GA18-2044-0
File No. S/370-13

Systems

IBM 3270 Information Display System Description and Configuration: APL/Text Feature

IBM 3276 Control Unit Display Station
IBM 3278 Display Station
IBM 3287 Printer
IBM 3289 Line Printer

IBM

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First Edition (February 1979)

Information contained in this manual is subject to change by subsequent revisions or Technical Newsletters until this manual is obsoleted. Before using this publication in connection with the operation of IBM systems or equipment, refer to the latest *System/370 Bibliography,* GC20-0001, for the editions that are applicable and current.

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Preface

This interim publication provides descriptive and configuration information about the APL and Text functions and features for the following IBM 3270 Information Display System units:

IBM 3276 Control Unit Display Station

IBM 3278 Display Station

IBM 3287 Printer

IBM 3289 Line Printer (Text Print capability only)

This publication is intended for data processing personnel, including managers, system analysts and programmers, and for operations and administrative managers.

Additional information about the characteristics of the IBM 3270 Information Display System is contained in the following publications:

- *An Introduction to the IBM 3270 Data Analysis-APL Feature,* GA27-2788
- *An Introduction to the IBM 3270 Information Display System,* GA27-2739
- *IBM 3270 Information Display System Character Set Reference,* GA27-2837
- *IBM 3270 Information Display System Configurator,* GA27-2849
- *IBM 3270 Information Display System Component Description,* GA27-2749
- *IBM 3287 Printer Component Description,* GA27-3153
- *IBM 3289 Line Printer Component Description,* GA27-3176
- *IBM 3270 Information Display System, 3276 Control Unit Display Station Planning and Setup Guide,* GA18-2041
- *Introduction to Programming the IBM 3270,* GC27-6999
- *IBM 3270 Information Display System, 3276 Control Unit Display Station Operator's Guide,* GA18-2040
- *IBM 3287 Printer Operator's Guide,* GA27-3150
- *IBM 3289 Line Printer Operator's Guide,* GA27-3147

This publication becomes obsolete when information concerning the 3276/3278/3287 APL and Text functions and features, and 3289 Text Print feature is included in the appropriate publications listed above.

For information about the Data Analysis-APL feature for the IBM 3271 Control Unit Models 2 and 12, IBM 3272 Control Unit Model 2, IBM 3277 Display Station Model 2, IBM 3284 Printer Model 2, IBM 3286 Printer Model 2, and IBM 3287 Printer Models 1 and 2 refer to *An Introduction to the IBM 3270 Data Analysis-APL Feature,* GA27-2788.

This publication contains three chapters and an appendix. Chapter 1 introduces the reader to the 3276/3278/3287 APL/Text functions and features, and the 3289 Text Print feature. Chapter 2 describes the additional features offered on each unit. Chapter 3 provides updated configuration diagrams and feature code tables for the units. Appendix A contains APL/Text and Text Print I/O interface code charts.

Contents

Figures

Chapter 1. Introduction

The APL and Text processing capabilities of the IBM 3270 Information Display System are extended to include the IBM 3276 Control Unit Display Station and the following units when (1) they are equipped with the appropriate APL/Text and Extended Character Set Adapter or Text Print features, and (2) they are attached to a 3276 with APL/Text control and Extended Function Base features:

Display station of IBM 3276 Models 1, 2, 3, 4, 11, 12, 13, and 14

IBM 3278 Display Station Models 1, 2, 3, and 4

IBM 3287 Printer Models 1 and 2

IBM 3289 Line Printer Models 1 and 2 (Text Print only)

An IBM 3276 Control Unit Display Station with APL/Text Control feature can control a mix of the following terminals:

(1) 3278s with and without APL/Text and Extended Character Set Adapter features

(2) 3287s (with a 3274/3276 Attachment feature) with and without APL/Text and Extended Character Set Adapter features

(3) 3289s with and without Text Print feature

APL/Text and Text Print Character Sets

The 3276, 3278, and 3287 equipped with their respective APL/Text features and prerequisite Extended Character Set Adapter features are able to display or print (with modified user application programs) the entire 222-character-plus-space APL/Text character set shown in Figures 1-1, A-2, and A-4.

The 3289 equipped with the Text Print feature is able to print a 125-character-plus-space Text Print character set (shown in Figure A-5) as follows:

- 93-character U.S. English set (except tilde ~ symbol)
- 32-character TN set

The 3276 and 3278 with the APL/Text and Extended Character Set Adapter features can be equipped with one of the following three types of keyboards:

(1) 87-Key (88-Key for Japanese English) EBCDIC Typewriter/APL keyboard

(2) 87-Key EBCDIC Typewriter/Text keyboard

(3) 88-Key Japanese Katakana Typewriter/APL keyboard

These APL and Text keyboards are described in Chapter 2 and are illustrated in Figures 2-1, 2-2, and 2-3.

The 87- or 88-Key EBCDIC Typewriter/APL keyboard enables the 3276/3278 operator to enter (with single keystrokes) a 175-character-plus-space set of the APL/Text character set (Figure 1-1) as follows:

- 94-character EBCDIC set
- 81-character APL-specific set

U.S. EBCDIC

0 through 9 (numeric)	10
A through Z (uppercase)	26
a through z (lowercase)	26
Invariant Symbols (common to all keyboard languages):	18
< (+ & *) ; - / , % _ > ? : ' =	
National Use Symbols:	14
¢ | ! $ ¬ # @ " ¦ ` ~ { } \	
EBCDIC Total	**= 94**

APL

A through Z (APL Underscored Alpha)	26
APL Symbols:	36
∧ ∨ ~ ↑ ↓ ≤ ⌈ ⌊ → ⍳ ⊃ ⊂ ○ ← ⍱ ∩ ∪ ⊥ ⍴ ≥ . ⍺ ∈ ⍸ ⍴ ⍵ × \ ÷ ∇ Δ T ⍴ ≠ |	
APL Compound Symbols:	18
⍲ ⍒ ⍋ ⌽ ⍉ ! ⍖ ⍏ ⍓ ⍤ ≠ ⍱ ⊙ ⍞ ⍉ ⍒ ⍟ ⍋	
Obsolete Symbol:	1
⍙	
APL-Specific Total	**= 81**

Text	**Text Specific**	**Text Unique**
TN Print Train (five common with APL):	32	27
± ° □ ■ ● { } ≠ ≤ ≥ + − [ ] ⌜ ⌝ ⌞ ⌟ 0123456789+ - ( )		
Additional Graphics (six common with APL)	14	8
↑ ↓ ← → \ $_{123n}$ ⊥ ⊤ ⊣ ⊢ |		
Special Purpose Graphics (all common with APL)	14	0
∧ ∨ ⌈ ⌊ □ ∇ Δ ⍒ ⍋ ⌿ ⍀ ⍟ ⍓ ⍙		
Text Edit Graphics (three common with APL):	5	2
⍞ ⍟ ⍵ ⍝ ¶		
Text Specific Total (twenty-eight common with APL)	**= 65**	
Text-Unique Total		**= 37**
Graphic Plot		**= 10**

APL/Text Total **= 222**

Figure 1-1. APL/Text Character Set

The 87-Key EBCDIC Typewriter/Text Keyboard enables the 3276/3278 operator to enter (with single keystrokes) a 159-character-plus-space set of the APL/Text character set (Figure 1-1) as follows:

- 94-character EBCDIC set
- 65-character Text-specific set

The 88-Key Japanese Katakana Typewriter/APL keyboard enables the 3276/3278 operator to enter (with single keystrokes) the 208-character-plus-space Katakana/APL character set shown in Figures A-3 and A-4. The Katakana/APL character set is made up of:

- 127-character Katakana set
- 81-character APL-specific set

The APL/Text character set is available for all languages supported by the control unit of 3276. APL typewriter keyboards are available for all 3276/3278 keyboard languages; however, the 3276/3278 Text typewriter keyboard (not available for IBM World Trade Europe/Middle East/Africa countries) is available for U.S. English only.

APL/Text and Text Print Data Streams

The I/O interface codes used by the 3276, 3278, and 3287 with APL/Text and Extended Character Set Adapter features are shown in Figures A-2 and A-4 The I/O interface codes used by the 3289 with the Text Print feature are shown in Figure A-5. The 3276/3278/3287 APL/Text and the 3289 Text Print I/O interface codes do not affect the operation of any 3276 data stream commands, orders, or control characters. All 3276/3278/3287 APL-specific and Text-specific characters are specified by 2-byte sequences; each 2-byte sequence consists of a Graphic Escape (hex '08') control character followed by a character code.

