Chapter 10. Non-SNA Environment (Locally Attached Devices—3272 Version)

Introduction

This chapter describes the data stream operations that differ from the SNA version for locally attached devices in a non-SNA environment. Most of the explanations cover only the differences between SNA and non-SNA for locally attached devices.

Commands

Except for the Read Modified All command, the commands valid for an SNA environment are also valid for the non-SNA locally attached environment.

The additional commands of Select, No Operation (No-op), and Sense are used in the non-SNA locally attached environment to improve device utilization, to retrieve pending status, and to obtain unit check definition, respectively. These commands are not 3270 data stream commands and are not discussed in this book. See the applicable product manuals for an explanation of these commands.

Write Commands

The EW and EWA commands operate the same as in an SNA environment. However, the starting buffer location of the W command depends on the following considerations:

- The starting location can be specified by an SBA order that follows the WCC.
- The starting location is the buffer address containing the cursor if the Write command is not chained or if it is chained from a Select, EAU, No-Op, or Sense command.
- The starting location is the current buffer address if the write command is chained from a read or another write command.

Read Commands

The read commands for devices in this non-SNA environment operate in the same way as for an SNA environment except for the differences described in the following sections.

Read Buffer Command

Execution of the Read Buffer command causes all data in the addressed device buffer location to be transferred to main storage. The transfer of data begins as follows:

- From buffer address 0 if the Read Buffer command is unchained
- From the current buffer address if the Read Buffer command is chained from either a W, EW, EWA, Read Modified, or another Read Buffer command.

Data transfer from the buffer terminates when the last character location in the buffer has been transferred or before the last character location has been transferred when the channel byte count reaches 0 (in this case, the buffer address after termination is undefined).

Read Modified Command

Read Modified initiates one of three operations as determined by operator actions at the display: Read Modified, Short Read, or Test Request Read.

Read-Modified Operation: The Read Modified command functions in the same way as in an SNA environment except that the buffer location at which the search begins for the field attribute bytes that define modified fields is a function of command chaining. This location is as follows:

- Buffer address 0 if the Read Modified command is unchained or is chained from a Select, Sense, or No-Op command
- The current buffer address if the Read Modified command is chained from a W, EW, Read Modified, or Read Buffer command.

The search for modified fields ends when the channel byte count reaches 0. The transfer of data is terminated as follows:

1. If the last modified field is wrapped from the last buffer location, the operation is terminated after all the data in the field has been transferred (nulls are suppressed). The buffer address at the end of the transfer is the address of the next field attribute byte in the buffer. For example, if a modified field extends from address 1900 (the field attribute byte) to address 79 (wrapped field), the data from addresses 1901 through 79 is transferred (nulls suppressed). In this case, the read operation is terminated with the buffer address set to 80 (the field attribute byte of the next field).
2. If the buffer does not contain a wrapped modified field and if the channel byte count has not reached 0, the modified data stream is terminated when the last modified field is transferred. At the end of the operation, the buffer address is set to 0.
3. If the channel byte count reaches 0 before all modified data is transferred, read operations are terminated and the remaining modified data is not transferred. The buffer address after termination is undefined.

If the buffer is formatted but none of the fields have been modified, the read data stream consists of the 3-byte read heading only.

If the buffer is unformatted, the read data stream consists of the 3-byte read heading followed by all alphanumeric data in the buffer (nulls suppressed), even when part or all of the data has not been modified. Since an unformatted buffer contains no field attributes, no SBA codes with associated addresses or address characters are included in the data stream, and the modification of the data cannot be determined. Data transfer starts at address 0, regardless of command chaining, and continues to the end of the buffer. At the end of the operation, the buffer address is set to 0. This read operation can also be terminated by the channel byte count's reaching 0 before all data is read. In this case, the buffer address after termination is undefined.

Short-Read Operation: The Read Modified command causes a short read operation if the Clear, CNCL (Cancel), or a PA key has been pressed at the selected device. During the short read operation, only an AID byte is transferred to the application program. This AID byte identifies the key that was pressed.

Test Request Read Operation: The Read Modified command causes a Test Request Read operation if the TEST REQ or SYS REQ key has been pressed at the selected device. The Test Request Read data stream sent inbound to the application program is the same as for the BSC environment, except there is no ETX.

Inbound Transmissions

Inbound transmissions result from an operator enter action, a host initiated (unsolicited) read request, or a host retry of an inbound transmission.

An operator enter action is one that causes the attention identifier to be transmitted inbound. The application program responds with a read request. The application program must acknowledge the inbound transmission before a new inbound operation can be performed.

A read operation initiated by the host is an inbound transmission not caused by an operator enter action. Host acknowledgment is not required before a new inbound transmission can occur.

Host retry is a retransmission of the last unacknowledged inbound transmission from the device. The application program must acknowledge reception of an inbound transmission before a new inbound transmission can take place. A host retry transmission does not cause read state transitions and is not considered a new inbound transmission requiring host acknowledgment. Host retry occurs until a host acknowledgment takes place.

The type of inbound transmission is either a Query Reply structured field (the reply to the Read Partition Query structured field) or data from the device buffer (for example, modified fields of the display image). An INOP, set by the controller, defines the type.

Inbound Operation (INOP)

The INOP determines the operation to be performed when data is transmitted inbound or when the device is in a data pending state.

INOP is set by any of the following:

- An operator enter action sets INOP to Read Modified.
- Reception of a Read Partition Query structured field sets INOP to query.
- Host acknowledgment of an inbound transmission sets INOP to Read Modified.

Read States

While power is on, a device is in one of seven states with respect to read operations. The three primary states are as follows:

- Normal read
- Data pending read
- Retry read.

The data pending read and retry read states have the following three substates:

- Enter
- Read
- Stacked enter.

The events that cause transitions between the states are shown in Table 9-1 on page 9-6.

Normal Read State

A device is in normal read state when power is on, prior to initiation of a read operation, or after use of the Reset key in certain instances. (See Table 10-1 on page 10-6.)

When in normal read state, an operator enter action or the reception of a Read Partition Query structured field causes the device to prepare to generate the inbound data stream, and then to go into a data pending state.

When in normal read state an application program initiated read operation using an RM, RMA, or RB command causes the data to be transmitted with no state transitions occurring. The device remains in normal read state.

Data Pending States

The three forms of data pending states are as follows:

Enter	Enter data has been transmitted to the application program.
Read	The device state after reception of a read partition query structured field.
Stacked enter	When a read partition structured field has been received while the device is in data pending enter state or retry enter state (the enter data is stacked).

A read command received while the device is in data pending state causes the data to be transmitted inbound and the device to be placed in the corresponding retry state.

An operator enter action is not processed, it is rejected. A host initiated read partition will be rejected.

Retry State

The three forms of retry states are as follows:

Enter	When enter data has been transmitted to the host.
Read	When the read data has been transmitted to the host.
Stacked enter	When enter data has been stacked and the Query Reply data has been transmitted to the host.

While in retry state, the last inbound transmission can be retried by means of a Read Modified command.

A host acknowledgment causes the device to revert from a retry state to the normal read state or, in the case of retry stacked enter, to the data-pending-stacked-enter-read state.

The read state transitions for non-SNA locally attached devices are summarized in Table 10-1.

Table 10-1. Read-State Transitions for Non-SNA Locally Attached Devices—3272 Version

Read States		Data Pending			Retry		
Events	**Normal**	**Enter**	**Read**	**Stacked Enter**	**Enter**	**Read**	**Stacked Enter**
Enter Action	2	R	R	R	R	R	R
Read Command	1	5	6	7	G	G	G
Read Partition Query	3	4	R	R	4	R	R
Host Acknowledge	—	1	1	2	1	1	2
Reset key	—	1	—	3	1	—	6

Legend:

R Reject, no state transition
G Retry, no state transition
— No action or state change
1 Normal Read state
2 Data pending enter state
3 Data pending read state
4 Data pending stacked enter state
5 Retry enter state
6 Retry read state
7 Retry stacked enter state

Indicators

With reference to Table 9-1 on page 9-6, the indicators displayed in the operator information area of a display are as follows:

State	Indicator
Normal read state	No indicator or System Lock
Data pending enter	System Lock
Data pending read	TWAIT
Data pending stacked enter	TWAIT
Retry enter	TWAIT
Retry read	TWAIT
Retry stacked enter	TWAIT.

Read Acknowledgments – Non-SNA

Read acknowledgements depend on the inbound operation. The following sections describe the read acknowledgements when the inbound operation is a Query, Query List, Operator Enter, RM, RMA, or RB Partition command.

Query or Query List

A Query or Query List operation is acknowledged by any outbound transmission except one with a read command.

The following commands acknowledge a Query or Query List:

- A WSF command with or without following structured fields. The transmission is an acknowledgment regardless of an error being detected in the accompanying structured fields, as long as the WSF is accepted.
- An EAU command.
- An EW, EWA, or W command with or without a WCC or data. If data is present and an error is detected in the data, the transmission is not an acknowledgment.

Operator Enter or RM, RMA, or RB Partition Command

An RM, RMA, or RB Partition command or an enter operation is acknowledged by either writing to the inbound partition (the partition associated with the inbound operation) with a transmission which restores the keyboard or destroying the inbound partition.

Any of the following constitute an acknowledgment when the display is in any of the retry or data pending states:

- If the inbound partition is implicit or explicit partition 0, either of the following:
  - An EW, EWA, or W command with WCC = Keyboard Restore (see note 1)
  - An EAU command.
- If in the explicit partition state, an EW or EWA command with the WCC = reset (see note 1).
- A WSF command followed by an outbound 3270DS structured field to the inbound partition with either of the following (see note 2):
  - An EW, EWA, or W partition command with WCC = Keyboard Restore
  - An EAU partition command.
- A WSF command followed by a Destroy Partition structured field to the inbound partition, including explicit and implicit partition 0 (see note 2).
- A WSF command followed by a Create Partition structured field to the inbound partition (see note 2).
- If in implicit partition state, a WSF command followed by a Create Partition structured field (see note 2).
- A WSF command followed by an Erase/Reset structured field. This acknowledgement applies to both implicit and explicit partition state (see note 2).

Notes:

1. If data follows the WCC and an error is detected in the data, the transmission is not a Read Acknowledgment.
2. If there is a detected error prior to, or within, the structured field providing the Read Acknowledgment, the transmission is not a Read Acknowledgment.

Processing of Read Commands

In a non-SNA (locally attached devices—3272 Version) environment, a read command (Read Buffer or Read Modified) as the first byte of the data stream is processed as follows:

- If the device is in normal read state, the command performs a read and the display data is transmitted inbound as defined by:
  - The Read Modified, or Read Buffer command
  - The AID (Read Modified command only)
  - The reply mode.

  The device remains in normal read state.
- If the device is in a data pending state, the commands are processed as follows:
  - If the command is Read Modified and INOP specifies Query or Query List, the appropriate Query Replies are transmitted.
  - If the command is Read Modified and INOP specifies a Read Modified, then data is transmitted as defined by:
    - The Read Modified command
    - The AID
    - The inbound reply mode.
  - If the command is Read Buffer, then data is transmitted as defined by the following:
    - The command
    - The reply mode.

  The device is placed in the corresponding retry state (Enter, Read, or Stacked Enter).
- If the device is in a retry state, the command performs a retry as follows:
  - If the command is Read Modified, and INOP specifies Query or Query List, then the appropriate Query Replies are transmitted inbound.

- If the command is Read Modified, and INOP specifies Read Modified, then data is transmitted as defined by the following:
  - The Read Modified command
  - The AID
  - The inbound reply mode.
- If the command is Read Buffer, then data is transmitted inbound as defined by the following:
  - The Read Buffer command
  - The inbound reply.

The device remains in the original retry state.

Processing of Read Partition Query Structured Fields

Read Partition Query and the Query Reply are processed as follows:

If the device is in normal read state:

1. The TWAIT indicator is displayed.
2. INOP is set to Query or Query List.
3. A channel attention occurs.
4. The device is placed in data pending read state.
5. A later read command causes the data to be transmitted and the device to be placed in retry read state.

If the device is in data pending enter or retry enter state:

1. The outstanding data is stacked.
2. The TWAIT condition remains in effect.
3. INOP is set to Query or Query List.
4. A channel attention occurs.
5. The device is placed in data pending stacked enter state.
6. A later Read Modified command causes the data to be transmitted inbound and the device to be placed in retry stacked enter state.

Chapter 11. Auxiliary Devices and Workstations

Introduction

This chapter describes how the 3270 data stream supports devices attached to a 3270 display.

The 3270 data stream was defined for use between a host application program and a single display. A *3270 workstation* consists of a 3270 display and one or more auxiliary devices. Auxiliary devices do not accept 3270 data stream commands and orders. However, the 3270 data stream is used to carry data to and from the auxiliary devices. The data must be in the form of structured fields.

The presentation space associated with an auxiliary device is independent of the display presentation space. Data directed to an auxiliary device must not alter the display presentation space and vice versa.

This enhancement of the 3270 data stream is based on a single session between the host application and the 3270 workstation. The workstation has only one network address. (The extensions for supporting a workstation also apply to the non-SNA environment.)

The term device in this section is used in a general sense; that is, a device can be either of the following:

- An actual device (for example, a printer)
- A logical device or process (for example, a DDM or DIA file).

An auxiliary device can support either an IBM data stream (for example, DDM or DIA file) or a non-IBM data stream.

IBM Data Streams: A different type auxiliary device Query Reply is defined for each different IBM data stream used by the auxiliary devices, for example, the DDM Auxiliary Device and DIA Auxiliary Device Query Replies.

The Query Reply provides a reference that identifies the IBM data stream supported. For example, the DIA Query Reply indicates the DIA function sets that are supported. The actual description of the data stream is provided by the IBM documentation associated with the data stream.

Non-IBM Data Streams: The 3270 data stream workstation can support a non-IBM device, such as an auxiliary device. A non-IBM device is defined here as a device that is manufactured outside IBM and does not use an IBM data stream. The device may carry either an outside manufacturer's logo or an IBM logo.

Only one Query Reply, the OEM Auxiliary Device Query Reply, is defined for all types of non-IBM auxiliary devices.

An OEM Data structured field is provided for carrying the data to and from a non-IBM auxiliary device. A parameter (DSREF) in the OEM Auxiliary Device Query Reply identifies the content of the OEM Data structured field as one of the following:

- A non-IBM data stream that the non-IBM auxiliary device sends or receives. The host application must derive what this data stream is from the DTYPE (Device type) parameter in the OEM Auxiliary Device query reply.
- A value added data stream; that is, a data stream that contains controls in addition to the data recognized or sent by the device. The controls are used by the 3270 data stream workstation. These controls are removed by the workstation prior to sending the non-IBM data stream to the auxiliary device. The DSREF parameter of the OEM Auxiliary Device Query Reply provides reference identification for the "value added" data stream.

Data Routing

In single display device implementations there is no ambiguity about the destination or source of the data. The using environment provides the routing, for example, via the network address in an SNA environment.

However, with the 3270 data stream workstation there is more than one destination or source for data. The destination or source must be explicitly identified. The using environment (for example, SNA) provides the same routing function for a 3270 data stream workstation as is currently provided for the single display implementation. Additional routing control for data is provided within the 3270 data stream.

The Destination/Origin structured field must be used to identify the destination or origin of all data to or from auxiliary devices. The same DOID value is used in the Destination/Origin structured field for sending data to or from a particular auxiliary device. Outbound, from the host application, the DOID indicates the destination of the data. Inbound, to the host application, the DOID indicates the origin of the data.

It is a 3270 data stream workstation implementation responsibility to assign each auxiliary device a unique destination DOID for use in the Destination/Origin structured field. All values except X'0000' and X'FFFF' are available for use by the 3270 data stream workstation implementation.

