IBM

Series/1

IBM Series/1
　　Attachment Features
　　Storage Load
　　　　User's Guide

GA34-0133-4

File No. S1-01

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Preface

This publication provides the information necessary to load IBM engineering change (EC) data or attachment load data into applicable IBM Series/1 I/O attachment feature storage. The reader should be an experienced IBM Series/1 assembler-language programmer, who writes, maintains, and debugs machine-level language programs. The reader should also be familiar with the concepts and operations of applicable IBM Series/1 I/O attachment features.

Publication Summary

Chapter 1 is an introduction to the attachment feature storage loading process. The introduction contains general descriptions of the two methods of loading attachment storage:

- An attachment storage diskette, which contains information for one attachment feature
- An IBM operating system or user-designed operating system, which stores attachment feature storage programs.

Chapter 2 describes the operations necessary to add the EC update or attachment load storage programs to a user-designed operating system. This chapter also describes the diskette label, data format, and storage load definition data. The appropriate immediate device control block (IDCB) and device control blocks (DCBs) are listed for each attachment feature.

Related Publications

- *IBM Series/1 5250 Information Display System Attachment Initializer Diskette User's Guide*, GA34-0098.
- *IBM Series/1 Multi-Function Attachment Feature Initialization User's Guide*, GA34-0147.
- Refer to the appropriate device description manual for details about the attachment load/EC update.

Contents

Chapter 1. Introduction

IBM Series/1 I/O attachment feature cards require microcode to operate. Some attachment cards require a microcode load into attachment storage before the attached devices can be used. Other attachment cards use microcode from internal read-only storage and do not require external intervention.

EC Updates

Engineering change (EC) updates to the microcode are applied from the operating system or the attachment program diskette. EC updates must be loaded into the attachment card following every power-on. The EC update remains active until the attachment card is powered off. EC updates are obtained from your Customer Engineer (CE).

Attachment cards for the following Series/1 devices and features may require an EC update:

- Integrated diskette/disk unit for 4952, 4954, and 4956 processors (with 8-inch diskettes)
- Integrated diskette/disk unit for 4956 processors (with 5.25-inch diskettes)
- IBM 4963 Disk Subsystem
- IBM 4965 Storage and I/O Expansion Unit Models 1, 30D, and 60D
- IBM 4965 Storage and I/O Expansion Unit Model E00
- IBM 4966 Diskette Magazine Unit
- IBM 4967 Disk Unit Subsystem
- IBM 4968 Autoload Streaming Magnetic Tape Unit
- IBM 4969 Magnetic Tape Subsystem
- IBM 4973 Line Printer
- IBM 4974 Matrix Printer
- IBM 4987 Programmable Communications Subsystem
- Communication Features
  - Asynchronous Multiple-Line
  - Binary Synchronous Multiple-Line
  - Programmable Multiple-Line
- Local Communications Controller
- RPQs D02312/13 (data entry loop)
- RPQ D02788 (Multi-Communications Controller)
- Synchronous Communication Single-Line Control/High Speed.

Attachment Load

The attachment load is implemented in the same way as an EC update. The attachment program diskette contains the attachment load and is shipped with the attachment feature. Updates to the attachment load are distributed as an engineering change to your CE.

The following IBM Series/1 I/O attachment feature cards require an attachment load following every power-on:

- Multidrop Work Station Attachment
- Multifunction Attachment [1]
- Printer Attachment – 5200 Series
- Telephone Communications Attachment [2]
- 5250 Information Display System Attachment [3]
- Series/1-to-Personal Computer Channel Attachment.

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[1] The Multifunction Attachment storage load is covered in a separate manual, *Multifunction Attachment Feature Initialization User's Guide*, GA34-0147.

[2] The Telephone Communications Attachment storage load is covered in a separate manual, *Telephone Communications Attachment Feature Description*, GA34-0174.

[3] The 5250 Attachment storage load is covered in a separate manual, *5250 Information Display System Attachment Initializer Diskette User's Guide*, GA34-0098.

Loading Attachment Storage and EC Updates

You can use the attachment program diskette or the operating system (IBM or User-designed) for loading attachment storage or an EC update. If you are using an IBM operating system, refer to the documentation supplied with your operating system for instructions on loading attachment storage or EC updates.

Attachment Program Diskette

The attachment program diskette contains the storage load or EC update for a specific device. The information on this diskette is required for operating the device and must be loaded into attachment storage each time the system is powered on.

