APTRA™ Advance NDC

Reference Manual

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Federal Communications Commission (FCC) Radio Frequency Interference Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Class A Device Declaration

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Information to User

This equipment must be installed and used in strict accordance with the manufacturer's instructions. However, there is no guarantee that interference to radio communications will not occur in a particular commercial installation. If this equipment does cause interference, which can be determined by turning the equipment off and on, the user is encouraged to consult an NCR service representative immediately.

Caution NCR Corporation is not responsible for any radio or television interference caused by unauthorised modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by NCR. Such unauthorized modifications, substitutions, or attachments may void the user's authority to operate the equipment. The correction of interference caused by such unauthorized modifications, substitutions, or attachments will be the responsibility of the user.

Revision Record

Date	Page	Description of Change
Feb 08		Updated for APTRA Advance NDC 03.02.01
	2-9	Added that a touch FDK cannot be used as the ***Enter*** key in the PIN Entry State
	2-12	Clarified how State C differs in Advance NDC from NDC+
	2-27	Removed minimum data length from Buffer B
	2-38	Added that the Close State must use the same BNA Notes Return / Retain / Leave flag option
	2-44	Removed sentence on Diebold PIN verification as Advance NDC does not support Diebold PIN verification
	2-88	Added note on cheque endorsement
	3-29	Added that compressed graphic formats can result in degradation of the display performance
	5-27	Added print cheque image printer control code
	7-4 7-21	Added GBXX to Timer 77
	7-3 7-20 10-60 10-61	Added Timer 10 description and uses
	7-11	Added that the BNA does not have Tamper Indication, but status messages can be used to track cassette insertion and removal
	7-13	Added that a reboot must occur before any changes to option 46 take effect at device level
	7-23	Removed Timer 10 from list of unsupported timers
	8-5	Clarified that ISO Format 0 is ANSI Clarified the PIN verification methods for PCKLN
	8-2 8-4 8-10	Added that PAGDX is not supported as Local Diebold PIN verification is not supported

Date	Page	Description of Change
	8-11	Added that ISO Format 0 is ANSI in PBFMT (PIN Block Format) Removed not supported from ISO format 1
	9-4	Updated field ‘r’ of the Transaction Request message
	9-10	Removed reference to Diebold emulation option as it is not supported by Advance NDC
	9-76	Added that, as in NDC+, it is the reponsibility of the host to put the SST into Out of Service mode if the MCRW becomes fatal
	9-80	Updated the details of the supplies status in the Cash Handler device status message
	9-85	Added that no message is sent to the host to indicate that the journal is not configured if no printer is attached to the SST and the EJ is not activated
	9-94	Added that an R07 indicates only that the Diagnostics menu item has been selected, not whether entry to Diagnostics has been successful
	10-57	Updated details of the Cheque Destination field in the Transaction Reply message
	10-59	Added note that Envelope is presented in Deposit and Print sequence only if it has not already been dispensed in State C
	E-4	Added option ‘D’ for Double-length Restricted mode in the EPP Hardware Configuration
	Glossary-4	Added JIFF (JPEG Image File Format)
July 07		New revision for APTRA Advance NDC 3.02, including restructuring of the publication
	1-4	Added that the NCR SNMP installation sends traps whenever a change in service mode occurs
	1-6	Updated information on deleting files remotely; added the files to delete for a fresh start
	Chap. 2 various pages	Added ranges for base 36 (alphanumeric) state numbers to support up to 46655 state numbers
	2-3	Added barcode reader State Type to Table 2-1
	2-12	Updated envelope dispenser state for MEI
	2-32	Added Barcode Buffer ‘e’ to Table 2-20

Date	Page	Description of Change
	2-34	Updated close state for receipt printers with retract Updated envelope dispenser for MEI
	2-37	Moved detail of journalling BNA vaulted note counts from here to the *APTRA Advance NDC, Supervisor's Guide*
	2-78 to 2-83	Updated the Cash Accept state
	2-85	Amended Image Lift information
	2-87	Updated note on CPM processing
	2-88	Added notes on CPM errors
	2-93	Amended Table Note 48 regarding next state exit
	2-91 to 2-93	Added new topic and state table for Barcode Reader State
	2-96	Added reference to Re-defining Reserved Screens
	Chapter 3	Restructured, rewritten and updated to include: the Cardholder/EOP screen layout (was CRT/EOP screen layout in Appendix E); screen display information (was Appendix G "Screen Display Considerations"); and details of the Supervisor settlement transactions screen (was Appendix L, "Supervisor/Settlement Transactions Parameter Screen")
	3-3	Updated multi-language screen definition
	3-8 to 3-10	Removed mention of screens K04, K05, and K06 as not supported
	3-16	Amended text for SO control
	3-30	Added that the path can be included in the filename information for the Display Image Files control
	3-34	Rewrote Re-defining Reserved Screens
	3-38 5-6 12-2 B-2 B-7	Changed online documentation title from Self-Service Support to APTRA XFS
	Chapter 4	Restructured, rewritten and updated for the CEN-XFS interface; added standard keyboard layouts (were in Appendix E) and how to calculate full touch-screen positions (was Appendix I)

Date	Page	Description of Change
	4-9	Updated information on the decision to use secure key entry
	4-12	Updated number of touchscreen areas
	5-7	Added information on printer-independent margin control
	5-15	Added introduction to USB receipt and USB journal character set support
	5-25	Added printer control sequences and registry settings
	6-4	Removed table of screens that are edited by the terminal; added reference to Appendix A, Reserved Screens
	Chapter 7	Restructured and rewritten to deduplicate information
	7-2 to 7-4	All configuration parameter load details moved here from the message format table on page 10-13
	7-3	Added barcode reader time-out to the Summary of Timers table
	7-5 to 7-23	All enhanced configuration load details moved here from the message format table on page 10-15
	7-8	Added value 002 for flexible TI/Sensor Status to enhanced configuration load parameters
	7-10	Added note that a Supervisor option allows option 36 to be ignored if sent from the host; Updated Print Track 2 to Journal 001 setting and format
	7-11	Updated Option 44 as it is no longer used in the Close State; Updated Option 45 descriptions; Added note on using GBRU devices with Option 45 set to accept up to 90 notes
	7-13	Added Option 48 - Barcode reader to the enhanced configuration parameters load message section
	7-14	Added Option 76 - Cash Handlers to the Enhanced Configuration Parameters information; Updated Option 77 - Next State Number, added option code for base 36 (alphanumeric) state numbers

Date	Page	Description of Change
	7-14	Added Option 78 - GBRU mStatus and Variant Reporting to the Enhanced Configuration Parameters information and Option 79 - Coin Dispenser to the Enhanced Configuration Parameters information
	7-15	Added Option 80 - Alphanumeric State Entry and Option 83 - Cheque Processing Module
	7-18 to 7-22	Moved Timer Descriptions here from chapter 10; Added time-out information for Timer 04; Added Timer 61 to the timer descriptions; Updated reserved timers list and details
	8-10	Added that the delimiter is not included in the offset count for FIT data; updated index referencing example
	9-5	Updated the last coins dispensed information in the Transaction Request message
	9-5	Added support for seven cassette types
	9-9	Added fields for barcode reader and more than four hoppers in the Transaction Request message
	9-12	Updated the minimum buffer length to 1 byte for the General Purpose Buffer B in the Interactive Transaction Response
	9-20 10-71	Expanded introduction to the send configuration information and send enhanced configuration information messages
	9-23	Added CPM to configuration message
	9-25, 9-33	Added Product class identifiers for 5879, 5889, and Personas 71
	9-26, E-2	Aligned configuration data for MCRW
	9-29	Added Byte 24 and Byte 29 information for coin dispenser
	9-30	Added note on dual cash handler restrictions
	9-39	Added tamper indication status codes
	9-40	Added new Extended Tamper Status field to Tamper and Status Data message
	9-44	Added note on BNA / GBNA note reporting for large denominations
	9-45	Updated fields g4-g7 of the Send Supply Counters message for dual cash handlers

Date	Page	Description of Change
	9-47	Updated fields g60-g62 of the Send Supply Counters message for coin dispensers with four hopper types
	9-48	Added CPM to Send Counters message
	9-49	Added send supply counters extended message format
	9-59	Added coin dispenser to the solicited device fault status response table
	9-61	Added comment on the format of the diagnostic status field for EPP encryptors
	9-62	Added mapping for reporting GBRU M-Status as CDM M-Status
	9-66	Moved “Encryptor Initialisation Data” and “Upload EJ Data Message” sections to “Other Solicited Messages”
	9-67 to 9-69	Added new information to “Encryptor Initialisation Data”
	9-77	Updated Card Reader/Writer status message for EMV
	9-77	Updated the Cash Handler device status message
	9-91 9-93	Added the value of ‘6’ for byte 1 of the Sensors message
	9-92	Added further fields to Sensors message for when byte 1 = ‘5’
	9-93	Added a note regarding the Option 24 setting and byte 1 of the Sensors message set to ‘5’ or ‘6’
	9-99	Updated the BNA device status message; supplies status now variable due to option 45
	9-100	Updated BNA denomination type to be hexadecimal values
	9-104 to 9-106	Added CPM device status message
	9-106	Added details of coin dispenser response to a Transaction Reply Command message
	9-109	Added details of barcode reader solicited or unsolicited device status message
	10-6 to 10-9	Added the NDC Configuration Command information

Date	Page	Description of Change
	10-8	Added ranges for base 36 (alphanumeric) state numbers
	10-17	Added information for options 48, 76, 78, 79, and 83
	10-19	Added note that a Supervisor option allows option 36 to be ignored if sent from the host
	10-22	Added note on when Config ID is saved
	10-25	Added details of using offset 16 to control whether buffer ‘f’ is included
	10-26	Added Offset 51 in the Transaction Request Message for barcode reader data ID field
	10-27	Updated Offset 5 in Transaction Reply Message for more than four hopper types
	10-29	Added note on Offset 16 and the inclusion of buffer ‘f’ in MAC generation
	10-36 to 10-40	Added extended encryption key information
	10-37	Added explanation that modifier ‘F’ will fail if the encryptor has previously been used in BAPE mode
	10-39	Added information to Table Note 32 on key mode support for secure and non-secure EPP
	10-48	Added ranges for base 36 (alphanumeric) state numbers Updated information on the number of notes to dispense; Added additional fields for additional hoppers in the transaction reply
	10-53 10-54	Updated printer flag ‘a’ and ‘b’ support for CPM
	10-57	Added note on inclusion of one of the printer flags ‘a’ or ‘b’ for CPM
	10-58	Added note on the maximum number of coins that can be dispensed
	10-59 to 10-68	Updated the transaction sequences to include journal to defined level
	10-59 10-63 10-64 10-65	Updated the transaction sequences to include coin dispense

Date	Page	Description of Change
	10-78	Updated the maximum dispense information
	10-80	Added specific command reject A06; Added specific command reject A09
	10-87	Updated note on processing of messages while in service
	Chapter 11	Updated to include PIN block formats for Diebold and ISO format 1
	Chapter 12	New chapter “EMV Smart Card Handling” (was Appendix N, “Smart Card Handling”)
	Chapter 13	New chapter “CCM VISA2 Dialup System” (was Appendix O)
	Appendix A	Added and updated the following screens: A90, A91, A92, A 93, A94, A95, A96, E0026, E1801, E1802, E1803, e13, e17, e18, e19, e20, e21, e22, e23, e24, e25, e26, e27, e28, e29, e30, e31, I06, I12I33, I37, I42, I44, I45, I63, I66, M07, m02, m12, m24, m28, m29, m30, m31, m32, m60, m90,m91, m,92, m93, m94, m95, m96, P33, P36, P37, P93, P94, p34, p51, p52, p53, s03, s04, s05, s06, s07, s08, T58, T59, T61, T62, T63, T64, T76, t10, t11, t15, t22, t24, t26, t27, t28, t29, t30, t35, t36, t37, t38, t39, t40, t41, t42, t43, t44, t45, t46, t47, t48, t49, t50, t51, t52, t53, t54, t58, t59, t60, t61, t62, t63, t64, t70, t71, t75, t76, t78, t79, t82, t83, t84, t85, t86, t87, t94, t97, t98, t99, U0057, U0058, U0059, U0067, U0068, U0069, U0070, U0071, U0072, U0073, U0074, U0075, U0100, U0101, U0102, U0103, i82, i83, i27, i88, i89, i90, j0003, j0004, j0010, d20, d21, d22, d23, d24, d25, d26, d27, d28, d29, d30, d31, d32, d33, d50, d51, d52, d53, d54, d60, d61, d62, d63, d64, d65, d66, d67
	Appendix B	Updated code pages and character sets
	B-7	Added information on downloadable character sets and USB receipt and journal printers
	B-8	Added section on using mapping files
	D-3	Updated limit of variable data for field ‘r’ of the Transaction Request message
	D-5	Added fields in Transaction Request message for coin dispensers with more than four hoppers
	D-10	Added modifiers for command code of 4 in Terminal Commands

Date	Page	Description of Change
	D-11	Updated CDM to Coin Dispenser and removed unsupported statement
	D-16	Updated printer flag ‘a’ support for CPM
	D-18	Added fields ba1 and ba2 for CPM transaction reply
	E-2	Amended details for MCRW, device 09
	E-3	Added maximum dispense information for extended cassettes
	E-5	Added coin dispenser device hardware configuration data identifiers
	E-6	Added cash handler 0 and cash handler 1 device hardware configuration data identifiers
	E-7	Added barcode reader device and CPM hardware configuration data identifiers
	E-7	Updated DIG E for supplies information with extended cassette support
	E-10	Added coin dispenser device supplies data identifiers
	E-11	Added cash handler 0 and cash handler 1 device supplies data identifiers
	E-7	Added CPM to the supplies data table
	E-16	Added coin dispenser device fitness data identifiers; added cash handler device fitness data identifiers
	E-17	Added barcode reader device fitness data identifiers; Added CPM to the fitness data table
	E-19 to E-22	Added device tamper data
	Appendix G	Updated related documentation information
	App. J	Appendix deleted and monitor burn-in information moved to the *APTRA Author, User’s Guide*
	App. M	Appendix deleted and font definition information moved to the *Advance NDC Developer’s Guide*

Date	Page	Description of Change
	Glossary-1 to Glossary-6	Added definitions for ABA, Basic Remote Key Protocol, CDM, Coin Hopper, Coin Hopper Type, Enhanced Remote Key Protocol, Standard Output and USB
May 06		New revision for APTRA Advance NDC 3.01
	liv	Added information on using and navigating this publication; including locating table notes
	2-5 2-53 2-54 10-19 N-2 N-3 N-7	Added note on using a DASH reader as a standard DIP reader
	2-21	Added note that the Amount Check State is unsupported with dual cash handlers
	2-96	Added timer 78
	3-22	Added information on control sequence for voice
	4-9	Added note regarding secure key entry
	5-2	Added reference to new Supervisor function for setting the maximum statement length
	6-4	Updated automatic screen editing table
	7-5	Added Enhanced EJ configuration load parameters
	7-10	Added timer 78
	9-34	Added details of BNA counters
	9-78	Updated cash handler status for solicited retract Transaction Reply message
	9-99	Updated BNA device status, error code 7 is always unsolicited
	9-101	Added information on enabling the extended message format through option 45
	10-11	Updated the maximum length of a Screen/Keyboard data load message
	10-19	Added information on Timer 78
	10-17	Added option digit 36
	10-23	Added option 45 values to enable the extended message format

Date	Page	Description of Change
	10-17	Added option digit 77
	10-68	Amended operation details for BNA encash, print and set next state
	11-29	Clarified double length restricted key entry mode information
	Appendix A	Updated and added reserved screens
	E-7	Updated BNA configuration information
	H-10	Added extended BNA supplies message format
	H-13	Added extended BNA fitness message format
	L-3	Added information on customisable settlement screens
	N-1	Added reference to Developer's Guide for information on fatal/suspend handling for DAH readers
	O-4	Updated information on BIN and Terminal ID message fields
Dec 05		Updated for APTRA Advance NDC 3.00.02
	2-11 2-46 8-8	Added notes on 4 PIN digit minimum check
	2-79	Added information on option 45 settings affecting note movement on timer expiry
	9-8	Updated information on ca1, ca2, and ca3 fields of Transaction Request Message
	9-36	Added partial counts for transport jam
	A-42	Added messages t19 and t21 to journal trace Reserved Screens
	G-2	Added PCX file distortion solution
	O-5	Added Dial-Up message format for I'm Alive Message
	O-7	Added Dial-Up message format for Disconnect Message
	O-8	Added Dial-Up message format for No-Op message
	Glossary-2	Added definitions for currency and denomination

Date	Page	Description of Change
	Glossary-5	Added definition for note type
Nov 05		File update
	2-18, 2-26	Removed reference to Diebold emulation mode.
Sep. 05		Updated for APTRA Advance NDC 3.00.01.
	7-10	Print Track 2 to Journal is now supported.
	9-34	Amended note about the inclusion of group separators preceding optional fields.
	10-19	Added description of Timer 69 for the receipt printer.
	10-17	Print Track 2 to Journal: added parameters for Option 37.
	10-51	Added note to clarify that Advance NDC works differently from NDC+ when Function ID is 1 or 7 as Diebold mode is not supported.
	A-15	Marked screen I18 as unavailable and added screen I19.
	A-19	Updated screen I98 to match *resrvd.def*.
	A-69	Added screens i93, i94 and i95 for Supervisor Settlement functions.
	L-2	Added heading explaining when rear settlement is not possible; added information about the customisable screens available in *resrvd.def* for some of the settlement functions.
	Glossary-2	Added DAPI.
Jun. 05		Updated for APTRA Advance NDC 3.00.
	All	Added headings to illustrations and tables; added lists of figures and tables; added links from tables to notes; removed references to *personaS SST Device Simulator For Windows NT*, Windows NT, and BAPE emulation as no longer supported; added details of support for the DASH card reader and CCM VISA2 dialup communications; added details of the BNA retract option.
	1-6	Added details of the process that must be stopped before *pmdata* can be deleted remotely.
	2-3	Added reference to the *Multi-Vendor Support Reference Manual* for unsupported state types on other vendors' SSTs.

Date	Page	Description of Change
	2-9	Removed references to Diebold PIN verification.
	2-33	Transaction request state I, table entry 6: added details of user data fields.
	2-54	Card Read - PIN Entry Initiation State: added information to table entry 4 for timer 72 and the DASH card reader.
	2-65	Added Operations Code extension table to state 'Y'.
	2-72	New state type table added: m - PIN & Language Select State.
	2-79	Extension 1 to State > (BNA): in table entry 4, removed mention of totals displayed on the confirmation screen; in table entry 8, added new screen for BNA.
	2-82	Extension 3 to State > (BNA), table entry 2: removed reference to *pcbna.ini* as no longer used.
	2-79	Added that BNA retract functionary is configured through option 45.
	3-3	Added reference to the *Multi-Vendor Support Reference Manual* for screen data on other vendors' SSTs.
	3-18	Added recommendation to use a form feed control character at the start of the screen following an idle screen.
	4-7	Added reference to the *Multi-Vendor Support Reference Manual* for keyboard configuration on other vendors' SSTs.
	5-2	Statement printer now supported through CEN-XFS interface. Added reference to the *Multi-Vendor Support Reference Manual* for printer control codes.
	6-1	Added reference to the *Multi-Vendor Support Reference Manual* for sizing Supervisor screens on other vendors' SSTs.
	6-6	Added new screens for the BNA.
	7-11	Heading "BNA Include Transaction Counts" changed as the option is now also used for retract functionality and reporting more than 90 notes.
	9-18	Specific Command Reject: added status information fields B23 to B29.

Date	Page	Description of Change
	9-26	Added more supported MCRW devices.
	9-27	Removed note on BAPE emulation as no longer supported; amended example of encryptor configuration.
	9-44	For Notes Definition Table, updated Note to explain response returned to INIT BNA if bins removed and INIT BNA fails.
	9-54, 9-62	Removed reference to *bna.ini* as no longer used; changed “RS232 BNA property page” to “platform configuration”.
	9-66	Updated fields ‘e’ and ‘f’ in the Encryptor Initialisation Data message table, to include modifiers 1,2 5, and 6.
	9-61	Updated location of the electronic journal log file, *ejdata.log*.
	9-70	Updated Upload EJ Data message format: Length of field ‘j’ is a variable number of characters depending on value in field ‘i’.
	9-84	Removed references to VB Scripts as continuous fatal print journal messages are always enabled.
	9-100	Added fields e/g207—e/g212 for BNA device status messages.
	9-90	Added unsolicited message sequences when option 35 is set (dual mode).
	10-4	Added two new commands (‘F’ Disconnect and ‘G’ No-Op) for dialup connections.
	10-19	Added Timer 72 for the DASH card reader.
	10-17	Added details of new values for option 45 (field ‘j’ in Enhanced Configuration Parameters Load table).
	10-39	Added details of MAC field for DCCMT.
	10-53	Transaction reply command: added that the setting for cheque destination field is ignored unless the transaction reply contains print data.
	11-2	Removed note on BAPE emulation as no longer supported.
	11-3	Added secure key entry through CEN-XFS.
	A-9	Added screen numbers: E1420, E1421, E1422 for statement printer; E1600 for nightsafe.

Date	Page	Description of Change
	A-16	Added screen I29 for key mode and I30 for secure key entry.
	A-51 to A-62	Added screens i46 to i86 for CCM VISA2 Dialup.
	A-67	Added screens i43 and i91 for the BNA.
	Appendix B	Added details of character set 6 for the euro.
	D-2	Removed reference to SM Installation Status message as not supported in Advance NDC; added reference to Extended Encryption Key Change message.
	E-2	Added more supported MCRW devices.
	E-4	Removed note on BAPE emulation as no longer supported.
	M-2	Updated location of the font definition file, *fontdefs.txt*.
	App. N	DASH card reader included in smart card handling.
	App. O	New appendix for dialup connections.
Oct. 04		Updated for APTRA Advance NDC 2.06.
	All	References to the following removed or marked as unsupported: nested keyboards; download of layouts for physical keyboards; Clear / Cancel key swap; Camera; Coin Dispenser Module (CDM); Door Access; and EKC.
	2-6	In 'A - Card Read State', added note in case EMV / CAM2 Exits product used.
	2-20	In 'F - Amount Entry State', added note for multi-language screens.
	2-27	In 'Information Entry State', added that buffer B minimum data length is 3 digits (NDC+ minimum = 1).
	2-48	In 'Extension To State R', added Language Dependent Screen Flag (table entry 5) for multi-language use and to table entry 3, a note for multi-language screens.
	2-58	In 'V - Language Select From Card State', added that specified screen group size of 001 means 1000.

Date	Page	Description of Change
		In ‘Extension To State Y’, added that specified multi-language screen base is multiplied by 1000.
	2-78	In ‘Cash Accept State’, removed specific escrow capacity.
	2-72	In ‘Extension 2 To State >’, changed wait time for notes to be taken to 60 seconds.
	2-85	In ‘Cheque Accept State’, updated required path for cheque image.
	3-2	Added that 9999 customised screens and two new screen groups are supported.
	3-6	Added note to screen C04 section for another scenario when screen C04 is displayed.
	3-7	Added note that for a card jam in Advance NDC, only suspend screen C05 is displayed, and not ‘card could not be read’ screen as in NDC+.
	3-12	In ‘Editing The Contents Of Reserved Screens’ added that ‘%’ placeholders in RESRVD.DEF must be left in place.
	3-16	In ‘Control Characters’ SO table entry, added note on nested screens.
	3-23	Added that the foreground (text) and background colour commands also work with Windows High Color (16 bit) or above display setting.
	3-30	Added note that AVI filenames must contain no more than 8 characters.
	3-33	Up to 9999 screens supported for multi-language screens.
	4-2	Updated ‘What Is A Keyboard?’ section.
	4-8	In ‘Supervisor Mode’ section, changed ‘FA (SOH Print or ISS)’ to ‘FA (SOH Print)’ as In Service Supervisor is not supported by Advance NDC.
	4-12	Clarified Note that return code range is limited to designated keyboard values as determined by application state.
	5-11	In ‘Print Graphics’ section, removed unsupported Document Processing Module text.
	7-1	In ‘Configuration Parameters, Introduction’ section, removed unsupported Diebold emulation text.

Date	Page	Description of Change
	7-3	In Configuration Parameters Load 'Timer Number' section, removed timers 78 and 93. Updated timer 92.
	7-9	In 'Simulate Supervisor Mode Entry / Exit' section, removed option 002 as not supported. Clarified options 000 and 001.
	7-10	In 'Report Dual Mode EJ and Hardcopy Backup Unsolicited Messages' section, added options as now supported.
	7-10	In Enhanced Configuration Parameters Load 'Timer Number' section, removed timer 78. Added timer 92.
	9-4	In Transaction Request 'Message Format' section, added 'Minimum data length is 3 characters' to Buffer B.
	9-8	Changed field ca2 to hexadecimal number (01 - 32) representing a denomination.
	9-12	Changed 'NVRAM' to 'persistent memory'.
	9-12	In 'Interactive Transaction Response' section, added 'Minimum data length is 3 characters' to Buffer B.
	9-18	Added that Specific Command Reject C02 is returned for Vendor Dependent Mode (VDM).
	9-19	Added Specific Command Reject C18.
	9-25	Updated 'g4' product classes.
	9-28	Clarified Cardholder Keyboard values 01 and 02.
	9-30	Corrected Hardware Configuration byte 34 BNA values to '00 = Not configured' or '03 = BNA configured' only.
	9-46	In 'Send Supply Counters', re-instated present but unsupported fields g20 to g62.
	9-55	In 'Send Tally Information' section, added that tally reporting is not supported in Advance NDC.
	9-56	In 'Send Error Log Information' section, added that error log reporting is not supported in Advance NDC.
	9-33	In 'Hardware Configuration Data', updated product classes.

Date	Page	Description of Change
	9-69	In 'Upload EJ Data Message', added note that any binary zeros are replaced with ASCII character '?' before upload data is sent.
	9-69, 9-70	Changed NVRAM to persistent memory.
	9-78	In 'Cash Handler (Solicited / Unsolicited)' section, added note that for a spray dispenser, device status 1 can also indicate an extra note has been dispensed.
	9-81	In 'Cash Handler (Solicited / Unsolicited)' section, added note on the significance of the counts for a spray dispenser.
	9-82	In 'Depository (Solicited / Unsolicited)' section, added that Supplies Status is not sent if a time-out occurs.
	9-86	Updated Electronic Journal status fields.
	9-90	Added Encryptor Diagnostic Status note.
	9-91	In 'Sensors (Unsolicited)' section, added 'Not supported by Advance NDC' to In Service Supervisor change.
	9-91	In 'Sensors (Unsolicited)' section, added Supervisor mode active / inactive.
	9-94	In 'Supervisor Keys (Unsolicited)' section, added 'Not supported by Advance NDC' to In Service Supervisor menu.
	9-101	Updated Supplies Status for the BNA with values '2' and 3'.
	10-2	In Terminal Commands, added tallies and error logs not supported.
	10-5	Changed NVRAM to persistent memory.
	10-7	Updated range of values for Extended Encryption Key Change message.
	10-10	In Screen / Keyboard Data Load, updated Screen Number field 'h'.
	10-12	Removed section "Control of Associations and Keyboard Data" as associated keyboards are not supported.
	10-16	In Configuration Parameters Load, added timer 92.

Date	Page	Description of Change
	10-20	Added Timer 92 section, including that if timer 92 is set to 000, EOP display is not refreshed.
	10-16	Updated options 16 and 17 as they are not supported when journal printer is in dual mode.
	10-16	In Enhanced Configuration Parameters Load, clarified 'Simulate Supervisor Mode Entry / Exit' option 33.
	10-17	In Enhanced Configuration Parameters Load, added 'Report Dual Mode EJ and Hardcopy Backup Unsolicited Messages' option 35 as now supported.
	10-26	In Enhanced Configuration Parameters Load, changed option 39 to Reserved.
	10-18	Added Timer 92.
	10-26	Added reference to new Note 6 for field offsets 35 and 36.
	10-29	Added Note 6 that NDC+ and Advance NDC EMV ICC field offsets are different.
	10-31	Added Encryption Key Change note.
	10-34	Added Extended Encryption Key Change note.
	10-36	In 'Extended Encryption Key Change' section, added modifiers 'B' to 'K' and additional notes.
	10-39	In 'Extended Encryption Key Change' section, added note for security messages.
	10-41	In Dispenser Currency Cassette Mapping Table message, added MAC must be included.
	10-42	Updated example to include Euros.
	10-51	In Transaction Reply Command, updated fields m and n for screen numbers > 999.
	10-71	In 'Interactive Transaction Response' section (field g), added 'Minimum data length 3 characters' to Buffer B.
	10-73	Added Note that EJ commands are rejected if EJ not configured.
	10-75, 10-76	Changed NVRAM to persistent memory.
	11-2	Updated BAPE emulation to 'Advance NDC 2.05 or above'.

Date	Page	Description of Change
	11-10	In 'Message Authentication' section, added that MACing is to ANSI X9.9 or X9.19 standard.
	11-11	In 'Message Authentication' section, added 'Double Length Keys' heading and that Advance NDC only uses/supports the Last Block method.
	11-11	Clarified 'Time Variant Number' section.
	11-14	In MAC Other Messages table, changed 'Terminal Command' to 'Terminal State' messages.
	11-15	Updated MAC default values. Changed 'Terminal Command' to 'Terminal State' message.
	11-18	Added 'RSA Initial Key Loading' section.
	11-30	Added that if the journal printer backup option is set while in dual journal mode, the mode is reconfigured to paper mode with hard copy backup enabled.
	A-1	Added that '%' placeholders in RESRVD.DEF must be left in place.
	A-1 onwards	Changed placeholder character 'x' to '%'. Updated 'Reserved Screens' appendix to RESRVD.DEF.
	A-4	Updated error message screens. Added E1904, e04 and e05 reserved screens.
	A-18	Added I63 'DUAL' for dual mode journal printing.
	A-21	Added '33 DISBL JRNL' to screen M02 for dual mode journal printing.
	A-23	Added new Select menu option '26 FAULT DISPLAY'.
	A-23	Updated TCP/IP Configuration menu.
	A-23	Updated Advanced TCP/IP Configuration menu.
	A-24	Added new Configure menu option '44 PD OPTIONS' for Problem Determination.
	A-29	Amended P78 reserved screen.
	A-30	Added P42 'SET JOURNAL OPTION - ' for dual mode journal printing.
	A-38	Amended t05 and t06 reserved screens.

Date	Page	Description of Change
	A-64	Added i40 reserved screen.
	D-3	In ‘Transaction Request’ section, added ‘Minimum data length is 3 digits’ to Buffer B.
	D-12	In ‘Customisation Data Commands’ section, added RSA modifiers ‘B’ to ‘G’. Added extended encryption key change values ‘J’ and ‘K’.
	E-3	Added Note that return code range is limited to designated keyboard values determined by application state.
	E-5	Added ‘Operator Keyboard Layout’ section.
	G-2	Updated default 16 colour palette values.
	E-3	Added 99 as Reserved journal printer variant.
	E-4	Clarified Cardholder Keyboard value definitions.
	G-6	Added documentation for APTRA XFS and Simulators to Other NCR Documentation.
	L-1	Added reference to *Supervisor’s Guide* for use of ‘15 SPVR TRANS (Supervisor Transactions)’ function.
	L-2	Added ‘Supervisor / Settlement Transactions’ section.
	L-4	In ‘Supervisor / Settlement Transactions Parameter Screen’ section, clarified fields.
	Glossary	Added ATM, CEN and XFS definitions. Removed ISS (In Service Supervisor) as not supported by Advance NDC. Changed NVRAM to persistent memory.

Contents

Chapter 4
Keyboard Data and Layouts

Chapter 8
Financial Institution Tables

Chapter 9
Terminal to Central Messages

Chapter 10
Central to Terminal Messages

Chapter 11
Security Features

Chapter 12
EMV Smart Card Handling

Chapter 13
CCM VISA2 Dialup System

Appendix A
Reserved Screens

Appendix B
Character Sets

List of Figures

Chapter 3
Screen Data

Chapter 4
Keyboard Data and Layouts

Chapter 5
Printer Data

Chapter 11
Security Features

Appendix B

Character Sets

Appendix C

Cardholder Screen Graphics

List of Tables

Preface

Chapter 2

State Tables

Chapter 3

Screen Data

Chapter 4

Keyboard Data and Layouts

Chapter 5

Printer Data

Chapter 6

Supervisor Messages

Chapter 7

Configuration Parameters

Chapter 8

Financial Institution Tables

Chapter 9

Terminal to Central Messages

Chapter 10

Central to Terminal Messages

Chapter 11

Security Features

Chapter 12

EMV Smart Card Handling

Chapter 13

CCM VISA2 Dialup System

Appendix A

Reserved Screens

Appendix B

Character Sets

Appendix D

Quick Reference To Message Types

Appendix E

Device Identifiers

Appendix F

ASCII/EBCDIC Conversion Table

Appendix G

Related Documentation

Purpose and Audience

The publication provides reference details of standard state tables, screen, keyboard and printer data, supervisor messages, configuration parameters, Financial Institution Tables (FITs), terminal to Central/ Central to terminal messages, security features and reserved screens.

Audience

The *APTRA Advance NDC, Reference Manual* is intended for the following:

- Developers who have customised, or wish to customise, the terminal configuration or the messages between the terminal and Central.
- Programmers responsible for the terminal configuration that customises the APTRA Advance NDC software
- Programmers who write or modify Central control applications to support terminals running APTRA Advance NDC.

How to Use This Publication

This section summarises the contents of the *Advance NDC Reference Manual,* and how to use it for different purposes. It also explains the navigational aids provided, the conventions used and where to obtain support.

Contents of the Publication

The publication contains the following information:

Chapter 1, “Introduction to Advance NDC”

Provides a brief outline of the Advance NDC software, and refers you to the *APTRA Advance NDC, General Description* and *APTRA Advance NDC, Developer’s Guide* for further introductory information.

Chapter 2, “State Tables”

Provides the function and format of the standard state tables, required for customised terminal configuration using Advance NDC.

Chapter 3, “Screen Data”

Provides details of the screen data, required for customised screen configuration using Advance NDC; a worksheet for the cardholder screen layout, including FDK alignment; and some points to consider when you are preparing screens for display on the terminal. It also includes the format and use of reserved screen C09, containing the transaction description data.

Chapter 4, “Keyboard Data and Layouts”

Provides details of the keyboard data, required for customised keyboard configuration using Advance NDC; the keyboard layouts provided with Advance NDC; and how to calculate the co-ordinates that are used to define touch areas on the screen.

Chapter 5, “Printer Data”

Provides details of the printer data, required for customised printer configuration using Advance NDC.

Chapter 6, “Supervisor Messages”

Provides details of the supervisor messages, required for customised supervisor messages using Advance NDC.

Chapter 7, “Configuration Parameters”

Provides details of the configuration parameters, required for customised terminal configuration using Advance NDC.

Chapter 8, “Financial Institution Tables”

Provides details of the Financial Institution Tables (FITs), required for customised FITs using Advance NDC.

Chapter 9, “Terminal to Central Messages”

Provides details of the function and format of each type of message that is sent from the terminal to Central. This information will help you to create or modify your Central control application.

Chapter 10, “Central to Terminal Messages”

Provides details of the function and format of each type of message that is sent from Central to the terminal. This information will help you to create or modify your Central control application.

Chapter 11, “Security Features”

Provides details of the features that Advance NDC provides to safeguard against message interference and fraudulent cards. This information will help you to decode the messages sent from the terminal to Central, if you are creating or modifying the Central control application.

Chapter 12, “EMV Smart Card Handling”

Provides an introduction to the smart-card handling enabled with Advance NDC.

Chapter 13, “CCM VISA2 Dialup System”

Provides information about message handling when using a modem for communications with Central.

Appendix A, “Reserved Screens”

Shows the screen positions of all Supervisor and other reserved screens.

Appendix B, “Character Sets”

Shows the character sets and code pages provided on screens and printers.

Appendix C, “Cardholder Screen Graphics”

Lists the example cardholder screen graphics provided with Advance NDC.

Appendix D, “Quick Reference To Message Types”

Provides a quick reference to the types of message sent between Central and the terminal. For each message type, we identify the message class and sub-class, and each field within the message. This will help you, if you are a programmer designing the Central control application, to identify the messages that pass to and from Central.

Appendix E, “Device Identifiers”

Provides details of the device identifiers for each terminal device and the configuration data associated with them.

Appendix F, “ASCII/EBCDIC Conversion Table”

Defines the code conversion between ASCII, EBCDIC and graphic characters.

Appendix G, “Related Documentation”

Provides a list of the documentation available to help you migrate to Advance NDC, and modify or enhance an Advance NDC application.

Roadmap to the Publication

If you are a programmer creating the terminal configuration that customises the Advance NDC software, see chapters 2 to 8 for details of state tables, screen, keyboard and printer data, supervisor messages, configuration parameters and FITs.

If you are a programmer creating a control application for host or switch (Central), see chapters 9 and 10 for details of the message types sent between the terminal and Central.

If you are a programmer who has extended or intends to extend Advance NDC with customised routines (‘Exits’) for the terminal, see the following:

- For information about the creation of Exit States, and the message types that can pass between Central and Exits, chapters 2 to 4
- For information about the message security features you can use, chapter 11.

Navigating the Publication

The publication can be viewed on-screen or printed with the Adobe Reader.

The following are available on-screen:

- Hyperlinked page references, for example, from the table of contents and index

- Hyperlinked notes referenced in tables; the table notes are given at the end of the relevant table and numbered consecutively within each chapter
- Hyperlinked bookmarks in the Bookmarks pane; the bookmarks give the structure of the publication down to three heading levels.

The structure of the publication contains the following to help you find information, or submit comments:

Table Pref-1
Navigation Aids

Element	Description
Revision Record	Lists updates for supported releases in page order with page references. The most recent revision is listed first. The page references for the current revision are hyperlinked; page references for earlier revision are not always hyperlinked.
Table of Contents	List the first two heading levels in page order with page references.
Table of Contents for chapter or appendix	Lists the first three heading levels in page order with page references.
Glossary	Provides an alphabetical list of terms, acronyms, and abbreviations with their meaning.
Index	Provides an alphabetical list of topics, keywords, concepts, and data references with page references.
Feedback	Allows you to comment on the publication by: — Printing the form — Selecting the Email link — Selecting the Web link.

Abbreviations Used in the Publication

The following abbreviations are used throughout the manual:

Table Pref-2
Abbreviations Used in the Manual

Full Form	Abbreviated Form
Europay, Mastercard, VISA	EMV
GBNA or GBRU	GBXX (when the information applies to both devices)
Integrated Circuit Card	ICC
Microsoft Windows XP Professional	Windows XP

For a list of all abbreviations used in the manual, see the Glossary.

What Else Should I Read?

NCR recommends you first read the *APTRA Advance NDC, Overview* and the *APTRA Advance NDC, Developer's Guide* (B006-6046).

If you are working with Advance NDC on other vendors' SSTs, you will also need the *APTRA Advance NDC, Multi-Vendor Support Reference Manual* (B006-6344).

All the documentation related to Advance NDC is listed and described in Appendix G, "Related Documentation".

Support Information

If you have a problem using the software, please contact your internal support department, or your local NCR representative. NCR provides a wide range of support programmes—for more information, contact your local account team.

If you have any problems using this manual, see the “User Feedback Form” at the back of the manual, for our electronic and postal addresses. Please take the time to reply; your comments are appreciated.

Chapter 1

Introduction to Advance NDC

Overview

This chapter introduces Advance NDC under the following topics:

- What is Advance NDC?
- The Advance NDC software system
- How the terminal operates
- Creating an Advance NDC system.

What is Advance NDC?

The Advance NDC application for self-service terminals (SSTs) offers the following:

- A multi-vendor environment capable of running on SSTs compliant with the CEN-XFS interface, release 3
- A migration path to the NCR APTRA platform for existing NCR Direct Connect Plus (NDC+) Native mode customers.

Note: Advance NDC supports NDC+ Native mode only, including Native mode status reporting. Any restrictions are summarised in the *APTRA Advance NDC, Developer's Guide*. More specific differences are documented in this publication.

The NDC+ Diebold Emulation product cannot be migrated to Advance NDC.

The Advance NDC Applications

Advance NDC consists of three applications authored with the APTRA Author as follows:

- Application Core
- Customisation Layer
- Supervisor.

When the applications are running, control passes between them at several key points.

The Application Core performs all the background processing activities done by the executable part of NDC+. The Customisation Layer performs the in-service activities associated with the cardholder. The Supervisor application performs the out-of-service activities associated with the maintenance and running of the SST.

Worker classes authored for Advance NDC are used in the applications to implement NDC-specific features.

Shared data is used by the Application Core, Customisation Layer and Supervisor applications. The repository that holds this data is called the Common Data Interface (CDI).

Further details about Advance NDC can be found in the *APTRA Advance NDC, Developer's Guide*.

The Advance NDC Software System

Like NDC+, the Advance NDC software system is made up of two parts, as follows:

- Terminal application
- Central application. Although NCR does not supply the Central application, a brief description is provided here to give you a clearer picture of the Advance NDC software system.

Terminal Application

The terminal application gathers transaction details from the cardholder and sends these details in a Transaction Request message to Central. For details, see the “Transaction Request Messages” section in Chapter 9, “Terminal to Central Messages”.

When the terminal receives a Transaction Reply command from Central, it completes the transaction. For details, see the “Transaction Reply Command” section in Chapter 10, “Central to Terminal Messages”.

The terminal application responds to Terminal commands from Central, such as Go-In-Service or Go-Out-Of-Service, and requests for information by sending Solicited Status messages to Central. For details, see the “Solicited Status Messages” section in Chapter 9, “Terminal to Central Messages”.

An unexpected event can also be reported to Central using an Unsolicited Status message. For details, see the “Unsolicited Status Messages” section in Chapter 9, “Terminal to Central Messages”.

Central Application

The Central application receives Transaction Request messages from the terminal, and determines whether the transaction should be approved or declined. It controls the terminal by sending Terminal commands to it and acting on responses received.

The Central application must be able to decode and act on the messages it receives from the terminal. For details, see Chapter 9, “Terminal to Central Messages”.

The Central application must also be able to code messages in the form that the Advance NDC software in the terminal understands. For details, see Chapter 10, “Central to Terminal Messages”.

How the Terminal Operates

When the terminal is switched on, after loading it with the Advance NDC terminal software, a power-up message is sent to Central. Central downloads any necessary data to the terminal in a series of messages. After each message is sent, the terminal sends an acknowledgement to Central. When Central has sent all the download data successfully, it will put the terminal in service.

When the terminal processes a transaction, it gathers the details from the cardholder and card, and sends the information in a Transaction Request message to Central. Central sends a Transaction Reply command, and the terminal completes the transaction.

If a fault occurs, the terminal sends a message to Central and waits for a further Transaction Reply command before completing the transaction. Once the transaction has been completed successfully, the terminal sends a message to Central to confirm it.

SNMP Traps

Traps are sent to the SNMP management application whenever a service mode change occur if the following apply:

- SNMP has been installed on the terminal
- SNMP is running
- The SNMP configuration has been changed from GASPER-compatible to NCR.

For more information on configuring the SNMP implementation, refer to the *APTRA Advance NDC, Developer's Guide.*

Creating an Advance NDC System

Like NDC+, when you create an Advance NDC system you will find there are two distinct tasks involved:

- Creating the customisation data
- Creating the Central control application.

Except for the keyboard, Advance NDC supports the existing NDC+ customisation data, and also offers additional mechanisms for customisation; refer to the *APTRA Advance NDC, Developer's Guide* for more details.

Unlike NDC+ and previous versions of Advance NDC, keyboards are now configured locally on the SST and not downloaded. For more information, see Chapter 4, "Keyboard Data and Layouts" and the *APTRA Advance NDC, Developer's Guide*.

The remainder of this Reference Manual relates to the use of existing NDC customisation data, and includes any specific restrictions.

Creating the Customisation Data

The customisation data consists of the following:

State Tables

These contain the sequence of states that determine how the terminal processes transactions. For details, see Chapter 2, "State Tables".

Screens

These are displayed while the cardholder is using the terminal. For details, see Chapter 3, "Screen Data".

Printed Screens

These are printed while the cardholder is using the terminal. For details, see Chapter 5, "Printer Data".

Supervisor Messages

These are the supervisor messages that are output to the cardholder screen, the enhanced operator panel, and the receipt and journal printers. For details, see Chapter 6, "Supervisor Messages".

Configuration Parameters

These are local configuration parameters such as Amount Buffer size, card reader / writer error thresholds, and timers. For details, see Chapter 7, "Configuration Parameters".

Financial Institution Tables (FITs)

These define which institutions the terminal supports. For each institution, the table defines whether PIN verification is local or remote, the type of data encryption, and the position of details on the card. For details, see Chapter 8, “Financial Institution Tables”.

Creating the Central Control Application

The Central control application uses the following commands and messages:

Terminal Commands

These send instructions to the terminal.

Transaction Reply Commands

These are sent in response to a Transaction Request message from the terminal. They tell the terminal how to complete the transaction.

Customisation Data Commands

These download customisation data to the terminal.

Interactive Transaction Response

This option allows you to send a message to the terminal to prompt the cardholder for more information.

For details, see Chapter 9, “Terminal to Central Messages” and Chapter 10, “Central to Terminal Messages”.

Exits

If you are defining Exits, you will need to create rule files and DLL files.

For details of using Exits within Advance NDC, see the *APTRA Advance NDC, Developer’s Guide* and the white paper, “CEN-XFS Exits in Advance NDC”, provided with the Advance NDC documentation. For specific information on Exits, refer to the publication, *Using NDC Exits*.

Clearing Persistent Memory (NVRAM)

If the *pmdata* file is to be deleted remotely using software management, close the Advance NDC applications and stop the APTRAUSERCDI service, to free the file for deletion.

For a completely fresh start, the *C:\Program Files\NCR APTRA\Advance NDC\Data* folder and all the files it contains must be deleted.

Chapter 2

State Tables

Overview

States control the information-gathering part of cardholder transactions. Advance NDC provides a set of standard states, and mechanisms for replacing standard states or adding new ones. States that you write yourself are called *Exit States*.

This chapter describes the function and format of each of the standard state table types supported in Advance NDC.

Introduction to State Tables

A state table is made up of the state number, state type and table data. Most states include a screen number and a next state number as part of the table data. A state number can be decimal (base 10) or alphanumeric (base 36). In general, where a screen is present, it is displayed when the state is entered, the terminal performs the action specified by the state type, and the transaction flow continues from the specified next state.

Invalid State Handling

If the next state specified is invalid or undefined, due to either the state table or the Transaction Reply specifying a state that has not been downloaded, the transaction flow continues from a default Close state.

When the default Close state is executed, it completes the cardholder transaction by delivering a receipt or statement, and delivering or capturing the card, as specified. The number of the last state executed is displayed in the top left hand corner of the cardholder screen. This allows you to check the parameters of the last state executed to find out which state the terminal was attempting to execute. From this you can specify the missing state and include it in the download.

Note: The full state flow can be traced using the STATEDATA trace stream in the DebugLog or Silent Debug tools. For further information on these tools refer to the *APTRA Advance NDC, Developer's Guide.*

Customising States

You customise a state by assigning values to its parameters. To build a state flow, you select different state types and place them in the application flow by linking the states together—one state references another with one or more of its parameters or entries.

When you have finished customising the state tables, Central downloads the information to the terminal in Customisation Data commands. Chapter 10, "Central To Terminal Messages" describes the format of these commands.

Unsupported State Types

The following states are not supported in Advance NDC:

- 'P' – Courtesy Amount Verification
- 'Q' – DPM Document Accept
- 'i' – Audio Control

From Advance NDC 2.06 onwards, state 'N' – Camera Control is not supported.

States ‘U’ and ‘c’ are reserved.

Standard State Types

The following table lists each of the supported standard state types that control transaction processing:

Table 2-1
State Table Types

State Table Type	Description
A	Card Read
B	PIN Entry
C	Envelope Dispenser
D	Pre-Set Operation Code Buffer
E	Four FDK Selection Function
F	Amount Entry
G	Amount Check
H	Information Entry
I	Transaction Request
J	Close
K	FIT Switch
_	Expanded FIT Switch
L	Card Write
M	Enhanced PIN Entry
R	Enhanced Amount Entry
S	Language Code Switch
T	Card Read - PIN Entry Initiation
V	Language Select From Card
W	FDK Switch
X	FDK Information Entry
Y	Eight FDK Selection Function
Z	Extension State
b	Customer Selectable PIN State
d ... g	Available as identifiers for Exit States
k	Smart FIT Check State
m	PIN & Language Select State

State Table Type	Description
>	Cash Accept State
w	Cheque Accept State
&	Barcode Reader State

Note 1: During transaction processing, before entry to each state, Advance NDC checks the keyboard layout to be used. If the screen that is about to be used references a touch-screen keyboard number but the touch-screen keyboard layout does not provide definitions of all the required keys, the transaction flow goes to the default Close state.

State Numbers

From Advance NDC 3.02, Alphanumeric (base 36) numbers in state table entries are supported as well as decimal (base 10). Using alphanumeric data provides support for up to 46655 state numbers, without changing the table entry length. In previous releases of Advance NDC only decimal (base 10) numbers were supported, providing a maximum of 999 state numbers. The character field in the state entries contains either a decimal or alphanumeric number, depending on the value of Option 80. For details, *see* "Option 80 - Alphanumeric State Entry" on page 7-15.

Decimal numbers are in the range '000' to '999'.

Alphanumeric numbers are in the range '000' to 'ZZZ'.

The value '255' is always reserved unless stated otherwise in the table entry.

A - Card Read State

When you use the Card Read State table, ensure it is the first table used during transaction processing by assigning state number 000 to it. The terminal automatically enters state 000 when put In-Service.

Note: If using a Dip and Smart Hardware (DASH) reader with the Card Read state, the DASH reader behaves as a standard DIP reader.

When the terminal enters the Card Read state, the following buffers are initialised:

Table 2-2
Buffers Initialised for State A

Buffer	Initialised to...
Card Data buffers	no data
PIN and General Purpose buffer	no data
Amount buffer	zero filled
Operation Code buffer	space filled
FDK buffer	zero filled

The Card Read state performs the following actions:

- Displays the screen that you have selected to prompt the cardholder to enter a card
- Displays the error screen that you have selected if the card cannot be read
- If all the read conditions are magnetic only, attempts to read Track 1 for future name display
- Sets the Media Entry Indicator flashing while the card reader is waiting for the cardholder to enter a card. The indicator is switched off when the card is entered.

It also sets the following information:

- The next state number the terminal goes to if the card is read successfully
- Which track(s) and / or chip data on the card will be read
- When the card should be returned to the cardholder. You can specify in table entry 8 that the card is returned immediately or after the terminal has received a Transaction Reply command from Central

- The next state number the terminal goes to if the FIT number on the card does not match the number in any FIT
- The next state number the terminal goes to if the card is a smart card, and the read condition being evaluated has the chip connect bit set.

If an attempted card eject fails during the above state processing, the card is captured and screen 'C04' is displayed for the time specified by timer 02. For details of reserved screens, see the "C – Cardholder Display" section in Chapter 3, "Screen Data". For details of timers, see the "Configuration Parameters Load" section in Chapter 10, "Central to Terminal Messages".

If the cardholder does not take the card before timer 09 expires, the terminal captures the card. When an invalid card is removed by the cardholder or captured by the terminal, the card reader is enabled for the next card entry.

If you have specified in table entry 8 that the card should be returned immediately, the transaction will proceed to the next defined state following card removal. However, if the card is captured after an eject, the card reader is enabled for the next card entry.

Note: If the chip connect bit is to be set for use with the 'EMV/CAM2 Exits for Advance NDC' product, NCR recommends this is set in the final read condition used, to permit the magnetic read conditions to be fully tested first.

If a magnetic read condition is met, the state will attempt to match the relevant card data to the FIT data.

If the magnetic read conditions all fail and the chip connect bit is set, no FIT match is attempted and the application proceeds to the No FIT Match Next State.

Table 2-3
A - Card Read State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'A'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter the card. While the terminal is waiting for card entry, this screen is displayed.
3	3	Good Read Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes: 1. Following a good read of the card if FITs are not used (Table entry 9 = 000) **or** 2. If the Financial Institution number on the card matches a Financial Institution number in a FIT.
4	3	Error (Misread) Screen Number (Range 000-999)	If the read conditions are not satisfied due to a bad card or a mechanism error, the card is ejected and this screen is displayed.
5	3	Read Condition 1	These three entries specify which card track(s) and / or chip data will be read. The possible values for these entries are shown below this table.
6	3	Read Condition 2	
7	3	Read Condition 3	
8	3	Card Return Flag	Tells the terminal when the card should be returned to the cardholder: 000 - eject the card immediately. 001 - return the card as specified by a Transaction Reply command message.
9	3	No FIT Match Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if either the Financial Institution number on the card does not match any FIT, or if the card reader is a smart card reader and the read condition being evaluated has the chip connect bit set (bit 3). If FITs are not used this entry must be 000.

Read Condition Values

The following table shows which tracks are read when each bit is set in the read condition:

Table 2-4
Read Condition Bit Information

Bit Number	Meaning
0	Read Track 3
1	Read Track 2

2	Read Track 1
3	Chip connect - read smart data
4-7	Reserved

The state table entry is the decimal equivalent of these binary values. For example to read track 1 only the entry would be 004 (bit 2 set), and to read tracks 1 and 3 (bits 0 and 2 set), the entry would be 005.

Read conditions are evaluated in order, so for magnetic-only read conditions (that is, none of the read conditions has the chip connect bit set):
If read condition 1 is satisfied, the Good Read Next State Number (table entry 3) exit is taken. Otherwise, read condition 2 is attempted, and if it is satisfied, the Good Read Next State Number (table entry 3) exit is taken. Otherwise, read condition 3 is attempted, and if it is satisfied, the Good Read Next State Number (table entry 3) exit is taken. Otherwise, the card is ejected and the Error Screen Number (table entry 4) displayed.

For read condition operations where the chip connect bit is set in one or more read conditions, see Chapter 12, “EMV Smart Card Handling”.

B - PIN Entry State

The terminal should not enter this state unless the Financial Institution number on the card matches a Financial Institution number in a FIT during the Card Read State. For details, see Chapter 8, “Financial Institution Tables”. This state does not have to be the next state after the Card Read state.

When specified in the FIT, PIN verification can take place at either the terminal or Central. If verified at Central, you can transmit the PIN either in an encrypted form or as clear text. If local DES PIN verification is specified in the FIT and no DES encryptor is available, the Maximum Bad PINs Next State exit is taken. If encrypted PIN transmission is specified in the FIT and no DES encryptor is available, a null PIN buffer field is included in the Transaction Request message.

If the conditions that generate a Specific Command Reject are met during the PIN verification process, the Maximum Bad PINs Next State exit (table entry 6) is taken. For details of these conditions, see the “FIT Data Load” section in Chapter 10, “Central to Terminal Messages”.

The cardholder enters the PIN, which can consist of from four to sixteen digits, on the facia keyboard. If the cardholder enters fewer than the number of digits specified in the FIT entry, PMXPN, he must press FDK ‘A’ (or FDK ‘I’ the keys to the left of the cardholder screen are enabled) or the Enter key after the last digit has been entered. Pressing the Clear key clears all digits.

Note: Due to security considerations, do not use a touch FDK as the ***Enter*** key during the PIN Entry State. In this state using a touch FDK will clear the PIN buffer.

Table 2-5
B - Pin Entry State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'B'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter the PIN the first time. This screen, which is displayed on entering the PIN Entry state, must leave the cardholder screen cursor at the start of the PIN Entry display area. An 'X' is displayed for each key pressed.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not enter the PIN within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses the Cancel key before the maximum number of digits specified for the PIN have been entered.
5	3	Local PIN Check Good PIN Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ) *See* Table Note 2.	State number to which the terminal goes after verification of a correct PIN entry. A Pre-Set Operation Code Buffer state (clearing the function key buffer before Transaction Selection) usually follows a correct PIN entry.
6	3	Local PIN Check Maximum Bad PINs Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ) *See* Table Note 1, Table Note 2.	State number to which the terminal goes if the correct PIN has not been entered after the number of attempts allowed by table entry 9. The terminal normally enters a Close state if this occurs.

Table Entry	Number of Characters	Contents	Description
7	3	Local PIN Check Error Screen Number (Range 000-999) *See* Table Note 1, Table Note 2.	Display screen that prompts the cardholder to re-enter the PIN. This screen is displayed after each incorrect PIN entry attempt. An 'X' is displayed for each key pressed. After the number of re-entry attempts allowed by table entry 9, the terminal enters the state determined by table entry 6.
8	3	Remote PIN Check Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes when local PIN verification is not performed.
9	3	Local PIN Check Maximum PIN retries (Range 001-009) *See* Table Note 1, Table Note 2.	Maximum number of incorrect PIN entries allowed before the terminal enters the state determined by table entry 6.

Table Note 1: These Local PIN fields (6, 7 and 9) are also used when the Check Remote PIN minimum length option is used; they are used in the same way as for Local PIN verification. An incorrect PIN is one which is less than the minimum length.

As these Local PIN fields can be used with Remote PIN verification, they must contain valid entries when either Remote or Local PIN verification is used.

Table Note 2: To support secure PIN encryption, fields 5, 6, 7 and 9 must always be set up, as they are used to control the number of allowed PIN retries when fewer than four PIN digits are entered. With secure PIN encryption, a check for the minimum four PIN digits is performed regardless of whether the FIT specifies to check for shorter PINs or not.

For FIT data details, see Chapter 8, "Financial Institution Tables".

C - Envelope Dispenser State

Use this state if your terminal has an envelope dispenser. If the state is entered on a terminal without the dispenser, it performs no action and takes the next state exit immediately. On a terminal with an envelope dispenser, an envelope is presented before the exit is taken. If the envelope is presented successfully, the MEI is switched on where a combined envelope dispenser and depository MEI is present. The MEI is switched off when the envelope is taken or retracted. If the envelope is not taken by the cardholder, it is retracted when the terminal enters the Close state.

Note: In Advance NDC, an envelope is dispensed when the Transaction Reply command message is processed if an envelope has not previously been dispensed through the Envelope Dispenser State.

Table 2-6
C - Envelope Dispenser State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'C'
2	3	Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal enters immediately or after an envelope is presented.
3-9	21	Must be 000.	Reserved

D - Pre-Set Operation Code Buffer State

This state will either clear the Operation Code buffer by filling selected bytes (to a maximum of eight) with the graphic character ‘space’, or it will pre-set the buffer with graphic characters ‘A’, ‘B’, ‘C’, ‘D’, ‘F’, ‘G’, ‘H’ or ‘I’. These characters correspond to the eight Function Display Keys.

Table 2-7
D - Pre-set Operation Code Buffer State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	‘D’
2	3	Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes after pre-setting the Operation Code buffer.
3	3	Clear Mask (Range 000-255)	Specifies bytes of Operation Code buffer to be cleared to graphic ‘space’. Each bit relates to a byte in the Operation Code buffer. If a bit is zero, the corresponding entry is cleared. If a bit is one, the corresponding entry is unchanged. *See* Table Note 3.
4	3	‘A’ Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to ‘A’. If a bit is one, the corresponding entry is set to ‘A’. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
5	3	‘B’ Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to ‘B’. If a bit is one, the corresponding entry is set to ‘B’. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
6	3	‘C’ Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to ‘C’. If a bit is one, the corresponding entry is set to ‘C’. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.

Table Entry	Number of Characters	Contents	Description
7	3	'D' Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to 'D'. If a bit is one, the corresponding entry is set to 'D'. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
8	3	Must be 000 for each entry.	Reserved
9	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of the Extension state containing information on how the other operation codes are pre-set.

Table 2-8
Extension to State D

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	'F' Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to 'F'. If a bit is one, the corresponding entry is set to 'F'. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
3	3	'G' Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to 'G'. If a bit is one, the corresponding entry is set to 'G'. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
4	3	'H' Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to 'H'. If a bit is one, the corresponding entry is set to 'H'. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
5	3	'I' Pre-Set Mask (Range 000-255)	The buffer contains eight bytes. This entry sets the specified bytes to 'I'. If a bit is one, the corresponding entry is set to 'I'. If a bit is zero, the corresponding entry is unchanged. *See* Table Note 3.
6-9	12	Must be 000.	Reserved

Table Note 3: The eight bits represent the binary equivalent of their respective masks. Bit 0 relates to the first entry, bit 7 relates to the eighth entry. For example, in the following mask,

b7	b6	b5	b4	b3	b2	b1	b0
0	0	1	0	1	0	1	0

the three decimal characters in the table entry are 042. The bytes in the Operation Code buffer modified are 2, 4 and 6.

The Operation Code buffer is set in the order:

'space', 'A', 'B', 'C', 'D', 'F', 'G', 'H' and 'I'.

Therefore, if a later value sets the same bit, it will be the one that is pre-set.

For example, F = 042 and I = 006 results in the following Operation Code buffer:

'_IIF_F__'

while F = 042 and I = 004 results in the following:

'_FIF_F__'

In this example, '_' represents a space character.

E - Four FDK Selection Function State

This state reads which one of the four Function Display Keys (FDKs) to the right of the cardholder screen ('A', 'B', 'C' or 'D') has been selected by the cardholder.

You can enable the four FDKs to the left of the screen ('I', 'H', 'G' and 'F'), instead of the four to the right, by setting option digit 7a. For information on option digits, see the *APTRA Advance NDC, Supervisor's Guide*.

Enabling the four keys to the left of the screen means that keys 'I', 'H', 'G' and 'F' assume the functionality of keys 'A', 'B', 'C' and 'D' respectively. If the cardholder selects one of these keys, the key code for that function is stored in the Operation Code buffer as key 'A' to 'D'. The transaction then goes to the next state.

Table entries 5-8 define which FDKs are to be active during this state. If you need to use any other FDK, you should use the Eight FDK Selection Function state table.

The terminal may support Touch Screen FDK Emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on the screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the "FDK Emulation" section in Chapter 4, "Keyboard Data and Layouts".

Alternatively, the terminal may support full touch screen keyboards. In this case, touch areas are defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. For details, see Chapter 4, "Keyboard Data and Layouts".

Table 2-9
E - Four FDK Selection Function State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'E'
2	3	Screen Number (Range 000-999)	Display screen that requests the cardholder to choose between transaction types, account names, and so on. This screen must be aligned with the active FDKs, and is displayed when the terminal enters the Four FDK Selection Function state. For details, see the "C – Cardholder Display" section in Chapter 3, "Screen Data".
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not respond to the screen message within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Cancel key is pressed.
5	3	FDK 'A' (or 'I') Next State Number	State number to which the terminal goes if the specified FDK or touch area is pressed. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ) Enter 255 to deactivate any FDK or touch area.
6	3	FDK 'B' (or 'H') Next State Number	
7	3	FDK 'C' (or 'G') Next State Number	
8	3	FDK 'D' (or 'F') Next State Number	
9	3	Buffer Location (Range 000-007)	Defines the Operation Code buffer byte in which the keycode for the selected FDK is stored. Entry Value — Position in Buffer '000' — 1st byte '001' — 2nd byte '002' — . '003' — . '004' — . '005' — . '006' — . '007' — 8th byte

F - Amount Entry State

This state reads the amount entered by the cardholder, displays it on the cardholder screen, and saves it in the Amount buffer. The standard field length for this buffer is eight digits, but it can be configured for twelve digits. For details, see the “Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”.

Note: If you require multi-lingual support for amount entry, see “R - Enhanced Amount Entry State” on page 2-47.

The terminal exits from the Amount Entry state once the cardholder presses an active FDK or the Cancel key. It also exits from this state if the cardholder does not press a key within the specified time limit. For details of timers, see the “Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”. If the cardholder presses the Enter key, it has the same effect as pressing FDK ‘A’ (or FDK ‘I’ if option digit 7a is set). For more details, see “E - Four FDK Selection Function State”. If the cardholder presses the Clear key, which is always active, the amount buffer and the screen echo field are cleared one character at a time. This allows the cardholder to re-enter the correct amount.

The terminal may support Touch Screen FDK Emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on the screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the “FDK Emulation” section in Chapter 4, “Keyboard Data and Layouts”.

Alternatively, the terminal may support full touch screen keyboards. In this case, touch areas are defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. For details, see Chapter 4, “Keyboard Data and Layouts”.

Note: The Digital Audio Service (DAS) cannot echo the keyboard in this state, as DAS is not supported by Advance NDC.

Table 2-10
F - Amount Entry State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'F'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to make an amount entry. This screen is displayed when the terminal enters the Amount Entry state.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the amount entry is not made within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Cancel key is pressed.
5	3	FDK 'A' (or 'I') Next State Number	State number to which the terminal goes if the cardholder presses an FDK or touch area. Normally one FDK or touch area is designated for correct amount entries and another for incorrect amount entries. The remaining two FDKs or touch areas are inactive. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ) Enter 255 to deactivate an FDK or touch area.
6	3	FDK 'B' (or 'H') Next State Number	
7	3	FDK 'C' (or 'G') Next State Number	
8	3	FDK 'D' (or 'F') Next State Number	
9	3	Amount Display Screen Number (Range 000-999) *See* Table Note 4.	Overlay screen for setting the cardholder screen cursor position. This screen optionally defines the initial display format before amount entry by the cardholder. The cursor should be set on the left-hand side of the echo field on the screen. This is space filled until the required start position for the currency character is reached. For details, see "International Currency Display Format" on page 3-31. The default echo field for eight digits is: bbbbb$b0.00 where b = space. The default echo field for twelve digits is: bbbbbbbbb$b0.00 where b = space.

Table Note 4: The Amount Entry Screen will not be adjusted for language, unless a language has been selected and the language group size is 1000 or greater. If the language-adjusted screen has not been loaded then the unadjusted screen will be used instead.

G - Amount Check State

This state checks whether the amount entered can be dispensed. This does not check for coins. Two checks are performed:

- Whether the amount held within a specified buffer is a multiple of an identified value.
- Whether the amount held within a specified buffer is dispensable when taking into account the currency required, denominations available, dispenser status and cassette status. Note counts are ignored.

