Systems

**Introducing the
IBM 3800 Printing Subsystem
and Its Programming**

IBM

Systems

Introducing the
IBM 3800 Printing Subsystem
and Its Programming

IBM

PREFACE

This publication is intended to introduce prospective users to the IBM 3800 Printing Subsystem. The intended audience is data-processing managers and system analysts planning for the 3800, and others seeking an introduction to it. The material is presented in general terms and assumes that the reader has prior knowledge of IBM printers.

The publication has the following major divisions:

- "Introduction," which presents an overview of the 3800 and discusses some of its advantages over impact printers.

- "Physical Description of the 3800," which briefly describes the 3800 Printing Subsystem.

- "Standard Features of the 3800," which describes the features that are included in the basic configuration.

- "Optional Features of the 3800," which describes the optional features that can be added to the basic configuration.

- "Using the IBM 3800 Printing Subsystem," which discusses the programming characteristics for using the features and functions of the 3800.

This publication also includes a glossary and an index.

There is no particular prerequisite reading for this publication, although a basic knowledge of computers is assumed.

Information on forms design for the 3800, including the use of forms overlay, is in *Forms Design Reference Guide for the IBM 3800 Printing Subsystem*, GA26-1633.

CONTENTS

FIGURES

INTRODUCTION

The IBM 3800 Printing Subsystem (Figure 1) is a nonimpact, high-speed, general-purpose system printer that uses standard single-ply computer output paper. It uses an electrophotographic technique with a low-powered laser to print on paper, rather than mechanically striking the paper through an inked ribbon as does a typewriter or conventional impact printer.
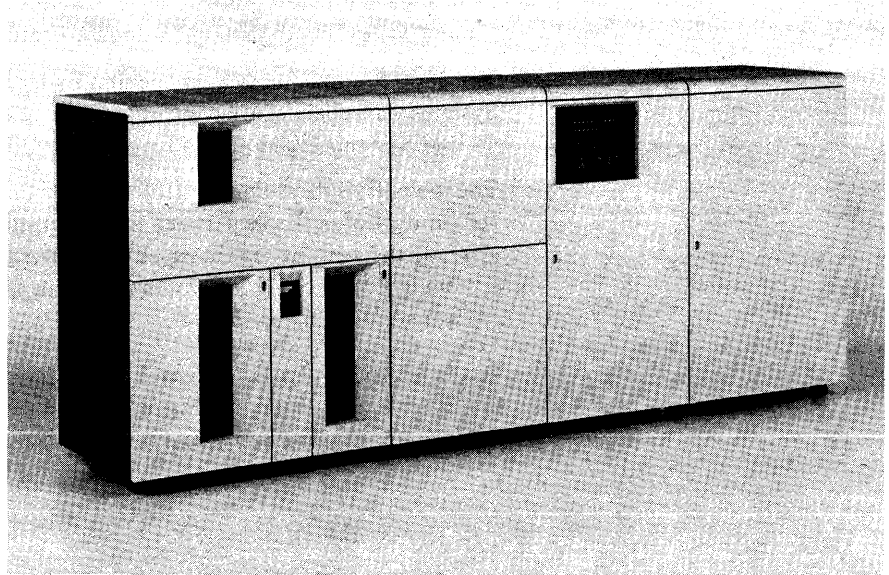
Figure 1. The IBM 3800 Printing Subsystem

The 3800 is designed to print faster than current impact printers, and to provide compatibility for user programs that, until now, have used impact printers. It also provides easy-to-use programming interfaces for its new functions and features. Among these new features are:

- Any two of eighteen different character sets (including 10-, 12- and 15-pitch sets) can be used, and these can be changed between data sets without operator intervention. With additional character generation storage, up to four character sets can be used when printing each data set.

- The forms control buffer in the 3800 controls the vertical format of pages, allowing printing at either six or eight lines per inch, or an intermix of both vertical line spacings on the same page.

- Multiple copies are printed on single-ply paper by programmed control, thus eliminating the need for multiple-ply paper and subsequent deleaving.

- Forms overlay permits printing of specialized forms as data is being printed, thus reducing the need for preprinted forms.

- Copy modification permits changing or suppressing printing of selected data from copy to copy when multiple copies are being printed.

- Graphic character modification allows the substitution or extension of graphic characters in an already-defined character set.

The 3800 uses a photoconductive material that retains an electrostatic charge until it is exposed to light. A light beam from a low-powered laser exposes onto the photoconductor the image of the data to be printed. This image is then toned and transferred to the paper.

As long as there is sufficient data to print, the 3800 prints at a constant high speed. It can process, for example, 3000 11-inch long forms in approximately 18 minutes of continuous printing, regardless of the number of lines per page.

The paper used in the 3800 Printing Subsystem is the same as that used in conventional impact printers (that is, single-ply, continuous form, side edges punched, and perforated between pages). The sizes of paper that can be used may be chosen from a set that covers a broad range of forms requirements (see "Continuous Forms Input Station" in the section "Standard Features of the 3800" for these sizes).

The 3800 Printing Subsystem operates under the OS/VS1 and OS/VS2 Operating Systems via a channel attachment and can be added to a system configuration with an IBM System/370 Model 145, 155-II, 158, 165-II, or 168.

The job entry subsystems control the setup and use of the 3800 and can reassign the printing of data sets between impact printers and the 3800, should such a need arise. If the printing requires special features unique to the 3800, the operating system ignores the JCL keywords specifying these features when the job is reassigned to an impact printer.

In the following pages the physical characteristics, standard and optional features, and programming support for selecting and controlling the features and functions of the 3800 Printing Subsystem are described in greater detail.

PHYSICAL DESCRIPTION OF THE 3800

To become more familiar with the IBM 3800 Printing Subsystem, let's follow the path the paper takes as it moves through to become printed output. Figure 2 shows this paper flow path.
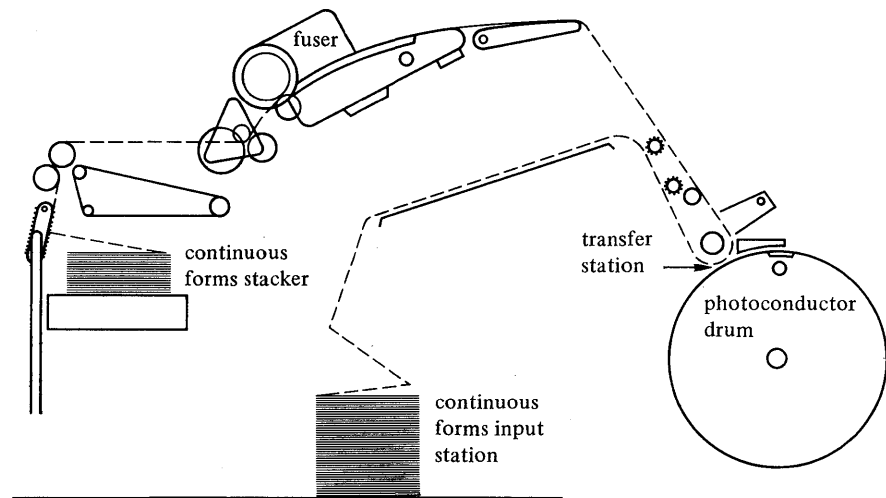
Figure 2. The paper flow through the 3800.

The box of single-ply continuous forms is placed in the input station by the operator. (For more about this station, including forms requirements, see "Continuous Forms Input Station.") The operator then threads the paper into the paper transport mechanism, making adjustments for the width and length of the forms to align the page-top perforations at the starting position.

When the 3800 begins printing, the paper feeds to the transfer station where it comes in contact with the photoconductive surface of a rotating drum. The desired character images have already been exposed onto the photoconductor by a low-powered laser beam, and the latent images coated with toner. The toner (a thermoplastic material impregnated with lampblack) is transferred from the photoconductor to the paper, and the paper then passes through the fuser, which fuses the toned image into the paper. After transferring its image to the paper, the photoconductor is cleaned and reconditioned for the next exposure. Figure 3 shows, with the covers open, the drum area and the paper feeding to and from the transfer station.

Finally the printed paper goes into the continuous forms stacker where it is refolded. Figure 4 shows both the continuous forms input station and, to the left of it, the continuous forms stacker.