Loading attachment storage or an EC update directly from the program diskette requires a programmer console and a diskette drive.

To load attachment storage or EC updates using the attachment program diskette, place the attachment program diskette in the diskette drive and initial-program-load (IPL) the system. When prompted by the programmer console lights, enter the device address. If the device address that is entered matches the device type for this attachment load or EC update, it is loaded into the device attachment storage. Next, you are prompted to enter another device address. If no other attachment cards are covered by this attachment program diskette, remove the diskette. If additional attachment cards on the system require an attachment load or EC update, insert the attachment program diskette for that attachment card and repeat this procedure. When all devices requiring an attachment load or EC update are loaded, remove the attachment program diskette and IPL the operating system.

User-Designed Operating System

If you have multiple attachments in your system configuration, loading attachment storage from each attachment program diskette would be time-consuming. By making the program diskette information part of a user-designed operating system, the operating system can load each attachment storage and EC update. When the system is IPLed, the operating system loads the attachment cards with the appropriate attachment load or EC update.

This method is discussed in detail in Chapter 2.

Chapter 2. User-Designed Operating System

The operating system can be designed to load all attachment loads or EC updates required by a Series/1 system. The system operator can then IPL the operating system rather than manually load the program diskettes. The operating system can load attachment storage or EC updates by:

- Accessing *all* attachment loads or EC updates required by the Series/1 system
- Knowing the correct engineering change level that must be loaded into each attachment card on the system
- Having a loader program for each attachment card on the Series/1 system that requires an attachment load or EC update.

To design the operating system, the user should have access to a copy of the attachment load or EC update loader program. Read a copy of the program from the attachment program diskette into storage and transfer it to the operating system area.

The operating system must have loader programs for those attachment cards that require an attachment load or EC update.

Attachment Program Diskette Description and Format

The attachment program diskette can be either a 8-inch or a 5.25-inch diskette. The one-sided 8-inch diskette contains 77 cylinders, numbered 00 (outermost) to 76 (innermost). Cylinder 00 is the label cylinder and is reserved for the operating system. Each cylinder contains one head, numbered 0. Each cylinder is divided into 26 sectors, with 128 bytes per sector. Sector numbers begin with 01 for the first sector after the index.

The two-sided 5.25-inch program diskette contains 80 cylinders, numbered 00 (outermost) to 79 (innermost). Cylinder 00 is the label cylinder and is reserved for the operating system. Each cylinder contains two heads, numbered 0 and 1. Each cylinder and head location is divided into 26 sectors, with 256 bytes per sector. Sector numbers begin with 1 for the first sector after the index.

The following figure shows the format of an 8-inch attachment program diskette.

```
Cylinders  +------------------------------------------------------------------+
  03 to 76 |                                                                  |
           | Attachment storage load or EC update data                        |
           |                                                                  |
           +--+---------------------------------------------------------------+
           |D |                                                               |
       02  |E | Attachment storage load or EC update data                     |
           |F |                                                               |
           +--+-----------------------------------------+---------------------+
           |                                            | Attachment storage or|
       01  | Diskette read program                      | EC update loader    |
           |                                            | program             |
           +--+-------+--+--+--+--+-----------------------------------------+--+
           |I |       |V |H |H |H |                                         |
       00  |P | Not   |O |D |D |D | Not                                     |
           |L | used  |L |R |R |R | used                                    |
           |  |       |1 |1 |2 |3 |                                         |
           +--+-------+--+--+--+--+-----------------------------------------+
            1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
           Sectors
```
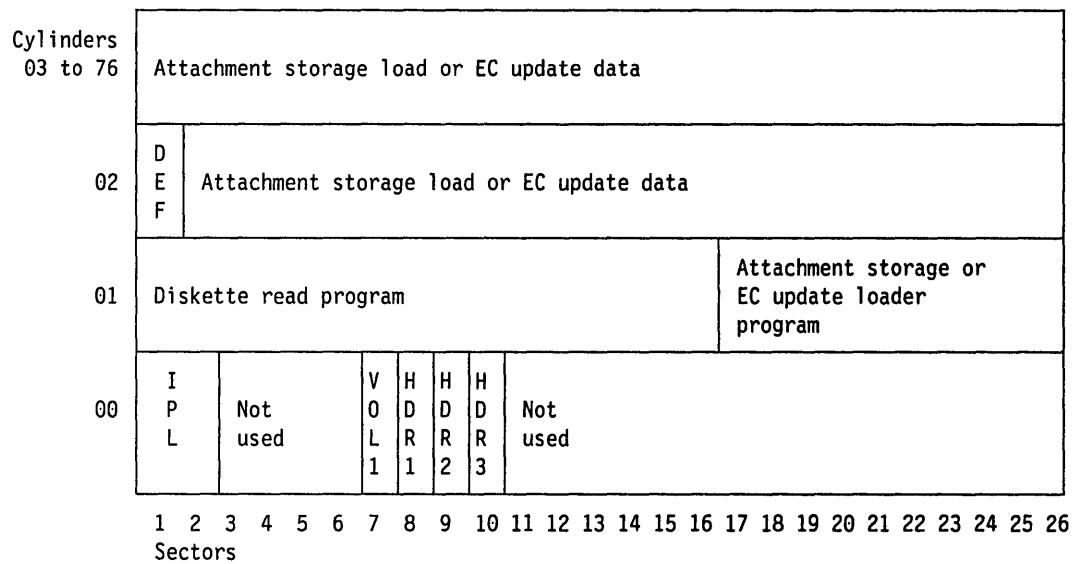
The 5.25-inch attachment program diskette uses the same general format as the 8-inch diskette. Additional attachment storage load and EC update data can also be stored on cylinders 77 through 79 on side 1 (head 0), and on cylinders 02 through 79 on side 2 (head 1). Cylinders 00 and 01 on side 2 (head 1) are not used.