Note: For dual cash handlers, this state is not supported when the "Amount Check Condition (Range 000 - 003)" on page 2-23 is set to 003.

To be able to check that an amount is dispensable, Central must have downloaded the Dispenser Currency Cassette Mapping Table, which associates the currency type, cassette type and denomination for the host and terminal (see page 10-41). If this table has not been downloaded, or a currency type identified in table entry 7 below is not present in the Dispenser Currency Cassette Mapping Table, processing will go to the default Close state.

When debugging, you can view the reason for a failure of this state in the Debug Log window. For example, an invalid length / value in the Dispenser Currency Cassette Mapping table will cause an error to be displayed, specifying the invalid value, field and position. The possible errors / causes are given after this state table.

Note: Only use Debug Log when debugging, **not** in a live SST environment.

Note: The XFS currency denominations configured in the Cash Dispenser service provider are not considered by this state.

Table 2-11
G - Amount Check State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'G'
2	3	Amount Check Condition True Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes when the amount check condition indicated by table entry 8 evaluates to 'true'.
3	3	Amount Check Condition False Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes when the amount check condition indicated by table entry 8 evaluates to 'false'.
4	3	Buffer to be checked (Range 000 - 002)	This field specifies which buffer is to be checked: 000 - Amount buffer 001 - Buffer B. 002 - Buffer C. If Buffer B or C contains more than 12 digits, the amount check condition evaluates to 'false'.
5	3	Integer Multiple Value (Range 000 - 999)	Integer multiple value used in checking specified buffer. For example, to check that the specified buffer contains a multiple of the minimum denomination $5, this field would be set to '005'. This field is ignored if table entry 8 is not '002'.
6	3	Number of Decimal Places (Range 000 - 004)	Number of decimal places used in specified buffer. For example, $5 is sent as 500 cents, so has 002 decimal places. This field is ignored if table entry 8 is '000'.

Table Entry	Number of Characters	Contents	Description
7	3	Currency Type (Range 001 - 255)	Currency type of amount in specified buffer. Used in conjunction with the Dispenser Currency Cassette Mapping Table. This field is ignored if table entry 8 is not ‘003’.
8	3	Amount Check Condition (Range 000 - 003)	Amount check condition required. If the condition being checked evaluates to 'true' then processing will proceed to the next state identified in table entry 2; otherwise processing will proceed to the next state identified in table entry 3. All conditions check the buffer indicated by table entry 4, and take account of the decimal point location via the value in table entry 6. When this entry is set to 000, the state simply evaluates whether the value to the right of the decimal point position is zero. When this entry is set to 001, the state also evaluates whether the value is zero, or if Buffer B or C contains more than 12 digits. When this entry is set to 002, the state also evaluates whether the value is a whole number multiple of the value identified in table entry 5. When this entry is set to 003, the state evaluates whether the value is dispensable by the terminal, taking into account the Dispenser Currency Cassette Mapping Table entries, currency type required (table entry 7), the currency type denominations available, dispenser status and cassette status.
9	3	Must be 000.	Reserved

The following table lists the possible errors associated with the Amount Check state, which you may see in Debug Log. The causes for each error are also included, to assist in correcting the error.

Table 2-12
Amount Check Error State

Error Message	Cause(s)
Amount Check State FAILED - Non-whole amount entered	1) A non-whole amount has been entered 2) The Amount Check State is checking the wrong buffer. For example, the Amount entered is stored in buffer B, but the Amount Check State specifies buffer C is to be checked in table entry 4
Amount Check State FAILED - Amount entered = 0	Amount entered is 0

Amount Check State FAILED - Buffer B contains more than 12 digits	The length of buffer B is more than 12 digits in length
Amount Check State FAILED - Buffer C contains more than 12 digits	The length of buffer C is more than 12 digits in length
Amount Check State FAILED - X is not a whole number multiple of Y	X is not a whole number multiple of Y, where X is the amount entered, and Y is the Integer Multiple Value specified in table entry 5
Amount Check State FAILED - Currency Type 'X' not found in Dispenser Currency Cassette Mapping Table - Proceeding to Default Close State	The Currency Type X was not found in the Dispenser Currency Cassette Mapping Table, where X is the Currency Type specified in table entry 7. Possible causes are: 1) The Dispenser Currency Cassette Mapping Table has not been downloaded 2) Currency Type X could not be found in the Dispenser Currency Cassette Mapping Table
Amount Check State FAILED - Amount requested cannot be satisfied from physical cassette types present	A Note Mix for the amount requested cannot be created because: 1) More than 50 notes are required 2) The amount cannot be created from the denominations specified in the Dispenser Currency Cassette Mapping Table 3) The cassette(s) containing the denominations required for the Note Mix have a bad status
Amount Check State FAILED - No valid entries found in the Dispenser Currency Cassette Mapping Table	There are no Cassette Types specified in the Dispenser Currency Cassette Mapping Table which are in the currently supported range of 1 - 4
Amount Check State FAILED - Cash Handler device error	The Cash Handler has a status of FATAL or SUSPEND

You may also see the following errors, associated with the Dispenser Currency Cassette Mapping Table:

Table 2-13
Amount Check Error State — DCCMT

Error Message	Cause(s)
ERROR - Invalid length error found in Dispenser Currency Cassette Mapping Table	The specific command reject received by Central indicates a message length error
ERROR - Invalid Value '< field h1 value >' found in field h1 of Dispenser Currency Cassette Mapping Table	The value of sub-field h1 must be a two digit ASCII hex value in the range '01' to 'FF' inclusive. If it is not, the command reject 'B08 - Field value error, data field value out of range' is returned.

ERROR - Invalid Value '< field h2 value >' found in field h2 (at position <value>) of Dispenser Currency Cassette Mapping Table	The value of sub-field h2 must be a two digit ASCII hex value in the range '01' to 'FF' inclusive. If it is not, the command reject 'B08 - Field value error, data field value out of range' is returned. The error output to the Debug Log gives the position of the error in the Dispenser Currency Cassette Mapping Table message. The value given is the number of characters from the beginning of the message to where the sub-field starts.
ERROR - Invalid Value '< field h3 value >' found in field h3 (at position <value>) of Dispenser Currency Cassette Mapping Table	The value of sub-field h3 must be a single digit ASCII hex value in the range '0' to 'F' inclusive. If it is not, the command reject 'B08 - Field value error, data field value out of range' is returned. The error output to the Debug Log gives the position of the error in the Dispenser Currency Cassette Mapping Table message. The value given is the number of characters from the beginning of the message to where the sub-field starts.
ERROR - Invalid Value '<field h4 value>' found in field h4 (at position <value>) of Dispenser Currency Cassette Mapping Table	The value of sub-field h4 must be a five digit ASCII numeric value in the range '00000' to '99999' inclusive. If it is not, the command reject 'B08 - Field value error, data field value out of range' is returned. The error output to the Debug Log gives the position of the error in the Dispenser Currency Cassette Mapping Table message. The value given is the number of characters from the beginning of the message to where the sub-field starts.

H - Information Entry State

When the cardholder enters numeric data at the keyboard, this state reads in the data and saves it in one of two general-purpose buffers. You specify in table entry 9 which buffer is to be used, and whether the actual data the cardholder enters is displayed on screen, or if 'X' is displayed for each key pressed. For example, specify 'X' to be displayed when the cardholder enters a PIN.

The terminal exits from the Information Entry state once the cardholder presses an active Function Display Key (FDK) or the Cancel key. It also exits from this state if the cardholder does not press a key within the specified time limit. This time limit is fixed. If the cardholder presses the Enter key, it has the same effect as pressing FDK 'A' (or FDK 'I' if option digit 7a is set). For details, see the "E - Four FDK Selection Function State" section.

The terminal may support touch-screen FDK emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on the screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the "FDK Emulation" section in Chapter 4, "Keyboard Data and Layouts".

Alternatively, the terminal may support full touch-screen keyboards, with touch areas defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. For details, see Chapter 4, "Keyboard Data and Layouts".

The Clear function key is always active. If the cardholder presses the key, the general-purpose buffer and the echo field displayed on the cardholder screen are cleared. The cardholder can now re-enter information.

The general-purpose buffers can hold a maximum of 32 bytes of data. When the terminal exits from the Information Entry state, the buffer specified in table entry 9 contains the numeric data that the cardholder has entered. If the cardholder has not entered any data, the buffer will be empty. For details of the general purpose buffers refer to the *APTRA Advance NDC, Developer's Guide.*

Note: Although the cardholder can enter up to 32 characters during the Information Entry state, only 30 characters can be echoed on the screen when 'X' is displayed. This is due to internal restrictions.

Table 2-14
H - Information Entry State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'H'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter data. This screen is displayed on entering the Information Entry state, and must leave the cursor at the start of the display area.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not respond to the cardholder screen message within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Cancel key is pressed.
5	3	FDK 'A' (or 'I') Next State Number	State number to which the terminal goes if the cardholder presses an FDK or touch area. Enter 255 to make an FDK or touch area inactive while the terminal is in the Information Entry state. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)
6	3	FDK 'B' (or 'H') Next State Number	
7	3	FDK 'C' (or 'G') Next State Number	
8	3	FDK 'D' (or 'F') Next State Number	
9	3	Buffer and Display Parameters (Range 000-003)	A general-purpose buffer (B or C) is designated for storage. The actual data entered (or 'X') to be displayed on the cardholder screen is also defined. The display begins from the current cursor position. Buffer and display parameters are as follows: 000 - Display 'X' for each numeric key pressed. Store data in general-purpose buffer C. 001 - Display data as keyed in. Store data in general purpose buffer C. 002 - Display 'X' for each numeric key pressed. Store data in general purpose buffer B. 003 - Display data as keyed in. Store data in general purpose buffer B. *See* Table Note 5.

Table Note 5: Refer to “G - Amount Check State” section in this chapter for details of when these buffers are checked.

I - Transaction Request State

This state sends a Transaction Request message to Central, and executes the Transaction Reply command received from Central. The information that is to be included in the Transaction Request message is defined in this state table. For more details, see the "Transaction Request Messages" section in Chapter 9, "Terminal to Central Messages".

On a terminal with digital audio capability and auto-voice enabled, message 1 is played when a Transaction Request message is sent to Central. For details, see "Voice" on page 3-21.

Table 2-15
I- Transaction Request State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'I'
2	3	Screen Number (Range 000-999)	Display screen shown on the cardholder screen while the terminal sends a Transaction Request to Central and waits for a Transaction Reply command. This is usually a 'Please Wait' screen.
3	3	Central Response Timeout Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if Central fails to reply to the Transaction Request within the permitted time interval (timer 03).
4	3	Send Track 2 Data	*See* Table Note 6.
5	3	Send Track 1 and / or Track 3 Data	*See* Table Note 7.
6	3	Send Operation Code Data	*See* Table Note 6.

Table Entry	Number of Characters	Contents	Description
7	3	Send Amount Data	*See* Table Note 6.
8	3	Send PIN Buffer (Buffer A) Data / Select Extended format	*See* Table Note 6 and Table Note 7.
9	3	Send General Purpose Buffer B and / or C **or** Extension State Number (Base 10 range 000-003 or 000-254, 256-999) (Base 36 range 000-003 or 000-254, 256-ZZZ)	To send the general purpose buffer, the following values apply: 000 - Send no buffers 001 - Send Buffer B. 002 - Send Buffer C 003 - Send Buffers B and C 004-007 - Reserved If the extended format is selected in table entry 8, this entry is an Extension state number. *See* Table Note 8.

Table Note 6: The following values determine whether or not the specified data is included in the corresponding Transaction Request message field sent to Central:

Table 2-16
Track 2 Data Send Modifier

Value	Send Data
000	No
001	Yes

Table Note 7: The following values only apply to table entry 5, and determine whether or not Track 1 and Track 3 data are included in the Transaction Request message sent to Central:

Table 2-17
Track 1/3 Data Send Modifier

Value	Track 1 Data	Track 3 Data
000	No	No
001	No	Yes
002	Yes	No
003	Yes	Yes
004	No	No
005	No	Yes
006	Yes	No
007	Yes	Yes

Table Note 8: If the terminal has been configured at installation time with the No-PIN message mode option, the definition of table entries 8 and 9 are changed. For details of selecting the message mode option from the Configure menu, refer to the *APTRA Advance NDC, Supervisor's Guide*. The definitions of table entries 8 and 9 are changed as shown in the following table:

Table 2-18
Table Entries 8 and 9 for No-PIN Message Mode

Table Entry	Number of Characters	Contents	Description	
8	3	Send General Purpose buffer C	If the entry has a value of 001, the contents of Buffer C are sent in the buffer A field of the Transaction Request message. If the value is 000, the buffer A field is omitted.	
9	3	Send General Purpose buffer B	**Value**	**Send Data**
			000	No
			001	Yes

Table Note 9: The least significant bit of table entry 8 is used to indicate if Buffer A is to be sent in the Transaction Request message. Bit 7 is used to select an extended format for the Transaction Request state parameter table which allows table entry 9 to hold the state number of the associated extension state number, as shown in the following table:

Table 2-19
Table Entry 8 for Buffer A

Value	Description
000	Standard format. Do not send Buffer A.
001	Standard format. Send Buffer A.
128	Extended format. Do not send Buffer A.
129	Extended format. Send Buffer A.

When Extended format is selected, table entry 9 has its meaning changed so that it can reference an Extension state number. When this is the case, table entry 2 of the Extension state controls the sending of Buffers B and C.

Table 2-20
Extension to State I

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Send General Purpose Buffers B and / or C	To send the general purpose buffers, these values apply: 000 - Send no buffers 001 - Send Buffer B. 002 - Send Buffer C 003 - Send Buffers B and C
3	3	Send Optional Data Fields 'A' - 'H' (Range 000-255)	This entry is bit-encoded to control the sending of individual optional data fields in the Transaction Request message. If a bit is set, the corresponding data field is sent. If a bit is clear, the data field is not sent. **Bit — Field ID** 1 — 'A' (Reserved) 2 — 'B' (Reserved) 3 — 'C' 4 — 'D' 5 — 'E' 6 — 'F' 7 — 'G' 8 — 'H'
4	3	Send Optional Data Fields 'I' - 'L' (Range 000-015)	This entry is as for table entry 3 but the data fields are as follows: **Bit — Field ID** 1 — 'I' 2 — 'J' 3 — 'K' 4 — 'L' 5 — Reserved for 'M' 6 — Reserved for 'N' 7 — Reserved for 'O' 8 — Reserved for 'P'

Table Entry	Number of Characters	Contents	Description
5	3	Send Optional Data Fields 'Q' - 'a' (Range 000-255)	This entry is as for table entry 3 but the data fields are as follows: **Bit** **Field ID** 1 'Q' 2 'R' 3 'S' 4 Reserved for 'T' 5 'U' 6 'V' 7 'w' 8 'a'
6	3	Send Optional Data. (Range 000-031)	This entry is as for table entry 3 but the data fields are as follows: **Bit** **Field ID** 1 'User Data Fields' 2 'b' (Notes on escrow counts) 3 Reserved 4 Reserved 5 'e' (Barcode data) 6 Reserved 7 Reserved 8 Reserved
7	3	Must be 000	Reserved
8	3	EMV CAM Processing Flag (Range 000-001)	Indicates if EMV CAM processing is to be performed, as follows: 000 - Do not perform EMV CAM processing (default). 001 - Perform EMV CAM processing.
9	3	Must be 000	Reserved

J - Close State

This state terminates the cardholder's current terminal session.

If a receipt and / or statement has been printed but not delivered during a previous Transaction Request state, it is presented to the cardholder now. If the card has not been ejected or captured, it is returned or retained depending on the instruction in the last Transaction Reply message. The appropriate message from those specified in entries 2, 4, 5 and 6 of Table 2-21 is displayed on the cardholder screen.

If a statement is presented and not taken by the cardholder then after Timer 02 has expired and prior to state exit, Timer 95 is started. When this timer expires, the statement is captured (this does not apply to receipt sideways printing). If the statement is taken, the timer is stopped. While the timer is running and until the next statement is staged after capture, exit from the Close state is delayed. If no statement is presented, Timer 95 is not started and exit from the Close state is delayed until the next statement is staged.

If the card cannot be ejected, it is captured and screen 'C04' is displayed for the period specified by timer 02. If the card is ejected but not taken within the time period specified by timer 09, it is captured. For details of cardholder display screens, see the "C – Cardholder Display" section in Chapter 3, "Screen Data". For details of timers, see the "Configuration Parameters Load" section in Chapter 10, "Central to Terminal Messages".

When a card is ejected, or if no card is present when the Close state is entered, timer 02 is started. The terminal does not exit from the Close state until this timer expires. This timer provides a guaranteed minimum display time for the close screen.

When a card is ejected, the beeper is sounded to remind the cardholder to take the card. If you do not want to use this feature, you can set Message Mode option 4b to inhibit the beeper. For details of the option, refer to the *APTRA Advance NDC, Supervisor's Guide*.

If the receipt printer supports retract and Timer 69 expires, any receipt that has not been removed is retracted.

On a terminal with an envelope dispenser, any envelope that is not taken by the cardholder is retracted. When the envelope is taken or retracted the MEI is switched off if it is under application control.

On a terminal with digital audio capability and auto voice enabled, message 8 is played as soon as the card is taken during the Close state. If the card has already been taken, the message is played on entry to the Close state. For details, see “Voice” on page 3-21.

All document data is flushed from the system when this state is executed.

Table 2-21
J - Close State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	‘J’
2	3	Receipt Delivered Screen Number (Range 000-999)	Screen displayed on entry to the Close state. This is only displayed if a receipt is delivered in the Close state and the terminal has not been instructed by the last Transaction Reply message to capture the card. The last Transaction Reply Command performed determines the screen text as follows: Card Before Cash - ‘Take cash and receipt’ Fast Cash - ‘Take card, cash and receipt’ Other Commands - ‘Take card and receipt’
3	3	Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes after the state is completed.
4	3	No Receipt Delivered Screen Number (Range 000-999)	Screen displayed on entry to the Close state. This is only displayed if no receipt is delivered in the Close state and the terminal has not been instructed by the last Transaction Reply message to capture the card. The last Transaction Reply Command performed determines the screen text as follows: Card Before Cash - ‘Take cash’ Fast Cash - ‘Take cash and card’ Other Commands - ‘Take card’
5	3	Card Retained Screen Number (Range 000-999)	Screen displayed on entry to the Close state, informing the cardholder that the card has been retained. This is only displayed if the terminal has been instructed by the last Transaction Reply message to capture the card during the Close state. This screen is also displayed for four seconds if the card is captured due to timer 09 expiring (card not taken).

Table Entry	Number of Characters	Contents	Description
6	3	Statement Delivered Screen Number (Range 000-999)	Display screen to be overlaid when either the receipt is delivered (entry 2) or there is no receipt delivery (entry 4). This screen is only displayed if the statement is cut and delivered in a Close state and the terminal has not been instructed by the last Transaction Reply message to capture the card.
7	3	Must be 000	Reserved
8	3	BNA Notes Returned Screen Number (Range 000-999)	Screen displayed on entry to the Close state, informing the cardholder that the Bunch Note Acceptor (BNA) notes are being returned.
9	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of the optional Extension state. *See* Table Note 10.

Table Note 10: You can use one of two methods to deal with 'Card Before Cash' and 'Fast Cash' transactions:

- Use different Close states
- Send a screen modify with the Transaction Reply command.

For details of 'Card Before Cash', 'Fast Cash' and 'Process Document With Cash' transactions, see the "Terminal Functions for Transaction Completion" section in Chapter 10, "Central to Terminal Messages".

Table 2-22
Extension to State J

Table Entry	Number Of Characters	Contents	Description
1	1	State Type	'Z'
2	3	CPM Take Document Screen Number (Range 000-999)	Screen number required for the error recovery actions which may take place in this state if the CPM is present.
3	3	CPM Document Return / Retain Flag (Range 000-001)	This flag controls the error recovery actions which may take place in this state if the CPM is present. *See* Table Note 11.

Table Entry	Number Of Characters	Contents	Description
4-7	12	Reserved	Must be 000.
8	3	BNA Notes Return / Retain / Leave Flag (Range 000-002)	This flag controls the error recovery actions which may take place in this state if the BNA is present. *See* Table Note 12.
9	3	Reserved	Must be 000.

Table Note 11: On entry to the Close State, the terminal detects whether a CPM is configured, and if so, whether any error recovery action is required. If it detects that the device has a recoverable error condition and still has a document within it, it will attempt to retain or return the document as defined by extension state entry 3 (CPM Document Return / Retain Flag).

If this extension state is not included, the default CPM document error recovery action is to retain any document found in the Close State.

If the document is to be retained (entry 3 flag = 0), an attempt is made to move it into the Reject Bin (bin 2).

If the document is to be returned (entry 3 flag = 1), an attempt is made to return it to the cardholder. If the document successfully reaches the exit, the CPM Take Document Screen will be displayed for the period specified by timer 94, or until the document is taken. The beeper is also sounded unless option 2c has been set. If the document does not reach the exit, or the cardholder fails to take the document, an attempt is made to move it to the Reject Bin (bin 2).

If the document is moved successfully to the bin, screen U0058 is journalled together with the security trace header message. If the document is not moved successfully to the bin and the cardholder does not have access, screen U0059 is journalled together with the security trace header.

If an error occurs while moving the document to bin 2, an unsolicited message is issued. If the error has an associated severity of fatal, then further attempted use of the device will yield an error message.

All cheque data is flushed from the system when this state is executed.

Table Note 12: On entry to the Close State the terminal will detect if a BNA is configured, and if so will determine if any error recovery action is required. If it detects that the device has a recoverable error

condition and still has notes in the escrow, it will attempt to retain or return or leave the notes as defined by the Close State extension state entry 8 (BNA Return / Retain / Leave Flag). If notes are refunded during the Close state, the note counts are journalled.

NCR recommends that you use the same option for all Close States. If the host does not use the same setting for all Close States, undesirable handling can occur. For example, if one Close State has the option to leave the notes at the escrow, but the next Close State has the option to return notes, notes from both the current and the previous transaction will be returned to the current customer.

K - FIT Switch State

Each Financial Institution Table (FIT) contains a next state index number. This index number refers to the next state number that the terminal goes to when it exits from the FIT Switch state, if the Financial Institution number on the card matches a Financial Institution number in a FIT. For more details, see the“A - Card Read State” section.

The FIT Switch state table contains a list of these next state numbers, together with an index which matches the index numbers of the FITs.

For example, if the FIT that has been identified during the Card Read state contains a next state index number of 3, this corresponds to index number 3 in the FIT Switch state table. This index number is found in table entry 5, so the terminal goes to the next state number contained in table entry 5 when it exits from this state.

Table 2-23
K - FIT Switch State

Table Entry	Index	Number of Chars	Contents	Description
1		1	State Type	‘K’
2	0	3	Next State Number	State to which the terminal goes depending on the next state index stored in the FIT. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)
3	1	3	Next State Number	
4	2	3	Next State Number	
5	3	3	Next State Number	
6	4	3	Next State Number	
7	5	3	Next State Number	
8	6	3	Next State Number	
9	7	3	Next State Number	

_ - Expanded FIT Switch State

Each FIT designates a next state according to the member institution to which it applies. This state table is a list of these states and contains indexing data referenced in the FIT for selecting the appropriate next state. This state operates as state type ‘K’ except that more switch capacity has been added through a mandatory extension state. For example, if the FIT identified during the Card Read state contains a next state index of 3, the next state number is found in table entry 5.

Table 2-24
_ - Expanded FIT Switch State

Table Entry	Index	Number of Chars	Contents	Description
1		1	State Type	‘_’
2	0	3	Next State Number	State to which the terminal goes depending on the next state index stored in the FIT. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)
3	1	3	Next State Number	
4	2	3	Next State Number	
5	3	3	Next State Number	
6	4	3	Next State Number	
7	5	3	Next State Number	
8	6	3	Next State Number	
9		3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of the mandatory Extension state.

Table 2-25
Extension to State _

Table Entry	Index	Number of Chars	Contents	Description
1		1	State Type	'Z'
2	7	3	Next State Number	State to which the terminal goes depending on the next state index stored in the FIT. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)
3	8	3	Next State Number	
4	9	3	Next State Number	
5	10	3	Next State Number	
6	11	3	Next State Number	
7	12	3	Next State Number	
8	13	3	Next State Number	
9	14	3	Next State Number	

L - Card Write State

During a Card Read state, the Card Data buffers are cleared of all previous data. The Card Read state defines the card tracks to be read and stores the card track data in the corresponding Card Data buffer. In the Transaction Request state, the terminal sends a Transaction Request message to Central. You can specify whether or not track data is included in this message. Central responds to this message by sending a Transaction Reply command to the terminal. Within this command are fields which contain updated track data. This data replaces any previous data in the terminal's track data buffer.

During the Card Write state, the terminal writes the contents of the Track data buffers onto the magnetic stripe of the card. You specify which screen is to be displayed on the cardholder screen while writing takes place.

Writing only takes place if the Track data buffers contain data obtained from a successful Track 3 read during a Card Read state, or updated Track data from a Transaction Reply command.

There are three next state numbers that the terminal can go to when it leaves the Card Write state. One exit is taken if the Track write is successful. Another is taken if the Track write is unsuccessful. A third exit is taken if the Track buffers are empty or contain invalid data, and no writing is attempted.

If the terminal is to write to more than one track, the order will be Track 1, Track 2 and Track 3. Before writing, a check is made to ensure that the data is valid. If the data is not valid the write state will exit without writing. If the data is valid and a track write fails the terminal will not attempt any further requested track writes and the write state will exit.

To use the Card Write state, the magnetic stripe card must still be in the reader. The following conditions must apply:

- If table entry 8 of the Card Read state is used, it must not be 000 (return card immediately)
- A Card Before Cash Transaction Reply must not have been performed
- A Parallel Eject / Dispense and Print (Fast Cash) Transaction Reply must not have been performed
- A card reader with the ability to write to the tracks specified must be present.

Table 2-26
L - Card Write State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'L'
2	3	Screen Number (Range 000-999)	Screen displayed during a Card Write operation.
3	3	Good Write Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes after a satisfactory Track write operation.
4	3	Bad Write Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Track write is unsuccessful.
5	3	No Write Attempted Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if no data or invalid data is present in the Track buffer. This state is also used if a start and / or end sentinel is missing, or the Track data buffers are too long.
6-9	12	Must be 000 for each table entry	Reserved

M - Enhanced PIN Entry State

This state performs the same functions as the PIN Entry state. It also supports Track 3 retries if the FIT specifies local PIN check and indicates that there is a Track 3 retry field on the card.

If the FIT specifies Track 3 retries but there is no data in the Track 3 buffer, the Cancel Next State exit is taken.

Before the cardholder can enter a PIN for a local PIN check with Track 3 retries, the PIN retry field on the card is checked. For a Mutual Institutions Transfer System (MINTS) format card, the retry field of the Track 3 data buffer must not equal or exceed the limit specified in state table entry 9. If an International Standards Organisation (ISO) format card is used, the retry field must not equal 0. If they do, in both situations the terminal exits to the Maximum Bad PINs Next State specified in table entry 6. This check is made before the start of each PIN entry attempt.

After the PIN is entered by the cardholder and compared with the calculated PIN, the PIN retry field in the Track 3 data buffer is updated. For MINTS format cards, if the entered PIN is correct, the PIN retry field is set to 0. For ISO format cards, the retry field is set to the value specified in state table entry 9. If the entered PIN is incorrect, the PIN retry field is incremented for MINTS format cards and decremented for ISO format cards. The updated Track 3 data buffer is available for transmission through the Transaction Request state. The buffer can also be written on the card using the Card Write state.

On a terminal with digital audio capability and auto voice enabled, message 7 is played on entry to this state. For details, see the “Special Features” section in Chapter 3, “Screen Data”.

Table 2-27
M - Enhanced PIN Entry State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'M'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter the PIN the first time. This screen is displayed on entering the PIN Entry state. It must leave the cursor at the start of the PIN Entry display area. An 'X' is displayed for each key pressed.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not enter the PIN within the permitted time limit. Enter state number 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses the Cancel key before the maximum number of digits specified for the PIN have been entered.
5	3	Local PIN Check Good PIN Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes after verification of a correct PIN entry. A Pre-Set Operation Code buffer state (clearing the function key buffer before Transaction Selection) usually follows a correct PIN entry. *See* Table Note 15.
6	3	Local PIN Check Maximum Bad PINs Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the correct PIN has not been entered after the number of attempts allowed by table entry 9. This could be a Card Write state in order to update the Track 3 PIN retry field. *See* Table Note 13, Table Note 14, and Table Note 15.

Table Entry	Number of Characters	Contents	Description
7	3	Local PIN Check Error Screen Number (Range 000-999)	Display screen that prompts the cardholder to re-enter the PIN. This screen is displayed after each incorrect PIN entry attempt. An 'X' is displayed for each key pressed. After the number of re-entry attempts allowed by table entry 9, the terminal enters the state determined by table entry 6. *See* Table Note 13 and Table Note 15.
8	3	Remote PIN Check Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes when local PIN verification is not performed.
9	3	Local PIN Check Maximum PIN Check Retries (Range 001-009)	Maximum number of incorrect PIN entries before the terminal enters the state determined by table entry 6. This entry is used as the PIN retry count if the PIN retry count is not on the card (FIT entry PRCNT = FF). *See* Table Note 13 and Table Note 15.

Table Note 13: These fields are also used when the Check Remote PIN minimum length option in the FIT is used. (The high order three bits of PANLN are not 0 and contain a value less than or equal to PMXPN. PANLN does not contain 0FF hex.) The fields are used in the same way as for local verification. An incorrect PIN is one that is less than the minimum length.

Table Note 14: The 'Local PIN Check Maximum Bad PINs Next State Number' should be set to a non-zero valid value, or an error will occur.

Table Note 15: To support secure PIN encryption, fields 5, 6, 7 and 9 must always be set up, as they are used to control the number of allowed PIN retries when fewer than four PIN digits are entered. With secure PIN encryption, a check for the minimum four PIN digits is performed whether or not the FIT specifies to check for shorter PINs.

R - Enhanced Amount Entry State

Use this state if you wish to use multi-language screens for enhanced amount entry.

This state reads the amount entered by the cardholder, displays it on the cardholder screen, and saves it in the buffers specified by the state table. Exit from the Enhanced Amount Entry state occurs when an active FDK is pressed, the Cancel key is pressed or a time-out occurs. The Enter key is equivalent to FDK 'A' (or FDK 'I', if the option which enables the keys to the left of the screen is set). The Clear key is always active and clears the amount entered and the screen echo filled to allow data entry retries within the Amount Entry state.

Table 2-28
R - Enhanced Amount Entry State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'R'
2	3	Screen Number (Range 000-999)	Number of display screen prompting an amount entry.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder fails to enter the amount within the specified time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses the Cancel key.

Table Entry	Number of Characters	Contents	Description
5	3	FDK 'A' (or 'I') Next State Number	State number to which the terminal goes if the cardholder presses the specified FDK. Normally one FDK is used to specify whether the amount entry is correct and another to specify incorrect. The other keys are inactive. Enter 255 to deactivate any FDK or touch area. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)
6	3	FDK 'B' (or 'H') Next State Number	
7	3	FDK 'C' (or 'G') Next State Number	
8	3	FDK 'D' (or 'F') Next State Number	
9	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of the Extension state.

Table 2-29
Extension to State R

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Document Amount Buffer (Range 000-002)	This field determines which buffer the amount entered will be stored in: 000 - Amount buffer 001 - Buffer B. 002 - Buffer C
3	3	Amount Display Screen Number (Range 000-999) *See* Table Note 16.	Overlay screen for setting the cursor position on the cardholder screen. This screen optionally defines the initial display format before amount entry by the cardholder. The cursor should be set on the left-hand side of the echo field on the screen. This is space filled until the required start position for the currency character is reached. For details, see "International Currency Display Format" on page 3-31. The default echo field for eight digits is: bbbb$b0.00 where b = space. The default echo field for twelve digits is: bbbbbbbb$b0.00 where b = space.

Table Entry	Number of Characters	Contents	Description
4	3	Start CAV command (Range 000-001)	Not used by Advance NDC.
5	3	Language Dependent Screen Flag (Range 000-001)	This flag determines if the screen defined in table entry 3 of this extension state is language dependent: 000 - Not language dependent 001 - Language dependent, regardless of language group size.
6-9	12	Must be 000	Reserved

Table Note 16: The Amount Entry Screen will not be adjusted for language, unless a language has been selected and the language group size is 1000 or greater. If the language adjusted screen has not been loaded then the unadjusted screen will be used instead.

S - Language Code Switch State

In this state, the flow of a transaction is switched depending on whether a language code is present in the card data or not.

You can use this state to select the language to be used automatically from the code on the card, or to allow manual selection for cards which have either no language code or an invalid language code.

The language used is determined by State V - Language Select From Card State, and State Y - Eight FDK Selection Function State.

This state is subject to the same restrictions as the Language Select state. For details, see the “V - Language Select From Card State” section.

Note: If 255 is placed in any of the language code exits or the ‘no language code’ exit, the terminal performs a default Close state. This means that the cardholder’s card is returned and the transaction is terminated.

Table 2-30
S - Language Code Switch State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	‘S’
2	3	No Language Code Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is illegal or cannot be read.
3	3	Language Code = 0 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 0.
4	3	Language Code = 1 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 1.

Table Entry	Number of Characters	Contents	Description
5	3	Language Code = 2 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 2.
6	3	Language Code = 3 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 3.
7	3	Language Code = 4 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 4.
8	3	Language Code = 5 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 5.
9	3	Extension state number (Range 000-999 or 000-ZZZ)	State number of the Extension state containing the next states for language codes 6-9. A value of 255 means that there is no Extension state, and language codes 6-9 cause the No Language Code next state exit to be taken.

Table 2-31
Extension to State S

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Language Code = 6 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 6.
3	3	Language Code = 7 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 7.

Table Entry	Number of Characters	Contents	Description
4	3	Language Code = 8 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 8.
5	3	Language Code = 9 Next State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the language code is 9.
6-9	3	Must be 000	Reserved

T - Card Read - PIN Entry Initiation State

You can use this state instead of the Card Read state, if you want to initiate PIN entry by the cardholder at the same time as the terminal reads the card. This state must be used for DASH card readers. However, if the DASH reader is used as a DIP reader, Card Read state A can also be used.

Note: If using a DASH reader, but no chip connect bit is set, the DASH will behave as a standard DIP reader.

If you use the Card Read State table, ensure it is the first table used during transaction processing by assigning state number 000 to it. The terminal automatically enters state 000 when put into service.

This state performs the same functions as the Card Read state:

- The terminal displays a screen prompting the cardholder to enter a card
- The state table identifies the next state number that the terminal goes to following a successful card read
- The terminal displays an error screen if the card cannot be read
- The state table specifies which card tracks are to be read.

One difference between this state and the Card Read state is that in this state the card is always returned according to the instruction in the Transaction Reply command message.

This state also enables the keyboard for PIN entry while the card is being read, and displays a screen prompting the cardholder to enter the PIN. The keyboard is enabled for a maximum number of numeric keys (16). You can specify which FDKs are to be active as Accept or Clear keys. The Clear key itself is always active. The Enter key is active if you specify FDK ‘A’ as an Accept key.

Note 1: The BAPE (Basic Alphanumeric PINpad Encryptor) does not support this early enabling of the keyboard with secure PIN entry. When the BAPE is configured, the keyboard is not enabled for PIN entry in this state; the keyboard is enabled only in the PIN Entry state.

Note 2: This state also supports magnetic smart cards. For details of how smart card data is handled, see the “A - Card Read State” section.

Once the card has been read successfully, processing continues to the next state. This must be a PIN Entry or Information Entry state (an intervening FIT Switch state is allowed).

If the next state entered is one of the PIN Entry states, the correct PIN length is obtained from the FIT. If the cardholder has not entered the complete PIN, the keyboard is re-enabled for the real PIN length without changing the screen. When the entered key data is returned, it is processed using the PIN Entry state table parameters. Accept key codes are ignored. The fast PIN entry screen is only used for the first PIN entry. For all subsequent attempts, the PIN entry screen is used. Track 1 data cannot be displayed on this screen because the card has not been read at this point.

If the next state entered is an Information Entry state, no keyboard re-enable is required. When the entered key data is returned, it is processed using the Information Entry State table parameters.

On a terminal with digital audio capability and auto voice enabled, message 7 is played as soon as the card is detected by the terminal. For details, see the “Special Features” section in Chapter 3, “Screen Data”.

DASH Card Reader

State 'T' now supports the DASH card reader for EMV processing. If the SST has a DASH card reader and one or more of the Card Read Conditions (state entries 5-7) has the Chip Connect Bit set to 1, then the card is latched on entry to the DASH card reader and EMV processing begins.

Note: If using a DASH reader, but no chip connect bit is set, the DASH reader behaves as a standard DIP reader.

When the DASH card is latched, an attempt to gain the Answer To Reset (ATR) from the chip is made. If the ATR is successful then the No FIT Match next state is taken. If at this point the No FIT Match Exit is taken, it is not possible to revert back to magnetic stripe processing for that transaction.

If the ATR fails, the DASH card reader unlatches the card and the cardholder is asked to remove the card and wait. The screen defined in Extension State Entry 6 is available for this. If the card is removed, the magnetic stripe data is read, magnetic stripe processing commences and the card read conditions are checked.

For more information about smart card handling in Advance NDC, see Chapter 12, “EMV Smart Card Handling”.

Table 2-32
T - Card Read - PIN Entry Initiation State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'T'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter a card. While the terminal is waiting for a card entry, this screen will be displayed.
3	3	Good Read Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes: 1. Following a good read of the card if FITs are not used (Table Entry 3 in Extension state = 000) **or** 2. If the Financial Institution number on the card matches a Financial Institution number in a FIT.
4	3	Error (Misread) Screen Number (Range 000-999)	Screen that is displayed if an unsuccessful read occurs; or for a DASH card, the cardholder fails to take the card before timer 72 expires.
5	3	Read Condition 1	These three entries specify which card track(s) and / or chip data will be read. The possible values for these entries are the same as for the 'A' Card Read state in Table 2-4 on page 2-7.
6	3	Read Condition 2	
7	3	Read Condition 3	
8	3	Reserved	This field is not used. The early card eject feature is not supported by this state. The card is always returned as specified by the Transaction Reply command message.
9	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of the Extension state containing information for parallel PIN entry.

Table 2-33
Extension to State T

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter a PIN. This screen is displayed on card entry. The identified screen must leave the cursor positioned at the beginning of the PIN Entry display area. An 'X' is displayed for each key pressed. The Track 1 name cannot be displayed at this time because the card has not been read.
3	3	No FIT Match Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Financial Institution number on the card does not match any FIT. If FITs are not used, this entry must be 000. The No FIT match exit is also taken if the SST has a DASH reader and one of the chip connect bits is set and the ATR succeeds.
4	3	Clear Key Mask (Range 000-255)	A binary encoded value which specifies the FDKs or touch areas that are active as Clear keys during PIN entry. Each bit relates to an FDK or touch area. Bit 0 relates to FDK 'A' (or FDK 'A' touch area); bit 7 relates to FDK 'I' (or FDK 'I' touch area). If a bit is '1', the relative FDK or touch area is active. If a bit is '0', the relative FDK or touch area is inactive. *See* Table Note 17.
5	3	Accept Key Mask (Range 000-255)	A binary encoded value which specifies the FDKs or touch areas that are active as Accept keys during PIN entry. Each bit relates to an FDK or touch area. Bit 0 relates to FDK 'A' (or FDK 'A' touch area); bit 7 relates to FDK 'I' (or FDK 'I' touch area). If a bit is '1', the relative FDK or touch area is active. If a bit is '0', the relative FDK or touch area is inactive. *See* Table Note 17.
6	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to remove the card and wait - if the card reader is a DASH card reader, and a chip connect bit is set, but the ATR fails. This screen is displayed until the cardholder removes the card or timer 72 expires.
7-9	9	Must be 000 for each table entry	Reserved

Table Note 17: The eight bits represent the binary equivalent of an Accept key or Clear key mask. For example, in the following mask:

b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	1	0	0	1	0

the three decimal characters in table entry 4 or 5 are 018 and the active FDKs or touch areas are B and F.

V - Language Select From Card State

In this state you can use one set of state tables to display screens in different languages within the same transaction. This is determined by a code on the cardholder's card. The code is a one-character field and is located using the Language Code Index parameter (PLNDX) in the FIT. For more details, see Chapter 8, "Financial Institution Tables".

You can use up to six screen groups in this state, and you specify which language is to be used in each group. You also specify in table entry 9 how many screens each group will contain. For more details, see the "Multi-Language Screens" section in Chapter 3, "Screen Data".

Table 2-34
V - Language Select from Card State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'V'
2	3	Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes after selecting the screen group.
3	3	Language Code (Range 0-9)	Decimal number in the range 0-9 identifying the code for screen group 1.
4	3	Language Code (Range 0-9)	Decimal number in the range 0-9 identifying the code for screen group 2.
5	3	Language Code (Range 0-9)	Decimal number in the range 0-9 identifying the code for screen group 3.
6	3	Language Code (Range 0-9)	Decimal number in the range 0-9 identifying the code for screen group 4.
7	3	Language Code (Range 0-9)	Decimal number in the range 0-9 identifying the code for screen group 5.
8	3	Language Code (Range 0-9)	Decimal number in the range 0-9 identifying the code for screen group 6.
9	3	Screen Group Size (Range 000-400, where 001 means 1000)	Number of screens in each language group. To specify 1000 screens, set this to 001.

W - FDK Switch State

Data is placed in the FDK buffer during the Eight FDK Selection Function state or the FDK Information Entry state. This data is read by the FDK Switch state in order to identify which next state the terminal should go to.

Table 2-35
W - FDK Switch State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'W'
2	3	FDK 'A' Next State Number	State number to which the terminal goes depending on the key code stored in the FDK buffer (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ).
3	3	FDK 'B' Next State Number	
4	3	FDK 'C' Next State Number	
5	3	FDK 'D' Next State Number	
6	3	FDK 'F' Next State Number	
7	3	FDK 'G' Next State Number	
8	3	FDK 'H' Next State Number	
9	3	FDK 'I' Next State Number	

X - FDK Information Entry State

Table entries 2-9 in the Extension to this state contain values relating to FDKs ‘A’ - ‘I’. When the cardholder selects an FDK, this state places the corresponding value in the General Purpose buffer or Amount buffer that you have specified in table entry 7.

You can use this function, for example, when a screen offers a selection of fixed amounts that the cardholder can select by pressing a particular FDK. This state translates the FDK selected by the cardholder into a value that is placed in the specified buffer.

The FDK key code is stored in the FDK buffer for use by an FDK Switch state.

The terminal may support Touch Screen FDK Emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on the screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the “FDK Emulation” section in Chapter 4, “Keyboard Data and Layouts”.

Alternatively, the terminal may support full touch screen keyboards. In this case, touch areas are defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. For details, see Chapter 4, “Keyboard Data and Layouts”.

Table 2-36
X - FDK Information Entry State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	‘X’
2	3	Screen Number (Range 000-999)	Display screen that prompts key selection by cardholder.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder fails to respond to the message within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Cancel key is pressed.

Table Entry	Number of Characters	Contents	Description
5	3	FDK Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if an FDK or touch area is pressed.
6	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of Extension state containing assigned values for the eight FDKs or touch areas.
7	3	Buffer ID (Range 010-039)	Identifies which buffer is to be edited and the number of zeros to add to the values specified in the Extension state: 01X - General purpose buffer B. 02X - General purpose buffer C 03X - Amount buffer. *See* Table Note 19. X specifies the number of zeros in the range 0-9
8	3	FDKs Active Mask (Range 000-255)	Specifies the FDKs or touch areas that are active during this state. Each bit relates to an FDK or touch area. Bit 0 relates to FDK 'A' (or FDK 'A' touch area); bit 7 relates to FDK 'I' (or FDK 'I' touch area). If a bit is '1' the relative FDK or touch area is active. If a bit is '0' the relative FDK or touch area is inactive. *See* Table Note 18.
9	3	Must be 000	Reserved

Table Note 18: The eight bits represent the binary equivalent of an FDK Active Mask. For example, in the following mask

b7	b6	b5	b4	b3	b2	b1	b0
0	0	1	1	1	1	0	0

the three decimal characters in table entry 8 are 060 and the active FDKs or touch areas are C, D, F and G.

Table Note 19: If used, the Amount buffer will contain eight or twelve digits, depending on the option selected. If this state is followed by an Amount Check state with an Amount Check Condition set to 000, the amount entered is assumed to be a whole amount.

Table 2-37
Extension to State X

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Value stored if FDK 'A' or FDK 'A' touch area pressed	Each table entry contains a value that is stored in the buffer specified in the associated FDK Information Entry state table (table entry 7) if the specified FDK or touch area is pressed. (Range 000-999 or 000-ZZZ)
3	3	Value stored if FDK 'B' or FDK 'B' touch area pressed	
4	3	Value stored if FDK 'C' or FDK 'C' touch area pressed	
5	3	Value stored if FDK 'D' or FDK 'D' touch area pressed	
6	3	Value stored if FDK 'F' or FDK 'F' touch area pressed	
7	3	Value stored if FDK 'G' or FDK 'G' touch area pressed	
8	3	Value stored if FDK 'H' or FDK 'H' touch area pressed	
9	3	Value stored if FDK 'I' or FDK 'I' touch area pressed	

Y - Eight FDK Selection Function State

This state reads the FDK selected by the cardholder, stores the key code in an FDK buffer for use by an FDK Switch state, and updates the Operation Code buffer. If you do not specify an extension state in table entry 6, the key code of the FDK selected by the cardholder is stored directly in the Operation Code buffer. If you do specify an extension state, the key code is translated into three pseudo key codes, which are then stored in the Operation Code buffer.

You can specify a second extension state in table entry 9 to identify the screen bases for multi-language screen displays. If you do not specify this extension state, then multi-language display is not used.

The terminal may support touch-screen FDK emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on the screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the “FDK Emulation” section in Chapter 4, “Keyboard Data and Layouts”.

Alternatively, the terminal may support full touch screen keyboards. In this case, touch areas are defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. For details, see Chapter 4, “Keyboard Data and Layouts”.

Table 2-38
Y - Eight FDK Selection Function State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	‘Y’
2	3	Screen Number (Range 000-999)	Display screen that prompts key selection by the cardholder.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not respond to the message within the specified time limit. Enter 255 if the time-out function is not required.

Table Entry	Number of Characters	Contents	Description
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses the Cancel key.
5	3	FDK Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses an FDK or touch area.
6	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of Extension state containing assigned operation codes for the eight FDKs or touch areas. If there is no Extension state, enter 255.
7	3	Buffer positions (Range 000-777)	If there is no Extension state, this defines the Operation Code buffer position to be edited by a value in the range '000' to '007'. If there is an Extension state, this specifies three bytes of the Operation Code buffer to be set to the values specified in the Extension state. Three numeric values, each in the range '0' to '7', are specified to define three positions in the 8 byte Operation Code buffer to be edited. These three values must be ordered to correspond with the edit characters in the Extension state. If no buffer positions or fewer than three buffer positions are to be edited, this is specified in the Extension state.
8	3	FDKs Active Mask (Range 000-255)	Specifies the FDKs or touch areas that are active during this state. Each bit relates to an FDK or touch area. Bit 0 relates to FDK 'A' (or FDK 'A' touch area); bit 7 relates to FDK 'I' (or FDK 'I' touch area). If a bit is '1' the relative FDK or touch area is active. If a bit is '0' the relative FDK or touch area is inactive. *See* Table Note 20.
9	3	Multi-Language Screens Selection Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	If the state selects the multi-language screen base, this contains the Extension state number. If there is no Extension state, enter 000 or 255.

Table Note 20: The eight bits represent the binary equivalent of an FDK Active Mask. For example, in the following mask:

b7	b6	b5	b4	b3	b2	b1	b0
0	0	1	1	1	1	0	0

the three decimal characters in table entry 8 are 060 and the active FDKs or touch areas are C, D, F and G.

Table 2-39
Extension 1 to State Y

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Operation Code stored if FDK 'A' or FDK 'A' touch area is pressed.	Each table entry contains the Operation Code characters to be written to the Operation Code buffer if the specified FDK or touch area is pressed. Three characters are specified for each code, which must be in the range 'A' - 'I'. They are written, in order, to the three positions specified in the associated Eight FDK Selection Function state table (table entry 7). Enter '@' if no character is to be written to a specified position in the buffer. *See* Table Note 21
3	3	Operation Code stored if FDK 'B' or FDK 'B' touch area is pressed.	
4	3	Operation Code stored if FDK 'C' or FDK 'C' touch area is pressed.	
5	3	Operation Code stored if FDK 'D' or FDK 'D' touch area is pressed.	
6	3	Operation Code stored if FDK 'F' or FDK 'F' touch area is pressed.	
7	3	Operation Code stored if FDK 'G' or FDK 'G' touch area is pressed.	
8	3	Operation Code stored if FDK 'H' or FDK 'H' touch area is pressed.	
9	3	Operation Code stored if FDK 'I' or FDK 'I' touch area is pressed.	

Table Note 21: If specifying characters in the range ‘A’ to ‘I’ and ‘@’ causes difficulties with the state table editor, you can use values ‘1’ to ‘9’ and ‘0’ instead

Table 2-40
Extension 2 to State Y

Table Entry	Number of Characters	Contents	Description
1	1	State Type	‘Z’
2	3	Screen Base if FDK ‘A’ or FDK ‘A’ touch area is pressed	Each table entry contains the screen number of the first screen of each language group. The initial base is 000, and all unused fields should contain this value. *See* Table Note 22
3	3	Screen Base if FDK ‘B’ or FDK ‘B’ touch area is pressed	
4	3	Screen Base if FDK ‘C’ or FDK ‘C’ touch area is pressed	
5	3	Screen Base if FDK ‘D’ or FDK ‘D’ touch area is pressed	
6	3	Screen Base if FDK ‘F’ or FDK ‘F’ touch area is pressed	
7	3	Screen Base if FDK ‘G’ or FDK ‘G’ touch area is pressed	
8	3	Screen Base if FDK ‘H’ or FDK ‘H’ touch area is pressed	
9	3	Screen Base if FDK ‘I’ or FDK ‘I’ touch area is pressed	

Table Note 22: When a multi-language screen base in the range 001 to 009 is specified, it is multiplied by 1000 to give 1000, 2000, 3000....9000.

b - Customer-Selectable PIN State

This state allows the cardholder to input a new PIN. It differs from the PIN entry state in the number of retries. The state will prompt for the new PIN twice and will take a good exit if both are the same and the terminal checking feature is enabled.

If checking is local, the exit will be taken when the two new PINs have been built into the PIN blocks for transmitting. If checking is enabled and the two PINs entered are not the same the cardholder will be asked to re-enter the Customer Selectable PIN (CSP) and the state will not exit. If the FIT specifies that short PIN entry is to be tested for, short PINs will be regarded as one try against the limit specified in the state table.

The screen association for this state is derived from the screen specified in table entry 2. The cardholder PIN is entered on the facia keyboard and consists of four to sixteen digits. If the number of digits entered is less than the value specified in the FIT entry PMXPN the cardholder must press FDK A (or FDK I if the option enabling the keys to the left of the cardholder screen is set) or the 'ENTER' key on the facia keyboard after the last digit entered. Note that pressing the 'CLEAR' key on the facia clears all the digits.

Table 2-41
b - Customer-Selectable PIN State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'b'
2	3	First Entry Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter the PIN the first time.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not make a CSP entry within the specified time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses the Cancel key to stop the CSP transaction.

Table Entry	Number of Characters	Contents	Description
5	3	Good Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder enters a matching pair of new PIN values.
6	3	CSP Fail Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder fails to enter a matching pair of new PIN digits or the maximum number of retries for local PIN checking is reached. This is also taken if: ● There is no FIT match. ● PIN block generation fails. Note that the option to send the PIN buffer irrespective of failure does not operate.
7	3	Second Entry Screen Number (Range 000-999)	Display screen used to ask for confirmation of the CSP.
8	3	Mis-Match First Entry Screen Number Range (000-999)	Display screen that replaces the screen for table entry 2 on each attempt after a CSP pair attempt did not match or an error has occurred and there are still further retries allowed.
9	3	Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of the Extension state.

Table 2-42
Extension to State b

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Number of attempts allowed to enter a matching CSP pair (Range 000-010)	Limits the number of attempts the cardholder may make to select a new PIN. A value of 0 is no limit.
3	3	Use local verification of new PIN pair attempts (Range 000-001)	Specifies which attempts are to be verified locally: 0 - Do not verify locally. Make attempts available in transaction request fields 'U' and 'V'. 1 - Verify both attempts locally. Result available in transaction request field 'U'. This option is not possible when using Banksys PIN block encryption. A random number is used as part of the encryption and therefore no two consecutive keys will be the same. If it is selected the CSP Fail Next State will be taken when an attempt to enter PINs is made. *See* Table Note 23
4-9	18	Must be 000	Reserved.

Table Note 23: If local check for short PINs is specified, it is possible to have the CSP failure screen displayed after a short first PIN entry. The wording of the CSP fail screen should avoid confusion, for example, "There is a problem with the new PIN please re-enter" with the second PIN entry screen worded "Please re-enter PIN to confirm new number".

d ... g - Exit States

State identification letters **d** to **g** are reserved for Exit States. For further information, refer to the NCR publication *NCR Direct Connect (NDC), Using NDC Exits.*

k - Smart FIT Check State

This state is required when chip data is to be used in a FIT check.

The Smart FIT Check state is designed to be entered from your own C-Exit state, such as the example Chip Data Read state, which will have read the chip data from the smart card and placed the data in the magnetic track buffers. For details of the example Chip Data Read state, see Chapter 12, “EMV Smart Card Handling”.

The Smart FIT Check state then performs a FIT check for a Smart Card.

It is possible to create more than one Smart FIT Check state to accommodate multiple FIT checks. This would allow different FIT checks to be performed on data from the same card.

Table 2-43
k - Smart FIT Check State

Table Entry	No. of Chars	Contents	Description
1	1	State type	‘k’ (6BH)
2	3	Reserved (000)	Not used - set to 0.
3	3	Good Read Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the Financial Institution number on the card matches a Financial Institution number in the FIT.
4	3	Reserved (000)	Not used - set to 0.
5	3	Reserved (000)	Not used - set to 0.
6	3	Reserved (000)	Not used - set to 0.
7	3	Reserved (000)	Not used - set to 0.
8	3	Card Return Flag	Tells the terminal when the card should be returned to the cardholder: 000 - eject the card immediately 001 - return the card as specified by a Transaction Reply message.
9	3	No FIT Match Next State Number	This is the state executed if the FIT check fails. The executed state may be a Close state, or a return to another C-Exit state which places the chip data in the read buffers before calling another Smart FIT Check state. If FITs are not used, this entry must be 000.

m - PIN & Language Select State

This state performs the same functions as the PIN Entry state (state 'B' or 'M') combined with the functionality of the Eight FDK Selection Function State (state 'Y'). This state allows language selection from an FDK following the PIN entry. All the functionality and conditions of PIN Entry and Eight FDK Selection states apply to this state.

This state also has several table entries that are included in the first extension state. Normally, the cardholder enters the PIN, which consists of four to sixteen digits, on the facia keyboard. If a cardholder enters fewer than the number of digits specified in the FIT entry, PMXPN, the cardholder must press an active FDK (as defined by the FDKs Active Mask) or the Enter key after entering the last digit. Otherwise, Auto-enter takes on the language assigned to the Enter key. If the Enter key is not active on the keyboard, the terminal uses the first active FDK.

If the cardholder does not enter a PIN, but presses an Active FDK to select a language, the terminal takes the No PIN Entered Next State Number (table entry 2) exit. The terminal normally enters the PIN Entry State (state 'B' or 'M') if this occurs.

If the FIT specifies local DES PIN verification and the cardholder enters an incorrect PIN, the terminal takes the Local PIN Entry Error Next State Number (table entry 5) exit. Usually, a PIN Entry State (state 'B' or 'M') is placed in this entry and the screen displayed is in the language just selected.

If the cardholder presses the Enter key or Auto-enter is used to accept the PIN, the FDK Enter Key Default Mask (table entry 9) defines which FDK key code, and therefore the Screen Base, to store in the FDK buffer.

The State 'B' or State 'M' table entry defines whether the maximum retry count is on Track 3 of the card or in the state table. Previously, NDC+ used two separate states, states 'B' and 'M', to implement this functionality. To support this function, the FIT must specify local PIN check and indicate that there is a Track 3 retry field on the card.

For more information about the PIN Entry State, see “B - PIN Entry State” on page 2-9. For more information about Eight FDK Selection Function State, see “Y - Eight FDK Selection Function State” on page 2-63.

Table 2-44
m - PIN & Language Select State

Table Entry	No of Chars	Contents	Description
1	1	State Type	'm' (ASCII 6d, EBCDIC 94)
2	3	Screen Number (Range 000-999)	Display screen that prompts the cardholder to enter the PIN and select a language for the first time. This screen, which is displayed on entering the PIN & Language Select state, must leave the cursor at the start of the PIN Entry display area. An asterisk (*) is displayed for each key pressed.
3	3	Time-Out Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not enter the PIN within the permitted time limit. If the time-out function is not required, enter state number 255.
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder presses the Cancel key before the maximum number of digits specified for the PIN have been entered.
5	3	Next State Options Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number of Extension state containing the PIN options; the Next State numbers that the terminal enters after the PIN is entered; and the FDKs 'Enter' Key Mask.
6	3	Operation Codes Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This entry is the same as State 'Y', table entry 6. State number of the Extension state containing assigned operation codes for the eight FDKs or touch areas. If there is no Extension state, enter 255.

Table Entry	No of Chars	Contents	Description
7	3	Buffer Positions (Range 000-777)	This entry is the same as State 'Y', table entry 7. If there is no Extension state, this defines the Operation Code buffer position to be edited by a value in the range '000' to '007'. If there is an Extension state, this specifies three bytes of the Operation Code buffer to be set to the values specified in the Extension state. Three numeric values, each in the range '0' to '7', are specified to define three positions in the 8 byte Operation Code buffer to be edited. These three values must be ordered to correspond with the edit characters in the Extension state. If no buffer positions or fewer than three buffer positions are to be edited, this is specified in the Extension state. Values greater than 7 will be ignored.
8	8	FDKs Active Mask (Range 000-255)	This entry is the same as State 'Y', table entry 8. Specifies the FDKs or touch areas that are active during this state. Each bit relates to an FDK or touch area. Bit 0 relates to FDK 'A' (or FDK 'A' touch area); bit 7 relates to FDK 'I' (or FDK 'I' touch area). If a bit is '1' the relative FDK or touch area is active. If a bit is '0' the relative FDK or touch area is inactive. Values above 255 will be accepted, but only bits 0 - 7 will be used. *See* Table Note 24.
9	3	Multi-Language Screens Selection Extension State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This entry is the same as State 'Y', table entry 9. If the state selects the multi-language screen base, this contains the Extension state number. If there is no Extension state, enter 000 or 255.

Table Note 24: The eight bits represent the binary equivalent of an FDK Active Mask. For example, in the following mask, the three decimal characters in table entry 8 are 060 and the active FDKs or touch areas are C, D, F and G:

Table 2-45
PIN & Language FDK Active Mask

b7	b6	b5	b4	b3	b2	b1	b0
0	0	1	1	1	1	0	0

Table 2-46
Extension 1 to State m

Table Entry	No. of Chars	Contents	Description
1	1	State type	'Z' (ASCII 5a, EBCDIC E9)
2	3	No PIN Entered Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if the cardholder does not enter a PIN, but selects a language from an active FDK or touch area. The terminal normally enters the PIN Entry State (state 'B' or 'M') if this occurs.
3	3	Local PIN Check -Good PIN Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This entry is the same as State 'B', table entry 5. State number to which the terminal goes after verification of a correct PIN entry.
4	3	Local PIN Check - Maximum Bad PINs Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This entry is the same as State 'B', table entry 6. State number to which the terminal goes if the correct PIN has not been entered after the number of attempts allowed by table entry 7. The terminal normally enters a Close state if this occurs. *See* Table Note 25.
5	3	Local PIN Check Error Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number to which the terminal goes if an incorrect PIN is entered. The terminal normally enters the PIN Entry State (state 'B' or 'M') in the language selected from this state as you cannot go back to the 'm' state, since there is no error screen for bad PIN entry. This state type should match the state type identified in table entry 8 below.
6	3	Remote PIN Check Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This entry is the same as State 'B', table entry 8. State number to which the terminal goes when local PIN verification is not performed.

7	3	Local PIN Check Maximum PIN Retries (Range 001-009)	This entry is the same as State 'B', table entry 9. Maximum number of incorrect PIN entries allowed before the terminal enters the state determined by table entry 4. *See* Table Note 25.
8	3	State 'B' or 'M' Option (Range 000 - 001)	Specifies whether to use Track 3 retries on the card or from the state table. Enter '000' if PIN Entry State B functionality is needed. Enter '001' if Enhanced PIN Entry State M functionality is needed.
9	3	FDK Enter Key Default Mask (Range 000 - 128)	Specifies the FDK or touch area that is the default language if the 'Enter' key on the key pad is pressed instead of an FDK. Each bit relates to an FDK or touch area. Bit 0 relates to FDK 'A' (or FDK 'A' touch area); bit 7 relates to FDK 'I' (or FDK 'I' touch area). Set the bit to a '1' to make that FDK the default 'Enter' key value. The mapped FDK will be set even if the FDK is inactive. Only one bit should be set to '1'; all other bits should be '0'. If all bits are set to '0', the 'Enter' key will not be active.

Table Note 25: These fields are also used when the Check Remote PIN minimum length option is used. They are used in the same way as for Local PIN verification. An incorrect PIN is one which is less than the minimum length.

Table 2-47
Extension 2 to State m

Table Entry	No of Chars	Contents	Description
1	1	State Type	'Z' (ASCII 5a, EBCDIC E9)
2	3	Operation Code stored if FDK 'A' or FDK 'A' touch area pressed	Each table entry contains the Operation Code characters to be written to the Operation Code buffer if the specified FDK or touch area is pressed. Three characters are specified for each code, which must be in the range 'A' - 'I'. They are written, in order, to the three positions specified in the associated Eight FDK Selection Function State table (table entry 7). Enter '@' if no character is to be written to a specified position in the buffer. **Note:** If specifying characters in the range 'A' to 'I' and '@' causes difficulties with the state table editor, you can use values '1' to '9' and '0' instead.
3	3	Operation Code stored if FDK 'B' or FDK 'B' touch area pressed	
4	3	Operation Code stored if FDK 'C' or FDK 'C' touch area pressed	
5	3	Operation Code stored if FDK 'D' or FDK 'D' touch area pressed	
6	3	Operation Code stored if FDK 'F' or FDK 'F' touch area pressed	

Table Entry	No of Chars	Contents	Description
7	3	Operation Code stored if FDK 'G' or FDK 'G' touch area pressed	
8	3	Operation Code stored if FDK 'H' or FDK 'H' touch area pressed	
9	3	Operation Code stored if FDK 'I' or FDK 'I' touch area pressed	

Table 2-48
Extension 3 to State m

Table Entry	No of Chars	Contents	Description
1	1	State Type	'Z' (ASCII 5a, EBCDIC E9)
2	3	Screen Base if FDK 'A' or FDK 'A' touch area is pressed	Each table entry contains the screen number of the first screen of each language group. The initial base is 000, and all unused fields should contain this value. *See* Table Note 26
3	3	Screen Base if FDK 'B' or FDK 'B' touch area is pressed	
4	3	Screen Base if FDK 'C' or FDK 'C' touch area is pressed	
5	3	Screen Base if FDK 'D' or FDK 'D' touch area is pressed	
6	3	Screen Base if FDK 'F' or FDK 'F' touch area is pressed	
7	3	Screen Base if FDK 'G' or FDK 'G' touch area is pressed	
8	3	Screen Base if FDK 'H' or FDK 'H' touch area is pressed	
9	3	Screen Base if FDK 'I' or FDK 'I' touch area is pressed	

Table Note 26: This Extension State is the same as the Extension 2 to State Y, Table 2-40 on page 2-66.

When a multi-language screen base in the range 001 to 009 is specified, it is multiplied by 1000 to give 1000, 2000, 3000,…9000.

> - Cash Accept State

If the Bunch Note Acceptor (BNA) is present, this state may be used to enable bunches of notes to be inserted by the cardholder into the BNA.

Most of the cash deposit transaction is not controlled by Central, as the time taken for a successful cash deposit could exceed the transaction request / reply timers. For this reason, the processing of a cash deposit transaction is performed by the Cash Accept State type, before a transaction request is sent.

Under state table control, the Cash Accept State:

- Accepts a bunch of notes into the escrow
- Identifies the notes
- Checks the note type and denomination are active, that is accepted by Central
- Returns invalid notes to the cardholder
- Refunds requested notes, or if there are more notes than the escrow capacity
- Retracts returned notes not taken (not supported on BNA1).

Table 2-49
> - Cash Accept State

Table Entry	No. of Chars	Contents	Description
1	1	State type	'>' (6EH)
2	3	Cancel Key Mask	Specifies the Cancel FDK which is active when the 'Please Enter Notes' screen is displayed. *See* Table Note 27 and Table Note 28.
3	3	Deposit Key Mask	Specifies the Deposit FDK which is active when the Confirmation screen or Escrow Full screen is displayed. *See* Table Note 27 and Table Note 29
4	3	Add More Key Mask	Specifies the Add More FDK which is active when the Confirmation screen is displayed. *See* Table Note 27.
5	3	Refund Key Mask	Specifies the Refund FDK which is active when the Confirmation screen or Escrow Full screen is displayed. *See* Table Note 27.
6	3	Extension State 1	State number for extension 1.

7	3	Extension State 2	State number for extension 2.
8	3	Extension State 3	State number for extension 3.
9	3	Reserved (000)	Reserved for future use.