The 3276 APL/Text support incorporates the same APL-specific and Text-specific characters provided by the 3271/3272 Data Analysis-APL feature plus two additional characters (¶ and $\oint$). However, the 3276 APL/Text data stream is different from the 3271/3272 Data Analysis-APL data stream, because the 3276 APL/Text data stream:

1. Contains 94 EBCDIC characters (plus space), whereas the 3271/3272 Data Analysis-APL data stream contains 88 EBCDIC characters (plus space)
2. Specifies all APL- and Text-specific characters by using a 2-byte sequence consisting of a hex '08' control character followed by a character code, whereas the 3271/3272 Data Analysis-APL data stream specifies some APL-specific and all Text-specific characters by using a 2-byte sequence consisting of a hex '1D' control character followed by a character code
3. Contains 10 graphic plot characters, whereas the 3271/3272 Data Analysis-APL data stream does not

The 3276 Text Print data stream is different from the 3271/3272 Text Print data stream, because the 3276 data stream:

1. Contains 93 U.S. English set characters (plus space), whereas the 3271/3272 Text Print data stream contains 88 characters (plus space)
2. Uses different interchange codes to specify some Text-specific characters

Programming Support

Support for the APL and Text keyboard characters will be available in the following environments:

- OS/VS1 VSPC Release 2.0
- OS/VS2 (MVS) VSPC Release 2.0
- OS/VS2 (MVS) VS APL for TSO (See Note)
- VM/370 BSEPP/SEPP
- CICS/DOS/VS V1, R4
- CICS/OS/VS (VS1 and MVS) V1, R4

Note: *Changes to the VS APL for TSO Installed User Program (5796-ALB) to support the APL and Text keyboard characters will be described in a Technical Newsletter distributed to users of record.*

In these environments, Release 3 of the VS APL program product (5748-AP1) will support the same characters on the 3274/3276/3278/3287 with the appropriate APL/Text features (Feature Codes 1067 and/or 1120) as are currently supported on the 3271/3272/3277/3284/3286 with the Data Analysis-APL feature (Feature Code 1066).

In a VSPC Release 2.0 environment, the APL and Text characters are supported in all VSPC processing modes, including full-screen editing, the full-screen manager, and all foreground processors. In addition, VS APL will support all the APL and Text keyboard characters. However, Country Languages that exceed the 94-character EBCDIC sets (for example, the Canadian-French and Japanese-Katakana character sets) are not supported by the host programming support for APL. OS/VS1, OS/VS2, and DOS/VS release levels which are current at the hardware first customer shipment may be used. Also, the release of VM/370 that supports the latest level of the BSEPP/SEPP at the hardware first customer shipment may be used.

This same support is also available to the 3276 with the appropriate APL/Text features (Feature Codes 1067 and 1120) that is attached to the IBM 8100 Information System and is supported via DPPX/DSC.

Support for Text keyboard characters is available in Release 1.2 of the ATMS-II program product (5740-XXV for ATMS-II/OS/VS and 5746-XXG for ATMS-II/DOS/VS). The latest level of the VM/370 BSEPP/SEPP will also support the Text keyboard character set. This support is in addition to existing support for the 3271/3272/3277 Data Analysis-APL feature (Feature Code 1066), and is transparent to programs using BSEPP/SEPP. Programs operating under BSEPP/SEPP with Feature Code 1066 will continue to operate unmodified with the 3276/3278 APL/Text Feature (Feature Code 1120). This operation includes 3276 clusters with APL/Text features co-resident on a VM/370 BSEPP/SEPP system that supports 3274 clusters with APL/Text feature, as well as 3271/3272 clusters with the Data Analysis-APL Features.

The 10 new graphic plot characters (Figure 1-1) are not supported by the preceding program products for APL or Text. Release 2 of TSO Session Manager program product (5740-XE2) also supports the complete APL/Text character set including the new graphic plot characters.

All characters in the complete APL/Text feature, including the 10 new graphic plot characters, will be available for use by suitably modified user application programs in the following environments:

- DOS/VS
- OS/VS1
- OS/VS2 (MVS, including TSO)
- VM/370

Chapter 2. Description

IBM 3276 Control Unit Display Station with Extended Function Base and APL/Text Control

The 3276 with Extended Function Base and APL/Text Control features provides control of:

- Display station of the 3276 Control Unit Display Station with APL/Text and Extended Character Set Adapter features
- 3278 Display Station with APL/Text and Extended Character Set Adapter features
- 3287 Printer with APL/Text and Extended Character Set Adapter features
- 3289 Line Printer with Text Print feature

The control unit of 3276 with APL/Text Control feature can control a mix of the preceding units, with or without APL/Text, Extended Character Set Adapter, and Text Print features.

The Extended Function Base feature on the 3276 cannot be installed with the Encrypt/Decrypt feature (Feature Number 3680) or with the SDLC/BSC Switch feature (Feature Number 6315).

IBM 3276 Control Unit Display Station and IBM 3278 Display Station with APL/Text

The 3276/3278 APL/Text special feature, Extended Character Set Adapter special feature (prerequisite for the APL/Text feature), and the appropriate APL or Text keyboard enable a 3276/3278 operator to interact with either APL or Text applications as well as existing applications. The APL/Text feature on the 3276 cannot be installed with the ASCII feature (Feature Number 9084).

APL Keyboards

The 3276/3278 APL keyboards are typewriter-like keyboards with keys that contain both APL and the featured language-characters. The APL characters are colored orange (on white keys). The APL keyboards have the PF1 through PF12 keys located on the right side of the keyboard instead of on the front of the top row of keys as on non-APL keyboards; PF13 through PF24 keys are not available on APL keyboards. The Numeric Lock feature is available for all APL keyboards and operates in both APL and non APL modes.

87- and 88-Key Typewriter/APL Keyboards

The 87-Key Typewriter/APL (U.S. English) keyboard is shown in Figure 2-1 (the Japanese English Typewriter/APL keyboard has 88 keys). This keyboard is available in all 3276/3278 keyboard languages.

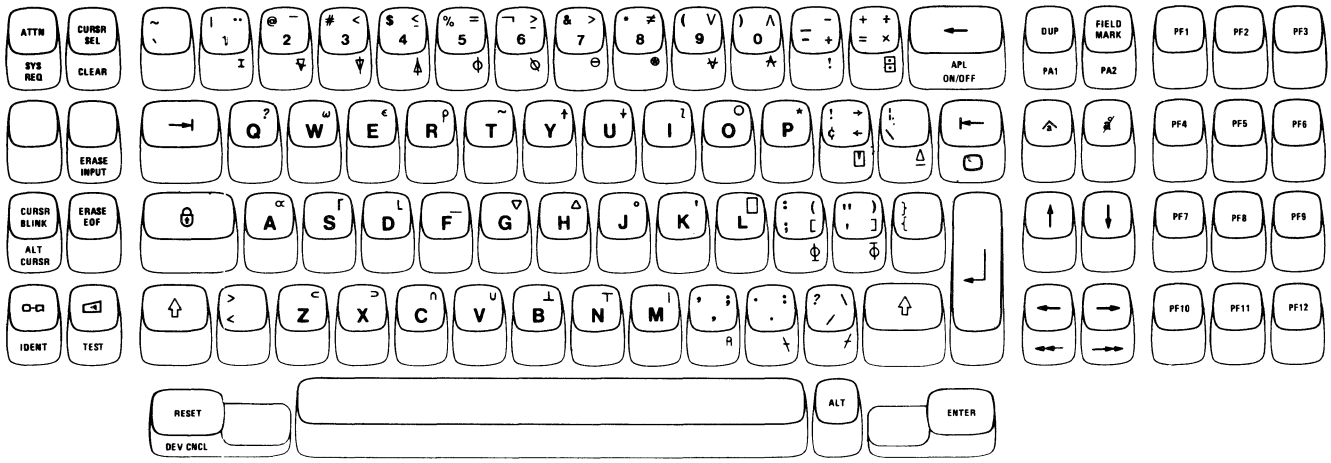


Figure 2-1. 87-Key Typewriter/APL Keyboard

The Typewriter/APL keyboard enables a 3276/3278 operator to enter the 81 APL-specific characters as well as the 94-character-plus-space EBCDIC dual case character set. The characters that can be entered are:

With APL "OFF"	-	94	EBCDIC characters plus Space
With APL "ON"	-	81	APL-specific characters plus:
			10 numerics (0 through 9)
			26 uppercase alphabetic characters
			16 invariant symbols (excluding & and %)

When the display station is first turned on, the Typewriter/APL keyboard operates similarly to the 75-Key Typewriter keyboard without APL, with the exception of the PF1 through PF12 keys. Pressing the APL ON/OFF key (with the ALT key held down) causes the keyboard to enter APL mode (the letters APL display in the Operator Information Area); in this mode the APL characters on the right half of the keys may be entered (the Shift, Lock, and ALT keys are used to select the desired character on a key). The keyboard is returned to normal (non-APL) mode by pressing the APL ON/OFF key again.

