/CURRENT OPERAND (COP) TABLE and DATA SEGMENTS.

For other types of analysis, after locating the NEXT INSTRUCTION, the DATA STACK ANALYSIS/CURRENT OPERAND (COP) TABLE section may give useful information on the state of the variables.

COMPILER OPTIONS

To facilitate reading the DP.ANALYZER ouput, compiler options have to be specified; that is:

- in MPL : $XMAP
- in COBOL : $LINE-CODE, $LINE-MAP, $COP-TABLE or $OPTCODE
- in RPG : column 15 of the H card specification must be set to 1.
  $MAP or $PARMAP or $XMAP, $NAMES.

The implications of those options are stated in the appropriate section.

SECTION 4
SECTION DESCRIPTION

Along with the title "C.M.S. DUMP-ANALYZER", the compile date and release level of DP.ANALYZER are given. Note that this information applies to DP.ANALYZER and not to the system release information.

PROGRAM PARAMETERS

PROGRAM NAME	This is the name of the user's program being analyzed in the DP.ANALYZER listing.
COMPILER NAME	This is the name of the compiler employed by the user's program.
COMPILER SYSTEM	This gives the processor name and MCP version of the system on which the user's program was compiled.
COMPILATION DATE	This is the date on which the user's program was last compiled.
INTERPRETER PACK.ID	This is the name of the pack on which the interpreter employed by the user's program is located.
INTERPRETER NAME	This is the name of the interpreter employed by the user's program. The released names of the interpreters are as follows: MPL = BILINTERP COBOL = COBOLINT RPG = COBOLINT
PRIORITY CLASS	This is the priority assigned by the compiler to the user's program. In general, priorities are assigned as follows: A = normal user tasks B = utilities C = data comm tasks Depending on the Program Parameter Block flags, one or all of the following messages may be printed after Priority Class: MAY OPEN SYSMEM SUPPRESS BOJ-EOJ MESSAGES MCS PROGRAM FILE NDL PROGRAM FILE PROGRAM USES DATA COMM COMMUNICATES This information is read from the field ICB.PRIORITY.CLASS which is fully described in the section entitled INTERFACE CONTROL BLOCK.

INITIATING MSG SEGMENT	If there is a segment for the initiating message declared in the user's program, this will give the initiating message segment number.
S-PROGR START ADDRESS	This is the SEGMENT number and DISPLACEMENT of the code segment containing the first executable instruction. It is also called the "S-CODE entry address".
INTERPRETER PRESET AREA (COBOL and RPG only)	This reflects the values of the eight edit characters. The following table indicates the edit table default values.

position 0 = "+"
1 = "–"
2 = " "
3 = "*"
4 = "."
5 = ","
6 = "$"
7 = "0"

RUNNING PARAMETERS

MIX NUMBER	This is the mix number the user program had at the time it was DP'ed or DM'ed.
BOJ AT:	This is the time and the date at which the user job began executing. The time is in the format HH:MM:SS.
DUMP AT:	This is the time and the date at which the user job was DP'ed. The time is in the format HH:MM:SS. If the program was DM'ed, the time and date of the dump will not be available. In this case, an appropriate message will be given.
PROGRAM STATUS	A message is printed which reflects the status of the user program at the time of the DP or DM action. There are three basic states a user task may be in during its lifetime: executing, delayed (that is, executing but waiting for some condition which may be satisfied at any moment; for example, "WAITING FOR I/O") or suspended (that is, no longer executing, waiting for some condition which will not be satisfied without operator intervention; for example, "WAITING FOR DIRECTORY SPACE").
REASON FOR DUMP	In the case of an error condition, the message given here will give the event number and description of the error. If the program was DP'ed while executing, the message "OPERATOR ACTION" will be given. If the program was DM'ed while executing, the message "DM FUNCTION" will be given.
NEXT INSTRUCTION	This gives the location that the execution was proceeding to at the time of the abnormal termination.

	In the case of an error causing a DS/DP condition, this would be the location at which the error occurred; but if the program was DP'ed and no error caused the DS/DP condition, it gives the location of the next S-OP to be handled by the interpreter. In the case of DM with specified breakpoints, it corresponds to the location of the breakpoint. Or, if the program was DM'ed without specifying breakpoints, it gives the location of the next S-OP to be handled by the interpreter.
MPL related	
SEGMENT (PSN)	This is the code segment number where the next instruction is to be found.
SEGM. DISPL	This is the displacement, in bytes, in the specified code segment where the next instruction is to be found.
PROCEDURE (SPN)	This is the number of the procedure in which the next instruction is located.
PROC.DISPL	This gives the location, in bytes, relative to the start of the procedure, of the next instruction.
REGION 1 REGION 2	They reflect the most frequently used lexical levels found in the procedure which was active at the time of the abnormal terminate. This information is useful only when the code segment has to be decoded.
LEXICAL LEVEL	This gives the current lexical level at which the next instruction resides.
COBOL/RPG related	
SEGMENT	This is the code segment number where the next instruction is to be found.
DISPLACEMENT	This is the displacement, in bytes, in the specified code segment where the next instruction is to be found.
LINE-COUNT	This is the line number of the next instruction. For COBOL, the $ LINE-CODE option must be specified in order to obtain line count information. In RPG, column 15 of the H card specification must be set to 1, indicating DEBUG, in order to obtain the same information. If this option has been specified at compile time, a code will have been added to cause the interpreter to update the LINE-NUMBER register. If the option has not been specified, the words "NOT AVAILABLE" will appear.
CARRY (MPL only)	This reflects the value of the CARRY register (16-bit field) employed by the MPL compiler in arithmetic operations.

VSN (MPL only)

The administration of the Virtual Segments (see SEGMAP instruction in MPL) is controlled through an 8-bit field found in the Interface Control Block. This field holds the segment number corresponding to the first page of the first virtual segment.
If no virtual segments have been declared, the value of the VSN field is not significant.

OVERFLOW FLAG

(COBOL/ RPG only)

This reflects the value of the OVERFLOW flag employed by the COBOL and RPG interpreters in arithmetic operations. In COBOL, the "ON SIZE ERROR" clause controls the use of this flag. In RPG, the flag is not accessible.

INTERFACE CONTROL BLOCK

The Interface Control Block resides in the user program's partition. It is a run time data structure containing all the parameters needed by the MCP to execute the program. As previously stated, an in depth knowledge of the MCP is required to analyze this section.

For each ICB field listed, its name, as it appears on the DP.ANALYZER listing, and its description are given. Note that for each compound field its data type description has been stated as a memorandum; a complete description of the members of the structure is given in the manual "B 1000 CMS MEMORY DUMP ANALYSIS USER'S GUIDE. Form no.2018909".

ICB.TRACE.AREA

It contains internal debugging fields.

ICB.COMM.ROUTING

This is the group name for fields used by COMMUNICATE.SWITCH to transfer control and make entries to the return stack.

Data type description:

01 ICB.COMM.ROUTING	CHAR(7)
02 ICB.CALLING	BIT(24)
03 ICB.CALLING.MOD.NB	BIT(8)
03 ICB.CALLING.DISPL	BIT(16)
02 ICB.SAVE.MY.PLACE	BIT(8)
02 ICB.CALLED	BIT(24)
03 ICB.CALLED.MOD.NB	BIT(8)
03 ICB.CALLED.DISPL	BIT(16)

ICB.STACK.PTR

This gives the bit displacement to the next free entry in the return stack; that is, the end of the last entry.

ICB.STACK.ENTRIES

This is the group name for the fields which make up an entry of the return stack.

Data type description: array of nine entries

01 ICB.STACK.ENTRY	BIT(24)

02 ICB.STACK.MOD.NB BIT(8)
02 ICB.STACK.DISPL BIT(16)

ICB.PRIORITY.CLASS This field is defined as follows:

bit 0 – when set, load only if mix is suitable (nothing in the mix, not even SYS-SUPERUTL).

bit 1 – when set, the program may open files with file type @20@ -@48@, maintain and create non-data files and use the "wild" file type.

bit 2 – when set, the BOJ/EOJ messages display headings are suppressed. This includes the suppression of the zip header on a zip with display (DS-ED messages are not suppressed).

bits 3,4 – reserved for expansion.

bit 5 – when set, it indicates the priority A.

bit 6 – when set, it indicates the priority B.

bit 7 – when set, it indicates the priority C.

bits 8,9 = 00 : Non data comm program file
01 : Reserved for expansion
10 : NDL Program file
11 : MCS Program file

bit 10 – when set, the program may maintain/create all files other than those with file types @20@ -@48@ and may use the "wild" file type.

bits 11-14 – reserved for expansion

bit 15 – when set, the program contains data comm communicates.

ICB.FETCH.VALUE It contains the fetch value returned to an interpreter when processing of an I/O request from that interpreter has been completed. See COMMUNICATE PARAMETER AREA section for the fetch value list.

ICB.ACTUAL.CPA This is the communicate parameter area for communication between an interpreter and the MCP.

Data type description:

```
01 ICB.ACTUAL.CPA
    02 ICB.VERB                    BIT(8)
    02 ICB.OBJECT                  BIT(8)
    02 ICB.ADVERB                  BIT(104)
```

See the COMMUNICATE PARAMETER AREA section for a complete description of those fields.

ICB.INTERNAL.CPA This is the communicate parameter area used by the MCP.

Data type description:

```
01 ICB.INTERNAL.CPA                BIT(216)
    02 ICB.INTERNAL.VERB           BIT(8)
    02 ICB.INTERNAL.CPA.ENTRY      BIT(208)
        03 ICB.INTERNAL.ADVERB     BIT(8)
```

ICB.REPLY.WORD This area is used to indicate success or failure of an internal communicate; that is, between MCP modules.

ICB.PHY.COUNTER It indicates PHYSICAL.IO activity unless it is set to zero. PHYSICAL.IO increments this field by one when invoked and decrements upon exiting.

ICB.PHY.SAVE.FCB This field contains the pointer to the top of the FCB queue of FCBs needing processing.

ICB.VM.FLAGS This contains a group of flags characterizing the rollin and rollout of a partition.

Data type description:

```
01 ICB.VM.FLAGS                                BIT(8)
    02 ICB.ROLLIN.ROLLOUT                      BIT(2)
    02 ICB.ROLLOUT.DISALLOW                    BIT(4)
        03 ICB.PERM.RO.DISALLOW                BIT(1)
        03 ICB.SCL.RO.DISALLOW                 BIT(1)
        03 ICB.DCCH.RO.DISALLOW                BIT(1)
        03 ICB.RO.AND.COMP.DISALLOW            BIT(1)
    02 ICB.PLAY.ALONE.PART                     BIT(1)
```

ICB.COMMON.DUMP.AREA This area is used by the COBOL Interpreter to save state when giving up control.

ICB.FILE.NB.ASSIGNMENT Each bit of this field corresponds to a file. This field is used to assign file numbers at OPEN time. The position of the first reset bit determines the file number of the file being opened, if any. The bit is reset at CLOSE time unless the file was half-closed. The first bit (bit 0) corresponds to the program file, the second bit (bit 1) to the virtual file, the third bit to file number three and so on.

ICB.FIB.REQSTED. ATTENTION This is a 72-bit field set by PHYSICAL.IO to indicate that further processing by LOGICAL.IO must be done before processing of the external communicate will be complete. Each bit corresponds to a file with the same relationship as the file number. That is, the first bit (bit 0) will correspond to the program file, the second bit (bit 1) to the virtual file, the third bit to file number three and so on.

ICB.FILE.LIST Each possible file for a program is represented by one byte. This byte contains the index of the data segment containing the corresponding FIB. Files are in position according to their file number in ICB.FILE.NB.ASSIGNMENT.

ICB.NON.COMMON.DUMP. AREA This area is used by the MPL Interpreter to save state when giving up control.

ICB.EOJ.DUMP.AREA This field contains various EOJ parameters like the EOJ date (in julian format), the EOJ time (HHMMSS), etc.

Data type description:

```
01  ICB.EOJ.DUMP.AREA                BIT(108)
    02  ICB.EOJ.DATE                 BIT(20)
    02  ICB.EOJ.TIME                 BIT(24)
    02  FILLER                       BIT(4)
    02  ICB.EOJ.PROGRAM.STATUS       BIT(24)
    02  ICB.EOJ.SAVE.ACTUAL.CPA      BIT(32)
    02  ICB.EOJ.VARIANT              BIT(4)
```

ICB.DATACOM This area is used for the processing of data comm communicates.

Data type description:

01	ICB.DATACOM	CHAR(16)
02	ICB.NEXT.ACTION	BIT(4)
02	ICB.ERROR.OPTION	BIT(1)
02	ICB.MCS.GONE	BIT(1)
02	ICB.PROGRAM.DSDP	BIT(1)
02	FILLER	BIT(1)
02	ICB.DATACOM.NAME	CHAR(12)

ICB.LOCKED.SLICE.SIZE — This is the size of the LOCKED SLICE.

ICB.CURRENT.VM.POINTER — It contains the bit offset, relative to the start of a partition, of the available reserved space in that partition.

ICB.VM.MIN.SIZE — It indicates the size, in bytes, of the partition size required to roll-in a partition. This includes the ICB, Locked Slice and necessary data and code segments. It is calculated at roll-out time.

ICB.VM.ACTUAL.SIZE — It contains the size of the partition in bytes. This is always an even number.

ICB.VM.MY.RESERV — It indicates the portion of the available space already reserved (in bytes).

ICB.VM.LENGTH — It contains the length, in bytes, of the available memory in the partition. This is always an even number.

ICB.VM.CUR.SEG.OFFSET — It is used by VM, when loading code or data segments into memory, to store the PST or DST index of this code or data segment.

ICB.VM.SAVE.AREA — This area is used by VM to store the relative record number in the virtual file of the first FIB rolled-out to disk. This avoids loosing space in the virtual file when opening and closing the same file frequently.