The attachment program diskette consists of:

Cylinder 00   **Sectors 1 and 2:** These sectors are used to IPL the system from the program diskette.

Sectors 3 to 6: Not used.

Sector 7: The volume label (VOL1) identifies the diskette volume, part number, EC level, and the length and sequence of the physical records.

Sector 8: Header 1 (HDR1) identifies the data set for the attachment load or EC update. The volume identifier is RAMDATA1.

Sector 9: Header 2 (HDR2) is used for EC updates only. It identifies the 128-byte storage load definition data (see "Storage Load Definition Data" on page 2-6). The volume identifier is RAMHDR.

Sector 10: Header 3 (HDR3) identifies the data set for the attachment load or EC update loader program. The volume identifier is RAMLDR.

Sectors 11 to 26: Not used.

Cylinder 01   **Sectors 1 to 16:** These sectors contain the diskette read program that is used after the program diskette IPL.

Sector 17: The communication area is used to pass device information (device address, Series/1 storage address) from the diskette read program to the attachment load or EC update loader program.

Sectors 18 to 26: The attachment storage loader program is used to load the EC update or attachment load into the attachment card.

Cylinder 02   **Sector 1:** This sector contains the storage load definition data for an attachment load (see "Storage Load Definition Data" on page 2-6). For an EC update, this sector is the beginning of the EC update data.

Sectors 2 to 26: These sectors contain attachment load or EC update data. This is the beginning of the data for an attachment load.

Cylinders 03 – 76   **All sectors:** These cylinders contain the remaining attachment load or EC update data. On a 5.25-inch diskette, this data can also reside on cylinders 77 – 79, and on head 1, cylinders 02 – 79. All cylinders could be used.

Volume label

The volume label is a required label, located at cylinder 00, sector 07, and designated by VOL1. It is formatted as follows:

Character position	Field name	Length (bytes)	Usage
000	Label identifier	3	Required
003	Label number	1	Required
004	Volume identifier	6	Required
010	Accessibility	1	Required
011	Reserved	13	(note 1)
024	System code (P/N=XXXXXXX)	13	Optional
037	Owner identifier (EC=XXXXXX)	14	Optional
051	Reserved	21	(note 1)
071	Media type	1	(note 2)
072	Extent arrangement indicator	1	Optional
073	Special requirements indicator	1	Optional
074	Reserved	1	(note 1)
075	Physical record length of available space	1	(note 3)
076	Physical record sequence code	2	(note 4)
078	Reserved	1	(note 1)
079	Label standard version	1	(note 5)
080	Reserved	48	(note 1)

Notes:

1. Reserved fields must be recorded as spaces; however, no assumptions should be made regarding their content on input.

2. This field is blank for 8-inch diskettes and contains the character "M" for 5.25-inch diskettes.

3. This field is blank for 8-inch diskettes and contains the character "1" for 5.25-inch diskettes.

4. Required only when formatting and initializing a diskette.

5. This field contains the character "W" for 8-inch diskettes and the character "3" for 5.25-inch diskettes.

Header labels

The header records of the attachment program diskette are examined to determine the location of the attachment load or EC update. In the header record, the beginning-of-extent field defines the start (first-used sector) of the attachment load or EC update program. The end-of-extent field defines the end (last-used sector) of the attachment load or EC update program. Both fields are defined in 5 bytes by cylinder, head, and sector (CC,H,SS). The length of the program can be found by using the starting sector and the ending sector.