The display is the default destination or origin if the data destination or origin is not explicitly identified by a Destination/Origin structured field.

Data of a type not supported that is directed to the display or an auxiliary device is rejected. For example, directing DDM data to the display or display data to the DDM auxiliary device causes the data to be rejected.

A Destination/Origin structured field can also be used in routing data to or from the primary display (DOID = X'0000'). It is invalid to use an inbound Destination/Origin structured field from the display (DOID=X'0000') unless the transmission also contains input from one or more auxiliary devices.

At the start of each outbound transmission the destination is the display (and at the start of each inbound transmission the origin is the display). Once a Destination/Origin structured field has established the destination or origin of the data, that destination or origin applies for all structured fields that follow until the end of the transmission unless changed by a subsequent Destination/Origin structured field.

Query Reply

The description for each Auxiliary Device Query Reply specifies whether it is sent in reply to either a Query or Query List or only in reply to a Query List.

Return of the Auxiliary Device Query Reply indicates a 3270 data stream workstation implementation; that is, support of the Destination/Origin structured field and one or more auxiliary devices. The Auxiliary Device Query Reply is returned in reply to either a Query List = Auxiliary Device (QCODE List =X'99') Equivalent or All or to a query.

The Query Reply for the individual auxiliary devices provides the DOID value to be used in the Destination/Origin structured field and any other required information concerning the auxiliary device.

A Query or Query List directed to an auxiliary device instead of the display is rejected unless it is specifically allowed by the device. See "Query Reply (IBM Auxiliary Device)" on page 6-67.

A separate Query Reply must be returned for each auxiliary device supported. For example, if two identical auxiliary devices were supported, a Query Reply would be returned for each. The DOID reported would be different for each.

When a 3270 data stream workstation supports an auxiliary device, the Query Reply for that device is returned regardless of whether the auxiliary device is available (for example, the necessary support code is not resident, or power is off).

Input Control

Some 3270 applications, particularly those not aware of auxiliary devices, cannot cope with unsolicited input from auxiliary devices. Therefore, the host application is given control over the time at which an auxiliary device is permitted to send in data. The control is achieved by the INCTRL (Input Control) flag in the Destination/Origin structured field. The INCTRL flag has meaning only outbound (to the auxiliary device) and is ignored on inbound. When the Destination/Origin structured field is directed to an auxiliary device, the INCTRL flag applies to that device. When the Destination/Origin structured field is directed to the display (DOID = X'0000'), the INCTRL flag applies to all (a global application) auxiliary devices supported. In other words, it provides global control.

The default (for example, POR) is input disabled. Once input is enabled for an auxiliary device, it remains enabled until disabled by any of the following:

- The auxiliary device receives a Destination/Origin structured field with INCTRL flag = B'10' (input disable).
- The display receives a Destination/Origin structured field with INCTRL = B'10' (global input disable).
- The workstation receives an EW or EWA with WCC = Reset.
- A Clear local function (for example, the Clear key is pressed).
- A power on reset.
- The workstation receives a Bind (SNA only).

Receiving a Destination/Origin structured field from the host application with INCTRL = B'01' causes no change in the input enabled/disabled state at the auxiliary device. Also, if the INCTRL flag value is the same as the existing input enable/disable states, the state is unchanged. For example, if the auxiliary device input enable/disable state is input enabled, receiving a Destination/Origin structured field with INCTRL = B'00' (input enable) is accepted and the input enable/disable state remains enabled.

Note: There is one exception during which an auxiliary device can send input without being enabled. An Exception Condition structured field, reporting unavailability of the auxiliary device, can be sent in reply to a Destination/Origin structured field sequence attempting to use the auxiliary device.

Auxiliary Device and Display Interaction

The auxiliary devices conform to the Read operations described in Chapter 3, "3270 Data Stream Commands" on page 3-1 except where otherwise noted in this chapter.

When data is read in from an auxiliary device, the rules or states for read retry and read acknowledgment apply. For example, once a transmission is sent from an auxiliary device, data from that device cannot be sent inbound until a read acknowledgment is received. If the data from an auxiliary device is transmitted in multiple transmissions, each transmission requires an acknowledgment. An inbound transmission can contain data from the display or data from one or more auxiliary devices. When display data is sent in the same transmission as auxiliary device data, the Outbound 3270DS structured field must be used for the display data. An inbound transmission containing data from auxiliary devices must start with an AID of X'88' which indicates that structured fields follow. The same conditions that acknowledge a Query Reply also acknowledge inbound transmissions from an auxiliary device.

An outbound transmission to an auxiliary device constitutes a read acknowledgment according to the description for outbound display transmissions. The fact that the transmission is to an auxiliary device adds no additional acknowledgment function. For example, a transmission to an auxiliary device would acknowledge an outstanding Query Reply transmission because the transmission contained a WSF. Furthermore, in an SNA environment a transmission to an auxiliary device would constitute an acknowledgment to an

outstanding enter transmission only if the transmission put the workstation in a send or contention state.

Only one display type read can occur in an outbound transmission. When in structured field form, the display type read must be the last structured field in the transmission. A display type read is defined as any of the following:

- A Query or Query List structured field
- A Read Partition structured field
- A Read Buffer, Read Modified, or Read Modified All command.

In an outbound transmission, data to an auxiliary device (for example, a DDM file) can initiate inbound data from the auxiliary device. Inbound data can be initiated from multiple auxiliary devices by a single outbound transmission containing multiple Destination/Origin structured fields. Inbound data from one or more auxiliary devices can be initiated in an outbound transmission which also contains a display type read. When this occurs, the display type read is performed first.

A display type read always takes priority over pending inbound data from an auxiliary device. A display operator enter action is considered a display type read. If inbound data is pending from one or more auxiliary devices, an operator enter action takes priority and uses the next available inbound transmission.

When the data from an auxiliary device must be sent in multiple transmissions (for example, a transmission size limit imposed for certain data), each inbound transmission is treated like an enter, to the extent that sending of the data is initiated by the device. A host read acknowledgment is required prior to sending the next part of the data. Therefore, data from an auxiliary device which is sent in multiple transmissions could have some interspersed display transmissions. Also, the display operator must not be locked out as a result of an auxiliary device condition; for example, if the power is off, or if a diskette is removed.

Exception Handling

An exception condition on an auxiliary device must not cause termination of the host to 3270 data stream workstation session. That is, an auxiliary device exception condition must not cause a negative response. The exception conditions must be reported at the application level.

In general, the exception handling is defined by the data stream used by the auxiliary device. The DIA data stream documentation defines the exception heading for a DIA auxiliary device. The DDM data stream documentation defines that for a DDM auxiliary device.

There are some instances where the exception condition is handled within the 3270 data stream. For example, if the auxiliary device is not available (for example, if the power is off, or if the processing code is not resident), the unavailability is reported by returning a Destination/Origin structured field followed by an Exception/Status structured field with the code field = X'0801' (Resource Not Available). Another example might be if the host exceeds the transmission size specified in an Auxiliary Device Query Reply. In this case the code is X'084C' (permanent insufficient resource).

Chapter 12. Double-Byte Coded Character Set (DBCS)-Asia

Introduction

This chapter describes the double-byte coded character set operation that is defined for use by the South East Asia Region (SEAR) countries, Japan, Korea, and Taiwan. The primary use is for Kanji.

This operation provides the capability for one- and 2-byte character sets.

Support of DBCS-Asia is indicated by the DBCS-Asia Query Reply and the Character Set Query Reply.

The operation of the DBCS-Asia character sets differ in many ways from the remainder of the 3270 data stream. However, when the DBCS-Asia implementation is operated exclusively in the 1-byte mode, the differences are limited to the following:

- Delete key operation
- The insert mode operation on an unformatted screen.

For the DBCS-Asia mode, the Delete key operates as follows:

1. If the cursor is located in a character location in an unprotected field, the Delete key deletes the character from the character location identified by the cursor and sets the MDT bit to 1. The cursor does not move.
2. All remaining characters, to the right of the cursor in the same field shift one column or two columns to the left, depending on whether a 1-byte character or a 2-byte character is deleted.
3. Vacated locations at the end of the field are filled with Nulls.

In an insert operation on an unformatted screen, text does not wrap at the end of the screen. Normal operation allows wrap at the end of the screen.

Codepoints

The following sections define the codepoints used by the DBCS-Asia operation.

Graphic Codes

When the current character set attribute specifies a DBCS character set, the data stream values are interpreted as follows:

- X'00' through X'3F' and X'FF' are control codes.
- X'4040' is a space (blank).
- Combinations of X'41' thru X'FE' are language-dependent graphics.

A maximum of 1+190x190 graphics (X'4040' and combinations of X'41' thru X'FE') exist in DBCS-Asia, but there are fewer than 1+190x190 unique graphics in each language.

The integrity of these codepoints is maintained; that is, if read back, the same codepoints are transmitted as were received.

Two-Byte Coded Field Selection Designators

The following five 2-byte codepoints are defined as Field Selection designators for the 2-byte character set. The function is the same as for that of 1-byte character sets.

Codepoint	Meaning
X'0000'	Two-byte coded NULL
X'4040'	Two-byte coded Blank
X'4250'	Two-byte coded &
X'426E'	Two-byte coded >
X'426F'	Two-byte coded ?.

Two-Byte Coded Printer and Control Characters

When the current character set attribute specifies a DBCS character set, each character is represented by a 2-byte codepoint. The special characters for printer controls, namely NL, EM, FF, CR, DUP, and FM, are also represented by 2-byte codes as follows:

NL	X'0015'
EM	X'0019'
FF	X'000C'
CR	X'000D'
DUP	X'001C'
FM	X'001E'.

The first byte in each of the above codes is not interpreted as a null character but is included in the 2-byte coded character representation definition.

When the current character set attribute specifies a DBCS character set, a null character is defined as X'0000'.

This 2-byte coded null has the same function as two 1-byte coded nulls in Insert Mode, and it is suppressed for the read modified operation.

DBCS Fields

This section describes the support of a 2-byte field that consists of only DBCS characters.

Character Set Attribute Type and Values

The character set attribute is used with the SFE and the MF orders in the 3270 data stream to specify a character set for the field, as follows:

Type	Value
X'43'	Character Set

The following are valid settings for the character set attribute value byte:

Codepoint	Meaning
X'00'	Default character set
X'40' to X'EF'	Local ID for loadable character set
X'F0' to X'F7'	Local ID for nonloadable 1-byte character set
X'F8' to X'FE'	Local ID for nonloadable 2-byte character set.

Character set X'F8' is assigned to the DBCS character set. The sequence of SFE-X'43'-X'F8' defines a DBCS field.

Data Stream Processing

The graphic codepoints in the data stream reference the character set that is currently in effect.

The decision on whether a graphic codepoint is treated as a 1-byte or 2-byte character is determined by the "look left" rule. This means that in the buffer the application looks back towards the beginning of the buffer for the extended field attribute (formatted buffer). If the first buffer position (when looking left) is reached without encountering an SI or SO, the buffer is unformatted and the graphic codepoints are treated as if they refer to the default character set.

To achieve the desired results when using 2-byte fields, DBCS-Asia requires that the appropriate extended field attribute (character sets) be established before loading data into the field. If the application does not follow this procedure, transmissions may be rejected.

Exception Conditions

If both bytes of a 2-byte graphic code are not in the range of X'40' through X'FE' the transmission is rejected with sense code 1003 or sense code 1001. Transmissions with invalid 2-byte representations of control codes are rejected with sense codes 1003 or 1001.

Two-byte codes cannot be separated into two 1-byte codes with an order inserted between the two halves. If this is done, the order is considered as the second half of a 2-byte code and the transmission is rejected with sense codes 1003 or 1001.

In a DBCS field, sending the sequence of a Null-Start Field or Null-Start Field Extended does not cause an exception condition. This sequence is used for filling the dead position. The *dead position* is a single-byte position that can occur at the end of a DBCS unprotected field and in which the operator cannot enter data.

If the end of processing of a W, EW, or EWA command or of an outbound 3270DS structured field (with W, EW, or EWA) occurs after receiving the first half of a 2-byte code, the transmission is rejected with either sense code 1005 or 1001.

A transmission that attempts to start writing a 2-byte character into a buffer position that is the second half of a 2-byte character is rejected with sense codes 1005 or 1001. One exception is that the second half of a 2-byte character can be replaced with a field attribute by an SF or SFE without error.

If a character attribute, type=character set, other than X'00' is received in the 2-byte field, the transmission is rejected.

If the 2-byte field contains a character attribute, type=character set, other than X'00', the data stream is rejected during post processing. *Post processing* is described on page 12-8. The character attribute, type=character set, is changed to X'00'.

Display Buffer Manipulation

As stated previously, DBCS-Asia assumes that an application properly establishes a field as 1-byte or 2-byte before attempting to enter data into the field. DBCS-Asia also assumes, for example, that an application does not change a field from 1-byte to 2-byte (or vice versa) without also updating the contents of the field in the same transmission. This section defines what happens when the application performs such buffer manipulations.

A transmission that only changes an extended field attribute from a 1-byte character set to a 2-byte character set changes how the codepoints are treated. That is, if the field character set is changed from 1-byte to 2-byte while leaving the field contents unchanged, the codepoints are treated as forming 2-byte characters and the character attribute, type=character set, is changed to default. Similarly, if the field character set is changed from 2-byte to 1-byte, the codepoints are treated as 1-byte characters.

Also, the way the codepoints in a 2-byte field are treated is changed by moving the field attribute (or adding a new attribute = 2-byte character set) within the field so that the attribute is an odd number of buffer positions from the attribute location. The codepoints are still treated as forming 2-byte characters but the pairing is shifted from the original pairing. For example, the new 2-byte characters are formed by pairing the second half of an old 2-byte character with the first half of the following old 2-byte character.

When a field contains control codes (codepoints below X'40'), manipulation of the field attribute as described above can result in leaving the buffer with invalid DBCS characters. When this occurs, the invalid characters are handled as follows:

- No error response occurs.
- Information displayed for the invalid DBCS is device dependent.
- On a read operation, an X'4040' is sent inbound for the invalid character.

Also, the manipulation of a field attribute can result in a single, non-null codepoint being left over at the end of a DBCS field; for example, a non-null in the dead position. A non-null in the dead position is handled as follows:

- No error response occurs.
- Information displayed for the non-null is device dependent.
- On a read buffer, the non-null dead position is sent inbound as an X'00' (null).
- On a read modified operation, the non-null dead position is treated as if it were a null and suppressed.

Operator Interface

The following sections describe the differences that the user is likely to notice when using DBCS-Asia.

Fields that Span Rows

When a field spans rows, a DBCS character can span rows in the character buffer. That is, the first half of the character is in the rightmost column and the second half is in the leftmost column. One way of handling this situation is to have the left half of the DBCS character displayed in the rightmost column on the screen and the right half displayed in the leftmost column of the next row. However, an implementation can provide a different approach.

For example, if the device has an additional column on the screen (for example, eighty-first column for eighty-column displays), a DBCS character is displayed in the rightmost column and the additional (eighty-first) column on the screen. The leftmost column in the next row on the screen is reserved.

Long and Short Cursors

There are two types of cursors used in DBCS-Asia: a cursor that is one character cell long (the *short cursor*) and a cursor that is two character cells long (the *long cursor*). When an operator positions a cursor in a DBCS field, the cursor is automatically two character cells long.

An operator cannot position a long cursor starting on the second half of a DBCS character. Any attempt by the operator to position a long cursor starting on the second half of a DBCS character causes the cursor to jump to the next position where the operator can enter data.