Table Note 27: Each bit relates to an FDK; Bit 0 relates to FDK A, Bit 7 relates to FDK I. If a bit is 1, the corresponding FDK is active. If a bit is 0, the corresponding FDK is inactive. If the same FDK is defined in more than one mask, the latest key mask is used.

Table Note 28: If the cancel key is pressed before notes are entered, the Cancel Next State Number table entry will be executed.

Table Note 29: If the FDK specified in the Deposit Key Mask table entry is selected from the Confirmation Screen, the Good Next State Number table entry will be executed.

Table 2-50
Extension 1 to State > (BNA)

Table Entry	No. of Chars	Contents	Description
1	1	State type	'Z'
2	3	Please Enter Notes Screen (Range 000-999)	This screen is displayed when the BNA has been successfully enabled (or re-enabled), to accept a cash deposit from the cardholder. *See* Table Note 30
3	3	Please Remove Notes Screen (Range 000-999)	This screen is displayed when the BNA has refunded or rejected notes to the cardholder until the notes are removed, or timer 78 expires and the retract option is enabled. *See* Table Note 31
4	3	Confirmation Screen (Range 000-999)	This screen is displayed when all the notes are at the escrow and are valid. The screen shows the number of notes of each denomination held at the escrow, and prompts the cardholder to add more notes, deposit the notes in the escrow, or request a refund. *See* "Confirmation Screens" on page 2-83
5	3	Hardware Error Screen (Range 000-999)	This screen is displayed for 15 seconds when a hardware error (for example a note jam) occurs, so that the transaction cannot continue. *See* Table Note 32
6	3	Escrow Full Screen (Range 000-999)	This screen is displayed when the maximum number of notes which can be held in the escrow is reached. *See* Table Note 33

7	3	Processing Notes Screen (Range 000-999)	This screen is displayed while a bunch of notes is being processed after entry to the BNA.
8	3	Please Remove More than 90 Notes Screen (Range 000-999)	This screen is displayed when the BNA refunds notes to the cardholder because the number notes in the escrow exceeds the set capacity.
9	3	Reserved (000)	Reserved for future use.

Table Note 30: If the enable is successful, the screen defined by the Please Enter Notes Screen table entry will be displayed, and the Cancel Key Mask table entry will be used.

Table Note 31: If any notes are automatically rejected, or the cardholder requests a refund when all the notes are at the escrow position, the Please Remove Notes Screen table entry will be displayed when the notes are at the refund slot.

Table Note 32: If a device error such as a note jam occurs, the screen defined by the Hardware Error Screen table entry will be displayed, and the Device Error Next State Number table entry will be executed. An unsolicited status message will be sent to Central containing error information.

Table Note 33: If the maximum number of notes which can be held at the escrow is reached, the Escrow Full Screen table entry will be displayed, and the Escrow Full Key Mask table entry will be used.

Table 2-51
Extension 2 to State > (BNA)

Table Entry	No. of Chars	Contents	Description
1	1	State type	'Z'
2	3	Good Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number the terminal proceeds to when the Deposit function has been selected.
3	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number the terminal proceeds to if the cardholder presses the Cancel key to stop the Cash Deposit transaction.

4	3	Device Error Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number the terminal proceeds to if an exception has occurred which may require subsequent action by Central. *See* Table Note 34 and Table Note 35
5	3	Timeout Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number the terminal proceeds to if the cardholder fails to enter notes into the BNA before timer 77 expires, or fails to respond to the prompts on the Confirmation screen, and does not want more time.
6	3	Notes at Refund Slot Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number the terminal proceeds to if the notes remain at the refund slot after timer 78 expires. Executed only if the retract option is not configured.
7	3	Reserved (000)	Reserved for future use.
8	3	Reserved (000)	Reserved for future use.
9	3	Reserved (000)	Reserved for future use.

Table Note 34: If notes are at the escrow when a timeout occurs, the Cancel Next State Number table entry defines whether notes are left at the escrow, refunded during the Close state, or vaulted during the Close state. The host is therefore in control of what happens, either directly through a transaction request state, or indirectly by specifying a Close state.

Table Note 35: If rejected or refunded notes are not removed from the refund slot before timer 78 expires, the Device Error Next State Number table entry is executed. If notes are at the escrow when a timeout occurs, the Timeout Next State Number exit is taken and the notes are left at the escrow.

Table 2-52
Extension 3 to State > (BNA)

Table Entry	No. of Chars	Contents	Description
1	1	State type	'Z'
2	3	Set denominations 1 - 12	The three ASCII characters represent 4 bit nibble Hex values. These give three bitmaps, starting from the rightmost character. The individual bits set the denominations to active or inactive. For example, sending Hex values '10E' would set denominations 2, 3, 4 and 9 to active. All other denominations from 1 to 12 inclusive would be inactive. Active denomination type notes would then be accepted by the BNA. *See* Table Note 36, Table Note 37 and Table Note 38 Hex values '10E' are broken down to binary as follows: 1 0 E 0001 0000 1110 Taking index 1 as the right most digit and index 12 as the left most digit, the active notes set will be notes indexed 2, 3, 4 and 9. *See* Table Note 39
3	3	Set denominations 13 - 24	The three ASCII characters represent three bitmaps, starting from the rightmost character. The individual bits set the denominations to active or inactive. Bits 12 to 23 map to denominations 13 to 24 respectively. *See* Table Note 38
4	3	Set denominations 25 - 36	The three ASCII characters represent three bitmaps, starting from the rightmost character. The individual bits set the denominations to active or inactive. Bits 24 to 35 map to denominations 25 to 36 respectively. *See* Table Note 38
5	3	Set denominations 37 - 48	The three ASCII characters represent three bitmaps, starting from the rightmost character. The individual bits set the denominations to active or inactive. Bits 36 to 47 map to denominations 37 to 48 respectively. *See* Table Note 38
6	3	Set denominations 49 - 50	The three ASCII characters represent three bitmaps, starting from the rightmost character. The individual bits set the denominations to active or inactive. Bits 48 to 49 map to denominations 49 to 50 respectively. *See* Table Note 38
7	3	Reserved (000)	Reserved for future use.
8	3	Reserved (000)	Reserved for future use.
9	3	Reserved (000)	Reserved for future use.

Table Note 36: For a GBNA or GBRU device, only the denominations marked as active in the *GBNA.ini* file are recognised for selection in this state. Therefore, denomination 1 will be the first active denomination in the *GBNA.ini* file.

Table Note 37: If the enable is successful, the subset of active denominations held by the application will be re-defined by the Set Denominations Table Entry.

Table Note 38: If Extension 3 to State > is set to all zeros, it is ignored and the previous download is retained.

Table Note 39: There is a dependency on which notes are reported through the Terminal Command, 'Send Configuration - Note Definitions' as to what actual index will be reported as active (for details, see "Note Definitions (Bunch Note Acceptor)" in Chapter 9, "Terminal to Central Messages"). If an index which is not reported is attempted to be set as active, then the previous reported note of that currency and value will be set to active.

Confirmation Screens

The default Confirmation screens are M10 and M11, held in the *resrvd.def* file. These screens contain displays of the deposited note denominations. The enhanced BNA screens, U0104 and U0105 can be used instead, as described in the *APTRA Advance NDC, Developer's Guide*.

These screens can be replaced with downloaded user screens by modifying the relevant worker in the Author to reference a user screen number. However, user screens cannot display the deposited note denominations information. You can also update *resrvd.def* to reference the screen by using the SO command (for example C02).

When the notes deposited are all at the escrow position and are all valid, the screen defined by the Confirmation Screen table entry is displayed, and the Add More / Deposit / Refund Key Mask table entries are used to define the active FDKs.

If the cardholder selects the Add More FDK (specified in the Add More Key Mask table entry) from the Confirmation screen, the screen defined by the Please Enter Notes Screen table entry is displayed, and the Cancel Key Mask table entry is used.

If no deposit is made after selecting Add More Notes at the confirmation screen and before timer 77 expires, the Timeout State followed by the Timeout Next State Number table entry is executed. If a deposit is made before timer 77 expires, the Processing Notes Screen table entry is displayed until the notes have been processed.

w - Cheque Accept State

If the Cheque Processing Module (CPM) is present, this state may be used to enable the entry of cheques into the CPM.

Under state table control, the Cheque Accept State:

- Accepts cheques
- Returns physically unacceptable cheques
- Returns incorrectly orientated cheques
- Lifts full front and / or rear images
- Reads the codeline, for Central authorisation
- Captures ejected cheques that are not taken
- Reports unsolicited events.

Table 2-53
w - Cheque Accept State

Table Entry	No. of Chars	Contents	Description
1	1	State type	'w' (77H)
2	3	Reserved (000)	Reserved for future use
3	3	Leave / Capture Option	This entry defines the action to take if a physically unacceptable or jammed cheque is presented for return, but not taken: 000 - Leave at throat 001 - Capture unacceptable cheque to bin 1 If the returned cheque is unacceptable because it is too short and the table entry is set to capture the returned cheque, a jam may occur in the rear transport.

Table Entry	No. of Chars	Contents	Description
4	3	Cheque Entry Retries	Represents the number of cheque entry retries the cardholder is allowed during the execution of the state. Retries may be allowed if a physically unacceptable or incorrectly orientated cheque is detected: 000 - Do not allow cardholder retries 001 - Allow one further retry following initial rejection 002 - Allow two further retries 003 - Allow three further retries After all permissible retries have failed, the CPM accepts a physically acceptable cheque and continues to process it, even if the codeline cannot be read. For example, if this entry is set to 003 the cardholder is allowed four attempts to correctly enter the cheque. If on the last attempt the codeline is not found, the cheque is accepted as valid, but no codeline read is done.
5	3	Image Lift (000 - 003)	Specifies whether a front and / or rear image is to be lifted, if hardware capabilities allow. 000 - No cheque images are lifted 001 - An image of the front of the cheque is lifted 002 - An image of the rear of the cheque is lifted 003 - An image of the front and rear of the cheque is lifted By default the front image of the cheque is displayed. Screen C07 can be modified to display the rear image. Lifted front and rear images are deleted from the system during the Close State. See Table Note 40.
6	3	Extension State 1 (Range 000-999 or 000-ZZZ)	State number for extension state 1. *See* "Extension 1 to State w" on page 2-87 If a value of 255 is used for this entry, this indicates there is no extension state 1.
7	3	Extension State 2 (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number for extension state 2. *See* "Extension 2 to State w" on page 2-89 If a value of 255 is used for this entry, this indicates there is no extension state 2.

Table Entry	No. of Chars	Contents	Description
8	3	Cancel Key Mask	Specifies the Cancel FDK which is active when the Please Insert Cheque and Further Processing screens are displayed. Each bit relates to an FDK, as follows: Bit 0 - FDK A Bit 1 - FDK B Bit 2 - FDK C Bit 3 - FDK D Bit 4 - FDK F Bit 5 - FDK G Bit 6 - FDK H Bit 7 - FDK I If a bit is set to 1, the relevant Cancel FDK is active. If a bit is set to 0, the relevant FDK is inactive.
9	3	Deposit Key Mask	Specifies the Deposit FDK which is active when the Further Processing screen is displayed. Each bit relates to an FDK, as follows: Bit 0 - FDK A Bit 1 - FDK B Bit 2 - FDK C Bit 3 - FDK D Bit 4 - FDK F Bit 5 - FDK G Bit 6 - FDK H Bit 7 - FDK I If a bit is set to 1, the relevant Deposit FDK is active. If a bit is set to 0, the relevant FDK is inactive.

Table Note 40: If the lifting of images is requested by the Image Lift entry in the state table, then these images are lifted.

The image is stored in `C:\Program Files\NCR APTRA\Advance NDC\Data`. This can be changed using the registry, as described in the *APTRA Advance NDC, Developer's Guide*.

If the image is to be displayed in an Information Entry state, the image can be displayed in an associated screen using a standard display escape sequence, or by referencing screen C07 to display the image as part of the Further Processing Screen.

Table 2-54
Extension 1 to State w

Table Entry	No. of Chars	Contents	Description
1	1	State type	'Z' (5AH)
2	3	Please Insert Cheque Screen (Range 000-999)	This screen is displayed when the CPM has been successfully enabled (or re-enabled) to accept a customer's cheque. See Table Note 41
3	3	Processing Cheque Screen (Range 000-999)	This screen is displayed when the cheque has been successfully entered into the CPM.
4	3	Unacceptable Cheque Screen (Range 000-999)	This screen is displayed when a cheque cannot be accepted by the CPM. *See* Table Note 42
5	3	Incorrect Orientation Screen (Range 000-999)	This screen is displayed when an incorrectly orientated cheque has been entered and retries still remain.
6	3	Further Processing Screen (Range 000-999)	This screen is displayed after the Processing Cheque screen, and may be used to display the lifted images.
7	3	Cheque Captured Screen (Range 000-999)	This screen is displayed when a cheque has been captured. Typically a cheque is captured if it is returned to the cardholder but not taken. This screen is displayed for the period defined by timer 87. *See* Table Note 43
8	3	Device Error Screen (Range 000-999)	This screen is displayed when a hardware error such as a cheque jam condition occurs, preventing the transaction from being continued. This screen is displayed for a fixed time of 15 seconds.
9	3	Please Remove Cheque Screen (Range 000-999)	This screen is displayed when the cheque is returned, and is waiting to be taken by the cardholder.

Table Note 41: If the CPM is empty, the CPM is enabled to accept a cheque. If the CPM is not empty the Cheque Already Present next state exit is taken. If the CPM is successfully enabled, the screen defined by the Please Insert Cheque Screen table entry is displayed. If option digit 2c is not set, the beeper is sounded. The CPM is enabled for the time specified by timer 04, or until the Cancel key is

pressed. If timer 04 is set to greater than one minute, the CPM firmware will time out, and be treated in the same way as a timer 04 expiry.

The beeper is disabled when a cheque is detected, if the Cancel key is pressed, or if the timer expires.

If the timer expires or the Cancel key is pressed, an unsolicited timeout / cancel status message is sent to Central, and the State exits to the state defined by the Cancel / Time Out next state exit.

If the cardholder inserts a physically acceptable cheque, the screen defined by the Processing Cheque Screen Entry in the state table is displayed.

Table Note 42: If the cardholder inserts a cheque of a size or nature that makes it unable to be processed (physically unacceptable) or if the cheque becomes jammed on entry, it is returned to the cardholder, and the screen defined by the Unacceptable Cheque Screen entry is displayed. The beeper is sounded if the ejection was performed.

The cardholder is presented with the cheque for the time defined by timer 94. The beeper is stopped when the cardholder takes the cheque, or when the cheque is retracted following a failure by the cardholder to retrieve the cheque.

If the cardholder fails to retrieve the cheque, an unsolicited timeout status message is sent to Central, and there is an attempt to move the cheque to the reject / retain bin if the Leave / Capture Option in the Cheque Accept state is set to capture. The state exits to the Cheque Captured next state exit or the Cancel / Timeout next state exit, depending on the Leave / Capture Option. If the cheque is successfully moved to the bin, a security trace message (U0058) is journalled at this point to indicate that the clearing action has taken place.

If the cardholder retrieves the cheque, the CPM is re-enabled if there are retries left, as defined by the Cheque Entry Retries entry in the state table.

If the cardholder retrieves the cheque but there are no retries left, the CPM is not re-enabled, and the State exits to the state defined by the Cancel / Time Out next state exit.

Table Note 43: When a cheque is captured, it is endorsed with the locally customisable data using reserved screen U0057. For details, refer to the *APTRA Advance NDC, Developer's Guide*.

Table 2-55
Extension 2 to State w

Table Entry	No. of Chars	Contents	Description
1	1	State type	'Z' (5AH)
2	3	Cheque Already Present Next State Exit (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This exit is taken if a cheque is detected as already present in the CPM. The recommended next state is the Close state, to perform error recovery.
3	3	No Exception Next State Exit (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This exit is taken if the cheque is accepted and processed without error, although the codeline may not have been read. The recommended next state is an Information Entry state, which prompts the cardholder to enter the amount on the cheque, and optionally displays the image lifted from the cheque. *See* Table Note 42
4	3	Exception Next State Exit (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This exit is taken when an exception has occurred (that is, a device failure occurs in the CPM). The recommended next state is the Close state, to perform error recovery. *See* Table Note 44
5	3	Customer Cancel / Timeout Next State Exit (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This exit is taken when the cardholder fails to insert a physically acceptable cheque within the required time or number of retries. The recommended next state is the 4 or 8 FDK Selection Function state from which the Cheque Deposit transaction was selected. *See* Table Note 45.
6	3	Cheque Captured Exit (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	This exit is taken when the cardholder fails to take a returned cheque, which is then cleared to the CPM reject bin. *See* Table Note 46
7	3	Reserved (000)	Reserved for future use.
8	3	Reserved (000)	Reserved for future use.
9	3	Reserved (000)	Reserved for future use.

Table Note 44: If a jam occurs during cheque processing, an unsolicited message with error code '5' is sent. If an error occurs during cheque processing, an unsolicited message with error code '4' is sent. In either situation, the state takes the Exception next state exit. For details of the message see "Cheque Processing Module (Solicited / Unsolicited)" on page 9-104.

Table Note 45: When a timeout occurs when the cheque processor is enabled (timer 94 or hardware internal timer) or during the Further Processing screen (timer 0), Advance NDC activates the timeout state to display the 'Do you need more time' screen. The Customer Cancel / Timeout next state exit is taken if the customer selects No or Cancel, or fails to respond before timer 01 expires..

Table Note 46: On entry to the CPM, the front of the cheque is scanned, and an attempt is made to read the codeline. If the minimum number of three valid characters is read successfully from the codeline, the cheque is deemed to be correctly orientated. This minimum number can be changed using the Active Script Host worker.

An incorrectly orientated cheque is returned to the cardholder if there are retries left, and the screen defined by the Incorrect Orientation Screen entry is displayed. If there are no retries left, the cheque is accepted and the No Exception next state exit is taken to allow Central to determine the acceptability of the cheque.

If the cardholder fails to retrieve the invalid cheque, it is cleared to the Reject / Retained Bin. If this action takes place, an unsolicited timeout status message is sent to Central, and the state exits to the Cheque Captured next state exit. A security trace message (U0058) is journalled to indicate that the clearing action has taken place.

& - Barcode Read State

The Barcode Read State allows an application to read a barcode. Optionally a filter can be used to select an alternative flow, based on the barcode content.

When this state is entered, the screen identified by table entry 1 is displayed and the barcode reader is enabled.

The barcode filters are defined in the barcode reader configuration file, which can be downloaded using the XML configuration download described on page 10-43. For details of the barcode reader configuration file refer to the *Advance NDC, Developer's Guide*.

The downloaded filters are compared to the barcode, starting in sequence from filter index zero. If a barcode is successfully read, and filter exit extension states are defined, the barcode is checked against the barcode reader configuration file as follows:

- If a barcode filter in the configuration file matches the barcode read state, the exit defined in the extension states in the filter index is taken

  If the state number for the matched barcode filter is set to '000' or '255', the Good Barcode Read exit is taken

- If the barcode does not match any filter, there are no filters defined, or there is no next state defined in the filter index, the Good Barcode Read exit is taken.

Table 2-56
& - Barcode Reader State

Table Entry	No. of Chars	Contents	Description
1	1	'&' (26H)	State Type
2	3	Screen Number (Range 000-999)	Display screen prompting the cardholder to scan a barcode.
3	3	Good barcode Read State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number the terminal goes to if a barcode has successfully been read and no Barcode Filter matches, or there is no exit defined for the Barcode Filter Index in the Extension States.

Table Entry	No. of Chars	Contents	Description
4	3	Cancel Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the barcode scan was cancelled by the customer. *See* Table Note 47
5	3	Error Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if there is a problem reading the barcode, for example a barcode reader hardware or barcode reader configuration error. *See* Table Note 48
6	3	Timeout Next State Number (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the barcode scan times out. *See* Table Note 49
7	3	Barcode Data Destination (0-7)	Destination buffer for barcode data **0** Track3 buffer (default) (max 106 bytes) **1** Track1 buffer (max 78 bytes) **2** Track2 buffer (max 39 bytes) **3** General Purpose buffers A and B (max 64 bytes) **4** General Purpose buffers B and C (max 64 bytes) **5** General Purpose buffers C and A (max 64 bytes) **6** Barcode reader buffer identified by the character ‘e’ (max size limited by message size) **7** Amount buffer (max 8 or 12 bytes, depending on configuration). *See* Table Note 50, Table Note 51, and Table Note 52.
8	3	Active Cancel FDK key mask (Range 0-255)	The FDK keys(s) enabled to cancel the barcode scanning process. The Cancel key on the pinpad will always be enabled if there is a Cancel Exit defined.
9	3	Extension State 1 (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	Extension State 1allows additional parameters to be added in the future, as all parameters in extension states 2 to N contain the Barcode Filter exit values.

Table Note 47: The Cancel key and associated FDK are enabled if a Cancel next state exit is defined. If the cardholder selects Cancel, the device is disabled and the Cancel next state exit is taken.

Table Note 48: If a barcode cannot be read because of a technical problem, or the barcode reader is not present, the Error next state is taken. An unsolicited status message is sent to report the device fault.

Table Note 49: If the time-out defined by Timer 61 expires or a hardware time-out occurs, the internal time-out state is taken to request more time. If the request is successful the barcode reader is enabled. If the request is denied, the time-out next exit state is taken.

Table Note 50: If the scanned barcode data exceeds the fixed length of the destination buffer size, it will be truncated to the length of the buffer.

Table Note 51: If option 3, 4 or 5 is selected, and the length of the scanned barcode data exceeds 32 bytes, it will be split across the two buffers and truncated at 64 bytes.

Table Note 52: When a barcode is successfully read it is placed in the buffer specified by Barcode Data Destination. If the specified destination buffer is unknown, the terminal will go to Error Next State Number.

Table Note 53: Table 2-57
Extension 1 to State &

Table Entry	No. of Chars	Contents	Description
1	1	State Type	'Z'
2	3	Reserved	Must be '000'
3	3	Reserved	Must be '000'
4	3	Reserved	Must be '000'
5	3	Reserved	Must be '000'
6	3	Reserved	Must be '000'
7	3	Reserved	Must be '000'
8	3	Reserved	Must be '000'
9	3	Extension State 2 (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	Extension State, '000' if there is no extension state.

Barcode Read Extension States 2-8 provide a mechanism for selecting a state flow branch based on the content of the barcode read. The barcode filters, downloaded using the XML configuration

download, are compared against the barcode. When a match is found, the index of the matching filter is used to select an exit. Barcode Read Extension State 2 defines the exits for a barcode filter match with an index equal to 0, 1, 2, 3, 4, 5, or 6; Barcode Read Extension State 3 defines the exits for a barcode filter match with an index equal to 7, 8, 9, 10, 11, 12, or 13, and so on. Up to 49 filters can be defined.

Table 2-58
Extension 2 - 8 to State &

Table Entry	No. of Chars	Contents	Description
1	1	State Type	'Z'
2	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7). (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7). If this value is '000' the Good Barcode Read Next State Exit is taken when the filter matches.
3	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7)+1. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7)+1. If this value is '000' the Default Barcode Read Next State Exit is taken when the filter matches.
4	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7)+2. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7)+2. If this value is '000' the Default Barcode Exit is taken when the filter matches.
5	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7)+3. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7)+3. If this value is '000' the Good Barcode Exit is taken when the filter matches.

Table Entry	No. of Chars	Contents	Description
6	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7)+4. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7)+4. If this value is '000' the Good Barcode Exit is taken when the filter matches.
7	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7)+5. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7)+5. If this value is '000' the Good Barcode Exit is taken when the filter matches.
8	3	Next State for a Barcode Filter match with index = ((Extension State *n* - 2)*7)+6. (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	State number that the terminal goes to if the Barcode matches the Barcode Filter with index equal to ((Extension State *n* - 2)*7)+6. If this value is '000' the Good Barcode Exit is taken when the filter matches.
9	3	Next Extension State (Base 10 range 000-254 or 256-999) (Base 36 range 000-254 or 256-ZZZ)	Extension State, '000' signifies there are no more extension states.

Time-Out State

In addition to the above states, the terminal has a fixed Time-Out state. This is entered under one of the following conditions:

- Timer 00 expires on a Keyboard Entry state
- Timer 04 expires during a Deposit transaction (envelope not inserted)
- Timer 08 expires during a Night Safe Deposit transaction
- Timer 61 expires during a barcode reader scan
- Screen timer from Interactive Transaction Response message expires when numeric keypad or FDKs are active
- The cardholder fails to remove an envelope or a cheque within the period specified by timer 94
- The cardholder fails to enter notes in a Cash Accept State before timer 77 expires
- The cardholder fails to remove returned notes from a BNA or GBXX without the retract option set before timer 78 expires.

For more details of timers, see the “Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”.

On entry to the Time-Out state, screen ‘C00’ is displayed, giving the cardholder the option of more time. Timer 01 and the fast beep are started. For more details see “Re-defining Reserved Screens” on page 3-34.

You should ensure that the Time-Out state deals appropriately with audio files if a foreign language has been selected in a multiple language environment.

If the cardholder presses FDK ‘A’ (or FDK ‘I’ if the option which enables the keys to the left of the screen is set), the terminal returns to the previous state, the original timer is restarted, and beeping stops for conditions 1 and 4, or a slow beep returns for conditions 2 and 3.

If the cardholder presses FDK ‘B’ (or FDK ‘H’) or timer 01 expires, the Time-Out next state exit from the previous state is taken for condition 1, a time-out status message is sent to Central for conditions 2 and 3, or ‘T’ is placed in the general purpose buffer B for condition 4. In each case beeping stops.

If the cardholder presses the Cancel key, the Cancel next state exit from the previous state is taken for condition 1, a time-out status message is sent to Central for conditions 2 and 3, or ‘E’ is placed in general purpose buffer B for condition 4. In each case beeping stops.

The terminal may support Touch Screen FDK Emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on the screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the “FDK Emulation” section in Chapter 4, “Keyboard Data and Layouts”.

Alternatively, the terminal may support full touch screen keyboards. In this case, touch areas are defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. If the keyboard definition is not validated, the keyboard layout is not changed, the keyboard is disabled and trace message ‘T86’ is printed on the journal. For details, see Chapter 4, “Keyboard Data and Layouts”.

Chapter 3

Screen Data

Overview

This chapter provides information on the following topics:

- The screen interface
- Types of reserved screen
- Formatting rules for cardholder display screens
- Multi-language screens
- Picture display
- Touch screen reset
- The screen used for Supervisor settlement transactions.

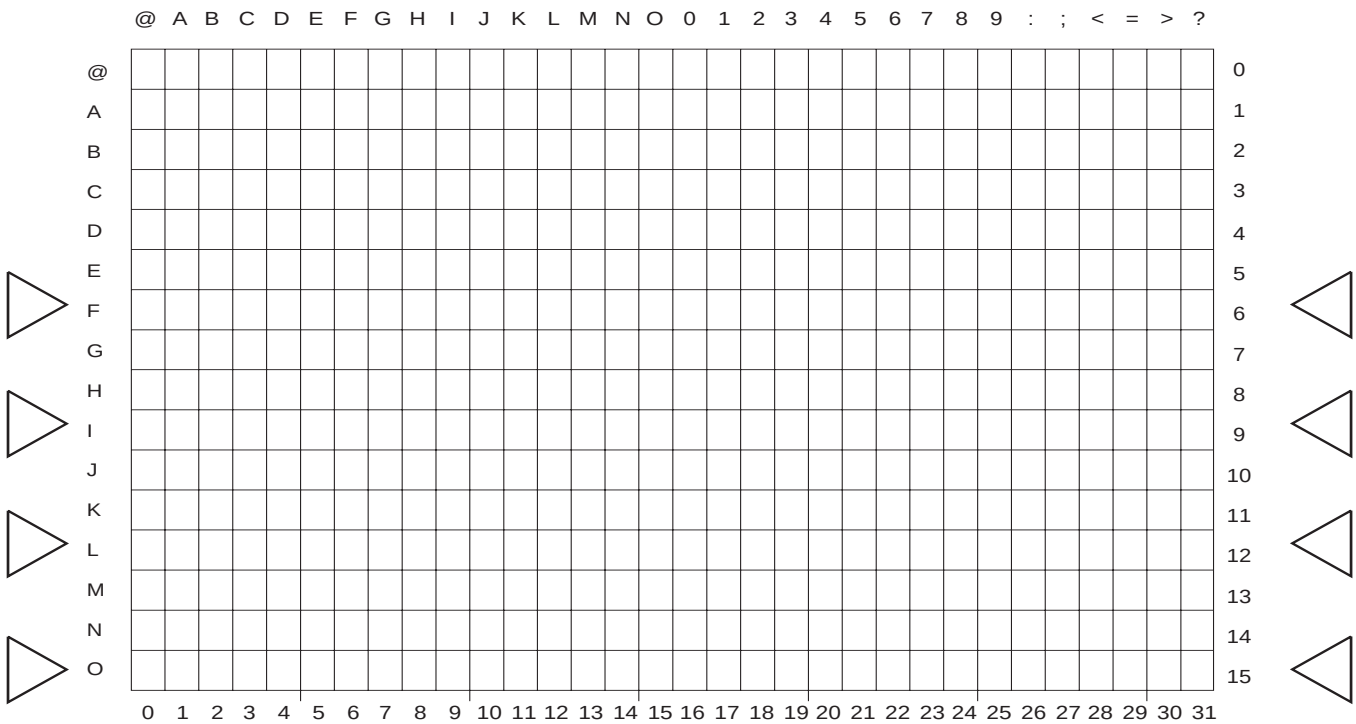
The Screen Interface

A screen is a string of characters, including control characters, that defines what is to be displayed and where to display it (cardholder screen, operator panel or printer). There are two types of screen:

- Customer screens—defined by the user
- Reserved screens—already defined within the terminal software.

The programmatic screen layout for cardholder screen and operator panel is as follows:

Figure 3-1
Cardholder/EOP Screen Layout



Customer Screens

A customer screen is a screen that you create. Advance NDC supports up to 9,999 customer screens. You decide on the text to be included, and any pictures or logos to be used.

The data is downloaded to the terminal in a screen data load message. For more details, see the “Screen / Keyboard Data Load” section in Chapter 10, “Central to Terminal Messages”.

All the screens that are accessed by the state tables are stored in the Screen Table. Each screen in the table has a unique number from 0000 to 9999. It is this number that is referenced by parameters in the state tables during transaction processing.

Customer Screen Groups

Two screen groups are used, as follows:

- Screen group ‘u’ for language-independent screen numbers
- Screen group 'l' for language-dependent screen numbers.

Screen group 'u' This defines language-independent numbers, for example, u1234. This is a four-digit screen group, so the full range of user screens is 0000 to 9999. For multi-language use, the user screens can be split into language groups. While the size of each group can be varied, it is assumed that each group will contain 1000 screens. A screen in group 'u' can also be defined as a four-digit number in double quotes, without the prefix letter, for example "1234".

Screen group 'l' This defines language-dependent screen numbers, for example, l1234. This is also a four-digit group, but will normally only define screens in the range 0000 to 0999. Screen group 'l' maps onto the 1000 screens from group 'u' which are in use for the current language. If no language is defined, then group 'l' will map to the first language group.

For compatibility, the following apply:

- Numeric screen numbers in the range 000 to 999 can still be specified, for example ‘123’.
- For state parameters, the screen numbers *must* be three numeric digits.

For examples, see “Multi-Language Screens” on page 3-33.

Reserved Screens

A reserved screen is a screen that is already defined within the terminal software. Reserved screens have fixed functions, such as displaying Supervisor prompts and menus, and are only displayed at predefined times, such as when the terminal is in Out-of-Service or Off-Line mode. Some reserved screens consist of control sequences and are used to manage different aspects of the display, for example, character sets and logos.

The numbering for reserved screens consists of an alpha character that defines the screen type, followed by two numeric digits that

define the particular screen. The exceptions to this are the error screens. These consist of an alpha character that defines the screen type, followed by four numeric digits that define the particular screen.

Note: For information about screen data on other vendors' SSTs, refer to the "Screen Data" topic in Chapter 3 of the *APTRA Advance NDC, Multi-Vendor Support Reference Manual*.

Types of Reserved Screen

The following screen types (also known as screen groups) are defined for reserved screens:

- 'A' – Supervisor facia and Enhanced Operator Interface Acknowledgements
- 'C' – Cardholder Display
- 'E or e' – Error Screens
- 'G' – Graphic Pictures
- 'I' – Supervisor Information
- 'i' – Supervisor TCP/IP, Dialup, Bunch Note Acceptor (BNA) and Settlement Screens
- 'j' - Supervisor miscellaneous
- 'K' – Extended Screen Controls
- 'L' – Logos
- 'M or m' – Supervisor Menus
- 'P or p' – Supervisor CRT and Enhanced Operator Interface Prompts
- 'R' – Simulated Receipt Pre-print
- 'S or s' – Supervisor Information Lines
- 'T or t' – Journal Trace and Acknowledgements
- 'U' – EMV Smart Card
- 'X' screens – pre-recorded audio messages.

This section discusses the following screen types:

- 'C' – Cardholder Display
- 'G' – Graphic Pictures
- 'K' – Extended Screen Controls
- 'L' – Logos
- 'M' – Supervisor Menus.

For information about 'R' screens (Simulated Receipt Pre-print), see "Simulated Pre-printed Receipt Messages" on page 5-19.

For information about the reserved screen 'C09' see "Supervisor Settlement Screen" on page 3-38.

For details of the default pre-recorded audio messages, see "Special Features" on page 3-20.

For details of the default text and layout for Supervisor menus and the other screen types not discussed here, see Appendix A, "Reserved Screens".

C – Cardholder Display

Screen type ‘C’, with the exception of screen C09, is reserved for use during cardholder transactions. For details of screen C09, see “Supervisor Settlement Screen” on page 3-38.

The ‘C’ screen type provides the following screens that are displayed at predefined times.

Screen ‘C00’

Prompts a cardholder who has failed either to make a deposit or to respond to a request for keyboard input. You must download the screen to the terminal for this to take effect. The screen must conform to the following requirements:

- If the cardholder presses FDK ‘A’ (or FDK ‘I’, if the option that enables the keys to the left of the cardholder screen is set), more time is allowed.
- If the terminal supports Touch Screen FDK Emulation instead of regular FDKs, the cardholder touches the FDK ‘A’ (or FDK ‘I’) touch area.
- If the cardholder presses FDK ‘B’ (or FDK ‘H’), the time-out next state exit of the previous state is taken.
- If the terminal supports Touch Screen FDK Emulation instead of regular FDKs, the cardholder touches the FDK ‘B’ (or FDK ‘H’) touch area.

For details, see the “Time-Out State” section in Chapter 2, “State Tables”.

Screen ‘C01’

Displayed when the terminal is in Off-Line mode.

Screen ‘C02’

Displayed when the terminal is in Out-of-Service mode.

Screen ‘C03’

Displayed when the terminal is in Supervisor mode.

Screen ‘C04’

Displayed when the terminal captures a card as a result of a card reader failure. When this occurs, the next state is executed, except in a Card Before Cash Transaction reply, when the terminal waits for a new transaction reply from Central. For details, see the “Terminal Functions for Transaction Completion” section in Chapter 10, “Central to Terminal Messages”. This screen is displayed for the amount of time specified by timer 02. For details of timers, see the “Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”.

Note: Screen C04 is also displayed when the card is captured because it has not been taken after being ejected before the PIN is entered.

Screen 'C05'

Displayed when cardholder tampering is suspected and the terminal enters Suspend mode.

Screen 'C06'

Displayed when the terminal is temporarily in Out-of-Service mode. This screen is displayed during any of the following conditions:

- When specified in a 'go out-of-service' terminal command sent from Central.
- On exit from Supply mode to Out-of-Service, if Supply mode was entered from In Service, and the auto-return to In-Service local configuration option is not set.
- If Supply mode is entered from Out-of-Service while displaying screen 'C06'.

Screen 'C07'

When table entry 5 (Image Lift option) of the "w - Cheque Accept State" (see page 2-84) is set, this screen is used to display the lifted cheque image.

This screen contains the screen control sequence 'PS', which is used to display the lifted cheque image as described in the "Lift Cheque Image Control" section on page 3-30.

If the image is required to be displayed in an "H - Information Entry State" (see page 2-26), the image can be displayed by referencing screen C07 to display the image as part of the Further Processing Screen.

G – Graphic Pictures

Screen type 'G' is reserved for graphic pictures. For details, see Appendix C, "Cardholder Screen Graphics". The screens provided are as follows:

- 'G00' – standard Insert Card picture
- 'G01' – standard Press Key picture
- 'G03' – standard Make A Deposit picture
- 'G04' – standard Take Receipt picture
- 'G05' – standard Take Money picture
- 'G06' – standard Take Statement picture.

The graphic pictures can be invoked as nested screens, and will be displayed with the top left hand corner at the current cursor position.

Up to 1000 pictures can be displayed using the Picture Control command. For details, see the “Special Features” section on page 3-20.

K – Extended Screen Controls

Screen ‘K00’ contains the screen control sequence to display the FIT-dependent logo.

Screen ‘K00’ cannot be downloaded. However, the control sequence SO ‘K00’ causes one of the logos ‘L00’ to ‘L15’ to be displayed. For details of control sequences, see the “Control Characters” section on page 3-16. The logo selected for display is defined by the Indirect Next State Index/Logo Number (PSTDX) parameter in the current FIT entry.

Screens ‘K01’ – ‘K03’ reset the receipt, journal and statement printers to their original settings.

Using the System Application within Supervisor, you can change the settings of the printers, for example, character size or margins.

To make sure that the settings are restored after using these options, screens are sent to each of the printers as follows:

Table 3-1
K – Extended Screen Controls: Restoring Settings

Screen	Optional Screen if Printer is Thermal	Printer
K01 and K09	K07 and K08	Receipt
K02 and K10	K07 and K08	Journal
K03	—	Statement

If you require the SST to maintain non-default settings before and after using the System Application, you must set screens ‘K01’ to ‘K03’ to the necessary non-default values during download.

You may define your directory for the receipt/journal specific data by editing screen ‘K07’ in the *resrvd.def* file or by downloading the screen from Central.

Screen ‘K08’ may contain the control sequence which identifies the file with the customisable data for code page 000. For details, see the “Define Downloadable Character Set” on page 5-11 in Chapter 5, “Printer Data”. By default, screen ‘K08’ is not defined.

Screens ‘K09’ and ‘K10’ may be edited to include the “Define Downloadable Bit Image” control sequence (described on page 5-12), which identifies an image and downloads it to the printer memory for processing when the “Print Downloadable Bit Image” command is present in the Transaction Reply printer stream.

Note: Some of the parameters for screens ‘K01’–‘K03’ can be set by hardware switches on the printers. If you decide to use these switches, make sure that the screens are downloaded with the same parameter values.

Note: Screens ‘K04’, ‘K05’ and ‘K06’ are not supported in APTRA Advance NDC.

The default contents for screens ‘K01’– ‘K03’ and ‘K07’–‘K10’ are defined as follows (all details are in hexadecimal):

Receipt: ‘K01’

Table 3-2
Screen Contents ‘K01’

1B 5B 31 36 33 75	Top margin 163 / 144 inch
1B 5B 30 72	Line feed 7.5 lpi
1B 28 31	G0 – set1 single size
1B 29 32	G1 – set2 single size
1B 5B 30 30 30 70	Left margin zero
1B 5B 30 34 30 71	Right margin 40 characters
0F	Select G0 set

Receipt: ‘K09’

Table 3-3
Screen Contents ‘K09’

1B 65 31	Print position of HRI barcode characters
1B 77 33	Width of barcode
1B 68 31 36 32	Height of barcode
1B 2A 31 <image filename> 1B 5C	Define Downloadable Bit Image

Journal: ‘K02’

Table 3-4
Screen Contents ‘K02’

1B 5B 30 72	Line feed 7.6 lpi
1B 28 31	G0 – set1 single size
1B 29 32	G1 – set2 single size

1B 5B 30 30 30 70	Left margin zero
1B 5B 30 34 30 71	Right margin 40 characters
0F	Select G0 set

Journal: 'K10'

Table 3-5
Screen Contents 'K010'

1B 65 31	Print Position of HRI barcode characters
1B 77 33	Width of barcode
1B 68 31 36 32	Height of barcode
1B 2A 31 <image filename> 1B 5C	Define Downloadable Bit Image

Receipt and Journal: 'K07'

Table 3-6
Screen Contents 'K07'

	Path to the Financial Institution Receipt and Journal specific data, including image files, graphic files and customer-defined code pages. Maximum length is 30. By default, this is not defined as the driver will use its own path of `\40colfil`

Receipt and Journal: 'K08'

Table 3-7
Screen Contents 'K08'

1B 26 <code page filename> 1B 5C	Define Custom Code Page. By default, this is not defined.

Statement: 'K03'

Table 3-8
Screen Contents 'K03'

1B 5B 31 34 34 75	Top margin 144 / 144 inch
1B 5B 30 72	Line feed 18 / 144 inch = 8 lpi
1B 28 31	G0 – set1 10 cpi
1B 29 32	G1 – set2 10 cpi
1B 5B 30 30 30 70	Left margin zero
1B 5B 30 38 30 71	Right margin 80 characters
0F	Select G0 set

Key for Receipt, Journal and Statement Printers

The following key applies to the receipt, journal and statement printers:

Set First Line Position

1B 5B P1 75 where P1 is a one, two or three byte ASCII representation of numbers in the range 018-288. The bottom of the first line is P1 / 144 inch and sets the top margin.

Line Feed

1B 5B P1 72 where P1 is a one, two or three byte ASCII representation of a number in the range 0-7.

The following applies for receipt and journal printers:

- P1 = 0 or 1 selects 7.5 lpi
- P1 = 2 or 3 selects 6.0 lpi
- P1 = 4 to 7 selects 5.0 lpi

The following applies for the statement printer:

- P1 = 0 or 1 selects 8 lpi
- P1 = 2 or 3 selects 6 lpi
- P1 = 4 to 7 are ignored

Character Sets

1B 28 / 29 G0 / G1 where G0 / G1 is one byte that defines a particular character set in the range 31-50 hex. For details, see Appendix B, “Character Sets”. There are more character sets for the statement printer than for the receipt or journal printer.

Set Left Margin

1B 5B P1 70 hex where P1 is a one, two or three byte ASCII representation of numbers in the range 000-038 for the receipt and journal printers and 0-(right margin – 4) for the statement printer. This sets the column position of the left margin.

Set Right Margin

1B 5B P1 70 hex where P1 is a one, two or three byte ASCII representation of numbers in the range 000-040 for the receipt and journal printers and (left margin + 4)-137 for the statement printer. This sets the column position of the right margin.

L – Logos

Screen type ‘L’ is reserved for logos. Screens ‘L00’ to ‘L15’ are reserved for 16 predefined graphic pictures such as bank logos. You can download these screens with alternative pictures or text if required.

Up to 100 logos can be displayed using the Logo Control command. For details, see “Special Features” on page 3-20.

M – Supervisor Menus

Screen type ‘M’ is reserved for Supervisor menus. They contain information on the following menus:

- Select
- Replenish
- Configure
- Access.

For the text and layout of these menus, see Appendix A, “Reserved Screens”.

The following additional ‘M’ screens have been defined which ensure that Advance NDC will operate in the same way as previous NDC+ releases if you choose not to use the touch-screen keyboard features. The actual screen display data contained in these screens is never used.

- ‘M06’ – Transaction processing standard layout
- ‘M09’ – Transaction processing standard layout with Clear / Cancel keys swapped.

You may edit these screens to customise the default layouts.

Editing the Contents of Reserved Screens

The reserved screens are defined in a plain ASCII text file named *resrvd.def*, which you can edit. This file may be used as a source for new screens and keyboard layouts. It may also be used to edit screens and keyboards. It allows keyboard layouts to be defined locally without any impact on Central.

Reserved Screen Constraints

The *resrvd.def* file has certain constraints on its use. Each screen definition starts with the screen number inside single quotation marks. There are then three spaces, followed by the first line of screen data, which is also enclosed in single quotation marks. A LF / CR must follow the trailing quotation mark.

As well as the screen text, the *resrvd.def* file contains placeholders, indicated by the percent (%) character, where dynamic data is to be included in a screen, for example, in screens I03, I04, T17, T18 and so on. If you are editing or localising the text, these placeholder characters must be left in place; only edit the preceding or

surrounding text. For example, in the following screen I08 line, edit/localise only the words 'CURRENT SCREEN' and do not remove the '%' placeholder:

```
CURRENT SCREEN = %
```

Subsequent lines of the screen are added until the last line. This last line terminates like the others but is followed by exactly one empty line before the next screen definition.

Note 1: Note: The *resrvd.def* file must not contain any TAB characters. Use the SPACE character instead.

Note 2: If you use an editor that adds control characters, ensure that they are not added to the *resrvd.def* file.

Formatting Rules for Cardholder Display Screens

The formatting rules for all screens that are displayed on the cardholder screen during State Table processing include the following:

- Display Characters
- Control Characters
- Track 1 Name Display
- Special Features
- International Currency Display Format.

For general points to consider when you are preparing screens for display, see “Displaying Pictures” on page 3-35.

Cardholder Screen: Display Characters

The cardholder screen can display any character contained in the following character sets:

Table 3-9
Cardholder Screen: Character Sets

Character Set ID	Number of Characters	Designator
Single size alphanumeric 1	96	‘1’
Single size alphanumeric 2	96	‘2’
Standard graphics 1	64	‘3’
Standard graphics 2	64	‘4’
Standard graphics 3	64	‘5’
Double size alphanumeric 1	96	‘>’
Double size alphanumeric 2	96	‘?’

Single size alphanumeric 1 is the standard character set. Other character sets can be accessed through the Select Character Set control sequence.

The following character sets contain customer-defined characters.

Table 3-10
Character Sets with Customer-Defined Characters

Character Set ID	Number of Characters	Designator
Customer graphics 2 (Arabic)	64	‘7’
Chinese 1	64	‘:’
Chinese 2	64	‘;’
Double size character graphics (Arabic)	64	‘B’

Two character sets can be active at any one time. Normally characters are displayed from the primary character set, but individual characters can be displayed from the secondary set using the ‘VT’ control.

For the default character sets provided on cardholder screens, and printers, see Appendix B, “Character Sets”.

Operator Interface Display Characters

The enhanced operator interface can display any character contained in the following character set:

Table 3-11
Enhanced Operator Interface: Character Set

Character Set ID	Number of Characters	Designator
Single size alphanumeric 1	96	‘1’

Control Characters

The function of each control character for cardholder screen activity is defined in the following table:

Table 3-12
Cardholder Screen: Control Character Functions

Character	ASCII Hex Code	Function
FF	0C	Clears the screen and positions the cursor in the top left hand corner of the screen. Sets blinking to 'off' and resets foreground and background colours to their defaults. NCR recommends you use the FF (form feed) control character at the start of the screen following an idle screen. This ensures the idle sequence is stopped before the next screen is displayed.
SO	0E	Inserts the screen called by the next 3, 5 or 6 characters. Screens can be 'nested' to 5 levels using SO. **Note**: A screen number specified as 3 decimal digits is a language-independent screen number unless the group size is 1000 or greater, in which case the screen is adjusted for language. A screen number specified as 4 decimal digits prefixed by 'u' (u1234) or as 4 decimal digits in double quotes ("1234") is a language-independent screen number. A screen number specified as 4 decimal digits prefixed by 'l' (l0234) is a language-dependent screen number and is adjusted for language. If the language-adjusted screen has not been loaded, then the unadjusted screen will be used instead. This enables logos and pictures to be defined just once in the base language.
SI	0F	Sets the cursor to the position indicated by the next two characters (row selected first, column selected second). Display data remains unchanged. The following characters are used to define rows on the cardholder screen: @,A,B,C,D,E,F,G,H,I,J,K,L,M,N,O where '@' is the top row and 'O' is the bottom row. The following characters are used to define columns on the cardholder screen: @,A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,0,1,2, 3,4,5,6,7,8,9,:,;,<,=,>,?

Character	ASCII Hex Code	Function
		where '@' is the left-hand column and '?' is the right-hand column. For a diagram showing the cardholder screen layout and FDK alignment, see "Cardholder / EOP Screen Layout" on page 3-2. For a diagram showing the Touch Screen FDK Emulation area, see the "FDK Emulation" section in Chapter 4, "Keyboard Data and Layouts". The cursor position is automatically reset to column '@', row '@' at the end of the outermost screen or after an idle screen delay control sequence.
HT	09	Causes the name encoded on Track 1 of the card to be displayed, starting at the current cursor position (32 characters maximum). Both ISO and VISA display formats are supported.
DC1	11	Enable video. Shows the screen display.
DC2	12	Disable video. This command inhibits the screen display so that the cardholder does not see the display being built on screen. NCR recommends that you send a 'disable video' as the first control character in the screen, and an 'enable video' as the last control character in the screen.
ESC	1B	Control character which introduces supplementary control codes for the following features: - Voice - Screen blinking and colour control - Changing display in idle - Select character set - Left margin control - Logo control - Picture control - Set display mode control - Display image files control - Lift cheque image control - Animation For details, see "Special Features" on page 3-20.
CR	0D	Causes the cursor to be moved to the character position specified by the current left-hand margin on the following line.
VT	0B	Causes the next character to be displayed from the secondary character set.

Note: Use of the full range of control characters in reserved screens is restricted. Only reserved screens in group ‘Y’ may contain any of the above control characters. All other reserved screen groups are limited to using SO (OE hex) and CR (OD hex).

Track 1 Name Display

For display purposes, Track 1 must contain the following data, in one of two formats:

Table 3-13
Track 1 Data Formats

Format A	Format B
Start Sentinel = ‘%’	Start Sentinel = ‘%’
Format Code = ‘A’	Format Code = ‘B’
Surname	Account Number (optional up to 19 characters)
Surname Separator = ‘/’	Field Separator = ‘^’
First Name and Title	Country Code (optional)
Field Separator = '^'	Surname
Discretionary Data (optional)	Surname Separator = ‘/’
End Sentinel = '?'	First name and Title
LRC	Field Separator = ‘^’
TOTAL: Maximum 79 chars.	Discretionary Data (optional)
	End Sentinel = ‘?’
	LRC
	TOTAL: Maximum 79 chars.

All the control characters defined above are mandatory and must be encoded whether or not all the fields are used.

The combined length of the surname, first name and title (excluding trailing spaces and surname separator) must be between 1 and 25 characters. If it exceeds this, the name field is ignored.

Four options are provided to control the extraction of the first name and title fields:

- ISO
- VISA
- Auto Select Backwards Search
- Auto Select Forwards Search.

ISO Format Cards

The separator between the first name and title is a space. This option uses a backward search for the separator.

- (first name, spaces allowed) (space) (title with no space) (space)
- (first name, spaces allowed) (space) (title with no spaces)
- (first name, spaces allowed) (two or more spaces)
- (space) (title with no spaces) (space)
- (first name with no spaces)-
- (first name with no spaces) (one or more spaces).

VISA Format Cards

The separator is a full stop. This option uses a backward search for the separator.

- (first name, full stops allowed) (full stop) (title with no full stops)
- (first name, full stops allowed) (full stop)
- (full stop) (title with no full stops)
- (first name with no full stops).

Auto Select Backwards Search

This option selects between ISO and VISA automatically, but places restrictions on the permitted formats.

- (first name, spaces allowed) (space) (title with no spaces) (space)
- (first name, spaces allowed) (two or more spaces)
- (space) (title with no spaces) (space)
- (first name with no spaces) (one or more spaces)
- (first name with full stops allowed) (full stop) (title with no full stops)
- (first name, full stops allowed) (full stop)
- (full stop) (title with no full stops)
- (first name with no full stops)
- (name with spaces).

Auto Select Forwards Search

This option selects between ISO and VISA automatically, but places restrictions on the permitted formats.

- (first name with no spaces) (space) (title, spaces allowed) (space)
- (space) (title, spaces allowed) (one or more spaces)
- (first name with no spaces) (one or more spaces)
- (first name with no full stops) (full stop) (title, full stops allowed)
- (first name with no full stops) (full stop)
- (full stop) (title, full stops allowed)
- (first name with no full stops)
- (name with spaces).

ABA Format Cards

These are the same as VISA format, with an optional three-digit country code immediately before the surname. This code is not displayed.

Name Display

When the name display is invoked at the current cursor position by the HT screen control character, a space is inserted between the fields. The name display is the same for both formats:

TITLE b FIRST NAME b SURNAME

TITLE b SURNAME

FIRST NAME b SURNAME

SURNAME

where b = space

Note: If an invalid control sequence is included in a screen, a ‘]’ character is displayed.

Special Features

The following features can be accessed by using the ‘ESC’ character and supplementary control codes:

Table 3-14
Display Special Features

Feature	Introducer	Identifier
Voice	ESC ‘P’	‘0’
Screen blinking and colour control	ESC ‘[‘	‘m’
Changing display in idle	ESC ‘[‘	‘z’

Feature	Introducer	Identifier
Select primary character set	ESC ‘(‘	
Select secondary character set	ESC ‘)’	
Left margin control	ESC ‘[‘	‘p’
Logo control	ESC ‘P’	‘1’
Picture control	ESC ‘P’	‘2’
Set display mode control	ESC ‘P’	‘i’
Display image files control	ESC ‘P’	‘E’
Lift cheque image control	ESC ‘P’	‘S’
Animation (may use picture control or display image files control)		
MPEG (may use picture control or display image files control)		

Voice

If digital audio hardware is installed, the terminal attempts to play pre-recorded messages in some states. Make sure that the pre-recorded message is brief enough to play completely before the state is timed out. The terminal attempts to play messages at the following times:

PIN Entry (Message 7) The message starts during a PIN Entry state or Enhanced PIN Entry state when the card has been read and recognised. If a Card Read – PIN Entry Initiation state is used, the message starts as soon as the card is detected by the terminal.

Transaction Request (Message 1) The message starts when a Transaction Request message is sent to Central.

Card Taken (Message 8) The message starts as soon as a card is taken in the Close state. If the card has already been taken, the message starts on entry to the Close state.

The voice messages occur even if additional messages are invoked, unless the voice feature is disabled by an Enhanced Configuration Parameters Load message. For details, see the “Enhanced Configuration Parameters Load” section in Chapter Table 10-1, “”.

The following ten messages are supplied as defaults:

0 We regret that the terminal’s services are not available.

1 Please wait while your transaction is processing.

2 Enter the amount when you are ready.

3 Your card and receipt are ready for removal.

4 Please select the service required and the account to be charged.

6 Please take your cash.

7 Welcome. Please enter your secret number.

8 Thank you for banking with us.

9 Please take an envelope from the dispenser and place your deposit inside. Then enter the amount when ready. Place the sealed envelope in the slot, where it will be checked and credited to your account.

12 Tone.

Note: Messages 5, 10, 11 and 13-998 are not provided. Message 999 is interpreted as a 'stop' command.

Digital Audio Control

Digital audio is invoked by the following control sequence:

Table 3-15
Digital Audio Control Sequence

Character	Description	Number of Characters
ESC 'P'	Device control string introducer	2
'0'	Control string ID	1
Variable	Message number, range 00 - 999	Var (2 - 3)
';'	Separator	1
Variable	Number of concatenated messages (0 - 3) *See* Table Note 1	1
ESC '\'	String terminator	2

Table Note 1: This parameter is included for migration purposes only and is ignored. Only one message can be played for each voice control sequence.

Screen Blinking and Colour Control

You can control the blinking of data and change the colour of data displayed on the screen with the following control sequence. This sequence is ignored by the enhanced operator interface.

Table 3-16
Screen Blinking and Colour Control

Character	Description	Number of Characters
ESC '['	Control Sequence Introducer	2
Variable	Screen blinking and colour control commands	2
;	Field separator The variable field, separated by field separators, can be repeated up to three times. There should not be a field separator after the last parameter.	1
m	Function-defining character	1

The variable field is made up from the following commands:

Blinking Commands

Table 3-17
Blinking Commands

Resets colours to defaults and blinking off	00
Set blinking on	10
Set blinking off	11

Foreground Colour Control Commands

Table 3-18
Foreground Colour Commands

	Intensity	
	Low	High
Black Foreground	20	B0
Red Foreground	21	B1
Green Foreground	B2	22
Yellow Foreground	B3	23
Blue Foreground	24	B4
Magenta Foreground	25	B5
Cyan Foreground	26	B6
White Foreground	B7	27

These foreground (text) and background colour commands can also be used with the Windows display set to High Color (16 bit) or above.

Background Colour Control Commands

Table 3-19
Background Colour Commands

	Intensity	
	Low	High
Black Background	30	C0
Red Background	31	C1
Green Background	C2	32
Yellow Background	C3	33
Blue Background	34	C4
Magenta Background	35	C5
Cyan Background	36	C6
White Background	C7	37
Transparent background (one code only)		80

Default Foreground Colour Control Commands

Table 3-20
Default Foreground Colour Commands

	Intensity	
	Low	High
Black Default Foreground	60	F0
Red Default Foreground	61	F1
Green Default Foreground	F2	62
Yellow Default Foreground	F3	63
Blue Default Foreground	64	F4
Magenta Default Foreground	65	F5
Cyan Default Foreground	66	F6
White Default Foreground	F7	67

Default Background Colour Control Commands

Table 3-21
Default Background Colour Commands

	Intensity	
	Low	**High**
Black Default Background	70	G0
Red Default Background	71	G1
Green Default Background	G2	72
Yellow Default Background	G3	73
Blue Default Background	74	G4
Magenta Default Background	75	G5
Cyan Default Background	76	G6
White Default Background	G7	77

When a Blinking On control sequence appears in the screen data, any display characters that follow are blinked until a Blinking Off control sequence or the data delimiter at the end of the outermost screen is reached, or an idle screen delay sequence occurs. Graphics are not blinked, unless they are character-based logos.

The colour change commands will have an effect on the levels of grey displayed on a monochrome screen.

Note: To set up default foreground and background colours for a screen, the control sequence should be placed before the clear screen control character. The reset attributes command will cause the default foreground and background colours to be replaced by those defined in *resrvd.def*. As attributes are reset each time a new screen number is to be displayed, you should ensure that the required default settings are applied each time a new screen is to be displayed.

Changing Display During the Idle Loop

It is possible to have a changing screen display on the cardholder screen while the terminal is idle, waiting for card entry. In this situation, the terminal cycles through the specified display sequence. If a delay control sequence occurs at the end of the idle screen, the loop is repeated indefinitely until a card is entered.

You can use this feature on the cardholder screen for advertising, preventing screen burn-in or when the terminal is in Out-of-Service, Off-Line, Supervisor (when control is at the rear) or Suspend mode.

The feature is invoked by the following control sequence, which is included in the idle screen referenced from the Card Read state:

Table 3-22
Change Display While Idle

Character	Description	Number of Characters
ESC '['	Control Sequence Introducer	2
Variable	Delay Time in 100 millisecond intervals (000-999)	3
'z'	Function-defining character	1

If this control sequence appears anywhere other than in the idle screen, it is ignored. For example, idle screens in Out-of-Service mode must be defined for reserved screen 'C02', not the default display screen '002'. Nested screens can be invoked from the idle screen to increase the amount of data that can be displayed during the idle sequence.

For example, user-defined screens 20 and 21 will be displayed alternately for 10 and 15 seconds if the following idle screen is defined:

```
S0 020 ESC [100z S0 021 ESC [150z
```

An idle screen delay sequence resets the following screen controls:

- Cursor position reset to '@@'
- Blink control off
- Character set – single size alpha
- Left margin set to left-most column

Foreground and background colours are reset to their defaults as defined in *resrvd.def*.

If you are using rotating idle screen sequences for Out-of-Service or Supervisor screens, NCR recommends that you send a screen download containing the following information:

- A non-rotating idle screen at the start of the download
- Any nested screens that are to be used in the idle sequence
- A top-level Out-of-Service / Supervisor screen at the end of the download.

If you do not follow these guidelines, you may find that the idle sequence jumps to its opening screen each time a screen download message is sent.

Select Primary Character Set

ASCII codes in the range 20-7F hex invoke display characters from the single size alphanumeric 1 character set. Characters from additional character sets including graphics can be invoked by the following control sequence:

Table 3-23
Select Primary Character Set

Character	Description	Number of Characters
ESC '('	Control Sequence Introducer	2
Variable	Character Set Designator	1

When a Select Primary Character Set control sequence appears in the screen data, the primary display characters that follow are invoked using the specified character set, until the data delimiter at the end of the outermost screen is reached, or until an idle screen delay sequence occurs. If this happens, the character set defaults to single size alphanumeric 1 until another Select Primary Character Set control sequence appears.

Select Secondary Character Set

ASCII codes in the range 20-7F hex, preceded by a 'VT' character, invoke display characters from the customer graphics 1 character set. Characters from additional character sets can be invoked for the screen by the following control sequence:

Table 3-24
Select Secondary Character Set

Character	Description	Number of Characters
ESC ')'	Control Sequence Introducer	2
Variable	Character Set Designator	1

When a Select Secondary Character Set control sequence appears in the screen data, the secondary display characters that follow are invoked using the specified character set, until the data delimiter at the end of the outermost screen is reached, or until an idle screen delay sequence occurs. If this happens, the character set defaults to customer graphics 1 until another Select Secondary Character Set control sequence appears, unless screen 'M15' has been changed.

Note: Customer graphics 1 is not supported by the basic or enhanced operator interfaces.

Left Margin Control

The column position of the cursor following a CR control character can be set by using the following control sequence. The default is column 00.

Table 3-25
Set Left Margin Position

Character	Description	Number of Characters
ESC '['	Control Sequence Introducer	2
Variable	Column Number (00-31)	2
'p'	Function-defining character	1

When a Left Margin control sequence appears in the screen data, all subsequent CR control characters will return the cursor to the column specified, until either the data delimiter at the end of the outermost screen is reached or until an idle screen display sequence occurs. The left margin control will then default to column 00.

Set Display Mode Control

Advance NDC supports display modes of 640 by 480 and above. If the Set Display Mode control is sent, it is ignored as screen resolution cannot be changed at runtime. For more information about display resolution refer to the *APTRA Advance NDC, Developer's Guide.*

Logo Control

This command is used for the cardholder screen to display one of 100 logos stored on the system disk.

Table 3-26
Select Logo

Character	Description	Number of Characters
ESC 'P'	Device Control String Introducer	2
'1'	Control String ID	1
Parameter	The logo number to be displayed in the range 00-99.	2
ESC '\'	String Terminator	2

A logo is the same as a picture. Logos are displayed from the current cursor position. After displaying the logo, the cursor is at the same column position as the start of the logo. The row position will be the next free line after the logo.

The logo is displayed, but will be clipped if the difference between the current row position and the maximum row position (15) is less than the logo length, or if the difference between the current column position and the maximum column position (31) is less than the width of the logo.

If the logo files are large, the capacity of the system disk may be reached before the limit of 100 logos.

Picture Control

This command is used for the cardholder screen to display one of 1000 pictures stored on the system disk.

The six predefined lead-through pictures (*pic00<?>.pcx*) are numbered '000'– '001', '003'–'006', and are also displayed by reserved graphics screens G00–G01, G03–G06. The pre-defined pictures are stored in *\ssds\dll* on the SST. Screen G02 is not used and screens G07–G09 are reserved.

Note: Various graphic formats are supported, including PCX, JPEG, GIF, TIFF, and JIFF. NCR recommends that a bitmap format, for example BMP or PCX, is used if display performance is critical. The use of highly compressed formats, such as JPEG may result in degradation of the display performance.

Pictures can be displayed with the following control string:

Table 3-27
Picture Control Command

Character	Description	Number of Characters
ESC 'P'	Device Control String Introducer	2
'2'	Control String ID	1
parameter	The picture number to be displayed. Range 0-999.	Var (1-3)
ESC '\'	String Terminator	2

Pictures are displayed from the current row position. The picture is displayed, but will be clipped if the difference between the current row position and the maximum row position (15) is less than the picture length, or if the difference between the current column position and the maximum column position (31) is less than the width of the picture.

If the picture files are large, the capacity of the system disk may be reached before the limit of 1000 pictures.

Display Image Files Control

This control code allows you to display pictures on the screen, using the following control string

Table 3-28
Display Image File Command

Character	Description	Number of Characters
ESC 'P'	Device Control String Introducer	2
'E'	Control String ID	1
parameter	The name of the image file to be displayed	Var
ESC '\'	String Terminator	2

The filename is an ASCII string containing the filename and optionally the path of the image file. The default path is *C:\SSDS\DLL*.

Note: When an AVI file is defined in a download, Advance NDC expects the filename to contain no more than eight characters (*<xxxxxxxx>.avi*). If a longer name is used, anything after the eighth character is ignored.

When a screen containing this control sequence is displayed, the image is drawn starting from the current cursor position.

Lift Cheque Image Control

This control code allows you to display a lifted cheque image on the screen, using the following control string:

Table 3-29
Display Lifted Cheque Image Command

Character	Description	Number of Characters
ESC 'P'	Device Control String Introducer	2
'S'	Control String ID	1
(x,y)	x = Width Scaling y = Height Scaling as percentages of total width/height	Var
Image Path	Path to directory where image is stored. Must be the same directory as specified when the CPM was configured.	Var
'/'	Separates Image Path and Filename	1
Filename	Name of Image File to be displayed	Var
ESC '\'	String Terminator	2

The filename is an ASCII string containing the filename of the cheque image file; for example, *cheque.bmp*.

When a screen containing this control sequence is displayed, the cheque image is drawn starting from the current cursor position.

Animation and Digital Video

This enables you to display a predefined animation or digital video sequence on the screen. This sequence is a type of picture and is displayed as a picture. For details, see "Picture Control" on page 3-29.

An animation or digital video sequence may alternatively be defined as a file. In this case it is displayed as an image file. For details, see "Display Image Files Control" on page 3-30.

Microsoft AVI (*.avi*) movies and industry-standard MPEG (*.mpg*) video / audio files are supported through the software.