The three header labels (RAMDATA1, RAMHDR, and RAMLDR) have an identical format, as follows:

Character position	Field name	Length (bytes)	Usage
000	Label identifier	3	Required
003	Label number	1	Required
004	Reserved	1	(note 1)
005	Data set identifier	17	Required
022	Block length	5	Required
027	Record attribute	1	Optional
028	Beginning of extent	5	Required
033	Physical record length	1	Required
034	End of extent	5	Required
039	Record/block format	1	Optional
040	Bypass indicator	1	(note 2)
041	Data set security	1	Optional
042	Write protect indicator	1	Required
043	Exchange type indicator	1	(note 3)
044	Multi-volume data set indicator	1	(note 4)
045	Volume sequence number	2	Optional
047	Creation date	6	Optional
053	Record length	4	Optional
057	Offset to next record space	5	Optional
062	Reserved	4	(note 1)
066	Expiration date	6	Required
072	Verify/copy indicator	1	Optional
073	Data set organization	1	Optional
074	End of data address	5	Required
079	Reserved	16	(note 1)
095	System code	13	Optional
108	File application type	2	Optional
110	Reserved	18	(note 1)

Notes:

1. Reserved fields must be recorded as space characters; however, no assumptions should be made regarding their content on input.

2. This field must contain a space character to enable the data set to be transmitted.

3. This field is blank for 8-inch diskettes and contains the character "E" for 5.25-inch diskettes.

4. Support for this field is required if the volume sequence number is supported.

Storage Load Definition Data

On the attachment program diskette, there will be an area reserved for storage load definition data. This information resides in one of two places:

- Immediately preceding the attachment load data (within the data set), which is normally the first sector of cylinder 02.
- A separate record on the attachment program diskette pointed to by the second header label.

Note: Diskettes released for EC updates prior to July, 1982, do not contain this information in either location.

The following table gives a brief summary of the storage load definition data for the ROS Patch Data Sets using Series/1 standard 16-bit architecture, the Control Load Data Sets (ROS Patch Data Sets) using Series/1 extended I/O architecture, and the Application Load Data Sets using Series/1 extended I/O architecture. The Series/1 extended I/O architecture support 32-bit addresses and byte counts. In the following description of the data set header, the data which immediately follows the header is referred to simply as the load:

Word Number	Current Header Definition (ROS Patch Data)	Extended I/O Header Definition (Control Load Data)	Extended I/O Header Definition (Application Data)
00 - 03	'RAMPATCH'	'CNTLLOAD'	'APPLLOAD'
04	ROS compatibility number	ROS compatibility number	ROS compatibility number
05	Reserved	Load release level	Load release level
06	Load segment count and load level	Reserved	Reserved
07 - 08	Feature code	Feature code	Feature code
09	Not used	Not used	Not used
10	Reserved	Device ID	Device ID
11	Reserved	Attachment personality number	Attachment personality number
12 - 13	Reserved	Reserved	Start execution address
14 - 15	Reserved	Load starting address	Load starting address
16 - 17	Reserved	Load byte count	Load byte count
18	Reserved	Reserved	Reserved
19	Load segment 1 starting address	Reserved	Reserved
20	Load segment 1 byte count	Reserved	Reserved
21 - 48	Load segments 2-15 start address/count	Reserved	Reserved
49 - 55	Reserved	Reserved	Reserved
56 - 63	Device dependent	Device dependent	Appl. dependent
64 - 127	Load data	Device dependent	Appl. dependent

A more detailed description of the information contained in the storage load definition data follows:

Words 0 through 3—Load type: The first four words give the EBCDIC value of the different load types. These types are:

- RAMPATCH, defines the currently supported storage load header; supports only a 16-bit attachment storage address and byte count for ROS patches.
- CNTLLOAD, defines the extended I/O architecture storage load header which supports a 32-bit attachment storage and byte count for ROS patches called the 'Control Load'.
- APPLLOAD, defines the extended I/O architecture storage load header which supports a 32-bit attachment storage and byte count for ROS patches called the 'Application Load'.