Using the Delete Key

If the cursor is located in a character location in an unprotected field, the Delete key deletes the character from the character location identified by the cursor and sets the MDT bit to 1. The cursor does not move. All remaining characters to the right of the cursor in the same field shift one or two columns to the left depending on whether a 1-byte character or a DBCS character is deleted. Vacated locations at the end of the field are filled with Nulls.

Entering Data with MSR

Data entered into the DBCS field by the MSR is inhibited.

DBCS Character Attribute (SA)

This section describes the support of a DBCS character set character attribute. The interaction with the other methods of selecting a DBCS character set (DBCS field or Shift Out [SO]/Shift In [SI]) is described later in this chapter.

The SA order, with the character set attribute type X'43' and its attribute value X'F8', sets the current character set character attribute to a DBCS character set.

Shift Out (SO)/Shift In (SI)

This section defines the operation of the Shift Out (SO) and Shift In (SI) controls. SO = X'0E' and SI = X'0F'. The SO/SI controls do not have any effect in the data stream. However, the SO/SI controls are stored in the display buffer and do affect how the data in the buffer is interpreted, displayed, and read. The buffer locations from SO to SI are termed a DBCS subfield.

Support of SO/SI is reported in the DBCS-Asia Query Reply. The character set associated with the SO is the DBCS character set, which has a SET ID = X'80' and an LCID = X'F8'. The Set ID of this character set is reported in the DBCS-Asia Query Reply. The LCID and CGCSGID associated with the SET ID is reported in the Character Set Query Reply.

Referencing the Character Set

The character set is referenced as follows:

- Formatted Screen:
  - If there is no SO or SI in the buffer between the extended field attribute (EFA) and a subsequent buffer position N, the codepoint in buffer position N references the character set designated by the EFA.
  - In moving from a buffer position N left (back) to the EFA, if the first SO/SI encountered is an SI, the codepoint in buffer position N references the character set designated by the EFA.
  - In moving from a buffer position N left to the EFA, if the first SO/SI encountered is an SO, the codepoint in the buffer position N references the character set associated with SO, which is the DBCS character set.
- Unformatted Screen:
  - If there is no SO or SI between the first buffer position and a subsequent buffer position N, the codepoint in buffer position N references the default character set.
  - In moving from buffer position N left to the first buffer position, if the first SO/SI encountered is an SI, the codepoint in buffer position N references the default character set.
  - In moving from buffer position N left to the first buffer position, if the first SO/SI encountered is an SO, the codepoint in buffer position N references the DBCS character set.

Exception Conditions For SO/SI

The following rules apply to the use of SO/SI:

- SO/SI must appear as SO/SI pairs in the buffer (unformatted screen) or in a field (formatted screen). To be paired, the SO must precede the SI. For example, the following buffer sequence is invalid:

  ```
  FA - - - - SI - - - -SO - - - FA
  ```

  SO/SI controls do not have to be paired in the data stream. Unpaired SO/SI controls can occur in a buffer update.
- SO/SI must not be sent to a DBCS field.

- In a DBCS subfield, the buffer locations with a character attribute type of character set (= X'00') must be in contiguous pairs to accommodate the 2-byte characters.
- In a DBCS subfield, the buffer contents with a character attribute type of character set (= other than X'00') are rejected.

There are some additional SO/SI exception considerations associated with the PT, RA, and EUA 3270 orders; see "Orders" on page 12-14.

The validity of SO/SI use is verified as the data stream is processed, and again after processing the command or the Outbound 3270DS structured field. This second validity checked is termed post processing.

Data Stream Processing

A transmission is rejected and processing stopped immediately for any of the following SO/SI error conditions:

- An SO is received, and when looking left in the buffer an SO is encountered prior to encountering one of the following:
  - An SI
  - The first buffer position (unformatted buffer)
  - An FA or EFA (formatted buffer).
- An SI is received, and when looking left in the buffer an SO is not encountered before encountering one of the following:
  - An SI
  - The first buffer position (unformatted buffer)
  - An FA or EFA (formatted buffer).
- An SO or SI is received and the EFA for the field designates the DBCS character set.

Post Processing

The validity of SO/SI is checked again after processing a command or an Outbound 3270DS structured field.

A transmission is rejected during post processing if any of the following conditions exist in the display buffer:

- Looking left from an SO, another SO is encountered before encountering either an SI, the first buffer position (unformatted buffer) or an FA or EFA (formatted buffer).
- Looking left from an SI, either an SI, the first buffer position (unformatted buffer) or an FA or EFA is encountered prior to encountering an SO.
- An SO or SI exists in a DBCS field.
- Within a DBCS subfield, the positions with the character attribute=field inherit are not contiguously paired.
- Within a DBCS subfield, the positions with the character attribute=other than X'00' are found.

Data integrity is not maintained for those errors detected during post processing since the buffer has already been altered.

Set Attribute (SA) Order and SO/SI Interaction

The SO/SI controls do not apply to buffer positions where an SA has set the character set character attribute of the codepoint to something other than default.

The character set character attribute set by an SA does not apply to SO and SI themselves, because they are control codes. However, the other character attributes (for example, color or highlighting) do apply because SO and SI take buffer positions (for example, NL or CR).

SO/SI Creation by Operator

The application program has control over whether or not SO/SI can be created as a result of operator entry of data. The control is provided using the input control attribute (type = X'FE'). This attribute can only be set on a field basis by either the SFE or MF orders. The input control attribute format is as follows:

Attribute Type	Attribute Value
X'FE'	Input Control

The input control attribute value has a 1-byte value:

Content	Meaning
X'00'	SO/SI creation disabled
X'01'	SO/SI creation enabled.

The default (for example, power on) is SO/SI creation disabled. The input control attribute only controls the creation of SO/SI by the operator. This attribute has no effect on SO/SI use in the outbound or inbound data stream. For example, if the SO/SI creation is disabled for a field, the application can send SO/SI to the field and the SO/SI appears in a read of the field.

If the operator is entering 2-byte data, and the use of both SO/SI and a character attribute is valid, the SO/SI is used to identify the 2-byte data. For example, the SO/SI is used to identify the 2-byte data if the following are true:

- The operator selects the 2-byte character set associated with SO.
- The operator enters 2-byte data in an unprotected field. A field is unprotected if the extended field attribute is a character set other than that associated with SO.
- SO/SI creation is enabled. The SO/SI is used to identify the 2-byte data, even if the reply mode = character.

The character attribute is used to identify the 2-byte data if the SO/SI creation is disabled, and the reply mode = character. If the SO/SI creation is disabled and the reply mode = field or extended field, input is inhibited unless the operator is entering into a DBCS subfield that the application created.

Types of Fields

The following table summarizes how operator-entered DBCS characters are identified in the display buffer for different conditions.

It is assumed that an operator has selected the DBCS character set. The data is being entered into an unprotected field that contains no DBCS subfields.

Conditions			Two-Byte Data Identified Via			
Field Character Set	Reply Mode	SO/SI Creation	SO/SI	CA	EFA	Input Inhibited
Not the same as SO	Field or extended field	Disabled				X[1]
Not the same as SO	Character	Enabled	X			
Not the same as SO	Character	Disabled		X		
Not the same as SO	Character	Enabled	X			
Same as SO	Field or extended field	Enabled or disabled			X	
Same as SO	Character	Enabled or disabled			X[2]	

[1] If the application creates DBCS subfields within the field, an operator can then enter DBCS data into the subfields. The entered DBCS data would be identified in the display buffer by the SO/SI delimiters.

[2] If the operator selects the DBCS character set, then X = the character attribute. If the operator selects field inherit, then X = the extended field attribute.

Graphic Character Input

This section describes the operation in a field with a 1-byte character set and with the SO/SI creation set on.

An operator cannot position a short cursor on the second half of a DBCS character nor a long cursor starting on the second half of a DBCS character. Any attempt by the operator to position a short cursor on the second half of a DBCS character or a long cursor starting on the second half of a DBCS character causes the cursor to jump to the next position where the operator can enter data.

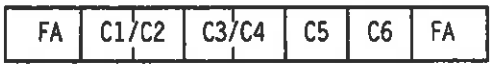
Outside DBCS Subfield

If the operator selects the DBCS character set and places a character into a position outside a DBCS subfield, the sequence created is as follows:

SO, the character, SI (if required to maintain the SO/SI pairing)

The sequence starts with the current cursor position, and after the operation, the cursor is positioned following the entered character.

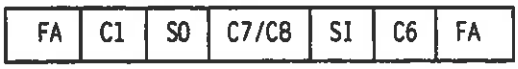
For example, the buffer contains:



Where:

FA = Field Attribute
Cx/Cy = DBCS characters
Cx = 1-byte characters.

The operator selects the DBCS character set, positions the cursor under C2 and C3, and enters C7/C8. The buffer becomes:



The cursor appears under SI and C6.

Inside DBCS Subfield

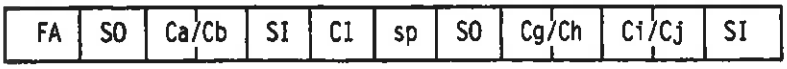
When the operator selects the DBCS character set, the operation is as described previously. If the SI is overwritten, an SI is added following the character.

When the operator selects a character set other than the DBCS character set, the operation can be summarized as follows:

- The DBCS subfield is terminated with an SI.
- The character is entered after the SI. If the character is a 1-byte character, a space is automatically added in the next position and an SO is automatically added after the space, except when the character is entered into the last 2-byte character position of the DBCS subfield.
- If the character is entered into the last 2-byte position of the DBCS subfield, the SO would not be added.

For example, the buffer contains:

If the operator positions the short cursor under Cc (the first half of the DBCS character Cc/Cd) and enters a 1-byte character, C1, the buffer becomes:



A space is automatically added, and the cursor appears under the space.

Delete Key

The operation of the Delete key on an SO or an SI itself is inhibited since the deletion of it changes the characteristics of the subsequent characters. The operation of the Delete key on the sequence of SOSI or SISO is allowed.

Erase EOF Key

When the cursor is at a DBCS character in a DBCS subfield, the operation of the Erase EOF key erases the character and all subsequent characters within the field but recreates SI in the cursor position.

Insert Mode

Nulls in the Subfield: When there are no DBCS subfields in an unprotected field, a character can be inserted if there are sufficient nulls in the field from (and including) the cursor position to the end of the field — one null for a 1-byte character and four nulls for a DBCS character. If there are sufficient nulls and a character is inserted, the character formerly occupying the cursor location and all remaining characters within the field (except for nulls and characters to the right of nulls) are shifted one or two locations to the right.

When there is a DBCS subfield in an unprotected field, the insert mode operation is as described above except the nulls in the subfield cannot be used for the insert operation. That is, if there are not sufficient nulls from (and including) cursor location to the end of the field, other than nulls in the subfield, an insert operation is inhibited. When there are sufficient nulls outside the DBCS subfield and an insert operation occurs, the nulls in the subfield are shifted right in the same way as the characters in the subfield.

Therefore, to avoid possible operator problems the host application program should not create nulls in a DBCS subfield.

Such nulls are never created by operator action.

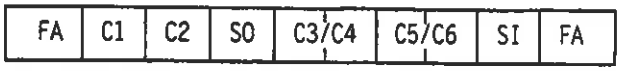
Unformatted Screen: The insert mode operation in the unformatted buffer does not wrap at the right-lower corner of the screen. This definition is unique to DBCS-Asia and it applies to a device which supports DBCS-Asia even when the host is operating the device in a 1-byte mode.

The Delete key and the Erase EOF key also work to the right lower corner of the screen.

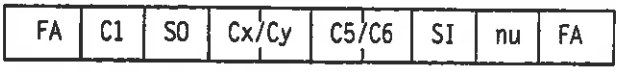
Automatic Delete Operation

The following case shows the automatic delete operation.

The buffer contains:



If the operator puts the long cursor under C2 and SO and enters Cx/Cy, the buffer becomes:



C4 (the second half of C3/C4) is deleted and the remainder of the DBCS subfield is shifted left one position. A null is added at the end of the field.

MSR

Data entered into the DBCS subfield by the MSR is inhibited.

Orders

The following table describes how 3270 orders are processed for DBCS:

Order (Abbreviation)	Operation
Start Field (SF)	This order cannot be used for defining DBCS fields. It operates the same for DBCS-Asia.
Set Buffer Address (SBA)	This order sets the current buffer address. The buffer address can be set for the second half of a DBCS character. However, if an attempt is made to write graphic data to this address, the data stream is rejected with a sense code of 1005 or 1001.
Insert Cursor (IC)	This order sets the cursor to the current buffer address. When the cursor address is set to the second half of a DBCS character, it is repositioned to the first half after processing the command or the Outbound 3270DS structured field, without informing the host.
Program Tab (PT)	This order operates the same for DBCS-Asia except that the padding function is done when the PT order follows SI. If the PT order follows SO the data stream is rejected with a sense code of 1003 or 1001.
Erase Unprotected to Address (EUA)	An EUA order is not executed and is rejected for any of the following conditions: • The execution of the EUA would have resulted in an odd number of nulls in a DBCS field (except Dead Position) or DBCS subfield. • The start address is the second half of a DBCS character. • The start address is in a DBCS subfield and the stop address is in a following field. A single (unpaired) null must not be created by EUA in the DBCS field, except for the dead position.
Start Field Extended (SFE)	This order is used for defining DBCS fields. Also, it is used to specify a new attribute type, input control. There is nothing unique for the SFE operation in DBCS-Asia.
Modified Field (MF)	This order is used to specify a new attribute type, Input Control. There is nothing unique for the MF operation in DBCS-Asia.
Repeat to Address (RA)	This order repeats a character in the buffer from the current buffer address to the specified stop address (not inclusive). The character to be repeated can be a 1-byte or a DBCS character. The RA order sequence does not explicitly indicate whether the repeated character is 1-byte or DBCS. Therefore, the decision is made implicitly on the basis of how the first byte following the stop address would be treated if received in place of RA: • If the byte would have been treated as a 1-byte code, then the byte is repeated according to the RA order. • If the byte would have been treated as the first byte of a DBCS character, then the first 2 bytes following the stop address are repeated according to the RA order. If the current buffer address is set to the position for the second half of an existing DBCS character and the order is encountered in the data stream, the data stream is rejected with a sense code of 1005. When the order repeats a DBCS character, the number of positions to be repeated must be even. That is, the stop address minus current buffer address must be even. If not, the data stream is rejected with a sense code of 1001 or 1005. An RA order sequence with either SI or SO as the repeated character is invalid and is rejected with a sense code of 1003, 1001, or 1005.

Chapter 13. Local Format Storage

Introduction

Local Format Storage (LFS) provides for host-controlled loading of formats into the format storage of a device and for subsequent run-time presentation of the stored formats. The intent is to provide enhanced performance through decreased line transmission time and, in some cases, decreased host application turnaround time. Additionally, overall system performance should be improved by reducing contention for the host connection.

The use of this function can result in significant reduction of traffic on the host to control unit transmission facilities and in improved response time, because the display of a stored format is initiated by calling its name rather than transmitting the format data from the host.

This is accomplished by storing a 3270 data stream representation of the formatted presentation space. Format creation is the responsibility of the host application program. Each format sent to a device must be specifically tailored to that device and must have a unique name.

These formats can be presented on any device which supports the 3270 Data Stream, including protocol converters.

Architecture Requirements

The function of loading formats into a format storage utilizes the 3270 data stream Auxiliary Device architecture as defined in Chapter 11, "Auxiliary Devices and Workstations" on page 11-1. An Auxiliary Device does not necessarily have to be an actual device. For example, it can be a file function or, as in this case, a format storage function.