International Currency Display Format

The Amount Display screen is an overlay screen which you assign and which is referenced from an amount entry state. This feature allows you to display an amount entry field, relating to the specific currency, and an entry echo field. This is used on screens that prompt for amount entry.

The cardholder screen cursor is set to the left of the echo field for amounts entered by the cardholder. You can also define an echo field format for amount entry. This is a simple text string that is displayed at the cursor position on entry into an amount entry state. The maximum length of the echo field is 32 characters. This includes up to 12 data entry characters (*), a character defining the decimal point position, zero prefill characters and leading currency characters.

The only screen control characters that can appear in this screen are the 'set cursor position' character, and the 'secondary character set introducer' (VT) character. All other characters are ignored. If you need to use some other attribute for the amount display screen, you must include it in the screen on which the amount screen is superimposed (the screen called from state table entry 2 of an amount entry state).

The decimal point character can be '.' or ','.

The following example shows the echo field for eight-digit fields, and then the extensions for twelve digits.

Currency Echo Example

If the screen contains SI'@@LIRA ***0,000', the following is displayed at the top left corner of the cardholder screen:

LIRA 0,000	Initial display before amount entry by cardholder
LIRA 0,001	First entry cardholder types 1
LIRA 0,012	Second entry cardholder types 2
LIRA 0,123	.
LIRA 1,234	.
LIRA 12,345	.
LIRA 123,456	.
LIRA 1234,567	.
LIRA 2345,678	Eighth entry cardholder types 8.

If no echo field format is defined, for example SI '@@', a default screen is used, '$ *****0.00'.

When configured by the option in the Configuration Parameters Load message, the amount entry buffer can contain up to twelve digits. For details, see the "Configuration Parameters Load" section in Chapter 10, "Central to Terminal Messages". This affects the amount echo field in the following ways:

- Up to 12 data entry characters (*) can be used
- the default is '$ *********0.00' if no echo field format is defined.

Example of Default Echo Display Format

bbbbb$b0.00	Initial default display before amount entry by cardholder
$b0.01	First entry cardholder types 1
$b0.12	Second entry cardholder types 2
$b1.23	Third entry cardholder types 3
$b12.34	Fourth entry cardholder types 4
.	.
.	.
$b123456.78	Eighth entry cardholder types 8
where b = space	

Multi-Language Screens

You can create up to 9,999 multi-language cardholder screens to be displayed as requested from one set of state tables. You do this by defining a group of screens for each language, in which the equivalent screen for all languages has the same relative position within the group. Make sure that all the screens for which a choice of languages can be made are in the group. Note that nested screens must have absolute positions.

The first group must start at ‘000’ or ‘0000’, and contain those screens for which language selection is not possible, that is, screens displayed from the Card Read state and Language Select From Card state. Screens normally associated with Not-In-Service conditions, such as Out-of-Service, Supply and Off-Line, should also be in this group if the ‘CXX’ default screens are used.

You do not need to change the state tables, but you must include a “Y - Eight FDK Selection Function State” (page 2-63) or “V - Language Select From Card State” (page 2-58) in order to select the language.

For example, if four languages are required and three digits are used, the screen group bases could be:

Language A – ‘000’

Language B – ‘100’

Language C – ‘200’

Language D – ‘300’

The screen group size would be ‘100’.

If screen ‘025’ is displayed from a state table, the screen is downloaded as:

‘025’ for language A

‘125’ for language B

‘225’ for language C

‘325’ for language D.

If four languages are required and four digits are used, the screen group bases could be:

Language A – ‘0000’

Language B – ‘1000’

Language C – ‘2000’

Language D – ‘3000’

The screen group size would be ‘001’, representing ‘1000’.

If screen ‘025’ is displayed from a state table, the screen is downloaded as:

‘0025’ for language A

‘1025’ for language B

‘2025’ for language C

‘3025’ for language D.

Re-defining Reserved Screens

When multi-language screens are supported, you must redefine the reserved screens used during cardholder transactions as follows:

- ‘C00’ – must contain an insert screen with the control sequence SO l0000.

  The first screen (‘0000’) in each language group must contain the time-out screen. If a control sequence other than SO l000 is in screen ‘C00’, the same screen will be displayed for all languages.

- ‘C01’, ‘C02’, ‘C03’ – No change in definition.
- ‘C04’ – Contains a null value if not used.

  Contains an insert screen for the relative screen number to be displayed for each language; for example, the control sequence SO xxx, where xxx is the offset in the screen group.

  Contains screen data if the same screen is to be displayed for all languages.

- ‘C05’ – No change in definition.
- ‘C06’ – No change in definition.
- ‘C07’ – No change in definition.

The usage of each screen does not change.

Displaying Pictures

This section discusses some points to consider when you are preparing pictures for display on the terminal.

Palette Information

When defining a full screen picture to be displayed with text, the picture palette should be adjusted to conform to the standard 16 colour palette to ensure that the text is visible.

Note: Various graphic formats are supported, including PCX, JPEG, GIF, TIFF, and JIFF.

The following table shows the default values for the standard 16 colour palette:

Table 3-30
Default Values for 16-Colour Palette

Index	Red	Green	Blue
0	0	0	0
1	0	0	170
2	0	170	0
3	0	170	170
4	170	0	0
5	170	0	170
6	170	170	0
7	170	170	170
8	85	85	85
9	85	85	255
10	85	255	85
11	85	255	255
12	255	85	85
13	255	85	255
14	255	255	85
15	255	255	255

Picture Resolution

The first picture displayed determines the amount of stretching that is applied to all pictures. For example, if the desktop resolution is set to 1024 x 768 and the first picture displayed is 800 x 600, the picture

is scaled up to 1024 x 768. All subsequent pictures will be scaled by the same amount.

Guidelines for Pictures

The following points should be considered when you are preparing pictures for screen display:

- To avoid display flicker with a full screen `pcx` file, include a form feed at the start of the screen definition
- If a sub-picture has a different palette from the main picture, it is displayed in the palette of the main picture
- A reset attributes command will cause the default palette to be used instead of the main picture palette. The colours of the displayed picture will be altered if the two palettes are different. The colours will remain the same if you:
  - — change the *resrvd.def* file so that it has M15 set up as the original sequence for new screens (allowing graphics colours to be specified) and M16 as the form feed substitute
  - — or change screens that use default settings to use direct settings allowing you to specify the colour.
- If one main picture is overwritten by another picture of a different palette, the colours of the picture being overwritten will alter while the screen is changing
- The supply mode screen, C03, is a cardholder display used when the terminal is in Supervisor mode. It **must** be of the same resolution and palette as those used during the rest of Supervisor mode if swapping from back to front displays
- Screens used during an idle sequence should be constructed using the same resolution and palette values.

Touch Screen Reset

A screen reset sequence is included as a reserved screen, ‘M15’, in the *resrvd.def* file. This screen sets the left margin and the primary and secondary character sets. It is sent when Advance NDC displays a primary screen (that is, one that is not part of a nested sequence).

A second screen reset sequence, ‘M16’, is also included in the *resrvd.def* file. This screen can contain sequences to be sent to the display when the form feed character (0C hex) is received from Central. The default sequence clears the screen and sets the cursor to the top left-hand corner, sets screen blinking off, sets the colours to default and resets the display mode to the Advance NDC default.

The default data for these two screens is as follows:

‘M15’ ESC[00p ESC(1 ESC)6

‘M16’ DC2 ESC[00m ESCPi0 ESC \ FF

For more information, see “Special Features” on page 3-20 and “Control Characters” on page 3-16.

Supervisor Settlement Screen

Supervisor settlement transactions are designed to allow a set of SST-related transactions (such as settlement of cash in the SST) to be performed using the operator keyboard, and without a Supervisor card. This avoids having to use a Supervisor card to activate a set of transaction flows in a download.

A transactions parameter screen (C09) is used for this purpose and Supervisor settlement transactions can only be carried out if the information relating to the transactions to be performed has been downloaded in reserved screen C09.

Selecting the Supervisor transactions function (menu item `15 SUPV TRANS`) on the Supervisor Replenish menu enables Supervisor settlement transactions. This indicates that on the next entry to In-Service mode, the operator panel is to be enabled for one or more predefined settlement transactions to be performed prior to the cardholder interface being enabled.

Using the Front or Rear Interface for Settlement

On a front-access SST, the cardholder display and keyboard or the front operator keyboard can be used to perform the transactions. On a rear-access SST, the cardholder display shows the In Supervisor screen (003) throughout the duration of the Supervisor settlement transactions.

Rear Settlement and International Security (DAPI-7)

If International Security is configured, rear settlement is not always possible. If an EPP is configured and PIN entry is required, rear settlement is not possible owing to a restriction in CEN-XFS. If International Security is configured but PIN entry is not required, rear settlement can be performed.

For more information about Security configuration, refer to the APTRA on-line documentation under **APTRA XFS | Programmer's Reference**.

Supervisor Settlement Transactions

When the operator selects the Supervisor Transactions function at the SST, screen C09 is checked for valid Supervisor settlement transaction data.

Screen C09 contains a definition of the card track data that would be on the supervisor card, and definitions for all the data that is required to be collected by the transaction flows. For each transaction, the opcode buffer that would have been created by the transaction flow is also defined. The format of the screen is defined in "Transactions Parameter Screen C09" on page 3-40.

During settlement, the operator may be presented with the following prompts for data entry:

`PIN-, FUNC-, CASH-, BUFFER B-, BUFFER C-`

For more information about the prompts for data entry, refer to the the *APTRA Advance NDC, Supervisor's Guide*, chapter 3, "Replenish Menu", section "15 SPVR TRANS (Supervisor Transactions)".

The screens for all functions, and the `PLEASE WAIT` screen shown during processing, are provided in *resrvd.def*. The screens may be customised to show more clearly what functions are offered and what values are to be entered. For example, the `BUFFER C-` prompt could be changed to display `ENTER NO OF NOTES` as the prompt.

For the default settlement screens in *resrvd.def*, see "'i' Supervisor Settlement" on page A-69.

On completion of data entry, the Transaction Request message is created using the specified Transaction Request state, file and entered data, and sent to Central (the Host). For details of the Transaction Request state, see "I - Transaction Request State" on page 2-29.

If the host does not respond within the transaction timeout period, the Central Response Timeout Next State Number exit from the Transaction Request state is used to check against the next state / action table from the data file, and the appropriate action is taken.

Valid Commands

Only 'Print Immediate' and 'Next State and Print' commands are acceptable; any other commands are acted on as a 'Next State and Print' command. Only the next state field and print fields for the receipt / journal are used; other fields in the message are ignored. Therefore, care needs to be taken when deciding how Central should respond to these transaction requests.

All printing associated with the receipt and journal is performed, and a status sent. A print immediate with no next state will wait for a further command. For any other command, the next state is checked against the next state / action table in the data file. A match in the Next State Number table will cause the equivalent next state action value to be checked for one of the following actions to be taken:

- Prompt for next transaction
- Indicate transaction failure and prompt for next transaction
- Exit to normal In-Service mode
- Indicate transaction failure and then exit to normal In-Service mode.

If no match in the table is found, the first action is performed.

Transactions Parameter Screen C09

The following fields are defined for screen C09. You must ensure that the field data is correct and within the permitted values.

If a failure is indicated, the message 'FAIL*n*' is displayed, where *n* is the next state offset number in the transaction data next state table.

Table 3-31
Field Definitions for Screen C09

Field	Length (Bytes)	Content/Meaning
a	1	'0-9', ':' - Number of Active Transactions (: = 10)
b	Var (1-78)	Track 1 data, including start and end sentinels. If there is no Track 1 data, insert end sentinel only.
c	Var (1-39)	Track 2 data, including start and end sentinels. If there is no Track 2 data, insert end sentinel only.
d	Var (1-106)	Track 3 data, including start and end sentinels. If there is no Track 3 data, insert end sentinel only.
e	1	PIN Flag. 0 - No PIN collect. 1 - PIN collect.
f	3	Transaction Request State Number. Used to create Transaction Request message.
g	30	Next State Number Table. 10 entries (3 bytes each). Used for comparison to next state in transaction reply. Not used entries = 255.
h	10	Next State Action Table. 10 entries (1 byte each). One for each of the Next state values defined above). Values 0-3: 0 - Function complete, prompt for next transaction. 1 - Function failed, prompt for next transaction. 2 - Function complete, return to normal operation. 3 - Function failed, return to normal operation.
i	8	Opcode Buffer transaction n Values ‘A’ - ‘I’ or space.
j	1	Length Buffer B transaction n Values 0-8 or ‘?’ ‘?’ - Buffer entry required.

Field	Length (Bytes)	Content/Meaning
k	Var (0-8)	Data for Buffer B length as specified by field ‘j’ (0-8). Not present if field ‘j’ = ‘?’. Values 0-9.
l	1	Length Buffer C transaction n Values 0-8 or ‘?’. ‘?’ - Buffer entry required.
m	Var (0-8)	Data for Buffer C length as specified by field ‘1’ (0-8). Not present if field ‘1’ = ‘?’. Values 0-9.
	:	Fields ‘i’ - ‘m’ are repeated for the number of
	:	transactions specified by field ‘a’.
n	Var (0-10)	Amount Buffer Flags - length is that of the number of transactions specified by field ‘a’. 1 byte for each transaction specified 0 - Amount entry not required 1 - Amount entry required.

Chapter 4

Keyboard Data and Layouts

Overview

This chapter provides information about the following:

- The keyboard interface
- States and keyboards
- Standard keyboard layouts
- Defining full touch-screen keyboards

The Keyboard Interface

The keyboard is part of the interface between the cardholder or operator and the terminal. Keyboards can be physical devices, or emulated on screen (touch-screen keyboards).

The keyboard layout for the rear interface is fixed and cannot be customised. Keyboard layouts for the front interface can be customised.

Note: From Advance NDC 2.06 onwards, the following restrictions apply:

- Nested keyboards are not supported
- Screen and keyboard associations are ignored as keyboard layouts are now defined at the platform and service provider level
- The Clear and Cancel key positions cannot be swapped.

Physical Keyboards

A physical keyboard consists of the keypad and FDKs. It is configured using the PIN and TTU service providers. For more information, refer to the *APTRA Advance NDC, Developer's Guide.*

Touch Screen Keyboards

For terminals supporting touch screens, touch-screen keyboards can be used in either of the following modes:

- FDK emulation
- Full touch screen.

In order for Central to download the correct screens, it requests information from the terminal as to whether FDKs or a touch screen is configured. The terminal responds to this request by sending a solicited configuration information status message to Central. For details, see the "Device Status Information" section in Chapter 9, "Terminal to Central Messages".

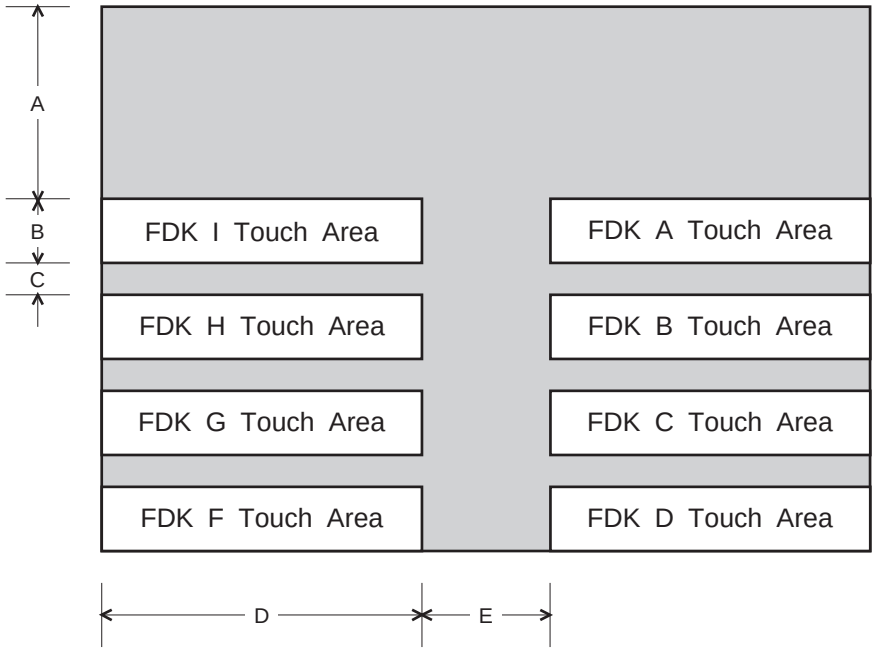
FDK Emulation

A touch screen contains eight fixed touch areas which are touched instead of pressing the corresponding FDKs. You can change the screens that are displayed when the cardholder is required to make a selection, but the number and position of the touch areas are fixed and cannot be changed.

The screens are changed using a Screen Data Load command from Central, For details of the command, see the "Screen / Keyboard Data Load" section in Chapter 10, "Central to Terminal Messages".

The following diagram shows the location of the emulated FDK touch areas.

Figure 4-1
Emulated FDKs: Touch Areas



The heights and widths used are given in the following table. The heights and widths correspond to the rows and columns if the touch screen is calibrated correctly.

Table 4-1
Emulated FDKs: Touch Area Measurements

Measurement Reference	Fraction/Screen Height	Fraction/Screen Width	Corresponding Row	Corresponding Column
A	5/16ths		5	
B	2/16ths		2	
C	1/16th		1	
D		15/32nds		15
E		2/32nds		2

Full Touch Screen

You can design full touch-screen keyboards that are easier to use than the physical keyboard. This is particularly helpful for cardholders with physical disabilities. Up to 200 rectangular areas can be defined on the screen. For more information, see “Defining Full Touch Screens” on page 4-12.

States and Keyboards

Both physical and touch-screen keyboards can be enabled in the following states:

- Four FDK Selection Function
- Amount Entry
- Information Entry
- Transaction Request
- Enhanced PIN Entry
- Enhanced Amount Entry
- Card Read - PIN Entry Initiation
- FDK Information Entry
- Eight FDK Selection Function
- Customer Selectable PIN Entry
- Exit States
- Time-Out
- Cash Accept
- Cheque Accept.

Note: Keyboards can also be used by the cardholder during an interactive transaction response.

Secure PIN Entry and Keyboards

Advance NDC uses secure PIN entry. Because the touch screen is not secure, any keyboard layout specified for secure PIN entry must use the physical keyboard for PIN entry. Therefore, only the physical keyboard can be enabled in the following states:

- PIN Entry
- Card Read - PIN Entry Initiation
- Language Select PIN Entry

The touch screen can only be used in FDK emulation mode during secure PIN entry.

Keyboards in Operation

If, during a transaction, a user-defined keyboard is about to be used but there is an error with the definition, the invalid keyboard is ignored and a standard layout used.

Exit States are responsible for their own keyboard use.

If a layout contains touch-screen definitions but no touch screen is available, that data will be ignored but the rest of the layout will be

used. This allows global configuration of a network where not all the SSTs have touch screens.

For touch screens, if the data supplied by the keyboard layout definition contains out-of-range values, the set of data will be ignored. If the resultant layout is incomplete for use by a state, the transaction flow may go to the Close state. For physical keyboards, the data is ignored.

Standard Keyboard Layouts

The following keyboard layouts are provided Advance NDC:

- Transaction processing
- Supervisor mode
- Encryption key entry
- Secure key entry
- Operator.

In CEN-XFS, key positions are managed by the service providers (SPs); therefore the return codes provided by Advance NDC are based on the CEN-XFS key values. For more information about the CEN-XFS specifications, see “CEN-XFS Documentation” on page G-7.

For information about SP keyboard configuration, refer to the on-line documentation for NCR APTRA under “XFS PIN Service Provider” and “XFS TTU Service Provider”.

For more information about keyboard configuration in Advance NDC on NCR SSTs, refer to the *APTRA Advance NDC, Developer’s Guide*; for other vendors’ SSTs, refer to the *APTRA Advance NDC, Multi-Vendor Support Reference Manual*.

Transaction Processing

The following illustration shows the layout of the standard cardholder keyboard during transaction processing, defined by screen M06:

Figure 4-2
Standard Transaction Processing Keyboard Layout

FDK ‘I’	1	2	3	CLR	FDK ‘A’
FDK ‘H’	4	5	6	CNL	FDK ‘B’
FDK ‘G’	7	8	9	ENT	FDK ‘C’
FDK ‘F’		0			FDK ‘D’

The following table shows how the autoactivator values are assigned to the numeric keys with the corresponding CEN-XFS function key definitions:

Table 4-2
Numeric Autoactivators (PIN)

1 WFS_PIN_FK_1	2 WFS_PIN_FK_2	3 WFS_PIN_FK_3
4 WFS_PIN_FK_4	5 WFS_PIN_FK_5	6 WFS_PIN_FK_6
7 WFS_PIN_FK_7	8 WFS_PIN_FK_8	9 WFS_PIN_FK_9
	0 WFS_PIN_FK_0	

Note: The autoactivator values for numeric keys apply to all cardholder keyboard layouts.

The following table shows how the autoactivator values are assigned for non-numeric keys, with the corresponding CEN-XFS function key definitions:

Table 4-3
Non-Numeric Autoactivators (PIN)

FA (FDK ‘I’) WFS_PIN_FK_FDK01	FF (Clear) WFS_PIN_FK_CLEAR	F6 (FDK ‘A’) WFS_PIN_FK_FDK05
F9 (FDK ‘H’) WFS_PIN_FK_FDK02	F2 (Cancel) WFS_PIN_FK_CANCEL	F5 (FDK ‘B’) WFS_PIN_FK_FDK06
F8 (FDK ‘G’) WFS_PIN_FK_FDK03	F1 (Enter) WFS_PIN_FK_ENTER	F4 (FDK ‘C’) WFS_PIN_FK_FDK07
F7 (FDK ‘F’) WFS_PIN_FK_FDK04		F3 (FDK ‘D’) WFS_PIN_FK_FDK08

Front Interface: Supervisor Mode

The layout of the cardholder keyboard during Supervisor mode is shown in the following illustration. If you define an invalid keyboard for Supervisor mode, it is ignored and this keyboard is enabled.

Figure 4-3
Supervisor Mode: Keyboard Layout

	1	2	3	CLR	
	4	5	6	CNL	
	7	8	9	ENT	
FDK ‘F’		0			FDK ‘D’

The following table shows how the autoactivator values for non-numeric keys are associated with the corresponding CEN-XFS key code definitions:

Table 4-4
Supervisor Mode Autoactivators (PIN)

	FF (Clear) `WFS_PIN_FK_CLEAR`	
	F2 (Cancel) `WFS_PIN_FK_CANCEL`	
	F1 (Enter) `WFS_PIN_FK_ENTER`	
FF (Clear) `WFS_PIN_FK_CLEAR`		F1 (Enter) `WFS_PIN_FK_ENTER`

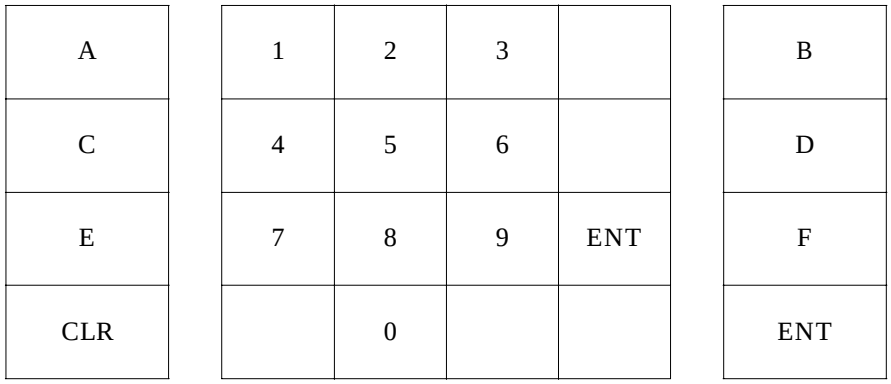
If you are using a touch screen, FDK emulation is the default.

Note: Redefining touch areas is not supported in Supervisor mode.

Encryption Key Entry

The cardholder keyboard layout for encryption key entry is shown in the following illustration. If you define an invalid keyboard for encryption key entry, it is ignored and this keyboard is enabled.

Figure 4-4
Encryption Key Entry Keyboard Layout



The autoactivator values for non-numeric keys are assigned as follows, with the corresponding CEN-XFS definitions for PIN and TTU:

Table 4-5
Encryption Key Entry Autoactivators (PIN)

	F1 (Enter) `WFS_PIN_FK_ENTER`	
FF (Clear) `WFS_PIN_FK_CLEAR`		F1 (Enter) `WFS_PIN_FK_ENTER`

Table 4-6
Encryption Key Entry Autoactivators (TTU)

	F1 (Enter) `WFS_TTU_CK_ENTER`	
FF (Clear) `WFS_TTU_CK_CLEAR`		F1 (Enter) `WFS_TTU_CK_ENTER`

Secure Key Entry

The following layout shows the positions for the cardholder keyboard during secure key entry on NCR SSTs. If you define an invalid keyboard for secure key entry, it is ignored and this keyboard is enabled.

Note: As well standards compliance, secure key entry offers enhanced security in that the application never sees the key value. The decision to use secure key entry is the responsibility of the financial institution.

Figure 4-5
Cardholder Keyboard: Secure Key Entry Layout

1	2	3	A
4	5	6	B
7	8	9	C
D	0	E	F

Key entry cannot be cancelled until all the digits are entered, when the option to confirm the key is given. As the application and service providers never see what keys are pressed in secure key entry, mapping to CEN-XFS codes is not required.

Rear Interface: Operator Keyboard Layout

The operator keyboard layout for the rear interface is as follows:

Figure 4-6
Operator Keyboard Layout

	1	2	3	CLR		
	4	5	6	CNL		
	7	8	9	ENT		
Clear		0			Enter	

No corresponding CEN-XFS definitions for numeric keys are provided as the numbers are returned.

The following table shows how the autoactivator values are assigned for non-numeric keys, with the corresponding CEN-XFS command keys definition for the Text Terminal Unit (TTU).

Table 4-7
Non-Numeric Autoactivators (TTU)

	FF (Clear) WFS_TTU_CK_CLEAR	
	F2 (Cancel) WFS_TTU_CK_CANCEL	
	F1 (Enter) WFS_PIN_FK_ENTER	
FF (Clear) WFS_TTU_CK_CLEAR		F1 (Enter) WFS_TTU_CK_ENTER

Defining Full Touch Screens

To define a touch-screen keyboard, each touch area is defined by the X and Y co-ordinates for two diagonally opposite corners, followed by the code which is returned to the terminal when the area is touched. Touch areas can only be rectangular in shape.

Up to 200 areas can be defined as hexadecimal strings and enabled on the touch screen at the same time. Each touch area can be any size and in any position. If any areas overlap, the first defined takes priority.

Touch Areas

Each touch area is defined as follows:

Table 4-8
Touch Area Definition

Label	No. Of Chars	Range	Description
TPx_1	8	00000000-FFFFFFFF	X co-ordinate of first corner
TPy_1	8	00000000-FFFFFFFF	Y co-ordinate of first corner
TPx_2	8	00000000-FFFFFFFF	X co-ordinate of second corner
TPy_2	8	00000000-FFFFFFFF	Y co-ordinate of second corner
TC	2	00-FF	The return code for the area

When this data is downloaded from Central, the range of the return code is checked but the range of the position characters is not. Therefore, you must ensure that valid values are used. If an illegal position value is used, the touch area that it belongs to is ignored. If the range check fails or insufficient characters are provided to define a touch area, the data for that area will be ignored.

Note: The return code range is limited to the designated keyboard values as determined by the application state. For details, see “Defining Full Touch Screens”.

Generic Keyboard Example

A generic keyboard can be set up with numeric keys 0-9, Cancel, Clear and FDKs ‘A’, ‘B’. A state that requires only FDKs ‘A’, ‘B’ and Cancel will ignore the numeric keys and Clear. A state that requires only the numeric keys 0-9, Cancel and Clear will ignore the FDKs. However, both states can reference this keyboard as long as their minimum requirements are met.

Note: This example can also be applied to physical keyboards.

Calculating Full Touch-Screen Positions

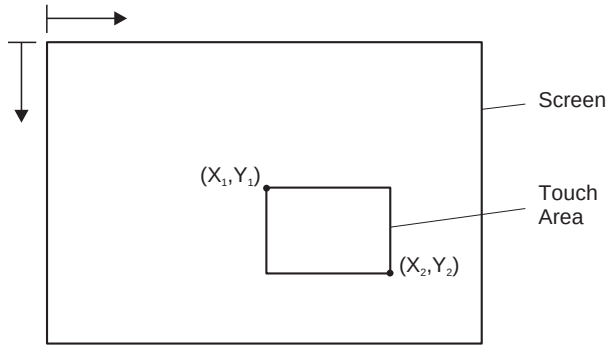
Touch screen definitions are supported for legacy definitions. If you want to define new ones, this section explains the format of the co-ordinates that are used to define touch areas on the screen and how to calculate them.

The Unary Co-Ordinate System

The unary co-ordinate system is based on a two-dimensional cartesian space with normalised co-ordinates. This allows you to specify positions that do not depend on the physical screen dimensions or resolution.

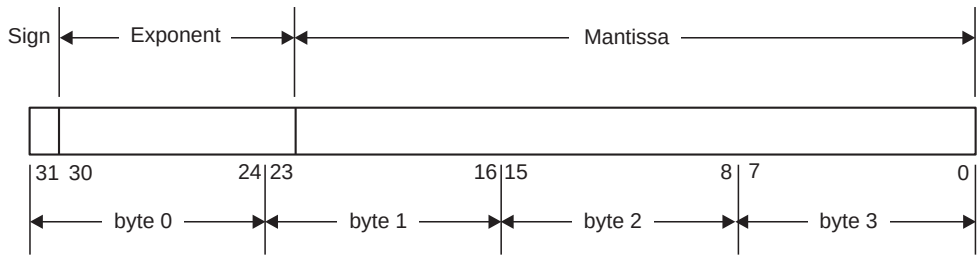
The co-ordinates are the horizontal and vertical displacements, X and Y, from an origin in the top left-hand corner of the screen. The range of values for each is from zero (inclusive) to one (non-inclusive), $0 \le (X, Y) < 1$. Thus each co-ordinate is defined as decimal fractions of the width and height of the physical screen.

Figure 4-7
Unary Co-ordinates



Co-ordinates are defined as IEEE floating point numbers, with a limit of E+21. A floating point number is stored in memory as 32 bits in the following format:

Figure 4-8
Format for Floating Point Numbers



A co-ordinate is calculated using the following formula:

$$N = \pm 2^{(\exp - 127)} \times \{1 + (\text{mant} \times 2^{-23})\}$$

where:

exp is a value in the range 0-255

mant is a value in the range 0-2^{23}

Co-ordinate Format

A co-ordinate may be expressed as either four bytes of packed data or eight bytes of unpacked data. A co-ordinate in packed format is obtained by reversing the four bytes representing the floating point number. Unpacked format is obtained by taking each hex digit in the packed format and adding 30 hex to it to produce eight bytes in the range 30-3F hex. The equivalent ASCII string is used in field 'j2' of the Screen / Keyboard Data Load message.

To convert a number to IEEE format, you should write it in the following form:

$$N = 2^{A} \times (1 + B)$$

where:

$$A = \exp - 127$$

$$B = \text{mant} \times 2^{-23}$$

Note: *A* is the highest whole-number power of 2 that gives a value less than or equal to the number, N.

Conversion to IEEE Example

In this example, the number 0.635 is converted to IEEE format.

N = 0.635

$$0.635 = 2^{A} \times (1 + B)$$

1 To calculate A:

The highest power of 2 that gives a value less than or equal to 0.635 is -1. ($2^{-1} = 0.5$)

$$A = -1$$

2 To calculate B:

$$0.635 = 2^{-1} \times (1 + B)$$

$$(1 + B) = 0.635 \times 2 = 1.27$$

$$B = 0.27$$

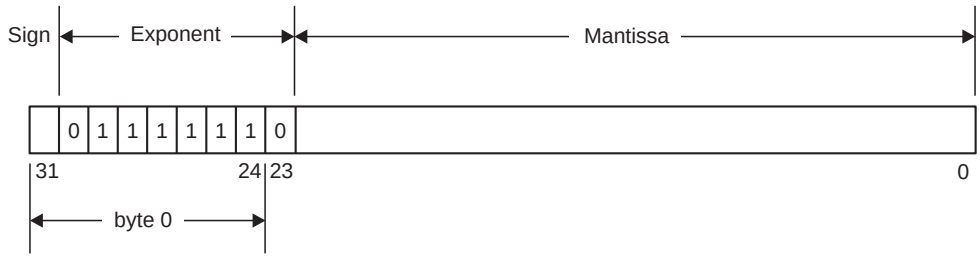
3 To calculate the exponent (exp):

$A = \text{exp} - 127 = -1$

exp = 126 = 7E hex

exp = 01111110 bin

Figure 4-9
Calculate Exponent



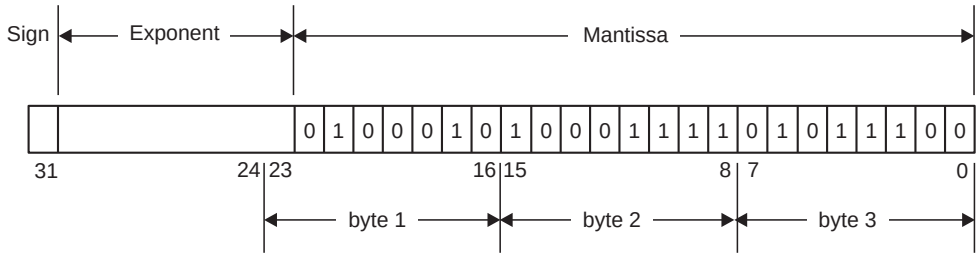
4 To calculate the mantissa (mant):

$B = \text{mant} \times 2^{-23} = 0.27$

$\text{mant} = 0.27 \times 2^{23} = 2264924 = 228F5C \text{ hex}$

mant = 0100010 10001111 01011100 bin

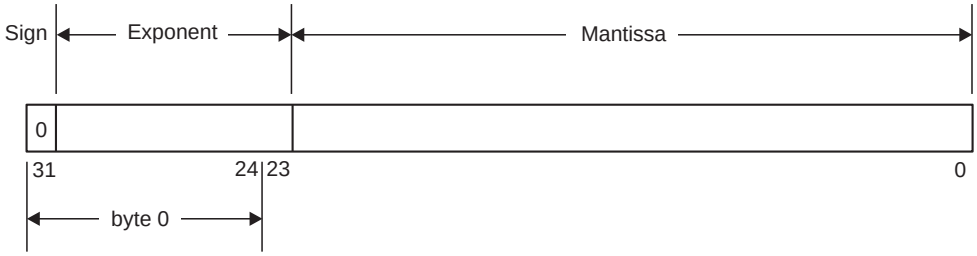
Figure 4-10
Calculate Mantissa



5 The co-ordinate is always positive, so the sign is always zero.

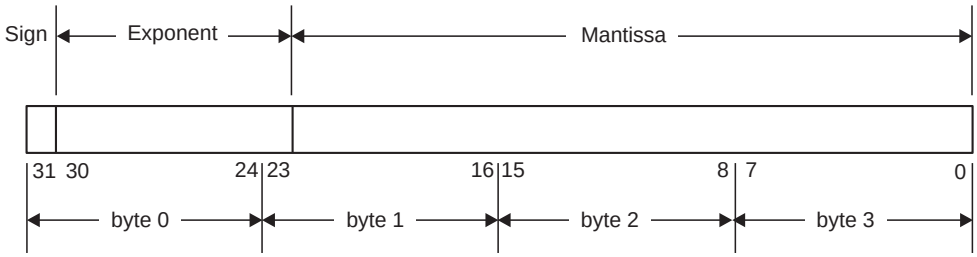
sign = 0

Figure 4-11
Calculate Sign



6 Putting all these together gives the following:

Figure 4-12
Calculate Co-ordinate



The most significant bit of byte 1 is determined by the least significant bit of the exponent. In this case, this is 0.

Byte 0	00111111 bin	3F hex
Byte 1	00100010 bin	22 hex
Byte 2	10001111 bin	8F hex
Byte 3	01011100 bin	5C hex

Therefore, 0.635 becomes 3F 22 8F 5C.

7 The co-ordinate in packed format is 5C 8F 22 3F.

8 The co-ordinate in unpacked format is 35 3C 38 3F 32 32 33 3F.

The equivalent ASCII string is 5<8?223?.

Chapter 5

Printer Data

Overview

This chapter provides information on the following topics:

- Printer types supported by Advance NDC
- Default prints for Programmable Printing Depository (PPD)
- Printer control characters
- Character sets
- Statement printer controls
- Simulated pre-printed receipt messages
- Sideways printing on receipt printers
- Printer control registry settings.

Note: This chapter provides information for NCR printers. For differences that might be experienced with printers from other vendors refer to the *APTRA Advance NDC, Multi-Vendor Support Reference Manual*.

Printer Types Supported by Advance NDC

The Advance NDC SST software supports printing on the following devices:

- Receipt (SDC, RS232, USB)
- Journal (SDC, RS232, USB)
- Statement (SDC, Parallel)
- Programmable Printing Depository (PPD) (SDC, USB)
- CPM endorse cheque

Note: All the printers listed above are supported using the CEN-XFS interface. For more information, refer to the *APTRA Advance NDC, Developer's Guide.* For details of multi-vendor printer support and control code mapping, see Appendix C, 'Printer Data - Control Codes' in the *APTRA Advance NDC, Multi-Vendor Support Reference Manual.*

Sideways printing is supported with the SDC and RS232 receipt printer. For more information, see "Sideways Printing on Receipt" on page 5-24.

The data to be printed on a particular printer, or printers, must be placed in a printer data field contained in a Transaction Reply Command message. For details, see the "Transaction Reply Command" section in Chapter 10, "Central to Terminal Messages".

The length of the printer data field is variable, and depends on the amount of data and data compression performed, the printer characteristics, and the overall message length limitation. There are 13 printer data fields.

On the SDC and RS232 receipt and journal printers, the uncompressed data length is restricted to 500 characters per printer data field. Therefore the uncompressed data length can be up to 6500 characters, although not all comms protocols may support user messages of this length.

Printing to the statement printer is restricted by the compressed data field length. An option from the Configure menu in supervisor allows the setting of a maximum number of lines to print before a cut on non-black mark printers. For details, refer to the *APTRA Advance NDC, Supervisor's Guide*. The PPD can print up to 80 characters.

The printer flag field specifies on which printer(s) the information is printed. Double-width characters can be printed on certain printers.

A receipt length is set at power-up time on a terminal that implements a cut after the following:

- 24 or 49 lines on a non-thermal receipt printer
- 24 lines or greater on a thermal printer, the maximum length is specified by the printer vendor.

Printing of chained transactions on one receipt forces an automatic cut if an attempt is made to print on the line after that specified as the default setting.

When printing in sideways mode on the SDC or RS232 receipt printer the form length is not configurable. A receipt with a maximum of 20 lines containing up to 80 columns can be printed in sideways mode on the receipt before a cut.

An alternative supervisor option is available that allows receipts of up to 49 lines to be printed on the terminal without a cut; for details, see the *APTRA Advance NDC, Supervisor's Guide*. This is not supported in sideways printing mode on the receipt printer.

PPD Default Print

If a deposit is requested in a Transaction Reply command, but none of the printer flag fields contains a value of '4' or '5', the following information is printed, depending on whether the amount buffer length is eight or twelve characters:

Eight-Character Amount Buffer

The following is printed for this buffer:

- Transaction serial number - this four character number is printed in print columns 1 to 4 and repeated in columns 16 to 19.
- Amount buffer - the contents of the Amount buffer are printed in print columns 6 to 14. Leading zeros are suppressed and the decimal character (',' or '.') is displayed in its true position. For details, see the "F - Amount Entry State" section in Chapter 2, "State Tables".
- Card data - the first 30 characters from Track 2 of the card are printed in columns 21 to 50, with a leading '*' in column 20. The Start/End sentinels are not printed. The field separator is printed as '='. Printing is truncated if an end sentinel is encountered. If the Track 2 data does not contain 30 characters, the trailing characters are blanked.
- Machine number - the machine number is entered using the supervisor function 'MACHINE NO'; for details, see the *APTRA Advance NDC, Supervisor's Guide*. Six characters are reserved for this field. If there is no machine number, the field remains blank. The machine number appears in columns 72 to 77.
- Date and time - the date is displayed in columns 53 to 60, and the time in columns 62 to 69. In Advance NDC, the date is displayed in one of two formats: MM/DD/YY or DD/MM/YY. The date format is set by the option set in the Enhanced Configuration Parameters Load message. For details, see the "Enhanced Configuration Parameters Load" section in Chapter 10, "Central to Terminal Messages". The time is displayed as hh:mm:ss, using the 24 hours convention. Eight characters are reserved for this field, and it is always displayed as hh:mm:ss.

A typical print line is:

```
1234    250.00 1234*01234567890123456789012345678 9  20/11/90  15:30:29  000000
```

Twelve-Character Amount Buffer

The following is printed for this buffer:

- Transaction serial number - this four-character number is printed in print columns 1 to 4
- Amount buffer - the contents of the Amount buffer are printed in print columns 6 to 18. For details, see the “F - Amount Entry State” section in Chapter 2, “State Tables”. Leading zeros are suppressed and the decimal character (‘,’ or ‘.’) is displayed in its true position
- Card data - the first 30 characters from Track 2 of the card are printed in columns 21 to 50, with a leading ‘*’ in column 20. The Start / End sentinels are not printed. The field separator is printed as ‘=’. Printing is truncated if an end sentinel is encountered
- Date and time - the date is displayed in columns 53 to 60, and the time in columns 62 to 69. Advance NDC supports two date formats: MM / DD / YY and DD / MM / YY. The date format is set by the option set in the Enhanced Configuration Parameters Load message. The time is always displayed in the format `hh:mm:ss`, using the 24 hours convention. Eight characters are reserved for this field.

A typical print line is:

```
1234    250.00 *01234567890123456789012345678 9  20/11/90  15:30:29  000000
```

Printer Control Characters

These characters allow data to be formatted for display. The printers vary in the control characters they support. Details of the control codes can be found in the APTRA on-line documentation for your printer under **APTRA XFS | Programmers Reference | XFS Service Providers**.

Note: For the statement printer, NCR recommends that print data has a line feed inserted at the end of each line and a form feed inserted at the end of each statement.

NCR recommends that no printing takes place within **5 mm** / 0.2 inch of the bottom of the statement.

Enhanced Printer Control Codes

These codes are all introduced into the control sequence by the control code 1BH (ESC) and are used for the SDC and RS232 receipt and journal printers.

Note: Differences in use or application of control codes for USB receipt and journal printers are given in “Printer Control Sequences and Registry Settings” on page 5-25.

Set Left Margin

You can set the indentation of print columns from the left edge of the paper to the value given by the variable field with the following control sequence. The format of the variable field is a one, two or three byte ASCII value in the range 000-078.

Table 5-1
Set Left Margin Position

Character	Description	Number of Characters
1BH 5BH (ESC) ‘[‘	Control Sequence Introducer	2
Variable	Position of the left-most print column from the left edge of the paper	3
70H ‘p’	Escape Sequence ID	1

The left margin setting must be at least two less than the current right margin setting or a square bracket will be printed.

The setting of the left margin remains until it is either changed by this control sequence, the power supply to the printer is turned off or a reset of the terminal is carried out.

This is supported on the statement printer and the receipt printer in sideways printing mode. The default value is 0.

Set Right Margin

The right margin for the print data is set with the following control sequence. The format of the variable field is a one, two or three byte ASCII representation of the print column with valid values in the range 002-080.

Table 5-2
Set Right Margin Position

Character	Description	Number of Characters
1BH 5BH (ESC) '['	Control Sequence Introducer	2
Variable	Position of the right-most print column from column 2	3
71H 'q'	Escape Sequence ID	1

An attempt to print beyond the right margin will result in the extra characters printing from the left margin.

The right margin setting must be at least two greater than the current left margin setting or a square bracket will be printed.

The setting of the right margin remains until it is either changed by this control sequence, the power supply to the printer is turned off or a reset of the terminal is carried out.

This is supported on the statement printer and on the receipt printer in sideways printing mode. The default value is 40.

Printer-Independent Margin Control

Some printers express margin values as dots, meaning that the actual margin is dependent on the resolution of the printer. Advance NDC provides a solution that is applicable to all printers and is not dependent on the printer resolution.

Note: This solution is applied to all printers.

The left margin control is set using the space character of the standard font size, regardless of the currently selected font size.

The right margin is set by inserting a line feed character at the point specified by the right margin control.

Select OS/2 Code Page

You can select one of the supported OS/2 code pages (for details, see the "Code Pages" section in Appendix B, "Character Sets") with

this control sequence. Once the OS/2 code page is selected, print data in the range 20H to FFH will be accepted and printed.

Table 5-3
Select OS/2 Code Page

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
25H '%'	Escape Sequence ID	1
3xH 3yH 3zH	OS/2 Code Page Identifier	3

Valid values for OS/2 code page identifiers are 000, 437, 850, 851, 852, 855, 857, 860, 861, 862, 863, 864 and 866. If an invalid code page is sent to the printer, a square bracket will be printed. Code page 000 is a user defined downloadable character set code page. For details, see the "Define Downloadable Character Set" section.

To return to standard character set mode, use the Select Character Set control sequence.

This is supported on the thermal receipt and journal printers only.

Select International Character Sets

The printer hardware supports both International and Arabic character sets and an application can make use of the International set with this control sequence which overrides the customisation switch setting.

Table 5-4
Select International Character Sets

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
32H '2'	Escape Sequence ID	1

This is not supported in code page mode on the thermal printer.

Note 1: When this control sequence is included in the Transaction Reply printer data stream, the printer defaults to International Character Set 1. If printing using another character set is required the Select Character Set control sequence must also be present in the printer data stream.

Note 2: This control sequence should not be included in Transaction Reply printer data which is to be interlaced with reserved screen 'R01'. For details, see the "Simulated Pre-printed Receipt Messages" section.

Select Arabic Character Sets

An application can make use of the Arabic character set with this control sequence which overrides the customisation switch setting.

Table 5-5
Select Arabic Character Sets

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
33H '3'	Escape Sequence ID	1

This is not supported in code page mode on the thermal printer.

Note 1: When this control sequence is included in the Transaction Reply printer data stream, the printer defaults to Arabic Character Set 1. If printing using another character set is required the Select Character Set control sequence must also be present in the printer data stream.

Note 2: This control sequence should not be included in Transaction Reply printer data which is to be interlaced with reserved screen 'R01'. For details, see the "Simulated Pre-printed Receipt Messages" section.

Print Downloadable Bit Image

This control sequence allows a predefined bit image to be printed in one of four formats.

The bit image is printed with the following control sequence:

Table 5-6
Print Downloadable Bit Image

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
2FH '/'	Escape Sequence ID	1
3xH	'1' - print bit image one '2' - print bit image two	1
3yH	'0' - normal width, normal height '1' - normal width, double height '2' - double width, normal height '3' - double width, double height	1

For details of defining the image prior to printing, see the "Define Downloadable Bit Image" section.

If the size of the image to be printed exceeds the width of the line, truncation will be used. Text and downloaded image(s) cannot be mixed on the same line.

When data is present in the printer buffer this command is ignored. It is therefore recommended that a line feed is sent before attempting to print images.

The control sequence should not be included in Transaction Reply printer data which is to be interlaced with reserved screen ‘R01’. For details, see the “Simulated Pre-printed Receipt Messages” section.

This is supported on thermal receipt and journal printers only.

Print Barcode

You can print a barcode for the ASCII characters present in the string with the following control sequence:

Table 5-7
Print Barcode

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
6BH ‘k’	Escape Sequence ID	1
3xH	Type of Barcode ‘0’ - UPC-A ‘1’ - UPC-E ‘2’ - JAN13(EAN) ‘3’ - JAN8(EAN) ‘4’ - Code 39 ‘5’ - Interleaved 2 of 5 ‘6’ - Codabar	1
<ASCII data>	ASCII characters to be printed as barcodes	Variable
1BH 5CH (ESC) ‘\’	Control Sequence Terminator	2

The printer service software will calculate the check digit for the UPC and JAN(EAN) codes if it is not sent from the host. It will also generate six character zero-suppressed UPC-E tags from full 11 or 12 characters sent from the host according to standard UPC-E rules.

When data is present in the printer buffer this command is ignored. It is therefore recommended that a line feed is sent before attempting to print barcodes.

This control sequence should not be included in Transaction Reply printer data which is to be interlaced with reserved screen ‘R00’ or

'R01'. For details, see the "Simulated Pre-printed Receipt Messages" section.

If the horizontal size exceeds one line, the excess data is not printed.

Barcode positional information, for example, printing position of Human Readable Interface (HRI) characters and width and height of barcode should be defined in the downloadable reserved K screens prior to attempting to print.

Print Graphics

With this control sequence, you can print a preloaded Epson printer graphics file on a thermal printer.

Epson printer graphics files are standard Epson graphics data files formatted for the Epson LQ-950 printer. The printer resolution should be set at 120×180 dots per inch.

The following escape sequence is used to print this type of file:

Table 5-8
Print Graphics

Character		Description	Number of Characters
1BH	ESC	Private use Escape Sequence Indicator	1
47H	'G'	Escape Sequence ID	1
<filename>		Name of file with graphics data	Variable
1BH 5CH	ESC '\'	Control Sequence Terminator	2

The format for the Epson graphics file is described in the *Programmer's Manual for the 40 Column Printer* (B006-4612).

When data is present in the printer buffer this command is ignored. It is therefore recommended that a line feed is sent before attempting to print graphics.

The graphics file can be generated using any software package which supports the Epson printer driver. The default pathname for the file defined in the control sequence should be defined in the downloadable reserved K07 screen.

This control sequence should not be included in Transaction Reply printer data which is to be interlaced with reserved screen 'R01'. For details, see the "Simulated Pre-printed Receipt Messages" section.

Define Downloadable Character Set

This command defines and enters characters into the memory area of the printer. Two modes of operation are available, standard and

compressed. Standard mode consists of characters represented by a character cell size of 11 horizontal bits by 16 vertical bits (a total of 22 bytes per character). Compressed mode consists of characters stored as a character cell of 8 horizontal bits by 16 vertical bits (a total of 16 bytes per character). The Advance NDC recommendation is to use standard mode only.

Table 5-9
Define Downloadable Character Set

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
26H '&'	Escape Sequence ID	1
<filename>	Name of file with the data for the selected character set	Variable
1BH 5CH (ESC) '\'	Control Sequence Terminator	2

The format for the filename is described in the *Programmer's Manual for the 40 Column Printer* (B006-4612).

This command can be used to overwrite single characters. The user defined characters are available until power to the printer is turned off or a reset of the terminal is carried out. This control sequence is defined in K Reserved Screen 'K08'.

This is supported on thermal receipt and journal printers only.

Define Downloadable Bit Image

You can use this control sequence to define and download a bit image to the printer. The image can then be printed using the *Print Downloadable Bit Image* control sequence without resending the data.

Table 5-10
Define Downloadable Bit Image

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
2AH '*'	Escape Sequence ID	1
Var	'1' - Define bit image one '2' - Define bit image two	1
<ASCII filename>	Name of file with the data for the selected bit image	Variable
1BH 5CH (ESC) '\'	Control Sequence Terminator	2

The format for the filename is described in the *Programmer's Manual for the 40 Column Printer* (B006-4612).

This control sequence is defined in K Reserved Screens 'K09' and 'K10'.

One large bit image can be defined and printed or two smaller bit images can be defined and printed. If one bit image is required then the maximum bit image data length that can be sent is 17920 bytes, that is bit image 1. If two bit images are required then the maximum bit image data length of each is 8960 bytes, that is a combined total of 17920 bytes.

Defining a new bit image erases the previous one. The downloaded image is available to the application until it is overwritten or power to the printer is turned off. A reset of the terminal does not erase the image.

This is supported on thermal receipt and journal printers only.

Select Printing Position of HRI Characters

This control sequence defines the location of Human Readable Interface (HRI) characters in ASCII character format with respect to the barcode they represent. The setting remains until either it is changed by this control sequence, power to the printer is turned off or a reset of the terminal is carried out.

The barcode can be printed using the *Print Barcode* control sequence without resending the positional information.

This control sequence is defined in K Reserved Screens 'K09' and 'K10'.

The default printing position is '1' - not printed.

Table 5-11
Select HRI Character Printing Position

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
65H 'e'	Escape Sequence ID	1
Var	Printing position '1' - not printed '2' - above the barcode '3' - below the barcode '4' - both above and below the barcode	1

This is supported on thermal receipt and journal printers only.

Select Width of Barcode

This defines the barcode minimum width in ASCII format to ‘n’ dots or ‘n’ / 150” with valid values of n being ‘2’, ‘3’ and ‘4’.

Table 5-12
Select Barcode Width

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
77H ‘w’	Escape Sequence ID	1
Var	Barcode minimum width	1

The setting remains until either it is changed by this control sequence, power to the printer is turned off or a reset of the terminal is carried out. The default setting is ‘3’.

The barcode can be printed using the *Print Barcode* control sequence without resending the positional information.

This control sequence is defined in K Reserved Screens ‘K09’ and ‘K10’.

This is supported on thermal receipt and journal printers only.

Select Horizontal Height of Barcode

This defines the barcode height, as three ASCII characters, in dots or ‘n’ / 150” with valid values of n in the range ‘001’ - ‘255’.

Table 5-13
Select Barcode Horizontal Height

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
68H ‘h’	Escape Sequence ID	1
Var	Barcode Height	3

The setting remains until either it is changed by this control sequence, power to the printer is turned off or a reset of the terminal is carried out. The default setting is ‘162’.

The barcode can be printed using the *Print Barcode* control sequence without resending the positional information.

This control sequence is defined in K Reserved Screens ‘K09’ and ‘K10’.

This is supported on thermal receipt and journal printers only.

Character Sets

The PPD envelope printer supports the single size alphanumeric 1 character set (96 characters).

The SDC and RS232 receipt and journal printers support as standard the first 96 characters from the single and double size alphanumeric 1 character set.

The USB receipt and USB journal printers support the same characters as the receipt and journal printers. However, this is achieved using a mapping file, as the USB Receipt and Journal printers use code pages to define the characters. For details of the mapping file, see "Mapping Files" in Appendix B.

The statement printer supports as standard the full single, double and condensed alphanumeric sets 1, 2, 4 and 5, plus a single, double and condensed alphanumeric set 3 comprising the last 32 characters of both alphanumeric sets 1 and 2, plus the last 32 characters from set 5. It also supports the full 12 cpi alphanumeric sets 1 to 5.

The following character set designators are available:

Table 5-14
Character Set Designators

Designator	Characters Per Inch	Character Set
'1'	10	Single size alphanumeric 1
'2'	10	Single size alphanumeric 2
'7'	10	Single size alphanumeric 3
'>'	5	Double size alphanumeric 1. *See* Table Note 1.
'?'	5	Double size alphanumeric 2. *See* Table Note 1.
'B'	5	Double size alphanumeric 3. *See* Table Note 1.
'C'	17	Condensed alphanumeric set 1 (statement, thermal receipt in sideways print only)
'D'	17	Condensed alphanumeric set 2 (statement, thermal receipt in sideways print only)
'E'	17	Condensed alphanumeric set 3 (statement, thermal receipt in sideways print only)
'F'	12	12 cpi size alphanumeric 1 (statement only)

Designator	Characters Per Inch	Character Set
'G'	12	12 cpi size alphanumeric 2 (statement only)
'H'	12	12 cpi size alphanumeric 3 (statement only)
'I'	10	Single size alphanumeric 4
'J'	10	Single size alphanumeric 5
'K'	5	Double size alphanumeric 4. *See* Table Note 1.
'L'	5	Double size alphanumeric 5. *See* Table Note 1.
'M'	17	Condensed alphanumeric set 4 (statement, thermal receipt in sideways print only)
'N'	17	Condensed alphanumeric set 5 (statement, thermal receipt in sideways print only)
'O'	12	12 cpi size alphanumeric 4 (statement only)
'P'	12	12 cpi size alphanumeric 5 (statement only)

Table Note 1: Double size sets are not supported by the receipt printer in sideways printing mode and receipt of these designators will not change the current selected code set.

The statement printer contains a set of Arabic character sets that can be selected instead of the standard sets by a hardware switch on the printer. Refer to the relevant printer manual for the hardware switch settings, or contact your local NCR representative.

When a Select Character Set control sequence appears in the printer data, the characters that follow are invoked using the specified data character set until a subsequent select character set control sequence appears.

For receipt and journal printers, the character set defaults to single size alphanumeric 1 at the end of the printer data field, until another Select Character Set control sequence appears.

For the statement printer, the character set selected is used until another Select Character Set sequence appears, although the character set may be changed by diagnostic operations. NCR recommends that the character set is selected at the start of each statement.

For the default character sets provided on cardholder screens and printers, see Appendix B, "Character Sets".

Primary Print Page

The default character set for all printers is the single size alphanumeric 1 set. ASCII characters in the range 20-7F hex invoke characters from a set. Alternative character sets are selected using the following sequence:

Table 5-15
Select Primary Print Page

Character	Description	Number of Characters
1BH (ESC)	Private Use Escape Sequence Introducer	1
'('	Escape Sequence ID	1
Variable	Character Set Designator	1

Secondary Print Page

The default character set is the single size alphanumeric 1 set. ASCII characters in the range 20-7F hex invoke characters from a set. Alternative character sets are selected using the following sequence:

Table 5-16
Select Secondary Print Page

Character	Description	Number of Characters
1BH (ESC)	Private Use Escape Sequence Introducer	1
')'	Escape Sequence ID	1
Variable	Character Set Designator	1

Statement Printer Controls

The following control sequences apply to the statement printer specifically:

- Left margin control
- Right margin control
- Margin control use
- Lines / inch control.

Left Margin Control

This control sequence gives the column where the print head is positioned following an LF character. The default value is 0.

Table 5-17
Set Left Margin (Statement Printer)

Character	Description	Number of Characters
1BH (ESC) 5BH '['	Control Sequence Introducer	2
<ASCII DATA>	Column number range From 000 to (right margin - 4)	Var (1-3)
70H 'p'	Function-defining character	1

When a Set Left Margin control sequence appears in the printer data, all the subsequent LF control characters return the print head to the column specified, until the next Set Left Margin control sequence is received. When the control is received, the specified column is defined for the character set.

Right Margin Control

This control sequence gives the column position for the right margin. This is the column at which an automatic LF is performed. The default value is 80.

Table 5-18
Set Right Margin (Statement Printer)

Character	Description	Number of Characters
1BH (ESC) 5BH '['	Control Sequence Introducer	2
<ASCII DATA>	Column number range From (left margin + 4) to 132	Var (1-3)
71H 'q'	Function-defining character	1

When a Right Margin Control sequence appears in the printer data, all subsequent printing causes an automatic LF if printing is attempted beyond the specified column number. The control stays in effect until the next Right Margin Control sequence is received. When the control is received, the position is defined for the character set. Excessive values of the column number are ignored, and the previous setting remains operative.

Margin Control Use

The margins are under the control of Central. When left and right margin controls are used, they must be included in the data for the statement printer before any printable characters on the current line. If they are not, the new margin does not take effect until the next line. They should be sent for each statement printed, as the margins can be changed by supervisor diagnostic functions.

When the controls are received, the margins are set to the column position in the selected character set. They are not affected by

subsequent character set changes. The right margin setting must remain within the paper width, or print head damage may occur.

Lines Per Inch Control

This control sequence provides you with the capability of switching between six and eight lines per inch. The default value is eight.

Table 5-19
Switch Lines Per Inch (6/8)

Character	Description	Number of Characters
1BH 5BH (ESC) '['	Control Sequence Introducer	2
<ASCII DATA>	Lines per inch selector range (from 00 to 03)	2
72H 'r'	Function-defining character	1

When a lines per inch control sequence is received, line spacing on the next explicit or automatic LF character assumes the specified value. This continues until the next lines per inch control sequence is received. Legal values are as follows:

Table 5-20
Line Spacing Values

Value	Spacing (Lines/Inch)
00	8
01	8
02	6
03	6

Other values are ignored.

Simulated Pre-printed Receipt Messages

Screen numbers 'R00' - 'R01' are reserved for simulated pre-printed receipt messages. The simulated pre-print data can be downloaded as a set of reserved screens. These can be interlaced with receipt printer text sent in a Transaction Reply Command message.

Note: When screen 'R00' is used to define images to be printed on the thermal receipt printer, the application is not aware of the size of the image or the number of print lines. Printing of 'R01' and / or Transaction Reply print data will begin on the line after the image

defined in ‘R00’. Therefore, if the number of lines of data plus the number of lines used by the image exceeds the configured form length, the data will be printed on two or more receipts.

- Screen ‘R00’ contains the receipt header. This can take the form of text to be printed or can contain the control sequence which instructs the thermal receipt printer to print the image defined in the control sequence. The control sequence is defined in “Print Downloadable Bit Image” in this chapter.

  This text or image is printed at the top of the receipt, before any print text. Printing starts on the first available print line. Subsequent printing occurs on the first blank line after the pre-print header. If a receipt is cut at the end of a transaction the header is printed before authorisation of the next transaction to speed up transaction time. Therefore the reserved screen ‘R00’ is not supported in sideways printing mode and should not be downloaded to a terminal which will be used for sideways printing on the receipt.

- Screen ‘R01’ contains the pre-print text to be interlaced with print text from Central. The print text is effectively overlaid line by line on the pre-print text to produce the final print (print text takes priority).

  The following control sequences should not be included in the printer data to be interlaced with screen ‘R01’ sent in the Transaction Reply:

Table 5-21
Invalid Control Sequences for Screen R01

Character	Description
1BH 32H	Select International Character Sets
1BH 33H	Select Arabic Character Sets
1BH 2FH 3xH 3yH	Print Downloadable Bit Image
1BH 6BH 3xH <ASCII Data> 1BH 5CH	Print Barcode
1BH 47H <filename> 1BH 5CH	Print Graphics

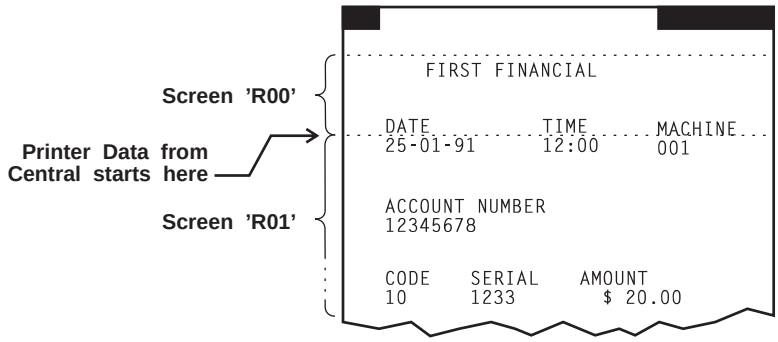
Screen ‘R01’ is not supported in sideways printing mode.

This feature allows blank stationery to be used with a Central application program that was originally designed to operate with pre-printed stationery. Another use of these screens is to align the first print line with pre-printed headers. This is done by building screen ‘R00’ with the required number of LF (line feed) controls.

These reserved screens must be constructed with normal printer message characters and controls.

The following example shows the interlacing of the simulated pre-print text screens and the text received from Central in a Transaction Reply Command message.

Figure 5-1
Screen Text Interlacing



The following example shows the data coding for the screens:

Table 5-22
Screen R00 Data

Screen 'R00'	Print Line
(SO) '4 FIRST FINANCIAL' (LF)	1
(LF)	2
(LF)	3
'DATE' (SO) '10 TIME' (SO) '6 MACHINE' (LF)	4

Table 5-23
Screen R01 Top-of-Receipt Print Data

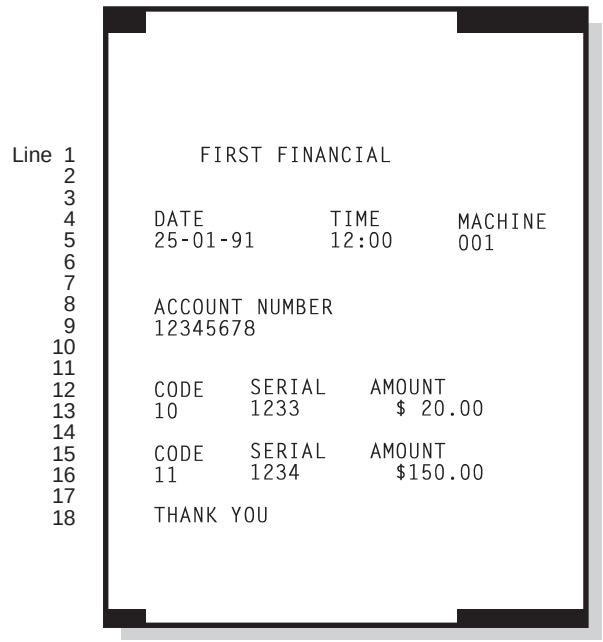
Screen 'R01'	Top-of-receipt Print Data	Print Line
(LF)	'25-01-91 12:00 001' (LF)	5
(LF)	(LF)	6
(LF)	(LF)	7
'ACCOUNT NUMBER' (LF)	(LF)	8
(LF)	'12345678' (LF)	9
(LF)	(LF)	10
(LF)	(LF)	11
'CODE SERIAL AMOUNT' (LF)	(LF)	12
(LF)	'10' (SO) '61233' (SO) '6$ 20.00' (LF)	13
(LF)	(LF)	14

Table 5-24
Screen R01Transaction Print Data

Screen 'R01'	Subsequent Transaction Print Data	Print Line
'CODE SERIAL AMOUNT' (LF)	(LF)	15
(LF)	'11' (SO) '61234' (SO) '6$150.00' (LF)	16
(LF)	(LF)	17
'THANK YOU' (LF)		18

The following diagram shows an example of the final receipt produced:

Figure 5-2
Final Simulated Pre-printed Receipt



Note: Pre-print screens must not contain form feed controls. Form feed controls in printer data are allowed and produce multiple receipts, each with pre-print. However, only Screen 'R00' is printed on the second and subsequent receipts, when produced by the same print function.