The control electronics section, located at the right end of the 3800, contains the electronics and microprogram that control the printing operations, paper transport, and communications with the system via the channel. Figure 5 shows a part of this area of the 3800 including the operator panel.
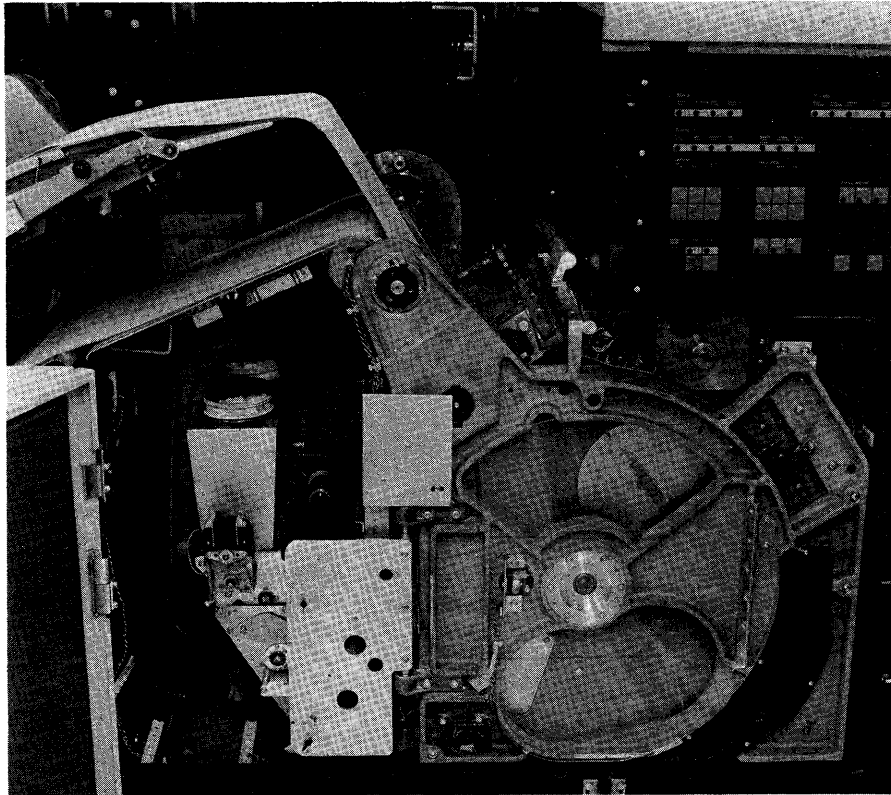
Figure 3. The photoconductor drum and paper feeding to and from the transfer station.
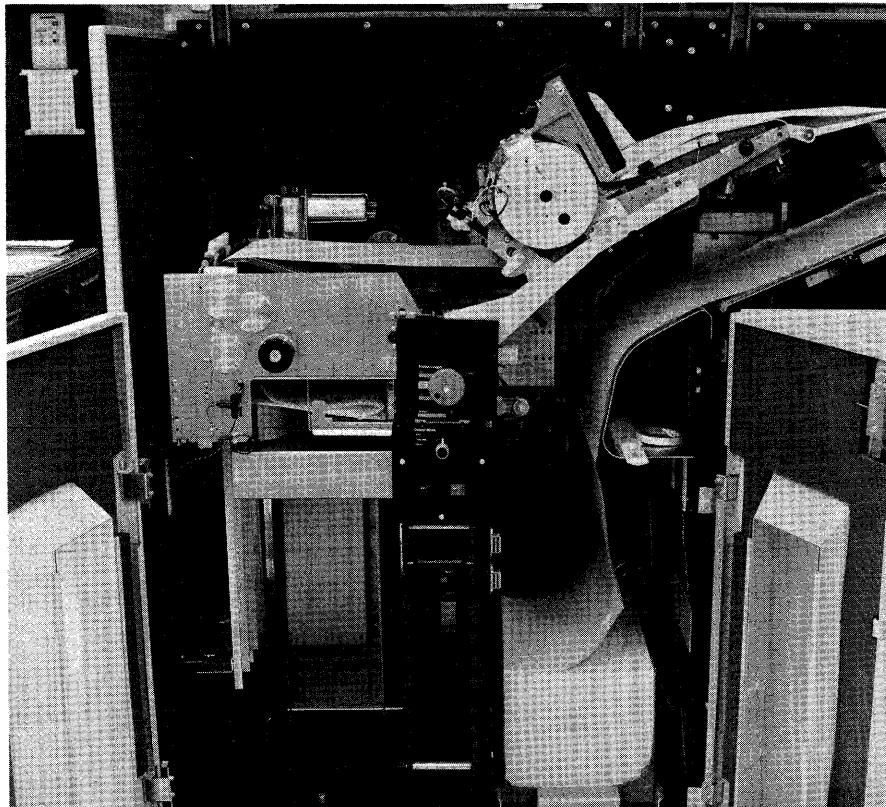
Figure 4. The continuous forms input station and continuous forms stacker.
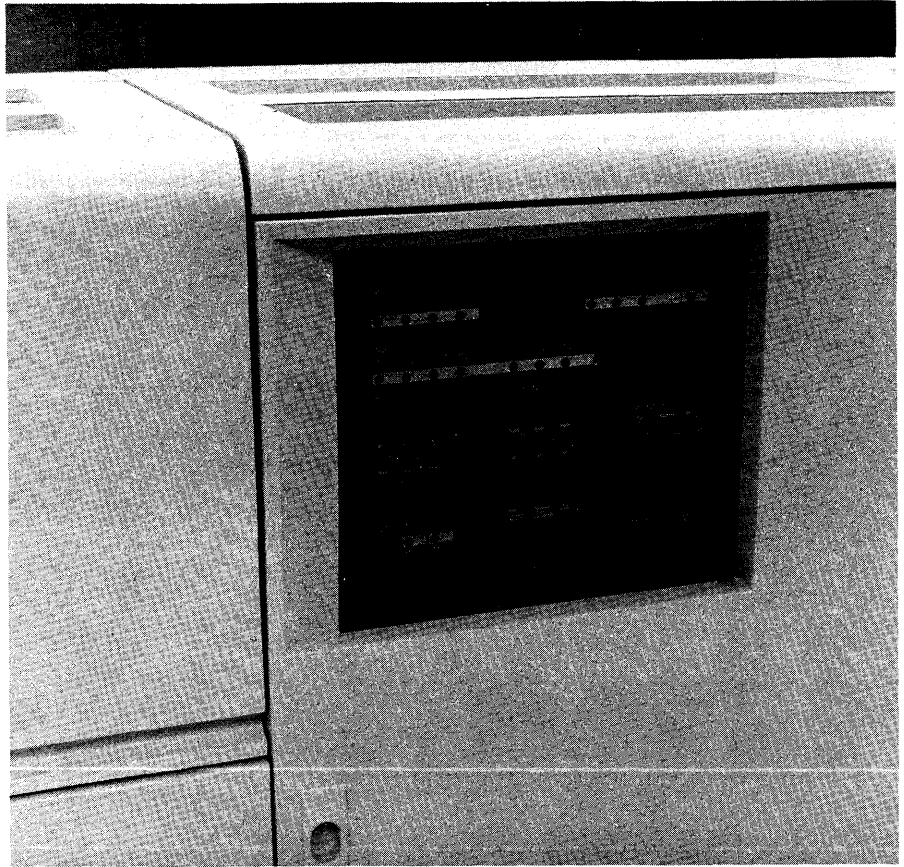
Figure 5. The operator panel of the 3800.

STANDARD FEATURES OF THE 3800

Standard features of the IBM 3800 Printing Subsystem include the following:

- A continuous forms input station.

- A continuous forms stacker.

- A forms control buffer.

- Page buffer storage of 54K bytes.

- Eighteen character sets, the capability to print multiple character styles separately or intermixed at 10, 12 or 15 characters per inch, and the capability to print at vertical spacings of 6 and 8 lines per inch separately or intermixed.

- Forms overlay.

- Graphic character modification, which allows the printing of substitution or user-designed graphic characters.

- Copy modification.

Continuous Forms Input Station

The input station for feeding continuous forms into the 3800 consists of a place for the paper supply, a support to position the web of paper as it is pulled in by the transfer station carriage tractors, and a forms sensor to indicate the end of forms.

The 3800 uses continuous single-ply fanfold forms with both edges punched for tractor feeding, and perforations between the pages. The paper may be of various light pastel colors; it may be preprinted, have ruled lines or color striping, or may be blank. The operator removes one side or end of the box before use, to prevent a vacuum from forming under the paper as it feeds from the box. Running carrier strip perforations should not be used, and there are various other specifications on allowable internal perforations, binder holes, and preprinting within the printable portion of the forms. See the *Forms Design Reference Guide for the IBM 3800 Printing Subsystem* for these specifications.

Figures 6 and 7, respectively, list common-use paper sizes and ISO paper sizes (not available in the United States and Canada) for the 3800. Only one set of sizes, either common-use or ISO, can be specified on any one 3800. Within each set, the widths, lengths, and basis weights shown within each figure can be used in any combination.

The operator, after opening a new box of paper and removing a side or end, threads the paper through the 3800 and makes adjustments for the size of form being used and top-edge alignment. When the paper runs out, the first sheet of the next box of paper is spliced onto the last sheet using a special splicing tape. No further adjustment is necessary as long as the paper size remains the same from box to box.