ICB.VM.PHYSIO.SAVED.ADDR — This area is used by VM to store the absolute bit address in the case of a roll-out or a DP.

ICB.MIX.VM.USE — It is used by VM for roll-in/roll-out decisions.

Data type description:

01	ICB.MIX.VM.USE	BIT(24)
02	ICB.MIX.IN.OUT	BIT(4)
02	ICB.MIX.IN.OUT.TIME	BIT(20)

ICB.INTERP.INDEX	It contains the Memory Assignment Table index of the interpreter employed by the program represented by this ICB.
ICB.ENTRY.SEGM	It indicates the index of the code segment containing the first executable S-OP.
ICB.ENTRY.OFFSET	It contains a byte offset into the code segment indicated by the field ICB.ENTRY.SEGM. This points to the first executable S-OP.
ICB.PST.PTR	This is the pointer to the Program Segment Table in bits, relative to the start of the ICB.
ICB.PST.LGTH	It contains the length of the Program Segment Table in bytes.
ICB.DST.PTR	It contains a pointer to the Data Segment Table in bits, relative to the start of the ICB.
ICB.DST.LGTH	It contains the Data Segment Table length in bytes.
ICB.TCB.PA.PTR	It contains a pointer to the Task Control Block Preset Area in bits, relative to the start of the ICB.
ICB.TCB.PA.LGTH	It contains the Task Control Block Preset Area length in bytes.
ICB.CNTL.STACK.PTR	It contains a pointer to the interpreter perform stack. The Task Scheduler returns to a point in the interpreter based on the last entry in this stack.
ICB.CNTL.STACK.LGTH	It contains the length of the interpreter perform stack.
ICB.CCB.PA.PTR	It contains the bit address, relative to the ICB of the Code Control Block Preset Area.
ICB.CCB.PA.LGTH	It contains the length of the Code Control Block Preset Area in bytes.
ICB.IFNB.PTR	It contains the bit address relative to the start of the ICB of the Internal File Name Block.
ICB.IFNB.LGTH	It contains the length of the Internal File Name Block in bytes.
ICB.DUAL.DC.FLAGS	It is used in a dual processor environment. Data type description: 01 ICB.DUAL.DC.FLAGS 02 ICB.TEMP.NOT.FOR.SLAVE BIT(1)

	02 ICB.RUN.ON.MASTER	BIT(1)
	02 ICB.IN.USE.ON.SLAVE	BIT(1)
	02 ICB.DC.RELATED.TASK	BIT(1)
ICB.MIX.WAIT.COUNTER	It is used to indicate the number of seconds a program has still to be delayed, according to a WAIT communicate issued.	
ICB.SCL.SAVE.AREA	This area is used by SCL to save necessary fields when giving up control; that is, when handling AD and SF intrinsics.	
ICB.PROG.FIB	It contains the Program file FIB.	
	Data type description:	
	01 ICB.PROG.FIB	BIT(2976)
	02 FILLER	BIT(1360)
	02 ICB.PROG.PACK.ID	BIT(56)
	02 ICB.PROG.FILE.ID	BIT(112)
	03 FILLER	BIT(104)
	03 ICB.OWNER.HASH.VALUE	BIT(8)
	02 FILLER	BIT(488)
ICB.VIRT.FIB	It contains the FIB of the Virtual file.	
	Data type description:	
	01 ICB.VIRT.FIB	BIT(2976)
	02 FILLER	BIT(1360)
	02 ICB.VIRT.PACK.ID	BIT(56)
	02 ICB.VIRT.FILE.ID	BIT(112)
	03 FILLER	BIT(104)
	03 ICB.EXECUTING.HASH.VALUE	BIT(8)
	02 FILLER	BIT(488)
ICB.PRIORITY.EXTENSION	Reserved for expansion	
ICB.USER.TYPE	Reserved for expansion	
ICB.SHARED.USER.NB	Reserved for expansion	
ICB.SLAVE.INTERNAL. CPA	This field contains the ICB.INTERNAL.CPA which is destroyed when control is given to PHYSICAL.IO upon detection of an ICB.PHY.SAVE.FCB.	

COMMUNICATE PARAMETER AREA

This is the last external communicate sent by the interpreter to LOGICAL.IO on behalf of the user's program.

The information analyzed here is taken from the fields ICB.ACTUAL.CPA and ICB.FETCH.VALUE in the Interface Control Block. This fetch value reflects the success or failure of the communicate analyzed here.

VERB	This gives the hexadecimal value and analysis of the last verb executed; a list of those verbs is given below, class by class.

CLASS	VERB VALUE	VERB SEMANTIC
CLASS A – file type I/O Where appropriate class A verbs are made conditional by adding 1 to the assigned value; for example, 89 is a conditional delete.		
	80	test status
	82	read (not console)
	84	write (not console)
	86	rewrite
	88	delete
	8A	stream control
	8C	start
	8E	overwrite
	90	read-write
	92	read (console)
	94	write (console)
	96	get
	98	put
	9C	free block
	A2	read (shared)
	A4	write (shared)
	A6	rewrite (shared)
	A8	delete (shared)
	AA	overwrite (shared)
CLASS B – file assignment	01	open
	02	close
CLASS C – field oriented	11	zip
	12	display
	13	zip and display
	14	pause
	15	zip and pause
	16	display and pause
	17	zip, display and pause
	1A	conditional display
	1B	zip and conditional display
	1C	display without logging
	1D	system display
	20	accept
	21	super accept
CLASS D – data communication	30	MCS control
	31	MCS interrogate
	32	MCS redefinition
	33	user data comm
	34	MCS DCP oriented
	35	implementation dependent

CLASS E – miscellaneous	40	date-time
	41	terminate
	42	wait
	43	system status
	44	complex wait
	49	append text
	4A	SPO size
	50	log on
	51	log off
	52	run (unconditional)
	53	run (conditional)
	54	read messages queue

OBJECT

The object definition is dependent on the verb specified, its values are detailed class by class.

CLASS	VERB	OBJECT MEANING
CLASSES A AND B		The hexadecimal number given here is the number of the Data Segment which contains the File Information Block for the file to which the communicate applies. When the number has been converted to decimal, one can search for the data segment in the "DATA SEGMENTS" section of the DP.ANALYZER to determine which file is involved in the communicate.
CLASS C		The hexadecimal number is the number of the Data Segment containing the text area.
CLASS D	30-34	The verb of a CLASS D communicate is used to specify a general type of function; the second byte of the ICB.ACTUAL.CPA, decoded as the OBJECT, defines the actual function. See the manual DATA COMMUNICATIONS SUBSYSTEM form no.1090909 for a complete description of those values.

	35	02 – DC job goes to EOJ 03 – MCS job goes to EOJ 05 – MCS job goes to BOJ
CLASS E	40	This is the index, in hexadecimal, into the DST of the related program.
	41	If bit 0 is set, two bytes are passed back to the initiating task. If bit 1 is set, the VM file is locked.
	42,44	The OBJECT field does not exist.
	43, 4A	The hexadecimal number is the number of the Data Segment containing the response area.
	49	The hexadecimal number is the number of the Data Segment containing the text area.
	52, 53	The hexadecimal number is the number of the Data Segment for the data area containing the text.
	54	The hexadecimal number is the number of the Data Segment for the data area receiving the text.

ADVERB

The adverb definition is dependent on the verb specified. Its values are listed below, byte by byte for each class.

Note that for OPEN and CLOSE communicates, the adverb field has no meaning, as in this case all attributes are stored in the file's FPB; see the fields ADVERB FOR OPEN and ADVERB FOR CLOSE, in the section entitled FILE ATTRIBUTES FROM FPB.

CLASS	VERB	ADVERB MEANING
CLASS A	80<VERB<=8F	If the file organization is sequential and ((the accessmode is random and the VERB > 81) or (the access mode is sequential and the VERB = START)) then: BYTES 0, 1, 2 represent the relative record number of the required record. If the file organization is indexed and the VERB = START or the file organization is indexed, the accessmode is random and the VERB = READ, then only byte 0 is significant; the relevant bit positions are: bits 0-5 are always set. bits 6-7 = 11 for READ equal, START equal = 10 for READ next, START greater than or equal = 01 for READ next, START greater than = 00 for READ next, START next
	90<=VERB<=99	byte 0 – this is the DST index of the work area segment. bytes 1, 2 – this is the offset of the work area within the named segment. bytes 3, 4 – this is the length of the work area.
	9A	bytes 0-2 – they give the binary sector address
	A0<VERB<=AF	These verbs map onto the corresponding verbs in the range 80-8F.
CLASS C	10<VERB<1F	bytes 0, 1 – this is the offset into the segment of the text area. bytes 2,3 – this is the length of the text area in bytes.

CLASS	VERB	ADVERB MEANING
	20	bytes 0,1 – this is the offset into the segment of the text area. bytes 2, 3 – this is the maximum length of the text area in bytes.
	21	bytes 0, 1 – this is the offset into the code of the text area . bytes 2, 3 – this is the maximum length of the text area in bytes. byte 4 – if bit 0 is set, two bytes are passed back to the initiating task. bytes 7, 8 – they contain the message passed back to the initiating task .
CLASS D		This field describes the entity on which the data communication communicate has to operate. See the manual DATA COMMUNICATIONS SUBSYSTEM form no. 1090909 for a complete description of the values.
CLASS E	40	bytes 0, 1 – this is the offset in the segment of the date or time value. byte 2 – only bits 0 and 1 are significant. The possible values are: 00 – the date is stored in BCD in the format YYMMDD 01 – the date is stored in BCD in the format YYDDD0 10 – the time is stored in BCD in the format HHMMSS 11 – the time is stored as a binary number of tenths of a second.

(continued)

CLASS	VERB	ADVERB MEANING
	41	bytes 0, 1 – they contain the message for the initiating task, if bit 0 of the OBJECT is set.
	42	bytes 0, 1 – they contain the binary number of seconds.
	43	bytes 0, 1 – they contain the offset into the segment for the response area. bytes 2, 3 – they contain the maximum length of the response area in bytes.
	44	bytes 0, 1 – they give the binary number of seconds. byte 2 – bit 0 is set if the NOLOCK option has been specified. bytes 3-9 – each byte contains 2 event class indicator values, the first 0 terminates the list. The event class indicators are listed in priority order. byte 10 – it contains the DST index of the response area. bytes 11, 12–they contain the bit offset into the segment of the response area. bytes 13, 14–they contain the maximum length of the response area in bytes.
	49	bytes 0,1 – they contain the bit offset into the segment of the text area. bytes 2,3 – they contain the length of the text area in bytes.
	4A	bytes 0,1 – they contain the bit offset into the segment for the response area.
	52, 53, 54	bytes 0,1 – they contain the bit offset into the segment for the data area. bytes 2,3 – they contain the length of the data area in bytes.

FETCH VALUE The hexadecimal value is the fetch value returned to the interpreter by LOGICAL.IO. This field is three bytes long; all the values are displayed in hexadecimal.

BYTE 0	BYTE 1	BYTE 2	MEANING
80			fatal error, for example, invalid communicate; if bytes 1 and 2 are equal to Fxxx, see section 5-2 System Dependent Fetch Values in the B 1000 CMS 3.03 Release letter; if not, bytes 1 and 2 contain an event number (see section 7 in the CMS Systems Software Operation Guide form no. 2007258-004).
40			a resource is temporarily unavailable (conditional failure). bytes 1 and 2 contain the event number corresponding to the message that is printed on the SPO. If no message corresponds to the conditions, bytes 1 and 2 contain 0 with the exception of the BLOCK-LOCKED condition, when they contain @9020@.
20 and the previous communicate was a file access	10		the end of file condition is encountered on input for sequential access
	20	00	an invalid key has been processed
		10	a sequence error on output to an indexed file is detected
		20	a duplicate key exists on an indexed file
		30	no such record exists (attempt to read beyond the end of file)
		40	there is a boundary violation (attempt to write beyond the allocated area)
	30	00	a permanent hardware error is detected on this file
		10	a read error on the data file is detected
		20	a write error on the data file is detected
		30	a read error on the key file is detected
		40	a write error on the key file is detected
	40		a block count error is detected on close
	90	10	the communicate is defined but not implemented

(continued)

BYTE 0	BYTE 1	BYTE 2	MEANING
		20	a block-lock condition is encountered
20 and the previous communicate was a ZIP	00	10	the program file is not found
		20	the interpreter file is not found or there is a release level mismatch
		30	there is no memory available
		40	there is no user disk or the directory is full
		50	the mix is full
		60	there is a usercount error
		70	there is duplicate pack
		80	the load request is invalid
		90	an MCS is already present
		A0	a disk error is detected
		B0	a code file error is detected
		C0	the data communication load request is invalid
		D0	the zipped program has been DS'ed
		D1	the zipped program has been DP'ed
		F0	a suitable mix is required
		F1	dual alphabet/reverse escapement is not supported
		F2	there is insufficient real store
		F3	the disk is locked
		F4	a faulty file equate is detected
	80		an invalid non-load request is detected
20 and the previous communicate was a complex wait	90	30	unknown or non-implemented event in event list
		40	SCLQ wait requested by a task not controlling remote system operation
		50	SUBQ wait requested on no queues attached or all queues have become detached during the wait.

(continued)

BYTE 0	BYTE 1	BYTE 2	MEANING
10	00	00	the queue is empty on a conditional receive or a no space condition is encountered on a conditional send.
		01	a limit exceeded condition is encountered on a conditional send
00	00	00	no error is detected

PERFORM STACK/CONTROL STACK

PERFORM STACK (COBOL and RPG)

Each "PERFORM" in COBOL and subroutine call in RPG causes an entry in the Perform Stack. Each "EXIT" in COBOL and subroutine end in RPG causes an entry to be removed. Therefore, the Perform Stack reflects the level of nesting in a program.