In addition to the requirements shown below, the device must be a display supporting EBASE level of function and the auxiliary device architecture (for example, the Destination/Origin structured field). See Appendix E, "Functions Required for Systems Application Architecture (SAA) Support" for a definition of EBASE functions.

Adding, replacing, or deleting formats requires support of the:

- Format Storage Auxiliary Device Query Reply
- Load Format Storage structured field.

The accessing of formats by the host application requires support of the:

- Format Presentation Query Reply
- Select Format Group structured field
- Present Absolute Format structured field
- Present Relative Format structured field.

Format Distribution

The format storage function is associated with the display returning the Format Storage Auxiliary Device Query Reply. The formats to be loaded are addressed only to that display.

The Destination/Origin structured field that precedes the Load Format Storage structured fields causes the formats to be routed to the format storage function rather than to the display itself. Formats can be added, replaced, or deleted; format groups can be deleted; and format storage can be reset at any time under control of the designated host.

If the F/T flag of the Format Storage Auxiliary Device Query Reply indicates only one format per transmission (or per Data Chain; see non-SNA considerations below), then the host application is limited to sending only one Load Format Storage structured field per transmission (or Data Chain). After sending the format using the Load Format Storage structured field, the host application cannot send another format until the device sends in an Exception/Status structured field (preceded by a Destination/Origin structured field with a DOID = Format Storage Auxiliary Device). The Exception/Status structured field can either contain a sense code of X'0000' (Acknowledge) or one of the exception sense codes (Reject).

If the F/T flag indicates that more than one format can be sent per transmission (or Data Chain), then the host application can send more than one Load Format Storage structured field per transmission (or Data Chain). After sending the transmission (or Data Chain), the host application cannot send more formats until the device sends an Exception/Status structured field indicating Acknowledgement or Rejection. If the transmission (or Data Chain) is rejected, the Exception/Status structured field must include the Failing Format self defining parameter to indicate the name of the first format encountered with an exception condition.

In the non-SNA environment, if the outbound transmission size is limited (for example, by the LIMOUT value imposed or by BSC link limitations to a size smaller than a format), support of the Data Chaining function is required. This function allows a structured field to span transmission. Use of the Data Chaining function is limited to the non-SNA environment. The chaining function provided by SNA makes support of Data Chaining unnecessary in the SNA environment.

Sample Sequences

The following are some sample sequences.

For a case in which only one format per transmission (or Data Chain) is allowed:

- Host sends - WSF, Destination/Origin SF (DOID = Format Storage Auxiliary Device), Load Format Storage structured field. In the SNA environment, the host must send the transmission with CD, EB.
- Device returns - AID 88, Destination/Origin SF (DOID = Format Storage Auxiliary Device), Exception/Status structured field (may be either 'acknowledge' or 'reject').

Repeat the above until all the formats have been loaded.

For the same case as above but in which non-SNA Data Chaining is required because the format does not fit in one transmission:

- Host sends - WSF, Destination/Origin SF (DOID = Format Storage Auxiliary Device), Data Chain SF (= Begin), and Load Format Storage structured field which is the structured field header and part of the format.
- Host sends - WSF, Data Chain SF (= continue) which is the next part of the format. Note that the SF header is not repeated.
- Host sends - WSF, Data Chain SF (= end) which is the remainder of the format.
- Device returns - AID 88, Destination/Origin SF (DOID = Format Storage Auxiliary Device), Exception/Status structured field (may be either 'acknowledge' or 'reject').

Repeat the above until all the formats have been loaded.

In a case in which more than one format is allowed per transmission (or Data Chain):

- Host sends - WSF, Destination/Origin SF (DOID = Format Storage Auxiliary Device), Load Format Storage SF, or Load Format Storage SF.
- Device returns - AID 88, Destination/Origin SF (DOID = Format Storage Auxiliary Device), Exception/Status SF (may be either 'acknowledge' or 'reject').

Format Selection

Although the formats are loaded to the particular display address which indicates support in the Query Reply, the formats stored are available to all the displays on the same controller. Provision is made for the host to determine at any time the number of groups assigned, the number of formats loaded, the number of local names used, and the amount of storage space available.

Formats are stored in available storage using a directory structure in which each group identifies a directory of all the formats loaded with the specified group name. The Select Format Group structured field assigns a directory to be searched when subsequent Present Absolute Format or Present Relative Format structured fields are received from the host. The most recently selected group directory is the one searched for the format to be presented.

Another directory can be selected by issuing the Select Format Group structured field specifying a different name. If a request is made for a non-existent group name, an exception indication is returned, and the selected group is set to indicate 'no group selected'. There is no default group name, so an existing group name must be correctly specified using a Select Format Group structured field before the host can request that any stored formats be presented by Local Format Storage.

Only the most recently selected directory is searched for the specified format, so it is the sender's responsibility to assure that the proper group name has been specified and that the desired format was loaded with the specified group name.

The Present Absolute Format and Present Relative Format structured fields are then sent by the host to select the name of the format to be presented. The difference between them is that the Present Relative Format structured fields contain an offset value that is added to each address-dependent order in the format data stream.

The 3270 data stream can contain multiple Present Format structured fields, and each one is processed in its turn, with the resulting format being passed to outbound data stream processing for each iteration of the Present Format structured field in the data stream. By issuing Present Relative Format requests with different offset values, users can cause recurring portions of a format to be presented in different locations on the screen.

Additional 3270 data can be sent by the host to a terminal following the Present Absolute Format and Present Relative Format structured fields. This is supported by the host concatenating a 3270 data stream structured field to the Present Absolute Format or Present Relative Format structured field. When this occurs, the control unit sends the data, unaltered, to normal outboard data stream processing after presenting the specified format.

Both the Present Absolute Format and Present Relative Format structured fields are sent with a presentation command specifying either a 3270 data stream Write, Erase/Write Alternate command and they contain a 3270 data stream WCC byte. These are the command and WCC to be used to display the format on the screen.

Using the format name contained in this structured field, the currently selected group directory is searched for a stored format with the same name. When the specified stored format is found, the format presentation command (Write, Erase/Write, or Erase/Write Alternate) and WCC are extracted from the Present Format structured field and passed to outbound data stream processing as if the command had been received from the host.

Note: Since formats are processed as 3270 data stream outbound structured fields, screen size is not changed for the Erase/Write or Erase/Write Alternate commands contained within the formats. The host application can establish the screen size by sending an Erase/Write or Erase/Write Alternate command as standard 3270 data stream transmissions prior to the Present Format structured field. An Erase/Reset structured field can also be used, but this resets all Set Partition Characteristics self-defining parameters that are currently in effect.

Presentation of any stored format can be initiated by host command, and presentation of selected 'local' formats can be initiated by a terminal user without host intervention, provided that local formats have been defined with the Load Formats structured field, and local format selection has been enabled.

User Selected Formats

The stored format name is a combination of the group name and format name. The user therefore does not necessarily know the stored format name. To accommodate user selection of formats, the Load Format Storage structured field provides a means of optionally specifying a "local name" for formats. When specified as a user-selected format, depending on flags in the Set Partition Characteristics structured field, the local name is treated as either:

- A pseudonym for a group name and format name (Default)
- A local format name qualified by the currently selected group name.

A search is made for a format with the local name, or for a format with the local name that is a member of the current group, depending on parameters passed in the Set Partition Characteristics structured field. If a match is found, the format is displayed as though a Present Absolute Format structured field had been received from the host.

This function can be enabled in two different ways:

- As a customization option
- Through the data stream.

  User-selected formats can be enabled from each host application with the Set Partition Characteristics structured field. If this method is selected, user-selected formats must be enabled for each logical session as required. Once enabled, user selection of formats remains enabled until one of the following events occurs:

  - A Set Partition Characteristics structured field is received that resets user-selected formats.
  - An Erase Write or Erase Write Alternate command is received with WCC = reset.
  - An SNA Bind command is received.
  - An Erase/Reset structured field is received.

  Note: User selection of formats mode is not reset by the CLEAR key, SYS REQ key, TEST key, or device power on.

If this method is selected, the default user-selected formats function is enabled for all sessions on this host. This option specifies the default mode, and does not preclude user-selected formats from being disabled or enabled through the data stream.

The local name search is initiated when the user enters data on a clear, unformatted screen. The data is considered to be a user request for local format presentation. Up to eight characters entered by the user, starting at the upper left corner of the presentation space, are used as the local name.

No validation is performed on the local name entered by the user.

The format presentation command used by the control unit is either Erase/Write or Erase/Write Alternate. The control unit determines which command to use based on the format screen size flag set by the user in the Load Format Storage structured field that distributes the format to the control unit. The default WCC (X'02' - Keyboard Restore) is used. After displaying the format, the SNA and keyboard states are the same as they were before the user entered the request for local format presentation.

If the Bracket state is Between Brackets (BETB), the SNA state remains in 'send' state during the local call-up fetch and display operation, thereby causing normal outbound requests to be rejected with sense code X'081B' (Receiver in Transmit Mode). When the user presses the ENTER key, the SLU goes to in-bracket state. The SLU begins a bracket and starts sending data. If the host sends a Bid or Begin Bracket (BB) before the first chain element is received, the SLU rejects the Bid or BB with an X'081B' (Bracket Bid Reject).

If no match to a stored format local name is found, the data is sent to the host in the normal fashion.

Identification and detection of a locally displayed format, when it is read by the host, is a host application responsibility. New panels should be developed in accordance with SAA requirements. Conventions such as requiring that the panel title always appear on line 1 are part of this architecture. This would aid in determining the types of panels that are being sent to the host and allow them to be processed in a standard fashion.

The host application is also responsible to ensure that the keyboard is restored following a Clear AID, thus allowing the user to enter local format requests.

Appendix A. SNA Sense Codes

Table A-1 lists the SNA sense codes for 3270 data stream command, order, and structured field errors.

For non-SNA environments, all 3270 data stream errors are rejected with an Op-Check (OC). Invalid commands are rejected with Command Reject (CR).

Table A-1 (Page 1 of 6). SNA Sense Codes

Command, Order, and Structured Field Errors	Sense Code (hex)
COMMANDS (valid for all commands)	
Invalid command code	1003/1001
Data following read command or EAU	1003/1001
ORDERS (valid for all orders)	
Invalid data stream order	1003/1001
Incomplete parameter list or parameter missing	1005/1001
Invalid codepoint to be repeated by RA	1003/1001
Invalid address	1005/1001
RA with GE and no data following	1005/1001
Modify Field Order:	
Current buffer location does not contain field attribute character	1005/1001
Invalid attribute type	1003/1001
Invalid color or highlighting attribute value	1003/1001
Unknown character set attribute value in range X'01' - X'FE'	0863
Character set attribute value = X'FF'	1003/1001
Field actions attribute value is reserved	1003/1001
Set Attribute Order:	
Invalid attribute type	1003/1001
Invalid color or highlighting attribute value	1003/1001
Unknown character set attribute value in range X'01' - X'FE'	0863
Character set attribute value = X'FF'	1003/1001
Set Buffer Address Order:	
Address not in form specified for partition (12-, 14-bit)	1005/1001
Invalid address flag in 12-, 14-bit mode (high order bits = B'10')	1005/1001
Start Field Extended Order:	
Invalid attribute type	1003/1001
Invalid color or highlighting attribute value	1003/1001
Unknown character set attribute value in range X'01' - X'FE'	0863
Character set attribute value = X'FF'	1003/1001
Field actions attribute value is reserved	1003/1001

Table A-1 (Page 2 of 6). SNA Sense Codes	
Command, Order, and Structured Field Errors	**Sense Code (hex)**
STRUCTURED FIELDS (valid for all structured fields)	
Invalid structured field type	1003/1001
Missing structured field parameter	1005/1001
Reserved field is not zero	1003/1001
RCV state and all windows have zero extent	0883
PID is unknown partition	1005/1001
Incorrect length	1005/1001
Activate Partition	
Zero extent window	1005/1001
Begin/End of File	
Received an End of File without a Begin of File	1003/1001
Received a second Begin of File without a previous End of File	1003/1001
Create Partition	
PID > maximum allowed	1005/1001
Invalid UOM value	1003/1001
Invalid A-MODE	1003/1001
Specification error in viewport/window	1005/1001
Base > supported number	1005/1001
Insufficient resource	1005/1001
CS=X'0002'-X'FFFE' and horizontal windowing not supported	1001
RS=X'0002'-X'FFFE' and vertical windowing not supported	1001
Data Chain	
Received a Data Chain structured field with GROUP parameter = Continue or End when a data chain does not exist.	1003/1001
Received a Data Chain structured field with GROUP parameter = Begin when a data chain already exists.	1003/1001
Received a transmission starting with any 3270 command except WSF or EW/EWA (with WCC = Reset) while a data chain exists.	1005/1001
Destination/Origin	See Note 1
Destroy Partition	
PID > maximum allowed	1005/1001
Erase/Reset	See Note 1
FMH-1	
Invalid field value	1008
Incomplete header	1008
RH indicates FMH-1 present but no FMH appears	1008
Load Color Table	
Table exhausted prior to LCTDEF	1003/1001
Attempted to modify preserved entry	1005/1001
Table modified but not LCTID	1005/1001
Load Line Type	
Unsupported UNITS value	1003/1001
Table modified but not LTTID	1005/1001
Invalid parameter length	1005/1001
Unsupported parameters	1003/1001
Insufficient storage	084C

Table A-1 (Page 3 of 6). SNA Sense Codes	
Command, Order, and Structured Field Errors	**Sense Code (hex)**
Load Programmed Symbol Set	
Invalid data type	1003/1001
Invalid LCID (values X'40' through X'EF' are not considered invalid)	1003/1001
CHAR not available	1005/1001
RWS not available	084C
RWS is valid but not installed	084C
EXTN not supported	1005/1001
P-length incorrect	1005/1001
Flag bits 5-6 not zero	1003/1001
Invalid LH or LW	1005/1001
Invalid SUBSN	1003/1001
Color resource not available	084C
Invalid ST.SUBSN	1005/1001
Excess bits in data	1005/1001
Compressed data terminator incorrectly specified	1005/1001
PS resource not available	084C
ECHAR not provided	1005/1001
ECHAR reached prior to exhaustion of data	1005/1001
Insufficient storage	084C
SET not supported	1003/1001
NW or NH value too large	1005/1001
Modify Partition	
PID > maximum allowed	1005/1001
Invalid reserved bits	1003/1001
Specification error in window/viewport	1005/1001
Invalid windowing parameters	1005/1001
Object Control	
Spanning error	1005/1001
Unsupported mode	1003/1001
Invalid command code	1005/1001
Maximum entity length exceeded	1003/1001
Invalid parameter length	1005/1001
Unsupported parameters	1003/1001
Insufficient storage	084C
Insufficient data	1005/1001
Object Data	
Spanning error	1005/1001
Unsupported mode	1003/1001
Invalid command code	1005/1001
Maximum entity length exceeded	1003/1001
REP/APPEND = B'01'	1005/1001
Entity (REP) length exceeded	1005/1001
Specified entity does not exist	1005/1001
Invalid parameter length	1005/1001
Unsupported parameters	1003/1001
Insufficient storage	084C
Insufficient data	1005/1001