88-Key Katakana Typewriter/APL Keyboard

The 88-Key Katakana Typewriter/APL keyboard (available for IBM World Trade Americas/Far East only) is shown in Figure 2-2.

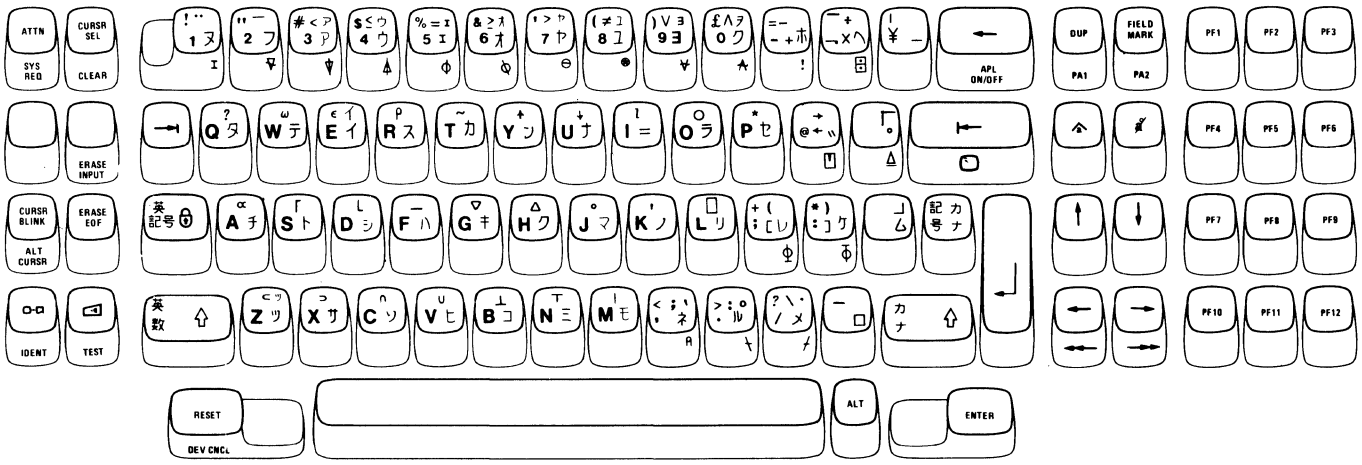


Figure 2-2. 88-Key Katakana Typewriter/APL Keyboard

The Katakana Typewriter/APL keyboard enables a 3276/3278 operator to enter the 81 APL-specific characters as well as the 127-plus-space Japanese Katakana character set. The characters that can be entered are:

With APL "OFF" - 127-character Japanese Katakana set plus Space
With APL "ON" - 81 APL-specific characters plus:
- 10 numerics (0 through 9)
- 26 uppercase alphabetic characters
- 16 invariant symbols (excluding & and %)

When the display station is first turned on, the Katakana Typewriter/APL keyboard operates similarly to the 76-Key Katakana Typewriter keyboard without APL, with the exception of the PF1 through PF12 keys. Momentarily pressing the APL ON/OFF key (with the ALT key held down) places the keyboard in APL downshift mode (the letters APL display in the Operator Information Area). APL upshift characters can be entered either by pressing and holding either ⇧ (Upshift) key or by pressing the ⇪ (Lock) key; when the keyboard is locked in APL upshift mode, pressing either Upshift key returns the keyboard to APL downshift mode. The APL characters on the right front of keys can be entered by pressing and holding the ALT key. The keyboard is returned to non-APL mode (ALPHA downshift) by pressing the APL ON/OFF key again.

APL Keyboard World Trade Considerations

The APL programming support does not support certain Canadian French and Katakana characters on the Canadian French and Katakana Typewriter/APL keyboards. The unsupported Canadian French characters are all those enterable by a Dead key sequence except à, è, é, and ù. The unsupported Katakana characters are those with I/O interface codes that are not included in the 94-character-plus-space EBCDIC character set. However, the control unit of 3276 does not block these unsupported codes when they are sent inbound to the host system.

87-Key Typewriter/Text Keyboard

The 87-Key Typewriter/Text Keyboard (shown in Figure 2-3) is a typewriter-like keyboard with keys that contain both U.S. English and Text-specific characters. This keyboard is available for U.S. English only (the Text keyboard is not available in IBM World Trade Europe/Middle East/Africa countries). The Numeric Lock feature is available for all Text keyboards and operates in both Text and non-Text modes.

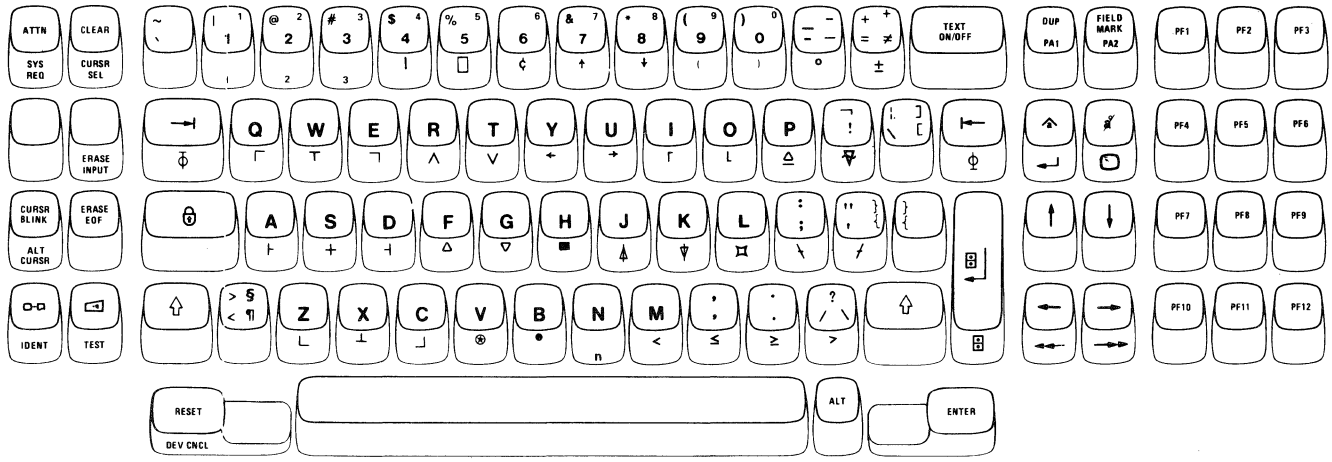


Figure 2-3. 87-Key Typewriter/Text Keyboard

The Text-specific characters are colored green (on white keys). The Typewriter/Text keyboard has PF1 through PF12 keys located on the right side of the keyboard instead of on the front of the top row of keys as on non-Text keyboards; PF13 through PF24 are not available on the Typewriter/Text keyboard.

The 3276/3278 operator can use the Typewriter/Text keyboard to enter the 65 Text-specific characters as well as the 94-character-plus-space U.S. English character set. The characters that can be entered are:

With TEXT "OFF" - 94 U.S. English characters plus
47 graphics on the front of the keys

With TEXT "ON" - 65 Text-specific characters plus:
10 numerics (0 through 9)
26 uppercase alphabetic characters
26 lowercase alphabetic characters
9 symbols (. < ; , > ? : ! ¬)

When the display station is first turned on, the Typewriter/Text keyboard enters the normal (non-Text) mode. In this mode, the U.S. English characters on the top of the keys may be entered, and the Text graphics on the front of the keys may be entered by pressing the ALT key simultaneously. Also, the PF1 through PF12 keys may be used. Pressing the TEXT ON/OFF key causes the keyboard to enter Text mode (TEXT is displayed in the Operator Information Area). In this mode, the Text characters on the right half of the keys may be entered. The keyboard is returned to normal mode by pressing the TEXT ON/OFF key again. The ⇧ (Shift), ⇧ (Lock), and ALT keys are used to select the desired character on a key, regardless of the mode.

IBM 3287 Printer with APL/Text

The 3287 APL/Text special feature and its prerequisite Extended Character Set Adapter special feature enable the 3287 to print the following characters:

- 94 EBCDIC characters plus Space
- 81 APL-specific characters
- 37 Text-unique characters
- 10 graphic plot characters

IBM 3289 Line Printer with Text Print

The 3289 Text Print special feature (not available in IBM World Trade Europe/Middle East/Africa countries) enables the 3289, when equipped with the Text Print belt, to print the following characters:

- 93 U.S. English characters plus Space
- 32 TN characters

The 93-character U.S. English set is identical to the normal 94-character U.S. English set except the tilde (~) symbol is not included.