The 'PERFORM STACK' area of an RPG or COBOL DP.ANALYZER listing reflects the level of nesting at the time of the abnormal terminate. All active PERFORMs or subroutines will have entries on the stack.

The last entry listed reflects the top of the stack; that is, the most recently activated paragraph or subroutine.

NOTE

Due to the nature of RPG and the "program cycle" concept, a lot of code is generated by the compiler which the user does not know about. It is, therefore, common to have entries on the Perform Stack though no subroutines are employed in the user's source.

KEY — This is used by the interpreter to correlate PERFORM entrance and exit statements for COBOL programs. In RPG this field is always 0.

SEGMENT — This gives the code segment number of the code segment containing the calling PERFORM or subroutine.

DISPL — This gives the displacement into the code segment given in "SEGMENT" at which the calling PERFORM or subroutine is found.

SEGMENT/DISPL can be related to the corresponding line number in the source by using $ options to obtain a map.

In RPG, the $ options "$MAP", "$PARMAP" or "$XMAP" will cause the "LINE MAP", needed to correlate SEGMENT/DISPL to line number, to be generated.
In COBOL, the "$LINE-MAP" option will generate the needed map.

LINE COUNT	This gives the contents of the line count register at the time of the calling PERFORM or subroutine. To obtain this information, certain options must be specified at compile time: – for COBOL, the "$ LINE–CODE" option must have been specified; – for RPG, column 15 of the H card specification must have been set to 1. With this information, the instruction containing the calling PERFORM or subroutine is identified.

CONTROL STACK (MPL)

When a procedure call is encountered, information about the currently active procedure is stored as an entry on the Control Stack. This information allows control to return to this procedure when the called procedure is exited. An exit from a procedure, therefore, causes an entry to be removed from the Control Stack.

The 'CONTROL STACK' area of an MPL DP.ANALYZER listing displays the state of the Control Stack at the time of the abnormal terminate, and therefore reflects the level of nesting at this time. There will be an entry in the Control Stack for every active procedure with the exception of the procedure being executed at the time of the abnormal terminate. Corresponding information about the currently executing procedure is found in the 'RUNNING PARAMETERS' area of the DP.ANALYZER listing. The last entry listed in the Control Stack reflects the top of the stack; that is, the last calling procedure.

Any executable instruction can be addressed using a code segment number and offset into that segment. The offset of the start of each procedure within a code segment, relative to that code segment, is also stored in that code segment, and associated with a procedure number. A reference to a code segment number (PSN) and a procedure number (SPN) within that code segment will, therefore, uniquely address a procedure.

Correlation between the procedure number/return address and the line number in the source may be found at the end of the compiler listing if the $ XMAP option has been specified.

LEXICAL LEVEL	This is the lexical level of the procedure whose state is saved by this entry. This corresponds to the lexical level given in the first column on the left-hand side of a source listing generated at compile time.
SEGMENT (PSN)	This is the code segment number in which the procedure is located.

PROCEDURE (SPN)	This is the procedure number within the code segment of the procedure
RETURN ADDRESS	This is a byte offset from the start of the code segment representing the address of the next executable instruction to which control will return when the procedure is reinstated.
REG1/REG2	This reflects the most frequently used lexical level of the procedure. This information is useful only when the code segment has to be decoded.

PROGRAM SEGMENT TABLE

The 'PROGRAM SEGMENT TABLE' section of a DP.ANALYZER listing displays information about a user program's code segments.

All the information listed in this section is read from the structure "PROGRAM SEGMENT TABLE" allocated in the Locked Slice. A complete description of the layout of this structure is stated in the chapter entitled LOCKED SLICE; each member of the structure has been labelled.

For each field listed, its name shown on the DP.ANALYZER listing, its name shown in the PROGRAM SEGMENT TABLE structure and its description, are stated.

SEGMENT NUMBER	It represents the index number of the segment.
SEGM TYPE	SEG.DESCR.TYPE It contains the value 00.
IN VIRTUAL	IN.VIRTUAL.FILE It indicates, when set, that the segment has already been copied to the virtual file and therefore has a disk address assigned (relative record number).
TO BE LOADED	TO.BE.LOADED It indicates, when set, that the corresponding segment has to be loaded by VM.
IN USE	IN.USE It indicates, when set, that the segment is in use and may not be rolled-out or must be rolled-in if not present before giving the control back to the interpreter.
IN CORE	IN.CORE It indicates, when set, that the segment is present in memory.
LOCK IN MEMORY	LOCK.IN.MAIN.STORE It indicates, when set, that the segment is locked in memory.
READ/WRITE	READ.WRITE.SEG It indicates, when set, that the segment is of the READ/WRITE type; that is, the user may read and write in it.

DISK ADDRESS	SEG.DESCR.DSK.ADD This gives the relative sector number of the segment in the Program file or in the Virtual file.
SEGM LENGTH	SEG.DESCR.LGTH This gives the length of the segment in bytes.
MEMORY ADDRESS	SEG.DESCR.MEM.ADD This gives the memory address, in bits, of the segment relative to the ICB start address.
DESCR FN	SEG.DESCR.FN This gives the file number in the ICB.FILE.LIST, used at half close time to keep a link with the file.
ROLL-IN COUNTER	SEG.DESCR.ROLL.IN.COUNTER It indicates the number of times the segment has been rolled in.

DATA SEGMENT TABLE

The 'DATA SEGMENT TABLE' area of a DP.ANALYZER listing displays information about a user program's data segments. The format of this table is exactly the same as for the Program Segment Table except for the following fields:

SEGM TYPE	SEG.DESCR.TYPE It indicates the segment type. The possible values are 01 for an FIB and 00 for anything else.
SEGM LENGTH	SEG.DESCR.LGTH If the segment contains an FIB and the file is not opened, it indicates the number of the FPB segment. Otherwise, it gives the length, in bytes, of the segment.

INTERNAL FILE NAME BLOCK

The INTERNAL FILE NAME BLOCK section contains a table of elements, one per file declaration in the program.

FIB.NB	It gives the index number of the data segment which contains the associated FIB.
FPB.NB	It gives the index number of the data segment which contains the associated FPB.
INTERNAL FILE NAME	It gives the internal file name.

FILE INFORMATION

Information listed in this section is read from a DATA SEGMENT containing
- the File Information Block (FIB), if the file is opened.
- the File Parameter Block (FPB) in all other cases.

The correspondence between the Data Segment and the described FIB or FPB is stated explicitly in the Data Segment section. It may also be found using the Internal File Name Block allocated in the Locked Slice; moreover, the latter structure IFNB may be used as an index to the Data Segment Table to determine the state of the file: opened or closed.

This chapter is divided into two main sections:
- one describes the parameters displayed for an opened file; the File Control Block (FCB), file's buffers, control information for its buffers, extended information for indexed files, data file FIB for an indexed file are listed.
- one describes the parameters displayed for a closed file, the FPB is listed.

In this section, for each field displayed, the following is stated:
- its name, as shown on the DP.ANALYZER listing.
- its name, as shown in the FIB or FPB structure description detailed in the DATA SEGMENT section.
- its description.

Note that for each compound field, its data type description has been given as a memorandum; a complete description of the members of those structures is given in the manual "B 1000 CMS MEMORY DUMP ANALYSIS USER'S GUIDE, form no. 2018909.

INFORMATION FOR AN OPENED FILE

INFORMATION FROM FCB

In the 'FILE INFORMATION' area of a DP.ANALYZER listing, the first three rows of information refer to the File Control Block (FCB) of the file.

CODE POINTER	FCB.CODE.PTR It contains the absolute bit address to which a return is effected after completion of the current I/O. If bits 0-3 are zero, it indicates a return to the PHYSICAL I/O resident code, otherwise the value in bits 0-3 is the PHYSICAL I/O overlay identification.
BUFFER ADDRESS	FCB.CUR.BUF.ADDR This field contains the absolute bit address of the buffer area for the last or current I/O operation.

BUFFER LENGTH

FCB.CUR.BUF.LENGTH
This is the length in bytes of the buffer for the current or last I/O operation.

OP CODE

FCB.OP.CODE
This is the actual opcode sent to the I/O control for the current or last I/O operation.
See the appropriate technical manual referring to the device.

DCB ADDRESS

FCB.DCB.ADDRESS
This field contains the absolute bit address of the Device Control Block (DCB) to which this FCB is currently attached.

FILE STATUS

FCB.FILE.STATUS
This field contains a set of one bit flags used by PHYSICAL.IO to control I/O activity.

Data type description:

```
01 FCB.FILE.STATUS
     02 FCB.USE.SYSMEM                    BIT(1)
     02 FCB.CUR.USE.SYSMEM                BIT(1)
     02 FCB.USE.AVAIL.TABLE               BIT(1)
     02 FCB.CUR.USE.AVAIL.TABLE           BIT(1)
     02 FCB.NEW.OLD                       BIT(1)
     02 FCB.OPENING                       BIT(1)
     02 FCB.CLOSE                         BIT(1)
     02 FCB.USE.FPB.VN                    BIT(1)
        03 FCB.TRANSLATE.COMPLETE         BIT(1)
     02 FCB.SEARCH                        BIT(1)
     02 FCB.ERRB                          BIT(1)
     02 FCB.QUEUED                        BIT(1)
     02 FCB.SUSPENDING.TASK               BIT(1)
     02 FCB.ACTIVE                        BIT(1)
     02 FCB.IN.USE                        BIT(1)
     02 FCB.DISPLAY                       BIT(1)
     02 FCB.READING.LABEL                 BIT(1)
     02 FCB.HALF.CLOSED                   BIT(1)
     02 FILLER                            BIT(7)
```

DEV.KIND

FCB.DEVICE.KIND
This value indicates the type and capabilities of the device to which this FCB is connected.

RETRY COUNT

FCB.RETRY.COUNT
It contains the number of retries attempted so far for the current I/O. It is reset to zero when an I/O is successful.

CHANNEL NR

FCB.CHANNEL
This is the physical channel number to which the file associated with this FCB is attached.

FILE NR	FCB.FILE.NR This is the internal file number assigned to the file associated with this FCB. The file number is assigned by LOGICAL.IO when the file is opened and will be in the range @03@ - @48@. A value of @FF@ indicates that PHYSICAL.IO is currently using the FCB for a SEARCH or for loading one of its overlays.
FIB ADDRESS	FCB.FIB.ADDRESS This is the absolute bit address of the FIB of the file associated with this FCB.
MIX NUMBER	FCB.MIX It contains the mix number of the program owning the file associated with this FCB.
QUEUE LINK	FCB.Q.LINK This is the absolute bit address of the next FCB in either the initiate queue or the completion queue.
RESULT DESCR.	FCB.RD It contains the result descriptor returned from an unsuccessful I/O operation or the last result descriptor with an I/O exception from an I/O operation that succeeded after one or more retries.
FCB.SAVE.SCRATCHPADS	FCB.SAVE.SCRATCHPADS It contains the length, begin address and end address of an area to be allocated or de-allocated from the Available Table. It is used by PHYSICAL.IO to update the disk file header.
FCB.RETURN.LIST	FCB.RETURN.LIST This is the list of return addresses queued by PHYSICAL.IO while processing an I/O communicate.
FCB.RETURN	FCB.RETURN This contains the pointer to the FCB.RETURN.LIST.
MY.USE OTHER.USE	FCB.MYUSE FCB.OTHERUSE Those fields are valid only for a disk FCB. The first field contains the value of MYUSE with which the file was opened (input, output, input-output).

The second field contains the value of OTHERUSE with which the file associated with this FCB was opened.

Data type description:

```
01 FIELD.DESCRIPTION
    02 FCB.MYUSE                    BIT(2)
        03 TO.USE.AS.OUTPUT         BIT(1)
        03 TO.USE.AS.INPUT          BIT(1)
    02 FCB.OTHERUSE                 BIT(3)
    02 FILLER                       BIT(3)
```

The possible FCB.OTHERUSE values are:

- 110 or 100 meaning free access
- 010 or 000 meaning lock access
- 001 meaning shared access.

MEMORIZE DCB

FCB.MEMORIZE.DCB

This field is valid only for a disk FCB. The address of a DCB is stored here by PHYSICAL.IO when needed.

DISK ADDRESS

FCB.DISK.ADDRESS

This field is valid only for a disk FCB. It contains the absolute disk address of the sector on which the current or last I/O operation took place.

CUR.AREA ADDRESS

FCB.CUR.AREA.AD

This field is valid only for a disk FCB. It contains the absolute sector address of the current area of the disk file.

DFH.ADDRESS

FCB.DFH.ADDRESS

This field is valid for a disk FCB. It contains the absolute sector address on disk of the disk file header for the file which is associated with this FCB.

DIR.ENTRY ADDRESS

FCB.DIRENTRY.ADDRESS

This is valid only for a disk FCB. It contains the absolute disk address of the File Name List sector which contains the entry for the file associated with this FCB.

AREA NR

FCB.AREA.NR and FCB.AREA.COUNT

This is the number of the area FCB.AREA.NR (@0@ - @F@) in which the last or current I/O operation (READ or WRITE) occurred.

FCB.AREA.COUNT represents the number of areas required to allocate the whole file.

Data type description:

```
01 AREA NR
    02 FCB.AREA.NR                BIT(4)
    02 FCB.AREA.COUNT             BIT(4)
```

DIR.INDEX

FCB.DIRENTRY.IX
This field is valid only for a disk FCB. It contains the index within the File Name List sector of the entry for the file associated with this FCB. The range is @0@-@A@ (there are 11 entries in each of the File Name List).

SECTOR NUMBER

FCB.SECTOR.NR

This field is valid only for a disk FCB. It contains the absolute disk address of the sector currently under examination during a SEARCH. If the SEARCH has terminated, this will be the absolute disk address of either the sector containing the search argument, if the search was successful, or the first sector after the search area, if the search was unsuccessful.