Widths in inches (overall, including carrier strips)	Lengths in inches	Basis weights
6-1/2	3-1/2	15 to 24 pounds
8-1/2	5-1/2	(56 to 90 grams per square metre)
9-1/2	7	
9-7/8	8-1/2	
10-5/8	11	
11		
12		
13-5/8		
14-3/10		
14-7/8		

Figure 6. Common-use paper sizes usable in the 3800.

Widths in millimetres (overall, including carrier strips)	Lengths in inches	Basis weights
165	3	15 to 24 pounds
180	4	(56 to 90 grams per square metre)
215	6	
235	8	
250	10	
270	12	
280		
305		
322		
340		
363		
378		

Figure 7. ISO paper sizes usable in the 3800 (not available in the United States and Canada).

Continuous Forms Stacker

After printing, the paper output from the 3800 is refolded in a continuous forms stacker. Both the length and width of the stacker are adjustable by the operator to fit the particular forms being used. For common-use paper sizes the two shortest lengths, 3-1/2 and 5-1/2 inches, are refolded two lengths at a time in fold lengths of 7 and 11 inches, respectively. Likewise, the two shortest ISO paper sizes, 3 and 4 inches, are refolded two lengths at a time into fold lengths of 6 and 8 inches.

With the 3800 the horizontal perforation between pages of the forms can be marked at the end of each job in the output stream, to help the operator separate the jobs. This is a hardware capability activated through the job entry subsystem.

Forms Control Buffer

The forms control buffer (FCB) in the 3800 replaces the paper carriage control tape used in some impact printers, and is used with program commands to control the vertical format of the page. Different from the forms control buffer of the IBM 3211 Printer, it permits printing at either six or eight lines per inch or an intermix of both vertical line spacings on the same page. The FCB is constructed and stored in SYS1.IMAGELIB with the use of the IEBIMAGE utility program. The FCB specifications are loaded before any data is transferred from the CPU to the 3800.

Page Buffer Storage

Data to be printed is transmitted one line at a time from the CPU to the 3800 and stored in an internal page buffer. When all of the data for a page is in the buffer, the specified number of copies is automatically printed. Blank lines, produced by Space and Skip commands, are automatically compressed before being stored, as are repeated characters within a data line. The page buffer of the 3800 stores 54K bytes of compressed data.

The page buffer can hold the data for more than one page at a time. While one page is being printed, data for the next page and any following pages is accepted from the CPU and stored in the page buffer until it is full. When printing of a page is completed, the page buffer storage required for that page is made available for new data. The 3800 immediately begins printing the next page if its data is already complete in the buffer. For a further discussion of the operation of the page buffer see "Performance Considerations" in the chapter "Using the IBM 3800 Printing Subsystem."

The page buffer is managed by the microprogram in the control electronics section. The program in the CPU has no control over the data in the page buffer.

Character Sets

Eighteen character sets are supplied with the 3800. Figure 8 lists the supplied sets. In addition, the graphic character modification feature allows extension or modification of the character sets.

The image information for each character set supplied with the 3800 resides on a flexible disk in the control electronics portion of the machine. The desired character set is selected by the programmer using the CHARS keyword (see "CHARS Keyword" under "New JCL DD Statement Keywords") and is loaded into character generation storage by the operating system. Once loaded, it remains there until overlaid by another load of a character set, or modified through graphic character modification. The character generation storage of the 3800 permits printing using two character sets (a maximum of 128 characters) for a single data set. More can be ordered, if desired, to allow printing with up to four character sets intermixed (see "Additional Character Generation Storage" in the next chapter).

Character set	Characters per inch (pitch)	Number of characters in the set (not including a blank, which is also part of each character set except Katakana)
Gothic-10	10	63
Gothic-12	12	63
Gothic-15	15	63
Gothic-10 underscored	10	63
Gothic-12 underscored	12	63
Gothic-15 underscored	15	63
Katakana-10*	10	64
Katakana-12*	12	64
Katakana-15*	15	64
OCR-A	10	52
OCR-B	10	54
Text 1	10	63
Text 2	10	63
Text 1 underscored	10	63
Text 2 underscored	10	63
Format-10	10	36
Format-12	12	36
Format-15	15	36

*Katakana is used together with Gothic, thus using character generation storage for 128 characters (including a blank).

Figure 8. Character sets supplied with the 3800.

Examples of the different styles of characters in the character sets are shown in Figure 9. The Format character sets are new with the 3800, providing lines, corners and tees in different line weights, which can be used, for example, to print a box where information is to be filled in later on a form.

Gothic-10: `ABCDEFGHI¢.<(+|&JKLMNOPQR!$*);¬-/STUVWXY Z¤,%_>?0123456789:#a'="`

Gothic-15: `ABCDEFGHI¢.<(+|&JKLMNOPQR!$*);¬-/STUVWXYZ¤,%_>?0123456789:#a'="`

Gothic-10 underscored: `ABCDEFGHI¢.<(+|&JKLMNOPQR!$*);¬-/S TUVWXYZ¤,% >?0123456789:#a'="`

Gothic-15 underscored: `ABCDEFGHI¢.<(+|&JKLMNOPQR!$*);¬-/STUVWXYZ¤,% >?012 3456789:#a'="`

Katakana-10: `¥。「」、・ヲァィゥコケサシスセソタチツテトナニヌネノ一アハヒフイウヘホマミム メモヤユエヨラリルオカキクェォャュョッレロワン゛゜`

OCR-A: `ABCDEFGHI♪・ ■ ¯Ⴤ&JKLMNOPQRⴕ$*_∅ఠ-/ƧTUVⴓXYZ Ñ┐Ä─Æ・0Ⴑ23456789Ȝ₿¥£Ü`

Figure 9 (Part 1 of 2). Samples of character set styles.

Text 1: `ABCDEFGHI¢.<(+|&JKLMNOPQR!$*);--/STUVWXYZ`
`¤,%_>?0123456789:#ə'="`

Text-2: `abcdefghi[•≤{±■°jklmnopqr+]-}↑§¶≠stuvwxyz`
`ᒧ ᒩ≥\0123456789-+()†‡`

Format-10: `ᒋ ᒋᒋᒉᒉ �L�L �Lᒲᒉᒉᒉ ┠┠┨┨┯┯┷┷┷┷┨┨┨ ━││││ ┊┊`

Format-15: `ᒋᒋᒉᒉᒉᒲᒲᒲᒉᒉᒉ ┠┠┨┨┯┯┷┷┷┨┨ ━│││┊┊┊`

Figure 9 (Part 2 of 2). Samples of character set styles.

The 3800 Printing Subsystem can print 10-pitch (10 characters per inch), 12-pitch, and 15-pitch characters in a line separately or intermixed.

Figures 10 and 11, for common-use paper sizes and ISO paper sizes, respectively, show the maximum number of printable characters per horizontal line according to the form width and character pitch used.

Forms width in inches	Maximum number of printable characters		
	10-pitch	12-pitch	15-pitch
6-1/2	55	66	82
8-1/2	75	90	112
9-1/2	85	102	127
9-7/8	89	106	133
10-5/8	96	115	144
11	100	120	150
12	110	132	165
13-5/8	126	151	189
14-3/10	133	159	199
14-7/8	136	163	204

Figure 10. Maximum characters per line on common-use paper sizes.

Forms width in millimetres	Maximum number of printable characters		
	10-pitch	12-pitch	15-pitch
165	55	66	82
180	61	73	91
215	74	89	111
235	82	99	123
250	88	106	132
270	96	115	144
280	100	120	150
305	110	132	165

Figure 11 (Part 1 of 2). Maximum characters per line on ISO paper sizes.

Forms width in millimetres	Maximum number of printable characters		
	10-pitch	12-pitch	15-pitch
322	116	139	174
340	123	148	185
363	133	159	199
378	136	163	204

Figure 11 (Part 2 of 2). Maximum characters per line on ISO paper sizes.

To allow for mechanical motion of the paper in the machine, the 3800 does not print within the 1/2-inch margin at the top and bottom of each page. Thus, the maximum number of lines that may be printed on an 11-inch long form, for example, is 60 at 6 lines per inch or 80 at 8 lines per inch.

Forms Overlay

The forms overlay feature provides the ability to print (in black) a form, graph, design, or constant data on paper as it is being processed through the 3800. This allows the use of blank forms rather than forms pre-printed for specific requirements. A frame holding the overlay negative for the form to be printed must be inserted into the machine before the printing begins. For information on designing and making forms overlays, see *Forms Design Reference Guide for the IBM 3800 Printing Subsystem.*

The form is printed on any desired number of copies of a data set, starting with the first copy, at the specification of the programmer (see "FLASH Keyword" under "New JCL DD Statement Keywords").