A 3289 with the Text Print feature can operate with the 125-character Text Print belt or a 48-, 64-, or 94-character U.S. English print belt at the following maximum speeds in lines per minute (lpm):

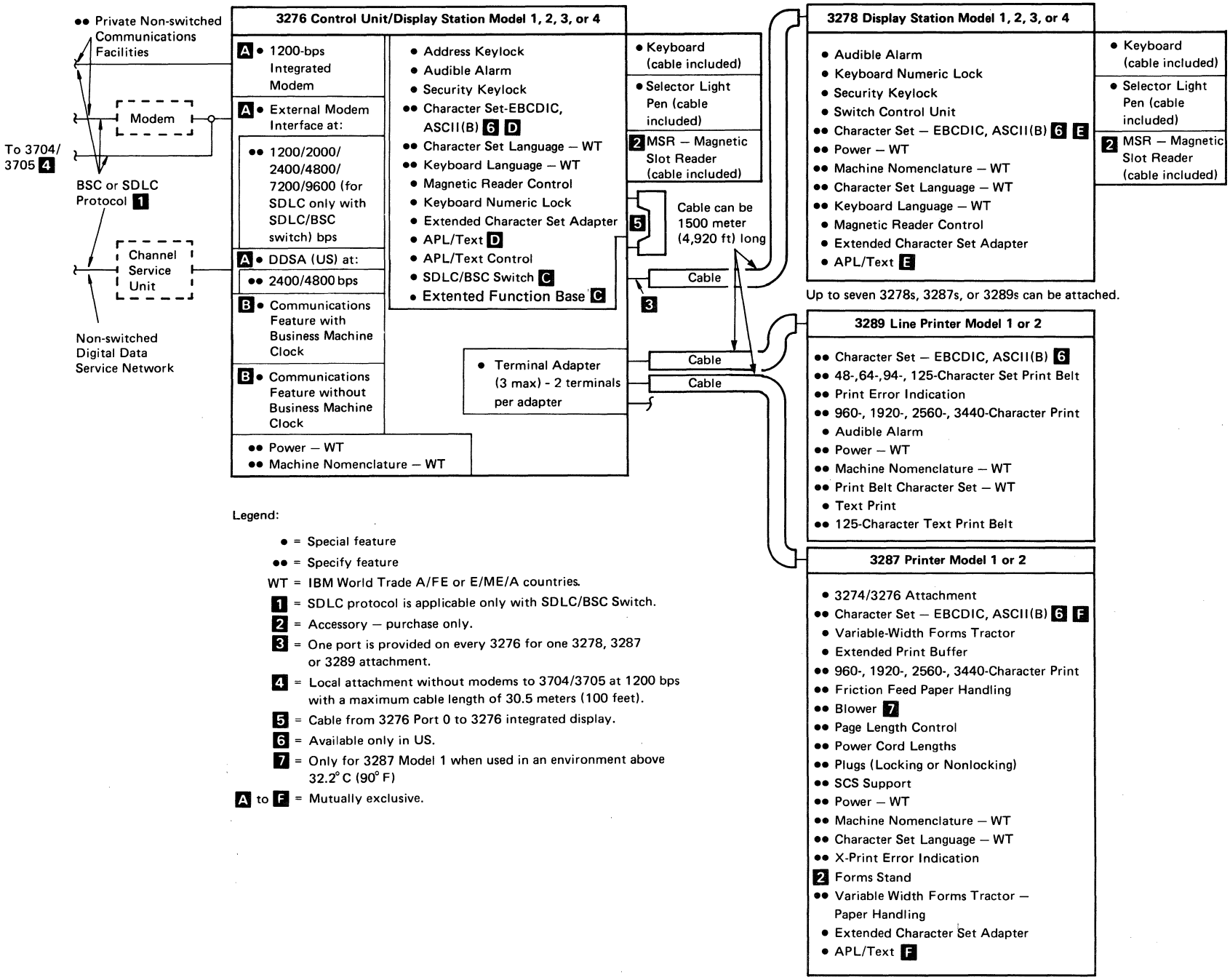
1. With the 125-character Text Print belt installed:
   - Model 1 = 40 lpm
   - Model 2 = 160 lpm
2. With the 48-, 64-, and 94-character print belts respectively:
   - Model 1 = 155 lpm, 120 lpm, 80 lpm
   - Model 2 = 400 lpm, 300 lpm, 230 lpm

Note: *Actual printer throughput depends upon operational and system characteristics. Maximum print speed may be affected by such factors as communication line speed, control unit load, character set, and application program.*

Local or host-initiated Copy operations from a 3276/3278 to a 3289, with or without the Text Print feature installed, are limited to the normal 3276/3278/3287/3289 94-character U.S. English set.

Chapter 3. Configurations

This chapter contains the configuration examples and feature code lists from the *IBM 3270 Information Display System Configurator,* GA27-2849, that are affected by the 3276/3278/3287 APL/Text functions and features, and the 3289 Text Print feature.



Legend:

- • = Special feature
- •• = Specify feature
- WT = IBM World Trade A/FE or E/ME/A countries.
- 1 = SDLC protocol is applicable only with SDLC/BSC Switch.
- 2 = Accessory — purchase only.
- 3 = One port is provided on every 3276 for one 3278, 3287 or 3289 attachment.
- 4 = Local attachment without modems to 3704/3705 at 1200 bps with a maximum cable length of 30.5 meters (100 feet).
- 5 = Cable from 3276 Port 0 to 3276 integrated display.
- 6 = Available only in US.
- 7 = Only for 3287 Model 1 when used in an environment above 32.2° C (90° F)
- A to F = Mutually exclusive.

Figure 3-1. Remote 3270 Display System Employing a 3276 Control Unit/Display Station Model 1, 2, 3, or 4 (BSC Application)

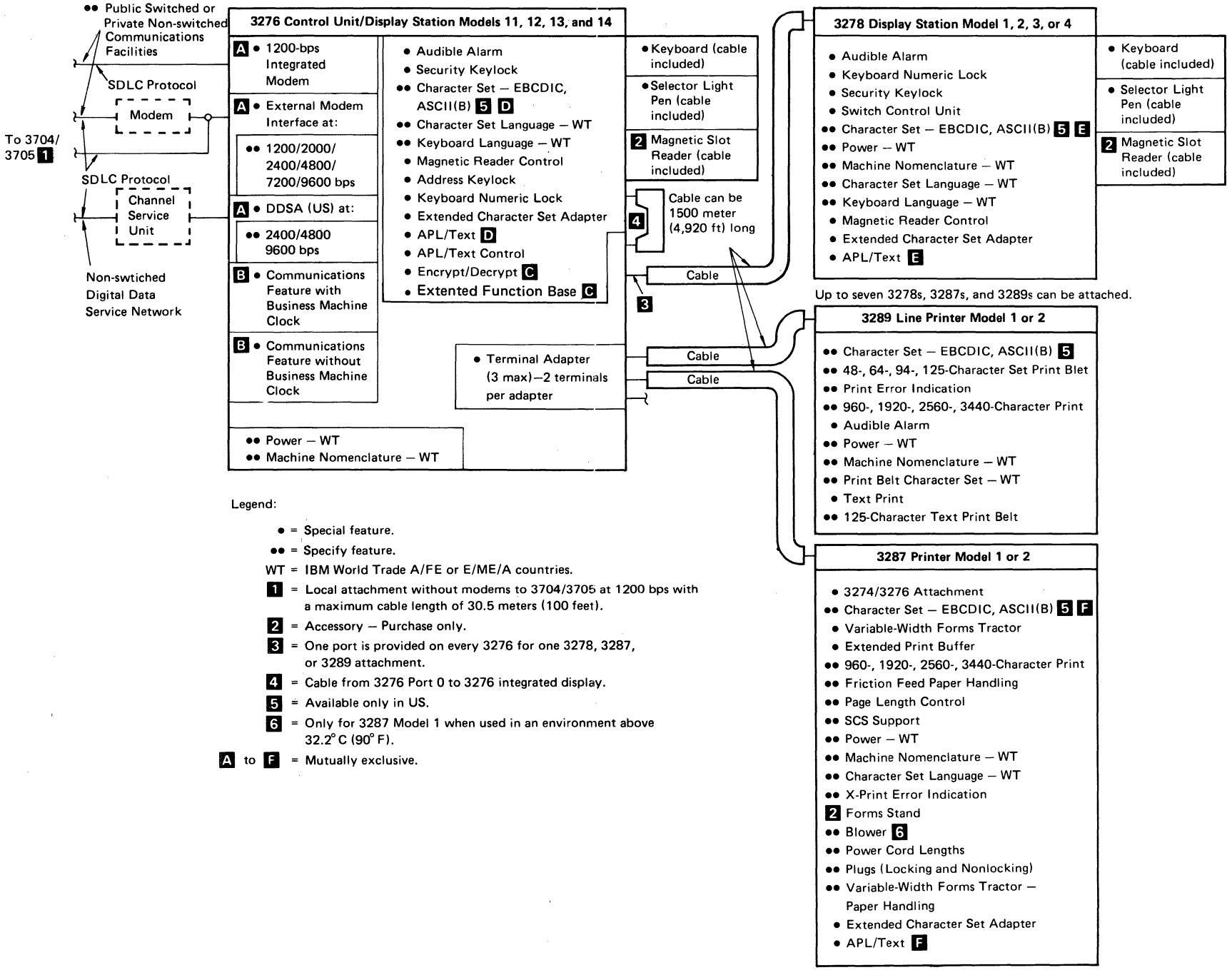


Figure 3-2. 3270 Display System Employing a 3276 Control Unit/Display Station Model 11, 12, 13, or 14 (SDLC Application).