Sideways Printing on Receipt

Sideways printing on the receipt printer is controlled through the use of function identifiers ‘P’ (Print Statement and Wait) and ‘Q’ (Print Statement and Set Next State) in conjunction with the printer flag ‘=’ in the Transaction Reply message sent from Central. For details, see the “Transaction Reply Command” section in Chapter 10, “Central to Terminal Messages”.

You can set the left and right margins of printer data to be printed sideways on the receipt printer by using the Set Left Margin and Set Right Margin control sequences described in this chapter. See “Enhanced Printer Control Codes” on page 5-6.

When printing in sideways mode on the receipt printer, the maximum configuration of a customer receipt is 80 columns by 20 lines. Where the data sent from Central causes this line count to be exceeded, the sideways statement is cut after 20 lines and the remaining data printed on the next statement(s).

Unsupported Functions

The following are not supported in sideways printing mode:

- Printing of images, graphics and double size characters
- Printing on the receipt printer in supervisor mode
- Printing on the USB Receipt printer
- Reserved screens ‘R00’ and ‘R01’; these screens should not be downloaded to an ATM that will be used for sideways printing on the receipt.

Printer Control Sequences and Registry Settings

The following table provides the printer control and related registry settings for printers.

Table 5-25
Printer Control Sequences and Registry Settings

Control	NDC Code Hex Value	Registry Name	USB Receipt and Journal Hex Value	Variable Description
Header		HEADER		Sequence added before any print data. The sequence is not processed by Advance NDC, and must therefore use the printer's native escape sequences
Footer		FOOTER		Sequence added after any print data. The sequence is not processed by Advance NDC, and must therefore use the printer's native escape sequences
Line-feed character	0A	LINE_FEED	0A	—
Form-feed character *See* Table Note 2	0C	FORM_FEED	1D 54 19 1B 46	—
Carriage return character	0D	CR	0A	—
Horizontal tab character	09	HT	09	—

Control	NDC Code Hex Value	Registry Name	USB Receipt and Journal Hex Value	Variable Description
Set left margin *See* Table Note 3	1B 5B var 70	LEFT_MARGIN	1D 4C `bvar` *See* Table Note 4	Column position of the left margin in standard characters, typically between 1 and 39 For the USB Receipt and Journal printers, this is the column position of left margin in dots
Set right margin	1B 5B var 71	RIGHT_MARGIN	—	Column position of the right margin in standard characters, typically between 1 and 39
Select OS2 code page	1B 25 var	OS2_CODE_PAGE	1B 25 `bvar`	Code page number
Copy code page to RAM	1B 3A var	COPY_CODE_PAGE	1B 3A 30 bvar 30	Code page number
Select international character set *See* Table Note 3	1B 32	INTR_CHAR_SET	—	—
Select Arabic character set *See* Table Note 3	1B 33	ARAB_CHAR_SET	—	—
Print downloaded bit image	1B 2F var	BIT_IMAGE	1D 2F `var` *See* Table Note 5	Bit image identifier / bit image size For the USB Receipt and Journal printers, this is bit image size

Control	NDC Code Hex Value	Registry Name	USB Receipt and Journal Hex Value	Variable Description
Print barcode	1B 6B var 1B 5C	BARCODE	1D 6B bvar	Barcode type and barcode data For the USB Receipt and Journal printers, this is barcode type (*tvar*), length (*lvar*), and data (*dvar*). See Table 5-27 on page 5-31 for details
Print last image processed See Table Note 6	1B 70 var 1B 5C	CHEQUE	bvar	Side of cheque to print and how the codeline is printed
Print graphics file See Table Note 7	1B 47 var 1B 5C	GRAPHICS	bvar	Path and name of graphics file For the USB Receipt and Journal printers, this is the graphics file content
Select primary character set G0	0E	SHIFT_IN	—	—
Select secondary character set G1	0F	SHIFT_OUT	—	—
Select character set as active set G0	1B 28 var	CHAR_SET1	—	Character set number
Select character set as active set G1	1B 29 var	CHAR_SET2	—	Character set number
Define character set *See* Table Note 12	1B 26 var 1B 5C	DEF_CHAR_SET	1B 26 03 bvar	Path / filename containing the character set definition
Define bit image	1B 2A var 1B 5C	DEF_BIT_IMAGE	1D 23 `bvar` *See* Table Note 5	Bit image ID and the path / filename containing the definition

Control	NDC Code Hex Value	Registry Name	USB Receipt and Journal Hex Value	Variable Description
Position of human-readable characters (for barcode) *See* Table Note 8 and Table Note 9	1B 65 var See Table Note 10	POS_HRI_CHAR	1D 48 bvar *See* Table Note 11	Position of characters
Height of barcode *See* Table Note 12	1B 68 var	HZ_HGHT_BARCODE	1D 68 bvar	Height in dots
Width of barcode *See* Table Note 12	1B 77 var	WIDTH_BARCODE	1D 77 bvar	Width in dots
Form length *See* Table Note 13	1B 5B var 73	SET_FORM_LEN	1B 62 bvar 73	Length of form in rows
Cut (and feed on some printers)	11	CUT	—	—
Sideways mode on	1D	SW_ON	—	—
Sideways mode off	1E	SW_OFF	—	—
Vertical tab	0B var	VERT_TAB	14 bvar	Number of lines to advance
Set extra dot rows *See* Table Note 14	1B 5B var 72	EXTRA_DOT_ROW	16 bvar	Number of extra rows
Set line spacing *See* Table Note 15	1B 5B var 74	LINE_SPACE	1B 33 bvar	Line spacing

Control	NDC Code Hex Value	Registry Name	USB Receipt and Journal Hex Value	Variable Description
Set first line position *See* Table Note 16	1B 5B var 75	FIRST_LINE_POS	1B 65 `bvar`	First line position
Select print mode	—	PRNT_MODE	1B 21 `var`	Print mode value
Select logo	—	SELECT_LOGO	1D 23 `bvar`	Bit map identifier

Table Note 2: This form feed control combines the form feed (1D 54), the cut (19) and the present (1B 46) control codes so that it provides the same functionality as the original form feed control (0C).

Table Note 3: This is supported at application level for all printers. The USB Receipt and Journal printers support code pages that differ from those used by other printers, but contain the same characters.

Advance NDC provides a mapping file so that each code is correctly mapped and applied. For details of the mapping file, see “Mapping Files” in Appendix B.

Whether a mapping file is checked for a corresponding section is set using the registry. When the host requests an Arabic or International character set and a mapping file is to be checked, the corresponding section is located in the mapping file. If found, the specified character set is used, otherwise the control sequence is sent directly to the printer.

Table Note 4: This is used only for positioning bit images for the USB Receipt and Journal printers, the NDC Code is used for setting the left margin for printable data.

Table Note 5: The USB Receipt and Journal printers support the printing of monochrome bit map files. The monochrome bit map is downloaded using the *Define Downloadable Bit Image* control sequence. It can then be printed using the *Print Downloadable Bit Image* control sequence. If the file is not found in the specified location, the path and file name are printed.

Table Note 6: The variable data for the print cheque image contains the following information:

Table 5-26
Print Cheque Image Variable Data

Variable	Description	Chars
side	Selects the front or rear of the cheque to be printed. Values can be as follows: ● '0' for front image ● '1' for rear image	1
codeline control	Defines how the codeline is printed. Values can be as follows: ● '0' to print the normal image of the cheque; this must be used if *side* is set to '1' ● '1' to print an image of the cheque with the codeline blackened ● '2' to print an image of the cheque with the codeline removed	1

Table Note 7: If using a USB Receipt and Journal printer, the graphic must be converted to a *.prn* file. For further information, refer to the *APTRA Advance NDC, Developer's Guide.*

Table Note 8: The default setting is empty so it is not processed

Table Note 9: Because of resolution differences, the barcode will be a different size on the USB Receipt printer.

Table Note 10: If the barcode does not fit on the line, a partial barcode is printed

Table Note 11: If the barcode does not fit on the line, the barcode is not printed

Table Note 12: The USB Receipt and Journal printers use a resolution of 203 dpi rather than 150 dpi. To adjust your existing character sets for this change, see "USB Printers and Downloadable Character Sets" in Appendix B. If more than 188 dots are specified, the USB Receipt and Journal printers will not be able to reproduce a barcode of the same size as other thermal journal or receipt printers.

Table Note 13: The receipt length is the number of lines to be printed. Maximum and minimum lengths are stated in inches. The default range is a minimum of either 4.4 inches or 3 inches and a maximum of 7.5 inches. USB Receipt and Journal printers ignore anything outside the set range. Other printers reset the form length appropriately.

Table Note 14: The EXTRA_DOT_ROW control sequence depends on printer resolution. To produce a consistent space between lines, NCR recommends using the LINE_SPACE control sequence instead.

Table Note 15: Advance NDC sets the line spacing in steps of n / 144 inch to ensure that line spacing is not affected by differences in resolution.

Table Note 16: Resolution differences are managed by Advance NDC. If using a USB Receipt and Journal printer, however, the input value should not be greater than 90 due to the input boundary constraints of the printer hardware.

Table 5-27
USB Receipt and Journal Printer Barcode Types, Length, and Data

tvar	**Type Name**	*lvar*	*dvar*
'65'	UPC-A	48-57 (ASCII numerals)	Fixed Length: 11, 12
'66'	UPC-E	48-57	Fixed Length: 11,12
'67'	JAN-13 (EAN13)	48-57	Fixed Length: 12,13
'68'	JAN-8 (EAN8)	48-57	Fixed Length: 7,8
'69'	CODE39	48-57 65-90 (ASCII alphabet) 32, 36, 37, 43, 45, 47 (ASCII special characters) dl=dk=42 (start / stop code is supplied by printer if necessary)	Variable
'70'	Interleaved 2 of 5 (ITF)	48-57	Variable Even number
'71'	CODABAR (NW-7)	65-68 (start code) 48-57 36, 43, 45, 46, 47, 58	Variable
'72'	Code 93	0-127	Variable
'73'	Code 128	0-105 dl=103-105 (must be a start code) d2=0-102 (data bytes) Stop code is provided by the printer	Variable
'10'	PDF417	0-255	Variable

Chapter 6

Supervisor Messages

Overview

This chapter describes the formatting rules for Supervisor messages that are output to the cardholder screen (when the Supervisor interface has been transferred to the front), the enhanced operator panel, and the receipt and journal printers.

Supervisor Messages

Formatting rules apply to the following:

- Character sets
- Control codes
- Screen size limitations
- Cardholder screen / Enhanced operator interface layout
- Printer layout
- Automatic screen editing
- Media status messages
- Test cash report.

The text for these messages is contained in reserved screens. If these screens are not downloaded, standard English language text is displayed or printed. If you want to use alternative text, you can do so by either of the following:

- Editing *resrvd.def* to translate the English text
- Downloading the alternative text with the reserved screen number.

For a list of all Supervisor reserved screens, showing the function for which each one is used and the default text, see Appendix A, “Reserved Screens”.

Note: For details of how the Supervisor messages are sized for another vendor’s hardware, see ‘Supervisor Messages’ in Chapter 3 of the *APTRA Advance NDC, Multi-Vendor Support Reference Manual.*

Character Sets

All display / print characters are obtained from the Single Size Alphanumeric 1 character set.

Control Codes

The following control codes are supported:

- CR - causes the next character to be displayed at the beginning of the next line. CR must appear on each line
- SO - the same as printer control (multiple spaces).

Screen Size Limitations

The following table shows the maximum number of columns and rows for each type of screen:

Table 6-1
Screen Size Limits

Screen Type	Usage	No. Of Rows	No. Of Columns
'A'	Cardholder / Enhanced Operator Interface Acknowledgement Lines	1	32
'E / e'	Error Messages	1	32
'I'	Cardholder / Enhanced Operator Interface / Printer Information Output	14	32
'M / m'	Cardholder / Enhanced Operator Interface / Printer Menus	13	32
'P / p'	Cardholder / Enhanced Operator Interface Data Entry Prompts	1	27
'S / s'	Media Status Lines	1	32
'T / t'	Journal Trace	15	32
'i'	Supervisor TCP / IP Screens	15	32
	Supervisor Bunch Note Acceptor (BNA) Screens	14	32
	Supervisor VISA 2 screens	15	32

Cardholder Screen /Enhanced Operator Interface Layout

If Supervisor functions are selected from the fascia keyboard or the enhanced operator interface, all screens are displayed from the left-most column. The following table shows the display positions.

Table 6-2
Display Positions

Screen Type	Usage	Row Position	Column Position
'A'	Acknowledgement Line	14	1-32
'A'	Last Supervisor Control Key	16	7-26
'E / e'	Error Messages	14	1-32
'I / i'	Information Display	1-2	1-32
'M / m'	Menus	1-13	1-32
'P / p'	Prompt Line	1-15	1-27
'P / p'	Enter and Clear Keys	16	1-5, 28-32
-	Keyboard Echo	15	28-32

Row 16 is used to display key legends for FDKs ‘D’ and ‘F’. As these act as Enter and Clear keys in Supervisor mode, columns 1 to 6 and 27 to 32 of ‘Last Supervisor Control Key’ screens must not contain significant text. You should also take care if you are designing a new screen to be downloaded for touch display when an enhanced operator interface is also present, as your design will have to incorporate both touch and FDKs.

Rows 1 to 14 can contain either the Current Menu and Acknowledgement line for the last function or the Information Display from the last function.

During encryption key entry, columns 1 to 3 and 29 to 32 contain legends for the six FDKs that are used as hex keys A-F. These hex keys supplement numeric keys 0-9 for entry of hexadecimal digits. The encryption key entry assistance screen must not contain significant text in these positions.

Printer Layout

All printing of reserved screens starts at column 6 and extends as far as column 37. The fixed format security trace header starts at column 1. Note that you cannot use sideways printing in Supervisor mode.

Automatic Screen Editing

Certain reserved screens are edited by the terminal prior to display or print in order to include information held by the terminal. These screens contain a percent (%) character as a placeholder to indicate the start location of the generated data. For details of the screens in *reservd.def*, see Appendix A, “Reserved Screens”. For information about editing the screens, see “Editing the Contents of Reserved Screens” on page 3-12.

Media Status Messages

The Media Status message is built by the terminal from the Media Status header (screen ‘I05’) and Media Status lines (‘S’ or ‘s’ screens). Screen ‘I05’ is overlaid from line 3 onwards with Media Status lines. If a media exception condition exists, the appropriate message is displayed. Otherwise, nothing is displayed. If no exception condition exists or if the reserved screen contains no data, screen ‘S00’ is displayed on line 3 to indicate that all supplies are adequate. This ensures that if you only use two cassette types, messages relating to cassettes 3 and 4 are never displayed.

Test Cash Report

This report is built by the terminal from the Cash Test Header (screen ‘I07’) and Cassette Operational lines (screens ‘S15’ - ‘S18’). Screen ‘I07’ is overlaid from line 3 onwards with Cassette Operational lines. If a cassette is operational, for example, a note has been successfully picked and purged, the appropriate line is displayed. If it is not operational, nothing is displayed. If no

cassettes are operational, screen ‘S14’ is displayed on line 3, with the message:

```
NO GOOD CASSETTES
```

A typical report is as follows:

```
*CASH TEST*
```
} Screen ‘I07’
}

```
TOP CASSETTE GOOD
SECOND CASSETTE GOOD
```

If an exit shutter fault is detected, screen ‘S25’ is displayed on the CRT after screen ‘I07’.

Chapter 7

Configuration Parameters

Overview

In addition to states, screens and printer data, you can download a configuration parameter message, or an enhanced configuration parameter message with additional options, to customise the way an SST operates.

This chapter describes the parameters available in these two configuration message formats.

Note: The SST can be further configured locally by the use of message mode options, which are accessed through the Supervisor Configure menu. For more information refer to the *APTRA Advance NDC, Supervisor's Guide*.

Configuration Parameters Load Message

This message contains the parameters used in NDC+ for Diebold emulation. The message format is supported in Advance NDC although Diebold emulation mode is not supported. Not all the parameters in this message are supported in Advance NDC. Details of unsupported and reserved parameters are given on page 7-4.

For details of the message format, see “Configuration Parameters Load” on page 10-13.

For details of other parameters that can be used in Advance NDC, see “Enhanced Configuration Parameters Load Message” on page 7-5.

Supply Mode, Ready Status & Amount Buffer Length (Field ‘m’)

This single parameter is used to set three configuration options and the value to be downloaded is formed by adding the values for the three options together. The values for the three options are as follows:

Table 7-1
Values for Supply Mode, Ready Status and Amount Buffer Length

Value	Description
000	No option selected
001	Ready Status Send a separate Ready (‘B’) status message to Central in response to a Transaction Reply message.
002	Supply Mode Return the SST automatically to the previous mode when it leaves Supply mode.
008	Amount Buffer Length Set the amount buffer length to twelve digits. The default is eight digits

For example, to send a separate Ready status message to Central and set the Amount Buffer Length to 12, but leave the Supply Mode unselected, the value to download is 001+000+008 = 009.

The default setting is 000, meaning a separate Ready message is not sent to Central in response to a Transaction Reply; the SST is not returned to the previous mode on exit from Supply; and the amount buffer length is eight digits.

Note: In Enhanced Configuration Parameters Load, this parameter is Option Code 01 of field ‘j’.

Logical Unit Number – LUNO (Field ‘o’)

This parameter determines whether the logical unit number, LUNO, will be transmitted in Transaction Request, Solicited and Unsolicited Status messages.

The number tells Central which SST transmitted the message. If this field is not present, the LUNO defaults to 000, or to a previously downloaded value held by the SST. If the data security feature is configured, an additional six characters are present containing the security SST number.

Note: In Enhanced Configuration Parameters Load, this parameter is field ‘h’.

Timer Number (Field ‘p’)

This parameter sets the time-out value for each of the timers that the SST application uses. The timers available are the same for both configuration load and enhanced configuration load.

The following table summarises the timers. For detailed descriptions, see “Timers” on page 7-18.

For the list of reserved timers, see “Reserved Timers” on page 7-22.

Note: In Enhanced Configuration Parameters Load, this parameter is field ‘k’.

Table 7-2
Summary of Timers

Timer Number	Function
‘00’	Keyboard entry time-out
‘01’	Cardholder response to time-out screen time-out
‘02’	Close state screen time-out
‘03’	Communications response time-out
‘04’	Cheque / envelope insertion time-out
‘05’	Cash retract time-out
‘06’	Communications connection sample interval
‘07’	Present time-out
‘08’	Night safe deposit time-out
‘09’	Card removal time-out
‘10’	Additional present time-out
‘61’	Barcode reader scan time-out

Timer Number	Function
'68'	Statement MEI duration time-out
'69'	Receipt MEI duration time-out
'72'	DASH card removal time-out
'77'	BNA / GBXX cash acceptance time-out
'78'	GBXX cash rejection time-out
'82'	Camera Delay Period (*not supported)*
'83'	File Expiry Mechanism (*not supported)*
'87'	Cheque capture screen time-out
'91'	EJ inspection time-out (*not supported).*
'92'	Fault display time-out
'94'	Cheque / envelope eject time-out
'95'	Statement retract time-out
'96'	Statement present time-out
'97'	Door access open time-out (*not supported).*

Number of 800 Millisecond Ticks per Timer Field (Field 'q')

This parameter sets the time-out intervals for the timers in 800 millisecond ticks. The number of ticks can be 000-255. This provides a time-out range of up to 204 seconds.

Unsupported Parameters

The following parameters are not supported in Advance NDC but are reserved in the message:

- Camera Control (Field 'h')
- Card Read Error Threshold (Field 'i')
- Card Write Error Threshold (Field 'l')

Reserved Parameters

The following parameters are reserved for future use:

- Field 'j'
- Field 'k'
- Field 'n'

Enhanced Configuration Parameters Load Message

The Enhanced Configuration Parameters Load message format contains all the options available in Advance NDC.

The following parameters are common to both Configuration Parameters Load and Enhanced Configuration Parameters Load message formats, and have the same values:

- Supply Mode, Ready Status and Amount Buffer Length
- Logical Unit Number – LUNO
- Timer Number

These parameters are described on page 7-2 to page 7-3:

Most enhanced configuration parameters are defined by an option number in field ‘i’ of the message, with field ‘j’ holding the option code. This section describes the options and codes.

For details of the message format, see “Enhanced Configuration Parameters Load” on page 10-15.

For a list of unsupported and reserved parameters see page 7-23.

Option 02 – Auto Voice

If the SST is fitted with an automatic voice feature, this parameter sets auto voice on or off. Possible values are as follows:

Table 7-3
Option 02: Auto Voice Values

Option Code	Description
001	Auto voice on (default)
002	Auto voice off.

Option 03 – Date Format

This parameter sets the date format to either MMDDYY or DDMMYY. Possible values are as follows:

Table 7-4
Option 03: Date Format Values

Option Code	Description
001	MMDDYY (default)
002	DDMMYY

Option 04 – Roll Width

This parameter defines the number of columns used in receipt and journal print screens in messages sent from Central. An automatic new line occurs if this limit is exceeded. The valid range is 001-040, and the default is 025. This option applies to the receipt printer only when it used in normal print mode (not sideways printing mode).

Option 05 – Left Print Column

This parameter defines the left-most column used in receipt and journal print screens in messages from Central. The range is 001 to 040, and the default value is 008. This option applies to the receipt printer only when it used in normal print mode (not sideways printing mode).

Note: It is the responsibility of the Central application to ensure that the sum of the values for roll width (option 04) and left column (option 05) do not exceed 041. NCR recommends that you define both options in the same message.

Option 07 – Track 1 Format

This parameter sets the method of extracting the name and title from Track 1 data on the card. Possible values are as follows:

Table 7-5
Option 07: Track 1 Format Values

Option Code	Description
001	ISO format (default)
002	VISA format
003	Autosearch backwards
004	Autosearch forwards.

Option 12 – Specific Command Reject

This parameter determines whether the SST transmits Specific Command Reject options. Possible values are as follows:

Table 7-6
Option 12: Specific Command Reject Values

Option Code	Description
000	Do not transmit specific command reject statuses, except MAC (default)
001	Transmit specific command reject statuses.

Option 15 – Transaction Status Information

This parameter determines whether the transaction status information from the last command is appended to Transaction Request messages. Possible values are as follows:

Table 7-7
Option 15: Transaction Status Information Values

Option Code	Description
000	Do not append last transaction status information (default)
001	Append last transaction status information.

Option 16 – Journal Printer Backup Time

This parameter sets the maximum time in hours that journal printer backup is allowed before all journalling is discontinued. It is not supported when dual mode journal printing is active.

The valid range is 000-255. The default setting is 000.

Note: If options 16 and 17 are both non-zero, whichever limit is reached first will execute.

Option 17 – Journal Printer Backup Print Operations

This parameter sets the maximum number of print operations (in hundreds) to be buffered while the journal printer is fatal. It is not supported when dual-mode journal printing is active.

The valid range is 000–225. The default setting is 000.

Note: If options 16 and 17 are both non-zero, whichever limit is reached first will execute.

Option 23 – Envelope Dispenser Status

This option determines whether envelope dispenser status messages are sent, remote status indicators are set, and the remote relay is activated. Possible values are as follows:

Table 7-8
Option 23: Envelope Dispenser Status Values

Option Code	Description
000	Do not send envelope dispenser status messages; do not set the remote status indicators; do not activate the remote relay (default)
001	Send envelope dispenser status messages
002	Set the remote status indicators; activate the remote relay
003	Send envelope dispenser status messages; set the remote status indicators; activate the remote relay.

Option 24 – Enhanced / TI Sensor Status Unsolicited Message

This option determines whether the Enhanced TI / Sensor Status unsolicited message is sent from the SST when tampering is suspected on devices not supported in the existing TI / Sensor Status unsolicited message. Possible values are as follows:

Table 7-9
Option 24: Enhanced/TI Sensor Status Unsolicited Message Values

Option Code	Description
000	Do not send the Enhanced TI/Sensor Status unsolicited message; continue to send the existing TI/Sensor Status unsolicited message (default)
001	Send the Enhanced TI/Sensor Status unsolicited message when appropriate; do not send the existing TI/Sensor Status unsolicited message.
002	Send the flexible TI / Sensor Status Unsolicited message in all circumstances. Do not send any other version. This includes buffer C in the message.

Option 25 – Media Entry / Exit Indicators Flash Rate

This parameter sets the flash rate for the Media Entry / Exit Indicators. The flash rate can range from 4.0 Hz to continuously on as follows:

Table 7-10
Option 24: Media Entry/Exit Indicators Flash Rate

Option Code	Description
000	4.0 Hz (fast) (default)
001	1.0 Hz (medium)
002	1.0 Hz
003	0.25 Hz (slow)
004	0.25 Hz
005	Continuously on.

The flash rate for media entry indicators can also be set using the message mode option on the Configure menu in Supervisor mode. On exit from Diagnostics, the flash rate is reset according to the value in the enhanced configuration parameter 25 or message mode option 8, whichever has been more recently set. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Option 27 – Remote Relay

This parameter determines when the remote relay is active. Possible values are as follows:

Table 7-11
Option 27: Remote Relay

Option Code	Description
000	Remote relay is active when a device condition that needs operator intervention occurs and during off-line mode (default)
001	Remote relay is active only when the SST is in service.

Option 33 – Simulate Supervisor Mode Entry / Exit

This option simulates Supervisor mode entry / exit after safe door activity. Possible values are as follows:

Table 7-12
Option 33: Simulate Supervisor Mode Entry/Exit Values

Option Code	Description
000	Simulate Supervisor mode entry/exit: the cash dispenser is cleared when the safe door is closed, and again when the SST is switched to In Service mode (default)
001	Do not simulate Supervisor mode entry/exit: the cash dispenser is only cleared when the SST is switched to in-service mode. No clear is issued when the safe door is closed.

Option 34 – MCN Range

This option controls the range of the Message Coordination Number (MCN). and extends it. Possible values are as follows:

Table 7-13
Option 34: MCN Range Values

Option Code	Description
000	31H to 3FH (default)
001	31H to 7EH

Any other value will keep the previous MCN range.

Option 35 – Report Dual Mode EJ & Hardcopy B/U Unsolicited Messages

This option controls the reporting to Central of unsolicited device status messages for dual mode EJ and hardcopy backup. Possible values are as follows:

Table 7-14
Option 35: Report Dual Mode & Hardcopy B/U Unsolicited Message Values

Option Code	Description
000	Do not report either dual mode EJ or hardcopy backup unsolicited error messages (default)
001	Report only dual mode EJ unsolicited error messages
002	Report both dual mode EJ and hardcopy backup unsolicited error messages.

For information about the message sequences returned by the SST, see Table 9-40 on page 9-87

Option 36 – Enhanced EJ Backup

This option determines whether multiple or standard EJ backups are allowed. Possible values are as follows:

Table 7-15
Option 36: Enhanced EJ Backup Values

Option Code	Description
000	Allow standard EJ backup (default)
001	Allow multiple EJ backup.

Note: Changes to option 36 can be disabled through Supervisor. For further information, refer to the *APTRA Advance NDC, Supervisor's Guide.*

Option 37 – Print Track 2 to Journal

This option determines whether the first 22 characters of data from card track 2 are automatically journalled when a card is read. Possible values are as follows:

Table 7-16
Option 37: Print Track 2 to Journal

Option Code	Description
000	Do not print data on the journal (default)
001	Print data on the journal. The card number is masked, as defined in screen t15. For details of editing screen t15, refer to the *APTRA Advance NDC, Developer's Guide.*

The print format is as follows:

```
CARD: ;XXXXXXXXXXXX1251=09

DATE DD-MM-YY TIME HH:MM:SS
```

Option 44 – BNA Journal Vaulted Notes Count

If the Bunch Note Acceptor (BNA) is present, this option determines whether vaulted note counts are automatically printed to the journal printer following a transaction reply.

Note: Note counts are always printed to the journal printer in the Close State.

Possible values are as follows:

Table 7-17
Option 44: BNA Journal Vaulted Notes Count Values

Option Code	Description
000	Do not journal vaulted notes count (default)
001	Journal vaulted notes count.

Option 45 – BNA Message Settings

If the BNA is present, this parameter sets the following:

- Inclusion of BNA last transaction status counts in the Transaction Request message sent to Central
- Note reporting configuration
- Retract option configuration
- Extended message format option.

The BNA does not have Tamper Indication, so if a cassette is removed this is not reported immediately. However, the supplies status information in the status messages will indicate whether a cassette is present or not. The status messages are also sent on exit from Supervisor to indicate whether a cassette has been inserted or removed during the time in Supervisor.

Note: If you use one of these options to accept up to 90 notes and also use a GBRU device, you must reduce the number of notes accepted by the device to 90. To do this, update the *GBRU_DP2_initial.ini* file as described in Chapter 5 of the *APTRA Advance NDC, Developer's Guide*.

Possible values are as follows:

Table 7-18
Option 45: BNA Message Settings Values

Option Code	Description
000	Do not include last transaction status counts; accept up to 90 notes; do not retract notes; do not use extended message format (default)
001	Include last transaction status counts; accept up to 90 notes; do not retract notes; do not use extended message format
002	Do not include last transaction status counts; accept more than 90 notes; do not retract notes; do not use extended message format
003	Include last transaction status counts; accept more than 90 notes; do not retract notes; do not use extended message format
004	Do not include last transaction status counts; accept up to 90 notes; retract notes; do not use extended message format
005	Include last transaction status counts; accept up to 90 notes; retract notes; do not use extended message format
006	Do not include last transaction status counts; accept more than 90 notes; retract notes; do not use extended message format
007	Include last transaction status counts; accept more than 90 notes; retract notes; do not use extended message format
008	Do not include last transaction status counts; accept up to 90 notes; do not retract notes; use extended message format
009	Include last transaction status counts; accept up to 90 notes; do not retract notes; use extended message format
010	Do not include last transaction status counts; accept more than 90 notes; do not retract notes; use extended message format
011	Include last transaction status counts; accept more than 90 notes; do not retract notes; use extended message format
012	Do not include last transaction status counts; accept up to 90 notes; retract notes; use extended message format
013	Include last transaction status counts; accept up to 90 notes; retract notes; use extended message format
014	Do not include last transaction status counts; accept more than 90 notes; retract notes; use extended message format
015	Include last transaction status counts; accept more than 90 notes; retract notes; use extended message format

Option 46 – MCRW Enhanced Card Device Security Jitter

If the Enhanced Card Device (ECD) is present, this parameter sets the level of ECD Jitter to be applied during card entry / exit. The default value is 000.

Note: A reboot is required if this parameter is changed, to allow the new setting to take effect at device level.

Table 7-19
Option 46: MCRW Enhanced Card Device Security Jitter Values

Option Code	Description
000	No ECD Jitter, or ECD Jitter not required (default)
001	Standard ECD Jitter
002	Maximum ECD Jitter (but slower card read/write).

Option 48 – Barcode Reader

If the barcode reader is present, this option defines whether the barcode reader-specific fields are included in the messages sent to the host.

Table 7-20
Option 48: Barcode Reader Values

Option Code	Description
000	The device identifier 'f' is not reported in any message sent to the host. Transaction Request buffer 'e' is still used if selected in the Transaction Request state (default).
001	Device identifier 'f' is reported.

Option 69 – EMV Smart Card Extended Status

This option is reserved for use with EMV Exits.

For details, refer to the *EMV Integrated Circuit Card (ICC) Reference Manual.*

Option 70 – EMV Smart Card

This option is reserved for use with EMV Exits.

If an EMV Smart Card Reader / Writer is present, this option enables EMV smart cards to be accepted. Possible values are as follows:

Table 7-21
Option 70: EMV Smart Card Values

Option Code	Description
000	EMV Smart Cards not accepted (default)
001	EMV Smart Cards accepted.

For details, refer to the *EMV Integrated Circuit Card (ICC) Reference Manual.*

Option 76 - Cash Handlers

This option specifies the cassette type support and message format as follows:

Table 7-22
Option 76: Cash Handlers

Option Code	Description
000	If dual cash handlers are used, emulate a single cash handler and support all existing messages. Only cassette types 1, 2, 3, and 4 are supported. DIG 'E' is used to report the combined status of the emulated device. (default)
001	If dual cash handlers are used, emulate a single cash handler, and support extended messages for up to seven cassette types. Cassette types 1, 2, 3, 4, 5, 6 and 7 are supported. DIG 'E' reports the combined status of the emulated device. If dual cash handlers are used, DIG 'd' reports cash handler 0 in Terminal Command responses only and DIG 'e' reports cash handler 1 in Terminal Command responses only. The Hardware Configuration message reports the maximum number of items that can be dispensed in a single transaction.

Option 77 – Next State Number

This option determines whether cardless transactions are permitted and sets the state number to go to from the initial Card Read state for consumer cardless transactions. Possible values are as follows:

Table 7-23
Option 77: Next State Number Values

Option Code	Description
000	Cardless transactions not allowed (default)
001-254 or 256-999	State number to go to from the Card Read state when cardless transactions are allowed and when Enhanced Configuration Parameter option 80 is set to 0
001-254 or 256 to ZZZ	State number to go to from the Card Read state when cardless transactions are allowed and when Enhanced Configuration Parameter option 80 is set to 1

Option 78 – GBRU M-Status Reporting

This option controls the reporting of the M-Status for a GBRU used as a dispenser in the following cases:

- In a status message, all fields are the same as for a four-cassette stacking dispenser (standard cash handler), with the possible exception of the M-Status. For details, see "GBRU to CDM M-Status Mapping" on page 9-62
- In response to a Terminal Command, all fields are the same as a standard cash handler.

Note: The M-Data is always GBRU-specific regardless of the setting of this option.

Possible values are as follows:

Table 7-24
Option 78: GBRU M-Status Reporting

Option Code	Description
000	Report a CDM M-Status.
001	Report a GBRU M-Status.

Option 79 – Coin Dispenser

This option allows the modification of the message format to support up to eight coin hopper types. Possible values are as follows:

Table 7-25
Option 79: Coin Dispenser

Option Code	Description
000	Coin dispenser supports four coin hopper types using NDC+ compatible message formats (default)
001	Coin dispenser can support more than four hopper types using extended message formats. Advance NDC supports up to eight hopper types

Option 80 - Alphanumeric State Entry

This option controls which number system is used to interpret state number fields. Possible values are as follows:

Table 7-26
Option 80: Alphanumeric State Entry

Option Code	Description
000	State numbers are interpreted as base 10 (decimal) numbers. Each character is in the range ‘0’ to ‘9’. State number range is ‘000’ to ‘999’. There are 1000 state numbers available. This is the default value.
001	State numbers are interpreted as base 36 numbers. Each character is in the range ‘0’ to ‘9’ or ‘A’ to ‘Z’. ‘A’ represents 10 and ‘Z’ represents 35. Both uppercase and lowercase letters are valid (‘A’ is the same as ‘a’). State number range is ‘000’ to ‘ZZZ’. There are 46655 state numbers available. Example - ‘ZD4’ is (35*(36^2)) + (13*36) + 4 = 45832.

Option 83 - Cheque Processing Module

This option allows the modification of the message format to support the reporting of bins in the CPM. Possible values are as follows:

Table 7-27
Option 83: Cheque Processing Module

Option Code	Description
000	CPM supports the reporting of three bins using NDC+ compatible message formats (default)
001	CPM supports the reporting of all present bins using extended message formats. A minimum of three bins are reported when a CPM is present. The number of bins reported depends on the hardware configuration.

Number of Seconds per Timer Field – Field 'l'

This parameter sets the time-out value in seconds for the timer number specified in field 'k'. The maximum number of seconds is 255.

For a description of the field in the "Enhanced Configuration Parameters Load" message, see page 10-15.

Unsupported Parameters

The following table lists the enhanced configuration load parameters that are not supported in Advance NDC. The option numbers are reserved in the message format.

Table 7-28
Unsupported Parameters

Option Number	Configuration Parameter Description
00	Camera control
09	Diebold status reporting for vandal guard. This parameter is retained for NDC compatibility only; Diebold is not supported by Advance NDC, so vandal guard errors are never reported.
10	Tamper indication status reporting
11	Extended status control
13	Card reader error threshold
14	Track 3 write error threshold
21	Optical sensor
22	Journal printer backup log tamper
26	Touch screen error reporting
28	Transaction processing application informed of SM activity
30	Include PAN in DCS data

31	Enable audible echo of keyboard
32	Report Digital Audio Service errors
39	MCRW non-magnetic card accept

Timers

The same timers are available in both configuration load messages and enhanced configuration load messages.

Timers that are reserved for future use or currently unsupported in Advance NDC are all marked as reserved in the message format. For details of these timers, see page 7-22.

Timer Descriptions

When a configuration load message is sent, the timer values are in ticks. A tick is 800 milliseconds. When an enhanced configuration message is sent, the values are in seconds. A value of 30 ticks in a configuration load message is the equivalent of 24 seconds in an enhanced configuration load message.

Note: The values are given in seconds in both configuration load and enhanced configuration load messages, unless otherwise stated.

Timer 00

Cardholder keyboard response time. When a screen is displayed which prompts the cardholder to make a keyboard entry, the cardholder must respond within the time-out interval specified for timer 00. Otherwise, the SST will exit its present state and enter the Time-Out state.

Timer 01

Cardholder time-out response. This timer is started on entry to the Time-Out state, to give more time for keyboard input, form insertion or envelope insertion.

Timer 02

Close state or eject failure cardholder screen display time-out interval. This timer is started in the Close state after the card has been ejected. It is also started during a Close or Card Read state if an eject cannot be successfully performed (screen ‘C04’ is displayed). At the end of this interval, the SST proceeds to the next state number specified in the state table date, provided the card has been taken or captured. If the card is still accessible to the cardholder when the timer expires, the Close state exit is delayed until timer 09 expires (inducing a capture) or until the card is taken. A time-out interval of zero is not permitted for timer 02.

Timer 03

Communication message time-out interval. When the SST is ready to transmit a Transaction Request to Central, the SST starts timer 03. If the SST does not receive a Transaction Reply command before timer 03 expires, the SST exits the Transaction Request state specified in the Transaction Request state table.

Timer 04

Cheque / envelope insertion response time-out. When a screen is displayed which prompts the cardholder to insert a cheque or envelope into a depository, the cardholder must respond within the time-out interval specified by timer 04, otherwise the SST enters the Time-Out state. The keyboard beeper sounds while this timer is active. The default is 30 ticks. If this timer is set to greater than one minute on the CPM, the CPM firmware will time-out.

Timer 05

Cash retract time-out. When cash is presented to a cardholder, this timer identifies the length of time it remains accessible to the cardholder before a retract is attempted. If the cardholder takes his money before expiry, the timer is cancelled. If the timer expires, a retract operation is attempted. A value of zero is not permitted for timer 05. If the SST is configured to sound the beeper during cash present, this timer gives the maximum length of time the beeper will sound. This timer is not used if the SST is configured to inhibit cash retract.

Timer 06

Communications connection sample interval. This timer defines the sample interval used by the application to monitor the communications connection. This timer is not used in a dial-up environment. Its default value is 600 seconds.

Note: For TCP / IP communications, you can reduce this interval (for example, to 1 second) as the time it takes for the TCP / IP communications to detect loss of a connection can be controlled via the Supervisor TCP / IP Configuration menu. For more information, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Timer 07

Present time-out. This timer is started when cash has been dispensed and the Transaction Reply screen ‘Take Cash’ has been displayed. When the timer expires, the next state specified in the Transaction Reply command is entered. This timer is not used on Parallel Dispense / Print and Eject Transactions on an SST

configured to inhibit cash retract. A time-out interval of zero is not permitted. The default value is 24 seconds.

Note: In "Card Before Cash" transactions (see page 10-63) when the no retract option is set, the recommended minimum value of this timer is 5.

Timer 08

Night safe deposit time-out. This timer is started when the night safe door is unlocked to accept a night safe deposit. If no bag is detected and this timer expires, the SST enters the time-out state. If the bag detection mechanism is faulty, this time-out is allowed to expire in order to give the cardholder time to perform a deposit. However, the Time-Out state is not entered.

Timer 09

Cardholder time-out interval before card capture attempt. If the card is presented to the cardholder and not removed within this time period, an attempt is made to capture the card. To reduce the possibility of a card not being completely ejected at the first attempt, the card is re-ejected after half the timer value has expired, and captured at the full timer expiry. The default value for timer 09 is 24 seconds. A time-out interval of zero is not permitted.

Timer 10

Additional present time-out. This timer, if configured, is added to Timer 07 to allow an additional time-out in the following functions:

- Dispense and Print. For details, see "Dispense and Print Sequence" on page 10-60
- Display and Print. For details, see "Display And Print Sequence" on page 10-61.

If a timeout interval of zero is configured, Timer 07 is not affected.

Timer 61

Barcode reader scan timer. Defines the length of time a barcode reader is enabled to scan for a barcode. The default value for timer 61 is 60 seconds.

Note: On some devices the time-out is also supported by hardware, in these cases the time that the device is enabled will be the shorter of the two values.

Timer 68

Statement MEI duration timer. The length of time the MEI flashes after the statement is presented to the cardholder. The MEI starts to

flash as soon as the data starts to print; that is, total MEI flashing duration = printing duration + cut and eject duration + timer 68. The default value for timer 68 is 2 seconds; the range is 2–10.

Timer 69

Receipt MEI duration timer. The length of time the MEI flashes after the receipt is presented to the cardholder. The MEI starts to flash as soon as the data starts to print; that is, Total MEI flashing duration = Printing Duration + Cut and Eject Duration + Timer 69. The default value for timer 69 is 6 seconds; the range is 2–10.

Timer 72

DASH card eject timer. This timer defines the time to wait for the cardholder to take the card, if the card reader is a DASH reader. If the timer expires before the cardholder takes the card, the SST displays an “Error Misread” screen and restarts the timer. If the timer expires again, the DASH card reader enters a Suspend state. The minimum time-out value is 1 second and the maximum is 255; the default is 20. If a value is sent outside the range, it defaults to 20 (25 ticks).

Note: If using a DASH reader and Card Read State A, or Card Read State T with no chip connect bit set, the DASH reader will not enter a Suspend state.

Timer 77

BNA / GBXX cash acceptance timer. This timer defines the time-out value for note entry to the Bunch Note Acceptor (BNA) or GBXX. The minimum time-out value is 10 seconds, the default is 30 and the maximum is 255. If enabled, the keyboard beeper sounds while this timer is active.

Timer 78

GBXX cash rejection timer. The timer defines the time-out value for note removal from the GBXX with the retract option selected. If the notes are not removed, they are retracted. The minimum time-out value is 10 seconds, the default is 30 and the maximum is 255. If enabled, the keyboard beeper sounds while this timer is active.

Timer 87

Cheque Capture screen time-out. This timer defines the duration for which the Cheque Captured screen is displayed, typically after a returned cheque has not been taken by the cardholder. The minimum time-out value is 1 second, the default is 24 and the maximum is 255.

Timer 92

Fault display time-out. This timer defines the amount of time for which each fault message is displayed. The minimum time-out value is 1 second, the maximum is 255 and the default is 4 (5 ticks).

Note: If this value is set to zero, the EOP display will never be refreshed.

Timer 94

Cheque / envelope removal response time. This timer defines the duration for which a cheque or envelope is presented for removal by the cardholder. The minimum time-out value is 10 seconds (values less than 10 are set to 10), the default is 30. Any downloaded value greater than 120 is set to 120.

Timer 95

Statement retract time-out. This timer is used during Close State processing. It determines when to retract a statement that has not been taken by the cardholder. The default is 30 seconds, and is used if you supply a value of zero.

Timer 96

Statement present time-out. This timer is used only in the statement and continue function and is started regardless of whether or not a statement is being delivered. When the timer expires, the next state specified by the Transaction Reply command is entered. A value of zero for this timer means ‘do not wait’.

Reserved Timers

The following timers are reserved for future use:

11 - 60

62 - 67

70 - 71

73 - 76

79 - 81

84 - 86

88 - 90

93

98 - 99

Unsupported Timers

The following timers are for functions that are not supported in Advance NDC:

82 - Camera delay period

83 - DCS file expiry time-out

91 - EJ log inspection time-out

97 - Door access open time-out.

Chapter 8

Financial Institution Tables

Overview

The Financial Institution Table (FIT) is an important part of the customisation data for an Advance NDC system. FITs may also be downloaded to the terminal by a message from Central. The FIT contains specific information about how a particular institution's transactions should be processed.

Every institution the terminal supports must have a FIT. Institutions which have more than one type of card must have a FIT for each card type.

When a card is read, the FIT is searched to find the FIT entry which matches the Financial Institution Identification number (FIID) on the card. Parameters in this FIT entry and following linked FITs are then used for all subsequent PIN processing.

This chapter describes the FIT data and linked FITs. For details of the FIT message format, see "FIT Data Load" on page 10-20.

FIT Data

Each FIT contains the fields described here, and each field defaults to zero if not specified. Some fields hold information on how transactions will be processed for that institution. Other fields contain an offset to where information required for transaction processing is stored on the card.

Each entry in the FIT Data load message has a value in the range 00-FF hexadecimal (hex), and for the purposes of this description is considered as two digits, each having possible values in the range 0-F hex. However, the FIT data is sent to the terminal in decimal, so to construct the FIT Data load message you should convert each digit pair from hex to decimal to produce a three-character string in the range 000-255.

For details of the FIT message format, see “FIT Data Load” on page 10-20.

The following table defines the fields in the FIT and indicates those fields that are offsets to data on the card.

Table 8-1
FIT Fields

Field	Contents	Acronym	Definition	No of Digits	Offset
a	Institution ID Index	PIDDX	Index for Financial Institution ID number on card	2	Yes
b	Institution ID	PFIID	Financial Institution ID number	10	No
c	Indirect next state index	PSTDX	Index for entries in the Indirect next state table	2	No
d	Algorithm / Bank ID index	PAGDX	Algorithm index for Diebold Not supported by Advance NDC as Local Diebold PIN verification is not supported.	2	Yes
e	Maximum PIN digits entered	PMXPN	Maximum number of PIN digits allowed for the cardholder to enter	2	No
f	Maximum PIN digits checked	PCKLN	Number of digits used for local PIN check	2	No
g	PIN pad	PINPD	Character used to pad PIN for transmission to Central and the encryption method used	2	No
h	PAN data index	PANDX	Index for location of PAN (Personal Account Number) on card	2	Yes
i	PAN data length	PANLN	PAN data field length	2	No

Field	Contents	Acronym	Definition	No of Digits	Offset
j	PAN pad	PANPD	Character used to pad PAN field for encryption	2	No
k	Track 3 PIN retry count index	PRCNT	Index for PIN retry count field on card	2	Yes
l	PIN offset index	POFDX	Index for PIN offset field on card	2	Yes
m	Decimalisation table	PDCTB	Decimalisation table used in encryption process	16	No
n	Encrypted PIN key	PEKEY	DES - Encrypted PIN key	16	No
o	Index reference point	PINDX	Track and index reference point information for all card-related entries in FIT	6	Yes
p	Language code index	PLNDX	Index for language code on card	2	Yes
q	CIM86 sensor flag	PMMSR	Flag to identify the location of the CIM86 sensor in the FIT Not supported by Advance NDC	2	No
r	Reserved	-	-	6	No
s	PIN Block format	PBFMT	Selects PIN block format for remote PIN verification	2	No

Note: For the two-digit fields, the terms ‘digit 1’ and ‘digit 2’ refer to the high and low nibbles respectively.

The FIT references data on the card using six fields in the FIT which are offsets to where information is stored on the card. These fields are:

- PIDDX
- PAGDX
- PANDX
- POFDX
- PLNDX
- PRCNT

Another field, PINDX, identifies the track, the delimiter and the direction of counting for each offset.

FIT Fields

Some of the fields in the FIT are not supported by Advance NDC, and this is indicated in the text. Unsupported fields are ignored by Advance NDC.

PIDDX (Institution ID Index)

Each card contains an ID number to identify the financial institution it belongs to. This field gives the offset for the FIID on the card. The range is 00-7F hex.

You should add 80 hex to this number if it is required to modify the index delimiters in table entry PINDX. See the "PINDX (Index Reference Point)" section for details. You can have a value of FF hex in this field if the Financial Institution identification number only contains 'F'.

PFIID (Institution ID)

The Financial Institution Identification number. The terminal checks whether the Financial Institution Identification number found using PIDDX matches this field. If it does, it uses this FIT. If it does not, it checks the next FIT. The range of each digit in this field is 0-9 or F hex. If F hex is used, the corresponding position of the identification number on the card is not compared.

PSTDX (Indirect Next State Index)

Each digit of this two-digit field has a separate purpose.

The first digit specifies a logo identifier, 0-15. The logo identifier identifies the logo that is to be used if a screen containing a FIT-dependent logo control code is displayed.

The second digit is used to identify an entry in a FIT Switch State table (state 'K' or '_'). The entry identifies the number of the next state that control will go to. The range of indirect next states is 0-7 for state 'K' and 0-14 for state '_' . This field used in association with a FIT Switch State enables you to select different parts of the state flow for different Financial Institutions.

PAGDX (Algorithm/Bank ID Index)

The use of this field depends on the type of PIN verification used for this Financial Institution.

DES verification - field not used - must be zero.

Diebold verification - the field gives the offset of the Algorithm Number on the card. The range is 00-7F hex. If the value in the field is FF hex, the Algorithm Number is not on the card, but is the PANPD field content. Not supported by Advance NDC as Local Diebold PIN verification is not supported.

PMXPN (Maximum PIN Digits Entered)

This field is a two-digit number that specifies the maximum number of digits the cardholder can enter as his personal identification number (PIN). The range is 04-10 hex.

The type of PIN block that is transmitted in the Transaction Request message is specified by the highest order two bits, as shown in the following table:

Table 8-2
PIN Block Type Selection

Bits		PIN Block to be used
7	6	
0	0	Diebold
1	0	ISO Format 0 (ANSI)
0	1	Specified by PBFMT (PIN Block Format)
1	1	BANKSYS

PCKLN (Maximum PIN Digits Checked)

This field identifies:

- The type of PIN verification used for this card
- If local or remote verification is required
- The number of PIN digits to be checked
- The length of the offset number.

There are only three supported methods of PIN verification, as follows:

- Remote DES
- Local DES
- Local VISA

The PCKLN field is one byte split into two fields, consisting of three bits and five bits. The high order three bit field specifies the type of local PIN verification to use:

- 000 - DES (Local or Remote)
- 001 - VISA (Local only)
- 010 - DIEBOLD. Not supported by Advance NDC.
- 011, 100, 101, 110, 111 - Reserved

For Local VISA PIN verification (high order 3 bits 001), the lower five-bit field specifies the number of entered PIN digits to check. It must be in the range 04-10 hex and less than or equal to PMXPN. The value also specifies the length of the offset number.

For DES PIN verification (high order 3 bits 000), the lower five-bit field specifies if local or remote verification is to be performed, and the number of entered PIN digits to check. Local verification is performed when the lower five-bit field is non-zero, in which case it must be in the range 04-10 hex and less than or equal to PMXPN. The value also specifies the length of the offset number.

If PCKLN is zero, remote DES PIN verification is performed and the only significant FIT entries are a, b, c, e, g, n and o.

PINPD (PIN Pad)

This field only applies to financial institutions that use DES encryption for remote verification. The field contains two digits, and the range is 00-CF hex.

The first digit specifies the method of encryption, the encryption key and whether the message co-ordination number should be included in the PIN block.

The second digit is the digit used to pad the PIN.

The first digit is binary encoded. The significance of each bit is as follows:

Table 8-3
PINPD Bit Encoding Significance

Bit 0 (1 hex) =	double encryption sequence: 0 - MAST-COM 1 - PEKEY-COM
Bit 1 (2 hex) =	double / single designator: 0 - single 1 - double
Bit 2 (4 hex) =	encryption / no-encryption: 0 - encrypt 1 - no encrypt
Bit 3 (8 hex) =	co-ordination number / no co-ordination number: 0 - no co-ordination number 1 - co-ordination number included. This bit has no effect if the PIN block format is specified using the PBFMT field.

Table 8-4
PINPD First Digit Coding

First Digit			
Hex Value	**Type of Encryption**	**Encryption Key and Sequence**	
		First	**Second**
0	Single	COM	-
2	Double *See* Table Note 2 and Table Note 3.	MASTER	COM
3	Double	PEKEY	COM
4	None *See* Table Note 1 and Table Note 3.	-	-
8	Single	COM	-
A	Double *See* Table Note 3.	MASTER	COM
B	Double	PEKEY	COM
C	None *See* Table Note 1 and Table Note 3.	-	-

Table Note 1: The encryption commands 4 and C hex which call for transmitting an unencrypted PIN are not secure and are not supported by Advance NDC.

Table Note 2: Double encryption involves encrypting the PIN field using the first encryption key, then encrypting the encrypted PIN field, using the second encryption key.
(Triple DES encryption involves encrypting a value using the first half of the encryption key, decrypting using the second half, and then encrypting with the first half again.)

Table Note 3: When the key entry mode is set to double length restricted, PIN block encryption modes 2, 4, A and C are not permitted. No PIN block will be sent.

For details of PIN block formats, see Chapter 11, “Security Features”.

PANDX (PAN Data Index)

This field gives the offset of the Primary Account Number on the card. PANDX specifies this location as the offset from a delimiter specified in PINDX. The range of PANDX is 00-7F hex.

PANLN (PAN Data Length)

This field specifies the number of digits from the offset, specified by PANDX, that the terminal will use in PIN verification. The permitted value depends on the type of PIN verification being used:

- DES - two digits in the range 00-10 hex
- VISA - two digits with values 0D or 10 hex

PANLN must be equal to or greater than the PIN check length specified in PCKLN. If PANLN is 1F hex, all the digits of the PAN are used, starting from the offset position given by PANDX to the field separator following the PAN.

When remote PIN verification is used, the top three bits of this field can be used to specify if local PIN checking is performed on a short PIN entry. If the value of the top three bits equals zero or is greater than the maximum PIN entry length, PMXPN, or if PANLN equals FF hex, no local PIN checking takes place. To support secure PIN encryption, a check for the minimum four digits is always performed locally, regardless of the PANLN setting. See Chapter 2, “B - PIN Entry State” for details.

If the value of the top three bits is not equal to zero and is less than or equal to the maximum PIN entry length, PMXPN, local PIN checking takes place. If the PIN is less than specified, a local PIN entry error is indicated. For details, see the “B - PIN Entry State” section in Chapter 2, “State Tables”.

PANPD (PAN Pad)

This is a two-digit field. The use depends on the type of PIN verification used.

DES Digit 1 specifies whether the encryption process uses the Master key or the PEKEY entry in the FIT for PIN verification. This digit must be 0 or 8:

- 0 - use the PEKEY for encryption
- 8 - use the Master key for encryption.

The range of PANPD is 00-0F hex and 80-8F hex. PANPD only applies to local PIN verification.

Digit 2 is the digit used to pad the PAN. This must be the same as the one specified in PINPD for encrypting PINs.

VISA Not used.

PRCNT (Track 3 PIN)

This field gives the offset for the PIN retry count field on the card. The PIN retry count field is a two-digit field, with values in the range 00-7E hex.

There are two different methods of counting retries:

- ISO - each try is decremented from an initial value, until the value reaches zero. If this method is used, 80 hex is added to the number.
- MINTS - each try increments a value until it reaches the retry value.

The range of PRCNT is 00-7E hex for MINTS and 80-FE hex for ISO. If you use the Enhanced PIN Entry state, but do not require Track 3 retries, this field should contain a value of FF hex.

POFDX (PIN Offset Data)

This field gives the offset for the Offset data field on the card. The length of the Offset data from POFDX is given by PCKLN. The Offset data is used to validate the PIN. If the Offset data is not used, then set POFDX to FF hex.

When VISA PIN verification is being used, this field contains the five-digit PIN verification key indicator, PVKI, followed by the four-digit PIN verification value, PVV.

The range of the Offset data is 00-7F hex and FF hex. The offset data is added (modulo 10) to the left-most digits of the generated PIN.

PDCTB (Decimalisation Table)

This field is used for DES PIN verification only. It is a table of 16 decimal digits which the terminal uses to convert hexadecimal digits generated during DES PIN verification into decimal for comparison with the PIN entered by the cardholder. This must be identical to the table used for PIN generation.

PEKEY (Encrypted PIN Key)

This field is used for DES local and remote PIN verification only. It is 16 hexadecimal digits long and is created by encrypting the encryption key used by the Financial Institution identified in this table. You can elect to use the PEKEY in the PINPD and PANPD fields. The terminal decrypts the PEKEY using the Master key.

PINDX (Index Reference Point)

This six-digit field is the key to starting points for all of the other card fields referenced in the FIT - PIDDX, PAGDX, PANDX, POFDX, PLNDX, and PRCNT.

- PIDDX locates the Financial Institution Identification Number
- PAGDX locates the Algorithm Number/Bank ID. Not supported by Advance NDC as Local Diebold PIN verification is not supported.
- PANDX locates the PAN
- POFDX locates the PIN Offset Data
- PLNDX locates the Language Code
- PRCNT locates the PIN Retry Count.

PINDX identifies the track, the starting point and the direction to count in to find the data. PAGDX and the other fields identify how far to count to the beginning of the data.

If the value of PIDDX is greater than 80 hex, the PINDX value is OR'ed with 1 hex to obtain the true PINDX value.

For example, if PINDX contains all zeros or it is omitted from the FIT data index referencing is carried out as follows:

- If PIDDX is less than 80 hex, all index referencing is carried out on track 2 in a forward direction from the start sentinel
- If PIDDX is greater than 7F hex, all index referencing is carried out on Track 3 in a forward direction from the start sentinel.

Note: The delimiter is not included in the offset count.

The following table gives the digit corresponding to each valid combination of track number, delimiter and direction:

Table 8-5
PINDX Index Reference Point

Hex Value	Track No.	Delimiter	Direction
0	2	Start Sentinel	Forwards
1	3	Start Sentinel	Forwards
2	1	Start Sentinel	Forwards
4	2	1st Field Separator	Forwards
5	3	1st Field Separator	Forwards
6	1	1st Field Separator	Forwards

Hex Value	Track No.	Delimiter	Direction
8	2	End Sentinel	Backwards
9	3	End Sentinel	Backwards
A	1	End Sentinel	Backwards

Each digit in PINDX specifies track and index reference points for one of the index entries in the FIT. The following table shows how these digits are assigned:

Table 8-6
PINDX Digit Assignment

PINDX Digit	Related Index	Related Card Data
1	PAGDX	Algorithm number (Diebold) Not supported by Advance NDC as Local Diebold PIN verification is not supported.
2	PIDDX	Financial Institution ID number
3	PRCNT	PIN retry count
4	PANDX	PAN
5	PLNDX	Language code
6	POFDX	PIN offset data

PLNDX (Language Code Index)

The field gives the offset for the language code on the card. This field can be used in conjunction with a Language Select From Card state to set the screen group that should be displayed. The terminal uses the language code to display multi-language screens during a transaction.

PLNDX is in the range 01-7F hex. A value of 00 hex is not allowed if the language code is used. A value of 7F hex means zero if the language code is used and the search is backwards from an end sentinel only.

PMMSR (MM Sensor Flag)

The field describes MM sensor with CIM86 MCRW usage.

The CIM86 MCRW is not supported by Advance NDC.

PBFMT (PIN Block Format)

This field specifies the format of the PIN block to be generated for remote PIN verification, as follows:

- 0 - Diebold without co-ordination number.

- 1 - Diebold with co-ordination number (*not supported*)
- 2 - ISO format 0 (ANSI)
- 3 - ISO format 1
- 4 - ISO format 3
- 5 - BANKSYS.

This field is only used when selected by PMXPN having bit 7 = 0 and bit 6 = 1.

Linked FITs

This section explains how to use linked Financial Institution Tables. This feature only applies for local PIN verification.

Data relating to PIN verification can appear in different locations, depending on the type of card used. For this reason, if a financial institution allows more than one position to be used, the customisation data must include one FIT for each variation. These FITs are referred to as linked FITs. The first FIT in a group of linked FITs is known as the base FIT.

A linked FIT is identified by the following FIT entries:

- PIDDX
- PFIID
- The PIN verification algorithm bits in PCKLN
- The track designator parameters of PINDX.

You must ensure that these entries are identical to the corresponding entries in the base FIT, and that the base FIT and associated linked FITs have consecutive FIT numbers.

The following FIT entries are used for local PIN verification:

- PCKLN
- PANDX
- PANLN
- PANPD
- POFDX
- PDCTB
- PEKEY
- PRCNT - only valid in the base FIT
- The index reference points in PINDX.

NCR recommends that the PSTDX values in linked FITs have the same values as the base FIT. The logo number is always obtained from the base FIT, but the indirect next state index is obtained from the currently active FIT. This means that it can be obtained from a linked FIT if the FIT Switch state follows a PIN Entry state.

Chapter 9

Terminal to Central Messages

Overview

This chapter describes the messages sent from the terminal to Central, under the following major headings:

- Transaction request messages
- Solicited and unsolicited status messages
- Encryptor initialisation data and EJ upload data
- Status information, device fault status and device status information
- Exit to host messages

Note: For any differences on other vendors' SSTs, refer to the *APTRA Advance NDC, Multi-Vendor Support Reference Manual*.

Transaction Request Messages

Transaction Request messages contain the data that Central requires in order to authorise a cardholder transaction at the terminal. The message is sent during a cardholder transaction, either on entry to the Transaction Request state or as part of an Interactive Transaction message sequence.

Transaction Request Message Format

The format of the Transaction Request message is given in the following table:

Table 9-1
Transaction Request Message Format

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header - Protocol-dependent.
b	1	M	Message Class. The message class is: '1' - Unsolicited message.
c	1	M	Message Sub-Class. The message sub-class is: '1' - Transaction Request message.
FS	1	M	Field Separator
d	3 or 9	M	Logical Unit Number (LUNO). This Number is defined in a field transmitted to the terminal in a Configuration Parameters Load message. The default number is 000. If the data security feature is configured, an additional six characters are present which contain the machine number.
FS	1	M	Field Separator
FS	1	M	Field Separator
e	8	*See* Table Note 2	Time Variant Number. This field can contain an eight-digit number derived from the time of day by the terminal for each transaction request. The digits can contain the characters 0-9, A-F.
FS	1	M	Field Separator
f	1	M	Top of Receipt Transaction Flag. Informs Central if receipt data for this transaction will print at the top of the receipt as follows: '0' - will not print data for this transaction at the top of the receipt '1' - will print data for this transaction at the top of the receipt.

Field	Number of Characters	Mandatory/Optional	Description
g	1	M	Message Co-Ordination Number. Contains a character assigned by the terminal to each transaction request message. The terminal assigns a different co-ordination number to each successive transaction request, on a rotating basis. Valid range of the co-ordination number is 31 hex to 3F hex, or if enhanced configuration parameter 34 'MCN Range' has been set to 001, from 31 hex to 7E hex. Central must include the corresponding co-ordination number when responding with a Transaction Reply Command. This ensures that the Transaction Reply matches the Transaction Request. If the co-ordination numbers do not match, the terminal sends a solicited status message with a Command Reject status. Central can override the Message Co-Ordination Number check by sending a Co-Ordination Number of '0' in a Transaction Reply command. As a result, the terminal does not verify that the Transaction Reply co-ordinates with the last transaction request message.
FS	1	M	Field Separator
h	Var (39)	*See* Table Note 1	Track 2 Data. Contains up to 39 characters of Track 2 data from the start sentinel to the end sentinel inclusive. Characters are in the range 30-3F hex.
FS	1	M	Field Separator
i	Var (106)	*See* Table Note 1	Track 3 Data. Contains up to 106 characters of Track 3 data from the start sentinel to the end sentinel inclusive. Characters are in the range 30-3F hex.
FS	1	M	Field Separator
j	8	*See* Table Note 1	Operation Code Data. Contains the data collected in the Operation Code buffer as a result of function display keys pressed. States "D - Pre-Set Operation Code Buffer State", "E - Four FDK Selection Function State" and "Y - Eight FDK Selection Function State" determine the contents of this field, which identifies the transaction selected by the cardholder.
FS	1	M	Field Separator
k	8 or 12	*See* Table Note 1 Table Note 3	Amount Entry Field. Identifies the amount entry made at the keyboard. The content of this field is determined by the Amount Entry and Enhanced Amount Entry states. The data is right-justified with zeros to fill unused positions on the left. This field, if requested in the transaction request state, is either eight or twelve bytes long. It will be zero-filled if no amount entry has been made since the last Card Read state was executed. The length is selected in the Configuration Parameters Load message or the Enhanced Configuration Parameters Load message.
FS	1	M	Field Separator
l	Var (32)	*See* Table Note 1	PIN Buffer (Buffer A). Contains a 16-character PIN, encrypted as specified in the FIT, for remote PIN verification.