RETR.ITEM

FCB.RETRIEVED.ITEM
It contains the absolute disk address giving the location of an item on which a successful SEARCH has been performed.

SEARCH ST.

FCB.SEARCH.STATUS
This field is valid only for a disk FCB. The format of this field is:

bits 0-3 are not used
bit 4: if set, the device is a disk pack
bit 5: if set, the search has terminated
bit 6: if set, the search was successful
bit 7: if set, the indexed search has terminated.

SEARCH.OP.

FCB.SEARCH.OP.CODE
This field is valid only for a disk FCB. It contains the opcode for a SEARCH. Possible values are:

@01@ for a disk directory search
@03@ for an indexed search (key file)

SEARCH SKIP

FCB.SEARCH.SKIP
The first digit gives, in hexadecimal format, the number of entries to skip in the directory for a SEARCH SKIP.

	The maximum value is @B@. The second digit is used to save the value of the first digit in the case of a retry.
ARGUM.ADDRESS	FCB.ARGUMENT.ADDRESS This is the absolute bit address of a string which is the argument for a SEARCH operation.
SPACE.TO ALLOC.	FCB.SPACE.TO.ALLOCATE This field is valid only for a disk FCB. It contains the length in sectors needed for allocation of the next area of a disk file.
CURRENT.AREA RANGE	FCB.CUR.AREA.RANGE This field is valid only for a disk FCB. It consists of two 24 bit fields which contain the block numbers of the first and last blocks within the current area. It is used to determine whether a READ or WRITE points outside the current area.

FILE ATTRIBUTES FROM FPB

IMPLEMENTATION LEVEL NUMBER	FIB.FPB.IMPL.LEVEL.NB It contains the implementation level number set by the compiler.
MULTIFILE-ID	FIB.FPB.PACK.ID It contains the name of the device containing the file, if applicable.
FILE-ID	FIB.FPB.FILE.ID It contains the file name.
FILE-ID – HASH.VALUE	FIB.FILE.NB It contains the hash code of the user code site. The value is @20@.
REEL NUMBER	FIB.FPB.REEL.NB It contains the current reel or cassette number. It is non-significant when the device is not a tape.
FILE TYPE	FIB.FPB.FILE.TYPE The different file type values are: 00 Normal Data File 01-0E Source Language File

0F Source Library File
10-12 Ordinary Program (S-code)
13 Protected System Program for example, SYS-SUPERUTL
1C-1F Interpreter
20 SYSMEM File
21 SYSLANGUAGE File
22 MCP-related File for example, SYSCONFIG
30 DUMP File
31 LOG File
80 Indexed Data File
81 Indexed Key File
A0 Printer Backup File

HIGHEST RECORD NUMBER

FIB.FPB.HIGHEST.RECD.NB

It contains the relative record number of the highest record within the file, that is, closest to End-Of-File.

DEVICE KIND

FIB.FPB.DEVICE.KIND
This is the hexadecimal value and analysis of the device containing the file.

WORK AREA SEGMENT NUMBER

FIB.FPB.WA.SEGM.NB

It contains the Data segment table index of the segment containing the work area for this file.

OFFSET OF A WORK AREA WITHIN SEGMENT

FIB.FPB.WA.OFFSET

It contains the offset into the work area data segment where the work area is found.

RECORD SIZE (BYTES)

FIB.FPB.REC.SIZE

It contains the record size in bytes.

BUFFER SIZE (BYTES)

FIB.FPB.BUF.SIZE
It contains the size of a buffer (block) in bytes.

MAXIMUM FILE SIZE (RECORDS)

FIB.FPB.MAX.FILE.SIZE

It contains the maximum number of records the file can contain.

NUMBER OF BUFFERS

FIB.FPB.NB.BUF

It contains the number of buffers requested for the file. However, for some file types this field value is fixed. If the file is

- SHARED, this field is set to 1;
- RANDOM, if one buffer is specified, this field is set to 1; otherwise it is set to 2;
- a backup file, this field is set to 2.

FLAGS

FIB.FPB.FLAGS

This is the group name for various flags associated with the file attributes.

Data type description:

01	FIB.FPB.FLAGS	BIT(8)
02	FIB.FPB.SPEC.FORM	BIT(1)
03	FIB.FPB.DUP.ALLOWED	BIT(1)
02	FIB.FPB.UPT.FILE	BIT(1)
02	FIB.FPB.NO.LABEL	BIT(1)
02	FIB.FPB.COND.FILE	BIT(1)
02	FIB.FPB.PROG.FILE	BIT(1)
02	FILLER	BIT(3)

ADVERB FOR CLOSE

FIB.FPB.ADV.CLOSE

It contains the adverb describing the CLOSE attributes. The bits are defined as follows:

bit 1 – when set this bit indicates:
- in the case of HALF-CLOSE, no rewind has to be performed
- otherwise, a CHANGE REEL has to be performed leaving the file opened.

bits 2,3,4 – 000 for HALF-CLOSE
011 for CLOSE with LOCK
101 for CLOSE with PURGE
111 for CLOSE with REMOVE
001 for CLOSE with RELEASE

All other combinations will be treated as HALF-CLOSE.

bit 5 – when set, a CRUNCH is requested.

bit 6 – when set, a MERGE of the overflow region into the index region is requested.

ADVERB FOR OPEN

FIB.FPB.ADV.OPEN

It contains the adverb describing the OPEN attributes. The bits are defined as follows:

bit 0 – reserved for expansion.

bit 1 – when set, open with EXTEND has to be performed.

bits 2, 3, 4 –
110 or 100 = free access
010 or 000 = lock access
001 = shared access.
bit 5 – when set, the backup is named.
bit 6 – when set, the usage is OUTPUT.
bit 7 – when set, the usage is INPUT.
bits 8, 9 – 01 = do not backup
10 = must backup
bits 10, 11 – reserved for expansion.

bits 12, 13 –
00 illegal
01 RANDOM
10 SEQUENTIAL
11 STREAM

bits 14, 15 – reserved for expansion.

Bits 2, 3 and 4 are collectively referred to as OTHERUSE.
Bits 5, 8 and 9 are relevant only to printer files.
Bits 6 and 7 are collectively referred to as MYUSE.
Bits 12 and 13 are collectively referred to as ACCESSMODE. ACCESSMODE RANDOM is only applicable to disk and ICMD files.

CYCLE NUMBER

FIB.FPB.CYCLE
Reserved for expansion.

GENERATION NUMBER

FIB.FPB.GEN.NB

It contains the generation number of the file.

CREATION DATE (YYDDD)

FIB.FPB.CREAT.DATE

It contains the file creation date in the format YYDDD.

LAST ACCESS DATE YYDDD

FIB.FPB.LAST.ACCESS.DATE
It contains the last access date in the form YYDDD.

SPARE BYTES IN LAST STREAM

FIB.FPB.SPARE.CHAR

It contains the number of spare bytes in the last record of a STREAM file.

SAVE FACTOR — FIB.FPB.SAVE.FACT
It indicates the number of days from the creation date for which the file is valid. The file is closed PURGE when it becomes no longer valid. The default is 999. The file is never closed PURGE if the save factor is 999.

CONTROL INFORMATION FROM FIB

FIB.AREA.ADDR.AND.LGTH — FIB.AREA.ADDR.LGTH
This 64 byte field is reserved for the 16 areas that might be used by the file. For each area allocated:

- the 2 first bytes contain the address, in allocation units, of the area
- the next 2 bytes contain the length of the area in allocation units.

FIB.COMMUNICATION.AREA — FIB.COMM.AREA
It is used to communicate with PHYSICAL.IO. It contains an internal communicate describing the desired action.

Data type description:

```
01 FIB.COMM.AREA
    02 FIB.COMM.VERB                    BIT(8)
    02 FIB.COMM.BLK.NB                  BIT(24)
        03 FIB.SEARCH.ADD               BIT(24)
    02 FIB.COMM.MEM.BLK.ADD
        03 FIB.OPEN.CLOSE.BUF.AD
            04 FIB.BUF.AD
                05 FIB.KEY.MEM.ADD      BIT(24)
    02 FIB.FILE.NB                      BIT(8)
    02 FIB.REPLY.WORD                   BIT(24)
    02 FIB.CUR.BLK.LGTH                 BIT(24)
        03 FIB.SEARCH.LGTH              BIT(24)
```

FIB.FILE.STATUS — FIB.FILE.STATUS
The first bit is set if the file has been half closed and must be half opened.

FIB.VARIOUS.FLAGS — FIB.VN
These bits are defined as follows:

bit 0 – it controls the OPEN/CLOSE messages. It prevents the messages from being displayed multiple times.

bits 1,2– they are used by PHYSIO

bit 3 – it indicates that the file-id in the FIB should be used for display and not the file-id in the FPB

bit 4 – it indicates that the buffer pointed to by PH.OUT.BUF.INDEX has been flushed

bit 5 – it indicates the opening of a backup file is in process

bit 6 – it indicates that a backup file should be opened when an open of a printer file has failed

bit 7 – it indicates that this FIB is for a backup file

FIB.NB.SECT.PER.BLK

FIB.NB.SECT.PER.BLK
It is set by PHYSICAL.IO and used by LOGICAL.IO to compute area range.

FIB.BUF.N.FILE.STATUS

FIB.BUF.N.FILE.STATUS
This is the group name of fields containing information concerning the management of the file buffers and the current status of the file. Displacements, in digits, relative to the start of the structure (0-relative) have been stated allowing an easier access to one field.

Data type description:

```
01 FIB.BUF.N.FILE.STATUS
     02 FIB.FPB.INDEX                    BIT(8)
     02 FIB.FILE.STAT                    BIT(4)
        03 FIB.FILE.OPENING              BIT(1)
           04 FIB.NEW.FILE               BIT(1)
        03 FIB.FILE.OPEN                 BIT(1)
        03 FIB.CLOSING.FILE              BIT(1)
        03 FIB.SHORT.BLK                 BIT(1)
     02 FIB.LAST.COMM                    BIT(4)  DIS 3
     02 FIB.STOP.FOR.READ                BIT(1)
     02 FIB.INH.READ.AGAIN               BIT(1)
     02 FIB.ERROR                        BIT(1)
     02 FIB.LAST.BLK.DET                 BIT(1)
     02 FIB.LOG.EOF                      BIT(1)
     02 FIB.ACT                          BIT(1)
     02 FIB.EOF                          BIT(1)
     02 FIB.BWD.REQ                      BIT(1)
        03 FIB.OPEN.EXTEND.ALLOWED       BIT(1)
     02 FIB.ERROR.REPLY.WORD             BIT(24)
        03 FIB.AD.DCB                    BIT(24)
     02 FIB.SAVE.RETURN.ADDR             BIT(24)
     02 FIB.REC.PER.BLK                  BIT(16)
     02 FIB.TOT.REC.COUNTER              BIT(20)
```

```
02 FIB.NB.REC.IN.LAST.BLK          BIT(16)
02 FIB.LAST.BLK.NB                 BIT(24)
02 FIB.PH.BLK.NB                   BIT(24)
    03  RET.ADDR.IN.I.S            BIT(24)
02  FIB.OUT.PH.BLK.NB              BIT(24)
    03  CURRENT.LOG.BUFFER         BIT(24)
02 FIB.BUF.INDEXES                 BIT(24)
    03 OUT.PH.BUF.INDEX            BIT(8)
    03 LOG.BUF.INDEX               BIT(8)  DIS 51
    03 PH.BUF.INDEX                BIT(8)
 02 FIB.LOG.REC.NB                 BIT(24) DIS 55
    03 FIB.DATA.FILE.PTR           BIT(24)
02 FIB.LOG.BLK.NB                  BIT(24) DIS 61
02 FIB.HIGHEST.KEY                 BIT(24)
02 FIB.BUF.STAT.AREA (17)          BIT(24)
    03 BUF.STAT                    BIT(8)
    03 FIB.PRINT.CNTL              BIT(16)
        04 FIB.SAVE.BUF.INDEX      BIT(8)
```

The following fields aid in determining the last communicate and the current processed record, if existing.

FIB.LAST.COMM It indicates the last communicate processed for the file. Possible values and their meaning are given below.

@1@ – open
@2@ – read
@3@ – write
@4@ – delete
@5@ – rewrite
@6@ – overwrite
@7@ – start
@9@ – test status
@A@ – read next
@B@ – unsuccessful read next
@F@ – unsuccessful start

This field is initialized to zero.

FIB.LOG.EOF It indicates, when set, that the logical end-of-file has been detected. It is set after the last record of the file has been read.

LOG.BUF.INDEX It indicates the relative buffer number (0-relative) used for the current communicate to LOGICAL.IO. It is initialized to zero.

FIB.LOG.REC.NB It contains the relative record number (1-relative) of the record involved in the

current communicate. This field is not significant for the data file of an I/S file. It is initialized to zero.

FIB.LOG.BLK.NB — It contains the relative block number (0-relative) of the block contained in the buffer pointed to by LOG.BUF.INDEX. This field is not significant for the key file of an I/S file. It is initialized to @FFFF@. The relationship between the block number and the record number is :
FIB.LOG.BLK.NB = (FIB.LOG.REC.NB − 1)/(BUFFER SIZE/RECORD SIZE)

FIB.TO.CONSIDER — FIB.TO.CONSIDER
This is the group name for fields pertaining to an indexed file FIB.

Data type description:

01 FIB.TO.CONSIDER	
02 WORK.WITH.EXTENDED.FIB	BIT(1)
02 FIB.COMM.FOR.LOG.IO	BIT(1)
02 FIB.COMM.FOR.LOG.IO.TERM	BIT(1)
02 FIB.I.S.FILE	BIT(1)
02 EXTENDED.FIB.ADD	BIT(24)
03 FIB.PCW	BIT(16)

FIB.COR.PTR — FIB.CALLING
This area is used when transferring control back to LOGICAL.IO to identify the calling module and displacement into that module desired by LOGICAL.IO.