Graphic Character Modification

The graphic character modification feature provides for the substitution or extension of the graphic characters in an already defined character arrangement. The IEBIMAGE utility program is used to link a group of graphic characters with those in an existing arrangement.

The information that defines a group of character images used for substitution or extension with an existing arrangement resides on a system storage device and is loaded into the 3800 when required for printing. The 3800 programming support contains the graphic character modification data for the standard substitution characters known collectively as the World Trade National Use Graphics. When generating the system, these characters are included through system generation macros. Graphic characters are included for the following country groups:

Austria/Germany	Italy
Belgium	Japan
Brazil	Portugal
Denmark/Norway	Spain
Finland/Sweden	Spanish-speaking
France	United Kingdom
International	

User-designed Graphic Characters

With the 3800, characters or symbols other than those supplied can be designed by the user. For example, user-designed graphic characters could be added to provide non-Roman alphabets (such as Greek or Cyrillic), special fonts (such as boldface), or special characters not available with the supplied character sets or World Trade National Use Graphics.

Following suggested design guidelines, the desired character(s) or symbol(s) is drawn on a character design form. The user then describes to the IEBIMAGE utility program the design of the character(s) by duplicating the blank and non-blank grid positions of the design form. The output from the utility program is a graphic character modification module, which is stored on the SYS1.IMAGELIB system data set.

Next, the IEBIMAGE utility program is used to link the graphic character modification module to an existing character arrangement through an appropriate character arrangement table. When the table is selected by a program, the character set it identifies is loaded into a writable character generation module (WCGM). The character set in the WCGM is then modified as determined by the graphic character modification modules called by the character arrangement table.

Copy Modification

The 3800 can print more than one copy of each output data set (see "COPIES Keyword" under "New JCL DD Statement Keywords"). The copy modification feature allows printing of predefined data on specified copies of all pages of a data set. Examples of such data are legends, explanatory remarks and column headings, which might vary from copy to copy of the same printed page of data. Copies may also be personalized with the recipient's name, department, and other desired information.

This predefined data is constructed, named, and stored as a copy modification record on SYS1.IMAGELIB by using the IEBIMAGE utility program (see "The IEBIMAGE Utility Program"). It is used by specifying the name of the copy modification record with the MODIFY keyword (see "MODIFY Keyword" under "New JCL DD Statement Keywords").

Blanks or printable graphic characters, such as asterisks, can be used as the copy modification data to suppress the printing of variable data on particular copies of a page. An example of this is a manufacturer's unit cost, which is required on a file copy of an invoice but not on the customer's copy. This is a function done in other printers by means of short or spot carbon in the forms set.

OPTIONAL FEATURES OF THE 3800

Optional features for the IBM 3800 Printing Subsystem are:

- Additional character generation storage.
- A two-channel switch.

Additional Character Generation Storage

The character generation storage in the basic 3800 is sufficient for 128 graphic characters — two character sets. Additional character generation storage can be added to increase to four the number of character sets that can be used during the printing of a data set. Since the last position (hex 'FF') of the added storage is reserved as a code to indicate a non-printable character, the maximum capacity with the added storage is 255 characters.

For operating purposes, the character generation storage is divided into 64-position modules called writable character generation modules (WCGMs), each to hold one character set. Any combination of up to four WCGMs may be program-selected to be active for the printing of any one data set (see "Changing Character Arrangements Dynamically").

Two-channel Switch

A two-channel switch is available as an optional feature for attaching the 3800 via two channels to either a uniprocessor or to two separate CPUs. The switching is done manually, and only one channel interface is enabled at a time.

With the two-channel switch installed, a dynamic switch feature can be added for multiprocessor configurations or for uniprocessors that require an alternate path capability. Both channel interfaces can be enabled at the same time and the selection of those interfaces is determined by programming. For multiprocessor systems, the dynamic two-channel switch allows both CPUs, one at a time, to access the 3800. For uniprocessors, it allows access to the 3800 via an alternate channel path.

Also, with the two-channel switch installed, a remote switch feature may be added to permit manual channel selection from a remote console rather than at the printer.

USING THE IBM 3800 PRINTING SUBSYSTEM

The OS/VS1 and OS/VS2 operating systems support the operation of the IBM 3800 Printing Subsystem via a channel attachment. The programming support includes:

- DD statement keywords for specifying character arrangement tables, multiple copies, forms overlay printing, and modifying copies of data to be printed.

- Use of the names of chain/train arrangements (for example, AN, TN, etc.) on existing printers. All standard 1416 and 3216 print train arrangements of the IBM 1403-N1 and IBM 3211 printers are recognized.

- A basic group of character arrangements, not equivalent to any previous print chain/train arrangements, that is suitable for a wider variety of printing applications. The GS10 arrangement, for instance, includes all the graphic characters previously found on a number of different print trains, thus eliminating the need to change trains for special applications.

- Provision for dynamically selecting the character arrangement during the printing of a data set.

- Automatic control of features and functions for SYSOUT data sets according to specifications in JCL or system defaults. Unless there is a need to override SYSOUT class values, no special provision needs to be taken in JCL to print on the 3800.

- Specification of the set of System Writer setup values for the 3800 that best suits the major printing load.

- The IEBIMAGE utility program to provide a means for constructing, naming, and storing:

  - Forms control buffer (FCB) records.

  - Copy modification records.

  - Character arrangement table records.

  - Graphic character modification records.

  It also permits modification of the last three. The utility program also allows a linkage to be established between existing character arrangement tables and graphic character modification records so that character substitution can be performed.

The 3800 configuration and selection of character arrangement tables can be specified through system generation macros. The SYS1.IMAGELIB system data set is required for a system using the 3800. The 3800 can be added to a system through a full system generation or an I/O device generation. It is not supported as an output console device.

New JCL DD statement keywords are provided to support functions that are new with the 3800. The operating system initializes the printer based on these keyword specifications. The configuration of the 3800 may also be initialized or changed dynamically using the SETPRT macro instruction, by a problem program that has direct control of the printer.

New JCL DD Statement Keywords

The new DD statement keywords for the 3800, which can be used with other output DD statement keywords, are used to describe the output for printing data sets.

The keywords are specified on the SYSOUT DD statement where the 3800 is allocated as a system output device or on the output DD statement where it is allocated as a unit-record device.

The formats of these keywords and their subparameters are:

CHARS=(*table id* [,*table id*] ...)

COPIES=(N [,(n_1 ,n_2 ,...)]])

FLASH=(*overlay id* [,*count*])

MODIFY=(*record id* [,*trc*])

CHARS Keyword

The CHARS keyword allows the specification of a particular character arrangement table name or names (equivalent to impact printer chain/train names) to be used when printing a data set. The universal character set (UCS) keyword is not supported by the 3800. If the JCL for a job uses the UCS keyword, it should be changed to specify the appropriate character arrangement table name in the CHARS keyword. For example, if UCS=AN is currently specified, CHARS=AN should be specified with the 3800. The UCS parameter and the CHARS parameter are *not* mutually exclusive; they may both be specified on a DD card. The UCS parameter will be ignored by the 3800, but may be needed when another type of printer is used.

More than one character arrangement table (up to four or until the character generation storage capacity is reached) may be used to print a data set with no resulting degradation in performance (see "Changing Character Arrangements Dynamically" in this chapter).

CHARS=(*table id* [,*table id*] ...)
    table id
        is the name (from 1 to 4 alphanumeric characters) of the character arrangement table. No more than four names can be specified in a given DD statement.

Figure 12 gives the names of character arrangement tables supplied with the 3800, including those corresponding to print train names of IBM impact printers.