Word 4—ROS Compatibility Number: The ROS Compatibility Number is used to ensure that this Load Data is intended for the ROS on the attachment. For either RAMPATCH or CNTLLOAD, the ROS Compatibility Number must be equal to the ROS Compatibility Number of the ROS on the attachment. Verification of the ROS Compatibility Number by APPLLOAD is not required.

Word 5—Load Release Level: This word contains the Release Level of the data to be loaded into the attachment for CNTLLOAD and identifies the level of the ROS patch. The first release will always be 0001, the second release will always be 0002, and so on. Use of this word by APPLLOAD is not required and is at the discretion of the application programmer. This word is not used by RAMPATCH. See Word 6 for the Load Release Level used by RAMPATCH.

Word 6—Load Information: This word contains the information required to load the data following this header into the attachment random access storage for modification of the attachment ROS. This word is used only by RAMPATCH and is defined as follows:

- Byte 0 - Load Segment Count

This byte contains the number of segments of data to be loaded into the attachment. Data segmentation is only supported by RAMPATCH.

- Byte 1 - Load Release Level

This byte contains the Release Level of the data to be loaded into the attachment and identifies the level of the ROS patch. The first release will always be 01, the second release will always be 02, and so on. etc.

Words 7 and 8—Feature Code: These words contain the EBCDIC value of the attachment's Feature Code.

Word 9—Not Used: This word is not used.

Word 10—Device ID: This word contains the Series/1 Device Identification for which this load data is intended.

Word 11—Attachment Personality Number: This word contains the Attachment Personality Number for which this load data is intended.

Words 12 through 13—Start Execution Address: These words contain the doubleword Application Storage Address at which the application execution is to start. These words are used by APPLLOAD only and have no meaning for RAMPATCH or CNTLLOAD.

Words 14 through 15—Load Start Address: These words contain the doubleword attachment storage address at which the load data is to be loaded into the attachment. These words are used by CNTLLOAD and APPLLOAD only. See Word 19 for the Start Address used by RAMPATCH.

Words 16 through 17—Load Byte Count: These words contain the doubleword count of the number of bytes of data to be loaded into the attachment starting at the Load Start Address. These words are used by CNTLLOAD and APPLLOAD only. See Word 20 for the byte count used by RAMPATCH.

Word 18—Reserved: This word is reserved and must be zero.

Word 19—Load Segment 1 Start Address: This word contains the 16-bit attachment storage address at which the first segment of load data is to be loaded into the attachment. This word is used by RAMPATCH only.

Word 20—Load Segment 1 Byte Count: This word contains the 16-bit count of the number of bytes of data to be loaded into the attachment starting at the Data Load Segment 1 Start Address. This word is used by RAMPATCH only.

Words 21 through 48—Load Segments 2-15 Start Address and Byte Count: These words contain the attachment storage address and byte counts of segments 2 through 15 of the data load. These words are used by RAMPATCH only.

Words 49 through 55—Reserved: These words are reserved and must be zero.

Words 56 through 63—Load Type Dependent Header Information: These words are not architectured and are either device dependent header information for RAMPATCH and CNTLLOAD or application dependent header information for APPLLOAD.

Words 63 through 127—Data/Load Type Dependent Header Information: For RAMPATCH, these words are actual data since RAMPATCH recognizes only a 64-word (128-byte) header, while both CNTLLOAD and APPLLOAD use a 128-word (256-byte) header for compatibility purposes with the RPS and EDX loaders.

These words are not architectured and are either device dependent header information for CNTLLOAD or application dependent header information for APPLLOAD.

Attachment Device IDCBs and DCBs

The following pages show the immediate device control blocks (IDCBs) and device control blocks (DCBs) for the various attachment features cards. Immediate device control blocks consist of two words and device control blocks consist of seven words. Word 0 of the DCB is the control word. The control word consists of:

- Command field (bits 0 – 4)

- Address key (bits 5 – 7)

- Modifier field (bits 8 – 15).

Each bit can be represented by 0, 1, or X. An X designates that the bit can either be 1 or 0.