Data type description:

01 FIB.CALLING	BIT(24)
02 FIB.CALLING.MOD.NB	BIT(8)
02 FIB.CALLING.DISPL	BIT(16)

FIB.SUPERLOGIO/ INDEXED STATUS — FIB.SUPERLOGIO.FLAGS
This first bit is set when the LOGIO module works in SUPERLOGIO mode.

FIB.AREA.RANGE — FIB.AREA.RANGE
It is set up by PHYSICAL.IO at area allocation time. It indicates the first and last sector allocated.

Data type description:

01 FIB AREA.RANGE	BIT(48)
02 FIB.AREA.MIN	BIT(24)
02 FIB.AREA.MAX	BIT(24)

FIB.BACKUP.INFO — FIB.BACKUP.INFO
This field is used as a save area for various backup information needed when a DIRECT TO BACKUP has been asked for, or if a backup file has been renamed.

Data type description:

```
01  FIB.BACKUP.INFO
    02  FPB.PACK.ID.SAVE                  BIT(56)
    02  FIB.FPB.FILE.ID.SAVED             BIT(96)
    02  FPB.FILE.ID.SAVED                 BIT(96)
    02  FIB.FPB.FILE.TYPE.SAVED           BIT(8)
    02  FIB.FPB.DEVICE.KING.SAVED         BIT(8)
    02  FIB.BACKUP.NUMBER                 BIT(1)
    02  FIB.NAME.SWAPPED                  BIT(1)
    02  FIB.DIRECT.TO.BACKUP              BIT(1)
    02  FIB.DISK.FOR.BACKUP.CHECK         BIT(1)
    02  FILLER                            BIT(1)
```

FIB.TO.CONSIDER

FIB.TO.CONSIDER
This is the group name for fields pertaining to an indexed file FIB.

Data type description:

```
01  FIB.TO.CONSIDER
    02  WORK.WITH.EXTENDED.FIB            BIT(1)
    02  FIB.COMM.FOR.LOG.IO               BIT(1)
    02  FIB.COMM.FOR.LOG.IO.TERM          BIT(1)
    02  FIB.I.S.FILE                      BIT(1)
    02  EXTENDED.FIB.ADD                  BIT(24)
        03  FIB.VIRT.FILE.AREA.LGTH       BIT(16)
        03  FIB.PCW                       BIT(16)
```

FIB.STREAM.INFO

STREAM.INFO
This is the group name for fields pertaining to STREAM I/O operations. Some fields of this area are also re-mapped to handle SHARED files as STREAM files cannot be opened SHARED.

Data type description:

```
01 STREAM.INFO
    02 FIB.STR.PTR                       BIT(16)
       03 PART.OF.FIB                    BIT(2)
       03 FIB.TOSF.DST.ENTRY.PTR
          04 FIB.TOSF.FILE.PTR           BIT(5)
          04 FIB.TOSF.MIX.PTR            BIT(3)
    02 FIB.STR.BUF.REM                   BIT(16)
       03 REL.DISP.OF.FIRST.FIB           BIT(16)
    02 FIB.STR.NB.BYTES.IN.LAST.BLK      BIT(16)
```

FIB.ADDR.OF.BUFFERS

FIB.ADDR.OF.BUFFERS
It contains the bit address of the first buffer relative to the FIB.

COMMON.BUF.STAT	COMMON.BUF.STAT This field is displayed only if LOGIO works in SUPERLOGIO mode. It remaps the first three entries of BUF.STAT.AREA defined in FIB.BUF.N.FILE.STATUS.
REAL.BLOCK.SIZE.ON. DISK	REAL.BLOCK.SIZE. ON.DISK This field is displayed only if LOGIO works in SUPERLOGIO mode. It contains the block size on disk in bytes.
NB.OF.BLOCK.PER. BUFFER	NB.OF.BLOCK.PER.BUFFER This field is displayed only if LOGIO works in SUPERLOGIO mode. It contains the number of blocks per buffer.
LOGICAL.BUFFER.SIZE	LOGICAL.BUFFER.SIZE This field is displayed only if LOGIO works in SUPERLOGIO mode. It contains the buffer size. It is equal to: REAL.BLOCK.SIZE.ON.DISK. * NB.OF.BLOCK.PER.BUFFER
LOGICAL BLOCK INFO	LOGICAL.BLOCK.INFO These fields are displayed only if LOGIO works on SUPERSUPERLOGIO mode. LOGICAL BLOCK 2 and LOGICAL BLOCK 3 contain the top and tail block numbers of the blocks contained in buffers 1 and 2. A block number is expressed on 24 bits.

BUFFERS

The contents of the file's buffers and their status are displayed next.

EXTENSION FOR INDEXED FILES

If the file is a Key file, the Key File Parameter Block (KFPB) and the Data file FIB will be displayed. The KFPB contains information associating the Data file to the Key file.

KFPB.IMPL.LEVEL	FIB.KFPB.IMPL.LEVEL It contains the implementation level of the Data file associated with this Key file. It corresponds to FIB.FPB.IMPL.LEVEL.NB.
KFPB.PACK.ID	FIB.KFPB.PACK.ID It contains the name of the device containing the Data file, if applicable.
KFPB.FILE.ID	FIB.KFPB.FILE.ID It contains the name of the Data file associated with this Key file.

COT.SECT.RANGE

COT.SECT.RANGE
It contains the number of sectors of the Overlay Region that can be represented by one entry in the COT.AREA.

CRT.SECT.RANGE

CRT.SECT.RANGE
It contains the number of sectors of the Rough Table that can be represented by one entry in the CRT.AREA.

KFPB.FLAGS

FIB.KFPB.FLAGS
This is the group name for some Key file related flags.

Data type description:

01 FIB.KFPB.FLAGS	CHAR(1)
02 B80.R.T	BIT(1)
02 B700.R.T	BIT(1)
02 B1700.R.T	BIT(1)
02 B 900.R.T	BIT(1)
02 B 1000.R.T.	BIT(1)
02 DATA.FILE.DUAL	BIT(1)
02 OLD.DUPL.ALLOWED	BIT(1)
02 DUPL.ALLOWED	BIT(1)

KFPB.RT.ADD

FIB.KFPB.RT.ADD
It contains the address in relative records of the Rough Table region in the Key file (1-relative).

KFPB.RT.LGTH

FIB.KFPB.RT.LGTH
It contains the length of the Rough Table in records (180 bytes).

KFPB.OV.ADD

FIB.KFPB.OV.ADD
It contains the address in relative records of the beginning of the Overflow region in the Key file (1-relative).

KFPB.OV.LGTH

FIB.KFPB.OV.LGTH
It contains the length of the Overflow region in records (180 bytes).

KFPB.IX.ADD

FIB.KFPB.IX.ADD
It contains the address in relative records of the beginning of the Index region in the Key file (1-relative).

KFPB.IX.LGTH

FIB.KFPB.IX.LGTH
It contains the length of the Index region in records (180 bytes).

KFPB.KEY.LGTH

FIB.KFPB.KEY.LGTH
It contains the actual key length in bytes.

KFPB.KEY.OFFSET

FIB.KFPB.KEY.OFFSET
It contains the key offset into the record in bytes.

KFPB.ZERO

FIB.KFPB.ZERO
It contains the value zero.

FIB.LAST.INPUT.COMM

FIB.LAST.INPUT.COMM
It contains the previous input communication for indexed files. START is considered as an input communicate.

FIB.IX.PARAM

FIB.IX.PARAM
This is the group name for the parameters associated with the buffer relating to the Index region of the Key file.

Data type description:

```
01 FIB.IX.PARAM
   02 TOP.SECT.NB.IN.DISK          BIT(24)
   02 TAIL.SECT.NB.IN.DISK         BIT(24)
   02 IX.REC.SECT.ADD              BIT(24)
   02 IX.REC.IN.BLK.PTR            BIT(8)
   02 IX.FLAGS
      03 IX.MEM.VALID              BIT(1)
      03 IX.KEY.FOUND              BIT(1)
      03 IX.EOF.REACHED            BIT(1)
      03 FILLER                    BIT(1)
```

FIB.OV.PARAM

FIB.OV.PARAM
This is the group name for the parameters associated with the buffer relating to the Overflow region of the Key file.

Data type description:

```
01 FIB.OV.PARAM
   02 TOP.SECT.NB.IN.DISK.0V       BIT(24)
   02 TAIL.SECT.NB.IN.DISK.0V      BIT(24)
   02 0V.REC.SECT.ADD              BIT(24)
   02 OV.REC.SECT.ADD              BIT(16)
   02 OV.REC.IN.BLK.PTR            BIT(8)
   02 OV.FLAGS
      03 OV.MEM.VALID              BIT(1)
      03 OV.KEY.FOUND              BIT(1)
      03 OV.EOF.REACHED            BIT(1)
      03 OV.DEL.FOUND              BIT(1)
```

FIB.RGH.PARAM

FIB.RGH.PARAM
This is the group name for the parameters associated with the Rough table of the Key file of an indexed pair of files.

Data type description:

```
01 FIB.RGH.PARAM
   02  TOP.SECT.NB.IN.DISK.RT      BIT(24)
   02  TAIL.SECT.NB.IN.DISK.RT     BIT(24)
   02  RGH.REC.SECT.ADD            BIT(24)
```

```
    02 RGH.REC.SECT.ADD                BIT(16)
    02 RGH.REC.IN.BLK.PTR              BIT(8)
    02 RGH.FLAGS
       03 RGH.MEM.VALID                BIT(1)
       03 RGH.KEY.FOUND                BIT(1)
       03 RGH.EOF.REACHED              BIT(1)
       03 FILLER                       BIT(1)
```

FIB.SRCH.PARAM

FIB.SRCH.PARAM
This is the group name for the fields used when LOGICAL.IO requests a SEARCH by PHYSICAL.IO.

Data type description:

```
01 FIB.SRCH.PARAM
    02 FIB.KEY.LGTH                   BIT(8)
    02 FIB.REC.LGTH                   BIT(16)
    02 FIB.KEY.REC.PER.SECT           BIT(8)
    02 FIB.REC.POSITION               BIT(16)
    02 FIB.SEARCH.REPLY.WORD          BIT(24)
    02 FIB.SEARCH.KEY                 CHAR(32)
```

I.S.INFO

I.S.INFO
This is the group name for fields pertaining to indexed files.

Data type description:

```
01 I.S.INFO
    02 I.S.HIGHEST.KEY                CHAR(29)
    02 COMM.RET.ADD                   BIT(24)
    02 I.S.ACC.MODE                   BIT(2)
    02 I.S.WRITE.PERFORMED            BIT(1)
    02 I.S.NULL.KEY.FILE              BIT(1)
    02 FIB.KFPB.ALREADY.UPDATED       BIT(1)
    02 FILLER                         BIT(3)
```

KEY.RETAINED

KEY.RETAINED
It contains the last key which has been read.

READ.POINTERS

READ.POINTERS
These are the fields which contain the location of the last key which has been read on disk.
Data type description:

```
01  READ.POINTERS
    02  INDEX.POINTER
        03  INDEX.READ.SECTOR          BIT(24)
        03  INDEX.READ.KEY.NB          BIT(8)
    02  OVERFLOW.POINTER
        03  OVERFLOW.READ.SECTOR       BIT(24)
        03  OVERFLOW.READ.KEY.NB       BIT(8)
    02  READ.FLAGS
        03  READ.OVERFLOW.BEFORE.
            NEXT                        BIT(1)
```

```
03  INDEX.READ.FLAGS
    04 INDEX.KEY.FOUND                BIT(1)
    04 INDEX.EOF.REACHED              BIT(1)
03  OVERFLOW.READ.FLAGS
    04 OVERFLOW.KEY.NOT.
       FOUND                          BIT(1)
    04 OVERFLOW.EOF.REACHED           BIT(1)
03  SKIP.0V.BEFORE.NEXT               BIT(1)
03  SKIP.IX.BEFORE.NEXT               BIT(1)
```

SAVE.PUSH.PTR

SAVE.PUSH.PTR
It contains the disk address (sector number plus offset) of the key to be pushed in the key file.

Data type description:

```
01  SAVE.PUSH.PTR
    02  SAVE.PUSH.SECTOR              BIT(24)
    02  SAVE.PUSH.KEY.NB              BIT(8)
```

SAVE.PUSH.KEY

SAVE.PUSH.KEY
It contains the value of the key to be pushed in the key file.

INFORMATION FOR A CLOSED FILE

For a closed file, only the FPB contents are printed, as there is no FCB and no FIB. Refer to FILE ATTRIBUTES FROM FPB of Information For An Opened File for a complete description of the fields. The names of the members of the FIB structure have to be modified as follows: each prefix of those names, namely FIB.FPB, has to be replaced by FPB; for example, the name FIB.FPB.PACK.ID becomes FPB.PACK.ID; the resulting name is the label of a member of the structure FPB.

For indexed files, additional fields are analyzed.

DATA FILE PACK-ID

FPB.DATA.FILE.P.ID
It contains the name of the device containing the data file.

DATA FILE ID

FPB.DATA.FILE.ID
It contains the name of the data file associated with this key file.

ROUGH TABLE SIZE IN CORE

FPB.RGH.TABLE.SIZE
It contains the length of the rough table in records (= 180 bytes).

LENGTH OF KEY IN BYTES

FPB.KEY.LGTH
It contains the key length in bytes.

OFFSET OF KEY

FPB.KEY.OFFSET
It contains the key offset into the record in bytes.

Following this data, one of the following messages will appear:

' FILE HAS NOT BEEN OPENED"
"FILE HAS BEEN CLOSED"
"FILE IS IN PROCESS OF OPEN"
"FILE HAS BEEN HALF CLOSED"

This message describes the file's status at the time of the abnormal terminate.