Field	Number of Characters	Mandatory/Optional	Description
FS	1	M	Field Separator
m	Var (32)	*See* Table Note 1	General Purpose Buffer B. Contains the keyboard data entered during the Information Entry state or after receiving an Interactive Transaction Response. The last character in this buffer is a graphic 'T' if the terminal times out waiting for the cardholder to respond (using the keyboard) to an Interactive Transaction Response, or a graphic 'E' if the cardholder presses the Cancel key. Minimum data length is 3 characters. Maximum data length is 32 characters. May contain an amount value entered during the Enhanced Amount Entry state. In this case, the buffer length will be the same as the Amount Entry Field.
FS	1	M	Field Separator
n	Var (32)	*See* Table Note 1	General Purpose Buffer C. Contains keyboard data as specified by the Information Entry state. Data length cannot exceed 32 characters. May contain an amount value entered during the Enhanced Amount Entry state. In this case, the buffer length will be the same as the Amount Entry Field.
FS	1	*See*	Field Separator
o	1	O	Track 1 Identifier. Identifies data in the next field as Track 1 data: '1' - Track 1 data.
p	Var (78)	O	Track 1 Data. Contains up to 78 characters of Track 1 data from the start sentinel to the end sentinel inclusive. The character range is 20-5F hex.
FS	1	O	Field Separator
q	1	*See* Table Note 4	Transaction Status Data Identifier. Identifies the data that follows in the next field as Transaction Status data: '2' - status data.
r	Var (71)	*See* Table Note 4	Last Transaction Status Data. Contains status data relating to the previous transaction performed by the terminal. It contains the following data: Last Transaction Serial Number - 4 bytes Last Status Issued - 1 byte. *See* Table Note 14. Last Transaction Notes Dispensed - 20 bytes or 35 bytes. *See* Table Note 8. Last Transaction Coinage Amount Dispensed - 5 bytes Last Transaction Coins Dispensed - 20 bytes Last Cash Deposit Transaction Direction - 1 byte Last Transaction Cash Deposit Data - 20 bytes

Field	Number of Characters	Mandatory/Optional	Description
			Last Transaction Serial Number contains the four-digit serial number of the last transaction partially processed by the terminal. If this does not match the last transaction serial number sent by Central, this transaction was not initiated. Last Status Issued contains one byte identifying what the last known status message sent from the terminal was (other than download-type messages). It does not necessarily relate to the Transaction Serial Number. The value will be one of the following: ‘0’ - none sent ‘1’ - good termination sent ‘2’ - error status sent ‘3’ - transaction reply rejected. If Option 76 is set to 000 (four cassette types), Last Transaction Notes Dispensed contains four five-digit decimal counts defining the notes dispensed on the last transaction if the last function command received and processed was a dispense command. These counts will be zero if the last function command received and processed was not a dispense command. If Option 76 is set to 001 (seven cassette types), Last Transaction Notes Dispensed contains seven five-digit decimal counts defining the notes dispensed on the last transaction if the last function command received and processed was a dispense command. These counts will be zero if the last function command received and processed was not a dispense command. The Last Transaction Coinage Amount Dispensed field is included for migration purposes only and always contains zeros. If a Coin Dispenser is present and Option 79 is set to 000 (four hopper types), the Last Transaction Coins Dispensed contains four five-digit decimal counts defining the coins dispensed from each hopper on the last dispense transaction. These will be zero if the last function command was not a coin dispense type function, or if this is the first transaction after installation. If a Coin Dispenser is present and Option 79 is set to 001 (more than four hopper types), this field is set to ‘00000’. In this case, the Last Transaction Coinage Amount Dispensed is provided in fields cf1 to cf*<n+1>*. If a Coin Dispenser is not present, this field is set to ‘00000’. The Last Cash Deposit Transaction Direction is present if a BNA or GBXX is present and contains 1 byte as follows: ‘0’ - last transaction was not a cash deposit ‘1’ - vault direction ‘2’ - refund direction.

Field	Number of Characters	Mandatory/Optional	Description
			Where option 45 (BNA Message Settings) is set to 001, 003, 005, 007, 009, 011, 013, or 015 the following data will also be included: Total Number Of Notes Refunded - 5 bytes Total Number Of Notes Rejected - 5 bytes Total Number Of Notes Encashed - 5 bytes Total Number Of Notes to Escrow - 5 bytes.
FS	1	*See* Table Note 5 Table Note 6	Field Separator
av1	1	*See* Table Note 5 Table Note 6	CSP Data ID 'U'. A value of 'U' (55H, ASCII) in this field identifies the following field as the first Customer Selected PIN data. If this field is selected in the "I - Transaction Request State" table (see Chapter 2, "State Tables") and no CSP has been requested, only this field will be present.
av2	Var(16)	*See* Table Note 5 Table Note 6	CSP Data. This field contains an encrypted 16 character PIN. See the "FIT Data" table in Chapter 8, "Financial Institution Tables".
FS	1	*See* Table Note 5 Table Note 6	Field Separator
aw1	1	*See* Table Note 5 Table Note 6	Confirmation CSP Data ID 'V'. A value of 'V' (56H, ASCII) in this field identifies the following field as the second Customer Selected PIN data. If this field is selected in the "I - Transaction Request State" table (see Chapter 2, "State Tables") and no CSP has been requested, only this field will be present. If the CSP state indicates that local verification of the two Customer Selectable PINs is to be carried out, only the identifier will be sent if requested by the Transaction Request State.
aw2	Var(16)	*See* Table Note 5 Table Note 6	Confirmation CSP Data. This field contains an encrypted 16 character PIN. For details, see the "FIT Data" table in Chapter 8, "Financial Institution Tables".
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator
ax1	1	*See* Table Note 5 Table Note 6 Table Note 7	VC Data ID 'W'. The value 'W' in this field identifies the following field as containing data inserted by Exits.
ax2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by Exits.

Field	Number of Characters	Mandatory/Optional	Description
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator
ay1	1	*See* Table Note 5 Table Note 6 Table Note 7	VC Data ID ‘X’. The value ‘X’ in this field identifies the following field as containing data inserted by Exits.
ay2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by Exits
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator
az1	1	*See* Table Note 5 Table Note 6 Table Note 7	VC Data ID ‘Y’. The value ‘Y’ in this field identifies the following field as containing data inserted by Exits.
az2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by Exits
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator
ba1	1	*See* Table Note 5 Table Note 6 Table Note 7	VC Data ID ‘Z’. The value ‘Z’ in this field identifies the following field as containing data inserted by Exits.
ba2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by Exits
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator

Field	Number of Characters	Mandatory/Optional	Description
bb1	1	*See* Table Note 5 Table Note 6 Table Note 7	VC Data ID '['. The value '[' in this field identifies the following field as containing data inserted by Exits.
bb2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by Exits
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator
bc1	1	*See* Table Note 5 Table Note 6 Table Note 7	VC Data ID '\'. The value '\' in this field identifies the following field as containing data inserted by Exits.
bc2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by Exits.
FS	1	*See* Table Note 5 Table Note 6 Table Note 7	Field Separator
bd1	1	*See* Table Note 5 Table Note 6 Table Note 7	Smart Card Data ID '5'. The value '5' in this field identifies the following field as containing data inserted by CAM2/EMV Exits.
bd2	Var	*See* Table Note 5 Table Note 6 Table Note 7	This field is available for use by EMV/CAM2 Exits.
FS	1	*See* Table Note 9	Field Separator
ca1	1	*See* Table Note 9	Device ID 'w'. The value 'w' in this field identifies the following two fields as containing BNA or GBXX data.
ca2	2	*See* Table Note 9	Two-digit hexadecimal number (01 - 32) representing a note type, allowing up to 50 note types to be represented.

Field	Number of Characters	Mandatory/Optional	Description
ca3	2 or 3	*See* Table Note 9	Number of notes in escrow for the note type defined in ca2. This field is variable, depending on whether option 45 is set to report more than 90 notes or not. If option 45 is not set to report more than 90 notes, this is a 2-digit number (01 - 50). If option 45 is set to report more than 90 notes, this is a 3-digit number (000-999). For details of the settings for option 45, see page 10-17 in the table "Enhanced Configuration Parameters Load".
FS	1	*See* Table Note 10 Table Note 11	Field Separator
cb1	1	*See* Table Note 10 Table Note 11	Document Data ID 'a'. The value 'a' in this field identifies the following field as containing Cheque Processing Module (CPM) data.
cb2	1	*See* Table Note 10, Table Note 11 Table Note 13	Magnetic Ink Code Recognition (MICR) detected. This field contains the value '1' if a minimum number of MICR characters have been detected, or the value '0' if the MICR on an otherwise good cheque has not been detected after retries.
cb3	Var(256)	*See* Table Note 10 Table Note 11	Magnetic Ink Code Recognition (MICR) value. This field is only present if the MICR detected field value is '1', in which case it contains the MICR read from the cheque.
FS	1		Field Separator
ce1	1	O *See* Table Note 12	Field ID 'e'. The value 'e' in this field shows that barcode data is being reported.
ce2	4	O	ASCII hexadecimal representation of the Barcode Format identifier. The list of barcode format values is based on the CEN XFS barcode reader device class, or the value '0000' if the barcode format is not known.
ce3	2	O	Reserved
ce4	Var	O	The scanned barcode data. The length is defined by the barcode format and the length of the scanned barcode. The length of the whole message, including this field, must not exceed the maximum message length, as defined by the COMMS protocol.
	1		Field Separator
cf1	1		Field ID 'f'. The value 'f' in this field shows that more than four coin hopper types are being reported.
cf2	2		Number of coins dispensed from hopper type 1
cf3	2		Number of coins dispensed from hopper type 2
cf4	2		Number of coins dispensed from hopper type 3

Field	Number of Characters	Mandatory/Optional	Description
cf5	2		Number of coins dispensed from hopper type 4
:			
If a coin dispenser is present and Option 79 is set to 001, the Last Transaction Coinage Amount Dispensed is reported in fields cf1 to cf<*n+1*> instead of field r as described on page 9-4. Depending on the number of hopper types present, *n* is a number between 5 and 8.			
:			
cf<*n+1*>	2		Number of coins dispensed from hopper type *n*
w	1	O	Field Separator
	1	O	Optional data fields. These fields will be used for future expansion.
	Var	O	Data.
FS	1	*See* Table Note 2	Field Separator
x	8	*See* Table Note 2	Message Authentication Code Data. This field contains the calculated value for authentication of this message.

Table Note 1: Fields ‘h’ to ‘n’ are optional, and the fields to be included in the message are specified in the Transaction Request state. If no keys have been loaded into the encryptor, field ‘l’ is not sent.

A field separator and optional fields ‘o’ and ‘p’ comprise a group. When included in the message, all the fields of this group must be present. The field separator must also be present if any of the succeeding fields are present.

Table Note 2: Fields ‘e’ and ‘x’ and the preceding field separator are present only if the Data security feature is selected and the security flags settings require their inclusion. For details, refer to the *APTRA Advance NDC, Supervisor’s Guide*.

Table Note 3: The standard field length is eight digits, but it can be configured for twelve digits. For details, see the “Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”.

Table Note 4: Fields ‘q’ and ‘r’ and the preceding field separator are present only if the download option selects them. For details, see the “Enhanced Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”. The field separator that precedes field ‘q’ must be present, even if fields ‘q’ and ‘r’ are not present.

Table Note 5: The optional fields from ‘av1’ onwards with the preceding field separator form field groups. The name of each field is given by two alphabetic characters with each sub-field element identified by a numeric character. These fields are used for general expansion of the transaction request message. Each field is identified by an ID field. Each field is only included in the message if the corresponding flag is set in the Transaction Request state. If the Transaction Request state specifies that a field will be included, at least the buffer identifier will be present. If the flag for a field is not set, the entire field and its preceding field separator are not included.

Table Note 6: If any of the fields from ‘av1’ onwards are included in the message, the field separators preceding fields ‘o’–‘p’ and ‘q’–‘r’ will be present even if the associated data is not.

Table Note 7: Fields **ax*** to **bd*** are available for use by Exits. They may contain any seven-bit ASCII data subject to length limits imposed by the communication protocol in use, except that they must not contain Group Separator (1DH) or Field Separator (1CH) characters.

Table Note 8: The Last Transaction Notes Dispensed data consists of 4 or 7 five-digit decimal counts, defining the notes dispensed in the last dispense transaction. If the last received command was not a dispense command, these counts will be zero.

Table Note 9: If the BNA or GBXX is present, the preceding field separator and optional BNA fields ca1, ca2 and ca3 are included as a group. When multiple note types are reported in the transaction request message, the sequence of these fields is ‘ca1 ca2 ca3 ca2 ca3 ....’, where ca2 and ca3 are repeated for the types that are present, up to 50 note types.

Table Note 10: If the CPM is present, the preceding field separator and optional CPM fields cb1, cb2 and cb3 are included as a group. The CPM fields are only included in the message if the corresponding flag is set in the Transaction Request state, in which case at least the Buffer Identifier will be present. When a flag for a field is not set, the entire field and its preceding field separator are not included.

Table Note 11: When any of the fields cb1, cb2 or cb3 are to be included in the message, the field separators preceding fields ‘o’ and ‘p’, and ‘q’ and ‘r’ will be present even if the associated data is not.

Table Note 12: If the barcode reader is present, the preceding field separator and optional barcode reader fields ce1, ce2 and ce4 are

included as a group. The barcode reader fields are only included in the message if the corresponding flag is set in the Transaction Request state, in which case at least the Buffer Identifier will be present. When a flag for a field is not set, the entire field and its preceding field separator are not included.

Table Note 13: If the MICR is not detected after all retries, there may be no MICR codeline on the cheque. All cheque details are still sent to Central, in case the cheque can be endorsed without the MICR being read.

Table Note 14: The Last Status Issued byte applies only to solicited status messages; unsolicited messages are not part of the transaction status.

Advance NDC always send a solicited status (error or ready) in response to a transaction reply. The Last Status Issued byte value of 0 will only be seen if the terminal is reset while processing a transaction reply, or on the very first transaction after persistent memory is cleared.

This field is present to guard against the previous response being lost due to a communications failure, and indicates what status Advance NDC previously attempted to send to Central. This is so that a communications failure will not cause the value to be set to 0.

If you have problems reconciling the unsolicited E5 message (unknown number of notes retracted) with the transaction, then message mode option 4A should be used to send a delayed dispenser status message.

Interactive Transaction Response

When the Transaction Request message is sent in reply to an Interactive Transaction Response, it differs from the previous description in that it consists only of the following fields.

Table 9-2
Reply to Interactive Transaction Response

b	Message Class
c	Message Sub-Class Field Separator
d	Logical Unit Number 2 Field Separators
e	Time Variant Number Field Separator
f	Top of Receipt Transaction Flag
g	Message Co-Ordination Number 6 Field Separators

m General Purpose Buffer B. Minimum data length is 1 characters. For further information on general purpose buffers, refer to the *APTRA Advance NDC, Developer's Guide.*
1 or 2 Field Separators

v MAC Data

Solicited Status Messages

This section gives information about the format and content of solicited status messages.

Content of Solicited Status Messages

The terminal responds to a command from Central by sending a solicited status message. The information in the status message depends on the command received, and whether or not the terminal can perform the instruction. The following fields in the status message contain this information:

- Status Descriptor
- Status Information.

Note: Exits can also send solicited status messages. These have the same format as standard solicited status messages, but the content of the Status Descriptor and Status Information fields depends on the Exit. For more information, see “Exit to Host Messages” on page 9-111.

Status Descriptor Field

The status descriptor field identifies which of the following conditions is being reported:

- Ready. The command has been performed successfully
- Device Fault. A device fault has occurred
- Command Reject / Specific Command Reject. The command has been rejected
- Terminal State. The values of supply counters or terminal configuration are included in the message.

Status Information Field

The status information field contains additional information when a Device Fault, Specific Command Reject or Terminal State descriptor is used. For more details, see “Status Information” on page 9-16.

Table 9-3
Solicited Status Message Format

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '2' - Solicited message.
c	1	M	Message Sub-Class. The message sub-class is: '2' - Status message.
FS	1	M	Field Separator
d	3 or 9	M	Logical Unit Number (LUNO). This number is defined in a field transmitted to the terminal in a Configuration Parameters Load message. The default number is 000. If the data security feature is configured, an additional six characters are present which contain the machine number. For details, see the *APTRA Advance NDC, Supervisor's Guide.*
FS	1	M	Field Separator
FS	1	M	Field Separator
e	8	*See* Table Note 15 Table Note 16	Time Variant Number. Contains an eight-digit number derived from the time of day by the terminal for each status message. The digits can be 0-9, A-F.
FS	1	*See* Table Note 15	Field Separator
f	1	M	Status Descriptor. Describes the status message as follows: '8' **Device Fault** - This indicates that a terminal device is reporting abnormal status. This value is also used in a configuration ID status message. '9' **Ready** - This indicates that the instruction was completed successfully. 'A' **Command Reject** - This is inserted into the status descriptor field under the following conditions: 1. Terminal receives an illegal command. 2. Terminal receives illegal data from Central. 3. Terminal receives data while not in the correct mode. For more information, see the "Message Validation" section in Chapter 10, "Central to Terminal Messages".

Field	Number of Characters	Mandatory/Optional	Description	
			'B'	**Ready** - This indicates that the Transaction Reply was successfully completed. (When separate 'Ready' for Transaction Reply commands option has been selected as a configuration parameter.)
			'C'	**Specific Command Reject** - This is sent to indicate a rejection of the message for authentication failure, or if the specific command reject option is set and a message is rejected that would otherwise generate a command reject 'A' . The status information field identifies the reason for rejection.
			'F'	**Terminal State** - This is sent in response to Terminal Commands requesting supply counters, terminal configuration information, or the date and time.
FS	1	*See* Table Note 17		Field Separator
g	Var	*See* Table Note 17		Status Information. Additional status information is sent only when the status descriptor contains '8', 'C' or 'F'.
FS	1	*See* Table Note 15 Table Note 16		Field Separator
h	8	*See* Table Note 15 Table Note 16		Message Authentication Code (MAC) Data. Contains the calculated value for authentication of this message. The characters are in the range 0-9 and A-F.
i	Var	M		Trailer. Protocol-dependent.

Table Note 15: This is not transmitted unless Message Authentication is in use, and has been selected for solicited status messages. For details, see the "Message Authentication Field Selection Load" section in Chapter 10, "Central to Terminal Messages".

Table Note 16: This is not transmitted if the Status Descriptor field contains '9' or 'B'.

Table Note 17: This is not transmitted unless the Status Descriptor field contains '8', 'C' or 'F'.

Status Information

Additional information is contained in the Status Information field when the following status descriptors are used:

- 'C' - Specific Command Reject
- 'F' - Terminal State
- '8' - Device Fault.

Specific Command Reject

When the Status Descriptor is 'C' - Specific Command Reject, the following information is present in the Status Information field. For details of the conditions under which individual status values are generated, see "Message Validation" on page 10-78.

Table 9-4
Specific Command Reject - Status Information

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Status Value. Gives the reason for rejecting the command. Values are: '1' - MAC Failure. Result of MAC verification did not equal the MAC field in the message. '2' - Time Variant Number Failure. The time variant number received in the last Transaction Reply message is not the same as the last transmitted value. '3' - Security Terminal Number Mismatch. The number received in the last transaction reply security terminal number is not the same as the number held in the terminal.
			'A' - Message Format error. (g2) Status Qualifier: 01 Message length error. 02 Field Separator missing / unexpectedly found. 03 Transaction Reply message has too many print groups. 04 Group Separator missing / unexpectedly found.
			'B' - Field Value error. (g2) Status Qualifier: 01 Illegal Message Class. 02 Illegal Message Sub-Class or Identifier. 03 Illegal Encryption Key Change or Extended Encryption Key Change Message Modifier. 04 Illegal Terminal Command Code. 05 Illegal Terminal Command Modifier. 06 Illegal Transaction Reply Function Identifier. 07 Data field contains non-decimal digit.

Field	Number of Characters	Mandatory/Optional	Description	
			08	Data field value out of range.
			09	Invalid Message Co-Ordination number.
			10	Illegal FIT number.
			11	Too many notes in a dispense function.
			12	Reserved
			13	Unrecognised Document Destination.
			14	Reserved
			15	Unrecognised Buffer Identifier.
			16	Reserved
			17	Document Name Error.
			18	The screen identifier is out of range.
			19	Reserved
			20	No data supplied to endorse cheque in CPM
			21	Reserved
			22	Invalid Encryption Key Size.
			23	RSA Signature Verification Failed.
			24	Signature or Encryption Key PKCS#1 Packing Failed.
			25	Signature or Encryption Key PKCS#1 Unpacking Failed.
			26	Invalid Signature or Encryption Key PKCS#1 Pad Block Type.
			27	Fixed Header Decryption Failed.
			28	Null Byte After Padding Missing.
			29	Invalid Pad Byte Count.
			'C' - Illegal Message type for current mode.	
			(g2) Status Qualifier:	
			01	Message type only accepted while terminal is In-Service and expecting a Transaction Reply
			02	Message not accepted while diagnostics is in progress. This is returned when the application has passed control to VDM
			03	Message not accepted while in Out-of-Service or Supply mode
			04	Message not accepted while in In-Service mode

Field	Number of Characters	Mandatory/Optional	Description	
			05	Message not allowed while configured for NCR status message mode
			06-09	Reserved
			10	Message not accepted while processing a Transaction Reply.
			11	Cheque not present in CPM transport while processing a Transaction Reply
			12-14	Reserved
			15	Encryption Key Change or Extended Encryption Key Change message not accepted during a cardholder transaction, or while the terminal is in suspend mode, or while the operator is initiating the execution of supervisory / settlement transactions.
			16	Reserved
			17	Key change operation cannot be accepted in restricted encryption mode. This applies when an Extended Encryption Key Change message with modifier '3', '4', '6' or '7' is received in restricted mode.
			18	Key entry mode change not authorised.
			'D' - Hardware Failure.	
			(g2) Status Qualifier:	
			01	Encryption failure during Encryption Key Change or Extended Encryption Key Change message.
			02	Time-of-Day Clock failure or invalid data sent during Date / Time Set command
			03-05	Reserved
			06	Insufficient disk space.
			'E' - Not Supported.	
			(g2) Status Qualifier:	
			01	Function not supported by software
			02	Required device not configured. Also, sideways print on the receipt is requested, but either the printer does not have the capability or has not been configured for sideways printing.
			03	Reserved

Field	Number of Characters	Mandatory/Optional	Description	
			04	Reserved
			05	Journal printer backup inactive
g2	2	O	Status Qualifier. Present for status values 'A' - E'. (See preceding text)	

Terminal State

This section describes what information can be contained in field 'g', the Status Information field, when the Status Descriptor is 'F' - Terminal State.

Field 'g' is made up of a number of sub-fields named 'g1', 'g2', 'g3' and so on. Sub-field 'g1' identifies which terminal command has been received, as shown in the following table. The remaining sub-fields contain the status information requested by that command, as shown in the subsequent tables.

Table 9-5
Terminal State - Status Information Sub-Field 'g1'

Terminal Command	Sub-Field 'g1'
Send configuration information	1
Send supply counters	2
Send tally information *(unsupported)*	3
Send error log information *(unsupported)*	4
Send date/time information	5
Send configuration ID	6
EKC retrieve hallmark key *(unsupported)*	F
Hardware configuration data	H
Supplies data	I
Fitness data	J
Tamper and sensor status data	K
Software ID and release number data	L
Local configuration option digits	M
Send note definitions (BNA)	N

Send Configuration Information

This solicited status message is sent to Central in response to a Send Configuration Information Terminal Command message (a command code of '7' with no command modifier or a command

modifier of 6 to include enhanced configuration information). It returns all the configuration information available.

If a message with a command code of '7' also has a command modifier, the response returns the configuration information specified by the command modifier. For details of the terminal command code, see "Configuration Information (Command Code = 7)" on page 10-4.

For the configuration responses when a modifier other than 6 is included, see sections "Hardware Configuration Data" on page 9-32 to "Note Definitions (Bunch Note Acceptor)" on page 9-42.

Table 9-6
Send Configuration Information Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message is sent to Central in response to a Send Configuration Information Terminal Command message and has identifier '1'
g2	4	M	Configuration ID. Contains the last four-digit configuration ID numbers (0000–9999) sent to the terminal from Central
FS	1	M	Field Separator
g3	22 or 38	M	Hardware Fitness. Contains one byte for each device or major device resource. The position of the byte identifies the device; the byte indicates the fitness status. For details, see "Hardware Fitness—Sub-field 'g3'" on page 9-22
FS	1	M	Field Separator
g4	44 or 76	M	Hardware Configuration. Contains information per device indicating whether or not it is configured. If configured, it gives details of which option, if any, is configured. For details, see "Hardware Configuration Data—Sub-Field 'g4'" on page 9-25.
FS	1	M	Field Separator
g5	23 or 26	M	Supplies Status. Contains one byte per type of media container or resource. The position of the byte identifies the media resource; the byte indicates the supplies status. For details, see "Supplies Status—Sub-field 'g5'" on page 9-31
FS	1	M	Field Separator

Field	Number of Characters	Mandatory/Optional	Description
g6	5 or 12	M	Sensor Status. Contains one byte per sensor and is identical to the information reported in characters 2-13 of the Sensors status message included later in this chapter. As in the status messages, TI sensors are only reported if the TI feature is configured. The number of characters is always twelve if fields 'g7' and 'g8' are present. The last seven bytes are blank if no TI is present
FS	1	O	Field Separator
g7	6	O	Advance NDC Release Number. Contains a six-digit decimal number. The first pair of digits represents the release number. The second pair of digits represents the point release number. The third pair of digits represents the patch release number. *See* Table Note 18.
FS	1	O	Field Separator
g8	9	O	Advance NDC Software ID. Contains the Advance NDC Software ID. The field takes the following values: G531-0283 (Advance NDC package) If the Advance NDC software ID is unavailable, this field contains nine blanks. *See* Table Note 18.

Table Note 18: Fields 'g7' and 'g8' are included only if the appropriate message mode option (6C, print reserved screens 'T37' and 'T38' to the journal) is set. For details, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Hardware Fitness—Sub-field 'g3' The device is identified by the position of the byte, as shown in the following table:

Table 9-7
Hardware Fitness Sub-Field 'g3'

Byte position	Device indicated
0	Time-of-Day Clock, *see* Table Note 19
1	High Order Communications
2	System Disk
3	Magnetic Card Reader / Writer, *see* Table Note 19
4	Cash Handler, *see* Table Note 19
5	Depository, *see* Table Note 19
6	Receipt Printer, *see* Table Note 19
7	Journal Printer, *see* Table Note 19
8	Reserved
9	Enhanced Thermal Statement Printer (SDC+)

Byte position	Device indicated
10	Night Safe Depository, *see* Table Note 19
11	Encryptor, *see* Table Note 19
12	Security Camera *(not supported)*
13	Door Access *(not supported)*
14	Flex Disk
15	Cassette type 1
16	Cassette type 2
17	Cassette type 3
18	Cassette type 4
19-20	Reserved for new device (= 0)
21	Statement Printer, *see* Table Note 19
22	Signage Display, *see* Table Note 20
23-24	Reserved, *see* Table Note 20
25	System Display, *see* Table Note 20
26	Media Entry Indicators, *see* Table Note 20
27	Envelope Dispenser *see* Table Note 19, Table Note 20
28	Document Processing Module *(not supported)* *See* Table Note 20
29	Coin Dispensing Module Tamper Indication, see Table Note 20
30	Document Processing Module, Module Tamper Indication *(not supported)* *See* Table Note 20
31	Reserved, *see* Table Note 20
32	Digital Audio Service *(not supported)* *See* Table Note 20
33	Reserved, *see* Table Note 20
34	Bunch Note Acceptor
35	Cheque Processing Module
36-37	Reserved, *see* Table Note 20

Table Note 19: The relationship between the Device Identification Graphic (DIG) in the status message and the offset in the Fitness table is: `offset = DIG - 41 hex`

Table Note 20: These fields are returned only if command modifier '6', "Send enhanced configuration data", is used. For details, see "Configuration Information (Command Code = 7)" on page 10-4 in table "Terminal Commands" on page 10-2.

Fitness Severity Each byte indicates the current fitness of the device by a severity value, as shown in the following table. Routine, warning and fatal conditions (severity values 1, 2 and 4) can only be cleared by local supervisor functions.

Table 9-8
Hardware Fitness Severity Values

Severity Value	Meaning
0	No error
1	Routine errors have occurred
2	Warning conditions have occurred - investigation required
3	Suspend. Terminal is currently in suspend state due to suspected tampering with this device
4	Fatal error condition exists

Hardware Configuration Data—Sub-Field 'g4' The configuration data for each device is reported as two hexadecimal characters representing a byte of configuration information. The following table gives details of the byte position for each device and the value or bit significance of each byte as appropriate.

Table 9-9
Hardware Configuration Data: Sub-Field 'g4'

Byte	Device	
0	Product	Class
	0E	5663
	0F	5674
	10	5675
	11	5684
	12	5685
	13	5688
	14	5665
	15	5670
	16	Personas 75
	17	Personas 88
	18	Personas 40
	19	Personas 70
	1A	Personas 74
	1B	Personas 84
	1C	Personas 85
	1D	Personas 90
	1E	EasyPoint 55 or Easypoint 57
	1F	Personas 86
	20	5588
	21	Personas 73
	22	Personas 72
	23	Personas 77
	24	6674
	25	6676
	26	5879
	27	5887
	29	Personas 71
		Note: This list does not imply Advance NDC support for all these product classes.
1	7F	No configuration
2	System Disk	
	00	Hard disk present
	01	Reserved
	02	Reserved

Byte	Device	
3	Magnetic Card Reader/Writer. *See* Table Note 21.	
	00	No card reader attached
	01	Track 2 (read only)
	03	Track 1/2/3 MCRW (write on track 3 only). *(Also returned if card reader cannot be identified)*
	05	PC Dip Reader
	07	3 Track Write MCRW
	08	Track 2 Smart Card Reader
	09	Track 1/2/3 Smart Card Reader
	0A	3 Track Write Smart Card Reader
	0B	Track 1/2 and Track 2/3 Dip MSR
	0C	Track 1/2/3 CIM86 MCRW
	10	Track 1/2 Dip MSR
	11	Track 1/2 Swipe Reader
	1D	Dip and Smart Hardware (DASH) Reader
	1E	Track 1/2/3 with MM
	1F	Track 1/2/3 Smart with MM
	20	Track 3 Smart with MM
4	Cash Handler. *See* Table Note 21 and Table Note 23.	
	00	Not configured
	01	Standard cash handler configured
	02	Spray cash dispenser configured
5	Envelope Depository. *See* Table Note 21.	
	00	Not configured
	01	Reserved
	02	Programmable Printing Depository (PPD)
	03	Reserved
	04	Reserved
6	Receipt Printer. *See* Table Note 21.	
	00	Not configured
	01	Plain paper
	02	Black dot paper
	03	Sideways printing, no black mark
	04	Sideways printing, black mark
	05	Thermal printer - no black mark
	06	Thermal printer - black mark
	07	Thermal printer - sideways printing, no black mark
	08	Thermal printer - sideways printing, black mark

Byte	Device
7	Journal Printer. *See* Table Note 21. 00 Not configured 01 Integral journal printer 02 Reserved 03 Thermal printer 80 Electronic journal 81 Electronic journal and integral journal printer 82 Reserved 83 Electronic journal and thermal printer
8	Reserved 00 Not configured
9	Reserved 00 Not configured
10	Night Safe Depository. *See* Table Note 21. 00 Not configured 01 Configured 02 Reserved
11	Encryptor. *See* Table Note 21. ?0 Not configured ?1 BAPE encryptor. 02 Reserved 03 Reserved 04 Reserved 05 Reserved 06 Reserved ?7 EPP encryptor ? = SST key entry mode (0, B, C or D) where: 0 = single-length keys without XOR key entry B = single-length keys with XOR key entry C = double-length keys D = double-length keys, restricted mode For example, C7 = double-length key entry with an EPP encryptor.
12	Security Camera *(not supported)* 00 Not configured
13	Door Access *(not supported)* 00 Not configured

Byte	Device	
14	Flex Disk	
	00	Not configured
	01	1.44 MB flex disk connected
	02	2.88 MB flex disk connected
15	Tamper Indicating (TI) Bins. *See* Table Note 21. Not coin dispenser	
	00	No TI bins present
	01	Secure cash and insecure cards, and either insecure deposit bin or no envelope depository (PPD)
	02	Secure cash and insecure cards, and either secure
	03	deposit bin or no envelope depository Secure cash and secure cards, and either secure deposit bin or no envelope depository
16	Cardholder Keyboard	
	00	Reserved
	01	Standard (BAPE) keyboard
	02	EPP keyboard
17	Operator Keyboard	
	00	Not configured
	01	Standard keyboard (basic)
	02	Keyboard plus FDKs (enhanced)
18	Cardholder Display / Voice	
	BIT 0	0 - (always)
	BIT 1	0 - (always)
	BIT 2	0 - Voice not supported
	BIT 2	1 - Voice supported if digital audio present.
	BIT 3	0 - Standard FDKs
	BIT 3	1 - Touch screen
	BIT 4	0 - (always)
	BIT 5	0 - (always)
	BIT 6	0 - (always)
	BIT 7	0 - (always)
19	7F	No configuration
20	7F	No configuration

Byte	Device
21	Statement Printer. *See* Table Note 21. 00 Not configured 01 Standard statement printer 02 Reserved 03 Reserved 09 Enhanced thermal statement printer (SDC+)
22	Reserved. *See* Table Note 22.
23	Reserved. *See* Table Note 22.
24	Coin Dispenser. 00 Not Configured 01 Reserved 02 Coin Dispenser with four hopper types 03 Coin Dispenser with more than four hopper types
25	System Display. *See* Table Note 22. 00 Not configured 01 Reserved 02 Configured
26	Media Entry Indicators 00 Not configured 01 Configured
27	Envelope Dispenser. *See* Table Note 21 and Table Note 22. 00 Not configured 01 Configured 02 Reserved 03 Reserved
28	Document Processing Module *(not supported)* *See* Table Note 22. 00 Not configured
29	Coin Dispensing Module Tamper Indication. *See* Table Note 22. 00 Not configured 01 Configured
30	Document Processing Module Tamper Indication *(not supported). See* Table Note 22. 00 Not configured
31	Reserved. *See* Table Note 22.

Byte	Device
32	Digital Audio Service *(not supported)* *See* Table Note 22 00 Not configured
33	Reserved. *See* Table Note 22.
34	Bunch Note Acceptor (BNA) *See* Table Note 21 and Table Note 22 00 Not configured 03 BNA device
35	Cheque Processing Module (CPM) *See* Table Note 21 and Table Note 22 00 Not configured 01 CPM Configured
36-37	Reserved. *See* Table Note 22.

Table Note 21: The relationship between the DIG and the configuration table offset is: `offset = 2 x (DIG - 41 hex)`

Table Note 22: These fields are returned only if command modifier '6', "Send enhanced configuration data", is used. For details, see "Configuration Information (Command Code = 7)" on page 10-4 in table "Terminal Commands" on page 10-2.

Table Note 23: When using dual cash handlers, both cash handlers must be Standard cash handlers.

Supplies Status—Sub-field 'g5' The media container or resource is identified by the byte position, as shown in the following table:

Table 9-10
Supplies Status Sub-Field 'g5'

Byte position	Device indicated
0	Reserved
1	Reserved
2	Not used (= 0)
3	Card Capture Bin
4	Cash Handler Reject Bin
5	Deposit Bin
6	Receipt Paper
7	Journal Paper
8	Not used (= 0)
9	Not used (= 0)
10	Night Safe
11	Not used (= 0)
12	Not used (= 0)
13	Not used (= 0)
14	Not used (= 0)
15	Type 1 Currency Cassettes
16	Type 2 Currency Cassettes
17	Type 3 Currency Cassettes
18	Type 4 Currency Cassettes
19	Not used (= 0)
20	Not used (= 0)
21	Statement Paper
22	Statement Ribbon
23	Reserved, *see* Table Note 24
24	Reserved, *see* Table Note 24
25	Envelope Dispenser, *see* Table Note 24

Table Note 24: These fields are returned only if command modifier '6', "Send enhanced configuration data", is used. For details, see "Configuration Information (Command Code = 7)" on page 10-4.

Supplies Values Each byte indicates the current status of the supples by a numeric value, as shown in the following table. A status of '0' - Not configured' for currency bins indicates that no cassettes of that type were installed on the last exit from Supervisor, and no subsequent attempt has been made to dispense from that type. If attempts are made to dispense from a cassette type that is not installed, the status changes to '3' - Media out.

Table 9-11
Supplies Status Values

Supplies Value	Meaning
0	Not configured
1	Good state
2	Media low
3	Media out
4	Overfill

Hardware Configuration Data

This solicited status message is sent to Central in response to a Send Configuration Information terminal command with a command code of '7' and a command modifier of '1'.

Table 9-12
Hardware Configuration Data Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'H' .
g2	1	M	Configuration ID Identifier 'A' .
	Var (4)	M	Configuration ID. This four-character field contains the last four-digit configuration ID number, in the range 0000-9999, sent to the terminal from Central.
FS	1	M	Field Separator

Field	Number of Characters	Mandatory/Optional	Description
g3	1	M	Product Class Identifier ‘B’ .
	Var (2)	M	Product Class. This two-character field contains the Product Class of the terminal. The following entries are possible, but this does not mean that Advance NDC supports all these classes: ‘0E’ - 5663 ‘0F’ - 5674 ‘10’ - 5675 ‘11’ - 5684 ‘12’ - 5685 ‘13’ - 5688 ‘14’ - 5665 ‘15’ - 5670 ‘16’ - Personas 75 ‘17’ - Personas 88 ‘18’ - Personas 40 ‘19’ - Personas 70 ‘1A’ - Personas 74 ‘1B’ - Personas 84 ‘1C’ - Personas 85 ‘1D’ - Personas 90 ‘1E’ - EasyPoint 55 or Easypoint 57 ‘1F’ - Personas 86 ‘20’ - 5588 ‘21’ - Personas 73 ‘22’ - Personas 72 ‘23’ - Personas 77 ‘24’ - 6674 ‘25’ - 6676 ‘26’ - 5879 ‘27’ - 5887 ‘29’ - Personas 71
FS	1	M	Field Separator
g4	1	M	Hardware Configuration Identifier ‘C’ . This field contains hardware configuration information for each of the devices present in the SST. It is divided into a series of subfields separated by group separators. If a device is not present, there will be no corresponding Device Identifier in the field.
	1	O *See* Table Note 25	Device Identifier. This identifies the device to which the following hardware configuration data applies. For details, see see “Hardware Configuration Data” on page E-2.

Field	Number of Characters	Mandatory/Optional	Description
	Var	O *See* Table Note 25	Hardware Configuration. This contains information for each device indicating which variant of the device is configured and any other configuration data available. For details, see "Hardware Configuration Data" on page E-2.
	1	O *See* Table Note 26	Group Separator.
	1	O *See* Table Note 26	Device Identifier.
	Var	O *See* Table Note 26	Hardware Configuration.
g5	1	O *See* Table Note 27	Field Separator
	1	O *See* Table Note 27	Data Identifier.
	Var	O *See* Table Note 27	Data.

Table Note 25: The Device Identifier and its associated data, together with the preceding group separator form a group. When the Device Identifier is present, all elements of this group must be present.

Table Note 26: The Device Identifier and its associated data, together with the preceding group separator form a group. When the Device Identifier is present, all elements of this group must be present. Such groups are repeated as often as necessary to ensure that the data relating to all devices present in the terminal is reported.

Table Note 27: These fields are reserved for future expansion.

Supplies Data

This solicited status message is sent to Central in response to a Send Configuration Information terminal command message (a command code of '7' with a command modifier of '2'). For details, see the "Terminal Commands" section of Chapter 10, "Central to Terminal Messages".

Note: If Option 83 is set to '000', no supplies data is sent to Central for the Cheque Processing Module (CPM).

Table 9-13
Supplies Data Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'I' .
g2	1	M	Supplies Status Identifier 'A' . This field contains supplies information for each of the devices present in the SST. It is divided into a series of sub-fields separated by group separators. If a device is not present, there will be no corresponding Device Identifier in the field.
	1	O *See* Table Note 28	Device Identifier. This identifies the device to which the following supplies status data applies. For details, see Appendix E, "Device Identifiers".
	Var	O *See* Table Note 28	Supplies Status. This contains information for each device indicating the condition of the device's replenishables. For details, see Appendix E, "Device Identifiers". Each element of the supplies status data will take one of the following values: **Value** **Description** '0' Not configured / reserved '1' Good state '2' Media low '3' Media out '4' Overfill
	1	O *See* Table Note 29	Group Separator.
	1	O *See* Table Note 29	Device Identifier.

Field	Number of Characters	Mandatory/Optional	Description
	Var	O *See* Table Note 29	Supplies Status.
g3	1	O *See* Table Note 30	Field Separator
	1	O *See* Table Note 30	Data Identifier.
	Var	O *See* Table Note 30	Data.

Table Note 28: The Device Identifier and its associated data, together with the preceding group separator form a group. When the Device Identifier is present, all elements of this group must be present.

Table Note 29: The Device Identifier and its associated data, together with the preceding group separator form a group. When the Device Identifier is present, all elements of this group must be present. Such groups are repeated as often as necessary to ensure that the data relating to all devices present in the terminal is reported.

Table Note 30: These fields are reserved for future expansion.

Fitness Data

This solicited status message is sent to Central in response to a Send Configuration Information terminal command message (a command code of '7' with a command modifier of '3'). For details, see the "Terminal Commands" section of Chapter 10, "Central to Terminal Messages".

Table 9-14
Fitness Data Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'J' .
g2	1	M	Hardware Fitness Identifier 'A' .
			This field contains fitness information for each of the devices present in the SST. It is divided into a series of sub-fields separated by group separators.
	1	O *See* Table Note 31	Device Identifier. This identifies the device to which the following fitness data applies. For details, see Appendix E, "Device Identifiers".
	Var	O *See* Table Note 31	Fitness. Each fitness character is encoded with one of the following error severity values, indicating the current fitness of the device: **Char** **Severity** '0' No error / not supported '1' Routine errors have occurred '2' Warning conditions have occurred - investigation is required '3' Suspend. The terminal is currently in the suspend state due to suspected tampering with this device '4' Fatal error condition exists on this device Routine, warning and fatal errors can only be cleared by local Supervisor functions. For details, see Appendix E, "Device Identifiers".
	1	O *See* Table Note 32	Group Separator.
	1	O *See* Table Note 32	Device Identifier.
	Var	O *See* Table Note 32	Fitness.

Field	Number of Characters	Mandatory/Optional	Description
g3	1	O	Field Separator. (Present for future expansion.)
	1	O	Data Identifier (Present for future expansion.)
	Var	O	Data - present for future expansion. (Present for future expansion.)

Table Note 31: The Device Identifier and its associated data, together with the preceding group separator form a group. When the Device Identifier is present, all elements of this group must be present.

Table Note 32: The Device Identifier and its associated data, together with the preceding group separator form a group. When the Device Identifier is present, all elements of this group must be present. Such groups are repeated as often as necessary to ensure that the data relating to all devices present in the terminal is reported.

Tamper and Sensor Status Data

This solicited status message is sent to Central in response to a Send Configuration Information terminal command message (a command code of '7' with a command modifier of '4'). For details, see the "Central to Terminal Messages" section of Chapter 10, "Central to Terminal Messages".

Table 9-15
Tamper and Sensor Data Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'K'.
g2	1	M	Sensor Status Identifier 'A'.
	Var (5)	M	Sensor Status. This five-character field contains one byte per sensor and is identical to the information reported in bytes 2-6 of the Sensors Status message. For details, see the "Sensors (Unsolicited)" section.
	1	M	Field Separator
g3	1	M	Tamper Indicator Identifier 'B'.
	Var	M	Tamper Status. This field contains the status of the TI sensors. If the TI feature is not configured, this field, with the buffer identifier, will not be present. The contents of the tamper status data field are as follows:

Char	Code
1-7	Identical to bytes 7-13 of the Sensors Status message, described in the "Sensors (Unsolicited)" section.
8	'0' '1'
9	'0' '1'
10	'0' '1'
11	'0' '1'
12	'0' '1'
13	Not supported in Advance NDC

If a device is not configured, any associated TI byte will take the value '0'.

Field	Number of Characters	Mandatory/Optional	Description
g4	1	O	Extended Tamper Indicator Identifier 'C'. *See* Table Note 33
	1	*See* Table Note 34 and Table Note 35	Device Identifier. This field contains data on each device present in the SST.
	Var	*See* Table Note 34 and Table Note 35	Tamper Status. This field contains the condition of the TI sensors. If the TI feature is not configured, this field, with the buffer identifier, will not be present. The length of the configuration data varies depending on the device being reported. For details, see Tamper Indicator Identifier 'B'.
	1	*See* Table Note 36	Group Separator
	1	*See* Table Note 36	Device Identifier. This field contains data on each device present in the SST. For details, see "Tamper Data" on page E-19.
	Var	*See* Table Note 36	Tamper Status. This field contains the condition of the TI sensors. If the TI feature is not configured, this field, with the buffer identifier, will not be present. For details, see Tamper Indicator Identifier 'B'.
g5	1	O	Field Separator. This field is present for future expansion.
	1	O	Data Identifier. This field is present for future expansion.
	Var	O	Data. This field is present for future expansion.

Table Note 33: The setting of Enhanced Configuration option 24 determines whether the extended tamper information is sent. For details of option 24, see "Option 24 – Enhanced / TI Sensor Status Unsolicited Message" on page 7-8.

Table Note 34: The device identifier and associated data are a group. If the device identifier is present, all the elements of the group must also be present.

Table Note 35: A device identifier and associated data are included as often as required to report on all devices.

Table Note 36: These fields are present for future expansion.

Software ID and Release Number Data

This solicited status message is sent to Central in response to a Send Configuration Information terminal command message (a command code of '7' with a command modifier of '5'). For details, see the "Terminal Commands" section of Chapter 10, "Central to Terminal Messages".

Table 9-16
Software ID and Release Number Data Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'L' .
g2	1	M	Release Number Identifier 'A' .
	Var (6)	M	NDC Release Number. Contains a six-digit decimal number. The first pair of digits represent the release number. The second pair of digits represent the point release number. The third pair of digits represent the patch release number. For example, 020600 is release 2.06.
FS	1	M	Field Separator
g3	1	M	Software ID Identifier 'B' .
	Var (9)	M	Advance NDC Software ID. Contains the Advance NDC Software ID. For this release, the field takes the following values: G531-0283 (Advance NDC package) If the Advance NDC software ID is unavailable, this field contains nine blanks.
g4	1	O	Field Separator. This field is present for future expansion.
	1	O	Data Identifier. This field is present for future expansion.
	Var	O	Data. This field is present for future expansion.

Local Configuration Option Digits

This solicited status message is sent to Central in response to a Send Configuration Information terminal command message (a command code of '7' with a command modifier of '7').

Table 9-17
Local Configuration Option Digits Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'M' .
g2	1	M	Local Options Identifier 'A' .
	Var (16)	M	Local Option Digits. These characters represent the values of the Local Option Digits which may be entered using Supervisor mode. For details, see the *APTRA Advance NDC, Supervisor's Guide.* Each character is an ASCII representation of the associated Option Digit.
g3	1	O	Field Separator. Reserved for future expansion.
	1	O	Data Identifier. Reserved for future expansion.
	Var	O	Data. Reserved for future expansion.

Note Definitions (Bunch Note Acceptor)

This solicited status message is sent to Central in response to a Send Note Definitions terminal command message (a command code of '7' with a command modifier of '8').

Table 9-18
Note Definitions (BNA) Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier 'N'.
g2	1	M	Accepted Bills Identifier 'A'.
	Var (11)	O	Bill type information, up to a maximum of 50 bill types. *See* Table Note 37.
g3	1	O	Field Separator. Reserved for future expansion.
	1	O	Data Identifier. Reserved for future expansion.
	Var	O	Data. Reserved for future expansion.

Table Note 37: Each bill type consists of 11 bytes with the following format:

#	B	B	I	S	O	V	A	L	U	E

which is interpreted as follows:

Byte	Meaning
#	Active indicator (! = inactive)
BB	Bit positions (00H - 32H)
ISO	Three-character ISO 4217 Country Code (for example, USD = US dollar)
VALUE	Maximum 5 character bank note value and series (for example, 1A, 10B, or 100-). This field is padded with the required number of spaces (20H) to make a total of 5 bytes.

Table Note 38: If the bank-note series description in the platform configuration starts with a hyphen, the series information is not returned to Central. This can be used to make different denomination revisions appear the same to Central.

Table Note 39: If the bank-note data has the same value and the same series, only one version is returned. Where two or more denominations differ only in their revision, only one instance of the denomination information is sent.

Table Note 40: If at least one revision of a denomination is active, that denomination is reported as active to the host. The position used for the denomination is the position of the first denomination of that type. For the other positions relating to the denomination, the bill type structure is zero-filled.

Table Note 41: If all revisions of a note are inactive, the denomination is reported as inactive. The position used for that denomination is the position of the first denomination of that type. For the other positions relating to the denomination, the bill type structure is zero-filled.

Table Note 42: The positions of denomination types 1 to 50 are fixed, so that Central and the terminal refer to the same denomination type when using an index from 1 to 50. This is true until the platform configuration is edited, when Central should request the note definitions again.

For example, for the following definitions for Country, Value, Series, Country Code, and Denomination Code respectively:

```
NCR,5,-A,27,1
NCR,5,-B,27,2
NCR,5,-C,27,3
NCR,10,A,27,4
NCR,10,A,27,5
NCR,10,A,27,6
NCR,10,A,27,7
NCR,20,A,27,8
NCR,20,B,27,9
NCR,20,C,27,11
NCR,20,D,27,12
NCR,20,E,27,15
NCR,20,F,27,16
NCR,20,G,27,16
NCR,50,A,27,17
NCR,50,B,27,18
```

the Advance NDC response would be:

```
[22¬000¬¬F¬NA#01NCR5   #04NCR10A  #08NCR20A  #09NCR20B
#0ANCR20C  #0BNCR20D  #0CNCR20E  #0DNCR20F  #0ENCR20G
#0FNCR50A  #10NCR50B]
```

Table Note 43: If the following message is returned, you need to use INIT BNA to clear the device and populate the note types message:

```
22<fs>000<fs><fs>F<fs>NA
```

The “NA” at the end of the message is returned as the device is in a bad state and an attempt has been made to initialise the device.

Table Note 44: For BNA and GBNA devices, the following conventions are used:

- Denominations of 1000 are returned as 1K.
- Denominations of 10,000 are returned as 10K.
- Denominations of 100,000 are returned as 100K
- Any denomination larger than 100,000 is returned as 1X.

Send Supply Counters

This Solicited Status message is sent to Central in response to a Send Counters Terminal Command message. Depending on the modifier used with the command code of ‘4’, the basic or extended message is used. For details of the Terminal Command message, see the “Terminal Commands” section of Chapter 10, “Central to Terminal Messages”.

See “Basic Send Supply Counters” for the basic message format and “Extended Send Supply Counters” on page 9-49 for the extended message format.

Basic Send Supply Counters The basic message format can report the following:

- Four cassette types. In a dual cash handler system it reports the combined number of notes for each cassette type.
- Four coin hopper types.

Table 9-19
Send Supply Counters Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier ‘2’ .
g2	4	M	Transaction Serial Number (TSN). Contains the TSN of the last transaction processed by the terminal. If this does not correspond to the last TSN sent by Central, it means that the transaction has not been initiated and the counters have not been updated.
g3	7	M	Accumulated Transaction Count. Defines the total number of detected transaction attempts since the terminal was installed or the non-volatile terminal memory was last corrupted. The count is reset to 0 after 9,999,999 transactions.
			A transaction attempt is detected when it is recognised that the TSN received from Central is different from the previously received TSN.
g4	20	M	Notes In Cassettes. Consists of four five-digit decimal counts of the total number of notes remaining in cassette types 1, 2, 3 and 4. The counts are set by supervisor functions and are decremented on each dispense transaction. These counts are zero if not set by an ‘Add Cash’ or ‘Set Standard Cash’ supervisor function. The count contains 65535 (the decimal equivalent of 0FFFF hex) if more notes have been dispensed from a cassette than it has been set to contain, or if notes are dispensed from a cassette type that has not been set. If dual cash handlers are used, the combined number of notes for the cassette type is reported. Only four cassette types are reported, regardless of the setting of the Enhanced Configuration option 76.

Field	Number of Characters	Mandatory/Optional	Description
g5	20	M	Notes Rejected. Consists of four five-digit decimal counts of the total number of notes moved to the reject bin from cassette types 1, 2, 3 and 4. If dual cash handlers are used, the combined number of notes for the cassette type is reported. Only four cassette types are reported, regardless of the setting of the Enhanced Configuration option 76. Although fields 'g4' and 'g5' may not be totally accurate, the sum of these counts for a particular cassette type does accurately represent the difference between the original number of notes added and the number of notes dispensed.
g6	20	M	Notes Dispensed. Consists of four five-digit decimal counts of the total number of notes dispensed from cassette types 1, 2, 3 and 4. These counts are consistent with note counts reported since the counts were last cleared by a supervisor transaction. If dual cash handlers are used, the combined number of notes for the cassette type is reported. Only four cassette types are reported, regardless of the setting of the Enhanced Configuration option 76.
			If a transaction is prematurely stopped by a power failure, these counts are updated to reflect the number of notes dispensed up to the time of power failure.
g7	20	M	Last Transaction Notes Dispensed. Consists of four five-digit decimal counts of the number of notes dispensed on the last transaction processed by the terminal. This field allows Central to recover note counts after power failure, even if the power failure occurred in the middle of a dispense operation.
g8	5	M	Cards Captured. Consists of one five-digit decimal count of the number of cards captured since the count was cleared by a supervisor transaction. The count includes cards captured up to and including the transaction defined in field 'g2' .
g9	5	M	Envelopes Deposited. Consists of one five-digit decimal count of the number of envelopes deposited since the count was last cleared by a Supervisor transaction. The count includes envelopes deposited up to and including the transaction defined in field 'g2' .
g10	5	M	Camera Film Remaining *(not supported).*
g11	5	M	Last Envelope Serial Number. The last envelope serial number is always 00000.
g12	1	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g20-g22	Var(15)	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.

Field	Number of Characters	Mandatory/Optional	Description
g30-g32	Var(15)	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g40-g4x	Var(x)	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g50-g53	Var(20)	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g60	Var(20)	O *See* Table Note 46	Coins remaining
g61	Var(20)	O *See* Table Note 46	Coins dispensed
g62	Var(20)	O *See* Table Note 46	Last transaction coins dispensed
GS	1	*See* Table Note 45	Group Separator.
g70	5	O *See* Table Note 47	Total notes refunded
g71	5	O *See* Table Note 47	Total notes rejected
g72	5	O *See* Table Note 47	Total notes encashed
g73	5	O *See* Table Note 47	Total notes to escrow
GS	1	*See* Table Note 45	Group Separator.
g80-g89	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g90-g99	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g100-g109	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.

Field	Number of Characters	Mandatory/Optional	Description
g110 - g119	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g120	5	O	CPM cheques deposited into BIN1
g121	5	O	CPM cheques deposited into reject / retain BIN2
g122	5	O	CPM cheques deposited into BIN3
g12n	5	O	CPM cheques deposited into BINn-1
GS	1	*See* Table Note 45	Group Separator.
g130 - g139	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g140	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g150 - g154	5	O	Reserved.
GS	1	*See* Table Note 45	Group Separator.
g160	5	O	Reserved.

Table Note 45: If any optional group is present, all of the group separators preceding it will be included, enabling the host to identify the group field by its position.

Table Note 46 Fields ‘g60’ - ‘g62’ form a group and will only be present if a coin dispenser is present.

Table Note 47: Fields ‘g70’ - ‘g73’ form a group and will only be present if a BNA is present.:

Fields ‘g120’ - ‘g129’ form a group and will only be present if a CPM is present.

Extended Send Supply Counters The extended message format supports the reporting of up to eight coin hoppers. The counts are grouped and separated by a Group Separator.

Table 9-20
Send Supply Counters Extended Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier '7'.
g2	1		Transaction group id 'A'.
g3	4	M	Transaction Serial Number (TSN). Contains the TSN of the last transaction processed by the terminal. If this does not correspond to the last TSN sent by Central, it means that the transaction has not been initiated and the counters have not been updated.
g4	7	M	Accumulated Transaction Count. Defines the total number of detected transaction attempts since the terminal was installed or the non-volatile terminal memory was last corrupted. The count is reset to 0 after 9,999,999 transactions. A transaction attempt is detected when it is recognised that the TSN received from Central is different from the previously received TSN.
GS	1	*See* Table Note 48	Group Separator.
g5	1	*See* Table Note 48	Card reader data group id 'B'
g6	5	M	Cards Captured. Consists of one five-digit decimal count of the number of cards captured since the count was cleared by a supervisor transaction. The count includes cards captured up to and including the transaction defined in field 'g3'.
GS	1	*See* Table Note 48	Group Separator.
g7	1	*See* Table Note 48	Cash Handler 0 data group id 'C'
g8	3	*See* Table Note 48 and Table Note 49	Cassette Type. Consists of one three-digit identifier of the cassette type being reported on. The identifier can be between 0 and 7 depending on the cash handler configuration.
g9	5	*See* Table Note 48 and Table Note 49	Notes In Cassettes. Consists of a five-digit decimal count of the total number of notes remaining in the cassette type identified in field g8. The counts are set by supervisor functions and are decremented on each dispense transaction. If not set by an 'Add Cash' or 'Set Standard Cash' supervisor function these counts are not correct. The count is set to 65535 (the decimal equivalent of 0FFFF hex) if more notes have been dispensed from a cassette than it has been set to contain, or if notes are dispensed from an unknown cassette type.

Field	Number of Characters	Mandatory/Optional	Description
g10	5	*See* Table Note 48 and Table Note 49	Notes Rejected. Consists of a five-digit decimal count of the total number of notes moved to the reject bin from the cassette type identified in field g8. Although fields 'g9' and 'g10' may not be totally accurate, the sum of these counts accurately represents the difference between the original number of notes added and the number of notes dispensed.
g11	5	*See* Table Note 48 and Table Note 49	Notes Dispensed. Consists of a five-digit decimal count of the total number of notes dispensed from the cassette type identified in field g8. This count is consistent with note counts reported since the counts were last cleared by a supervisor transaction. If a transaction is prematurely stopped by a power failure, these counts are updated to reflect the number of notes dispensed up to the time of power failure.
g12	5	*See* Table Note 48 and Table Note 49	Last Transaction Notes Dispensed. Consists of a five-digit decimal count of the number of notes dispensed on the last transaction processed by the terminal. This field allows Central to recover note counts after power failure, even if the power failure occurred in the middle of a dispense operation.
g13	5	*See* Table Note 48, Table Note 49 and Table Note 51	If present, this field is always 00000. Notes deposited. Consists of a five-digit decimal count of the total number of notes deposited from the cassette type identified in field g8. This count is consistent with note counts reported since the counts were last cleared by a supervisor transaction.
GS	1	*See* Table Note 48	Group Separator.
g14	1	*See* Table Note 48	Cash Handler 1 data group id 'D'
g15	3	*See* Table Note 48 and Table Note 49	Cassette Type. Consists of one three-digit identifier of the cassette type being reported on. The identifier can be between 0 and 255 depending on the cash handler configuration.
g16	5	*See* Table Note 48 and Table Note 49	Notes In Cassettes. Consists of a five-digit decimal count of the total number of notes remaining in the cassette type identified in field g15. The counts are set by supervisor functions and are decremented on each dispense transaction. These counts are zero if not set by an 'Add Cash' or 'Set Standard Cash' supervisor function. The count is set to 65535 (the decimal equivalent of 0FFFF hex) if more notes have been dispensed from a cassette than it has been set to contain, or if notes are dispensed from a cassette type that has not been set.

Field	Number of Characters	Mandatory/Optional	Description
g17	5	*See* Table Note 48 and Table Note 49	Notes Rejected. Consists of a five-digit decimal count of the total number of notes moved to the reject bin from the cassette type identified in field g15.
			Although fields 'g16' and 'g17' may not be totally accurate, the sum of these counts accurately represents the difference between the original number of notes added and the number of notes dispensed. This is because notes presented but not taken and then retracted are sent to the reject bin. In this scenario, the Notes Rejected count is not increased, but the Notes In Cassettes count is decremented.
g18	5	*See* Table Note 48 and Table Note 49	Notes Dispensed. Consists of a five-digit decimal count of the total number of notes dispensed from the cassette type identified in field g15. This count is consistent with note counts reported since the counts were last cleared by a supervisor transaction.
			If a transaction is prematurely stopped by a power failure, these counts are updated to reflect the number of notes dispensed up to the time of power failure.
g19	5	*See* Table Note 48 and Table Note 49	Last Transaction Notes Dispensed. Consists of a five-digit decimal count of the number of notes dispensed on the last transaction processed by the terminal. This field allows Central to recover note counts after power failure, even if the power failure occurred in the middle of a dispense operation.
g20	5	*See* Table Note 48, Table Note 49 and Table Note 51	Notes deposited. Consists of a five-digit decimal count of the total number of notes deposited from the cassette type identified in field g15. This count is consistent with note counts reported since the counts were last cleared by a supervisor transaction.
GS	1	*See* Table Note 48	Group Separator.
g21	1	*See* Table Note 48	Coin dispenser data group id 'E'
g22	2	*See* Table Note 48 and Table Note 50	Hopper type number. Consists of one two-digit identifier of the hopper type being reported on. The identifier can be between 01 and 08 depending on the coin hopper configuration.
g23	5	*See* Table Note 48 and Table Note 50	Coins remaining. Consists of a five-digit decimal count of the total number of coins remaining in the hopper type identified in field g22. The counts are set by supervisor functions and are decremented on each dispense transaction. These counts are zero if not set by an 'Add Coins' or 'Std Coins' supervisor function. The count is set to 65535 (the decimal equivalent of 0FFFF hex) if more coins have been dispensed from a hopper than it has been set to contain, or if coins are dispensed from a hopper type that has not been set.

Field	Number of Characters	Mandatory/Optional	Description
g24	5	*See* Table Note 48 and Table Note 50	Coins dispensed. Consists of a five-digit decimal count of the total number of coins dispensed from the hopper type identified in field g22. This count is consistent with coin counts reported since the counts were last cleared by a supervisor transaction.
g25	5	*See* Table Note 48 and Table Note 50	Last transaction coins dispensed. Consists of a five-digit decimal count of the number of coins dispensed on the last transaction processed by the terminal. This field allows Central to recover coin counts after power failure, even if the power failure occurred in the middle of a dispense operation.
g26	5	*See* Table Note 48, Table Note 50, and Table Note 51	Coins deposited. Consists of a five-digit decimal count of the total number of coins deposited from the hopper type identified in field g22. This count is consistent with coin counts reported since the counts were last cleared by a supervisor transaction.
GS	1	*See* Table Note 48	Group Separator.
g27	1	*See* Table Note 48	Envelope depository data group id ‘F’
g28	5	*See* Table Note 48	Envelopes Deposited. Consists of one five-digit decimal count of the number of envelopes deposited since the count was last cleared by a Supervisor transaction. The count includes envelopes deposited up to and including the transaction defined in field ‘g3’.
g29	5	*See* Table Note 48	Last envelope serial number. The last envelope serial number is always 00000.
GS	1	*See* Table Note 48	Group Separator.
g30	1	*See* Table Note 48	Camera data group id ‘G’ *(not supported).*
g31	5	*See* Table Note 48	Camera Film Remaining. *(not supported).*
GS	1	*See* Table Note 48	Group Separator.
g32	1	*See* Table Note 48	DPM data group id ‘H’ *(not supported).*
g33	2	*See* Table Note 48	Deposit bin identifier *(not supported).*
g34	5	*See* Table Note 48 and Table Note 66	Documents deposited in bin *(not supported).*
GS	1	*See* Table Note 48	Group Separator.
g35	1	*See* Table Note 52	Enhanced cash deposit data group id ‘I’. Not supported by Advance NDC.
g36	3	*See* Table Note 52 and Table Note 53	NDC cassette type
g37	5	*See* Table Note 52 and Table Note 53	Total notes in cassette

Field	Number of Characters	Mandatory/Optional	Description
g38	3	*See* Table Note 52 and Table Note 53	Number of note types reported. This is a value in the range '000' to '999'
g39	4	*See* Table Note 52 and Table Note 54	Note type identifier. This is a value in the range'0001' to 'FFFF'
g40	5	*See* Table Note 52 and Table Note 54	Number of notes of the type identified by the note type identifier in field g39
GS	1	*See* Table Note 48	Group Separator.
g41	1	*See* Table Note 55	CPM group data id 'J'
g42	1	*See* Table Note 55 and Table Note 56	Bin number
g43	5	*See* Table Note 55 and Table Note 56	Cheques deposited in bin
GS	1	*See* Table Note 48	Group Separator.
g44	1	*See* Table Note 57	BNA Emulation (and Extended Emulation) deposit data group id 'K'. Not supported by Advance NDC.
g45	5	*See* Table Note 57 and Table Note 58	Total notes refunded
g46	5	*See* Table Note 57, Table Note 58 and Table Note 59	Total notes returned rejected
g47	5	*See* Table Note 57 and Table Note 58	Total notes encashed
g48	1	*See* Table Note 57 and Table Note 58	Total notes to escrow
GS	1	*See* Table Note 48	Group Separator.

Table Note 48: If any optional group is present, all of the group separators preceding it will be included, enabling the host to identify the group field by its position. The groups included in the message depend on the presence of devices in the ATM. In future releases, new groups may be added and new counts added to the end of existing groups.

Table Note 49: Fields g8 to g13 and g15 to g20 are repeated for each cassette type present in the dispenser. They will be repeated either four or seven times depending on the setting of Enhanced Configuration option 76.

Table Note 50: Fields g22 to g26 are repeated for each configured hopper type in the coin dispenser.

Table Note 51: These fields used only on devices that can recycle deposited items.

Table Note 52: These fields are included in Enhanced Cash Deposit mode.

Table Note 53: Fields g36 to g38 are repeated for each NDC cassette type.

Table Note 54: Fields g39 and g40 are repeated for each Note Type Identifier within each cassette. These fields are not present if there are no notes in the cassette.

Table Note 55: Fields g41 to g43 are only included when a CPM is present.

Table Note 56: Fields g42 and g43 report the number of cheques stored in each bin.

Table Note 57: Fields g44 to g48 are only included in BNA Emulation modes.

Table Note 58: Fields g45 to g48 contain the counts for all note types.

Table Note 59: Notes returned to the cardholder without being processed are unknown under CEN XFS.

Send Tally Information

From Advance NDC 2.06 onwards, tally reporting is not supported. A default message is sent to Central in response to a Send Tally Group Terminal Command message (a command code of '5').

The data is always as shown in the following table:

Table 9-21
Send Tally Information Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier '3'.
g2	1	M	Group Number. Contains the group number of the requested tallies ('A' to 'N' or 'V').
g3	12	M	Date And Time Last Cleared. This field always contains the following default date and time: YY = Year ('00') MM = Month ('01') DD = Day ('01') HH = Hour ('00') MM = Minute ('00') SS = Second ('00')
g4	6	M	Tally Data. This field is always = 000000.