Integrated diskette unit for IBM 4952, 4954, and 4956 Model C Processors (8-inch diskettes)

IDCB

Word	Command field	Device address
0	Hex 70	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 1 0 1 0 0 0 0
1	0's		
2	0's		
3	Hex 0C00		
4	0's		
5	0's		
6	Byte count (Hex 03A0)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 1 1 0 0 0 0 1
1	0's		
2	0's		
3	Hex 0C00		
4	0's		
5	0's		
6	Byte count (Hex 03A0)		
7	Data address		

0   15

Integrated diskette/disk unit for IBM 4952, 4954, and 4956 processors (8-inch diskettes)

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 0 1 0 0
1	Controller start address		
2	0's		
3	0's		
4	Residual status block address		
5	DCB chain address		
6	Byte count		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 1 0 0 0
1	Controller start address		
2	0's		
3	0's		
4	Residual status block address		
5	DCB chain address		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	Controller start address		
2	0's		
3	0's		
4	Residual status block address		
5	DCB chain address		
6	Byte count		
7	Data address		

0   15

Integrated diskette/disk unit for IBM 4956 processors (5.25-inch diskettes)

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0 15

	Immediate data field
1	DCB address

16 31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 0 1 0 0
1	Storage address (offset)		
2	Storage address (segment)		
3	RAM load code	0's	
4	0's		
5	0's		
6	Byte count		
7	Data address		

0 15

Load DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 1 0 0 0
1	Storage address (offset)		
2	Storage address (segment)		
3	Ram load	0's	
4	0's		
5	0's		
6	Byte count		
7	Data address		

0 15

Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	0's		
7	0's		

0 15

IBM 4963 Disk Subsystem

IDCB

Word	Command field	Device address
0	Hex 7D	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 0 0 1 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0200)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 1 0 0 0 1
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0200)		
7	Data address		

0   15

IBM 4965 Storage and I/O Expansion Unit Model 1

IDCB

Word	Command field	Device address
0	Hex 70	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 1 0 1 0 0 0 0
1	0's		
2	0's		
3	Hex 0C00		
4	0's		
5	0's		
6	Byte count (Hex 03A0)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 1 1 0 0 0 0 1
1	0's		
2	0's		
3	Hex 0C00		
4	0's		
5	0's		
6	Byte count (Hex 03A0)		
7	Data address		

0   15

IBM 4965 Storage and I/O Expansion Unit Models 30D and 60D

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 0 1 0 0
1	Controller start address		
2	0's		
3	0's		
4	Residual status block address		
5	DCB chain address		
6	Byte count		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 1 0 0 0
1	Controller start address		
2	0's		
3	0's		
4	Residual status block address		
5	DCB chain address		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	Controller start address		
2	0's		
3	0's		
4	Residual status block address		
5	DCB chain address		
6	Byte count		
7	Data address		

0   15

IBM 4965 Storage and I/O Expansion Unit Model E00

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 0 1 0 0
1	Storage address (offset)		
2	Storage address (segment)		
3	Ram load code	0's	
4	0's		
5	0's		
6	Byte count		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 1 0 0 0
1	Storage address (offset)		
2	Storage address (segment)		
3	Ram load	0's	
4	0's		
5	0's		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	0's		
7	0's		

0   15

IBM 4966 Diskette Magazine Unit

IDCB

	Command field	Device address
Word		
0	Hex 70	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 1 0 1 0 0 0 0
1	0's		
2	0's		
3	Hex 0C00		
4	0's		
5	0's		
6	Byte count (Hex 03A0)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 1 1 0 0 0 0 1
1	0's		
2	0's		
3	Hex 0C00		
4	0's		
5	0's		
6	Byte count (Hex 03A0)		
7	Data address		

0   15

IBM 4967 High-Performance Disk Unit Subsystem

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	
	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 0 1 0 0
1	Attachment storage address		
2	Device selector		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	Attachment storage address		
2	Device selector		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	Attachment storage address		
2	Device selector		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

IBM 4968 Autoload Streaming Magnetic Tape Unit

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	1 1 1 0 0 1 0 0
1	Start address (see note)		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (see note)		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 1 0 0 0
1	Start address (see note)		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (see note)		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 0 0 1 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	0's		
7	0's		

0   15

Note: The combination of the start address and the byte count must be within the address range of Hex 4100−438F. Byte count must be even and less than Hex 028F.