DATA STACK ANALYSIS/CURRENT OPERAND (COP) TABLE

DATA STACK ANALYSIS (MPL)

DATA STACK STRUCTURE

The 'DATA STACK ANALYSIS' section of an MPL DP.ANALYZER listing provides information about a user program's active data. The value of all fields active at the time of the abnormal terminate is given along with descriptive information for each of these fields.

The data is presented according to its entry in the CONTROL STACK. All global data is presented first. Data local to the procedure next represented on the CONTROL STACK is presented next (if there is an entry) and so on.

The last group of data listed in lexical level order is that which is local to the procedure active at the time of the abnormal terminate. There is no CONTROL STACK entry for this currently active procedure.

The last active procedures group of data may be followed by a group of data related to a Working Stack. During the execution of a statement, one or more descriptors are temporarily loaded onto a Working Stack. If the contents of this Working Stack are accessible, the descriptors loaded on it will be printed. If it can be determined that the Working Stack is empty, the following message is printed:

"(EMPTY WORKING STACK)."

HEADING DESCRIPTION

The groups of data are separated by a box of asterisks containing information identifying the procedure, and, when pertinent, one of the following messages:

(GLOBAL DECLARATIONS)	indicating that the subsequent data is global to the program.
(PRESENTLY OUT OF SCOPE)	indicating that the subsequent data is local to a procedure on the Control Stack but not to the currently active procedure.
(ACTIVE PROCEDURE)	indicating that the subsequent data is local to the procedure being executed at the time of the abnormal terminate.

If there is no data declared in a procedure which is active or on the Control Stack, the message:

"NO DECLARATION IN THIS PROCEDURE"

is given.

Various messages not described in this section are self-explanatory, and are printed in the case of errors detected by DP.ANALYZER, for example:

"** ERROR -UNEXPECTED END OF DATA SEGMENT 0 WHILE LOOKING FOR A DESCRIPTOR **
** DATA STACK ANALYSIS ABORTED **"

The number of parameters passed to a procedure may validly be less than the number of parameters expected by the procedure. The interpreter builds invalid descriptors in place of the missing parameters. In the case of missing parameters, the number of invalid descriptors built by the interpreter will be printed. The message given is:

"NUMBER OF INVALID DESCRIPTORS: <integer>"

The following fields appear in the box of asterisks:

LL	This is the procedure lexical level corresponding to the first column on the left-hand side of a compiled source listing.
PSN	This is the code segment number (Program Segment Number) of the segment containing the procedure concerned.
SPN	This is the Segment Procedure Number. That is, the number representing the position of the procedure within the code segment, relative to its other procedures.
STACK BASE	This is the byte offset into the Data Segment where the descriptors for the procedure represented are found. The descriptors for a procedure are always contiguous. The offset is given in hexadecimal and then in decimal.

DATA DESCRIPTION

INDEX NR	It allows the identification of the data item. The compiler associates each declared data item to an index number (it appears on the compiler source listing in the third column from the left); this number is relative to the procedure, that is, the first declared data item of every procedure has an index number of zero.
DESCRIPTOR	A 4-byte descriptor exists for each data item and is used to locate and describe the data associated with that item. The descriptor contains information as to the type of the data and where it is located, that is, either in a data segment at an offset or, in the case of a self-relative data item, in the descriptor itself. Each descriptor is checked to see if it refers to valid data. When the descriptor is found to point outside the segment boundary, the following warning is printed: "** ERROR – DESCRIPTOR POINTS OUTSIDE SEGMENT **" If a descriptor is found to be invalid, an appropriate message is printed.

The Data Stack is often destroyed by invalid use of indices.

DATA ADDRESS - SEGM/DISPL

These two columns give the data segment and offset into that segment in bytes at which the data is located. This information is taken from the data descriptor.

If the item is self-relative, that is, if the data is located in the descriptor itself, the words "SELF RELATIVE" will appear.

BIT OFFSET

If the data item describes a field of type BIT, this column gives the bit position in the byte given by "DATA ADDRESS – SEGM/DISPL" at which the bit string begins.

DATA TYPE/ LGTH

This gives the type and length of the data represented by this entry.

'TYPE' is one of the following:

BIT	a bit string of maximum length 8 bits.
FIXED	a 16-bit numeric field
CHAR	a character string up to 255 bytes in length.
MSG. REF	a four byte description of a data communication message.

'LGTH' represents the length in bits for type BIT fields, in bytes for type CHAR and is not given for type FIXED as this length is always 16 bits.

NOTE

The field containing the length of a bit string is four bits long, therefore a length of up to 15 bits can be represented. BILINTERP will sometimes use bit strings of greater than eight bits in length. The MPL language, however only provides for a maximum of eight bits.

VALUE

The contents of the data are displayed. This represents the value of the data at the time of the abnormal terminate. The data is displayed in hexadecimal. For fields of type CHAR, the value is displayed in alphanumeric (ASCII) format as well. Invalid ASCII representations appear as the period character.

CURRENT OPERAND (COP) TABLE (COBOL and RPG)

The COP table consists of a set of entries, each being a descriptor containing the attributes of a data item. All data declared in a user's program is presented in this section of a DP.ANALYZER listing.

COP INDEX

It allows the identification of the data item; it is assigned by the COBSVERTER pass of the RPG and COBOL compilers.

COBOL related

To find the value of a data item COP INDEX
1. Find the declaration in the source listing to obtain the "old" COP index found at the right of the declaration in brackets.

2. Use this index to find the "new" COBSVERTER index in the COP-TABLE transformation map generated with either the "$COP-TABLE" or "$OPTCODE" options.

3. Use the "new" index found in (2) to identify the desired item in the DP.ANALYZER listing by searching the column headed "COP INDEX".

NOTE

Some COP-TABLE entries are removed by COBSVERTER and replaced by in-line code, therefore, they will not be seen in the COP-TABLE. One easy way to ensure a field's appearance is to use the desired field more than once in the program.

RPG related

To find the value of a data item COP INDEX

1. Find the field name in the "FIELDS" table, generated by the "$NAMES" option, to obtain the "old" COP index found in the column entitled "COP NUMBER" of this table.

2. Use this "old" index to find the "new" COBSVERTER index found in the COP-TABLE transformation map generated with the "$XMAP" option. This new index is found in the column entitled "C.O.P.".

3. Use the "new" index found in (2) to identify the desired item in the DP.ANALYZER listing by searching the column headed "COP INDEX".

ADDRESS - SEG/DISP.

These two columns give the data segment and offset into that segment in digits (that is, 4-bit units) at which the data is located. With this information the data can be located in the appropriate data segment.

DATA TYPE

This gives the type of the data represented by this entry. The possible types are as follows:

4U – 4-bit packed, unsigned alphanumeric
8U – 8-bit unpacked, unsigned alphanumeric
4LS – 4-bit packed, sign on left, numeric
4TS – 4-bit packed, trailing sign (on right), numeric
8SLS – 8-bit unpacked, separate sign on left, numeric
8OLS – 8-bit unpacked, overpunched sign on left, numeric
8STS – 8-bit unpacked, separate trailing sign (on right), numeric
8OTS – 8-bit unpacked, overpunched trailing sign (on right), numeric

UNIT LENGTH

This gives the length of the data represented by this entry. When the type of the field is "4U", "4LS" or "4TS" (that is, packed) the length is given in digits (that is, 4-bit units). Otherwise the length is given in bytes.

In the case of an array declaration, the array element length is given. Up to 20 elements of the array will be displayed consecutively. Additional elements of the array will be displayed only in the case of multi-dimensional arrays. Enough elements will be displayed to allow the location of any other element in the corresponding data segment to be determined.
For example, in the case of a 3-dimensional array, elements (1,1,1) through (1,1,20) will be displayed. The elements (1,2,1) and (2,1,1) will also appear. These can assist in determining the location of the other elements of the array. In this case, therefore, 22 elements of the array will be displayed.
For array elements the words "ELEM (n)" will appear where "n" is replaced by the index of the element listed.

NOTE

If the word "ARRAY" is given in the initiating message passed to DP.ANALYZER, all elements of all arrays will be printed.

VALUE — The contents of the data are displayed. This represents the value of the data at the time of the abnormal terminate. The data is displayed in hexadecimal for all unpacked fields, followed by the ASCII representation. In the case of packed fields, the value of the data is displayed in digits with the sign if appropriate.

When a descriptor refers to a signed numeric value, the message:
"UNEXPECTED SIGN"
is printed if the sign is not valid.

In the case of an array declaration, information about the array is given here as its value will be listed element by element. The array information includes the size of the array (that is, number of elements), and whether it is a subscripted or indexed array. In the case of a subscripted array, the word "SUBSCRIPTED" will appear. In the case of an array referred to with indexes, the number of indexes declared is given here. The element contents are then displayed; only the first 180 bytes are printed. If only a portion of the array is printed, the remaining portion can be seen in the appropriate data segment.

DATA SEGMENTS

The contents of the user program's data segments are listed in numerical order, using hexadecimal and ASCII representations. Each segment's contents are separated by a line identifying the segment and giving its size in bytes.

To the left of a data segment's contents are numbers identifying the displacement of the first digit or byte in the corresponding line. In the case of RPG and COBOL, these numbers identify digit (4-

bit unit) displacements. In the case of MPL, these numbers represent byte displacements. In all cases, the numbers are 0-relative.

When lines of text are repetitive, the message 'SAME AS LINE ABOVE' appears in the data segment. The position number to the left helps to determine how many lines are suppressed.

If a pair of digits does not represent a valid ASCII character, a period appears in the display representation of that byte position.

Some messages identifying the contents of a data segment are given, where appropriate. These messages are as follows:

"INITIATING MESSAGE"
"FPB FOR FILE: <file-id>"
"FIB FOR FILE: <file-id>"

If the option "NO.INIT" is used in an MPL segment declaration and that segment was never accessed by the interpreter, the message:

"NO VALUE ATTRIBUTED TO SEGMENT"

is printed.