	Character Arrangement Table Names	Character Set	Pitch[1]	Number of Graphic Characters[2]	Comments
Basic	GS10	Gothic	10	63	
group	GS12	Gothic	12	63	
	GS15	Gothic	15	63	
	GF10	Gothic – folded	10	63	[3]
	GF12	Gothic – folded	12	63	[3]
	GF15	Gothic – folded	15	63	[3]
	GU10	Gothic – underscored	10	63	
	GU12	Gothic – underscored	12	63	
	GU15	Gothic – underscored	15	63	
	TU10	Text 1 & 2 – underscored	10	120	Uses two WCGMs[4]
3211	A11	Gothic	10	48	
group	G11	Gothic	10	63	
	H11	Gothic	10	48	
	P11	Gothic	10	60	
	T11	Text 1 & 2	10	120	Uses two WCGMs[4]
1403	AN	Gothic	10	48	
group	GN	Gothic	10	63	
	HN	Gothic	10	48	
	PCAN	Gothic	10	48	
	PCHN	Gothic	10	48	
	PN	Gothic	10	60	
	QN	Gothic	10	60	
	QNC	Gothic	10	60	
	RN	Gothic	10	52	
	XN	Gothic	10	40	
	YN	Gothic	10	42	
	SN	Text 1 & 2	10	84	Uses two WCGMs[4]
	TN	Text 1 & 2	10	120	Uses two WCGMs
OCR	AOA	OCRA, Gothic	10	48	Uses two WCGMs
group	AOD	OCRA, Gothic	10	48	Uses two WCGMs
	AON	OCRA, Gothic	10	48	Uses two WCGMs
	OAA	OCRA, Gothic	10	48	Uses two WCGMs
	ODA	OCRA, Gothic	10	48	Uses two WCGMs
	ONA	OCRA, Gothic	10	48	Uses two WCGMs
	BOA	OCRB, Gothic	10	48	Uses two WCGMs
	BON	OCRB, Gothic	10	48	Uses two WCGMs
	OAB	OCRB	10	48	
	ONB	OCRB, Gothic	10	48	Uses two WCGMs
Katakana	2773	Katakana, Gothic	10	62	Uses two WCGMs
group	2774	Katakana, Gothic	10	108	Uses two WCGMs
	KN1	Katakana, Gothic	10	127	Uses two WCGMs
Format	FM10	Format	10	36	
group	FM12	Format	12	36	
	FM15	Format	15	36	

[1] For any table using 10-pitch Gothic or Katakana, the pitch can be changed to 12 or 15 by changing the character set identifier using the IEBIMAGE utility.

[2] not including a blank, which is also part of each character set except Katakana.

[3] The GF10, GF12, and GF15 tables provide the folding effect to allow the printing of upper-case graphic characters when lowercase are called for.

[4] A WCGM (writable character generation module) is a 64-position portion of character generation storage for one character set.

Figure 12. Character arrangement tables supplied with the 3800.

The COPIES keyword is used to specify the number of copies to be printed and how the copies are to be grouped.

COPIES=(N[,(n_1,n_2,...)])

N

    is the total number of copies of each individual page in the data set to be printed, the maximum not exceeding 255. If the COPIES keyword is omitted, one copy, or the number specified in the JES Writer, is printed.

n

    values describe how the printed copies are to be grouped. Each n specifies the number of copies of each individual page that is to be printed in a group before starting the printing of the next page. Up to eight n values may be specified.

Retransmission of the data set over the channel may be necessary when more than one copy is specified in the JCL DD statement. For SYSOUT data sets, the retransmission is done automatically by the job entry subsystems.

The following are examples of the use of the COPIES keyword for SYSOUT data sets:

COPIES=14

    In this example, 14 copies of each page in the data set are printed, and each copy is in page number sequence. When the printing of the data set is completed, there are 14 separate but identical copies of the same data set. The complete data set is transmitted over the channel 14 times. If there were three pages in the data set, for example, the output would be as shown in Figure 13.
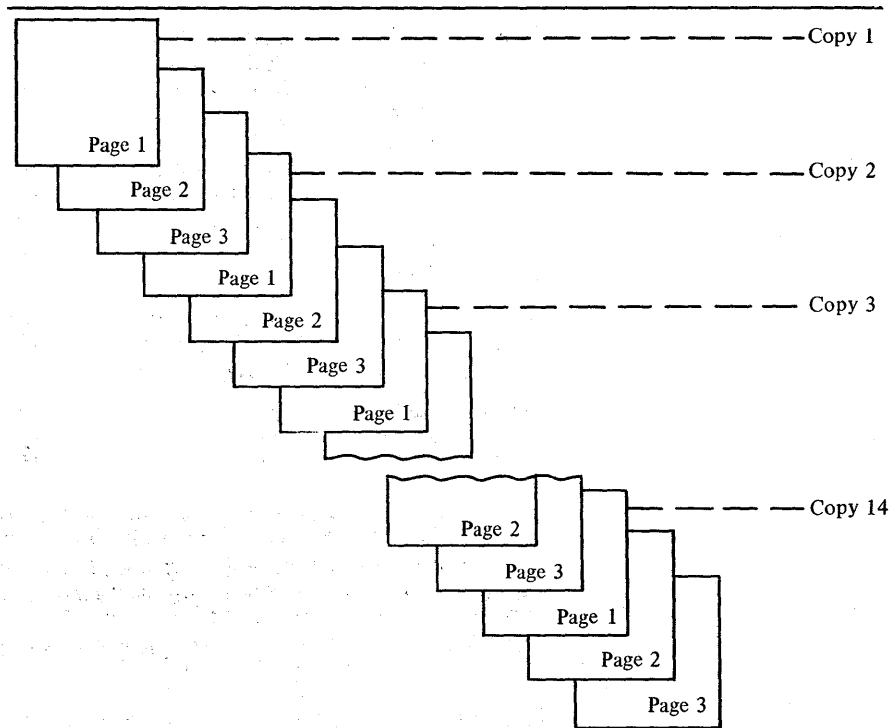

Figure 13. Output in response to COPIES=14.

COPIES=(6,(1,3,2))

In this example, 6 copies of the data set are to be printed with three groups being produced. The first group contains one copy of the data set, the second group contains three copies of each page of the data set, and the third contains two copies of each page of the data set. The complete data set is transmitted over the channel three times, once for each group. If there were three pages in the data set, for example, the output would be as shown in Figure 14.
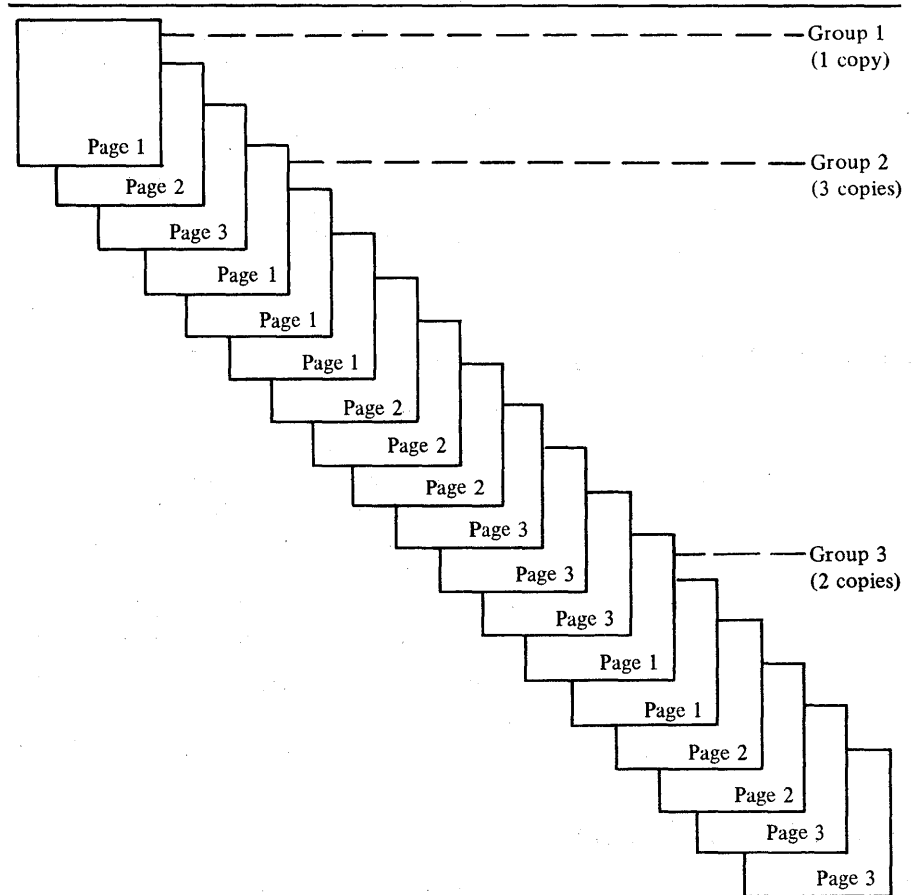

Figure 14. Output in response to COPIES=(6,(1,3,2)).

FLASH Keyword

The FLASH keyword is used with forms overlay to identify the overlay to be used. A message tells the operator to insert that particular forms overlay frame into the printer. The keyword also enables the specification of the number of copies on which the forms overlay is to be printed.

FLASH=(*overlay id* **[** *,count* **])**

   overlay id
      is the 1- to 4-character name of the forms overlay frame.

   count
      beginning with the first copy printed, is the number of consecutive copies on which the overlay will be printed. The maximum value of *count* is the value of N or the sum total of n's in the COPIES keyword. If the *count* value is not specified with the FLASH keyword, all copies have the overlay printed.

The MODIFY keyword is used to identify the name of a copy modification data record. The record is defined and stored in the system using the IEBIMAGE utility program. When loaded into the 3800, the data in the record replaces all variable data that would otherwise print in the positions specified.

MODIFY=(*record id* [, *trc*])

> *record id*
>> is the 4-character name of the copy modification record stored by the IEBIMAGE utility program in the SYS1.IMAGELIB system data set.