IBM 4969 Magnetic Tape Subsystem

IDCB

Word	Command field	Device address
0	Hex 7D	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 0 0 1 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0200)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 1 0 0 0 1
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0200)		
7	Data address		

0   15

IBM 4973 Line Printer

IDCB

Word	Command field	Device address
0	Hex 70	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 0	X X X	0 0 0 1 0 0 0 0
1	0's		
2	0's		
3	0's		
4	Diagnostic address		
5	Chain addr (word 0, bit 0=1)		
6	Byte count (see note)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 1 0 0 0 1
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (see note)		
7	Data address		

0   15

Note: Maximum byte count is Hex 0400. If byte count is even, the printer branches to the last diagnostic address accessed as soon as the byte count equals 0. This activates the attachment load program.

IBM 4974 Printer

IDCB

Word	Command field	Device address
0	Hex 70	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 0	X X X	0 0 0 1 0 0 0 0
1	0's		
2	0's		
3	0's		
4	Diagnostic address		
5	Chain addr (word 0, bit 0=1)		
6	Byte count (see note)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0	X X X	0 0 0 1 0 0 0 1
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (see note)		
7	Data address		

0   15

Note: The maximum byte count is Hex 0400 (Hex 0800 with the Katakana RPQ installed). If the byte count is even, the printer branches to the last diagnostic address accessed as soon as the byte count equals 0. This activates the attachment load program.

IBM 4987 Programmable Communications Subsystem

IDCB

Word	Command field	Device address
0	Hex 79	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Write DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	Function ID (see note 1)		
2	Starting address (see note 2)		
3	0's		
4	0's		
5	0's		
6	Byte count (see note 3)		
7	Data address		

0   15

Notes:

1. Function ID; Byte 0 (bits 0 − 7) must be equal to 0 for the first data block and equal to 1 for all other data blocks; Byte 1 (bits 8 − 15) must be 0's.

2. Starting address must be greater than Hex 9200 and less than Hex C000. This address is the second word of the program change data.

3. Byte count must be even and greater than or equal to Hex 0800. The byte count is the first word of the program change data.

5250 Information Display System

IDCB

Word	Command field	Device address
0	Hex 72	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	0 0 0 0 0 0 1 0
1	Storage address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	Storage address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Load and Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	0 0 0 0 0 0 0 1
1	Storage address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Communications Feature—Asynchronous Multiple-Line

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0800)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 01F8)		
7	Data address		

0   15

Communications Feature—Binary Synchronous Multiple-Line

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0800)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0300)		
7	Data address		

0   15

Communications Feature—Programmable Multiple-Line

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0800)		
7	Data address		

0   15

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 01B0)		
7	Data address		

0   15

Local Communications Controller

The attachment load or EC update can be read from the attachment using the following DCB.

IDCB

Word	Command field	Device address
0	Hex 72	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	Hex 0180		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0600)		
7	Data address		

0   15

The following two Write DCBs are used to load and activate attachment storage or EC updates. The first Write DCB loads attachment storage into Hex 1800 of read access memory, and the second Write DCB points to that location.

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	Hex 1800		
3	0's		
4	0's		
5	0's		
6	Byte count (see note)		
7	Data address		

0   15

Note: Byte count is the first word of the attachment storage load data if read from the attachment program diskette. Byte count is Hex 0600 if read from the attachment.

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	0's		
2	Hex 1FFE		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0002)		
7	Data address (Hex D801)		

0   15

Multidrop Work Station Attachment

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 0	X X X	1 1 1 0 0 1 0 0
1	Start address (>Hex 7FFF)		
2	0's		
3	0's		
4	0's		
5	DCB chaining address (even)		
6	Byte count (even, <Hex 0801)		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 1 0 0 0
1	Start address (see note)		
2	0's		
3	0's		
4	0's		
5	DCB chaining address (even)		
6	Byte count (even)		
7	Data address		

0   15

Note: Start address can range from Hex 8000 – BEFE or C000 – FFFE.

Load and Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 1 0 1 0
1	Start address		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (even)		
7	Data address		

0   15

Note: After you initialize the multidrop work station attachment, you must customize the attachment with the WRITE DEFINITION DATA command, and then initialize the 4980. (See the *Series/1 Multidrop Workstation Attachment Description*, GA34-0268, and the *Series/1 4980 Display Station Description and Reference Manual*, GA21-9296.)

Printer Attachment —5200 Series

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 0	X X X	1 1 1 0 0 1 0 0
1	Start address (>Hex 7FFF)		
2	0's		
3	0's		
4	0's		
5	DCB chaining address (even)		
6	Byte count (even, <Hex 8001)		
7	Data address		

0   15

Note: The combination of start address and byte count must be less than Hex E000.