Send Error Log Information

Note: From Advance NDC 2.06 onwards, error log reporting is not supported. A default message is sent to Central in response to a Send Error Log Group message (a command code of '6')

The data is always as shown in the following table:

Table 9-22
Send Error Log Information Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier '4'.
g2	1	M	Group Number. The group number of the requested log group ('A', 'B' or 'C').
g3	2	M	New Entries. This field is always 00.
g4	12	M	Date Last Cleared. This field always contains the following default date and time: YY = Year ('00') MM = Month ('01') DD = Day ('01') HH = Hour ('00') MM = Minute ('00') SS = Second ('00')

Send Date/Time Information

This solicited status message is sent to Central in response to a Send Date And Time message (a command code of ‘8’). For details, see the “Terminal Commands” section of Chapter 10, “Central to Terminal Messages”.

Table 9-23
Send Date/Time Information Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier ‘5’ .
g2	1	M	ToD Clock Status. This field has the following values: ‘0’ - Time is actual. ‘1’ - Time is default (clock not loaded with actual time). ‘2’ - ToD malfunction.
g3	12	M	Terminal Date / Time. The actual date and time returned by the terminal clock in the following format: YY = Year (‘00’ - ‘99’) MM = Month (‘01’ - ‘12’) DD = Day (‘01’ - ‘31’) HH = Hour (‘00’ - ‘23’) MM = Minute (‘00’ - ‘59’) SS = Second (‘00’ - ‘59’) If 00<=YY<=89, the year is taken to be in the range 2000<=YY<=2089. If 90<=YY<=99, the year is taken to be in the range 1990<=YY<=1999. In the case of a ToD malfunction, these are zero. In the case of Default time, the value is initialised to the lowest value, and counting starts from this.

Send Configuration ID

This solicited status message is sent to Central in response to a Send Configuration ID terminal command message (a command code of '3'). For details, see the "Terminal Commands" section of Chapter 10, "Central to Terminal Messages".

Table 9-24
Send Configuration ID Response

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier '6' .
g2	4	M	Configuration ID. Contains the last four-digit configuration ID number (0000-9999) sent to the terminal from Central.

Solicited Device Fault Status

This section describes the information contained in the Status Information field when the Status Descriptor is ‘8’ - Device Fault, For details, see the “Device Fault Status Information Field” section.

All solicited status device fault messages require Central to reply with a Transaction Reply command. The cash handler and depository devices are used only in response to a Transaction Reply (TR) command, and only give unsolicited statuses during Transaction Reply processing.

The first character in the Status Information field identifies the device by means of a Device Identification Graphic (DIG). Devices are identified by the same code in Solicited and Unsolicited messages. For details, see Appendix E, “Device Identifiers”.

Device Fault Status Responses

The following table shows the solicited device fault status messages which may be returned for each Transaction Reply command.

Table 9-25
Device Fault Status in Response to Transaction Reply Commands

Transaction Reply Command	Device Faults
Deposit and Print	Depository
Dispense and Print	Cash Handler, Coin Dispenser
Print Immediate	None
Set Next State and Print	None
Night Safe Deposit and Print	None
Card Before Cash	Card Reader/Writer, Cash Handler, Coin Dispenser
Fast Cash	Cash Handler, Coin Dispenser
Card Before Parallel Dispense and Print	Card Reader/Writer, Cash Handler, Coin Dispenser
Print Statement and Wait	Statement Printer and Receipt in sideways mode
Print Statement and Set Next State	Statement Printer and Receipt in sideways mode
Refund	Bunch Note Acceptor

Transaction Reply Command	Device Faults
Encash	Bunch Note Acceptor
Process Cheque	Cheque Processing Module

Device Fault Status Information Field

When the Status Descriptor is '8' - Device Fault, the information given in Table 9-26 is present in the Status Information field. In the "Number of Characters" column, a number in brackets indicates the maximum field length.

The data returned in the fields is variable in length as it is different for each device, but each device will always send the same number of characters. For details, see "Fitness Data" on page E-14.

Table 9-26
Device Fault Status Information Field

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Device Identification Graphic (device identifier).
g2	Var (17)	O	Transaction Status. Contains information required to make a transaction completion decision.
FS	1	*See* Table Note 60	Field Separator
g3	Var (14)	O	Error Severity. Contains information required to decide whether to shut down or continue to use the SST. Each character is always coded in the same way: **Code** **Description** '0' No Error. Continue to use - no error has occurred. Diagnostic information follows. '1' Routine. Continue to use - a routine error has occurred and diagnostic information follows. '2' Warning. Continue to use, but it is recommended that the network operator be informed of the error or exception condition. Diagnostic information follows. '3' Suspend. This code indicates that the terminal will suspend transaction processing on completion of the current transaction (state 000 entered). This is sent if cardholder tampering is suspected. If no action is taken by Central, the terminal will attempt to go back in service in five minutes. Diagnostic information follows.

Field	Number of Characters	Mandatory/Optional	Description
			'4' Fatal. This code indicates that the device is out-of-service and will continue to report fatal error until operator intervention at the terminal. It is recommended that the terminal is put out-of-service or that transactions involving the faulty device are not allowed.
FS	1	*See* Table Note 60	Field Separator
g4	Var	O	Diagnostic Status. Used for logging errors. The field length may be omitted if there is no error condition to be reported. The field will always be present if preceded by an Error Severity field with a value of 1 or greater. The following vendor-specific rules are applied for all devices: **Characters 1 and 2** contain a main error status value (M-Status) in the range 0-99, transmitted as two characters which give the decimal representation of the M-Status value. M-Status is used mainly as an error log to assist machine servicing. It may also be used in a transaction log to supplement Transaction status or Device status information. **Note:** If using a GBRU, with Enhanced Configuration option 78 set to 000, see "GBRU to CDM M-Status Mapping" on page 9-62 for the M-Status reporting. **Characters 3 to n** (M-Data) contain detailed diagnostic information related to the device. Each byte is transmitted as two characters. These give the hexadecimal representation of the value of the byte. **Note:** The data returned for devices is hardware-dependent, except for the EJ printer, where the data is application-driven. **Note:** Where an EPP is present, the data returned in this field is of the format 00*mm*. 00 is always returned in characters 1 and 2, and *mm*, in characters 3 to *n*, contains the value from byte 0 of the T-Code data.
FS	1	*See* Table Note 60	Field Separator.
g5	Var (8)	O	Supplies Status. Contains information about the state of supplies (paper, currency, magnetic cards, envelopes, inkwells, documents) in the terminal. This field contains 1 character for each supplies container managed by the device. Each character is always coded in the same way: '0' No New State. The state of the container can be assumed to be unchanged. '1' Good State. The state of the container is known to be good, for example, not low, empty or overfilled. '2' Media Low.

Field	Number of Characters	Mandatory/Optional	Description
			'3' Media Out. '4' Overfill. The container has sensed a full condition and should be emptied. If this field is omitted, it can be assumed that there is 'no new state' on any container.

Table Note 60: Included if any of the subsequent fields are present.

As the field lengths may change with the hardware being used, Central should not attempt to analyse these fields by allocating a fixed length to each device. Instead field lengths should be determined by searching for the FS (field separator) characters.

GBRU to CDM M-Status Mapping

If using a GBRU device as a cash dispenser, you can choose to report the M-Status (field 'g4') as a CDM or as a GBRU. This is set using Enhanced Configuration option 78, for details see "Option 78 – GBRU M-Status Reporting" on page 7-14.

To report using the CDM M-Status, the GBRU M-Status is mapped to an equivalent CDM M-Status, as shown in Table 9-27.

Table 9-27
GBRU to CDM M-Status Mapping

GBRU M-Status	Meaning	CDM M-Status	Meaning
0	No error	0	No error
50	Software error		
20	Cassette not installed	1	Dispense requested from a cassette that is not installed or no cassettes installed during self test
6	Too many unrecognised notes	2	Too many bills being rejected, for example, undersize, oversize, doubles, extra bills, or unable to learn bill width and singularity
7	Too many counterfeit notes		
8	Too many suspect notes		

GBRU M-Status	Meaning	CDM M-Status	Meaning
44	Cassette position 1 module error	3	Pick failure
45	Cassette position 2 module error		
46	Cassette position 3 module error		
47	Cassette position 4 module error		
5	Bills out - not enough notes to satisfy request	4	Pick failure plus low (out of notes)
38	Reject transport error	7	Purge bin not present or inoperative
39	Counterfeit area error		
40	Reject area error		
41	Capture area error		
50	Software error		
14	Counterfeit area full	8	Purge bin overfill sensor blocked
15	Reject area full		
16	Capture area full		
15	Reject area full	8(1)	Purge bin full
52	Control failure. Device error condition not correctly reported.	9	Communications failure. Current replenishment information may not be correct
2	Operation not attempted as device, or cassette type, is fatal from previous operation	10	Operation not attempted as device, or cassette type, is fatal from previous operation
22	Shutter jammed open		
9	Not cleared - this operation cannot be performed because notes may not have cleared from a previous operation	11	Operation not attempted due to one of the following reasons ● Notes are still stacked in the transport from a previous operation ● Notes may not have been cleared following an unrecovered error in a previous operation ● The dispenser has been powered up but not cleared
27	Pre-acceptor module error	12	Presenter clamping or bill alignment mechanism failed or jammed
28	Pre-acceptor transport error		

GBRU M-Status	Meaning	CDM M-Status	Meaning
22	Shutter jammed open	13	Exit shutter jammed open
26	Shutter module error		
23	Shutter jammed closed	14	Exit shutter jammed closed
27	Pre-accepter module error	18	Currency jam in presenter transport or transport sensor failure
28	Pre-acceptor transport module error		
29	Separator module error		
30	Separator transport error		
31	Transport before bill validator module error		
32	Bill validator module error		
33	Transport after bill validator module error		
34	Escrow transport error		
35	Escrow module error		
36	Reservoir module error		
37	Bunch transport error		
42	Transport to cassettes error		
43	Lower transport error		
4	Suspected customer tampering	19	Exit sensor blocked on next operation after a good present
50	Software error		
48	Upper Printed Circuit Board (PCB) module error	32	Heartbeat on execution processor failed
49	Lower PCB module error		
52	Control failure. Device error condition not correctly reported		
50	Software error	34	A present notes operation has been attempted without notes being stacked or a retract has been attempted with no notes present

GBRU M-Status	Meaning	CDM M-Status	Meaning
25	Interlock open	35	Operation incomplete due to power disconnection through interlock on SST access door
51	Unit open — some part of the device is open or racked out		
24	Bill validation unit error	39	The linear variable displacement transducer / note thickness sensor (LVDT / NTS) or associated circuit is malfunctioning
1	USB communications error	146	SDC link error

Other Solicited Messages

Other solicited messages that can be sent from the terminal to Central are as follows:

- Encryptor Initialisation Data
- Upload EJ Data Message

Encryptor Initialisation Data

This message class / sub-class is used when initialising the encryptor module, and is used in a similar way to the terminal state message. However, it does not contain any of the fields associated with message authentication, and is therefore suitable for the initial exchange of data required to initialise the encryptor.

This solicited message is returned in response to an Extended Encryption Key Change message, described in "Extended Encryption Key Change" on page 10-7.

Table 9-28
Encryptor Initialisation Data Response

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '2' - Solicited message.
c	1	M	Message Sub-Class. The message sub-class is: '3' - Encryptor Initialisation Data.
FS	1	M	Field Separator
d	3 or 9	M	Logical Unit Number (LUNO). This number is defined in a field transmitted to the terminal in a Configuration Parameters Load message. The default is 000. If the data security feature is configured, an additional six characters are present. These contain the security terminal number.
FS	1	M	Field Separator
FS	1	M	Field Separator
e	1	M	Information Identifier. Identifies the type of information sent, as follows: '1' EPP Serial Number and Signature '2' EPP Public Key and Signature

Field	Number of Characters	Mandatory/Optional	Description
			'3' New Key Verification Value (KVV) for key just loaded or reactivated
			'4' Keys Status
			'5' Key Loaded
			'6' Key Entry Mode
			'7' RSA encryption KVV
			'9' ATM random number
			'B' Encryptor capabilities and state
			'C' Key deleted
FS	1	M	Field Separator
f	Var	O	Encryptor Information, dependent on the Information Identifier as follows:
	When Information Identifier = '1':		
	8		EPP Serial Number
	320		EPP Serial Number Signature, created using the RSA NCR key, and base 94 encoded. For further details of EPP authentication and base 94 encoding, see "EPP Authentication Process" on page 11-18 and "Base 94 Encoding and Decoding" on page 11-26.
	When Information Identifier = '2':		
	320		EPP Public Key, base 94 encoded. The exponent of the EPP Public Key is always 65537, and is therefore not sent to Central.
	320		EPP Public Key Signature, created using the RSA NCR key, and base 94 encoded. For further details of EPP authentication and base 94 encoding, see "EPP Authentication Process" on page 11-18 and "Base 94 Encoding and Decoding" on page 11-26.
	When Information Identifier = '3':		
	6 or 72		New Key Verification Value (KVV)
	When Information Identifier = '4':		
			Keys Status, containing KVVs as follows:
	6		● Master Key KVV
	6		● Communications Key KVV
	6		● MAC Key KVV
	6		● B Key KVV

Field	Number of Characters	Mandatory/Optional	Description
			If a key has not been loaded, its KVV will be six zeroes. **Note**: Central should accept a variable length Key Status field, in case new keys need to be added in the future. For details of the calculation of KVVs, see "Key Verification Values" on page 11-17.
	When Information Identifier = '5':		
			For Key Loaded, this field is absent.
	When Information Identifier = '6':		
			Key Entry Mode, a single character in the range '1' to '4' as follows: '1' Single length without XOR '2' Single length with XOR '3' Double length with XOR '4' Double length, restricted.
	When Information Identifier = '7'		
	3		Binary data length
	VAR		RSA KVV base 94 encoded
	When Information Identifier = '9'		
	VAR		ATM random number, ASCII hexadecimal encoded. This message is not required in the basic remote key protocol and, if received, a Specific Command Reject is returned.
	When Information Identifier = 'B'		
	2		Remote Key Protocol, two characters in the range '00' to '06' as follows: '00' None '01' Basic Signature '02' Basic Certificate '03' Basic Signature and certificate '04' Enhanced signature '06' Enhanced signature and certificate
	2		Certificate state '00' Not ready or not supported '01' Certificate primary

Field	Number of Characters	Mandatory/Optional	Description
			'02' Certificate secondary
	When Information Identifier = 'C'		
			For Key Deleted, this field is absent
g	Var	O	Trailer. Protocol-dependent.

Upload EJ Data Message

The terminal sends this solicited message to Central in response to an EJ Command, taking the data from the file *ejdata.log* in the *c:\program files\ncr aptra\advance ndc\data* directory on the SST. A pointer is maintained in persistent memory to indicate the location of the next block of data to be uploaded. Any binary zeros in the electronic journal data are replaced with an ASCII question mark (?) character before the upload data is sent.

The size of the electronic journal data blocks that are sent in each upload message can be set in the EJ Options and Timers command. For details of EJ Options and Timers and acknowledgement messages, see the "EJ Commands" on page 10-73.

The SST will continue to upload EJ data blocks as long as an acknowledgement message is received from Central for each message sent. If an acknowledgement is not received within the time specified by timer 60, the SST will re-send the current block up to the maximum number of retries set in the EJ Options and Timers message. When all EJ data is uploaded, the data is deleted from the *ejdata.log* file.

The SST will only send an Upload EJ Data message, or process an EJ command, when in Out-of-Service mode or In-Service mode when there is no transaction in progress. Upload EJ Data messages will not be sent when the SST is in Supervisor mode. Any EJ data accumulated in the EJ file *ejdata.log* while the SST is in Supervisor mode will be sent at the next opportunity.

Note: The Supervisor function INIT EJRNL should not be performed during EJ upload. For more information, refer to the *APTRA Advance NDC, Supervisor's Guide*, Chapter 3, "Replenish Menu".

Table 9-29
Format of the Upload EJ Data Message

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '6' - Electronic Journal.
c	1	M	Message Sub-Class. The message sub-class is: '1' - Upload Data.
FS	1	M	Field Separator
FS	1	M	Field Separator
FS	1	M	Field Separator
FS	1	M	Field Separator
d	6	M	Machine Number. Range 000000 to 999999.
e	6	M	Date. Range 000000 to 999999 in the format YYMMDD. Date the block was sent, determined by the SST's internal clock.
f	6	M	Time. Range 000000 to 999999 in the format HHMMSS. Time the block was sent, determined by the SST's internal clock.
g	6	M	Last Char Previous Block. Range 000000 to 999999. *See* Table Note 61.
h	6	M	Last Char This Block. Range 000000 to 999999. *See* Table Note 61. The SST compares the Last Character Received field in the acknowledgement message sent from the host with the Last Char This Block field of the last Upload EJ Data message it sent to the Host. If these two values are not the same, the acknowledgement message is ignored. For more details, see the "EJ Commands" section in Chapter 10, "Central to Terminal Messages". The Last Character Previous Block field can be used by the host to check on the received message.
i	3	M	Block Length. Range 001-350. Default is 200. Set using the EJ Options and Timers command message; only the last data block sent to the host should be less than this block length.
j	Var	M	Response Data. Range 001-350 as specified by Field 'i'. Upload data consists of ASCII text with a carriage return (CR) at the end of each line. Lines are a maximum of 40 characters. *See* Table Note 62.

Table Note 61: The Last Char Previous Block and Last Char This Block values are based on a modulus 1,000,000 character count which starts at zero following a cold start of the SST. The count is

incremented for each character written to the electronic journal. The count is not re-set for a warm start, that is, a power fail or reset during which the persistent memory is preserved.

Table Note 62: If the last block length at the end of file is less than specified in Field ‘i’, that length will be returned.

Unsolicited Status Messages

Unsolicited Status messages are used to report any change of condition at the terminal. These include:

- Recognition of an external event
- Device errors
- Supplies problems.

Conditions for Sending Unsolicited Messages

Unsolicited status messages do not require a reply from Central. They are sent under the following conditions:

- Power failure: a message is sent on power-up
- An external event is detected. This includes bin inserted / removed, alarm activated, supervisor keys and switches. The reporting of supervisor switch changes is delayed if a card is inserted
- A device fault is detected as a result of processing a Transaction Reply command, but the fault condition does not require Central recovery action. This means that Transaction Reply processing can continue as if no fault had occurred
- A device fault is detected which is not the result of processing a Transaction Reply command. For example, printer / MCRW errors
- If an alarm is activated during a power failure or communications loss, a message is sent when power or communications are restored
- If supervisor / supply switch values are changed while off-line, the last change of both switches is reported when communications are restored
- If the message mode option is set to enable the Cancel key while a Statement and Wait function is being carried out and the cardholder presses the Cancel key. For details, see the *APTRA Advance NDC, Supervisor's Guide*
- Errors in the Close state.

Note: Exits can also send Unsolicited Status Messages. These are of the same format as standard Unsolicited Status Messages, but the content of the Status Information field depends on the Exit. For more information, see "Exit to Host Messages" on page 9-111.

Table 9-30
Unsolicited Status: Message Format

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '1' - Unsolicited message.
c	1	M	Message Sub-Class. The message sub-class is: '2' - Status message.
FS	1	M	Field Separator
d	3 or 9	*See* Table Note 63	Logical Unit Number (LUNO). This number is defined in a field transmitted to the terminal in a Configuration Parameters Load message. The default is 000. If the data security feature is configured, an additional six characters are present. These contain the security terminal number.
FS	1	M	Field Separator
FS	1	M	Field Separator
e	Var	M	Status Information. The content of this field varies according to the message mode selected at installation time. *See* Table 9-31.
f	Var	M	Trailer. Protocol-dependent.

Table Note 63: In power-up status messages, this field contains either the LUNO that has been previously downloaded, or '000'.

Unsolicited Status Information Field

One of the following conditions must be satisfied before an unsolicited message is sent:

- Device status is non-zero
- Error severity is 2 (warning) or greater
- Supplies status is 2, 3, or 4.

A routine error does not generate an unsolicited status message.

The following table shows the structure of the Status Information field in unsolicited status messages.

Table 9-31
Unsolicited Status: Status Information Field

Field	Number of Characters	Mandatory/Optional	Description
e1	1	M	Device Identification Graphic.
e2	Var (154 max)	O	Device Status. Used for recording any transaction exception of change of state of the device. For devices which report both Solicited and Unsolicited Status messages, a common set of Transaction / Device Status codes are defined for use in either type of message. When processing a Transaction Reply command, any unsolicited Transaction exceptions are reported prior to the solicited 'device fault' or 'ready' status.
FS	1	*See* Table Note 64	Field Separator
e3	Var (14)	O	Error Severity. As 'g3' in Solicited messages.
FS	1	*See* Table Note 64	Field Separator
e4	Var	O	Diagnostic Status. As 'g4' in Solicited messages.
FS	1	*See* Table Note 64	Field Separator
e5	Var (8)	O	Supplies Status. As 'g5' in Solicited messages.

Table Note 64: This field separator is included if any of the following optional fields are included.

Device Status Information

Solicited or unsolicited status information can be reported for devices as described in the following sections.

For information on the journalling that occurs, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Time-Of-Day Clock (Unsolicited)

This message indicates that the Time-of-Day Clock is not available. Central can either keep the terminal out-of-service or return it to service.

Table 9-32
Time-Of-Day Clock Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic 'A' .
e2	1	Device Status. '1' - Clock reset but running. '2' - Clock has stopped.
e3	1	Error Severity. '2' - Warning - clock reset. '4' - Fatal - clock malfunction.
e4		Not present.
e5		Not present.

Power Failure (Unsolicited)

This message is sent during power-up to tell Central that a power interruption has occurred. Central can use the configuration ID contained in this message to check if a download is needed before sending a Start Up Terminal Command message to put the terminal in-service

Table 9-33
Power Failure Status

Field	No. of Characters	Content
e1	1	Device Identification Graphic 'B' .
e2	4	Device Status. This contains the configuration identification number (0000-9999) of the customisation data stored on disk. Central can use this information to check if a download is needed before putting the terminal in-service. A value of '0000' indicates that a download must be performed.
e3		Not present.
e4		Not present.
e5		Not present.

Card Reader / Writer (Solicited / Unsolicited)

This message gives details of any exception condition that is detected during card processing. Solicited device faults are only reported on Card Before Cash transactions.

Note: If failure occurs in the physical connection, an unsolicited status message is reported indicating that the MCRW has a fatal severity and that the device is inoperative. Advance NDC does not put the SST into Out of Service mode when the MCRW enters a fatal state. As in NDC+, it is the reponsibility of the host to do this and the host must be configured to do this if required.

Table 9-34
Card Reader/Writer Status

Field	Number of Characters	Content
g1 / e1	1	Device Identification Graphic 'D'.
g2 / e2	1	Transaction / Device Status. Gives details of any transaction-related exception condition detected while processing a card at the terminal. Possible values are:

Field	Number of Characters	Content		
		Sol/ Unsol	**Code**	**Description**
		U	'0'	No transaction exception condition occurred but consult other fields for error severity, diagnostic status or supplies status changes.
		S / U	'1'	The cardholder did not take his card within the allowed time and it was captured or jammed.
		S / U	'2'	The mechanism failed to eject the card and it was captured or jammed.
		S / U	'3'	The mechanism failed to update the requested tracks on the card.
		S / U	'4'	Invalid track data was received from Central.
		U	'7'	Error in track data.
		If using EMV, you should use the EMV-generated hardware error to identify the device status. EMV can also generate messages to identify whether the error is due to hardware or data problems using a DIG of 'c'. For further information on the EMV messages, refer to the *EMV Integrated Circuit Card (ICC) Reference Manual*.		
g3 / e3	Var (1 or 2)	Error Severity. This is a one or two character field coded in the standard way to be used to make a shut-down decision.		
g4 / e4	Var	Diagnostic Status (M-status plus M-data). This contains information to be used for logging device errors. The M-status describes the main error found.		
g5 / e5	1	Supplies Status. This is a single character field indicating the state of the card capture bin.		
		Code	**Description**	
		'0'	No new state	
		'1'	No overfill condition (capture bin)	
		'4'	Overfill condition (capture bin)	

Cash Handler (Solicited / Unsolicited)

This message gives details of a dispense operation in response to a Transaction Reply Command message.

The format depends on the setting of Enhanced Configuration option 76, as described in Table 9-35. When Enhanced Configuration option 76 is set to 001, the counts and status fields report cassette types in numerical order.

Table 9-35
Cash Handler Status

Field	Number of Characters	Content
g1 / e1	1	Device Identification Graphic 'E' .
g2 / e2	Var (23)	Transaction / Device Status (T-code plus T-data). Gives details of a dispense operation in response to a Transaction Reply Command message. Character 1 (T-code) can be:

Sol/Unsol	Code	Description
U	'0'	Successful operation, but an exception condition occurred which is detailed in later fields.
S	'1'	Short dispense. For a spray dispenser, this can also indicate that an extra note has been dispensed.
S	'2'	No notes dispensed.
S	'3'	Notes dispensed unknown. The cardholder may have had access to any presented notes, so it should be assumed some may have been dispensed. Intervention may be required to reconcile the cash amount totals. The following counts contain requested dispense values.
S	'4'	No notes dispensed or card not ejected. This status is returned on a card before cash transaction if the stack operation fails and the notes are purged prior to card eject.
S / U	'5'	Some notes have been retracted when the notes were not taken following a Present time-out. The number of notes retracted is unknown.

See Table Note 69

When Enhanced configuration option 76 is set to 000, the counts are reported as follows:

Characters 2-9 (T-data) contain notes dispensed counts. Each pair of characters represents a two-digit decimal value in the range 00-99 for a particular cassette type.

Characters	Cassette Types
2-3	1
4-5	2
6-7	3
8-9	4

Field	Number of Characters	Content
		The following optional characters 10-17 are only valid for a spray cash dispenser, and contain a count of notes dispensed to the cardholder plus notes in an unknown location. Each pair of characters represents a two-digit decimal value in the range 00-99 for a particular cassette type. The default message format does not include these characters. The extra fields are enabled in option 4c; for details, refer to the *APTRA Advance NDC, Supervisor's Guide.* **Characters** **Cassette Types** 10-11 1 12-13 2 14-15 3 16-17 4
		When Enhanced configuration option 76 is set to 001, the counts are reported as follows: Characters 2-15 (T-data) contain notes dispensed counts. Each pair of characters represents a two-digit decimal value in the range 00-99 for a particular cassette type. **Characters** **Cassette Types** 2-3 1 4-5 2 6-7 3 8-9 4 10-11 5 12-13 6 14-15 7 The following optional characters 16-31 are only valid for a spray cash dispenser, and contain a count of notes dispensed to the cardholder plus notes in an unknown location. Each pair of characters represents a two-digit decimal value in the range 00-99 for a particular cassette type. The default message format does not include these characters. The extra fields are enabled in option 4c; for details, refer to the *APTRA Advance NDC, Supervisor's Guide.* **Characters** **Cassette Types** 16-17 1 18-19 2 20-23 3 24-25 4 26-27 5 28-29 6 30-31 7
g3/ e3	5 or 8	Error Severity. Used to make a shut-down decision. Character '0' Severity information related to complete device Character '1' Severity related to cassette type 1 Character '2' Severity related to cassette type 2

Field	Number of Characters	Content
		Character '3' Severity related to cassette type 3 Character '4' Severity related to cassette type 4 If enhanced configuration option 76 is set to 001, the error severity is reported for the further cassettes as follows: Character '5' Severity related to cassette type 5 Character '6' Severity related to cassette type 6 Character '7' Severity related to cassette type 7 If all cassettes of one type are unusable for any reason, for example, empty, not present, or faulty, then the severity code for that cassette type is marked as fatal. If dual cash handlers are used, this severity code can be changed to suspend using a registry key, as described in the *APTRA Advance NDC, Developer's Guide*. The suspend severity is reported when neither cash handler has the required note mix. Reporting a fatal severity means that an available note type is never requested; the suspend severity allows transactions to continue requesting both note types.
g4/ e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found and occupies two characters.
g5/ e5	5	Supplies Status. Indicates the state of the currency cassettes and reject bin. Character '0' state of reject bin Character '1' state of cassette type 1 Character '2' state of cassette type 2 Character '3' state of cassette type 3 Character '4' state of cassette type 4 If Enhanced Configuration option 76 is set to 001, the supplies status is reported for the further cassettes as follows: Character '5' state of cassette type 5 Character '6' state of cassette type 6 Character '7' state of cassette type 7 Codes for characters 1 to 7 are: **Code** **Description** '0' No new state (cassette not accessed or state unknown because of fatal hardware malfunction). '1' Sufficient notes.

Field	Number of Characters	Content	
		'2'	Notes low.
		'3'	Out of notes.
		Codes for character 0 are:	
		Code	**Description**
		'0'	No new state (cassette not accessed or state unknown because of fatal hardware malfunction).
		'1'	No overfill condition.
		'4'	Overfill condition.
		Note: If an attempt is made to dispense notes from a cassette type that is not installed, a supplies status code of '3' is returned.	

Table Note 65: For a spray dispenser the notes dispensed counts are significant. For example, the cardholder may have received some, but not all, requested notes due to an error condition. In this case, these are counts of the notes delivered to the cardholder. However, if the notes stick in the transport, these counters display the number of notes requested and not the number delivered.

Depository (Solicited / Unsolicited)

This message gives details of a deposit operation in response to a Transaction Reply Command message.

Table 9-36
Depository Status

Field	Number of Characters	Content
g1 / e1	1	Device Identification Graphic 'F' .

Field	Number of Characters	Content
g2 / e2	1	Transaction / Device Status. Gives details of a deposit operation in response to a Transaction Reply Command message. The values are: Sol/Unsol: U, Code: '0', Description: Successful operation, but an exception condition occurred and is detailed in the following field. Sol/Unsol: S, Code: '1', Description: Time-out on cardholder deposit. Sol/Unsol: S, Code: '2', Description: Failure to enable mechanism for a deposit. Sol/Unsol: S, Code: '3', Description: Envelope / document jam or envelope / document deposit failed. The cardholder has access. This status is also returned if there is any doubt about cardholder access. Sol/Unsol: S, Code: '4', Description: Envelope / document jam or envelope / document deposit failed. The cardholder does not have access.
g3 / e3	1	Error Severity. Standard code.
g4 / e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
g5 / e5	1	Supplies Status. Indicates the state of the deposit bin. This field is not sent with the message when a deposit time-out occurs. States reported are: Code: '0', Description: No envelope deposited Code: '1', Description: No overfill condition Code: '4', Description: Overfill detected

Receipt Printer (Solicited / Unsolicited)

This message indicates whether or not a print operation has been successfully completed.

Table 9-37
Receipt Printer Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic 'G' .
e2	1	Transaction / Device Status. Indicates whether or not the print was successfully completed.

Field	Number of Characters	Content		
		Sol/ Unsol	**Code**	**Description**
		U	‘0’	Successful print
		S / U	‘1’	Print operation not successfully completed
		U	‘2’	Device not configured
		U	‘4’	Cancel key pressed during sideways receipt print
e3	1	Error Severity. Standard code used to make a shut-down decision.		
e4	Var	Diagnostic Status (M-status plus M-data). This M-status describes the main error found.		
e5	4	Supplies Status. Indicates the status of the printer paper, ribbon, print-head and knife.		
		Char	**Code**	**Description**
		0	‘1’	Sufficient paper
			‘2’	Paper low
			‘3’	Paper exhausted
		1	‘1’	Ribbon OK
			‘2’	Ribbon replacement recommended
			‘3’	Ribbon replacement mandatory
		2	‘1’	Print-head OK
			‘2’	Print-head replacement recommended
			‘3’	Print-head replacement mandatory
		3	‘1’	Knife OK
			‘2’	Knife replacement recommended
		When a ‘paper exhausted’ condition is detected, the status message is:		
		Transaction Status = 0 Error Severity = 4 Supplies Status = 3111		
		(Ribbon, print-head and knife are OK).		

Journal Printer (Unsolicited)

This message indicates whether or not a print operation has been completed successfully. From Advance NDC 2.06 onwards, continuous messaging of fatal journal device status is set and cannot be changed.

Table 9-38
Journal Printer Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic ‘H’ .
e2	1 or 25	Transaction / Device Status. Indicates whether or not the print was successfully completed. *See* Table Note 66, Table Note 67, and Table Note 68.

Sol/ Unsol	Code	Description
U	‘0’	Successful print
U	‘1’	Print operation not successfully completed
U	‘2’	Device not configured
U	‘6’	Journal printer backup activated
U	‘7’	Journal printer backup and reprint terminated
U	‘8’	Journal printer backup reprint started
U	‘9’	Journal printer backup halted
U	‘:’	Journal printer backup log security error
U	‘;’	Journal printer backup reprint halted
U	‘<’	Journal printer backup tamper state entered

Field	Number of Characters	Content
e3	1	Error Severity. Standard code used to make a shut-down decision.
e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
e5	4	Supplies Status. Indicates the status of the printer paper, ribbon and print-head.

Char	Code	Description
0	‘1’	Sufficient paper
	‘2’	Paper low
	‘3’	Paper exhausted

Field	Number of Characters	Content		
		1	'1'	Ribbon OK
			'2'	Ribbon replacement recommended
			'3'	Ribbon replacement mandatory
		2	'1'	Print-head OK
			'2'	Print-head replacement recommended
			'3'	Print-head replacement mandatory
		3	'1'	Knife OK
		When a 'paper exhausted' condition is detected, the status message is: Transaction Status = 0 Error Severity = 4 Supplies Status = 3111 (Ribbon and print-head are OK).		

Table Note 66: If the transaction code is ':', Journal Printer backup is operational, and the value of Enhanced Configuration Parameters Load option 22 is '2', the following extra data is sent:

An ASCII digit string with a format of `*XXX*dd/mm/yy*hh:mm*YYYY`, as follows:

`XXX`	the last printed Security Trace Number
`dd/mm/yy hh:mm`	the record date and time
`YYYY`	the record number relative to the last printed Security Trace Number

Table Note 67: If required, supervisor message mode option 12 can be used to report a journal out status as low. For more details, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Table Note 68: As in NDC+, when no journal printer is connected to the SST and the EJ has not been activated, no unsolicited message is sent to the host to indicate that the journal is not configured.

Electronic Journal Printer (Unsolicited)

This message indicates whether or not a print operation has been completed successfully.

Note: If the cutover automatic INIT is in use, this message should not be returned when the EJ file reaches 90% or 100% full. As cutover performs an INIT operation when the EJ file reaches 90% full, the 100% full message will only be returned in the cutover operation has failed. For information on enabling cutover, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Table 9-39
Electronic Journal Printer Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic 'H'.
e2	1	Transaction / Device Status. Indicates whether or not the print was completed successfully.

Sol/ Unsol	Code	Description
U	'0'	Successful print
U	'1'	Print operation not completed successfully
U	'2'	Device not configured
U	'='	EJ in dual mode print operation successful
U	'>'	EJ in dual mode print operation not successful

e3	1	Error Severity. Standard code used to make a shut-down decision.
e4	Var	Diagnostic Status (M-status plus M-data). This data is generated by Advance NDC. The M-status describes the main error found, as follows:

0	EJ status OK
1	EJ fatal
5	EJ log file full
6	EJ not configured
7	EJ log file not found
50	EJ log file open failure
51	EJ log file close failure
52	EJ flex disk not found
53	EJ flex disk drive head jam
54	EJ flex disk protected
55	EJ flex disk full.

e5	1	Supplies Status. Indicates the status of the electronic journal, as follows:

Field	Number of Characters	Content		
		Char	**Code**	**Description**
		0	'1'	EJ log space OK
			'2'	EJ log space low
			'3'	EJ log full
		1	'1'	Value always '1'
		2	'1'	Value always '1'
		3	'1'	Value always '1'
		When an 'electronic journal log space low' condition is detected, the status message is: Transaction Status = 0 Error Severity = 2 Supplies Status = 2111		

Table Note 69: If option 35 in the enhanced configuration parameters load (see page 10-17) is set to 001 ('report EJ in dual mode' unsolicited errors) or 002 ('report EJ and hard copy backup in dual mode' unsolicited errors) and both the journal printer and the EJ are in error, two unsolicited errors will be reported; one for the physical device and one for the EJ. If the option is set to the default of 000, only the physical device will be reported.

The following table lists the message sequences returned for dual mode for each type.

Table 9-40
Unsolicited Message Sequences for Option 35 (EJ Dual Mode)

Option 35 Value	Type	Message Sequence		Comment
000	Physical journal	H0	Successful print operations	Supplies indicate lowness.
		H1	Print operation not completed successfully	Sent when the paper is low or out. No messages are sent from the EJ or hard copy backup.

Option 35 Value	Type	Message Sequence		Comment
001	Physical journal	H0	Successful print operations	Supplies indicate lowness.
		H1	Print operation not completed successfully	Sent when the paper is low or fatal. No messages are sent from hard copy backup.
	EJ only	= or >	Print operation successful Print operation not successful	Sent in addition to message for physical device.
002	EJ and hardcopy backup	H1	Print operation not completed successfully	Sent when the paper is low or fatal.
		H6	Journal printer backup activated	Sent when the journal printer paper is replenished.
		H8	Journal printer backup reprint started	Sent when the journal printer restarts.
		H7	Journal printer backup and reprint terminated	Sent after H8 when the mode is switched to Supervisor and the reprint occurs.
		H;	Journal printer backup reprint halted	Sent if the journal printer enters a fatal state during a reprint.
		Reprints H6	Journal printer backup activated	Sent when the journal printer paper is replenished.
		H8	Journal printer backup reprint started	Sent when the journal printer restarts.

Night Safe Depository (Solicited / Unsolicited)

The solicited status message is sent in response to a Transaction Reply Command message, if the deposit was not detected. It indicates that one of the following conditions has occurred:

- Cardholder did not attempt a deposit
- Deposit door is jammed closed
- Bag detection mechanism is faulty.

The unsolicited status message is sent on the tenth consecutive ‘cardholder did not attempt deposit’ indication.

Table 9-41
Night Safe Depository Status

Field	Number of Characters	Content
g1	1	Device Identification Graphic 'K' .
g2	1	Transaction / Device Status. **Sol/ Unsol** / **Code** / **Description** U / '0' / Tenth consecutive 'customer did not attempt a deposit' . Reported only once. S / '1' / Undetected deposit, or bag detection switch blocked before enable. *See* Table Note 70.
g3	1	Error Severity. **Code** / **Description** '0' / No error. Bag detection mechanism was clear when the deposit door was unlocked. '2' / Warning. Bag detection mechanism was blocked when the deposit door was unlocked (solicited status). NCR recommends that you shut down the terminal if you require confirmation of all deposits. Tenth consecutive 'customer did not make deposit' (unsolicited status).
g4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
g5	1	Supplies Status. Indicates the status of the night safe. **Code** / **Description** '0' / No new state (solicited only) '1' / No overfill condition '4' / Overfill condition

Table Note 70: If the bag detection mechanism is blocked when the deposit door is unlocked, the cardholder is given time to make the deposit (timer 08). When timer 08 expires, the error status is sent. The 'more time' screen (screen 'C00') is not displayed unless the bag detection mechanism is clear when the door is unlocked.

If the message mode option (option digit 3, option A) is selected to check the bag detection mechanism before unlocking the Night Deposit door, and it is found to be blocked (overfill), the solicited status message is sent immediately. For details, see the *APTRA Advance NDC, Supervisor's Guide*. In this case, no deposit is allowed. The current transaction must be terminated by Central, and no

further Night Deposit transactions will be allowed by Central until the condition is cleared.

Encryptor (Unsolicited)

This message indicates that an attempt to use the encryptor has failed. If an error status is reported, NCR recommends that you attempt to re-enter the local encryption keys.

Table 9-42
Encryptor Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic 'L' .
e2	1	Device Status. '1' Encryptor error. '2' Encryptor not configured.
e3	1	Error Severity. Warning or fatal.
e4	Var	Diagnostic Status. **Note:** The encryptor status is reported in the M-data field of the Diagnostic Status for compatibility with NDC+.
e5	-	Not used.

Sensors (Unsolicited)

This message is sent on Supervisor mode entry and exit, tamper indicating bin in / out conditions and alarm conditions.

Table 9-43
Sensors Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic 'P' .
e2	19	Device Status. This field contains up to 19 bytes. Byte 1 indicates the type of change being reported: **Char** **Code** **Description** 1 '1' 'TI' sensor change '2' Mode change '3' Alarm state change *See* Table Note 73 '5' Full TI and full alarms change detected *See* Table Note 73 '6' Flexible TI and alarms change detected If byte 1 = '2', mode change, the next byte gives details of the current state: 2 '0' Supervisor mode exit '1' Supervisor mode entry Bytes 3-13 are omitted. For example, 'P21' means Supervisor mode entry. If byte 1 = '1'(TI sensor change) or '3' (Alarm state change) bytes 2-13 give details of the state of the following sensors: 2 '0' Supervisor mode inactive '1' Supervisor mode active 3 '0' Vibration and / or heat sensor inactive. *See* Table Note 71 and Table Note 72. '1' Vibration and / or heat sensor active 4 '0' Door contact sensor inactive. *See* Table Note 71 and Table Note 72. '1' Door contact sensor active 5 '0' Silent signal sensor inactive. *See* Table Note 71 and Table Note 72. '1' Silent signal sensor active

Field	Number of Characters	Content		
		6	‘0’	Electronics enclosure sensor inactive.*See* Table Note 71 and Table Note 72.
			‘1’	Electronics enclosure sensor active
		7	‘0’	Deposit bin out
			‘1’	Deposit bin in
		8	‘0’	Card bin out
			‘1’	Card bin in
		9	‘0’	Currency reject bin out
			‘1’	Currency reject bin in
		10	‘0’	Currency cassette in position 1 (top) out
			‘1’	Currency cassette in position 1 (top) in
		11	‘0’	Currency cassette in position 2 (second) out
			‘1’	Currency cassette in position 2 (second) in
		12	‘0’	Currency cassette in position 3 (third) out
			‘1’	Currency cassette in position 3 (third) in
		13	‘0’	Currency cassette in position 4 (bottom) out
			‘1’	Currency cassette in position 4 (bottom) in

If byte 1 = ‘5’, full TI and full alarms change detected, bytes 2-13 are as above. Bytes 14-19 give details of the state of the following sensors:

Char	Code	Description
14	‘0’	Coin dispenser out
	‘1’	Coin dispenser in
15	‘0’	Coin dispenser hopper 1 out
	‘1’	Coin dispenser hopper 1 in
16	‘0’	Coin dispenser hopper 2 out
	‘1’	Coin dispenser hopper 2 in
17	‘0’	Coin dispenser hopper 3 out
	‘1’	Coin dispenser hopper 3 in
18	‘0’	Coin dispenser hopper 4 out
	‘1’	Coin dispenser hopper 4 in

Field	Number of Characters	Content
		If byte 1 = '6' (flexible TI and alarms change detected), bytes 2 to 7 are the same as those for the Extended Tamper Indicator Identifier 'C' of the Tamper and Sensors Data command. For details, see Table 9-15, "Tamper and Sensor Data Response" on page 9-39.
e3		Not present
e4		Not present
e5		Not present

Table Note 71: If the terminal is not configured with the Tamper Indicating feature, a code of '1' is never returned and bytes 7-13 are omitted from all messages.

Table Note 72: If a device is not configured, the associated tamper byte will take the value zero.

Table Note 73: These types of change are only reported when Option 24 is set to send the Enhanced TI/Sensor status.

Touch Screen Keyboard (Unsolicited)

This message indicates that the keyboard has detected an error.

Table 9-44
Touch Screen Keyboard Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic ‘Q’ .
e2	1	Device Status. Always ‘3’, indicating a hardware error.
e3	1	Error Severity. Always ‘4’, indicating fatal.
e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
e5	-	Not present

Supervisor Keys (Unsolicited)

This message is sent to inform Central of the functions selected by the operator after entry to Supervisor mode.

Note: When Diagnostics is selected from the Select menu in Supervisor, an R07 message is sent to the host. This indicates that the Diagnostics option has been selected, but not whether entry to Diagnostics has been successful.

Table 9-45
Supervisor Keys Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic ‘R’ .
e2	Var	Device Status.

Char	Code	Description
If option digit 0 = ‘0’, the device status field will contain two characters:		
1-2	‘00’ - ‘98’	Key selection from Select menu.
or		
If option digit 0 = ‘1’, the device status field will contain three characters:		
1	‘0’	Select menu
	‘1’	Replenishment menu
	‘2’	Configure menu

Field	Number of Characters	Content		
			‘3’	Access menu
			‘4’	Reserved.
			‘7’	Exit menu. *See* Table Note 74.
			‘8’	Exit menu. *See* Table Note 74.
		2-3	‘00’ - ‘98’	Menu item selected. For the permitted values for each menu, see the *APTRA Advance NDC, Supervisor’s Guide.*
		or		
If option digit 0 = ‘2’, the device status field will contain five characters:				
		1-3	as for option digit 0 = ‘1’	
		4-5	‘00’ - ‘98’	Item selected from a sub-menu, such as the Key Entry menu. For the permitted values for each menu, see the *APTRA Advance NDC, Supervisor’s Guide.*
		or		
If option digit 0 = ‘3’, the device status field will contain seven characters:				
		1-5	as for option digit 0 = ‘2’	
		6-7	‘00’ - ‘98’	Item selected from the options, such as component selection on the Key Entry menu. For the permitted values for each menu, see the *APTRA Advance NDC, Supervisor’s Guide.*
		or		
If option digit 0 is set to any value greater than ‘3’, the selections are reported as if option digit 0 had been set to ‘2’; that is, the component selections are not reported.				

Table Note 74: Menu numbers 7 and 8 are reserved for Exits designers. You may also redefine these messages using the SUPCTR file. For further details, see the *Using NDC Exits* publication.

Table Note 75: When a menu is longer than one screen, function ‘99’ is used to switch between the screens. No message is transmitted for this selection.

The menu item is normally as defined in the *APTRA Advance NDC, Supervisor’s Guide,* but with the following exception:

For compatibility with previous releases, function '25' Key Entry on the Access menu is not reported when option digit 0 = ‘1’. Actions in

the Key Entry sub-menu are reported using the Access menu functions ‘6’ to ‘11’. The components of each key are entered and written to the encryptor as follows:

Key	Enter Component	Write to Encryptor
V	06	07
A	08	09
B	10	11

All other fields are omitted.

Statement Printer (Solicited / Unsolicited)

A solicited status message is sent to Central if a fault which requires attention occurs during transaction processing. An unsolicited status message is sent when a statement is detected in the transport, the statement printer supplies (paper, ribbon, print-head, knife, capture bin) require attention, or an error occurs on a cut-and-deliver function during a close state.

Table 9-46
Statement Printer Status

Field	Number of Characters	Content
g1 / e1	1	Device Identification Graphic 'V' .
g2 / e2	1	Transaction / Device Status. In a solicited status, the contents of this field give details of any transaction-oriented fault. In an unsolicited status, it indicates the presence of a statement in the transport or an error on a cut and deliver function in the close state.

Sol/ Unsol	Code	Description
U	'0'	No transaction error condition, but consult other fields for Error Severity, diagnostic status or supplies status change.
S / U	'1'	Print / cut not successful
S	'2'	Device not configured
U	'3'	Statement present in transport
U	'4'	Cardholder pressed Cancel during a 'print statement and wait' function.

g3 / e3	1	Error Severity. Standard code used to make a shut-down decision.
g4 / e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
g5 / e5	5	This five-character field indicates the status of the printer paper, paper ribbon, print-head, knife and capture bin.

Char	Code	Description
0	'1'	Sufficient paper
	'2'	Paper low
	'3'	Paper exhausted

Field	Number of Characters	Content		
		1	'1'	Ribbon OK
			'2'	Ribbon replacement recommended
			'3'	Ribbon replacement mandatory
		2	'1'	Print-head OK
			'2'	Print-head replacement recommended
			'3'	Print-head replacement mandatory
		3	'1'	Knife OK
			'2'	Knife replacement recommended
			'3'	Knife replacement mandatory
		4	'1'	Capture bin OK
			'4'	Capture bin overfill. *See* Table Note 77.

Table Note 76: If the message mode option digit 3c is set, the Cancel key on the cardholder keyboard is enabled during Print Statement And Wait functions. For details, see the *APTRA Advance NDC, Supervisor's Guide*. If the cardholder presses the Cancel key, a new unsolicited status message is sent to Central. If this option is used, you must change the Central application so that it recognises the new status message.

The statement print that is being performed when the cardholder presses Cancel is unaffected and is completed as normal.

Table Note 77: If the statement capture bin returns a status of 'overfill', the statement printer must be initialised using the Supervisor option 'INIT STMNT' from the Replenish Menu, once the capture bin has been emptied. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Bunch Note Acceptor (Solicited / Unsolicited)

This message gives the status of the BNA in the following situations:

- In response to a Transaction Reply Command message
- As a result of a BNA error

  In the event of an error, for example when a refund operation jams, the number of bills at each location of the BNA will become indeterminable. In this case, the number of each denomination will be indeterminable, and each number field will be filled with a tilde (~) character (7EH). The tilde also appears in any position corresponding to an undefined currency.

- During a cash in transaction

  For example, an unsolicited message may be sent to report a nearly full supplies status.

- In the Close state if no transaction reply is received.

Table 9-47
Bunch Note Acceptor Status

Field	Number of Characters	Content
g1 / e1	1	Device Identification Graphic ‘w’.
g2 / e2	1	Transaction / Device Status. Gives details of a BNA operation in response to a Transaction Reply Command message, or as a result of a BNA error. The values are:
	1	**Error Code (e200/g200).** *See* Table Note 78.

Sol/ Unsol	Code	Description
S / U	‘0’	Successful operation, but an exception occurred.
U	‘1’	Cancel selected / Time-out occurred during the Enable Cash state.
N / A	‘2’	Not used.
S / U	‘3’	Error.
S / U	‘4’	Device inoperative - bills stuck at the exit throat.
S	‘5’	No bills in escrow when transaction reply function attempts to move escrowed bills to vault, or attempts to return cash.
S / U	‘6’	Bills detected at power-up.
U	‘7’	Bills not taken, retracted and vaulted (not supported on BNA1).

Field	Number of Characters	Content
		U '8' Unable to move escrowed bills to vault (**not** due to a BNA function ID in a Transaction Reply).
	50	**Escrow Counts (e201/g201)** Counts for denomination 1 to 50. *See* Table Note 79.
	50	**Vaulted Counts (e202/g202)** Counts for denomination 1 to 50. *See* Table Note 79.
	50	**Returned Counts (e203/g203)** Counts for denomination 1 to 50. *See* Table Note 79.
	2	**Total Number of Bills Returned (e204/g204)** The total number of bills moved to the return slot - decimal value. *See* Table Note 80.
	2	**Total Number of Bills in Escrow (e205/g205)** The total number of bills in the escrow / top transport - decimal value. *See* Table Note 80.
	2	**Total Number of Bills Just Vaulted (e206/g206)** The total number of bills just vaulted - decimal value. *See* Table Note 80.
		When bit 1 of option 45 is set, the following fields are also present if more than 90 notes of 1 type are reported. **Note:** These fields are repeated for each note type where the number of notes entered is more than 90. If any of these fields is present, all the group separators must be present even if there is no data for the data groups. If all the total values are less than 90 notes, no fields after e206 / g206 will be present.
		Escrow counts (e207/g207) Counts for denomination 1 to 50. *See* Table Note 81.
	2	The hexadecimal value representing the denomination type of any note type where more than 90 notes are entered
	3	The decimal value to be added to the previous note count for that type, to report the total number of notes entered
		Vaulted counts (e208/g208) Counts for denomination 1 to 50. *See* Table Note 81.
	2	The hexadecimal value representing the denomination type of any note type where more than 90 notes are entered
	3	The decimal value to be added to the previous note count for that type, to report the total number of notes entered
		Returned counts (e209/g209) Counts for denomination 1 to 50. *See* Table Note 81.
	2	The hexadecimal value representing the denomination type of any note type where more than 90 notes are entered

Field	Number of Characters	Content
	3	The decimal value to be added to the previous note count for that type, to report the total number of notes entered
	3	**Total number of bills returned (moved to the exit slot) in excess of 90 (e210/g210)** A decimal representation of the excess number of notes. *See* Table Note 82.
	3	**Total number of bills in the escrow/top transport in excess of 90 (e211/g211)** A decimal representation of the excess number of notes. *See* Table Note 82.
	3	**Total number of bills in the just vaulted in excess of 90 (e212/g212)** A decimal representation of the excess number of notes. *See* Table Note 82.
g3/ e3	1	Error Severity. The error severity is reported for each cassette and overall if option 45 of the enhanced configuration (see page 10-17) is set to enable the extended message format. Standard code.
g4/ e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
g5/ e5	Var	Supplies Status. Indicates the state of the BNA. If option 45 is set to enable the extended message format, the supplies status is provided for each cassette. States reported are: **Code** **Description** '0' No change '1' Good state '2' Bin Out '3' Nearly Full '4' Overfill (vault full).

Table Note 78: For field g2, the error code information is obtained by mapping the ActiveXFS event received to the corresponding error code.

Table Note 79: Each byte contain an ASCII value between 20H and 7AH, representing the number of notes of that denomination; for example, ASCII char !(21H) in position 2 means one note of denomination type 2.

Table Note 80: A single ASCII value between 20H and 7AH, representing a total for the number of notes within a processing category; for example, ASCII char !(21H) means one note.

Table Note 81: A group of zero or more data pairs providing information for denominations with more than 90 notes. Only denominations that have more than 90 notes are included; denominations with exactly 90 notes are not. Each data pair consists

of a Denomination Type field and a Note Count field. The Denomination Type field has a hexadecimal value in the range 01 to 32. The Note Count field has a decimal value in the range 001 to 999. The Note Count value is added to the equivalent previous single-byte ASCII note count. The sum of the previous field and the current field provides the total number of notes.

Table Note 82: The decimal value (001 to 999) to be added to the equivalent previous single byte ASCII note count. The sum of the previous field and this value provides the total number of notes. If any of fields e210/g210 to e212/g212 are present, all must be present.

Envelope Dispenser (Unsolicited)

The envelope dispenser reports unsolicited status messages depending on the value of the enhanced configuration option 23 (see page 10-16). Status messages are sent when the envelope dispenser is detected as being low / out or an envelope failed to be presented or retracted.

Remote status indicators and the remote relay are optionally set and enabled depending on the value of option 23. Solicited status messages are never sent for the envelope dispenser, regardless of the value of option 23.

Messages detailing fitness, configuration and supplies information are sent to the host in response to the 'send configuration data' terminal command.

Table 9-48
Envelope Dispenser Status

Field	Number of Characters	Content
e1	1	Device Identification Graphic '\' .
e2	1	Device Status. Indicates whether the last operation was successful. **Sol/ Unsol** / **Code** / **Description** U / '0' / Envelope presented satisfactorily. U / '1' / Failure - envelope not presented or retracted.
e3	1	Error Severity. Standard code.
e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found.
e5	1	Supplies Status Indicates the replenishment status of the bin containing envelopes to be dispensed. **Code** / **Description** '1' / Sufficient envelopes. '2' / Envelopes low. '3' / Envelopes exhausted.

Cheque Processing Module (Solicited / Unsolicited)

This message gives details of a Cheque Processing Module (CPM) response to a Transaction Reply Command message.

If a transaction reply contains one of the CPM function values and the SST does not have a CPM configured, a standard solicited error message is returned.

Table 9-49
CPM Status

Field	Number of Characters	Content
g1	1	Device Identification Graphic ‘q’.
g2	Var(2)	Transaction / Device Status. Gives details of a CPM operation in response to a Transaction Reply Command message. The values are: **Error Code (e200/g200).** *See* Table Note 83. **Sol/Unsol** / **Code** / **Description** U / ‘0’ / Successful operation, but an exception condition occurred. When Option 83 is ‘000’, this code also reports retracts. S / U / ‘1’ / Cancel selected / Time-out occurs during processing (entry / retrieval) of cheque. Due to one of the following: - Cardholder did not insert a cheque - Cardholder inserted cheque which was not successfully accepted, but retrieved by cardholder - Cardholder selected Cancel key instead of inserting cheque. S / U / ‘2’ / CPM failure. U / ‘3’ / Cheque detected at power-up. S / U / ‘4’ / Error, no access (error on bin). S / U / ‘5’ / Cheque jam. S / ‘6’ / Cheque jam, no access. When Option 83 is ‘001’ the following code may also be returned: S / U / ‘7’ / Cheque retracted and captured. **Error Position (e201/g201)** **Code** / **Description** (space) / ‘ ’ / Non-hardware status reported, or error position not known (severity Good, Suspend or Fatal). ‘E’ / Cheque entry / re-entry error (Suspend or Fatal). ‘F’ / Image lifting error (Suspend or Fatal).

Field	Number of Characters	Content	
		'J'	Eject error (Suspend or Fatal).
		'C'	Capture error (Suspend or Fatal).
		'W'	Endorse error (Suspend or Fatal).
		'P'	Power-fail error, last cheque endorsed (Error code 3, Suspend only).
		'N'	Power-fail error, last cheque not endorsed (Error Code 3, Suspend only).
g3/ e3	Var	Error Severity. When Option 83 is '000', a single character is returned, which represents the overall error severity of the device. **Char** **Description** 1 Overall CPM When Option 83 is '001', and the following is returned: **Char** **Description** 1 Overall CPM 2 Endorse printer 3 Stamper 4 Reserved 5 Reserved 6 Bin 1 7 Bin 2 8 Bin 3 : : *n* Bin *n* The number of bins reported depends on hardware configuration Each character can take one of the following values: **Value** **Description** '0' No error / Not configured '1' Routine '2' Warning '3' Suspend	

Field	Number of Characters	Content	
		'4'	Fatal
g4 / e4	Var	Diagnostic Status. When Option 83 is '000' this field contains zeroes and is 14 bytes long. When Option 83 is '001' this field is variable length and contains the CPM diagnostic information.	
g5 / e5	Var	Supplies Status. When Option 83 is '000' this field contains zeroes and is 4 bytes long. When Option 83 is '001' the following is returned:	
	1		Endorse printer
	1		Stamper
	1		Reserved
	1		Reserved
	1		Bin 1
	1		Bin 2
	1		Bin *n*

Supplies Status Values

Value	Description
'0'	Not configured / Reserved
'1'	Good state
'2'	Media low
'3'	Media out
'4'	Overfill
'5'	Media high (almost full)

Table Note 83: For field g2, the error code information is obtained by mapping the received ActiveX event to its corresponding error code.

Coin Dispenser (Solicited / Unsolicited)

This message gives details of a Coin Dispenser response to a Transaction Reply Command message.

When Option 79 is set to '000', this message reports the status of four hopper types. When Option 79 is set to '001', this message

reports the status of the number of hopper types reported in the Hardware Configuration message. The status is always reported for a minimum of four hopper types.

Table 9-50
Coin Dispenser Status

Field	Number of Characters	Content		
g1 / e1	1	Device Identification Graphic 'Y'.		
g2 / e2	1 *See* Table Note 84 *See* Table Note 85	Transaction / Device Status. Gives details of a coin dispense operation in response to a Transaction Reply Command message. The values are:		
		Sol/ Unsol	**Code**	**Description**
		S / U	'0'	Successful operation, but an exception condition occurred.
		S	'1'	The coin dispenser low thresholds for each coin hopper were not set during the configuration of the SST. No coins have been dispensed.
		S	'3'	The coin dispense was not started as the requested hopper had one of the following problems: ● the hopper was in a fatal state ● the hopper was out of coins ● the hopper was not in the correct position to allow a dispense ● the hopper was in a low condition without enough coins to perform the dispense. No coins have been dispensed.
		S	'4'	The coin dispense has failed for a reason other than a jam. Some coins may have been dispensed.
		S	'9'	The coin dispense has failed due to a jam in the hopper. Some coins may have been dispensed.
		S	':'	The coin dispense has failed due to a jam in the transport chute. Some coins may have been dispensed.
		S	';'	The transport chute exit sensor was blocked at the start of the coin dispense. No coins have been dispensed.
		S	'<'	A coin dispense has been attempted while the coin dispenser was in a fatal state. No coins have been dispensed.
		S	'='	Tampering detected during dispense. The coin dispense has failed due to the module being accessed during the dispense. Some coins may have been dispensed.

Field	Number of Characters	Content
	Var *See* Table Note 86	**Coins Dispensed** **Char** / **Description** 2-3 — Decimal representation of the number of coins dispensed from hopper type 1 4-5 — Decimal representation of the number of coins dispensed from hopper type 2 6-7 — Decimal representation of the number of coins dispensed from hopper type 3 8-9 — Decimal representation of the number of coins dispensed from hopper type 4 10-11 — Decimal representation of the number of coins dispensed from hopper type 5 *<n>*-(*<n>*+1) — Decimal representation of the number of coins dispensed from hopper type *<n>*
g3/ e3	Var	Error Severity. Used to make a shut-down decision. Holds the severity information for the coin dispenser and the sub-device elements (coin hoppers 1 to *<n>*). **Char** / **Description** 1 — Coin dispenser core components 2 — Coin hopper type 1 3 — Coin hopper type 2 4 — Coin hopper type 3 5 — Coin hopper type 4 6 — Coin hopper type 5 *<n>* — Coin hopper type*<n>* Each character can take one of the following values: **Value** / **Description** ‘0’ — No error ‘1’ — Routine ‘2’ — Warning ‘3’ — Suspend. This is only used for the coin dispenser core components character ‘4’ — Fatal
g4/ e4	Var(14)	Diagnostic Status. Maintenance data reported by the coin dispenser.
g5/ e5	Var(4)	Supplies Status. Holds the replenishable condition for the coin dispenser and the sub-device elements. See Error Severity for the order of reporting on the coin dispenser and the sub-device elements.

Field	Number of Characters	Content	
		Value	Description
		'0'	State not determined during this operation
		'1'	Good
		'2'	Hopper Low. The sensor associated with this hopper has indicated a low condition.
		'3'	Hopper Empty. The sensor associated with this hopper has indicated low and the coin low threshold limit has been reached.

Table Note 84: For field g2, the error code information is obtained by mapping the received ActiveX event to its corresponding error code.

Table Note 85: Unsolicited messages always have a device status of '0'.

Table Note 86: This information can be used to facilitate a transaction reversal or correction if required. The information refers to coins that have left the hopper, but not necessarily reached the cardholder.

Barcode Reader

This message gives details of a barcode reader response to a Transaction Reply Command message.

Table 9-51
Barcode Reader Status

Field	Number of Characters	Content		
e1 / g1	1	Device Identification Graphic 'f'		
e2 / g2	1	Device Transaction Status Error Code (e200 / g200)		
		Sol/ Unsol	**Code**	**Description**
		U	'0'	Good Operation but some exception has occurred as detailed in the accompanying data.
		U	'1'	Barcode reader inoperative.
	1	Field Separator		

Field	Number of Characters	Content	
e3/ g3	1	Overall Barcode Reader Error Severity	
		Code	**Description**
		'0'	No error / Not configured
		'1'	Routine
		'2'	Warning
		'3'	Suspend
		'4'	Fatal
	1	Field Separator	
e4/ g4	Var	Diagnostic status Barcode reader diagnostic information	
	1	Field Separator	
e5/ g5	0	Supplies Status	

Table Note 87: If any of the optional sub-fields are present, then all preceding Field Separators must be present. If any entry is present within a sub-field, then all entries must be present.

Exit to Host Messages

Advance NDC, acting as a communications gateway, can send messages on behalf of an Exit to the host using High Order Comms. Exit to host messages can be solicited or unsolicited, but the content of the Status Descriptor and Status Information fields depends on the Exit.

Format Restrictions on Exit to Host Messages

Exits are free to use these messages for any purpose. Any Exit may send a message of this class to the Host. Advance NDC imposes the following restrictions on these messages:

- Field **f**, the data field of the message, must contain 7-bit transmittable ASCII data
- The overall length of the message must comply with any maximum message length imposed by the communications protocol that you are using.

An Exit may send an Exit to Host message by invoking the routine `SendUnformatedData`, which is supplied in the DLL file *EXUTIL.DLL*. Advance NDC will add the Message Class (field b), Message Sub-Class (field c) and the LUNO (field d) to the data pointed to by the first parameter of `SendUnformatedData`, which is included as message field 'f'.

For further information about Exits and Virtual Controllers, refer to the publication *Using NDC Exits.*

Table 9-52
Exit to Host Message Format

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol dependent.
b	1	M	Message Class. The message class is '5' - Exit To Host
c	1	M	Message Sub-Class. The message sub-class is '1'
FS	1	M	Field separator
d	3 or 9	M	Logical Unit Number
FS	1	M	Field Separator
f	Var	M	Exit Supplied Data
g	Var	M	Trailer. Protocol dependent.

Chapter 10

Central to Terminal Messages

Overview

This chapter describes Central to terminal messages, under the following topics:

- Terminal Commands
- Customisation Data Commands
- Host to Exit Messages
- Transaction Reply Command
- Interactive Transaction Response
- EJ Commands
- Message Exception Handling
- Messages Received in Wrong Operational Mode.

Note: For any differences on other vendors' SSTs, refer to the *APTRA Advance NDC, Multi-Vendor Support Reference Manual*.

Unsupported Commands

Commands that are not supported in Advance NDC are marked as Reserved in the message formats, except for send tallies and send error logs, as default messages are returned if these commands are sent.

Unsupported Terminal Commands

- Send tally information (command code 5)
- Send error log information (command code 6)
- Retrieve and send hallmark key from EKC (command code =)
- Enable FREE JDATA (command code >)
- Enable image dumping information (command code ?).

Unsupported Customisation Data Commands

- Initialise EKC (identifier F)
- Override reserved screens (identifier G)
- Screen / Keyboard Data: Nested Keyboard Data (field j3)

Terminal Commands

These commands are sent by Central to start up or shut down the terminal, or to request configuration, counter, or date and time information.