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
O	Audible Alarm	1090			
O	Terminal Adapter 1	3255			
Choose as many as needed (2 terminals per adapter)	Terminal Adapter 2	3256		3255	
	Terminal Adapter 3	3257		3256	
N	75-Key Typewriter Keyboard – EBCDIC	4621		9082	
Choose one	75-Key Data Entry Keyboard – EBCDIC	4622		9082	
	75-Key Data Entry Keypunch keyboard – EBCDIC	4623		9082	
	[5] 75-Key Typewriter Keyboard – ASCII(B)	4624		9084	1067
	87-Key EBCDIC Typewriter/APL Keyboard	4626		1067, 1120, 9082	
	87-Key Typewriter Keyboard – EBCDIC (12 additional PF keys)	4627		9082	
	[5] 87-Key Typewriter Keyboard – ASCII(B) (12 additional PF keys)	4628		9084	1067
	[4] 87-Key EBCDIC Typewriter/Text Keyboard	4629		1067, 1120, 9082	
[1] O	Keyboard Cable, 1.8 meters (6 ft)		9399		
O	Keyboard-Numeric Lock	4690			
O	APL/Text Control	1067		1068	9084
O	Extented Function Base	1068			3680, 6315
O	Security Keylock	6340			
O	Address Keylock	1009			
O	Selector Light Pen	6350			
O	SDLC/BSC Switch (Models 1, 2, 3, and 4 only)	6315			1068
N	120 V, 60 Hz Locking Plug		9890		
Choose one	120 V, 60 Hz Nonlocking Plug		9891		
[2] O	[4] Power Cable, 1.8 meters (6 ft)		9511		
Choose one	[4] Power Cable, 3.7 meters (12 ft)		9512		
	Power Cable, 4.5 meters (15 ft)		9513		
[3] O	Communication Cable, 3.0 meters (10 ft)		9061		
Choose one	Communication Cable, 9.1 meters (30 ft)		9062		
	Communication Cable, 12.2 meters (40 ft)		9063		
N	Communications Feature with Business Machine Clock	6301			6302
Choose one	Communications Feature without Business Machine Clock	6302			6301
N	• 1200 bps		9820		
Choose one	• 2000 bps		9821	6302	
	• 2400 bps		9822	6302	
	• 4800 bps		9823	6302	
	• 7200/8000 bps		9824	6302	
	• 9600 bps (SDLC only)		9825	6302	
O	External Modem Interface	3701		6301 or 6302	5500, 5501, 5502, 5507, 5508, 5650, 5651
N	• Public Switched Network [6]		9490		
Choose one	• Private Nonswitched Communication Facilities		9491		

Legend:

[1] = 91 cm (3 ft) normally supplied.

[2] = 2.8 meters (9 ft) normally supplied. Optionally specify other lengths.

[3] = 6.1 meters (20 ft) normally supplied. Optionally specify other lengths.

[4] = Available only in US and Canada.

[5] = Available only in US.

[6] = Models 11, 12, 13, and 14 only.

Figure 3-3 (Part 1 of 2). 3276 Control Unit Display Station – Universal

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
O Choose one	[1] 1200-bps Integrated Modem, Switched with Manual Answer (Models 11, 12, 13, and 14 only)	5502		6301	3701, 5500, 5501, 5507, 5508, 5650, 5651
	1200-bps Integrated Modem, Non-switched	5500	9651 or 9652	6301	3701, 5501, 5502, 5507, 5508, 5650, 5651
	[1] 1200-bps Integrated Modem, Non-switched with Switched Network Backup and Manual Answer	5507	9651 or 9652	6301	3701, 5500, 5501, 5502, 5508, 5650, 5651
	[4] 1200-bps Integrated Modem, Switched with Auto Answer (Models 11, 12, 13, and 14 only)	5501		6301	3701, 5500, 5502, 5507, 5508, 5650, 5651
	[4] 1200-bps Integrated Modem, Non-swtiched with Swtiched Network Backup and Auto Answer	5508	9651 or 9652	6301	3701, 5500, 5501, 5502, 5507, 5650, 5651
N with 5500, 5507, or 5508	• 4-wire facility		9651	5500, 5507, 5508	
	• 2-wire facility		9652		
O Choose one	DDSA (US only) Point-to-point	5650		6302	3701, 5500, 5501, 5502, 5507, 5508, 5651
	Multipoint	5651		6302	3701, 5500, 5501, 5502, 5507, 5508, 5650
N Choose one	• 2400 bps		9822	5650 or 5651	
	• 4800 bps		9823	5050 or 5651	
	[3] • 9600 bps		9825	5650 or 5651	
N Choose one	Character Set — EBCDIC		9082	4621, 4622, 4623, 4626, 4627, 4629	2715, 2716, 2717, 2718, 4624, 4628
	Character Set — ASCII(B) (US only)		9084	4624, 4628	2715, 2716, 2717, 2718, 4621, 4622, 4623, 4626, 4627, 4629
O	Extended Character Set Adapter	3610		1067	
O	APL/Text	1120		3610, 1067	9084
O	Magnetic Reader Control	4999			
O	[2] Magnetic Slot Reader Accessory			4999	
O	[3] Encrypt/Decrypt	3680		6340	1068

Legend:

[1] = Data Coupler Type CDT or FCC certified equivalent is required (US only).
[2] = Accessory Item — purchase only.
[3] = Models 11, 12, 13, and 14 only.
[4] = CBS type data access arrangement or FCC-registered equivalent is required (US only).

Figure 3-3 (Part 2 of 2). 3276 Control Unit Display Station — Universal

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
N	Power – IBM WT A/FE except Canada		2998		
Choose one	100 V, 50 Hz		2804		
	100 V, 50 Hz		2805		
	200 V, 50 Hz		2806		
	220 V, 50 Hz		2813		
	230 V, 50 Hz		2821		
	240 V, 50 Hz		2801		
	100 V, 60 Hz		2730		
	110 V, 60 Hz		2822		
	120 V, 60 Hz		2800		
	127 V, 60 Hz		2823		
[1] N	Locking plug		9890		
Choose one (Japan only)	Nonlocking plug		9891		
N	Machine Nomenclature				
Choose one	Brazilian		2933		
	Canadian/French		2935		
	English (US)		2924		
	Japanese		2930		
	Spanish-speaking		2931		
N	Character Set Language				
Choose one	Brazilian		2775		
	Canadian/French		2777		
	EBCDIC		2751		
	English (US)		2756		
	International		2750		
	Japanese (English)		2755		
	Japanese (Katakana)		2773		
	Spanish-speaking		2769		
N	Keyboard Languages				
Choose one	Brazilian		2975	2775	2715, 2716, 2717, 2718
	Canadian/French		2977	2777	2715, 2716, 2717, 2718
	EBCDIC		2951	2751	2715, 2716, 2717, 2718
	English (US)		2956	2756	2715, 2716, 2717, 2718
	International		2950	2750	2715, 2716, 2717, 2718
	Japanese (English)		2955	2755	2716, 4621, 4626, 4627, 4629
	Japanese (Katakana)		2973	2773	4621, 4622, 4623, 4626, 4627, 4629
	Spanish-speaking		2969	2769	2715, 2716, 2717, 2718

[1] = Available for all voltages under 200 V.