The structures of the FPB and the FIB are given below; the description of significant fields may be found in the section FILE INFORMATION. Displacements, in bytes, relative to the start of the structure have been stated allowing an easier access in the adequate data segment.

```
01 FPB
    02 FPB.IMPL.LEVEL.NB                BIT(8)      DISPL 0
    02 FPB.PACK.ID                      BIT(56)     DISPL 1
    02 FPB.FILE.ID                      BIT(96)     DISPL 8
    02 BLANK                            BIT(8)
    02 FPB.REEL.NB                      BIT(24)     DISPL 21
    02 FPB.FILE.TYPE                    BIT(8)      DISPL 24
    02 FPB.HIGHEST.RECD.NB              BIT(24)     DISPL 25
    02 FPB.DEVICE.KIND                  BIT(8)      DISPL 28
    02 FPB.WA.SEGM.NB                   BIT(8)      DISPL 29
    02 FPB.WA.OFFSET                    BIT(16)     DISPL 30
    02 FPB.REC.SIZE                     BIT(16)     DISPL 32
    02 FPB.BUF.SIZE                     BIT(16)     DISPL 34
    02 FPB.MAX.FILE.SIZE                BIT(24)     DISPL 36
    02 FPB.NB.BUF                       BIT(8)      DISPL 39
    02 FPB.FLAGS                        BIT(8)      DISPL 40
        03 FPB.SPEC.FORM                BIT(1)
            04 FPB.DUP.ALLOWED          BIT(1)
        03 FPB.OPT.FILE                 BIT(1)
        03 FPB.NO.LABEL                 BIT(1)
        03 FPB.COND.FILE                BIT(1)
        03 FPB.PROG.FILE                BIT(1)
        03 FPB.FILLER.A                 BIT(3)
    02 FPB.ADV.CLOSE                    BIT(8)      DISPL 41
```

```
            03  FILLER                          BIT(1)
            03  FPB.NO.REWIND                   BIT(1)
                04  FPB.CHANGE.REEL              BIT(1)
            03  FPB.CLOSE.MODE                  BIT(3)
            03  FPB.CLOSE.CRUNCH                BIT(1)
            03  FPB.IX.0V.MRG                   BIT(1)
            03  FILLER                          BIT(1)
        02  FPB.ADV.OPEN                        BIT(16)     DISPL  42
            03  FPB.FILLER.B                    BIT(1)
            03  FPB.EXTEND                      BIT(1)
            03  FPB.OTHERUSE                    BIT(3)
            03  FPB.FILLER.C                    BIT(1)
            03  FPB.MYUSE                       BIT(2)
            03  FPB.BACKUP.CNTL                 BIT(2)
            03  FPB.FILLER.D                    BIT(2)
            03  FPB.ACCESS.MODE                 BIT(2)
            03  FPB.FILLER.E                    BIT(2)
        02  FPB.CYCLE                           BIT(16)     DISPL  44
        02  FPB.GEN.NB                          BIT(16)     DISPL  46
        02  FPB.CREAT.DATE                      BIT(40)     DISPL  48
        02  FPB.LAST.ACCESS.DATE                BIT(40)     DISPL  53
        02  FPB.SPARE.CHAR                      BIT(16)     DISPL  58
        02  FPB.SAVE.FACT                       BIT(24)     DISPL  60
        02  FPB.DATA.FILE.P.ID                  BIT(56)     DISPL  63
        02  FPB.DATA.FILE.ID                    BIT(96)     DISPL  70
        02  FPB.BLANK                           BIT(8)      DISPL  82
        02  FPB.SPARE                           BIT(8)      DISPL  83
        02  FPB.RGH.TABLE.SIZE                  BIT(16)     DISPL  84
        02  FPB.ZERO1                           BIT(8)      DISPL  86
        02  FPB.KEY.LGTH                        BIT(8)      DISPL  87
        02  FPB.KEY.OFFSET                      BIT(16)     DISPL  88
        02  FPB.ZERO2                           BIT(32)     DISPL  90
01  FIB
        02  FIB.FCB                             BIT(728)
            03  FCB.CODE.PTR                    BIT(24)     DISPL   0
            03  FCB.CUR.BUF.ADDR                BIT(24)     DISPL   3
            03  FCB.CUR.BUF.LENGTH              BIT(24)     DISPL   6
            03  FCB.OP.CODE                     BIT(24)     DISPL   9
            03  FCB.DCB.ADDRESS                 BIT(24)     DISPL  12
            03  FCB.FILE.STATUS                 BIT(24)     DISPL  15
                04  FCB.USE.SYSMEM              BIT(1)
                04  FCB.CUR.USE.SYSMEM          BIT(1)
                04  FCB.USE.AVAIL.TABLE         BIT(1)
                04  FCB.CUR.USE.AVAIL.TABLE     BIT(1)
                04  FCB.NEW.OLD                 BIT(1)
                04  FCB.OPENING                 BIT(1)
                04  FCB.CLOSE                   BIT(1)
                04  FCB.USE.FPB.VN              BIT(1)
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                05  FCB.TRANSLATE.COMPLETE     BIT(1)
            04  FCB.SEARCH                     BIT(1)
            04  FCB.ERRB                       BIT(1)
            04  FCB.QUEUED                     BIT(1)
            04  FCB.SUSPENDING.TASK            BIT(1)
            04  FCB.ACTIVE                     BIT(1)
            04  FCB.IN.USE                     BIT(1)
            04  FCB.DISPLAY                    BIT(1)
            04  FCB.READING.LABEL              BIT(1)
            04  FCB.HALF.CLOSED                BIT(1)
            04  FILLER                         BIT(7)
        03  FCB.DEVICE.KIND                    BIT(8)      DISPL  18
        03  FCB.RETRY.COUNT                    BIT(4)      DISPL  19
        03  FCB.CHANNEL                        BIT(4)
        03  FCB.FILE.NR                        BIT(8)      DISPL  20
        03  FCB.FIB.ADDRESS                    BIT(24)     DISPL  21
        03  FCB.MIX                            BIT(8)      DISPL  24
        03  FCB.Q.LINK                         BIT(24)     DISPL  25
        03  FCB.COMM
            04  FCB.RD                         BIT(24)     DISPL  28
            04  FCB.SAVE.SCRATCHPADS           BIT(64)     DISPL  31
                05  SHORT.FCB.LENGTH           BIT(64)
            04  FCB.RETURN.LIST                BIT(96)     DISPL  39
            04  FCB.RETURN                     BIT(8)      DISPL  51
            04  FCB.MYUSE                      BIT(2)      DISPL  52
            04  FCB.OTHERUSE                   BIT(3)
            04  FILLER                         BIT(3)
            04  FCB.MEMORIZE.DCB               BIT(24)     DISPL  53
            04  FCB.DISK.ADDRESS               BIT(24)     DISPL  56
            04  FCB.CUR.AREA.AD                BIT(24)     DISPL  59
            04  FCB.DFH..ADDRESS               BIT(24)     DISPL  62
            04  FCB.DIRENTRY.ADDRESS           BIT(24)     DISPL  65
            04  FCB.AREA.NR                    BIT(4)      DISPL  68
            04  FCB.AREA.COUNT                 BIT(4)
            04  FCB.DIRENTRY.IX                BIT(8)      DISPL  69
            04  FCB.SECTION.NR                 BIT(24)     DISPL  70
            04  FCB.RETRIEVED.ITEM             BIT(24)     DISPL  71
                05  FCB.DUAL.FILE              BIT(24)
            04  FCB.SEARCH.STATUS              BIT(8)      DISPL  76
            04  FCB.SEARCH.OP.CODE             BIT(8)      DISPL  77
            04  FCB.SEARCH.SKIP                BIT(8)      DISPL  78
            04  FCB.ARGUMENT.ADDRESS           BIT(24)     DISPL  79
            04  FCB.SPACE.TO.ALLOCATE          BIT(24)     DISPL  82
            04  FCB.CUR.AREA.RANGE             BIT(48)     DISPL  85
    02  FIB.AREA.ADDR.LGTH. (16)               BIT(32)     DISPL  91
    02  FIB.COMM.AREA
        03  FIB.COMM.VERB                      BIT(8)      DISPL 155
        03  FIB.COMM.BLK.NB                    BIT(24)     DISPL 156
            04  FIB.SEARCH.ADD                 BIT(24)
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      03  FIB.COMM.MEM.BLK.ADD
          04  FIB.OPEN.CLOSE.BUF.AD
              05  FIB.BUF.AD
                  06  FIB.KEY.MEM.ADD          BIT(24)     DISPL  159
      03  FIB.FILE.NB                          BIT(8)      DISPL  162
      03  FIB.REPLY.WORD                       BIT(24)     DISPL  163
      03  FIB.CUR.BLK.LGTH                     BIT(24)     DISPL  166
          04  FIB.SEARCH.LGTH                  BIT(24)
  02  WORKING.COPY.OF.FPB
      03  FIB.FPB.IMPL.LEVEL.NB                CHAR(1)     DISPL  169
      03  FIB.FPB.PACK.ID                      CHAR(7)     DISPL  170
      03  FIB.FPB.FILE.ID                      CHAR(12)    DISPL  177
      03  FIB.FPB.PSEUDO.PACK.TAG              BIT(8)      DISPL  189
      03  FIB.FPB.FILE.ID.HASH                 BIT(8)      DISPL  190
      03  FIB.FPB.FILE.NB                      BIT(8)      DISPL  191
      03  FIB.FPB.REEL.NB                      CHAR(3)     DISPL  192
      03  FIB.FPB.FILE.TYPE                    BIT(8)      DISPL  195
      03  FIB.FPB.HIGHEST.RECD.NB              BIT(24)     DISPL  196
      03  FIB.FPB.DEVICE.KIND                  BIT(8)      DISPL  199
      03  FIB.FPB.WA.SEGM.NB                   BIT(8)      DISPL  200
      03  FIB.FPB.WA.OFFSET                    BIT(16)     DISPL  201
      03  FIB.FPB.REC.SIZE                     BIT(16)     DISPL  203
      03  FIB.FPB.BUF.SIZE                     BIT(16)     DISPL  205
      03  FIB.FPB.MAX.FILE.SIZE                BIT(24)     DISPL  207
      03  FIB.FPB.NB.BUF                       BIT(8)      DISPL  210
      03  FIB.FPB.FLAGS                        BIT(8)      DISPL  211
          04  FIB.FPB.SPEC.FORM                BIT(1)
              05  FIB.FPB.DUP.ALLOWED          BIT(1)
          04  FIB.FPB.UPT.FILE                 BIT(1)
          04  FIB.FPB.NO.LABEL                 BIT(1)
          04  FIB.FPB.COND.FILE                BIT(1)
          04  FILLER                           BIT(3)
      03  FIB.FPB.ADV.CLOSE                    BIT(8)      DISPL  212
          04  FILLER                           BIT(1)
          04  FIB.FPB.NO.REWIND                BIT(1)
              05  FIB.FPB.CHANGE.REEL          BIT(1)
          04  FIB.FPB.CLOSE.MODE               BIT(3)
          04  FIB.FPB.CLOSE.CRUNCH             BIT(1)
          04  FIB.FPB.IX.0V.MRG                BIT(1)
      03  FIB.FPB.ADV.OPEN                     BIT(16)     DISPL  213
          04  FIB.FPB.FILLER.B                 BIT(1)
          04  FIB.FPB.EXTEND                   BIT(1)
          04  FIB.FPB.OTHERUSE                 BIT(3)
          04  FIB.FPB.CREATENAMED              BIT(1)
          04  FIB.FPB.MYUSE                    BIT(2)
          04  FIB.FPB.BACKUP.CNTL              BIT(2)
          04  FIB.FPB.INTEG.LEVEL              BIT(2)
          04  FIB.FPB.ACCESS.MODE              BIT(2)
          04  FIB.FPB.FILLER.E                 BIT(2)
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      03  FIB.FPB.CYCLE                    CHAR(2)     DISPL  215
      03  FIB.FPB.GEN.NB                   BIT(16)     DISPL  217
      03  FIB.FPB.CREAT.DATE               CHAR(5)     DISPL  219
      03  FIB.FPB.LAST.ACCESS.DATE         CHAR(5)     DISPL  224
      03  FIB.FPB.SPARE.CHAR               BIT(16)     DISPL  229
      03  FIB.FPB.SAVE.FACT                CHAR(3)     DISPL  231
02    FIB.FPB.USERCODE                    BIT(136)    DISPL  234
02    FIB.FPB.SECURITY.FLAGS              BIT(8)      DISPL  251
      03  FIB.FPB.SECURITYTYPE             BIT(2)
      03  FIB.FPB.SECURITYUSE              BIT(2)
      03  FILLER                           BIT(4)
02    FIB.FPB.GUARD.MFID                  BIT(56)     DISPL  252
02    FIB.FPB.GUARD.FID                   BIT(96)     DISPL  259
      03  FIB.FPB.VM.LGTH.FORWARD          BIT(24)
02    FIB.FILE.STATUS                                 DISPL  271
      03  FIB.FILE.HALF.CLOSE              BIT(1)
      03  FIB.GUARD.FILE.OPENED            BIT(1)
      03  FIB.HOST                         BIT(1)
      03  FIB.EXEC                         BIT(1)
      03  FIB.OWN                          BIT(1)
      03  FIB.PROG                         BIT(1)
      03  FILLER                           BIT(10)
02    FIB.VN                              BIT(8)      DISPL  271
      03  FIB.ALREADY.DISPLAYED            BIT(1)
      03  FIB.FLAGS.USED.BY.PHYSICAL       BIT(2)
      03  FIB.USED.TO.DISPLAY              BIT(1)
      03  FIB.FILE.TESTED                  BIT(1)
      03  FIB.OPENING.BACKUP               BIT(1)
      03  FIB.PRINTER.CHECK                BIT(1)
      03  FIB.FOR.BACKUP.FILE              BIT(1)
02    FIB.NB.SECT.PER.BLK                 BIT(24)     DISPL  274
02    FIB.BUF.N.FILE.STATUS
      03  FIB.FPB.INDEX                    BIT(8)      DISPL  277
      03  FIB.FILE.STAT                    BIT(4)      DISPL  278
          04  FIB.FILE.OPENING             BIT(1)
              05  FIB.NEW.FILE             BIT(1)
          04  FIB.FILE.OPEN                BIT(1)
          04  FIB.CLOSING.FILE             BIT(1)
          04  FIB.SHORT.BLK                BIT(1)
      03  FIB.LAST.COMM                    BIT(4)
      03  FIB.STOP.FOR.READ                BIT(1)      DISPL  279
      03  FIB.INH.READ.AGAIN               BIT(1)
      03  FIB.ERROR.                       BIT(1)
      03  FIB.LAST.BLK.DET                 BIT(1)
      03  FIB.LOG.EOF                      BIT(1)
      03  FIB.ACT                          BIT(1)
      03  FIB.EOF                          BIT(1)
      03  FIB.BWD.REQ                      BIT(1)
          04  FIB.OPEN.EXTEND.ALLOWED      BIT(1)
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    03  FIB.ERROR.REPLY.WORD                    BIT(24)          DISPL  280
        04  FIB.AD.DCB                          BIT(24)
    03  FIB.SAVE.RETURN.ADDR                    BIT(24)          DISPL  283
    03  FIB.REC.PER.BLK                         BIT(16)          DISPL  286
    03  FIB.NB.REC.IN.LAST.BLK                  BIT(16)
    03  FIB.LAST.BLK.NB                         BIT(24)
    03  FIB.PH.BLK.NB                           BIT(24)
    03  FIB.OUT.PH.BLK.NB                       BIT(24)
    03  FIB.BUF.INDEXES                         BIT(24)
        04  OUT.PH.BUF.INDEX                    BIT(8)
        04  LOG.BUF.INDEX                       BIT(8)
        04  PH.BUF.INDEX                        BIT(8)
    03  FIB.LOG.REC.NB                          BIT(24)
        04  FIB.DATA.FILE.PTR                   BIT(24)
    03  FIB.LOG.BLK.NB                          BIT(24)
    03  FIB.HIGHEST.KEY                         BIT(24)
    03  FIB.BUF.STAT.AREA. (17)                 BIT(24)          DISPL  311
        04  BUF.STAT                            BIT(8)
        04  FIB.PRINT.CNTL                      BIT(16)
    03  SUPERLOGIO.BUFFER.STATUS.REMAPS FIB.BUF.STAT.AREA
        04  COMMON.BUF.STAT                     BIT(72)
        04  REAL.BLOCK.SIZE.ON.DISK             BIT(16)
        04  NB.OF.BLOCK.PER.BUFFER              BIT(8)
        04  LOGICAL.BUFFER.SIZE                 BIT(16)
        04  LOGICAL.BLOCK.INFO (3)
            05  TOP.BLOCK.NB                    BIT(24)
            05  TAIL.BLOCK.NB                   BIT(24)
02  FIB.CALLING                                 BIT(24)          DISPL  362
    03  FIB.CALLING.MOD.NB                      BIT(8)
    03  FIB.CALLING.DISPL                       BIT(16)
02  FIB.COMM.FOR.SUPERLOGIO                     BIT(1)           DISPL  365
02  FIB.SUPERLOGIO.FLAGS                        BIT
    03  FIB.INTERPRETER.RESTARTED               BIT(1)
        04  FIB.RESTART.COMM                    BIT(1)
        04  FIB.AREA.RANGE.UPDATED              BIT(1)
    03  FIB.END.OF.AREA.REACHED                 BIT(1)
    03  FIB.REWRITE.OPERATION                   BIT(1)
02  FIB.SEARCH.IX                               BIT(1)
02  FIB.CLOSE.MERGE.FAILURE                     BIT(1)
02  FILLER                                      BIT(1)
02  FIB.AREA.RANGE                              BIT(48)          DISPL  366
    03  FIB.AREA.MIN                            BIT(24)
    03  FIB.AREA.MAX                            BIT(24)
02  FIB.BACKUP.INFO
    03  FPB.PACK.ID.SAVE                        BIT(56)          DISPL  372
    03  FIB.FPB.FILE.ID.SAVED                   BIT(96)          DISPL  379
    03  FPB.FILE.TO.SAVED                       BIT(96)          DISPL  391
    03  FIB.FPB.FILE.TYPE.SAVED                 BIT(8)           DISPL  403
    03  FIB.FPB.DEVICE.KIND.SAVED               BIT(8)           DISPL  404
    03  FIB.BACKUP.NUMBER                       BIT(8)           DISPL  405
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      03  FIB.NAME.SWAPPED                    BIT(1)
      03  FIB.DIRECT.TO.BACKUP                BIT(1)
      03  FIB.DISK.FOR.BACKUP.CHECK           BIT(1)
      03  FILLER                              BIT(1)
   02 FIB.TO.CONSIDER
      03  WORK.WITH.EXTENDED.FIB              BIT(1)
      03  FIB.COMM.FOR.LOG.IO                 BIT(1)
      03  FIB.COMM.FOR.LOG.IO.TERM            BIT(1)
      03  FIB.I.S.FILE                        BIT(1)
      03  EXTENDED.FIB.ADD                    BIT(24)      DISPL  407
          04  FIB.VIRT.FILE.AREA.LGTH         BIT(16)
              05  FIB.PCW                     BIT(16)

02  STREAM.INFO
    03  FIB.STR.PTR                           BIT(16)      DISPL  410
        04  PART.OF.FIB                       BIT(2)
        04  FIB.TOSF.DST.ENTRY.PTR
            05  FIB.TOSF.FILE.PTR             BIT(5)
            05  FIB.TOSF.MIX.PTR              BIT(3)
    03  FIB.STR.BUF.REM                       BIT(16)      DISPL  412
        04  REL.DISP.OF.FIRST.FIB             BIT(16)
    03  FIB.STR.NB.BYTES.IN.LAST.BLK          BIT(16)      DISPL  414
02  FIB.ADDR.OF.BUFFERS                       BIT(24)      DISPL  416
02  BUFFER.SPACE
    03  IX.BUFFER                             CHAR(1800)   DISPL  419
        04  IX.AREA                           CHAR(180)
    03  0V.BUFFER                             CHAR(1800)
        04  0V.AREA                           CHAR(180)
    03  RGH.BUFFER                            CHAR(1800)   DISPL 4019
        04  RGH.AREA                          CHAR(180)
    03  CRT.AREA                              CHAR(180)
02  KFPB.AREA
    03  FIB.KFPB.IMPL.LEVEL                   CHAR(1)      DISPL 5999
    03  FILLER                                CHAR(2)
    03  FIB.KFPB.PACK.ID                      CHAR(7)      DISPL 6002
    03  FIB.KFPB.FILE.ID                      CHAR(12)     DISPL 6009
    03  FIB.KFPB.BLANK                        CHAR(1)
    03  FIB.KFPB.LINK.TO.DATA.FILE            CHAR(5)      DISPL 6022
        04  COT.SECT.RANGE                    BIT(8)
        04  CRT.SECT.RANGE                    BIT(8)
    03  FIB.KFPB.FLAGS                        CHAR(1)      DISPL 6027
        04  B 80 R.T.                         BIT(1)
        04  B 700 R.T.                        BIT(1)
        04  B 1700 R.T.                       BIT(1)
        04  B 900 R.T.                        BIT(1)
        04  B 1000 R.T.                       BIT(1)
        04  DATA.FILE.DUAL                    BIT(1)
        04  OLD.DUPL.ALLOWD                   BIT(1)
        04  DUPL.ALLOWED                      BIT(1)
    03  FIB.KFPB.RT.ADD                       BIT(24)      DISPL 6028
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    03  FIB.KFPB.RT.LGTH                BIT(16)
    03  FILLER                          CHAR(1)
    03  FIB.KFPB.0V.ADD                 BIT(24)
    03  FIB.KFPB.0V.LGTH                BIT(24)
    03  FIB.KFPB.IX.ADD                 BIT(24)
    03  FIB.KFPB.IX.LGTH                BIT(24)
    03  FILLER                          BIT(8)
    03  FIB.KFPB.KEY.LGTH               BIT(16)     DISPL 6047
    03  FIB.KFPB.KEY.OFFSET             BIT(16)
    03  FIB.KFPB.ZERO                   BIT(32)
02  FIB.LAST.INPUT.COMM                 BIT(4)      DISPL 6055
02  FIB.IX.PARAM
    03  TOP.SECT.NB.IN.DISK.IX          BIT(24)
    03  TAIL.SECT.NB.IN.DISK.IX         BIT(24)
    03  IX.REC.SECT.ADD                 BIT(24)
    03  IX.REC.IN.BLK.PTR               BIT(8)
    03  IX.FLAGS
        04  IX.MEM.VALID                BIT(1)
        04  IX.KEY.FOUND                BIT(1)
        04  IX.EOF.REACHED              BIT(1)
        04  FILLER                      BIT(1)
02  FIB.0V.PARAM
    03  TOP.SECT.NB.IN.DISK.0V          BIT(24)     DISPL 6066
    03  TAIL.SECT.NB.IN.DISK.0V         BIT(24)
    03  0V.REC.SECT.ADD                 BIT(24)
    03  0V.REC.IN.BLK.PTR               BIT(8)
    03  0V.FLAGS
        04  0V.MEM.VALID                BIT(1)
        04  0V.KEY.FOUND                BIT(1)
        04  0V.EOF.REACHED              BIT(1)
        04  0V.DEL.FOUND                BIT(1)
02  FIB.RGH.PARAM
    03  TOP.SECT.NB.IN.DISK.RT          BIT(24)
    03  TAIL.SECT.NB.IN.DISK.RT         BIT(24)
    03  RGH.REC.SECT.ADD                BIT(24)
    03  RGH.REC.IN.BLK.PTR              BIT(8)
    03  RGH.FLAGS
        04  RGH.MEM.VALID               BIT(1)
        04  RGH.KEY.FOUND               BIT(1)
        04  RGH.EOF.REACHED             BIT(1)
        04  FILLER                      BIT(1)
02  FIB.SRCH.PARAM
    03  FIB.KEY.LGTH                    BIT(8)      DISPL 6087
    03  FIB.REC.LGTH                    BIT(16)
    03  FIB.KEY.REC.PER.SECT            BIT(8)
    03  FIB.REC.POSITION                BIT(16)
    03  FIB.SEARCH.REPLY.WORD           BIT(24)
    03  FIB.SEARCH.KEY                  CHAR(32)
02  I.S.INFO
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	03	I.S.HIGHEST.KEY	CHAR(29)	DISPL 6128
	03	COMM.RET.ADD	BIT(24)	
	03	I.S.ACC.MODE	BIT(2)	
	03	I.S.WRITE.PERFORMED	BIT(1)	
	03	I.S.NULL.KEY.FILE	BIT(1)	
	03	FILLER	BIT(8)	
02	READ.POINTERS			
	03	KEY.RETAINED	CHAR(29)	DISPL 6161
	03	INDEX.POINTER		
		04 INDEX.READ.SECTOR	BIT(24)	DISPL 6190
		04 INDEX.READ.KEY.NB	BIT(8)	
	03	OVERFLOW.POINTER		
		04 OVERFLOW.READ.SECTOR	BIT(24)	
		04 OVERFLOW.READ.KEY.NB	BIT(8)	
	03	READ.FLAGS	BIT(8)	DISPL 6198
		04 READ.OVERFLOW.BEFORE.NEXT	BIT(1)	
		04 INDEX.READ.FLAGS		
		05 INDEX.KEY.FOUND	BIT(1)	
		05 INDEX.EOF.REACHED	BIT(1)	
		04 OVERFLOW.READ.FLAGS		
		05 OVERFLOW.KEY.NOT.FOUND	BIT(1)	
		05 OVERFLOW.EOF.REACHED	BIT(1)	
		04 SKIP.0V.BEFORE.NEXT	BIT(1)	
		04 SKIP.IX.BEFORE.NEXT	BIT(1)	
02	SAVE.PUSH.PTR			
	03	SAVE.PUSH.SECTOR	BIT(24)	DISPL 6199
	03	SAVE.PUSH.KEY.NB	BIT(8)	
02	SAVE.PUSH.KEY		CHAR(29)	DISPL 6203
02	SND.PART.OF.FIB		BIT(1)	

CURRENT CODE SEGMENT

The contents of the code segment active at the time of the abnormal terminate are listed here. The last instruction executed is located in this code segment. The contents are displayed in hexadecimal.

To the left of the text are numbers indicating the byte position or displacement of the first pair of digits in the corresponding line.

The code segment number and size in bytes are also listed.

Repetitive lines are suppressed and the message 'SAME AS LINE ABOVE' is given. The displacement to the left helps to determine the number of lines suppressed.

LOCKED SLICE

The contents of a program's LOCKED SLICE are displayed here. The Locked Slice of a program is located in the program's Interface Control Block (ICB) residing in the user program's partition.

The contents are displayed in hexadecimal.

To the left of the text are numbers indicating the bit position or displacement of the left-most bit of the first digit in the corresponding line, relative to the ICB base.

The LOCKED SLICE contains the following structures:

- the Program Segment Table
- the Data Segment Table
- the Task Control Block Preset Area
- the Control Stack
- the Code Control Block Preset Area
- the Internal File Name Block

Those structures are located in the LOCKED SLICE using pointers stored in the ICB.

PROGRAM SEGMENT TABLE

This table contains information about a user program's code segments. It is used by the DP.ANALYZER program to display the PROGRAM SEGMENT TABLE section.

Address : ICB.PST.PTR

Length : ICB.PST.LGTH

Data type : array