Table A-1 (Page 4 of 6). SNA Sense Codes	
Command, Order, and Structured Field Errors	**Sense Code (hex)**
Object Picture	
Spanning error	1005/1001
Unsupported mode	1003/1001
Invalid command code	1005/1001
REP/APPEND = B'10'	1005/1001
Segment storing not supported	1003/1001
Maximum entity length exceeded	1003/1001
REP/APPEND = B'01'	1003/1001
Entity (REP) length exceeded	1005/1001
Specified entity does not exist	1005/1001
Invalid parameter length	1005/1001
Unsupported parameters	1003/1001
Insufficient storage	084C
Insufficient data	1005/1001
OEM Data	See Note 2
Outbound Text Header	
PID > maximum allowed	1005/1001
Invalid command	1003/1001
Violation of PS integrity	082B
Invalid WCC bit	1003/1001
Unsupported control in header	1003/1001
Parameter error in header	1005/1001
Inconsistent controls in header	1005/1001
Graphic in header	1005/1001
Cursor column > partition width	1005/1001
Incorrect A-MODE	1005/1001
Outbound Type1 Text	
PID > maximum allowed	1005/1001
Unsupported control	1003/1001
Parameter error in control	1005/1001
Incorrect A-MODE	1005/1001
Insufficient resource	084C
Outbound 3270 Data Stream	
Incorrect A-MODE	1005/1001
Invalid CMD byte	1003/1001
Violation of presentation space integrity	082B
Data following EAU partition command	1003/1001
WCC print bit = 1, but this is not the last structured field	1001
Present Absolute/Relative Format	
Invalid format presentation command	1003/1001
Group not selected	1009
No formats loaded	0868
Format not found	0869
Format offset out of range	1005/1001
Format processing error	087A

Table A-1 (Page 5 of 6). SNA Sense Codes	
Command, Order, and Structured Field Errors	**Sense Code (hex)**
Read Partition	
Invalid read type code	1003/1001
Invalid Q-code	1003/1001
PID not equal to X'FF' for Query	1005/1001
Read Partition not last structured field in chain	1005/1001
Device in retry state	0871
RU Chain containing Read Partition does not specify CD	0829
RU Chain containing Read Partition does specify EB	0829
Request Recovery Data	
Request Recovery Data not last structured field in chain	1005/1001
Device in retry state	0871
RU Chain containing Request Recovery Data does not specify CD	0829
RU Chain containing Request Recovery Data does specify EB	0829
Reset Partition	See Note 1
Restart	See Note 1
Save/Restore Formats	
Received chain containing Save/Restore structured field = primary/save which does not specify CD	0829
Received chain containing Save Restore Format structured field = primary/save which specifies EB	0829
Save/Restore Format structured field not last structured field in chain	1005/1001
SCS Data	See Note 1
Set Checkpoint Interval	See Note 1
Select Color Table	
Table exhausted prior to LCTDEF	1003/1001
Attempted to modify preserved entry	1005/1001
Table modified but not LCTID	1005/1001
Select Format Group	See Note 1
Select IPDS Mode	
When in 3270 mode, receive a Select IPDS Mode structured field which is not immediately after a WSF or a WSF, Data Chain structured field (=begin)	1003/1001
Set MSR Control	
Invalid magnetic data or length specification	1001
Invalid encode character set or length specification	1005/1001
Encode aborted by operator	0824
Not last structured field in a chain or chain sent with neither RQD or CD	0843

Table A-1 (Page 6 of 6). SNA Sense Codes	
Command, Order, and Structured Field Errors	**Sense Code (hex)**
Set Partition Characteristics	
For Viewport Outlining self-defining parameter:	
This parameter is not supported	1005/1001
Incorrect length	1005/1001
Value is greater than maximum allowed	1005/1001
Set Printer Characteristics	See Note 1
Set Reply Mode	
Invalid reply mode	1003/1001
Invalid attribute type in A-list	1003/1001
Incorrect reply mode for partition type	1005/1001
Set Window Origin	
Window spec. outside presentation space	1005/1001
CW > 0, but horizontal windowing not supported	1005/1001

Notes:

1. Where an entry in the table is shown without any sense codes (for example, Erase/Reset), the only applicable sense code conditions are those shown in the Structured Fields (All) section on page A-1.

   The following are included for clarification:

   - The validity of the field attribute is not checked.
   - W, EW, EWA, and WSF commands without data are accepted without error but are treated as no-op.

2. When the OEM Data structured field is used in conjunction with the Destination/Origin structured field (that is, for data to or from a direct accessed OEM auxiliary device), this table does *not* apply. In this situation, all exception conditions associated with the OEM Data structured field must be reported either through the OEM data stream or with the Exception/Status structured field. Use of the subsystem -rsp (or OP-Chk) is not allowed.

Appendix B. Reset Actions

Table B-1 summarizes the reset actions performed as a result of the actions listed.

Table B-1 (Page 1 of 2). Reset Actions

Action	Partitions	Inbound Reply Mode	Highlighting Color Character Set		INPID INOP	PS Content PS LCID
			Selection	Indicators		
Jump key	6	1, 3	NC	7	NC	NC
Clear key SSCP	9	9	9	9	NC	NC
Clear key Unowned	R	ID	R	7	NC	NC
Clear key LULU	R	R	ID	7	9	NC
System Request key SSCP (Unowned)	9	13	9	9	NR	NC
System Request key SSCP (LULU)	9	9	9	9	R	NC
System Request key Unowned	R	R	R	7	NR	NC
Receipt of RU	R	R	R	7	NR	NC
System Request key LULU	R	R	ID	7	NR	NC
Test key Enter	R	R	R	7	NR	NR
Test key Exit	9	9	R	7	NR	15
WCC in EW/EWA	R	R	ID	7	R	NC
WCC Reset in 3270DS EW/EWA Only	NC	12	NC	11	16	NC
Reset Partition	NC	12	NC	11	16	NC
Power on	R	13	NR	R	NR	R
Clear LULU	10	10	NC	10	10	10
DACTLU LULU	ID	ID	ID	ID	NR	NC
DACTLU SSCP	ID	ID	ID	ID	NR	NC
ACTLU SSCP	9	9	9	9	NR	NC
DACTLU Unowned	ID	ID	ID	ID	NR	NC
ACTLU Unowned	ID	ID	ID	ID	NR	NC
Unbind LULU (8)	17	13	NC	7	NR	NC
Unbind SSCP	9	9	9	9	NR	NC
Bind SSCP	9	9	9	9	R	NC
Bind Unowned	R	R	R	R	R	NC
Set Inbound Reply Mode	NC	2	NC	7	NC	NC
Create Partition	4	12	NC	7	16	NC
Destroy Active Partition	6	1	ID	7	16	NC

Table B-1 (Page 2 of 2). Reset Actions

Action	Partitions	Inbound Reply Mode	Highlighting Color Character Set		INPID INOP	PS Content PS LCID
			Selection	Indicators		
Destroy Not Active Partition	5	5	NC	NC	16	NC
Clear Partition key LULU	NC	NC	NC	NC	9	NC
Host Acknowledgment	NC	NC	NC	NC	R	NC
Erase/Reset	R	R	ID	7	R	NC

Legend:

ID = Implementation defined (effect visible on external interface).
NA = Not Applicable.
NC = No change.
NR = Not relevant (will be changed by subsequent action).
R = Reset (effect visible on external interface).

Notes:

1. The inbound reply mode is set to the mode of the newly activated partition.
2. The inbound reply mode is changed to the mode described in the structured field.
3. The alternate character set is changed to the mode of the newly activated partition.
4. Add the partition name to the list along with its attributes.
5. Delete the partition name from the list along with its attributes. Reset if it is the last partition.
6. Change the active partition to the next in the list. Reset if it is the last partition.
7. Display exactly those attribute selection indicators that are honored as a result of the inbound reply mode in the current partition. If the inbound reply mode is reset, no operator selection is displayed.
8. In the unowned state, the last application write is still displayed (that is, the operator may be able to add data and perform a local copy).
9. The state will already be set.
10. No change. SNA does not permit Clear in the FM layer.
11. Reset if the active partition; otherwise, make no change.
12. Reset the referenced partition only.
13. Change the inbound reply mode to allow all selections.
14. Reset when the test mode alters the programmed symbols.
15. Reset if directed to INPID.
16. Screen remains—operator interaction restricted to the active partition.

A response of 082B also causes resetting of all the functions shown in the figure, except for PS LCID and PS CONTENT.

Appendix C. 12-, 14-, and 16-Bit Addressing

This appendix describes the 12-, 14-, and 16-bit addressing that the SNA 3270 data stream allows. With 12-bit addressing, an address is created from 2 bytes of binary information. The 6 low-order bits of each byte are joined to provide a 12-bit address. The address specifies the buffer position, not the line and column position on the display surface. For example, on a 480-character display, the buffer addresses are 0 to 479. To specify a 12-bit buffer address of 160 (binary 000010100000), bits 2-7 of the first byte are set to 000010; bits 2-7 of the second byte are set to 100000:

xx000010	xx100000

The 12-bit binary value is a combination of the two 6-bit values of the first and second bytes.

With 14-bit addressing, an address is created from 2 bytes of binary information, but the 14 bits of the address are contiguous. For example, an address of 800 decimal (X'320') would be represented as follows:

xx000011	00100000

With 16-bit addressing, all bits in both bytes are used. For example, an address of 3100 decimal (X'C1C') would be represented as follows:

00001100	00011100

SNA products (displays) that support only 12-bit addressing ignore bits 0 and 1 of each address byte in outbound data streams. For inbound data streams, they should set these bits in accordance with Figure C-1 on page C-2, although the bits provide no function other than retaining compatibility with previously written applications.

When a product supports both 12- and 14-bit addressing, bits 0 and 1 of the first address byte are flag bits and have the following significance:

xx Setting	Meaning
B'00'	14-bit binary address follows
B'01'	12-bit coded address follows
B'10'	Reserved
B'11'	12-bit coded address follows.

For inbound data streams that contain 12-bit addresses, the display generates the B'01' or B'11' setting, using Figure C-1 on page C-2.

A partition may be defined (using the Create Partition structured field) to operate with either 16-bit addressing or 12- and 14-bit addressing. When 16-bit address mode is specified in Create Partition, bits 0 and 1 are part of the address, outbound buffer addresses are interpreted as 16-bit binary, and inbound

addresses are generated as 16-bit binary. If no partitions are defined, 12- and 14-bit addressing is assumed.

The SNA 3270 data stream can be EBCDIC or ASCII. With ASCII, each of the allowable characters is a graphic symbol; that is, there are no unprintable characters in the data stream. In addition, only 12-bit addressing is used with ASCII. Figure C-1 shows the 64 binary values permitted, using bits 2 through 7, and defines how they are transformed into ASCII values. Field attributes and write control characters also require special processing for conversion from binary values to graphic symbols when ASCII or 12-bit addressing is used.

Bits 2-7	EBCDIC	ASCII
00 0000	40	20
00 0001	C1	41
00 0010	C2	42
00 0011	C3	43
00 0100	C4	44
00 0101	C5	45
00 0110	C6	46
00 0111	C7	47
00 1000	C8	48
00 1001	C9	49
00 1010	4A	5B
00 1011	4B	2E
00 1100	4C	3C
00 1101	4D	28
00 1110	4E	2B
00 1111	4F	21
01 0000	50	26
01 0001	D1	4A
01 0010	D2	4B
01 0011	D3	4C
01 0100	D4	4D
01 0101	D5	4E
01 0110	D6	4F
01 0111	D7	50
01 1000	D8	51
01 1001	D9	52
01 1010	5A	5D
01 1011	5B	24
01 1100	5C	2A
01 1101	5D	29
01 1110	5E	3B
01 1111	5F	5E

Bits 2-7	EBCDIC	ASCII
10 0000	60	2D
10 0001	61	2F
10 0010	E2	53
10 0011	E3	54
10 0100	E4	55
10 0101	E5	56
10 0110	E6	57
10 0111	E7	58
10 1000	E8	59
10 1001	E9	5A
10 1010	6A	7C
10 1011	6B	2C
10 1100	6C	25
10 1101	6D	5F
10 1110	6E	3E
10 1111	6F	3F
11 0000	F0	30
11 0001	F1	31
11 0010	F2	32
11 0011	F3	33
11 0100	F4	34
11 0101	F5	35
11 0110	F6	36
11 0111	F7	37
11 1000	F8	38
11 1001	F9	39
11 1010	7A	3A
11 1011	7B	23
11 1100	7C	40
11 1101	7D	27
11 1110	7E	3D
11 1111	7F	22

Figure C-1. Conversion of Binary Values to Hexadecimal Values that Obtain Graphic Symbols

Appendix D. Special Applications

Introduction

This appendix contains information on how some implementations that do not conform to the 3270 Data Stream report those deviations to the host.

Query Reply (Anomaly Implementation)

This section describes the Query Reply (Anomaly Implementation) structured field.

Function

The Query Reply (Anomaly Implementation) structured field indicates that an implementation of a function does not conform to the 3270 data stream operation for that function.

When the Anomaly Implementation Query Reply is supported, it is transmitted inbound in reply to a Read Partition structured field specifying Query List (QCODE List [=X'9D'], or All).

Although a host application must accept the Anomaly Implementation query reply, the associated anomaly implementation may not be supported.

Format

The following table shows the format of the Query Reply (Anomaly Implementation) structured field:

Byte	Content	Content Description
0-1	**L**	Length of this structured field
2	**SFID**	**X'81'** Query reply
3	**QCODE**	**X'9D'** Anomaly Implementation
4	**RES**	Reserved - must be zeros
5	**ANREF**	Anomaly reference number
6-7	**LIMIN**	Maximum bytes/inbound transmission
8-9	**LIMOUT**	Maximum bytes/outbound transmission
10	**LPARM**	Length in bytes of device dependent parameters (includes LPARM byte)
11-n	**DPARMS**	Device dependent parameters

Additional Content Description

The content of the Query Reply (Anomaly Implementation) structured field is further described as follows:

ANREF Provides the reference number assigned to the anomaly implementation. Refer to the associated product documentation for the description of the anomaly implementation.

LIMIN Indicates the maximum number of bytes of Anomaly Auxiliary Device information the host application can expect in an inbound transmission.

The sum of bytes contained in all the structured fields associated with the Anomaly Auxiliary Device following an AID X'88' will be equal to or less than the value specified (in hexadecimal) in LIMIN.

LIMOUT Indicates the maximum number of bytes of Anomaly Auxiliary Device information the host application is allowed to send in an outbound transmission.

The sum of bytes contained in all the structured fields associated with an Anomaly Auxiliary Device, following a WSF command, must be equal to or less than the LIMOUT value (in hexadecimal). If this limit is exceeded, the transmission will be rejected. Note that the data received prior to reaching the limit may have been processed. A LIMOUT value of X'0000' indicates no implementation limit on outbound data to the Anomaly Auxiliary Device.

LPARM Gives the number of bytes of device-dependent parameters + the LPARM byte.

DPARMS Provides the device-dependent information associated with the anomaly implementation.

3270 PC Application-to-Application

This version of the Anomaly Implementation Query Reply is approved for use by Release 2.0 of the 3270 PC.

The following table shows the format of this version of the Anomaly Implementation Query Reply:

Byte	Content	Content Description
0-1	**L**	**X'0019'** Length of this structured field
2	**SFID**	**X'81'** Query Reply
3	**QCODE**	**X'9D'** Anomaly Implementation
4	**RES**	Reserved - must be zeros
5	**ANREF**	**X'01'** Anomaly reference number for a 3270 PC Application-to-Application
6-7	**LIMIN**	Maximum bytes of 3270 PC application data that will be sent in an inbound transmission
8-9	**LIMOUT**	Maximum bytes of 3270 PC application data allowed in an outbound transmission
10	**LPARM**	**X'0F'** Length in bytes of device-dependent parameters (includes LPARM byte)
11-12	**DOID**	Destination/Origin ID
13-24	**APLNME**	Application name

The content of this version of the Anomaly Implementation Query Reply is further described as follows:

ANREF 3270 PC Application/Application. Refer to the *IBM 3270 PC Control Program Programming Guide* for a description of the anomaly implementation.