Figure 3-4 (Part 1 of 2). 3276 Control Unit Display Station – Additions for IBM World Trade Americas/Far East

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
N Choose one	76-Key Japanese English/Japanese Katakana Typewriter Keyboard	2715		2955 or 2973	
	76-Key Japanese Katakana Data Entry Keyboard	2716		2973	2955
	88-Key Japanese English/Japanese Katakana Typewriter Keyboard	2717		2955 or 2973	
	88-Key Japanese English/Japanese Katakana/APL Keyboard	2718		2955 or 2973 and 1120	
O Choose one	[1] 1200-bps Integrated Modem, Non-switched	5500	9651 or 9652	6301	3701, 5501, 5502, 5507, 5508
	[2] 1200-bps Integrated Modem, Switched with Auto-Answer (Models 11, 12, 13 and 14 only)	5501		6301	3701, 5500, 5502, 5507, 5508
	[2] 1200-bps Integrated Modem, Non-switched with Swtiched Network Backup and Auto-Answer	5508	9651 or 9652	6301	3701, 5500, 5501, 5502, 5507

Legend:

[1] Japan only — Specify 2943 if used on NTT D-1 service.

[2] Excluding Canada — This feature includes the PSN line plate, which is mandatory for attachment to the public switched telephone network.

Figure 3-4 (Part 2 of 2). 3276 Control Unit Display Station – Additions for IBM World Trade Americas/Far East

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
O	Audible Alarm	1090			
[6] O	75-Key Typewriter Keyboard – EBCDIC	4621		9082	
	75-Key Data Entry Keypunch – EBCDIC	4622		9082	
	75-Key Data Entry Keypunch Keyboard – EBCDIC	4623		9082	
	75-Key Typewriter Keyboard – ASCII(B)	4624		9084	
	[7] 87-Key EBCDIC Typewriter/APL Keyboard	4626		9082, 1120	
	87-Key Typewriter Keyboard – EBCDIC (12 additional PF keys)	4627		9082	
	87-Key Typewriter Keyboard – ASCII(B) (12 additional PF keys)	4628		9084	
	87-Key EBCDIC Typewriter/Text Keyboard	4629		9082, 1120	
O	[3] Keyboard Cable, 1.8 metres (6 ft)		9399	Any keyboard	
O	Keyboard Numeric Lock	4690		Any keyboard	
O	Security Keylock	6340			
O	Selector Light Pen	6350			
O	Magnetic Reader Control	4999			
N	[1] [4] 120 V, 60 Hz Locking Plug		9890		
Choose one	[1] [4] 120 V, 60 Hz Nonlocking Plug		9891		
N Choose one	Character Set – EBCDIC		9082	4621, 4622, 4623, 4626, 4627, 4629	2715, 2716, 2717, 2718, 4624, 4628
	Character Set – ASCII(B)		9084	4624, 4628	1120, 2715, 2716, 2717 2718, 4621, 4622, 4623, 4626, 4627, 4629
O	[7] Extended Character Set Adapter	3610			
O	[7] APL/Text	1120		3610	9084
[2] O	[4] Power Cable, 1.8 metres (6 ft)		9511		
	[4] Power Cable, 3.7 metres (12 ft)		9512		
	Power Cable, 4.5 metres (15 ft)		9513		
O	Switch Control Unit	1720			
O	[6] Magnetic Slot Reader – Accessory			4999	

Legend:

[1] = 120 V, 1 phase, 60 Hz (US/Canada only)

[2] = 2.8 metres (9 ft) normally supplied. Optionally specify other lengths.

[3] = 91 centimetres (3 ft) normally supplied. Optionally specify other lengths.

[4] = Not available in IBM WT E/ME/A countries.

[5] = Accessory item – Purchase only.

[6] = If the 3278 is attached to a 3274, only two of the following keyboard types can be present in the cluster of terminals: (1) the typewriter keyboard, (2) data entry keyboard, and (3) data entry keypunch keyboard. This limitation does not apply to APL or Text keyboards.

[7] = The 3278 must be attached to a 3274 Model 1A, 1C, or 1D, or to a 3276 with APL/Text Control feature (1067).

Figure 3-5. 3278 Display Station – Universal

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with):	Mutually Exclusive (Must not be ordered with):
N Choose one	Power – IBM WT A/FE except Canada		2998		
	100 V, 50 Hz		2804		
	110 V, 50 Hz		2805		
	200 V, 50 Hz		2806		
	220 V, 50 Hz		2813		
	230 V, 50 Hz		2821		
	240 V, 50 Hz		2801		
	100 V, 60 Hz		2730		
	110 V, 60 Hz		2822		
	120 V, 60 Hz		2800		
	127 V, 60 Hz		2823		
[1] N Choose one (Japan only)	Locking Plug		9890		
	Nonlocking Plug		9891		
N Choose one	Machine Nomenclature				
	Brazilian		2933		
	Canadian/French		2935		
	English (US)		2924		
	Japanese		2930		
	Spanish-speaking		2931		
[2] N Choose one	Character Set Language				
	Brazilian		2775		
	Canadian/French		2777		
	EBCDIC		2751		
	English (US)		2756		
	International		2750		
	Japanese (English)		2755		
	Japanese (Katakana)		2773		
	Spanish-speaking		2769		
O Choose one	Keyboard Languages				
	Brazilian		2975	2775	2715, 2716, 2717, 2718
	Canadian/French		2977	2777	2715, 2716, 2717, 2718
	EBCDIC		2951	2756	2715, 2716, 2717, 2718
	English (US)		2956	2756	2715, 2716, 2717, 2718
	International		2950	2750	2715, 2716, 2717, 2718
	Japanese (English)		2955	2755	4621, 4627, 2716
	Japanese (Katakana)		2973	2773	4621, 4622, 4623, 4627
	Spanish-speaking		2969	2769	2715, 2716, 2717, 2718
O	76-Key Japanese English/Japanese Katakana Typewriter Keyboard	2715		2955 or 2973	
	76-Key Japanese Katakana Data Entry Keyboard	2716		2973	2955
	88-Key Japanese English/Japanese Katakana Typewriter Keyboard	2717		2955 or 2973	
	88-Key Japanese English/Japanese Katakana/APL Keyboard [3]	2718		2955 or 2973 and 1120	

Legend:

[1] Available for all voltages under 200 V.

[2] When attached to a 3276, the character set on the 3278 must be the same as the character set on the 3276.

[3] The 3278 must be attached to a 3274 Model 1A, 1C, or 1D, or to a 3276.

Figure 3-6. 3278 Display Station – (Additions for IBM World Trade Americas/Far East)

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
N	[1] 3271/3272 Attachment	8330			8331, 9660
Choose one	[2] 3274/3276 Attachment	8331			8330
[3] N	Locking Plug		9890		
Choose one	Nonlocking Plug		9891		
[4] O	[7] Power Cable, 1.8 metres (6 ft)		9511		
Choose one	[7] Power Cable, 3.7 metres (12 ft)		9512		
	Power Cable, 4.5 metres (15 ft)		9513		
N	Character Set – EBCDIC		9082		
Choose one	[8] Character Set – ASCII (B)		9084		9660, 1120
O	[9] Extended Character Set Adapter	3610			1066, 8330, 9084
O	[9] APL/Text	1120		3610, 8331 9082	1066, 8330, 9084
O	[5] Friction Feed Paper Handling		9180		
O	Blower		9030	3287 Model 1	
O	Page Length Control		9550	8700	
O	SCS (SNA Character String)		9660	8700, 8331, 9082	8330 or 9084
O	X-Print Error Indication		9488		
N	480-Character Print		9520	8330	8331
Choose one	960-Character Print		9521	8331	8330
	1920-Character Print		9522	8330 or 8331	
	2560-Character Print		9523	3880 and 8331	8330
	3440-Character Print		9524	3880 and 8331	8330
O	Variable-Width Forms Tractor	8700		9850	
O	Variable-Width Forms Tractor-Paper Handling		9185	8700	
O	Extended Print Buffer	3880		8331	8330
O	[6] Forms Stand	4450			

Legend:

[1] To be attached to the 3274 Type B Terminal Adapter.
[2] To be attached to the 3276 or 3274 Type A Terminal Adapter or base ports.
[3] 120 V, 1 Phase, 3-Wire, 60 Hz (US/Canada)
[4] 2.8 metres (9 ft) normally supplied. Optionally specify other lengths.
[5] Required if special feature 8700 is not ordered.
[6] Accessory item – purchase only.
[7] Not available in IBM WT E/ME/A countries.
[8] Available only in US and Canada.
[9] The 3287 must be attached to a 3274 Model 1A, 1C, or 1D, or to a 3276 with APL/Text Control feature (1067).