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	1 1 1 0 1 0 0 0
1	Start addr (Hex 8000 - BEFF)		
2	0's		
3	0's		
4	0's		
5	DCB chaining address (even)		
6	Byte count (even, <Hex 3F01)		
7	Data address		

0   15

Load and Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 1 0 1 0
1	Start addr (Hex 8000 - BEFF)		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (even, <Hex 3F01)		
7	Data address		

.0   15

RPQs D02312/13/14 (Data Entry Loop)

IDCB

Word	Command field	Device address
	Hex 70	Hex 00-FF
0	0	15

	Immediate data field
1	DCB address
	16 31

Read DCB

Word	Command	Key	Modifier
0	0 0 1 0 0	X X X	0 1 1 0 0 0 0 0
1	Hex 0800		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 0100)		
7	Data address		
	0 15		

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 1 1 0 0 0 0 0
1	Hex 0800		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count (Hex 00FE)		
7	Data address		
	0 15		

Synchronous Communication Single-Line Control/High Speed

IDCB

Word	Command field	Device address
	Hex 72	Hex 00-FF
0	0	15

	Immediate data field
1	DCB address
	16 31

Write DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	0 0 0 0 0 0 0 0
1	Storage address		
2	0's		
3	0's		
4	0's		
5	0's		
6	Byte count		
7	Data address		
	0 15		

Series/1 to Personal Computer Channel Attachment

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 0	X X X	1 1 1 0 0 1 0 0
1	Start address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Clear DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	1 1 1 1 0 0 1 0
1	0's		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	0's		
7	0's		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	1 1 1 0 1 0 0 0
1	Start address (>Hex 00FF)		
2	Operation dependent (see note)		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 0 0 1 0
1	0's		
2	Operation dependent (see note)		
3	0's		
4	0's		
5	0's		
6	0's		
7	0's		

0   15

Load and Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 1 0 1 0
1	Start address (>Hex 00FF)		
2	Operation dependent (see note)		
3	0's		
4	0's		
5	0's		
6	Byte count		
7	Data address		

0   15

Note: DCB word 2 contains:

Bit 0	Reverse inhibit
Bit 1	Checksum inhibit
Bit 2	Clear storage
Bits 3−4	0's
Bits 5−7	Function ID
Bits 8−15	0's.

RPQ D02788 (Multi-Communications Controller)

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

Word	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 0	X X X	1 1 1 0 0 1 0 0
1	Start address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Clear DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	1 1 1 1 0 0 1 0
1	0's		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	0's		
7	0's		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	1 1 1 0 1 0 0 0
1	Start address (>Hex 00FF)		
2	Operation dependent (see note)		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 0 0 1 0
1	0's		
2	Operation dependent (see note)		
3	0's		
4	0's		
5	0's		
6	0's		
7	0's		

0   15

Load and Initialize DCB

Word	Command	Key	Modifier
0	0 0 0 0 0	X X X	1 1 1 0 1 0 1 0
1	Start address (>Hex 00FF)		
2	Operation dependent (see note)		
3	0's		
4	0's		
5	0's		
6	Byte count		
7	Data address		

0   15

Note: DCB word 2 contains:

Bit 0	Reverse inhibit
Bit 1	Checksum inhibit
Bit 2	Clear storage
Bits 3 − 14	0's
Bit 15	Segment flag.

The Initialize DCB is operation dependent for bit 1 only.

Multifunction Attachment

IDCB

Word	Command field	Device address
0	Hex 7C	Hex 00-FF

0   15

	Immediate data field
1	DCB address

16   31

Read DCB

Word	Command	Key	Modifier
0	X 0 1 0 X	X X X	1 1 1 0 0 1 0 0
1	Storage address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Load DCB

Word	Command	Key	Modifier
0	X 0 0 0 0	X X X	1 1 1 0 1 0 0 0
1	Storage address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

Initialize DCB

Word	Command	Key	Modifier
0	X 0 0 0 X	X X X	1 1 1 0 0 0 1 0
1	Storage address		
2	0's		
3	0's		
4	0's		
5	DCB chaining address		
6	Byte count		
7	Data address		

0   15

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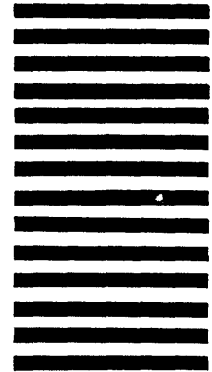## BUSINESS REPLY MAIL

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