LIMIN The sum of bytes contained in all the structured fields associated with the Anomaly Auxiliary Device, following an AID X'88', is equal to or less than the value specified (in hexadecimal) in LIMIN.

LIMOUT The sum of bytes contained in all the structured fields associated with an Anomaly Auxiliary Device following a WSF command must be equal to or less than the LIMOUT value (in hexadecimal). If this limit is exceeded, the transmission is rejected. Note that the data received prior to reaching the limit may have been processed. A LIMOUT value of X'0000' indicates no implementation limit on outbound data to the Anomaly Auxiliary Device.

DOID The DOID is the 2-byte ID provided by the 3270 PC for use in the Destination/Origin structured field used in routing data to or from the 3270 PC application.

APLNME The APLNME is the 12-byte EBCDIC name assigned to the application by the 3270 PC.

Appendix E. Functions Required for Systems Application Architecture (SAA) Support

Introduction

This appendix lists the functions that the 3270 data stream must support for SAA. These functions are required for Extended Function Base Support (EBASE) in the 3270 data stream. Each function is listed in this appendix with a pointer to the specific sections of this book that explain that function.

To read about SAA, refer to *Systems Application Architecture: An Overview.* Other SAA publication titles are provided in the list of related publications in the preface of this book.

Query Replies

The following Query Replies are necessary for SAA support. See Chapter 6, "Inbound Structured Fields," for information about these Query Replies:

Query Reply (Character Sets)
Query Reply (Device Characteristics) (LU 1 printers only)
Query Reply (Implicit Partition)
Query Reply (Null)
Query Reply (SCS Data) (LU 1 printers only)
Query Reply (Summary)
Query Reply (Usable Area).

Structured Fields

The following structured fields are necessary for SAA support. See Chapter 5, "Outbound/Inbound and Outbound Structured Fields," for information about these structured fields:

Read Partition
Erase/Reset
Outbound 3270DS.

Basic 3270 Commands

The following 3270 commands necessary for SAA support. See Chapter 3, "3270 Data Stream Commands," for information about these commands:

Erase All Unprotected (EAU)
Erase/Write (EW)
Erase/Write Alternate (EWA)
Read Buffer
Read Modified
Read Modified All
Write (W)
Write Structured Field (WSF).

Note: Read Buffer and Read Modified All are not supported by printers. The Read Modified command is supported only for retry of a query.

Basic 3270 Orders

The following orders are those required for SAA support. See Chapter 4, "Character Sets, Orders, and Attributes," for an explanation of these orders:

Start Field
Set Buffer Address
Program Tab
Insert Cursor
Repeat to Address
Erase Unprotected to Address.

3270 Format Control Orders

The following table shows the format control orders that must be present for SAA support:

Order	Meaning	EBCDIC	ASCII	Displayed as
NUL	NULL	X'00'		A space, suppressed on Read Modified
SUB	Substitute Character	X'3F'	-----	A solid circle
DUP	Duplicate	X'1C'	X'1C'	An overscore asterisk
FM	Field Mark	X'1E'	X'1E'	An overscore semicolon
FF	Form Feed	X'0C'	X'0C'	A space
CR	Carriage Return	X'0D'	X'0D'	A space
NL	New Line	X'15'	X'0A'	A space
EM	End of Medium	X'19'	X'19'	A space
EO	Eight Ones	X'FF'	-----	A space

NUL is read back as a null (X'00') on a Read Buffer operation but is not read back on Read Modified operations.

NL, EM, FF, and CR are printer control codes with no display function. However, the code must be supported to the extent of being accepted and, on reading back, must appear as NL, EM, FF, and CR, respectively. All are displayed as a space. EO is also displayed as a space.

FM and DUP are displayed as above. When read back, they appear as the FM and DUP codes.

FM and DUP can be entered from the keyboard. They are stored in the display buffer as controls; the current character set selection has no effect on them. They are transmitted to the application program as control codes.

The SUB local function, Error Override, entered from the keyboard, is required only as a part of Field Validation.

Some of these control codes provide a print format function when they are received by a printer. The control codes and their functions are as follows:

NL (New Line) moves the print position horizontally to the left margin and vertically down to the next line.

CR (Carriage Return) moves the print position horizontally to the left margin.

EM (End of Medium) terminates the print operation.

FF (Form Feed) moves the print position to the top and left margin of the next page.

Appendix F. Hexadecimal Index

Introduction

This appendix indexes all commands, orders, format control orders, structured fields, and SCS control codes by hexadecimal value.

Commands

Hex Value	Name	Page
6E	Read Modified All	3-15
6F	Erase All Unprotected	3-8
7E	Erase/Write Alternate	3-7
F1	Write	3-6
F2	Read Buffer	3-12
F3	Write Structured Field	3-8
F5	Erase/Write	3-7
F6	Read Modified	3-13

Orders

Hex Value	Name	Page
05	Program Tab	4-9
08	Graphic Escape	4-11
11	Set Buffer Address	4-5
12	Erase Unprotected To Address	4-10
13	Insert Cursor	4-8
1D	Start Field	4-4
28	Set Attribute	4-6
29	Start Field Extended	4-4
2C	Modify Field	4-7
3C	Repeat To Address	4-9

Format Control Orders

Hex Value	Name	Page
00	Null	4-12 (all)
0A	New Line	
0C	Form Feed	
0D	Carriage Return	
19	End Of Medium	
1C	Duplicate	
1E	Field Mark	
3F	Substitute	
FF	Eight Ones	

Structured Fields (One-Byte ID)

Hex Value	Name	Page
00	Reset Partition	5-54
01	Read Partition	5-51
03	Erase/Reset	5-19
06	Load Programmed Symbols	5-25
09	Set Reply Mode	5-68
0B	Set Window Origin	5-70
0C	Create Partition	5-13
0D	Destroy Partition	5-17
0E	Activate Partition	5-11
40	Outbound 3270DS	5-45
41	SCS Data	5-56
4A	Select Format Group	5-57
4B	Present Absolute Format	5-47
4C	Present Relative Format	5-49
80	Inbound 3270 DS	6-13

Structured Fields (Two-Byte ID)

Hex Value	Name	Page
0F01	Set MSR Control	5-59
0F02	Destination/Origin	5-74
0F04	Select Color Table	5-56
0F05	Load Color Table	5-20
0F07	Load Line Type	5-24
0F08	Set Partition Characteristics	5-60
0F0A	Modify Partition	5-41
0F0F	Object Data	5-78
0F10	Object Picture	5-80
0F11	Object Control	5-76
0F1F	OEM Data	5-82
0F21	Data Chain	5-72
0F22	Exception/Status	6-7
0F24	Load Format Storage	5-21
0F71	Outbound Text Header	5-43
0F83	Select IPDS Mode	5-84
0F84	Set Printer Characteristics	5-65
0F85	Begin/End Of File	5-12
0FB1	Inbound Text Header	6-12
0FC1	Type 1 Text (Outbound)	5-71
0FC1	Type 1 Text (Inbound)	6-18
81*nn*	Query Reply	6-22
80	Summary	6-96
81	Usable Area	6-100
82	Image	6-70
83	Text Partitions	6-97
84	Alphanumeric Partitions	6-23
85	Character Sets	6-28
86	Color	6-36
87	Highlighting	6-65
88	Reply Modes	6-89
8A	Field Validation	6-59
8B	MSR Control	6-77
8C	Field Outlining	6-58
8E	Partition Characteristics	6-84
8F	OEM Auxiliary Device	6-78
90	Format Presentation	6-60

Hex Value	Name	Page
91	DBCS-Asia	6-43
92	Save/Restore Format	6-91
94	Format Storage Auxiliary Device	6-60
95	Distributed Data Management	6-52
96	Storage Pools	6-94
97	Document Interchange Arch.	6-55
98	Data Chaining	6-41
99	Auxiliary Device	6-26
9A	3270 IPDS	6-110
9C	Product Defined Data Stream	6-87
9D	Anomaly Implementation	D-2
9E	IBM Auxiliary Device	6-67
9F	Begin/End Of File	6-27
A0	Device Characteristics	6-45
A1	RPQ Names	6-90
A2	Data Streams	6-42
A6	Implicit Partition	6-71
A7	Paper Feed Techniques	6-82
A8	Transparency	6-99
A9	Settable Printer Chars.	6-93
AA	IOCA Auxiliary Device	6-75
AB	Cooperative Proc. Requestor	6-39
B0	Segment	6-92
B1	Procedure	6-86
B2	Line Type	6-76
B3	Port	6-85
B4	Graphic Color	6-63
B5	Extended Drawing Routine	6-57
B6	Graphic Symbol Sets	6-64
FF	Null	6-77
1030	Request Recovery Data	5-53
1031	Recovery Data	6-14
1032	Set Checkpoint Interval	5-58
1033	Restart	5-55
1034	Save/Restore Format	5-83

SCS Control Codes

Hex Value	Name	Page
04	Vertical Channel Select (VCS)	8-11 (all)
05	Horizontal Tab (HT)	
08	Graphic Escape (GE)	
0B	Vertical Tab (VT)	
0C	Form Feed (FF)	
0D	Carriage Return (CR)	
14	Enable Presentation (ENP)	
15	New Line (NL)	
16	Backspace (BS)	
1E	Interchange Record Separator (IRS)	
24	Inhibit Presentation (INP)	
25	Line Feed (LF)	
28	Set Attribute (SA)	
2B	Format (FMT)	
2BC1(L)(P)	Set Horizontal Format (SHF)	
2BC2(L)(P)	Set Vertical Format (SVF)	
2BC6(L)(P)	Set Line Density (SLD)	
2BD1(L)83(P)	Set Text Orientation (STO)	
2BD2(L)29(P)	Set Print Density (SPD)	
2BD2(L)48(P)	Page Presentation Media (PPM)	
2BFE(L)35(P)	ASCII Transparent (ATRN)	
2F	Bell (BEL)	
35(L)(P)	Transparent (TRN)	

Note:

L = length
P = parameters

List of Abbreviations

A

ACK. Acknowledge.

ACTLU. Activate Logical Unit.

ACTPU. Activate Physical Unit.

AID. Attention identifier.

Alt. Alternate.

A/N. Alphanumeric.

APA. All points addressable.

API. Application program interface.

APL. A Programming Language.

ASCII. American National Standard Code for Information Interchange.

B

BB. Begin bracket.

BETB. Between-bracket state.

BSC. Binary synchronous communication.

C

CA. Character attributes.

CC. (1) Control check. (2) Chain Command (flag).

CCC. Copy control character.

CD. Change direction.

CE. Channel-end.

CGCSGID. Coded graphic character set global identifier.

char. Character.

CI. Calling Indicator.

cmnd. Command.

cncl. Cancel.

cont. Continuous.

cpi. Characters per inch.

CUT. Control unit terminal.

D

D. Display.

DACTLU. Deactivate logical unit.

DACTPU. Deactivate physical unit.

DBCS. Double-byte character set.

DE. Device-end.

DLE. Data link escape.

DOID. Destination/origin ID.

E

EAU. Erase All Unprotected.

EB. End bracket.

EBCDIC. Extended Binary-Coded Decimal Interchange Code.

EM. End of message.

ENP. Enable Presentation.

EOF. End of field.

EOR. End of Record.

EPC. Early Print Complete.

ETX. End of Text.

EUA. Erase Unprotected to Address.

F

FA. Field attribute.

FF. Form Feed.

FM. (1) Field mark. (2) Function management.

FMH. Function management header.

G

GDDM. Graphical Data Display Manager.

GE. Graphic escape.

H

hex. Hexadecimal.

HG. Hardware group.

HT. Horizontal Tab.

I

I. Information (format).

IC. Insert Cursor.

ID. (1) Identification. (2) Identifier.

IML. Initial microcode load.

ind. Indicator.

INOP. Inbound operation.

INPID. Inbound partition identity.

INS. Insert.

I/O. Input/output.

IPDS. Intelligent Printer Data Stream.

IRS. Interrecord-separator character.

K

k. 1000.

K. 1024.

L

LCID. Logical channel identifier.

LF. Line feed.

LFS. Local Format Storage.

LH. Link header.

LRC. Longitudinal redundancy check.

LT. Logical terminal.

LU. Logical unit.

LUSTAT. Logical unit status.

M

max. Maximum.

MDT. Modified data tag.

MF. Modify field.

MHS. Magnetic hand scanner.

MPP. Maximum print position.

MSR. Magnetic stripe reader.

N

NL. New Line.

NOP. No operation.

NTT. Nippon Telephone and Telegraph.

NUL. Null.

NUM. Numeric.

O

OC. Operation Check.

OEM. Original equipment manufacturer.

P

PA. (1) Program access. (2) Program attention.

PC. Personal computer.

PEL. Picture element.

PF. Program function.

PID. Product-set ID.

PLU. Primary logical unit.

POST. Power-On Self Test.

PS. Programmed symbols.

PSS. (1) Programmable Store System. (2) Programmed symbol set.

PT. Program Tab.

R

RA. Repeat to Address.

RB. Read Buffer.

RCV. Receive.

Req. Request.

resp. Response.

RH. Request/response header.

RM. Read Modified.

RO. Ring Out.

RPQ. Request for price quotation.

R/R. Request/response.

RSP. Response.

RSS. Reverse start sentinel.

RU. Request/response unit.

RWS. Read/write storage.

S

SA. Selection addressing.

SAA. Systems Application Architecture.

SBA. Set Buffer Address.

SCS. SNA character string.

SDLC. Synchronous Data Link Control.

sec. Second.

SF. Start field.

SFE. Start Field Extended.

SHF. Set Horizontal Format.

SI. Suppress Index.

SLU. Secondary logical unit.

SNA. Systems Network Architecture.

SOH. Start-of-heading character.

SOR. Start of record.

SP. Specific Poll.

SPC. Set Printer Characteristics.

SPD. Selector pen detect.

SS. Surge suppressor.

SSCP. System services control point.

STX. Start of text.

SUB. Substitute.

SVF. Set Vertical Format.

T

TH. Transmission header.

U

U. Unprotected.

UOM. Unit of Measure.

US. (1) Unit specify (2) Unit separator.

V

V. Volt.

VFC. Vertical forms control.

W

WACK. Wait before transmit positive acknowledgement.

WCC. Write control character.

WSF. Write Structured Field.

Glossary

A

acknowledgment. The transmission, by a receiver, of acknowledge characters as an affirmative response to a sender.

active. (1) Able to communicate on the network. A token-ring network adapter is active if it is able to transmit and receive on the network. (2) Operational. (3) Pertaining to a node or device that is connected or is available for connection to another node or device. (4) Currently transmitting or receiving.

active logical terminal (LT). In MLT, the currently displayed logical terminal. Synonymous with *foreground logical terminal.* Contrast with *background logical terminal.*

adapter. (1) A general term for a device that provides some transitional function between two or more devices. (2) In a local area network, within a communicating device, a circuit card with its associated software that enables the device to communicate over the network.

address. (1) A value that identifies a register, a particular part of storage, a data source, or a data sink. The value is represented by one or more characters. (2) To refer to a device or an item of data by its address. (3) In word processing, the location, identified by an address code, of a specific section of the recording medium or storage. (4) The location in the storage of a computer where data is stored. (5) In data communication, the unique code assigned to each device or workstation connected to a network.

alphanumeric field. A field that may contain any alphabetic, numeric, or special characters.

alternate character set. A character set, located in the terminal, from which characters are obtained for display and printing by using the graphic escape character in the data stream.