> *trc*
>> indicates the table reference character (0, 1, 2, or 3) used to select one of the character arrangement tables specified in the CHARS keyword to be used for the copy modification text. The values of 0, 1, 2, or 3 correspond to the order in which the table names have been specified. If *trc* is not included, the first reference character (0) is assumed.

Changing Character Arrangements Dynamically

When the *table id* of more than one character arrangement table is specified using the CHARS keyword, the programmer can select and change the character arrangements as desired. A new option, OPTCD=J, when specified as a DCB subparameter on the DD statement for the 3800, instructs the system that the first byte in the output data line (following the print control character) is a table reference character. This table reference character (0, 1, 2, or 3) selects the character arrangement table corresponding to the order in which the table names have been specified with the CHARS keyword.

As an example, if CHARS=(GS10,FM10),DCB=(OPTCD=J) is included on the SYSOUT DD statement, the printed output can include both the Gothic-10 and Format-10 character sets. A sample of this is shown in Figure 15.

The IEBIMAGE Utility Program

The IEBIMAGE system utility program is provided for the user to define, modify, print, or link records of the four types listed below. The records are stored on the SYS1.IMAGELIB data set under the names specified by the user. Control statements for each of the four types allow specification of the following:

- Forms control buffer (FCB) records — vertical line spacing for each line at six or eight lines per inch (separately or intermixed), and any of 12 channel punches per line.

- Copy modification records — the starting copy number along with the number of copies on which the data applies, the starting line number, the number of lines, the starting print position, the type of text (in character or hexadecimal representation), and the text.

WORKS 30	END PRODUCT CODE XZY-35874206

END PRODUCT DESCRIPTION BULLDOZER	

END PROD CODE OR ATTACHMENT PART NUMBER	END PRODUCT OR ATTACHMENT DESCRIPTION	B S I S	G R P	T D Y A P T E A	TYPE OF DATA DESCRIPTION	ACCUM THRU 12/72	MONTH OF 01/73	MONTH OF 02/73	MC OF 03
AZB-65003-CO	BOLT ASSEMBLY	L	C	A		407	10	20	
AZB-65112-BA	CASTER SUB-ASSEMBLY	1	B	A		1308	100	303	
AZC-30201-DB	GEARBOX ASSEMBLY	2	B	B		1930	303	259	
ZBG-41867-GA	CAM ASSEMBLY	1	C	C		101	12	30	
JBN-16409-BB	BELT ASSEMBLY	2	A	C		33	20		
BBO-71604-CB	WHEEL	2	F	A		41			
BBO-86531-WM	TIRE	2	A	A		600	100		
BBO-93612-JC	LUG	2	B	A		10591	2000	520	
BBO-69512-SA	BEARINGS,ROLLER	1	D	C		403		25	
BBO-69653-SB	BEARINGS,BALL	1	D	C		1860		1680	
ZOB-75680-XA	VALVE	2	F	B		1160	300	114	
YMN-83569-PA	VALVE COVER	1	E	B		123049	1000	20	
CAZ-66590-DB	CHASSIS	1	A	C		10	300		
DZB-75113-ST	FRAME	1	A	C		327	500	5	
EIR-40173-LR	SPRING	2	E	A		16490	330	590	
HES-35692-FN	BOLT	2	E	C		56014	1000	356	12
UCT-79931-DA	NUT	2	F	B		3160	16	625	
LIN-03276-AC	PIN,TAPER	1	B	B		10403	1236	1596	2
LBN-13657-BC	PULLEY	1	C	A		1001	3165	4297	6
LNL-10583-DA	PLUG	1	B	C		3318	18890	13697	36
LKJ-31659-CM	RIVET	1	B	C		5269	31	99	
	DIFFERENTIAL								
	CASTING								
	PUMP,WATER								
END PROD CODE OR ATTACHMENT	END PRODUCT OR ATTACHMENT DESCRIPT	B S	9 P	T D Y T	TYPE OF DATA DESCRIPTION	ACCUM MONTH	MONTH 1	MONTH 2	MC 3

END PRODUCT DESCRIPTION BULLDOZER

Figure 15. Output using both Gothic and Format character sets.

- Character arrangement tables — the values within the tables that index into the writable character generation module(s), the character set identifiers (which specify style or pitch of characters), and the graphic character modification record names. These tables establish the linkage between an existing character modification record(s), character set(s) and the location of the characters within the WCGM(s).

- Graphic character modification records — copying or selecting characters from existing graphic character modification modules, assigning a character arrangement table code for the character, as well as creating new user-designed graphic characters.

Formatting the Forms Control Buffer

As in the IBM 3211 Printer, the 3800 Printing Subsystem uses a forms control buffer (FCB) for carriage control. The format of the 3800 FCB, however, is different from that of the 3211 and a new 3800 FCB must be provided for any existing program that uses a 3211 FCB. The format of the 3800 FCB is different in that the top and bottom 1/2 inch of the form must be left blank, and the vertical line spacing (6 lines per inch or 8 lines per inch, separately or intermixed) must be specified. The 3800 FCB must describe the exact length of the forms being printed. The 3800 FCB is constructed and stored by the IEBIMAGE utility program in the SYS1.IMAGELIB system data set.

Valid and Invalid Channel Commands

Channel commands direct a channel, control unit, or device to perform an operation or set of operations. Certain channel commands, however, vary from printer to printer. Also, the IBM 1403, 3211, and 3800 all use physically different carriage control methods.

The following groups of channel commands are valid for the 3800:

- *Forms Commands* cause independent forms spacing and skipping operations. The following commands are the same as those used by most IBM impact printers:

  Space 1 Immediate
  Space 2 Immediate
  Space 3 Immediate
  Skip Immediate to Channel 1
  Skip Immediate to Channel 2
  Skip Immediate to Channel 3
  Skip Immediate to Channel 4
  Skip Immediate to Channel 5
  Skip Immediate to Channel 6
  Skip Immediate to Channel 7
  Skip Immediate to Channel 8
  Skip Immediate to Channel 9
  Skip Immediate to Channel 10
  Skip Immediate to Channel 11
  Skip Immediate to Channel 12

- *Write Commands* transfer data from the system to the printer and are the same commands used by most IBM impact printers. The 3800 will accept up to 204 characters in a Write command; however, for 10-pitch lines, no more than 136 characters should be transferred for each line to prevent the page buffer from being filled with unnecessary data before the page is completely transferred. The 3800 prints only the maximum number of characters for the form width, regardless of how many characters were transferred with the Write command. The valid Write commands are:

  Write without Spacing
  Write and Space 1
  Write and Space 2
  Write and Space 3
  Write and Skip to Channel 1
  Write and Skip to Channel 2
  Write and Skip to Channel 3
  Write and Skip to Channel 4
  Write and Skip to Channel 5
  Write and Skip to Channel 6
  Write and Skip to Channel 7
  Write and Skip to Channel 8

Write and Skip to Channel 9
　　　　Write and Skip to Channel 10
　　　　Write and Skip to Channel 11
　　　　Write and Skip to Channel 12

- *Load Commands* are used to initialize the control blocks, buffers, and tables in the 3800. All Load commands cause any remaining partial page in the page buffer to be completed (i.e., the resulting operation is equivalent to a skip to the beginning of the next page). The 3800 then waits until all pages currently residing in the page buffer are printed, before processing the Load command. The valid Load commands are:

　　　　Load Forms Control Buffer
　　　　Load Translate Table
　　　　Load WCGM
　　　　Load Sequence Control
　　　　Load Graphic Character Modification
　　　　Load Copy Modification
　　　　Load Copy Number

- *Status Commands* present status conditions to the channel and are:

　　　　Test I/O
　　　　Sense I/O
　　　　Sense Error Log
　　　　Sense Intermediate Buffer

- *Control Commands* perform various control functions in the 3800 and are:

　　　　No-Op (no operation)
　　　　Block Data Check
　　　　Allow Data Check
　　　　End of Data Set
　　　　Select Translate Table, 0, 1, 2, or 3
　　　　Mark Form (end of job)

Certain channel commands are device dependent and cannot be used interchangeably among printers. The following is a complete list of channel commands that are valid for either the IBM 1403 or IBM 3211 Printer but are *not* accepted by the 3800:

1403	3211
Diagnostic Write	Load UCSB
Diagnostic Data Read	Fold
Diagnostic Check Read	Unfold
Raise Cover	Read PLB
UCS Load (without folding)	Read UCSB
UCS Load (folding)	Read FCB
UCS Gate	Check Read
	Diagnostic Write
	Diagnostic Gate
	Skip to Channel 0
	Raise Cover

Folding is a technique used with the UCS feature to allow printing in uppercase graphic characters when lowercase graphic characters are called for and not available in the character array. Activating the Fold function on an impact printer is done by issuing the Fold channel command, while deactivating the same function is done by issuing the Unfold channel command. While the 3800 does not recognize the Fold and Unfold channel commands, using the GF10, GF12, or GF15 character arrangement table provides the folding effect. If character arrangement tables with the folding feature for other than Gothic are desired, they may be provided by the user.