Figure 3-7. 3287 Printer (3274/76 Attachment) – Universal

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
[1] N	Locking Plug		9890		
Choose one	Nonlocking Plug		9891		
[2] O	[5] Power Cable, 1.8 metres (6 ft)		9511		
Choose one	[5] Power Cable, 3.7 metres (12 ft)		9512		
	Power Cable, 4.5 metres (15 ft)		9513		
[3] N	48-Character Set — EBCDIC		9490		
Choose one	64-Character Set — EBCDIC		9491		
[6]	94-Character Set — EBCDIC		9492		
	[5] 48-Character Set — ASCII (B)		9493		
	[5] 64-Character Set — ASCII (B)		9494		
	[5] 94-Character Set — ASCII (B)		9495		
	[8] 125-Character Text Print — EBCDIC		9496	1130	
O	Print Error Indication		9488		
N	960-Character Print		9521		
Choose one	1920-Character Print		9522		
	2560-Character Print		9523		
	3440-Character Print		9524		
O	Audible Alarm	1090			
[4] O	48-Character Set Print Belt — EBCDIC (Additional)	5821			
[6]	64-Character Set Print Belt — EBCDIC (Additional)	5822			
	94-Character Set Print Belt — EBCDIC (Additional)	5823			
	[9] 125-Character Text Print Belt — EBCDIC (Additional)	5824			
	[7] 48-Character Set Print Belt — ASCII(B) (Additional)	5811			1130
	[7] 64-Character Set Print Belt — ASCII(B) (Additional)	5812			1130
	[7] 94-Character Set Print Belt — ASCII(B) (Additional)	5813			1130
	[8] Text Print (U.S. English only)	1130		1067	

Legend:

[1] 120 V, 1 phase, 3-Wire, 60 Hz (US/Canada).
[2] 2.8 metres (9 ft) normally supplied. Optionally specify other lengths.
[3] Available at time of manufacturing only. Do not specify if Text Print feature (1130) is ordered.
[4] Accessory item — purchase only.
[5] Not available in IBM WT A/FE and E/ME/A countries.
[6] EBCDIC and ASCII (B) print belts are not interchangeable.
[7] Available only in US and Canada.
[8] The 3289 must be attached to a 3274 Model 1A, 1C or 1D, or to a 3276.
[9] Interchangeable only with US English print belts.

Figure 3-8. 3289 Line Printer – Universal

Necessary (N) or Optional (O)	Feature Name	Special Feature Code	Specify Feature Code	Prerequisite (Must be ordered with)	Mutually Exclusive (Must not be ordered with)
N	Power – IBM WT A/FE except Canada		2988		
Choose one	100 V, 50 Hz		2804		
	110 V, 50 Hz		2805		
	200 V, 50 Hz		2806		
	220 V, 50 Hz		2813		
	230 V, 50 Hz		2821		
	240 V, 50 Hz		2801		
	100 V, 60 Hz		2730		
	110 V, 60 Hz		2822		
	120 V, 60 Hz		2800		
	127 V, 60 Hz		2823		
[5] N					
Choose one (Japan only)	Locking plug		9890		
	Nonlocking plug		9891		
O	120 V, 60 Hz Locking Plug (Canada only)		9890		
Choose one (Canada only)	120 V, 60 Hz Nonlocking Plug (Canada only)		9891		
N	Machine Nomenclature				
Choose one	Brazilian/Portuguese		2933		
	Canadian/French		2935		
	English		2924		
	Japanese		2930		
	Spanish-speaking		2931		
N	Print Belt Character Set				
Choose one each from Groups A and B	Group A				
	48-Character Set		2767		
	64-Character Set		2768		
	94-Character Set		2769		
	116-Character Set (Canadian/French only)		2820		
	125-Character Set (Text Print)		2825	1130	
	127-Character Set (Japanese Katakana only)		2873		
	EBCDIC		2951		
[1]	Group B				
	Brazilian		2975		
	[3] Canadian/French		2977		
	EBCDIC		2951		
	English (US)		2956		
	International		2950		
	[4] Text Print EBCDIC		2953		
	Japanese (English)		2955		
	[2] Japanese (Katakana)		2973		
	Spanish-speaking		2969		

Legend:

[1] Group B belts are not interchangeable.

[2] The 127-character Japanese (Katakana) belt is interchangeable only with the 48- and 64-character Japanese (English) belts.

[3] 116-character Canadian/French is interchangeable with 48-, 64-, and 94-character Canadian/French belts.

[4] The 125-character Text Print belt is interchangeable only with the 48-, 64-, and 94-character U.S. English belts.

[5] Available for all voltages under 200 V.

Figure 3-9. 3289 Line Printer – Additions for IBM World Trade Americas/Far East

Appendix A. APL/Text and Text Print Features I/O Interface Code Charts

Code Key (Note 1) → / Character Set ↓ EBCDIC	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	4A	4F	5A	5B	5F	6A	79	7B	7C	7F	A1	C0	D0	E0
English (US)	¢	|	!	$	¬	¦	`	#	@	"	~	{	}	\
Austrian/German	Ä	!	Ü	$	^	ö	°	#	§	"	ß	ä	ü	Ö
Austrian/German (Alternate)	ö	|	ü	Ü	¬	ß		Ä	Ö	ä				
Danish/Norwegian	#	!	¤	Å	^	ø	`	Æ	Ø	"	ü	æ	å	\
Danish/Norwegian (Alternate)	ø	|	å	Å	¬	¦		Æ	Ø	æ				
Finnish/Swedish	§	!	¤	Å	^	ö	é	Ä	Ö	"	ü	ä	å	É
Finnish/Swedish (Alternate)	ö	|	å	Å	¬	¦		Ä	Ö	ä				
French	°	!	§	$	^	ù	`	£	à	"	..	é	è	ç
Italian	°	!	é	$	^	ò	ù	£	§	"	ì	à	è	ç
Portuguese (Note 2)	[	!	]	$	^	õ	`	Ã	Õ	"	ç	ã	´	Ç
Spanish	[	|	]	Pt	¬	ñ	`	Ñ	@	"	..	{	}	\
Spanish (Alternate)	¢	¦	¡	Pt	¬	¦		Ñ	@	ñ				
English (UK)	$	|	!	£	¬	¦	`	#	@	"	¯	{	}	\
Belgian	[	!	]	$	^	ù	`	#	à	"	..	é	è	ç
Brazilian	É	!	$	Ç	^	ç	ã	Õ	Ã	"	~	õ	é	\
Japanese (English)	£	|	!	¥	¬	¦	`	#	@	"	¯	{	}	$
Spanish Speaking	[	|	]	$	¬	ñ	`	Ñ	@	"	..	{	}	\
Canadian/French	à	!	´	$	^	ù	`	#	@	"	..	é	è	¸
International	[	!	]	$	^	¦	`	#	@	"	~	{	}	\

Notes:

1. See Figure A-2 for code points.
2. Portugal
   a. Host system to control unit: 4C or E0 is Ç.
   b. Control unit to host system: E0 is Ç and 4C (<) is removed.
   c. APL/Text Control Feature: 4C (<) and E0 (Ç) are active both from and to host system.

Figure A-1. National Use Differences I/O Interface Code (3276/3278/3287)

Bits 4567	Hex 1	00				01				10				11				Bits 0,1
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	←2,3
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	←Hex 0
0000	0					SP	&	–						12	13	14	0	
0001	1							/	Ê	a	j	11		A	J		1	
0010	2					â	ê	Â	Ê	b	k	s		B	K	Ş	2	
0011	3						ë		Ë	c	l	t		C	L	T	3	
0100	4							À	È	d	m	u		D	M	U	4	
0101	5									e	n	v		E	N	V	5	
0110	6						î		Î	f	o	w		F	O	W	6	
0111	7						ï		Ï	g	p	x		G	P	X	7	
1000	8					ç		Ç		h	q	y		H	Q	Y	8	
1001	9								7	i	r	z		I	R	Z	9	
1010	A					1	3	6	:									
1011	B					.	4	,	8					ô	û	Ô	Û	
1100	C					<	*	%	9						ü		Ü	
1101	D					(	)	_	'								Ù	
1110	E					+	;	>	=									
1111	F					2	5	?	10									

Notes:

1 through 14 are the National use differences. They are shown in Figure A-1.

= Canadian/French characters.

1. All control characters are deleted from this chart.
2. All codes can be entered from the keyboard.
3. Character code assignments other than those shown within all outlined areas of this chart are undefined. If an undefined character code is programmed, the character that will be displayed or printed is a hyphen (hex 60); also, a hex 60 will be returned on a subsequent read operation. The character displayed or printed for a given undefined character code may be different for other devices. IBM reserves the right to change at any time the character displayed or printed for any undefined character code.
4. NL (hex 15), EM (hex 19), FF (hex 0C), CR (hex 0D), and NUL (hex 00) are not displayed or printed. The DUP (hex 1C) and FM (hex 1E) control characters on dual case terminals are displayed as $\overline{*}$ and $\overline{;}$ respectively, and are printed as * and ; .
5. DUP (hex 1C) and FM (hex 1E) control characters on mono case terminals are displayed as * and ; respectively, and are printed as * and ; .