American National Standard Code for Information Interchange (ASCII). The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphics characters.

application. (1) The use to which an information processing system is put, for example, a payroll application, an airline reservation application, or a network application. (2) A collection of software components used to perform specific types of work on a computer.

application program. (1) A program written for or by a user that applies to the user's work. Some application programs receive support and services from a special kind of application program called a network application program. (2) A program used to connect and communicate with stations in a network, enabling users to perform application-oriented activities.

asynchronous. (1) Pertaining to two or more processes that do not depend upon the occurrence of a specific event such as a common timing signal. (2) In Fiber Distributed Data Interface (FDDI) rings, a type of data traffic that does not need bounded access delay to the medium and guaranteed throughput.

attaching device. Any device that is physically connected to a network and can communicate over the network.

attention (ATTN). An occurrence external to an operation that could cause an interruption of the operation.

attention field. In the 3270 Information Display System, a detectable field in which the designator character is a null, a space, or an ampersand.

attention identifier (AID). (1) A code in the inbound 3270 data stream that identifies the source or type of data that follows. (2) A character in a data stream indicating that the user has pressed a key, such as ENTER, that requests an action by the system.

attention key. A function key on terminals that, when pressed, causes an I/O interruption in the processing unit.

attribute. (1) A characteristic. (2) A terminal display language or transformation definition language (TDL) keyword that specifies a particular quality for the TDL object with which it is associated.

attribute type. In the 3270 data stream, a code that identifies the properties from which an associated set of attribute values can be selected. See also *extended color.*

attribute value. In the 3270 data stream, a code immediately following the attribute type that specifies a particular property from the set defined by the attribute type.

audible alarm. (1) An alarm that is sounded when designated events occur that require operator attention or intervention before system operation can continue. (2) A special feature that sounds a short, audible tone automatically when a character is entered from the keyboard into the next-to-last character position on the screen. The tone can also be sounded under program control.

automatic skip (auto-skip). After entry of a character into the last character position of an unprotected display field, automatic repositioning of the cursor from a protected and numeric field to the first character position of the next unprotected display field.

B

background logical terminal (LT). In MLT, any logical terminal that is not currently displayed. Contrast with *active logical terminal (LT).*

base color. The capability of displaying or printing all characters in a field, in one of four colors, on a color terminal by use of combinations of the field protection and the field intensify bits of the field attribute.

binary synchronous communication (BSC). A form of telecommunication line control that uses a standard set of transmission control characters and control character sequences, for binary synchronous transmission of binary-coded data between stations. Contrast with *synchronous data link control (SDLC).*

bind command. A command used to start a session and to define the characteristics of that session. Contrast with *unbind command.*

bracket. In SNA, one or more chains of request units (RUs) and their responses, which are exchanged between two LU-LU half-sessions and represent a transaction between them. A bracket must be completed before another bracket can be started. Examples of brackets are data base inquiries/replies, update transactions, and remote job entry output sequences to workstations.

buffer. (1) A portion of storage used to hold input or output data temporarily. (2) A routine or storage used to compensate for a difference in data rate or time of occurrence of events, when transferring data from one device to another.

buffer address. The address of a location in the buffer.

byte. (1) A string that consists of a number of bits, treated as a unit, and representing a character. (2) A binary character operated upon as a unit and usually shorter than a computer word. (3) A string that consists of a particular number of bits, usually 8, that is treated as a unit, and that represents a character. (4) A group of 8 adjacent binary digits that represent one extended binary-coded decimal interchange code (EBCDIC) character.

C

card. In the 3174 Establishment Controller, a unit of electronic circuitry contained in a plastic casing (or cassette) and providing the controller with a specialized function, for example, a Terminal Adapter or an Encrypt/Decrypt Adapter.

channel. (1) A functional unit, controlled by a host computer, that handles the transfer of data between processor storage and local peripheral equipment. (2) A path along which signals can be sent. (3) The portion of a storage medium that is accessible to a given reading or writing station. (4) In broadband transmission, a designation of a frequency band 6 MHz wide.

channel-attached. Pertaining to attachment of devices directly by data channels (I/O channels) to a computer. Synonym for *local.* Contrast with *telecommunication-attached.*

character attribute. The properties of a character with respect to its color, highlighting, and character set. See also *extended field attribute.*

character buffer. The read/write storage used by a partition for storing character or graphic data for display or printing on a terminal.

character mode. A mode in which input is treated as alphanumeric data, rather than graphic data.

character position. (1) A location on the screen at which one character can be displayed. (2) An addressed location in the buffer at which 1 character can be stored.

character set. (1) A defined collection of characters. (2) A group of characters used for a specific reason, for example, the set of characters a printer can print. (3) The collection of graphic characters required to support a specific language.

code page. An assignment of graphic characters and control function meanings to all code points.

code point. A 1-byte code representing one of 256 potential characters.

command. (1) A request for performance of an operation or execution of a program.

(2) A character string from a source external to a system that represents a request for system action.

command retry. A channel and control unit procedure that causes a command to be retried without requiring an I/O interruption.

component. (1) Hardware or software that is part of a functional unit. (2) A functional part of an operating system, for example, the scheduler or supervisor. (3) In systems with VSAM, a named, cataloged collection of stored records, such as the data component or index component of a key-sequenced file or alternate index. (4) In System/38 graphics, the representation of a data group on a chart. (5) See *terminal component* and *solid state component.*

configuration. The arrangement of a computer system or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term *configuration* may refer to a hardware configuration or a software configuration. See also *system configuration.*

control block. (1) A storage area used by a computer program to hold control information. (2) In the IBM Token-Ring Network, a specifically formatted block of information provided from the application program to the Adapter Support Interface to request an operation.

control character. (1) A character whose occurrence in a particular context specifies a control function. (2) A character used to specify that a control unit is to perform a particular operation.

control codes. (1) Code points and their assigned control function meanings. (2) The hexadecimal values hex 00 through hex 3F, and hex FF in the 3270 data stream. ASCII control codes are the hexadecimal values hex 00 through hex 1F and 7F.

control function. Synonym for *control operation.*

controller. A unit that controls input/output operations for one or more devices.

control operation. An action that affects the recording, processing, transmission, or interpretation of data; for example, starting or stopping a process, carriage return, font change, rewind, and end of transmission. Synonymous with *control function.*

control unit. A general term for any device that provides common functions for other devices or mechanisms. Synonym for controller.

control unit terminal (CUT). A terminal that relies on the 3174 to interpret the data stream. Examples are the 3178, 3179, 3278 Model 2, and 3279 Model S2A.

control unit terminal (CUT) mode. A host-interactive mode that enables an IBM 3270 Personal Computer customized in this mode to run only one session emulating a 3178, 3179, 3278 Model 2, or 3279 Model S2A.

conversion. (1) In programming languages, the transformation between values that represent the same data item but belong to different data types. Information may be lost as a result of conversion because accuracy of data representation varies among different data types. (2) The process of changing from one method of data processing to another or from one data processing system to another. (3) The process of changing from one form of representation to another, for example, to change from decimal representation to binary representation.

copy control character (CCC). A character used in conjunction with the Copy command to specify the type of data to be copied.

copy operation. An operation that copies the contents of the buffer from one terminal to another terminal attached to the same control unit.

create. In 3174 central site customizing, to create a library member for a network controller, and store the customizing data for that library member on a Library diskette.

cursor. (1) A movable, visible mark used to indicate the position at which the next operation will occur on a display surface. (2) A unique symbol that identifies a character position in a screen display, usually the character position at which the next character to be entered from the keyboard will be displayed.

customization. Procedures that tailor the control unit microcode to fit the various types of display stations and printers and the method of host attachment that a particular control unit will handle.

D

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (2) Any representations such as characters or analog quantities to which meaning is or might be assigned.

data chaining. In synchronous data link control (SDLC) data transmission, the chaining together of scattered segments of storage data to assemble a complete SDLC frame.

Data Entry keyboard. A keyboard layout designed for data entry applications.

data link. (1) Any physical link, such as a wire or a telephone circuit, that connects one or more remote terminals to a communication control unit, or connects one communication control unit with another. (2) The assembly of parts of two data terminal equipment (DTE) devices that are controlled by a link protocol, and the interconnecting data circuit, that enable data to be transferred from a data source to a data sink. (3) In SNA, see also *link*.

Note: A telecommunication line is only the physical medium of transmission. A data link includes the physical medium of transmission, the protocol, and associated devices and programs; it is both physical and logical.

data stream. (1) All data transmitted through a data channel in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form, using a defined format. See also *data stream format*.

data stream format. In SNA, the format of the data elements (end-user data) in the request unit (RU). See also *3270 data stream* and *SNA character string (SCS)*.

data transfer. (1) The result of the transmission of data signals from any data source to a data receiver. (2) The movement, or copying, of data from one location and the storage of the data at another location.

decode. (1) To convert data by reversing the effect of some previous encoding. (2) To interpret a code. Contrast with *encode*.

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

default destination. A destination for display stations and printers that is defined in AEA customization.

designator character. A character or space that immediately follows the field attribute character in a detectable field to denote either a selection field or an attention field. The designator character controls whether a detect on the field will or will not cause an attention. For a nonattention-producing field, the designator character also determines whether the modified data tag for the field is to be set or reset as a result of a selector-pen detect.

destination. Any point or location, such as a node, station, or a particular terminal, to which information is to be sent.

detectable. An attribute of a display field.

device. (1) A mechanical, electrical, or electronic contrivance with a specific purpose. (2) An input/output unit such as a terminal, display, or printer.

diskette. A flexible magnetic disk enclosed in a protective container.

display field. (1) An area in the display buffer that contains a set of characters that can be manipulated or operated upon as a unit. (2) A group of consecutive characters (in the buffer) that starts with an attribute character (defining the characteristics of the field) and contains one or more alphanumeric characters. The field continues to, but does not include, the next attribute character.

display station. An input/output device containing a display screen and an attached keyboard that allows a user to send information to or receive information from the system.

dot. One point in a printer or display block matrix.

downstream. (1) In the direction of data flow or toward the destination of transmission. (2) From the processor toward an attached unit or end user. (3) Contrast with *upstream*.

downstream load (DSL). The capability of a distributed function terminal to receive its control program from the control unit to which it is attached. A disk containing the terminal's control program is loaded into the control unit.

duplex. Pertaining to communication in which data can be sent and received at the same time.

E

EBCDIC. Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters.

emulation. (1) The imitation of all or part of one system by another, primarily by hardware, so that the imitating system accepts the same data, executes the same programs, and achieves the same results as the imitated computer system. (2) The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (3) Imitation; for example, imitation of a computer or device. (4) See *terminal emulation*. (5) Contrast with *simulation*.

enabled. (1) On a LAN, pertaining to an adapter or device that is active, operational, and able to receive frames from the network. (2) Pertaining to a state of a processing unit that allows the occurrence of certain types of interruptions.

(3) Pertaining to the state in which a transmission control unit or an audio response unit can accept incoming calls on a line.

encode. To convert data by the use of a code or a coded character set in such a manner that reconversion to the original form is possible. *Encode* is sometimes loosely used when complete reconversion is not possible. Contrast with *decode.*

envelope. (1) Information added to a frame or other message unit to allow it to be transmitted using a protocol other than the protocol in which the message unit originated. (2) To surround or enclose a message unit in information to allow the message unit to be transmitted using a protocol other than the protocol in which the message originated.

Erase All Unprotected (EAU) command. A 3270 data stream command that erases all unprotected fields and inserts nulls.

Erase Unprotected to Address (EUA) order. A data stream order that erases all unprotected character positions (inserts nulls) from the current buffer address up to, but not including, the specified stop address.

event. (1) An occurrence or happening. (2) An occurrence of significance to a task; for example the completion of an asynchronous operation, such as an input/output operation.

extended binary-coded decimal interchange code (EBCDIC). A coded character set consisting of 8-bit coded characters.

extended color. (1) A capability that allows color terminals to display or print fields or characters in colors using extended field and character attributes. (2) An attribute type in the extended field attribute and character attribute.

extended field attribute. Additional field definition to the field attribute that controls defining additional properties; for example, color, highlighting, character set, and field validation. The extended field attribute is altered by information passed in the Start Field Extended and Modify Field orders.

extended highlighting. (1) A function that provides blink, reverse video, and underscore for emphasizing fields or characters on devices supporting extended field attributes and character attributes. (2) An attribute type in the extended field attribute and character attribute. (3) An attribute passed between session partners in the Start Field Extended, Modify Field, and Set Attribute orders.

F

feature. A part of an IBM product that may be ordered separately by the customer.

field. See *display field.*

field attribute. A control character stored in the character buffer in the first character position of a field. For those devices supporting the 3270 data stream, a field attribute defines protected/unprotected, alphanumeric/numeric, detectable/nondetectable, display/nondisplay, intensity, and modified data tag (MDT).

field inherit. A bit setting in the character attribute that defaults the character properties to the extended field attributes or device default if the buffer is unformatted.

file. A named set of records stored or processed as a unit.

flag. (1) An indicator or parameter that shows the setting of a switch. (2) Any of various types of indicators used for identification, for example, a wordmark. (3) A character that signals the occurrence of some condition, such as the end of a word. (4) Deprecated term for *mark.*

foreground logical terminal (LT). Synonym for *active logical terminal (LT).*

formatted display. A display screen in which the attributes of one or more display fields have been defined by the user. Contrast with *unformatted display.*

frame. (1) The unit of transmission in some LANs, including the IBM Token-Ring Network and the IBM PC Network. It includes delimiters, control characters, information, and checking characters. On a token-ring network, a frame is created from a token when the token has data appended to it. On a token bus network (IBM PC Network), all frames including the token frame contain a preamble, start delimiter, control address, optional data and checking characters, end delimiter, and are followed by a minimum silence period. (2) A housing for machine elements. (3) In synchronous data link control (SDLC), the vehicle for every command, every response, and all information that is transmitted using SDLC procedures. Each frame begins and ends with a flag.

full duplex. Synonym for *duplex.*

function. In NetView DM, a function is the specification of a transmission activity on a resource or group of resources. Functions are grouped into phases. In CSCM, resources are known as data objects.

G

generate. In 3174 central site customizing, to write a Control diskette containing the customizing data for a particular controller. Also, to print a mailing address label and a diskette label for a particular controller.

graphic escape. In the 3270 data stream, a control code used to introduce a graphic character (hex 40 through hex FE) from an alternate character set.

group. (1) A set of related records that have the same value for a particular field in all records. (2) A collection of users who can share access authorities for protected resources. (3) A list of names that are known together by a single name.

H

hexadecimal. (1) Pertaining to a selection, choice, or condition that has 16 possible values or states. (2) Pertaining to a fixed-radix numeration system, with radix of 16. (3) Pertaining to a numbering system with base of 16; valid numbers use the digits 0 through 9 and characters A through F, where A represents 10 and F represents 15.

hexadecimal number. The 1-byte hexadecimal equivalent of an EBCDIC character.

host application program. An application program processed in the host computer.

host attachment. A mode of SNA communication in which the processor acts as a secondary SNA device.

host interface. Interface between a network and the host computer.

host logical unit (LU). An SNA logical unit (LU) located in a host processor, for example, an ACF/VTAM application program.

host system. (1) A data processing system used to prepare programs and operating environments for use on another computer or controller. (2) The data processing system to which a network is connected and with which the system can communicate. (3) The controlling or highest-level system in a data communication configuration; for example, a System/38 is the host system for the workstations connected to it.

I

IBM Cabling System. A permanently installed wiring system that eliminates the need to rewire when terminals are moved from one location to another within an office complex. It allows transmission of data at very high speeds and is the foundation for installing a local area network.

initial microcode load (IML). The action of loading the operational microcode.

input device. A device in a data processing system by which data may be entered into the system.

input/output (I/O). (1) Pertaining to a device whose parts can perform an input process and an output process at the same time. (2) Pertaining to a functional unit or channel involved in an input process, output process, or both, concurrently or not, and to the data involved in such a process. (3) Pertaining to input, output, or both.