How the 3800 is Different from Impact Printers

One of the most significant differences between the 3800 and current IBM impact printers is the actual printing process. The impact printers use print chains or trains to produce the printed output while the 3800 uses an electrophotographic technique with a low-powered laser. The chains/trains of the impact printers must be mounted physically in the printers to obtain the desired character arrangement. With the 3800, desired character arrangements can be specified through the use of a JCL DD statement keyword (see "CHARS Keyword" above).

Character Sets versus Print Chains/Trains

The 3800 makes it possible to attain a uniform printing speed independent of the number of graphic characters within a given character set being used to print a data set. It is not necessary to limit the number of characters used to obtain optimum speed, as it is with current impact printers.

The 3800 provides compatibility for users of previous IBM printers by providing character arrangement tables that correspond with the character arrangements for current 1416 and 3216 print trains (as used on IBM 1403 and 3211 Printers), and the names of the tables are the same as those of the corresponding print trains. Desired groups of these character arrangement tables can be specified during system generation. In addition, a basic group of character arrangement tables is new with the 3800, providing more usable characters than most print trains by taking advantage of the fact that printing speed is not limited by the number used. Also new are the Format character sets, with lines, corners, and tees in various line weights.

The 3800 programming support does not provide character arrangement tables equivalent to nonstandard 1416 and 3216 print trains. Any program using a nonstandard print train must have a user-defined character arrangement table to correspond to the train stored in the SYS1.IMAGELIB system data set for accessing. Special characters on such a chain may have to be created by the user (see "User-designed Graphic Characters").

Overprinting

Because printing on the 3800 is done by transferring images to the paper from a constantly revolving drum, overprinting cannot be done. Overprinting on an impact printer requires stopping the paper in a fixed position (i.e., no carriage movement) while two or more lines of data are printed in the same line space. This results in having two or more sets of printed characters superimposed one on the other (or one set superimposed on itself, for bold face printing).

While the 3800 cannot create multiple images at the same print location, it can merge lines of nonconflicting data into a single line before exposing the resulting line onto the moving drum. (Nonconflicting data lines contain either blanks or the same data characters as those in the corresponding positions of previously transmitted lines.)

The following two examples of frequently-used impact printer applications of overprinting are included to indicate what the results would be on the 3800.

- Boldfaced printing — the same data line is printed on an impact printer more than once in the same line position to emphasize the line with a heavier and darker image. Since the data lines to be superimposed are identical, the 3800 performs the operation merging the lines in the page buffer. The result on the printout is a line with no special emphasis in terms of contrast or thickness to

make it stand out against other lines. The user may, however, design boldface characters and load them into the printer by means of the graphic character modification feature.

- Printing of special composite characters (for example, a zero with a slash over it — this requires two characters to be printed in the same space on an impact printer. The 3800 prints the first character while rejecting the second with an error indication, unless data checks are blocked, in which case no error is indicated. The output is either a zero or a slash, depending on which was transmitted first. Again, the special character might be designed by the user and loaded into the 3800 using the graphic character modification feature.

Underscoring

The 3800 supports printing with underscores using either of two methods, both different from that of an impact printer:

- The 3800 has a built-in underscore capability. When the 3800 detects that two characters are to be printed in the same character position on a page, it determines whether one of the characters is an underscore, and if it is, the underscored character is printed.

- In addition, five underscored Gothic and Text character sets are supplied.

Using the built-in underscore requires transmitting the character to be underscored and the underscore separately over the channel to the 3800, while using the appropriate underscored character set permits transmitting both as a single character, with a resulting saving in channel use and transmission time. The use of an underscored character set, however, may require additional character generation storage when underscored printing is intermixed with nonunderscored (for example, when Text 1 and 2 and underscored Text 1 and 2 are used together), and requires specifying the desired underscored character arrangement table name in the JCL CHARS keyword. The amount of underscoring required, then, should be the primary factor in determining which of the two methods is used.

Top and Bottom Margins of Page

The 3800 reserves the top and bottom 1/2-inch of each page for accelerating and decelerating paper when it is necessary to start or stop printing. If current programs are designed to print in these areas of a page, either the printing format or the FCB (forms control buffer) definition should be changed.

For example, only 10 inches on an 11-inch long page can be used for printing with the 3800. Therefore, if a program must print 61 lines per page on an 11-inch long page, it cannot do so using a line spacing of 6 lines per inch for the whole page. The FCB must be redefined to obtain 61 printable lines at various vertical line spacings, or all at 8 lines per inch, in order to fit in the 10-inch printable length. Jobs that in the past required printing across page boundaries (such as long graphs, or computer-produced contour or demographic maps) cannot be produced in the same way on the 3800.

Performance Considerations

The 3800 Printing Subsystem operates at a constant rate, moving paper at a nominal speed of 31.8 inches per second as long as data to be printed is available in the page buffer. The photoconductor on the drum surface is nominally 77 inches long. There is a 2-inch gap where the supply and takeup ends of the photoconductor material pass into reels mounted inside the drum. Since the image to be printed cannot be generated across the 2-inch gap, all the pages that can be printed in one revolution of the drum must fit into a 77-inch length. Data must be available in the page buffer in time to print each successive page while the drum is revolving if maximum printing speed is to be maintained. A delay in filling the page buffer to complete the data for any page can result in deferring the printing of at least one page to the next length of photoconductor.

To illustrate, assume that 11-inch long forms are being printed. Seven such forms can be printed in each 77-inch length of photoconductor per drum revolution. If there were just one instance when all the data for a page to be printed was not in the page buffer when the image was to be generated, only six forms could be printed in that revolution of the drum. If this occurred consistently during the printing of the data set, the 3800 would perform at only 6/7 of its potential.

The approximate formula $PB \div N$, where PB is the number of bytes of available page buffer storage, and N is as given in the following tables, can be used to estimate the maximum data content of a page that can be printed without performance degradation.

Page length (common-use sizes) in inches	N, number of required pages in the page buffer when using forms overlay	N, number of required pages in the page buffer when not using forms overlay
3-1/2	8	2
5-1/2	6	2
7	5	2
8-1/2	5	2
11	4	2

Page length (ISO sizes) in inches	N, number of required pages in the page buffer when using forms overlay	N, number of required pages in the page buffer when not using forms overlay
3	9	2
4	8	2
6	6	2
8	5	2
10	5	2
12	4	2

For an 11-inch page, the figures are as follows:

Page buffer capacity, PB, in bytes (54K)	Forms overlay utilized: Maximum page size in bytes (PB÷4)	No forms overlay: Maximum page size in bytes (PB÷2)
55,296	13,824	27,648

Whenever the formula is used, the size of the page buffer should be reduced by 256 bytes for each additional character arrangement table beyond the first and by the amount of data contained in copy modification records. The page buffer occupied by copy modification data can be closely approximated by assuming 1 byte for every non-repetitive character (including blanks) in a line, 3 bytes for every set of

four or more repeating characters in a line, and 6 bytes for each unique entry appearing on one or more copies. When using hardware underscore, an additional byte of storage is required for each underscored character and there is no consecutive character compression for the line.

To optimize performance these general recommendations should be followed when planning for a 3800:

- Direct output to the 3800 from a problem program is not recommended since it is unlikely that a problem program can drive the 3800 at full speed. In addition, direct output would not provide for the enhanced page recovery available with SYSOUT. Data to be printed by the 3800 should be assigned to SYSOUT data sets.

- To estimate the amount of storage required for a page of data, allow one byte per character printed. When four or more identical characters occur consecutively within a line, such as fill blanks at the end of the printable data line, only three bytes are required for each such compressed group. For example, a 136-character line with only 120 printable characters requires 123 bytes of page buffer storage. A page of printed output from the standard storage dump used in systems installations consists of one line for the page number and either 55 or 73 lines for the storage information. Because each of the storage data lines includes a few groups of repeated characters among the 120 that are printed, the page buffer storage is about 101 bytes per line rather than the 123 that might be expected. The data for an entire output page of 55 lines will occupy about 5600 bytes in the page buffer. The 73-line output page requires about 7500 bytes of storage.

- It is recommended that the 3800 be attached to either a byte or a block multiplexer channel. Attachment to a selector channel is not recommended unless the channel is dedicated, because other devices on the same channel can be totally superseded when the 3800 is running. The 3800 load should be added to the existing channel load to help determine whether a byte or a block multiplexer channel is appropriate.