```
01 PST.ENTRY                                  BIT(8)
    02 SEG.DESCR.TYPE
    02 SEG.DESCR.FLAGS
        03 ALREADY.HANDLED                    BIT(1)
        03 SEG.HAS.BEEN.UPDATED               BIT(1)
        03 IN.VIRTUAL.FILE                    BIT(1)
        03 TO.BE.LOADED                       BIT(1)
        03 IN.USE                             BIT(1)
        03 IN.CORE                            BIT(1)
        03 LOCK.IN.MAIN.STORE                 BIT(1)
        03 READ.WRITE.SEG                     BIT(1)
    02 SEG.DESCR.DSK.ADD                      BIT(16)
    02 SEG.DESCR.LGTH                         BIT(16)
    02 SEG.DESCR.MEM.ADD                      BIT(24)
    02 SEG.DESCR.FN                           BIT(8)
    02 SEG.DESCR.ROLL.IN.COUNTER              BIT(16)
```

DATA SEGMENT TABLE

This table contains information about a user program's data segments. It is used by the DP.ANALYZER program to display the DATA SEGMENT TABLE section.

Address : ICB.DST.PTR

Length : ICB.DST.LGTH

Data type : identical to PST data type

TASK CONTROL BLOCK PRESET AREA

It contains the value of the eight edit characters used in COBOL and RPG programs. It is used to print the Interpreter Preset Area in the PROGRAM PARAMETERS section.

Address : ICB.TCB.PA.PTR

Length : ICB.TCB.PA.LGTH

CONTROL STACK

It contains
- the CONTROL STACK for MPL programs
- the PERFORM STACK for COBOL and RPG programs.

It is used to print the PERFORM STACK/CONTROL STACK section.

Address: ICB.CNTL.STACK.PTR

Length: ICB.CNTL.STACK.LGTH

CODE CONTROL BLOCK PRESET AREA

It contains the Message Reference Table for MPL programs, the COP table for COBOL and RPG programs.

Address : ICB.CCB.PA.PTR

Length : ICB.CCB.PA.LGTH

INTERNAL FILE NAME BLOCK

It indicates the correspondence between the name by which the program refers to the file and the indices to the data segments containing the FIB and FPB.

Address : ICB.IFNB.PTR

Length : ICB.IFNB.LGTH

Data type : array

```
01  IFNB.ENTRY
    02 DST.INDEX.FOR.FIB          BIT(8)
    02 DST.INDEX.FOR.FPB          BIT(8)
    02 FILE.NAME                  CHAR(28)
```

APPENDIX A

GLOSSARY OF TERMS

BCD

Binary Coded Decimal — A decimal digit (0-9) is implemented in binary in a 4-bit field.

COP

Current OPerand table–contains the attributes and address of the data item pertaining to COBOL/ RPG programs.

CPA

Communicate Parameter Area – is a block of contiguous bytes containing a message sent from an S-Program to the MCP requesting a function.

DST

Data Segment Table–contains information about a user program's data segments.

FCB

File Control Block — a structure, built at run time, associated with each file contained in a program. It is part of the FIB structure.

FIB

File Information Block — a structure, built at run time, associated with each file contained in a program.

FPB

File Parameter Block — a structure, built at compile time, associated with each file contained in a program.

ICB

Interface Control Block — a run time structure containing all the parameters needed by the MCP to execute the program.

IFNB

Internal File Name Block–indicates the correspondence between the name by which the program refers to the file and the numbers of the data segments containing the related FIB and FPB.

PPB

Program Parameter Block — the first record of the program file for which it gives general information.

PSN

Program Segment Number — a code segment number.

PST

Program Segment Table — contains information about a user program's code segments.

SPN

Segment Procedure Number — represents the position of an MPL procedure within a code segment.

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Date: August 1982

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