Insert Cursor (IC) order. An order that displays the cursor at the current buffer address.

intensified display. An attribute of a display field; causes data in that field to be displayed at a brighter level than other data displayed on the screen.

interface. (1) A shared boundary between two functional units, defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics as appropriate. (2) A shared boundary. An interface may be a hardware component to link two devices or a portion of storage or registers accessed by two or more computer programs. (3) Hardware, software, or both, that links systems, programs, or devices.

K

keyboard definition. A customizing procedure for defining a maximum of four modified keyboard layouts for modifiable keyboards only. Most characters, symbols, and functions can be relocated, duplicated, or deleted from almost any keyboard position. Synonym for *modify keyboard.*

L

layer. (1) One of the seven levels of the Open Systems Interconnection reference model. (2) In open systems architecture, a collection of related functions that comprise one level of hierarchy of functions. Each layer specifies its own functions and assumes that lower level functions are provided.

(3) In SNA, a grouping of related functions that are logically separate from the functions of other layers. Implementation of the functions in one layer can be changed without affecting functions in other layers.

light pen. A light-sensitive pick device that is used by pointing it at the display surface.

line control characters. Characters that regulate the transmission of data over a line; for example, delimiting messages, checking for transmission errors, and indicating whether a station has data to send or is ready to receive data.

link. (1) The logical connection between nodes including the end-to-end link control procedures. (2) The combination of physical media, protocols, and programming that connects devices on a network. (3) In computer programming, the part of a program, in some cases a single instruction or an address, that passes control and parameters between separate portions of the computer program. (4) To interconnect items of data or portions of one or more computer programs. (5) In SNA, the combination of the link connection and link stations joining network nodes.

local. Pertaining to a device accessed directly without use of a telecommunication line. Synonym for *channel-attached.* Contrast with *remote.*

local format storage. In 3174, this function allows the controller to store pre-defined formatted screens and subsequently be viewed by a terminal user. The formatted screens are downloaded from the host into the 3174.

location. With reference to a 3174, a place within the 3174 chassis where a particular card or adapter is inserted.

logical terminal (LT). In MLT, one of five sessions available to share one display station.

logical unit (LU). In SNA, a port through which an end user accesses the SNA network in order to communicate with another end user and through which the end user accesses the functions provided by system services control points (SSCPs). An LU can support at least two sessions, one with an SSCP and one with another LU, and may be capable of supporting many sessions with other logical units.

M

main storage. Program-addressable storage from which instructions and other data can be loaded directly into registers for subsequent processing.

mark. A symbol or symbols that indicate the beginning or the end of a field, a word, an item of data or a set of data such as a file, record, or block.

medium. A physical carrier of electrical or optical energy.

memory. Program-addressable storage from which instructions and other data can be loaded directly into registers for subsequent execution or processing. Synonymous with *main storage.*

modified data tag (MDT). A bit in the attribute character of a display field that, when set, causes that field to be transferred to the channel during a read-modified operation. The modified data tag may be set by a keyboard input to the field, a selector-pen detection in the field, a card read-in operation, or program control. The modified data tag may be reset by a selector-pen detection in the field, program control, or ERASE INPUT key.

Modify Field (MF) order. An order that allows specified field and extended attributes to be modified, without having to respecify all of the attributes of the field.

modify keyboard.. Synonym for *keyboard definition.*

multidrop (network). A network configuration in which there are one or more intermediate nodes on the path between a central node and an endpoint node.

N

name. An alphanumeric term that identifies a data set, statement, program, or cataloged procedure.

network. (1) A configuration of data processing devices and software connected for information interchange. (2) An arrangement of nodes and connecting branches. Connections are made between data stations.

node. (1) Any device, attached to a network, that transmits and/or receives data. (2) An endpoint of a link, or a junction common to two or more links in a network. (3) In a network, a point where one or more functional units interconnect transmission lines.

O

open. (1) To make an adapter ready for use. (2) A break in an electrical circuit. (3) To make a file ready for use.

operator information area (OIA). The area below the line near the bottom of the display area where graphics and alphanumeric characters are displayed to define the status of the terminal or the system to the operator.

option. (1) A specification in a statement, a selection from a menu, or a setting of a switch, that may be used to influence the execution of a program. (2) A hardware or software function that may be selected or enabled as part of a configuration process. (3) A piece of hardware (such as a network adapter) that can be installed in a device to modify or enhance device function.

order code. A code that may be included in the write data stream transmitted for a display station or printer; provides additional formatting or definition of the write data.

order sequence. A sequence in the data stream that starts with an order code and includes a character address and/or data characters related to the order code.

original equipment manufacturer (OEM). A manufacturer of equipment that may be marketed by another manufacturer.

output device. A device in a data processing system by which data may be received from the system.

P

pacing. (1) A technique by which a receiving station controls the rate of transmission of a sending station to prevent overrun. (2) In SNA, a technique by which a receiving component controls the rate of transmission of a sending component to prevent overrun or congestion.

parallel. (1) Pertaining to a process in which all events occur within the same interval of time, each handled by a separate but similar functional unit; for example, the parallel transmission of the bits of a computer word along the lines of an internal bus. (2) Pertaining to concurrent or simultaneous operation of two or more devices or to concurrent performance of two or more activities in a single device. (3) Pertaining to concurrent or simultaneous occurrence of two or more related activities in multiple devices or channels. (4) Pertaining to the simultaneity of two or more processes. (5) Pertaining to the simultaneous processing of the individual parts of a whole, such as the bits of a character and the characters of a word, using separate facilities for the various parts. (6) Contrast with *serial*.

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (2) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

port. (1) An access point for data entry or exit. (2) A connector on a device to which cables for other devices such as display stations and printers are attached.

Power-On Self-Test (POST). A series of diagnostic tests that are run each time the computer's power is turned on.

primary logical unit (PLU). In SNA, the logical unit (LU) that contains the primary half-session for a particular LU-LU session. Contrast with *secondary logical unit*.

program access (PA) key. On a display device keyboard, a key that produces a call to a program that performs display operations. See also *program function (PF) key*.

program attention key. On a display device keyboard, a key that produces an interruption to solicit program action. See also *program access (PA) key* and *program function (PF) key*.

program function (PF) key. On a display device keyboard, a key that passes a signal to a program to call for a particular display operation. See also *program access (PA) key*.

programmable symbols (PS). Customer-defined symbols. There are a maximum of 190 symbols in a programmed symbol set.

programmed symbol set (PSS). A set of fonts that can be system-defined or defined by the user and to which a code can be assigned.

programmed symbols (PS). In the 3270 Information Display System, an optional feature that stores up to six user-definable, program-loadable character sets of 190 characters each in terminal read/write storage for display or printing by the terminal.

Program Tab (PT) order. An order that advances the current buffer address to the address of the first character location of the next unprotected field and resets the character attributes of all characters in the field that are replaced by nulls.

protected field. (1) In word processing, preset data or an area that cannot be changed or overridden by an operator without altering the program. (2) On a display device, a display field in which a user cannot enter, modify, or erase data. Contrast with *unprotected field*.

protocol. (1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components. (3) A specification for the format and relative timing of information exchanged between communicating parties.

put. In 3174 central site customizing, to store data from the working copy into a library member.

R

remote. Pertaining to a system, program, or device that is accessed through a telecommunication line. Contrast with *local.*

remove. (1) To take an attaching device off a network. (2) To stop an adapter from participating in passing data on a network.

Repeat to Address (RA) order. An order that stores a specified alphanumeric or null character in up to 480 buffer locations, starting at the current buffer address and ending at, but not including, the specified stop address.

request for price quotation (RPQ). An alteration or addition to the functional capabilities that the controller provides.

ring out (RO). In an IBM Token-Ring Network, the transmit or output receptacle on an access unit or repeater.

routing. (1) The assignment of the path by which a message will reach its destination. (2) In SNA, the forwarding of a message unit along a particular path through a network, as determined by parameters carried in the message unit, such as the destination network address in a transmission header.

S

scroll. To move all or part of the display image vertically or horizontally to display data that cannot be observed within a single display image.

secondary logical unit (SLU). In SNA, the logical unit (LU) that contains the secondary half-session for a particular LU-LU session. Contrast with *primary logical unit.*

segment. A section of cable between components or devices on the network. A segment may consist of a single patch cable, multiple patch cables connected, or a combination of building cable and patch cables connected.

selector pen. A pen-like instrument that can be attached to a display station. When a program using full-screen processing is assigned to the display station, the pen can be used to select items on the screen or to generate an attention. Synonym for *light pen.*

serial. (1) Pertaining to a process in which all events occur one after the other; for example, serial transmission of the bits of a character according to V24 CCITT protocol. (2) Pertaining to the sequential or consecutive occurrence of two or more related activities in a single device or channel. (3) Pertaining to the sequential processing of the individual parts of a whole, such as the bits of a character or the characters of a word, using the same facilities for successive parts. (4) Contrast with *parallel.*

server. (1) A device, program, or code module on a network dedicated to providing a specific service to a network. (2) On a LAN, a data station that provides facilities to other data stations. Examples are a file server, print server, and mail server.

session. (1) In network architecture, an association of facilities necessary for establishing, maintaining, and releasing connections for communication between stations. (2) In MLT, synonymous with logical terminal (LT). (3) In SNA, a logical connection between two network addressable units that can be activated, tailored to provide various protocols, and deactivated as requested.

Set Attribute (SA) order. (1) An order that specifies an attribute-type-value pair defining the property to be applied to subsequent characters in the data stream. An SA order is required for each property assigned. (2) An order that associates attributes in the EAB with individual characters.

Set Buffer Address (SBA) order. An order that sets the buffer address to a specified location.

Set Printer Characteristics. This 3270 data stream structured field allows an application program to control the setting and resetting of certain functions on CUT printers.

simulation. (1) The representation of selected characteristics of the behavior of one physical or abstract system by another system. In a digital computer system, simulation is done by software; for example, (a) the representation of physical phenomena by means of operations performed by a computer system, and (b) the representation of operations of a computer system by those of another computer system. (2) Contrast with *emulation.*

SNA character string (SCS). A character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

solid-state component. A component whose operation depends on control of electric or magnetic phenomena in solids, for example, a transistor, crystal diode, or ferrite core.

Start Field (SF) order. (1) A data stream order that establishes the start of a data field for displaying or printing. (2) An order that indicates a specified location that contains an attribute byte and not a text character.

Start Field Extended (SFE) order. (1) A data stream order that defines the start of a field that includes extended field attribute type-value pairs. (2) An order that generates an extended field attribute in the EAB and at the current buffer location.

station. (1) An input or output point of a system that uses telecommunication facilities; for example, one or more systems, computers, terminals, devices, and associated programs at a particular location that can send or receive data over a telecommunication line. (2) A location in a device at which an operation is performed, for example, a read station. (3) In SNA, a link station.

storage. A unit into which recorded text can be entered, in which it can be retained and processed, and from which it can be retrieved. See also *memory*.

structured field. A data stream format that permits variable-length data and controls to be parsed into its components without having to scan every byte.

subsystem. A secondary or subordinate system, or programming support, usually capable of operating independently of or asynchronously with a controlling system. The 3174 and its attached terminals are an example of a subsystem.

Suppress Index (SI) order. An order that generates the suppress index character, valid only for the 3288 Model 2 printer. This character inhibits a line index to allow overprinting.

synchronous. (1) Pertaining to two or more processes that depend on the occurrences of a specific event, such as common timing signal. (2) Occurring with a regular or predictable time relationship.

Synchronous Data Link Control (SDLC). A discipline conforming to subsets of the Advance Data Communication Control Procedures (ADCCP) of the American National Standards Institute (ANSI) and High-level Data Link Control (HDLC) of the International Organization for Standardization, for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or nonswitched links. The configuration of the link connection may be point-to-point, multipoint, or loop. See also *binary synchronous communication (BSC)*.

system configuration. A process that specifies the devices and programs that form a particular data processing system.

Systems Application Architecture (SAA). An architecture developed by IBM that consists of a set of selected software interfaces, conventions, and protocols, and that serves as a common framework for application development, portability, and use across different IBM hardware systems.

system services control point (SSCP). In SNA, the focal point within an SNA network for managing the configuration, coordinating network operator and problem determination requests, and providing directory support and other session services for end users of the network. Multiple SSCPs, cooperating as peers, can divide the network into domains of control, with each SSCP having a hierarchical control relationship to the physical units (PUs) and logical units (LUs) within its domain.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

T

telecommunication-attached. Pertaining to the attachment of devices by teleprocessing lines to a host processor. Synonym for *remote*. Contrast with *channel-attached*.

terminal. In data communication, a device, usually equipped with a keyboard and display device, capable of sending and receiving information.

terminal component. A separately addressable part of a terminal that performs an input or output function, such as the display component of a keyboard-display device or a printer component of a keyboard-printer device.

terminal emulation. The capability of a microcomputer, personal computer, 3270 CUT mode display station, 3270 printer, ASCII display station, or ASCII printer to operate as if it were a particular type of terminal linked to a processing unit and to access data.

transaction. In an SNA network, an exchange between two programs that usually involves a specific set of initial input data that causes the execution of a specific task or job. Examples of transactions include the entry of a customer's deposit that results in the updating of the customer's balance, and the transfer of a message to one or more destination points.

transparency. See *transparent*

transparent. (1) Pertaining to operations or data that are of no significance to the user. (2) In data transmission, pertaining to information not recognized by the receiving program or device as transmission control characters.

type. In the 3174 Establishment Controller, the identifying number of a card. For example, 9150 is a type number of the terminal adapter in the 3174.

U

unbind. In SNA, to deactivate a session between logical units.

unbind command. A command used to reset the protocols for a session. Contrast with *bind command.*

unformatted display. A display screen on which the user has not defined a display field. Contrast with *formatted display.* See also *protected field.*

unprotected field. A displayed field in which a user can enter, modify, or delete data. Contrast with *protected field.*

update. In 3174 central site customizing, to tailor a library member's customizing data, in working copy, and put it back to the library disk.

upstream. (1) In the direction opposite to data flow or toward the source of transmission. (2) Toward the processor from an attached unit or end user. (3) Contrast with *downstream.*

V

variable. (1) In computer programming, a character or group of characters that refers to a value and, in the execution of a computer program, corresponds to an address. (2) A quantity that can assume any of a given set of values.

vector. One or more related fields of data, in a specified format. A quantity usually characterized by an ordered set of numbers.

version. A separate IBM-licensed program, based on an existing IBM-licensed program, that usually has significant new code or new function.

viewport. In the 3270 Information Display System, an area on the usable area of the display surface through which an operator views all or a portion of the data outlined by the window on the presentation plane.

W

workstation. (1) An I/O device that allows either transmission of data or the reception of data (or both) from a host system, as needed to perform a job: for example, a display station or printer. (2) A configuration of I/O equipment at which an operator works. (3) A terminal or microcomputer, usually one connected to a mainframe or network, at which a user can perform tasks.

write. To make a permanent or transient recording of data in a storage device or on a data medium.

write control character (WCC). A character used in conjunction with a Write command to specify that a particular operation, or combination of operations, is to be performed at a display station or printer.

Write Structured Field (WSF) command. A command used to transmit data in structured field format.

3

3270 data stream. (1) The commands, control codes, orders, attributes, and data or structured fields for 3270 devices, that are transmitted inbound to an application program or outbound to a terminal. (2) Data being transferred from or to an allocated primary or tertiary device, or to the host system, as a continuous stream of data and 3270 Information Display System control elements in character form.

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Data Stream Programmer's Reference

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