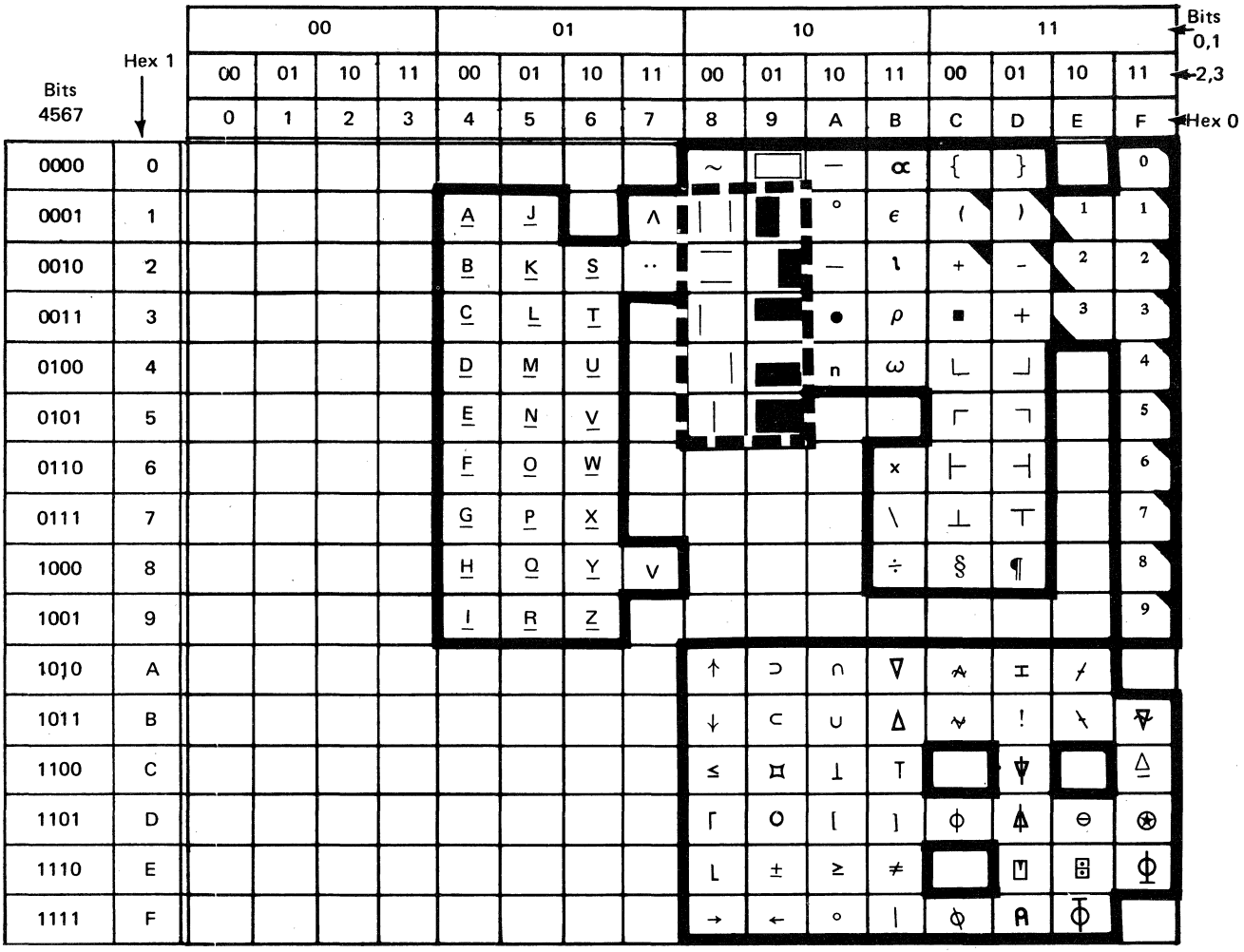
Figure A-2. APL/Text Feature, 1-Byte I/O Interface Codes (3276/3278/3287)

Bits 4567	Hex 1	00				01				10				11				Bits 0,1
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	←2,3
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	←Hex 0
0000	0					SP	&	−			ソ					$	0	
0001	1					。	エ	/		ア	タ	ー		A	J		1	
0010	2					「	ォ			イ	チ	ヘ		B	K	S	2	
0011	3					」	ャ			ウ	ツ	ホ		C	L	T	3	
0100	4					、	ュ			エ	テ	マ		D	M	U	4	
0101	5					・	ョ			オ	ト	ミ		E	N	V	5	
0110	6					ヲ	ッ			カ	ナ	ム		F	O	W	6	
0111	7					ァ				キ	ニ	メ		G	P	X	7	
1000	8					ィ	−			ク	ヌ	モ		H	Q	Y	8	
1001	9					ゥ				ケ	ネ	ヤ		I	R	Z	9	
1010	A					£	!		:	コ	ノ	ユ	レ					
1011	B					.	¥	,	#				ロ					
1100	C					<	*	%	@	サ		ヨ	ワ					
1101	D					(	)	_	'	シ	ハ	ラ	ン					
1110	E					+	;	>	=	ス	ヒ	リ	゛					
1111	F					|	¬	?	"	セ	フ	ル	°					

Notes:

1. All control characters are deleted from this chart.
2. All codes can be entered from the keyboard.
3. Character code assignments other than those shown within all outlined areas of this chart are undefined. If an undefined character code is programmed, the character that will be displayed or printed is a hyphen (hex 60); also, a hex 60 will be returned on a subsequent read operation. The character displayed or printed for a given undefined character code may be different for other devices. IBM reserves the right to change at any time the character displayed or printed for any undefined character code.
4. NL (hex 15), EM (hex 19), FF (hex 0C), CR (hex 0D), and NUL (hex 00) are not displayed or printed. The DUP (hex 1C) and FM (hex 1E) control characters on dual case terminals are displayed as $\overline{*}$ and $\overline{;}$ respectively, and are printed as * and ; .
5. DUP (hex 1C) and FM (hex 1E) control characters on mono case terminals are displayed as * and ; respectively, and are printed as * and ; .

Figure A-3. Katakana/APL, 1-Byte I/O Interface Codes (3276/3278/3287)



Notes:

Subscripts

Superscripts

1. These codes, preceded by a hex 08 control character, transmit the graphics shown.
2. All codes within the solid outlined areas of this chart can be entered from the keyboard; the 10 graphic plot characters within the dashed outlined area can not be entered from the keyboard.
3. Character code assignments other than those shown within all outlined areas of this chart are undefined. If an undefined character code is programmed, the character that will be displayed or printed is a hyphen (hex 60); also, a hex 60 will be returned on a subsequent read operation. The character displayed or printed for a given undefined character code may be different for other devices. IBM reserves the right to change at any time the character displayed or printed for any undefined character code.

Figure A-4. APL/Text and Katakana/APL, 2-Byte I/O Interface Codes (3276/3278/3287)

Bits 4567	Hex 1	00				01				10				11				Bits 0,1 / 2,3
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	Hex 0
0000	0					SP	&	-				~	0	{	}	\	0	
0001	1							/		a	j	~°	1	A	J		1	
0010	2									b	k	s	2	B	K	S	2	
0011	3									c	l	t	3	C	L	T	3	
0100	4									d	m	u	4	D	M	U	4	
0101	5									e	n	v	5	E	N	V	5	
0110	6									f	o	w	6	F	O	W	6	
0111	7									g	p	x	7	G	P	X	7	
1000	8									h	q	y	8	H	Q	Y	8	
1001	9									i	r	z	9	I	R	Z	9	
1010	A					¢	!	¦	:									
1011	B					.	$	,	#	{	}	∟	⌟					
1100	C					<	*	%	@	≤	¤	⌜	⌝					
1101	D	CR				(	)	_	´	(	)	[	]					
1110	E					+	;	>	=	+	±	≥	≠					
1111	F					|	¬	?	"	+	■	●	¯					

Notes:

Superscripts

1. All control characters are deleted from this chart.
2. Character code hex A1 causes a ° (degree) character to print when the 3289 Text Print belt is installed and a ~ (tilde) character to print when a U.S. English 3289 print belt is installed.
3. Character code assignments other than those shown within the outlined areas of this chart are undefined. If an undefined character code is programmed, the character that will be printed is a hyphen (hex 60); also, a hex 60 will be returned on a subsequent read operation. IBM reserves the right to change at any time the character printed for an undefined character code.
4. NL (hex 15), EM (hex 19), FF (hex 0C), CR (hex 0D), and NUL (hex 00) are not printed. The DUP (hex 1C) and FM (hex 1E) control characters are printed as * and ; respectively.

Figure A-5. 3289 Text Print Feature I/O Interface Codes

IBM 3270 Information Display System
Description and Configuration: APL/Text Feature

GA18-2044-0

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