- The DASD unit(s) containing the JES spool volume(s) should have an access time that will not limit production of printed output. For example, an IBM 3330 or 3340 attached to the processor by a different block multiplexer channel than the 3800 should have a suitably fast access time, while a slower DASD device may not.

  An estimate of the approximate data rate can be made by using the number of characters (including imbedded blanks) to be printed on a page and the time it takes to print that length of page at 31.8 inches per second. For example, an 11-inch page takes about 0.346 seconds to pass a point in the 3800. If each such page contains 3100 bytes, the channel data rate required to maintain this printing would be 3100 divided by 0.346, or about 8960 bytes per second.

- When much of the printing on a system is at relatively high print densities (for instance, when storage dumps are frequently printed), multi-spool volumes and 4K blocking in JES are recommended.

Data Security

The 3800 contains several features for protecting the data in the page buffer from improper alterations or disclosures.

- Page buffer data cannot be read back into the CPU using available channel commands.

- Residual data in the page buffer cannot be printed because page definition is destroyed after the last copy of a page has been exposed onto the photoconductor.

- Residual images on the photoconductor are removed by the cleaner assembly, which prevents reading the images on the photoconductor.

GLOSSARY

The following terms are defined as they are used in this book. If you do not find the term you are looking for, refer to the index or to the IBM *Data Processing Glossary*, GC20-1699.

basis weight: The weight in pounds of a ream (500 sheets) of paper cut to a given standard size for that grade: 25x38 inches for book papers, 17x22 inches for bond, and other sizes for other grades. The basis weight of continuous forms for computer output is based on the size for bond papers.

* **chain printer:** A printer in which the type slugs are carried by the links of a revolving chain.

channel command: An instruction that directs a channel, control unit, or device to perform an operation or set of operations.

* **character:** A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. A character is often in the form of a spatial arrangement of adjacent or connected strokes.

character arrangement: An arrangement composed of graphic characters from one or more modified or unmodified character sets.

character arrangement table: A table, including the 256-byte translate table, that translates the user's data code to the 3800's control electronics code, that identifies up to four character sets and graphic character modification records to be used, and other system-related information.

character set: As used in this book, the scan patterns for a set of a maximum of 64 graphic characters all of one size and style; analogous to a font in the printing trades.

character set identifier: A 1-byte code identifying the particular character set.

copy modification: A feature that allows printing of predefined data on all pages of specified copies of a data set.

copy modification record: A record, constructed, named and stored in SYS1.IMAGELIB, and used for copy modification by specifying the name of the record with the MODIFY keyword.

FCB: *forms control buffer.*

folding: A technique used with the universal character set (UCS) feature on an impact printer to allow each of the 256 possible character codes to print some character on a chain or train with fewer graphics. For example, it allows the printing of uppercase graphic characters when lowercase are not available in the character array on the chain or train.

Format: Character sets that provide graphics such as lines, corners, and tees in different line weights, which can be used, for example, to print lined columns or boxes around data.

forms control buffer: A buffer for controlling the vertical format of printed output; analogous to the punched paper carriage control tape used on IBM 1403 printers.

forms overlay: A feature providing the ability to print a form, graph, design, or other constant data overlaid upon the data being printed.

fuser: The unit that fuses the toned image into the paper.

Gothic: Character sets (available in 10-, 12-, and 15-pitch) with 63 sans serif graphic characters.

* **graphic:** A symbol produced by a process such as handwriting, drawing, or printing.

* **graphic character:** A character normally represented by a graphic.

graphic character modification: A feature that allows for the substitution or extension of the graphic characters in an already-defined character arrangement.

graphic character modification record: A record, constructed, named and stored in SYS1.IMAGELIB. When named in a character arrangement table, the graphic character modification record will be called to substitute those characters in a character set identified by the character arrangement table and the translate table code associated with each graphic character modifier.

impact printer: A printer that mechanically strikes the paper through an inked ribbon.

ISO: *International Standards Organization.* Used in this book to identify a set of paper sizes (used outside the United States and Canada) from those that have been standardized by that organization for use in data processing.

JES: *job entry subsystem.*

job entry subsystem: In OS/VS, a system facility for spooling, job queueing, and managing the scheduler work area.

Katakana: Character sets of symbols for writing in one of the two common Japanese phonetic alphabets.

OCR: *optical character recognition.*

OCR-A, OCR-B: Character sets that are designed for optical character recognition use.

* **optical character recognition:** The machine identification of printed characters through use of light-sensitive devices. Abbreviated OCR.

pitch: A unit of width of type based on the number of times a letter can be set in a linear inch. For example, 10-pitch has 10 characters per inch.

print chain/train: The revolving chain or train in which the type slugs of an impact printer are carried.

* **print control character:** A control character for print operations such as line spacing, page ejection, or carriage return.

splicer: A flat platform located ahead of the transfer carriage tractors, that has tractor drive pins that may be raised to properly register and splice the last sheet of paper in a box to the first sheet in a new box.

table reference character: A numeric character (0, 1, 2, or 3) corresponding to the order in which the character arrangement table names have been specified with the CHARS keyword.

Text: Character sets of upper and lowercase graphic characters with serifs.

* American National Standard Definition

toner: A thermoplastic material impregnated with lampblack. Toner adheres to the exposed areas on the photoconductor during the developing process and is then transferred to the paper to form the developed image on the paper.

transfer station: The location where the toned image on the photoconductor is transferred to the paper.

translate table: That 256-byte portion of the character arrangement table that translates the user's data code for a character to the code required by the 3800's control electronics.

UCS: *universal character set.*

universal character set: A printer feature that permits the use of a variety of character arrays.

WCGM: *writable character generation module.*

writable character generation module: A 64-position portion of the 3800's character generation storage that holds the scan elements of one character set. There are two WCGMs in the character generation storage of the basic 3800, and optional added storage provides two more.

INDEX

J

JCL DD statement keywords, new   26-29
JES spool volume recommendation   37
job entry subsystem (JES)   10,28,37,39

K

Katakana character sets
    character arrangement table names   27
    definition of   39
    sample of   18

L

line compression in page buffer   17
Load commands   33

M

mark form (end of job) capability   16,33
maximum characters per line
    on common-use paper sizes   19
    on ISO paper sizes   19-20
MODIFY keyword   30
multiple copies of output   28-29
multiplexer channel attachment recommended   37

O

OCR-A, OCR-B character sets
    character arrangement table names   27
    definition of   39
    sample of   18
operating systems supporting the 3800   10,25
operator panel   11,13
OPTCD=J option for DCB   30
optional features of the 3800   23
overlay, forms   20,29
overprinting   34-35

P

page buffer storage   17,36-37
paper flow path   11
paper requirements   15-16
performance considerations   36-37
photoconductor drum   11,12,36
physical description of the 3800   11-13
pitch
    capabilities   19-20
    definition of   39
printing speed independent of number of characters used   34

R

reassignment of printing between impact printers
        and the 3800   10
remote switch feature   23

S

security of data   38
selector channel attachment restriction   37
SETPRT macro instruction   25
special characters, user-designed   21,34-35
splicer   15,39
stacker, continuous forms   11,12,16
standard features of the 3800   15-21
Status commands   33
storage, page buffer   17,36-37
system generation   20,25,34
SYS1.IMAGELIB system data set   17,21,25,30,34

T

table reference character   30
Text character sets
    character arrangement table names   27
    definition of   39
    samples of   19
toner   11,40
top and bottom margins of page   20,35
transfer station   11,12,40
translate table   40
two-channel switch   23

U

underscored character sets
    character arrangement table names   27
    description of use   35
    samples of   18
underscoring   35
universal character set feature and keyword
    definition of   40
    not supported by the 3800   26
user-designed graphic characters   21
utility program, IEBIMAGE   30-31

V

valid and invalid channel commands   32-33
vertical line spacing   17,32

W

WCGM (see writable character generation module)
World Trade National Use Graphics   20
writable character generation module
    character arrangement tables requiring two   27
    definition of   40
    optional additional   23
Write commands   32-33

Introducing the
IBM 3800 Printing Subsystem
and Its Programming
GC26-3829-0

Your comments about this publication will help us to improve it for you.
Comment in the space below, giving specific page and paragraph references
whenever possible. All comments become the property of IBM.

Please do not use this form to ask technical questions about IBM systems and
programs or to request copies of publications. Rather, direct such questions or
requests to your local IBM representative.

If you would like a reply, please provide your name, job title, and business
address (including ZIP code).

Fold on two lines, staple, and mail. No postage necessary if mailed in the U.S.A. (Elsewhere,
any IBM representative will be happy to forward your comments.) Thank you for your
cooperation.

GC26-3829-0

Fold and Staple

Fold and Staple

IBM

Introducing the IBM 3800 Printing Subsystem and Its Programming   (File No. S370-03)   Printed in U.S.A.   GC26-3829-0

GC26-3829-0

IBM
®