Table 10-1
Terminal Commands

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '1' - Terminal Command.
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Command Code. One-character field used to identify the type of Terminal Command. The codes that can be used in this field are: **Code** — **Description** 1 — Go in-service (start-up). The Start-Up command is used to place the terminal In-Service after a power-up and Customisation Data load. The terminal sends a Ready status in response to a start-up command when the terminal enters the In-Service mode. If a start-up command is received while the terminal is In-Service, but not in State 000, the terminal sends a Ready status when it enters State 000. The start-up command can also put the terminal into service after a shut-down, exit from Supervisor mode or Suspend.

Field	Number of Characters	Mandatory/ Optional	Description	
			2	Go out-of-service (shut-down). The Shut-Down command places the terminal temporarily Out-of-Service. All pending messages are sent and current transactions completed before the terminal executes the shut-down. The terminal then indicates that it has successfully completed the shut-down procedure by sending a Ready status in a Solicited Status message.
			3	Send configuration ID. The Send Configuration ID command asks the terminal to send the Config ID number to Central.
			4	Send supply counters. The Send Supply Counters command asks the terminal to send the state of the supply counters to Central in the format identified by the Command Modifier field ‘g’, as follows: - Send basic supply counters message - Send extended supply counters message
			5	Send tally information. *Not supported; default message returned.*
			6	Send error log information. *Not supported; default message returned.*
			7	Send configuration information. The Send Configuration Information command asks the terminal to send the following configuration information data, identified by the Command Modifier field ‘g’, to Central: - Hardware Configuration * - Supplies Status * - Hardware Fitness * - Sensor Status - Software ID and release number - Local Configuration Option Digits - Note Definitions (BNA) * These categories return information for a subset of possible devices.
			8	Send date and time information. The Send Date and Time Information command asks the terminal to send the locally held date and time to Central.
			9	Reserved.
			:	Reserved.
			;	Reserved.
			=	Reserved.
			<	Reserved.

Field	Number of Characters	Mandatory/ Optional	Description	
			>	Reserved.
			?	Reserved.
			F	Disconnect. For details, see Chapter 13, “CCM VISA2 Dialup System”.
			G	Maintain connection to complete transaction (No-Op). For details, see Chapter 13, “CCM VISA2 Dialup System”.
g	1	0	Command Modifier. This field *can optionally* be used when the Command Code is 2 or 4 and *must* be present when the Command Code is 5, 6 or 7.	
			Code	**Go out-of-service (Command Code = 2)**
			‘0’	Standard Out-of-Service screen displayed
			‘1’	Temporary Out-of-Service screen displayed
				Defaults to zero if: - Any value other than zero or one is sent - The field is empty
			Code	**Send Supply Counters message (Command Code = 4)**
			none	Send basic supply counters message
			‘0’	Send basic supply counters message
			‘1’	Send extended supply counters message
			Code	**Tally (Command Code = 5)** *not supported*
			Code	**Error Log (Command Code = 6)** *not supported*
			Code	**Configuration Information (Command Code = 7)**
			none	Send configuration information (included for compatibility with earlier releases)
			‘1’	Send hardware configuration data only
			‘2’	Send supplies data only
			‘3’	Send fitness data only
			‘4’	Send tamper and sensor status data only
			‘5’	Send software ID and release number data only
			‘6’	Send enhanced configuration data
			‘7’	Send local configuration option digits

Field	Number of Characters	Mandatory/ Optional	Description
			'8' Send note definitions (BNA) If the command modifier is not within the range '1' - '8', the message will be rejected. If the specific command reject option is set, a Specific Command Reject will be returned.
h	Var	M	Trailer. Protocol-dependent.

Customisation Data Commands

Central can use various Customisation Data commands to download different types of data to the terminal. The commands are:

- State Tables Load
- Screen / Keyboard Data Load
- Configuration Parameters Load
- Enhanced Configuration Parameters Load
- FIT Data Load
- Configuration ID Number Load
- MAC Field Selection Load
- Date and Time Load
- Encryption Key Change
- Extended Encryption Key Change
- Dispenser Currency Cassette Mapping Table
- XML Configuration Download

The following table shows the message class, sub-class and identifier for each command.

Table 10-2
Customisation Data Commands

Message Class	Message Sub-Class	Identifier	Command
3	1	1	Screen / Keyboard Data Load
3	1	2	State Tables Load
3	1	3	Configuration Parameters Load
3	1	4	Reserved
3	1	5	FIT Data Load
3	1	6	Configuration ID Number Load
3	1	A	Enhanced Configuration Parameters Load
3	1	B	MAC Field Selection Load
3	1	C	Date and Time Load
3	1	D	Reserved
3	1	E	Dispenser Currency Cassette Mapping Table

Message Class	Message Sub-Class	Identifier	Command
3	1	F	Reserved
3	1	G	Reserved
3	1	I	XML Configuration Download
3	2	0-9	Interactive Transaction Response
3	3	1-9	Encryption Key Change
3	4	1-9, A-K	Extended Encryption Key Change

State Tables Load

Use this message to download state tables into the terminal. It may take more than one message to transmit the state tables, in which case each message will contain a portion of the state tables. For details of the state tables, see Chapter 2, “State Tables”.

Table 10-3
State Tables Load

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: ‘3’ - Data Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: ‘1’ - Customisation Data
g	1	M	Message Identifier. The message identifier is: ‘2’ - State Table
FS	1	M	Field Separator.
h	3	M	State Number. Contains a base 10 (decimal) number in the range 000 - 254 or 256-999, or a base 36 (alphanumeric) number in the range 000-254 or 256-ZZZ. This identifies the state number for the state data which follows it.
i	Var (25)	M	State Table Data. The first character identifies the state type. Valid values are: **A, B, C, D, E, F, G, H, I, J, K, L, M, R, S, T, V, W, X, Y, Z, b, d, e, f, g, k, m, w, _, >.** Characters 2 to 25 give associated state data.
FS	1	O	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description
	3	O	State Number.
	Var (25)	O	State Table Data.
	:		
	The field separator, state number and state data fields may be repeated if necessary to the maximum length per message permitted by the protocol.		
	:		
FS	1	*See* Table Note 1.	Field Separator.
j	8	*See* Table Note 1.	Message Authentication Code (MAC) Data. Contains the value transmitted for authentication of this message.
k	Var	M	Trailer. Protocol-dependent.

Table Note 1: The field separator and field 'j' are only used when the Data Security feature is selected and the flags are correct. For details, see the *APTRA Advance NDC, Supervisor's Guide.*

Screen / Keyboard Data Load

This message is used to download screen and / or keyboard data into the terminal. The maximum length of a single Screen / Keyboard Data Load message is 2000 bytes.

Table 10-4
Screen/keyboard Data Load

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol Dependent.
b	1	M	Message Class. The message class is: '3' - Data Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '1' - Customisation Data
g	1	M	Message Identifier. The message identifier is: '1' - Screen and / or Keyboard Data
FS	1	M	Field Separator.
h	3, 5 or 6	*See* Table Note 2 Table Note 3	Screen Number. Identifies the screen data being transmitted. For details, see Chapter 3, "Screen Data". Screen numbers can be specified as three decimal digits (123), four decimal digits in double quotes ("0123"), a group letter and two digits or a group letter and four digits. The groups with four digit numbers are 'E', 'X', 'Y', 'Z' and 'u'. A screen defined in group 'l' is also accepted, mapping directly onto group 'u' (l0123 is equivalent to u0123).

Field	Number of Characters	Mandatory/Optional	Description
			Note: The numbering for error message reserved screens consists of an alpha character followed by four numeric digits. The numbering for all other reserved screens consists of an alpha character followed by two numeric digits.
i	Var	*See* Table Note 2	Screen Data Field. Represents the data to be displayed on the cardholder screen or printer. This field always follows a screen number field and is always followed by a field separator or protocol-dependent trailer. For details, see Chapter 3, “Screen Data”.
GS	1	*See* Table Note 2	Group Separator
j1	Var	*See* Table Note 4	Not supported in Advance NDC.
GS	1	*See* Table Note 4	Group Separator
j2	Var	*See* Table Note 4	Touch Screen Data. Identifies the touch screen keyboard data being transmitted. The characters make up a variable length data field that defines the keyboard layout. This data is made up of sets of 34 characters, 32 for defining the touch area plus two for the return code. For details, see “Rear Interface: Operator Keyboard Layout” on page 4-10. If you create new definitions, you can calculate the co-ordinates of the touch area manually For details, see “Calculating Full Touch-Screen Positions” on page 4-13.
GS	1	*See* Table Note 4	Group Separator
j3	3	*See* Table Note 4	Reserved
GS	1	*See* Table Note 4	Group Separator
j4	Var	*See* Table Note 4	Miscellaneous Keyboard Data This field is reserved for future expansion.
k	Var	M	Trailer. Protocol-dependent.

Table Note 2: Screen data and/or keyboard data may be downloaded in a message. If any part of field ‘j1’ - ‘j4’ is present, the screen data field must be terminated by a group separator to indicate the start of keyboard data.

Table Note 3: Fields ‘h’ - ‘j4’ may be repeated any number of times, as defined by the communications protocol limit but not exceeding the maximum message length of 2000 bytes for Screen/Keyboard data. The field separator preceding field ‘h’ must be repeated for each additional screen and/or keyboard definition.

Table Note 4: If keyboard data is to be downloaded, it must be separated from the screen data field by a group separator even when no screen data is present in the message.

Each field of keyboard data must be terminated by the associated group separator, even when that field is empty. The only exception to this is that trailing group separators may be omitted after the last keyboard field that contains actual data. This rule means that the keyboard data type can be identified by the number of group separators preceding it.

Configuration Parameters Load

This message downloads the Logical Unit Number (LUNO), parameters and timers into the terminal. For details of the parameters and timers, see “Configuration Parameters Load Message” on page 7-2.

This message does not enable the configuration of additional options available with Advance NDC, for which you use the “Enhanced Configuration Parameters Load” message described on page 10-15.

Table 10-5
Configuration Parameters Load

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: ‘3’ - Data Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: ‘1’ - Customisation Data
g	1	M	Message Identifier. The message identifier is: ‘3’ - Configuration Data
FS	1	M	Field Separator.
h	1	*See* Table Note 5	Reserved
i	3	*See* Table Note 5	Reserved
j	3	*See* Table Note 5	Reserved
k	3	*See* Table Note 5	Reserved

Field	Number of Characters	Mandatory/Optional	Description
l	3	*See* Table Note 5	Reserved
m	3	O *See* Table Note 5	Supply Mode, Ready Status and Amount Buffer Length Options. (For details, see page 7-2)
n	9	O *See* Table Note 5	Reserved. Must be 000 000 000.
FS	1	*See* Table Note 6	Field Separator.
o	3	O	LUNO. Logical Unit Number to return in transaction requests, and solicited status and unsolicited status messages sent by the terminal. (For details, see page 7-3)
FS	1	*See* Table Note 6	Field Separator. Must be present if the following fields are present.
p	2	O *See* Table Note 7	Timer Number. (For a list of timers, see page 7-3; for detailed descriptions, see page 7-18)
q	3	O	Number of 800 Millisecond Ticks per Timer Field. (For details see page 7-4)
	:		
	The timer number and ticks are repeated. The data for each timer is downloaded in this sequence: timer number (2 bytes), number of 800-millisecond ticks (3 bytes) unless stated otherwise in the table above. If a particular timer is not included, a default value is assumed.		
	:		
r	Var	M	Trailer. Protocol-dependent.

Table Note 5: Fields ‘h’ to ‘n’ may be omitted unless field ‘m’ is populated when all the earlier fields must be populated. The omitted fields assume a value of zero.

Table Note 6: This field separator must be present if any of the later fields in the message are present.

Table Note 7: Unless otherwise stated in the timer descriptions (see page 7-18) a time-out interval of 000 is taken as infinity, and an unconfigured timer takes a time-out interval of 30 ticks.

Enhanced Configuration Parameters Load

This message supports configuration of options and timers, including additional options that are not supported in the Configuration Parameters Load message.

This message does not include options and timers for the Electronic Journal (EJ) Upload feature; these are set in the EJ Options and Timers command. For details, see the “EJ Commands” on page 10-73.

Table 10-6
Enhanced Configuration Parameters Load

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: ‘3’ - Data Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: ‘1’ - Customisation Data
g	1	M	Message Identifier. The message identifier is: ‘A’ - Enhanced Configuration Data
FS	1	M	Field Separator.
h	3	O	Logical Unit Number. As field ‘o’ of Configuration Parameters Load; (for details see page 7-3)
FS	1	*See* Table Note 8	Field Separator. Must be present if any of the following fields are present.

<table>
<tr><th>Field</th><th>Number of Characters</th><th>Mandatory/Optional</th><th>Description</th></tr>
<tr><td>i</td><td>2</td><td>O</td><td>Option Number. Contains a configuration option number, for which the values are held in field ‘j’. For details of option numbers and codes, see “Enhanced Configuration Parameters Load Message” on page 7-5.</td></tr>
<tr><td>j</td><td>3</td><td>O</td><td>Option Code. Specifies the configuration for the function (option number) in field ‘i’. Option numbers and option codes are as follows.

Option Number — Option Code and Description
00 — Reserved.
01 — Ready / Supply / Amount buffer options: as field ‘m’ in Configuration Parameters Load; (for details, see page 7-2)
02 — Auto voice
03 — Date format for Supervisor journal messages
04 — Roll width
05 — Left print column.
06 — Reserved
07 — Track 1 format
08–11 — Reserved
12 — Specific command reject option
13–14 — Reserved
15 — Transaction status information option
16 — Journal printer backup time option
17 — Journal printer backup print operations option
18 - 22 — Reserved
23 — Envelope dispenser status option.
24 — Enhanced TI / Sensor status option.
25 — Media entry / exit indicators flash rate option.
26 — Reserved
27 — Remote relay
28 - 32 — Reserved
33 — Simulate Supervisor Mode entry / exit
34 — MCN range</td></tr>
</table>

Field	Number of Characters	Mandatory/Optional	Description	
			35	Report Dual Mode EJ and Hardcopy Backup Unsolicited Messages
		See Table Note 9	36	Enhanced EJ backup
			37	Print Track 2 to Journal
			38 - 43	Reserved
			44	Bunch Note Acceptor (BNA) Journal Vaulted Notes Count
			45	Bunch Note Acceptor (BNA) Message Settings
			46	MCRW Enhanced Card Device (ECD) Security Jitter
			47	Reserved
			48	Barcode reader
			49-68	Reserved
			69	EMV Smart Card Extended Status: reserved for use with EMV Exits.
			70	EMV Smart Card: reserved for use with EMV Exits.
			76	Cash Handlers
			77	Next state number
			78	GBRU variant reporting
			79	Coin Dispenser
			80	Alphanumeric State Entry
			83	Cheque Processing Module
FS	1	*See* Table Note 8	Field Separator.	
k	2	O	Timer Number. Contains the timer number. The use of the timers is as follows. For detailed descriptions, see “Timers” on page 7-18.	
			‘00’	Keyboard entry time-out
			‘01’	Cardholder response to time-out screen time-out
			‘02’	Close state screen time-out
			‘03’	Communications response time-out
			‘04’	Envelope / cheque insertion time-out
			‘05’	Cash retract time-out
			‘06’	Poll / select time-out

Field	Number of Characters	Mandatory/Optional	Description	
			'07'	Present time-out
			'08'	Night safe deposit time-out
			'09'	Card removal time-out
			'11 - 60'	Reserved
			'61'	Barcode reader scan time-out
			'62 - 67'	Reserved
			'68'	Statement MEI duration time-out
			'69	Receipt MEI duration time-out
			'70' 71'	Reserved
			'72'	DASH card removal time-out
			'73 - 76'	Reserved
			'77'	BNA cash acceptance time-out
			'78'	GBXX cash retract time-out
			'80 - 86'	Reserved
			'87'	Cheque capture screen time-out
			'88 - 91'	Reserved
			'92'	Fault display time-out
			'93'	Reserved
			'94'	Cheque removal time-out
			'95'	Statement retract time-out
			'96'	Statement present time-out
			'97 - 99'	Reserved.
l	3	O	Customisation Data Commands Number of Seconds per Timer Field. Specifies the time-out interval for the preceding timer in seconds. The number of seconds can be 001-255.	

Field	Number of Characters	Mandatory/Optional	Description
	:		
	The previous two fields (Timer Number and Number of Seconds per Timer Field) may be repeated to define different timers. If not specified in this message or a previous message, timers default to 30 seconds.		
	:		
m	Var	M	Trailer. Protocol-dependent.

Table Note 8: This field separator must be present if any of the subsequent fields in the message are present.

Table Note 9: A Supervisor option allows option 36 to be ignored if sent from the host. For further information, refer to the *APTRA Advance NDC, Supervisor's Guide*.

FIT Data Load

This message downloads Financial Institution Tables (FIT) to the terminal. Each command can include as many tables as the protocol permits. From NDC+ version 6.00, the terminal can store up to 1000 FITs. One FIT is required for each member Financial Institution in the network. For details, see Chapter 8, “Financial Institution Tables”.

Table 10-7
FIT Data Load

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: ‘3’ - Data Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: ‘1’ - Customisation Data
g	1	M	Message Identifier. The message identifier is: ‘5’ - FIT Data
FS	1	M	Field Separator.
h	3	M	FIT Number. Designates the number assigned to the FIT in the following field. Values in the range 000 to 999 are valid. The FIT number defines the search order. For example, FIT 000 is the first entry checked during a FIT search. If there is a gap in the numbering range, all omitted entries in the FIT data default to 000. If linked FITs are used, they must have consecutive FIT numbers.

Field	Number of Characters	Mandatory/Optional	Description
i	Var	M	FIT Data. Specifies control words for local PIN verification, remote PIN encryption and indirect next state processing. FIT data consists of a number of three character entries. The valid range is 000 to 255, representing decimal values in the range 000-255. The terminal stores 41 entries. Those in excess of this are ignored. If fewer than 41 entries are received, no values are stored. For details of the data, see "FIT Data" on page 8-2.
FS	1	M	Field Separator.
j	3	M *See* Table Note 10	FIT Number. As field 'h' .
k	Var	M *See* Table Note 10	FIT Data. As field 'i' .
FS	1	*See* Table Note 11	Field Separator.
l	8	*See* Table Note 11	Message Authentication Code (MAC) Data. Contains the value transmitted for authentication of this message. The characters are 0-9, A-F.
m	Var	M	Trailer. Protocol-dependent.

Table Note 10: A field separator and fields 'j' and 'k' can be repeated until the maximum length permitted by the protocol is reached.

Table Note 11: The field separator and MAC Data field 'l' are only present if the flag settings are correct. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Configuration ID Number Load

This message contains an identifier for the customisation data in the terminal. At terminal installation time, or any time customisation data is sent to the terminal, the configuration ID is set to 0000. The configuration ID number load message must be included as the last of the downloaded customisation data messages to set the configuration ID to the desired number. The configuration ID number can be any number from 0001 to 9999.

The terminal holds customisation data and the configuration ID on the system disk. On receipt of a power-up status message from the terminal, Central can verify that the customisation data has been correctly loaded. Only if a configuration ID of 0000 is received does Central need to reload the customisation data.

Note: Config ID is stored in memory, but not saved until a go-in-service is issued. If power fail occurs before the command is issued, the Config ID will need to be reloaded.

Table 10-8
Configuration ID Number Load

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '3' - Data Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '1' - Customisation Data

Field	Number of Characters	Mandatory/ Optional	Description
g	1	M	Message Identifier. The message identifier is: '6' - Configuration ID number
FS	1	M	Field Separator.
h	4	M	Configuration ID Number. The valid range is 0001-9999.
i	Var	M	Trailer. Protocol-dependent.

Message Authentication Field Selection Load

This message is used to set the messages and fields specified for full or selective MAC verification, if a change to the default values is necessary. Fields are selected for inclusion in the MAC if the relevant offset byte is set to 1.

Table 10-9
Message Authentication Field Selection Load

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '3' - Data Command
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '1' - Customisation Data
g	1	M	Message Identifier. The message identifier is: 'B' - Message Authentication Field selection
FS	1	M	Field Separator.
h	Var (47)	*See* Table Note 12	Transaction Request Field. This field contains the field selection data for the transaction request message. The fields of the Transaction Request message are selected for inclusion in the MAC if the relevant offset byte is set to 1. The offsets for the Transaction Request message fields are shown:

Field	Number of Characters	Mandatory/ Optional	Description	
			Offset	**Description**
			0	0 - MAC the complete message. Ignore the following digits in the field 1 - Selectively MAC the fields below if the relevant byte is set to 1
			1	Fields ‘b’ and ‘c’
			2	Field ‘d’
			3	Reserved
			4	Field ‘e’
			5	Field ‘f’
			6	Field ‘g’
			7	Field ‘h’
			8	Field ‘i’
			9	Field ‘j’
			10	Field ‘k’
			11	Field ‘l’
			12	Field ‘m’
			13	Field ‘n’
			14	Field ‘o’
			15	Field ‘p’
		See Table Note 12	16	Fields ‘q’ and ‘r’, optionally buffer ‘f’
			17	Field ‘aa’ * - Identified by Data ID ‘A’ - Reserved
			18	Field ‘ab’ * - Identified by Data ID ‘B’ - Reserved
			19	Field ‘ac’ * - Identified by Data ID ‘6’ - Reserved
			20	Field ‘ad’ * - Identified by Data ID ‘C’ - Reserved
			21	Field ‘ae’ * - Identified by Data ID ‘D’ - Reserved
			22	Field ‘af’ * - Identified by Data ID ‘E’ - Reserved
			23	Field ‘ag’ * - Identified by Data ID ‘F’ - Reserved
			24	Field ‘ah’ * - Identified by Data ID ‘G’ - Reserved
			25	Field ‘ai’ * - Identified by Data ID ‘H’ - Reserved
			26	Field ‘aj’ * - Identified by Data ID ‘I’ - Reserved

Field	Number of Characters	Mandatory/ Optional	Description
			27 Field ‘ak’ * - Identified by Data ID ‘J’ - Reserved
			28 Field ‘al’ * - Identified by Data ID ‘K’ - Reserved
			29 Field ‘am’ * - Identified by Data ID ‘L’ - Reserved
			30 Field ‘an’ * - Identified by Data ID ‘M’ - Reserved
			31 Field ‘ao’ * - Identified by Data ID ‘N’ - Reserved
			32 Field ‘ap’ * - Identified by Data ID ‘O’ - Reserved
			33 Field ‘aq’ * - Identified by Data ID ‘P’ - Reserved
			34 Field ‘ar’ * - Identified by Data ID ‘Q’ -Reserved
			35 Field ‘as’ * - Identified by Data ID ‘R’ - Reserved
			36 Field ‘at’ * - Identified by Data ID ‘S’ - Reserved
			37 Field ‘au’ * - Identified by Data ID ‘T’ - Reserved
			38 Field ‘av’ * - Identified by Data ID ‘U’ - CSP Data
			39 Field ‘aw’ * - Identified by Data ID ‘V’ - Confirmation CSP Data
			40 Field ‘ax’ * - Identified by Data ID ‘W’ - Available for use by Exits
			41 Field ‘ay’ * - Identified by Data ID ‘X’ - Available for use by Exits
			42 Field ‘az’ * - Identified by Data ID ‘Y’ - Available for use by Exits
			43 Field ‘ba’ * - Identified by Data ID ‘Z’ - Available for use by Exits
			44 Field ‘bb’ * - Identified by Data ID ‘[’ - Available for use by Exits
			45 Field ‘bc’ * - Identified by Data ID ‘\’ - Available for use by Exits
			46 Field ‘bd’ * - Identified by Data ID ‘5’ - Available for use by EMV / CAM2 Exits
			51 Field ‘ce’ identified by Data ID ‘e’ - Barcode reader data
			* Indicates that all the elements present for that field will be MACed (group separators excluded).
FS	1	O	Field Separator.
i	Var (36)	*See* Table Note 12	Transaction Reply Field. This field contains the selection data for the Transaction Reply message. The fields of the Transaction Reply message are selected for inclusion in the MAC if the relevant offset byte is set to 1. The offsets for the transaction reply message fields are shown below:

Field	Number of Characters	Mandatory/ Optional	Description	
			Offset	**Description**
			0	0 - MAC the complete message. Ignore the following digits in the field 1 - Selectively MAC the fields below if the relevant byte is set to 1
			1	Fields ‘b’ and ‘c’
			2	Field ‘d’
			3	Field ‘e’
			4	Field ‘f’
			5	Fields ‘g’, ‘h’, ‘i’, ‘j’ and ‘j1’ - ‘j*n*’
			6	Field ‘k’
			7	Field ‘l’
			8	Field ‘m’
			9	Field ‘n’
			10	Field ‘o’
			11	Field ‘p’
			12	Fields ‘q’ and ‘r’
			13	Fields ‘s’ and ‘t’
			14	Fields ‘u’, ‘v’ and subsequent print fields. *See* Table Note 15.
			15	Field ‘w’
			16	Field ‘x’
			17	Field ‘aa’ * - Identified by Data ID ‘A’ - Reserved
			18	Field ‘ab’ * - Identified by Data ID ‘B’ - Reserved
			19	Field ‘ac’ * - Identified by Data ID ‘C’ - Reserved
			20	Field ‘ad’ * - Identified by Data ID ‘D’ - Reserved
			21	Field ‘ae’ * - Identified by Data ID ‘E’ - Reserved
			22	Field ‘af’ * - Identified by Data ID ‘F’ - Reserved
			23	Field ‘ag’ * - Identified by Data ID ‘G’ - Reserved
			24	Field ‘ah’ * - Identified by Data ID ‘H’ - Reserved
			25	Field ‘ai’ * - Identified by Data ID ‘I’ - Reserved

Field	Number of Characters	Mandatory/ Optional	Description
			26 Field ‘aj’ * - Identified by Data ID ‘J’ - Reserved
			27 Field ‘ak’ * - Identified by Data ID ‘K’ - Track 1 Data
			28 Field ‘al’ * - Identified by Data ID ‘L’ - Track 2 Data
			29 Field ‘am’ * - Identified by Data ID ‘M’ - Virtual Controller data
			30 Field ‘an’ * - Identified by Data ID ‘N’ - Virtual Controller data
			31 Field ‘ao’ * - Identified by Data ID ‘O’ - Virtual Controller data
			32 Field ‘ap’ * - Identified by Data ID ‘P’ - Virtual Controller data
			33 Field ‘aq’ * - Identified by Data ID ‘Q’ - Virtual Controller data
			34 Field ‘ar’ * - Identified by Data ID ‘R’ - Virtual Controller data
			35 Field ‘as’ * - Identified by Data ID ‘a’ - Cheque Processing Module (CPM) data. *See* Table Note 18.
			36 Field ‘at’ * - Identified by Data ID ‘5’ - Available for use by EMV / CAM2 Smart Card Exits. *See* Table Note 18.
			* Indicates that all the elements present for that field will be MACed (group separators excluded).
FS	1	O	Field Separator.
j	11	*See* Table Note 12	Solicited Status Field. This field contains the MAC selection data for the solicited status message.
FS	1	O	Field Separator.
k	4	*See* Table Note 12	Other Messages Field. This field contains the MAC selection data for FIT load, state tables load, terminal state status and Dispenser Currency Cassette Mapping Table messages.
FS	1	O	Field Separator.
l	6	*See* Table Note 12	Track 1 Field. This field contains the MAC selection data for magnetic card track 1.
FS	1	O	Field Separator.
m	6	*See* Table Note 12	Track 2 Field. This field contains the MAC selection data for magnetic card track 2.
FS	1	O	Field Separator.
n	11	*See* Table Note 12	Track 3 Field. This field contains the MAC selection data for magnetic card track 3.
FS	1	O	Field Separator.
o	5	*See* Table Note 12	EMV Smart Card Configuration. This field contains the MAC selection data for the EMV Configuration message.

Field	Number of Characters	Mandatory/ Optional	Description
FS	1	*See* Table Note 14	Field Separator.
p	8	*See* Table Note 14	Message Authentication Code (MAC) Data. This field contains the eight-character value transmitted for authentication of this message. The characters are 0-9 and A-F.
q	Var	M	Trailer. Protocol-dependent.

Table Note 12: Offset 16 not only controls whether fields ‘q’ and ‘r’ are included in the MAC generation, but also whether buffer ‘f’ is included when more than four hopper types are supported by the coin dispenser.

Table Note 13: Variable length fields may be truncated, that is, trailing characters may be omitted. The omitted characters will take a value of zero. If Message Authentication is turned on, any fixed (not variable) length fields must be either empty or fully populated, or this message will be rejected with a MAC failure.

Table Note 14: The field separator and MAC are only present when the Data Security feature is selected and the flags are set correctly. For details, see the *APTRA Advance NDC, Supervisor’s Guide*.

When the Data Security feature is set, all the messages sent from Central to the terminal that contain a MAC field must have this optional field present.

Table Note 15: The printer fields, following fields ‘u’ and ‘v’, will be MACed if fields ‘u’ and ‘v’ are to be MACed. The group separators between the additional printer fields will not be included in the MACing activity.

Table Note 16: The MACing of other messages, including the Dispenser Currency Cassette Mapping Table message and the EMV Configuration messages, are specified in the “Selective Message Authentication” section of Chapter 11, “Security Features”.

Table Note 17: If you require further reference information for EMV Integrated Circuit Card (ICC or ‘Smart Card’) configuration using APTRA Advance NDC, refer to “Other NCR Documentation” in Appendix G, “Related Documentation”.

Table Note 18: If you wish to use selective MACing on EMV ICC data with Advance NDC and NDC+ based terminals, you cannot use the same Message Authentication Field Selection Load message. This is because of the different EMV field offsets (35 for NDC+ and 36 for Advance NDC).

Date and Time Load

This message is used to set the local date and time in the terminal.

Table 10-10
Data and Time Load

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is : '3' - Data Command
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '1' - Customisation Data
g	1	M	Message Identifier. The message identifier is: 'C' - Date and Time
FS	1	M	Field Separator.
h	10	M	Date/Time Data. This field contains the date and time in the following format: YY = Year ('00' - '99') MM = Month ('01' - '12') DD = Day ('01' - '31') HH = Hour ('00' - '23') MM = Minute ('00' - '59') If 00<=YY<=89, the year is taken to be in the range 2000<=YY<=2089. If 90<=YY<=99, the year is taken to be in the range 1990<=YY<=1999. **Note:** Seconds are set to zero when the date and time are set.

Encryption Key Change

For security, the Central programmer can use this message to change the Master Key ('A' key), Communication Key ('B' key) and VISA Master Key ('V' key) initially entered by a local operator through Supervisor mode. From Advance NDC 2.02, it is possible to change the Communication key while the terminal is in-service, but not currently handling a transaction. This is not possible when the terminal is in suspend mode, or the operator is initiating the execution of settlement transactions.

In addition to the Encryption Keys, the operator may change the Message Authentication Key and VISA Key Table. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Note: If an Encryption Key Change message is sent in Supervisor mode, the message is not processed until the front keyboard is disabled, following a menu selection or supervisor mode exit.

The Encryption Key Change message may:

- Include an encrypted encryption key.
- Specify the current encryption key that the terminal must use to decrypt this encrypted encryption key.
- Specify which of the current encryption keys to replace.

The above specifications are contained in the modifier field of the message.

A solicited status message will be returned to Central after an attempt to modify an encryption key, to indicate its success or failure.

Central must encrypt the new encryption key with the same key designated to decrypt it at the terminal.

PIN verification may require the use of a separate PIN key. The key used in this case is the PEKEY, contained in the FIT, which can be different for each financial institution in the system.

On power failure the Master key is unchanged, but the Communications key and MAC key are changed to the locally entered B key if the Restart Mode option specifies this, or configuration data reload from disk fails.

This message is not considered part of the customisation data and does not reset the configuration ID to zero.

Table 10-11
Encryption Key Change

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '3' - Data Command
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '3' - Encryption Key Information
g	1	M	Modifier. This one-character field specifies the encryption key change to take place: '1' - Decipher new master key with current master key * '2' - Decipher new communications key with current master key * '3' - Decipher new communications key with current communications key * '4' - Use locally-entered communications key ('B' key) as current communications key '5' - Decipher new MAC key with current master key * '6' - Decipher new MAC key with current communications key * '7' - Use locally-entered communications key ('B' key) as current MAC key '8' - Decipher new VISA master key with current VISA master key * '9' - Key data is new VISA key table; the equivalent old key is overwritten. *See* Table Note 19. * The equivalent old key is overwritten.
FS	1	O	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description
h	24 or 288	O	New Key Data. Key data consists of entries of three characters. The valid range of each entry is 000-255. Each entry defines the value of two hexadecimal encryption key digits. A key consists of eight entries. The first entry contains digits 1 and 2. The last entry contains digits 15 and 16 (95 and 96). For example, 255, 254, 253, 252, 251, 250, 249, 248 is equivalent to FF, FE, FD, FC, FB, FA, F9, F8 entered locally at the terminal. *See* Table Note 20.
i	Var	M	Trailer. Protocol-dependent

Table Note 19: When VISA PIN verification is used, any change to the keys should be done with a message modifier ‘8’ to change the master key, followed by a message modifier ‘9’ to load the new key table.

Table Note 20: In all messages where key data is present, except for modifier ‘9’, only one key is present. For modifier ‘9’, twelve keys comprising the six VISA key table pairs are present.

Extended Encryption Key Change

With an Encrypting PIN Pad (EPP), this message can be used to change the Master Key (A key), Communication Key (B key) and VISA Master Key (V key) initially entered by a local operator through Supervisor mode. If an EPP is not present, this message is rejected.

From Advance NDC 2.04 onwards, it is possible to change the Communication key while the terminal is in-service, but not currently handling a transaction. This is not possible when the terminal is in suspend mode, or the operator is initiating the execution of supervisory or settlement transactions.

This message supports the terminal key modes of single and double-length keys. For further details, see Chapter 11, “Security Features”.

Note: If an Extended Encryption Key Change message is sent in Supervisor mode, the message is not processed until the front keyboard is disabled, following a menu selection or supervisor mode exit.

The Extended Encryption Key Change message may:

- Include an encrypted encryption key
- Specify the current encryption key that the terminal must use to decrypt this encrypted encryption key
- Specify which of the current encryption keys to replace.

The above specifications are contained in the modifier field of the message.

The Extended Encryption Key Change message enables single-length keys to be downloaded (as the previous Encryption Key Change message), but also double-length keys.

If this message is sent for a single-length key when the terminal is in double-length key mode, or vice versa, a command reject is issued indicating an Encryption Key Change message of the wrong length has been issued.

The Extended Encryption Key Change message can be sent to change the Communication Key (‘B’ key) at any point after it is initially entered, except when a transaction is in process, or the terminal is in Suspend mode, or when the operator is executing a supervisor / settlement transaction.

If the key load is successful, an “Encryptor Initialisation Data” message is returned to Central to report the new key’s Key Verification Value (KVV). If the key load fails, a reject message is sent.

When a DES key is used to encrypt the new encryption key, Central must encrypt the new encryption key with the same key designated to decrypt it at the terminal.

PIN verification may require the use of a separate PIN key. The key used in this case is the PEKEY, contained in the FIT, which can be different for each financial institution in the system.

On power failure the Master key is unchanged, but the Communications key and MAC key are changed to the locally entered B key if the Restart Mode option specifies this, or if configuration data reload from disk fails.

This message is not considered part of the customisation data and does not reset the configuration ID to zero.

Table 10-12
Extended Encryption Key Change

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: ‘3’ - Data Command
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: ‘4’ - Extended Encryption Key Information

Field	Number of Characters	Mandatory/ Optional	Description
g	1	M	Modifier. This one-character field specifies the encryption key change to take place: '1' - Decipher new master key with current master key. *See* Table Note 21. '2' - Decipher new communications key with current master key. *See* Table Note 21. '3' - Decipher new communications key with current communications key. *See* Table Note 21 and Table Note 22. '4' - Use locally entered communications key ('B' key) as current communications key. *See* Table Note 22 and Table Note 24. '5' - Decipher new MAC key with current master key. *See* Table Note 21. '6' - Decipher new MAC key with current communications key. *See* Table Note 21 and Table Note 22. '7' - Use locally entered communications key ('B' key) as current MAC key. *See* Table Note 22 and Table Note 24. '8' - Decipher new VISA master key with current VISA master key. *See* Table Note 24. '9' - Key data is new VISA key table. *See* Table Note 21 and Table Note 23. 'A' - Decipher new VISA master key with current master key. *See* Table Note 21 and Table Note 23. 'B' - Load Host Security Module (HSM) public key and signature. *See* Table Note 25. The key data field contains the HSM public key (PK-HSM) and signature block (PK-HSM) created using SK-NCR, each base 94 encoded giving a total length of 640 bytes. 'C' - Load initial master key (A-key) with RSA key. *See* Table Note 25. The key data field contains the initial A-key encrypted with the EPP public key [A-KEY], PK-EPP and signature block ([A-KEY], PK-EPP) created using SK-HSM, each base 94 encoded giving a total length of 640 bytes. *See* Table Note 32.

Field	Number of Characters	Mandatory/ Optional	Description
			'D' - Load new initial communications key (B-key) with RSA key. *See* Table Note 25. The key data field contains the initial B-key encrypted with the EPP public key [B-KEY], PK-EPP and signature block ([B-KEY], PK-EPP) created using SK-HSM, each base 94 encoded giving a total length of 640 bytes. *See* Table Note 22 and Table Note 32. 'E' - Load new initial VISA master key (V-key) with RSA key. *See* Table Note 25. The key data field contains the initial V-key encrypted with the EPP public key [V-KEY], PK-EPP and signature block ([V-KEY], PK-EPP) created using SK-HSM, each base 94 encoded giving a total length of 640 bytes. *See* Table Note 32. 'F' - Send Encrypting PIN Pad (EPP) serial number. *See* Table Note 25. The terminal will respond with an Encryptor Initialisation Data message containing the signed serial number. If the encryptor has previously been used in BAPE mode, this command option will fail unless the key entry mode is changed through either the modifier 'J' or the Supervisor Access menu. *See* Table Note 30. 'G' - Send EPP public key. *See* Table Note 25. The terminal will respond with an Encryptor Initialisation Data message containing the signed EPP public key. 'H' - Send all Key Verification Values (KVVs). *See* Table Note 24. 'I' - Reserved. 'J' - Set key entry mode. *See* Table Note 25 and Table Note 30. 'K' - Send current key entry mode. 'N' - Send random ATM number. 'Q' - Send encryptor capabilities and state. 'R' - Load HSM Root public key and signature. *See* Table Note 33. 'S' - Delete HSM public key. *See* Table Note 34. 'T' - Delete HSM Root public key. *See* Table Note 33 and Table Note 34.
FS	1	O	Field Separator.
h	3	O	Key Data Size. Specifies the size of the following key data field in hexadecimal (hex). For a single-length DES key, the size is 018 hex (24 decimal) characters.

Field	Number of Characters	Mandatory/ Optional	Description
			For a double-length DES key, the size is 030 hex (48 decimal) characters. For the six VISA table keys, the size is 120 hex (288 decimal) characters.
i	0 - 640	O	New Key Data. Maximum length is 640 bytes. *See* Table Note 25 and Table Note 30 For DES keys, the key data consists of entries of three characters. The valid range of each entry is 000-255. Each entry defines the value of two hexadecimal encryption key digits. A key consists of eight entries for a single-length key, or sixteen entries for a double-length key. The first entry contains digits 1 and 2. The last entry contains digits 15 and 16 (95 and 96). For example, 255, 254, 253, 252, 251, 250, 249, 248 is equivalent to FF, FE, FD, FC, FB, FA, F9, F8 entered locally at the terminal. In all messages where DES key data is present, except for modifier '9', only one key is present. For modifier '9', twelve keys comprising the six VISA key table pairs are present. The key is interpreted as single or double-length depending on the Key Entry mode option selected from the Supervisor Access menu. For more information, see Chapter 11, "Security Features".

Table Note 21: For modifiers '1', '2', '3', '5', '6', '8', '9' and 'A' the equivalent old key is overwritten.

Table Note 22: Modifiers '3', '4', '6', '7' and 'D' cannot be used if the Key Entry mode is set to Double Length Restricted, when they will be rejected with reason C17. *See* Chapter 11, "Security Features".

Table Note 23: When VISA PIN verification is used, any change to the keys should be performed with message modifier '8'or 'A' to change the master key, followed by message modifier '9' to load the new key table.

Table Note 24: For modifiers '4', '7' and 'H', field 'i' is not present.

Table Note 25: Modifiers 'B', 'C', 'D', 'E', 'F', 'G' and 'J' are only supported by the EPP. If the terminal does not have an EPP, the message will be rejected with the error E02 'Function not supported in hardware'.

Table Note 26: Only the A key has to be downloaded using RSA. The communications key, MAC key and VISA key can be loaded, encrypted by the A key.

Table Note 27: Modifiers 2 and 3 can be used while the terminal is in service, but not performing a transaction, to change the communications key. All other modifiers can only be used while the terminal is out of service. If the terminal is not in the correct mode, the message is rejected with reason C15.

Table Note 28: Depending on the single / double encryption mode of the terminal, the initial keys (A, B and V) may be single or double length. As the length of an encrypted RSA block is always 256 bytes, the message length remains unchanged.

Table Note 29: The exponent of the HSM-PK is always 65537, and is therefore not transmitted to the terminal.

Table Note 30: Modifier 'J' is only supported on the EPP encryptor, and has the additional restriction that it will only be accepted after the host has demonstrated that it has the ability to download encryption keys using RSA key download. This is achieved by the exchange of public keys and reading the EPP serial number. If this exchange of messages has not been performed since the last power up the command will be rejected (Reason C18 - not authorised). To permit migration from previous NDC+ releases, if the EPP is operating in BAPE emulation mode this modifier will be accepted once without the need for the authorisation sequence. Changing the key entry mode will switch the encryptor into EPP mode.

For modifier 'J' the key data consists of a single character in the range '1' to '4' which selects the new mode, as follows:
'1' = Set mode to single length without XOR
'2' = Set mode to single length with XOR
'3' = Set mode to double length with XOR
'4' = Set mode to double length restricted.

The mode controls the manual encryption key entry mode, the encryption key size and the restrictions placed on key usage. When using a remote key protocol, the mode must be set based on the DES key size to be used and the level of restriction to be placed on the usage of encryption keys.

All four key modes are supported for non-secure EPP on NCR and other vendors' machines. With secure EPP and DAPI7 only key mode '4' is supported. If the mode cannot be supported by the EPP, a Specific Command Reject is returned.

Table Note 31: Security messages from Central will not be processed if the application is in Supervisor mode.

Table Note 32: For modifiers 'C', 'D' and 'E', when the enhanced signature remote key protocol is used the signature is generated from a random number concatenated with the encrypted single or

double length DES key. The random number is returned in response to an EEKC request with modifier 'N'. The random number is not included in the message from the host to the EPP.

Table Note 33: Modifiers 'R' and 'T' are only supported under the enhanced signature remote key protocol. If the enhanced signature is not supported, a Specific Command Reject is returned.

Table Note 34: Modifiers 'S' and 'T' key data consists of the EPP serial number, the Public Key to be deleted, and a Key Deletion Authentication signature block. The signature block is created using the secret key belonging to the key pair for which the public key is to be deleted. The signature is generated from the EPP ID concatenated with the public key. The public key and signature are base 94 encoding, after which they are 320 bytes long each. The data is passed as follows:

- EPP Serial Number (SN-EPP) 8 bytes
- Host public key to delete 320 bytes
- Deletion Authentication Signature 320 bytes

Dispenser Currency Cassette Mapping Table

The table contained in this message is used to define currency types, which map to the configuration settings in table entry 7 of the Amount Check State defined in the Amount Check State Table.

When the Data Security feature is set, all the messages sent from Central to the terminal that contain a MAC field must have this optional field present.

Table 10-13
Dispenser Currency Cassette Mapping

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is : '3' - Data Command
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
e	3	O	Message Sequence Number. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '1' - Customisation Data
g	1	M	Message Identifier. The message identifier is: 'E' - Dispenser Currency Cassette Mapping Table
FS	1	M	Field Separator.
h	2	M	Number of Mapping Entries. Two-digit ASCII hex value (range 01 to FF). *See* Table Note 35.
i1	2	*See* Table Note 35	Currency Type. Single-digit ASCII hex value (range 01 to FF). Used for mapping to state type 'G' table entry 7.

Field	Number of Characters	Mandatory/ Optional	Description
i2	1	*See* Table Note 35	Cassette Type. Single-digit ASCII hex value (range 0 to F, types 1 to 4 supported).
i3	5	*See* Table Note 35	Denomination for Cassette. Five-digit ASCII numeric value (for example, 00005 for $5).
FS	1	*See* Table Note 36	Field Separator.
j	8	*See* Table Note 36	Message Authentication Code (MAC) Data. Contains the value transmitted for authentication of this message. The characters are 0-9, A-F.
k	Var	M	Trailer. Protocol-dependent.

Table Note 35: If field h is greater than 01, the fields i1 to i3 inclusive are repeated for the number of times indicated by field h.

The Data Command message is expected at the terminal only when the terminal is in out-of-service mode or supply / supervisor mode.

If Central transmits a Data Command message and it does not conform to the format above, or is sent at a time when it is not expected, a solicited error message is generated, identifying a specific command reject value for the failure reason (or simply 'A' if specific command reject processing is not activated).

If a specific command reject value is generated then the message content will be ignored.

The following example shows the contents for fields h and i using two currencies, dollars and euros, with:

- cassette type 1 = 10 dollars
- cassette type 2 = 20 dollars
- cassette type 3 = 100 euros
- cassette type 4 = 200 euros

```
.... 04 01 1 00010 01 2 00020 02 3 00100 02 4 00200 ....
```

The spaces are included for clarity but do not appear in the actual message to the terminal.

Table Note 36: The field separator and MAC are present only when the Data Security feature is selected and the flags are set correctly. See the *APTRA Advance NDC, Supervisor's Guide* for details.

When the Data Security feature is set, all the messages sent from Central to the terminal that contain a MAC field must have this optional field present.

XML Configuration Download

This message is a generic command that downloads configuration data to the terminal. The configuration data content is defined in XML files and is contained within a number of XML schema files. These schema files are defined when new configuration requirements are identified.

Advance NDC responds to the XML configuration download in the same way as all other data commands, for example, it sends a 'Ready 9' or a Reject solicited message. An XML schema file containing configuration data can be downloaded in parts (up to a maximum of 9999), or as a single file. The 'Ready 9' acknowledges receipt of the XML schema file part it does not imply the content is valid. XML validation only occurs when the final part of the file is downloaded.

The host must download the parts of the file in sequence. When the last part of the file is downloaded, Advance NDC constructs the whole file, validate the file, complete the configuration process and store the file. The name of the file is read from the XML configuration data and is stored in the *C:\Program Files\NCR APTRA\config* directory. If a file part is downloaded out of sequence a specific command reject is returned. If the host does not receive the 'Ready 9' acknowledgement, it can re-send the last part sent without getting an error. This allows the host to recover from a communications failure or continue with the download after a power failure at the SST.

The host can cancel a download (and potentially re-start the whole process) by setting either field 'h' (Total Message Parts), or field 'i' (Message Part) to '0000'. The download cancel request is required if the host receives a specific command reject. Advance NDC replies with a 'Ready 9' when it has processed the cancel download request.

All parts of the download are discarded when the final part has been downloaded and processed, or when the host cancels the download.

Table 10-14
Terminal Commands

Field	Number of Characters	Mandatory/ Optional	Description
b	1	M	Message Class. The message class is: '3' - Data Command.
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
	1	M	Field Separator.
d	3	O	Logical Unit Number. Included for future use and is ignored by the terminal.
	1	M	Field Separator.
e	3	O	Message Sequence Number. Included for future use and is ignored by the terminal.
	1	M	Field Separator.
f	1	M	Message Subclass. The message subclass is: '1' - Customisation Data.
g	1	M	Message Identifier. The message identifier is: 'I' - XML Configuration Download.
	1	M	Field Separator.
h	4	M	Total Message Parts. Total number of parts that the configuration data is split into. It contains a four digit decimal number, in the range '0000' to '9999'. If this value is '0000', all previous parts of a partial configuration data download are discarded (*see* Table Note 37).
	1	M	Field Separator.
i	4	M	Message part. Part number for the configuration data contained within this message. It contains a four-digit decimal number, in the range '0000' to '9999'. If this value is '0000', all previous parts of a partial configuration data download are discarded (*see* Table Note 37). If this value equals the value in Total Message Parts (field h), the downloaded parts are combined and validated against the specific schema. If the data is valid the configuration data is stored in an XML file at a specific location.
	1	M	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description
j	VAR	M	NDC Configuration Data. Configuration data.
	1	*See* Table Note 38.	Field Separator.
k	8	*See* Table Note 38.	Message Authentication Code Data (MAC) Data. Value transmitted for authentication of this message. The characters are in the range '0-9' and 'A-F'.

Table Note 37: If either field h or i contain the value '0000', all previous parts of a partial configuration download are discarded.

Table Note 38: The field separator and MAC Data field k are only present if the flag settings are correct. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Host to Exit Messages

Advance NDC does not use this class of message, but makes the data in field g available to the Exit, after the message header fields, b, c, d, f, and the following field separator character have been stripped from the message.

An Exit may use these messages for any purpose. Advance NDC forwards them to the Exit which is listed in the file *MISCONT* as having Point of Use 7. Advance NDC imposes the following restrictions on these messages:

- Field **g**, the data field of the message, must contain 7-bit transmittable ASCII data
- The overall length of the message must comply with any maximum message length imposed by the communications protocol that you are using.

If Advance NDC detects no support for Exits, the message is rejected with specific reject B01 (if enabled).

For further information about Exits and Virtual Controllers, refer to the publication *Using NDC Exits*.

Table 10-15
Host to Exit

a	Var	M	Header. Protocol dependent.
b	1	M	Message Class. The message class is '7' - Host To Exit
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field separator
d	3 or 9	O	Logical Unit Number
FS	1	M	Field separator
f	1	M	Message Sub-Class. The message sub-class is '1'
FS	1	M	Field Separator
g	Var	M	Data intended for the Exit
h	Var	M	Trailer. Protocol dependent.
a	Var	M	Header. Protocol dependent.

Transaction Reply Command

A Transaction Reply command is sent to the terminal once the cardholder has entered all the data necessary for a specific Transaction Request, and a request has been sent to Central.

The terminal regards the Transaction Reply command as an authorisation to complete the transaction. If the transaction cannot be completed successfully, the terminal sends a device fault Solicited Status message to Central. The terminal then waits for another Transaction Reply command, authorising it to complete the transaction in another way.

The maximum length of a Transaction Reply command depends on the protocol.

Table 10-16
Transaction Reply Command: Message Format

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '4' - Transaction Reply Command
c	1	O	Response Flag. Included for future use and ignored by the terminal.
FS	1	M	Field Separator.
d	3 or 9	O	Logical Unit Number (LUNO). The contents of this field are only used when Central asks for the security terminal number to be checked. In this case the field will contain nine characters, the last six of which are checked.
FS	1	M	Field Separator.
e	3 or 8	*See* Table Note 49	Message Sequence / Time Variant Number. The Message Sequence number field is ignored by the terminal and is included for future use. The Time Variant field contains an eight-character time variant number which should be the same as the last time variant number transmitted to Central.
FS	1	M	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description
f	3	O	Next State ID Data. Contains a base 10 (decimal) number in the range 000-254 or 256-999, or a base 36 (alphanumeric) number in the range 000-254 or 256-ZZZ. This identifies the state number which the terminal should execute after it has completed the specified Transaction Reply command. This field must be included in all Transaction Reply messages except a Print Immediate.
FS	1	M	Field Separator.
g1	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 1 notes to dispense. Contains the number of type 1 notes to be dispensed. Valid range is defined by hardware capabilities.
g2	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 2 notes to dispense. Contains the number of type 2 notes to be dispensed. Valid range is defined by hardware capabilities.
g3	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 3 notes to dispense. Contains the number of type 3 notes to be dispensed. Valid range is defined by hardware capabilities.
g4	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 4 notes to dispense. Contains the number of type 4 notes to be dispensed. Valid range is defined by hardware capabilities.
g5	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 5 notes to dispense. Contains the number of type 5 notes to be dispensed. Valid range is defined by hardware capabilities.
g6	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 6 notes to dispense. Contains the number of type 6 notes to be dispensed. Valid range is defined by hardware capabilities.
g7	2	*See* Table Note 45, Table Note 46, Table Note 47, and Table Note 48	Number of type 7 notes to dispense. Contains the number of type 7 notes to be dispensed. Valid range is defined by hardware capabilities.
GS	1	*See* Table Note 51	Group Separator
j1	2	*See* Table Note 52 and Table Note 51	Number of hopper type 1 Coins to Dispense. Contains the number of coins to be dispensed from hopper type 1. Valid range is defined by hardware capabilities. *See* Table Note 53.

Field	Number of Characters	Mandatory/ Optional	Description
j2	2	*See* Table Note 52 and Table Note 51	Number of hopper type 2 Coins to Dispense. Contains the number of coins to be dispensed from hopper type 2. Valid range is defined by hardware capabilities. *See* Table Note 53.
j3	2	*See* Table Note 52 and Table Note 51	Number of hopper type 3 Coins to Dispense. Contains the number of coins to be dispensed from hopper type 3. Valid range is defined by hardware capabilities. *See* Table Note 53.
j4	2	*See* Table Note 52 and Table Note 51	Number of hopper type 4 Coins to Dispense. Contains the number of coins to be dispensed from hopper type 4. Valid range is defined by hardware capabilities. *See* Table Note 53.
j5	2	*See* Table Note 52 and Table Note 51	Number of hopper type 5 Coins to Dispense. Contains the number of coins to be dispensed from hopper type 5. Valid range is defined by hardware capabilities. *See* Table Note 53.
			:
	Repeated for the number of hopper types present.		
			:
j*n*	2	*See* Table Note 52 and Table Note 51	Number of hopper type *n* Coins to Dispense. Contains the number of coins to be dispensed from hopper type *n*. Valid range is defined by hardware capabilities. *See* Table Note 53.
FS	1	M	Field Separator.
k	4	M	Transaction Serial Number. Number that Central uses to identify the transaction. It is used by the SST for the following functions: - Default PPD printing - Transaction number of the last transaction processed by the SST. (This can be requested by Central by transmitting a Send Supply Counters Terminal Command to the terminal.) - Part of the information printed on the journal when an exception status is sent to Central. Valid range is 0000-9999
l	1	M	Function Identifier. Instructs the terminal on what functions are to be performed: **Function ID** — **Functions Performed** '1' or '7' — Deposit and print. *See* Table Note 41. '2' or '8' — Dispense and print. *See* Table Note 39. '3' or '9' — Display and print '4' — Print immediate

Field	Number of Characters	Mandatory/ Optional	Description	
			'5'	Set next state and print
			'6'	Night safe deposit and print
			'A'	Eject card and dispense and print (card before cash)
			'B' or 'C'	Parallel dispense and print and card eject
			'E'	Reserved. A specific command reject will be sent if this is received.
			'F'	Card before parallel dispense / print
			'O'	Reserved
			'P'	Print statement and wait. *See* Table Note 40.
			'Q'	Print statement and set next state. *See* Table Note 40.
			'R'	Reserved. A specific command reject will be sent if this is received.
			'S'	Reserved. A specific command reject will be sent if this is received.
			'T'	Reserved. A specific command reject will be sent if this is received.
			'*'	Refund BNA deposited money and set next state.
			'-'	Encash BNA deposited money, issue receipt if requested, and set next state.
			''	Encash BNA deposited money, and wait for another reply from Central.
			':'	Process CPM cheque.

Table Note 39: If the Dispense and Wait function is used with a spray cash dispenser and a motorised card reader, the full timeout on cash taken before returning card and then printing will be used.

Table Note 40: Function IDs 'P' and 'Q' are used to print statements on the statement printer when the printer flag in the Transaction Reply is '8' or sideways on the receipt printer when the printer flag is '='.

<table>
<tr><th>Field</th><th>Number of Characters</th><th>Mandatory/ Optional</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>The action taken on a Print Immediate command depends on when it is received and the contents of the next state ID field.

Table Note 41: Diebold mode is not supported, therefore Advance NDC operation is different from NDC+. In Advance NDC, an envelope is always dispensed on execution of the transaction reply if an envelope has not previously been dispensed through the execution of the Envelope Dispenser State.</td></tr>
<tr><td></td><td></td><td></td><td><table>
<tr><th>State</th><th>Next State Field</th><th>Action</th></tr>
<tr><td>Trans. Request</td><td>Included</td><td>As next state and print.</td></tr>
<tr><td>Trans. Request</td><td>Omitted</td><td>Print and wait for new Transaction Reply command.</td></tr>
<tr><td>Other</td><td>-</td><td>See “Message Validation” section in this chapter.</td></tr>
</table></td></tr>
<tr><td>m</td><td>3 or 5</td><td></td><td>Screen Number. Contains either a three-digit decimal value from 010 to 999, or a five-character value containing a four-digit screen number prefixed with the letter ‘u’ or ‘l’. The screen number defines the screen to be displayed on the terminal during execution of the specified function.

To select a screen from the current language group, use either group 'l' or a three-digit screen number. To select a screen independently of language group, use group ‘u’.

On a Card Before Cash or Card Before Parallel Dispense and Print transaction, this screen should contain two nested screen numbers for displaying at different times during the transaction; S0 (screen 1) S0 (screen 2). Do not include a clear screen control, as this prevents the nested screens being displayed.

This field must be present if field ‘n’ is present. Otherwise, it is optional.</td></tr>
<tr><td>n</td><td>Var</td><td>O</td><td>Screen Display Update. Contains screen numbers and new screen data which can replace existing screen data. The new screen data is displayed when its screen number is referenced during transaction processing.
To immediately update a displayed screen, the displayed screen must be the first screen in the screen update data.</td></tr>
</table>

Field	Number of Characters	Mandatory/ Optional	Description
			Screen numbers in the screen update can be specified as four digit numbers in group 'u' (u1234) to load a screen independent of language group. A screen number from group 'l' (l1234) can be specified to load a screen in the current language group. A screen number specified with three decimal digits (123) will be language independent, unless a language has been selected with a group size of 1000 or greater, in which case the screen number will be adjusted for language.
			The screen update data is in the format: **No. Of Bytes** — **Content** 3, 5 or 6 — Screen number Var — Screen data 1 * — Group separator 4 * — Reserved 3 * — Screen number Var * — Screen data * These fields are only included when multiple screens are to be updated within one message. They are repeated for each additional screen.
FS	1	M	Field Separator.
o	1	M	Message Co-Ordination Number. *See* the “Transaction Request Messages” section (field ‘g’) in Chapter 9, “Terminal to Central Messages”.
p	1	M	Card Return / Retain Flag. Tells the terminal to either return or retain the card during the Close state. ‘0’ - return card ‘1’ - retain card This flag is ignored and the card is always returned if the Function ID is ‘A’, ‘B’ or ‘C’ and the card is not in the card reader at the close state.
q	1	M *See* Table Note 42	Printer Flag Field. Tells the terminal which printer or printers to use. ‘0’ - Do not print ‘1’ - Print on journal printer only ‘2’ - Print on receipt printer only

Field	Number of Characters	Mandatory/ Optional	Description
			'3' - Print on receipt and journal printer '4' - Print on PPD if the Function ID is '1' or '7' (Deposit and print). '5' - Print on PPD and journal if the Function ID is '1' or '7' (Deposit and print). '8' - Print on statement printer only '9' - Reserved ':' - Reserved '=' - Print sideways on the receipt printer if the Function ID is 'P' (Print Statement and Wait) or 'Q' (Print Statement and Set Next State). 'a' - Stamp cheque if the Function ID is ':' (Process cheque in CPM). This flag indicates that a cheque is to be stamped. The data field is ignored as the stamp content is fixed. This flag is not actioned if the cheque is ejected. 'b' - Endorse cheque if the Function ID is ':' (Process cheque in CPM). This flag indicates that printing takes place on the reverse of a cheque and relates to cheque endorsement. This flag is not actioned if the cheque is ejected. If the Function ID is 'B' or 'C' (Parallel dispense, eject and print), NCR recommends that you use only one journal print data field and one receipt print data field. If multiple printer flags '4' and/or '5' are used in the same transaction message, only the first printer data field will be printed on the depository. If printer flag value '8' is used in any functions other than 'P' and 'Q', the following printer data field will be ignored. Only the first printer data field with flag value '8' will be accepted in a message. For sideways printing on the receipt, only one printer flag of '=' will be accepted in the message for functions 'P' and 'Q'. If printer flag '=' is used in any other function, the following printer data field will be ignored. If printer flags '=' and '8' are both present in a transaction reply along with Function Id 'P' or 'Q', the first of these flags encountered in the message will be accepted and processed. It is therefore recommended that only one of these printer flags is present in a Print Statement and Wait or Print Statement and Set Next State function. Printer flags ';' and '<' are ignored.

Field	Number of Characters	Mandatory/ Optional	Description
r	Var (500)	O	Printer Data Field. The maximum length of this field depends on the amount of data compression used in the transmitted data, but it is at least 500 bytes of uncompressed print data. Inserted data is printed by the printer indicated in the Printer Flag field. Each printer device has its own restrictions: Text sent to print on the depository must be 80 characters or less. Text sent to print on the receipt printer must be: - 24 lines or less if printing in normal mode - 49 lines or less if local configuration option digit 6B is set - 20 lines or less for sideways printing on the receipt. Sideways printing is not supported for the journal printer. Text sent to be printed sideways on the receipt printer can be up to a maximum width of 80 characters. The statement printer is constrained either to the compressed data length and the overall message length, or to the length of paper. When used with printer flag 'b' for Function ID ':' (Process cheque in Cheque Processing Module (CPM)), this field contains the endorsement print data (ASCII text) for the cheque. If the first character is '?', the text is printed in the alternative format. The alternative format could be normal, bold, or compressed text depending on the CPM variant. The '?' character can be used to select the XFS PTR form to use. These forms can be used to modify the text format. For details, refer to the APTRA online help under **APTRA XFS | Programmer's Reference | XFS Service Providers | XFS PTR Service Provider**. No escape sequences are supported with the printer flag 'b'. If no endorsement data is suppled with this flag, a specific command reject is returned.
GS	1	*See* Table Note 42	Group Separator.
s	1	O	Printer Flag. *See* field 'q'.
t	Var (500)	O	Printer Data. *See* field 'r'.
GS	1	*See* Table Note 42	Group Separator.
u	1	O	Printer Flag. *See* field 'q'.
v	Var (500)	O	Printer Data. *See* field 'r'.
GS	1	*See* Table Note 42	Group Separator
v1	1	O	Printer Flag. *See* field 'q'.

Field	Number of Characters	Mandatory/ Optional	Description
v2	Var (500)	O	Printer Data. *See* Field 'r'.
			:
	GS, 'v1' and 'v2' may be repeated up to nine further times. *See* Table Note 42.		
			:
FS	1	*See* Table Note 44	Field Separator.
w	1	O *See* Table Note 44	Buffer Identifier. A '4' in this field identifies the following data as Track 3 data.
x	Var (106)	O *See* Table Note 44	Track 3 Data. Contains the data to be written on to Track 3 during the Card Write state or Card Before Cash function command. This data replaces any existing data in the terminal's Track 3 buffer. The Track 3 data consists of up to 106 characters including the start and end sentinels.
FS	1	*See* Table Note 44	Field Separator.
ak1	1	O	Buffer Identifier 'K'. A value of 'K' for the Buffer Identifier indicates that the following fields define the new Track 1 data that is to be written to the card.
ak2	Var (78)	O	Track 1 Data. This field contains the data to be written to Track 1 during the Card Write state or Card Before Cash function command. This data replaces any data already in the terminal's Track 1 buffer. The Track 1 data consists of up to 78 characters.
FS	1	*See* Table Note 44	Field Separator.
al1	1	O	Buffer Identifier 'L'. A value of 'L' for the Buffer Identifier indicates that the following fields define the new track data that is to be written to the card.
al2	Var(39)	O	Track 2 Data. This field contains the data to be written to Track 2 during the Card Write state or Card Before Cash function command. This data replaces any data already in the terminal's Track 2 buffer. The Track 2 data consists of up to 39 characters.
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
am1	1	O	VC data ID 'M'. Fields am1 / am2 to ar1 / ar2 are reserved for Exits use. The first field in the pair is a data identifier, the second is a variable length buffer. The data identifier should be in the range 'M' (4DH) to 'R' (52H). The fields can be selectively MACed. For details, see the "Message Authentication" section in Chapter 11, "Security Features".
am2	Var	O	VC data The Exit data. The data field should not contain the Group Separator character (1DH).

Field	Number of Characters	Mandatory/ Optional	Description
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
an1	1	O	VC data ID ‘N’.
an2	Var	O	VC data
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
ao1	1	O	VC data ID ‘O’.
ao2	Var	O	VC data
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
ap1	1	O	VC data ID ‘P’.
ap2	Var	O	VC data
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
aq1	1	O	VC data ID ‘Q’.
aq2	Var	O	VC data
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
ar1	1	O	VC data ID ‘R’.
ar2	Var	O	VC data
FS	1	*See* Table Note 44	Field Separator. Reserved for Exits
as1	1	*See* Table Note 44	Reserved
as2	1	*See* Table Note 44	Reserved
FS	1	O	See Table Note 50
at1	1	*See* Table Note 44	EMV ICC (Smart Card) data ID ‘5’
at2	Var	*See* Table Note 44	EMV ICC (Smart Card) data. For details, refer to the *EMV ICC Reference Manual*.
FS	1	O	*See* Table Note 50
ba1	1	*See* Table Note 44	CPM Cheque Destination Buffer Data ID ‘a’

Field	Number of Characters	Mandatory/ Optional	Description
ba2	1	*See* Table Note 44 and Table Note 54	Cheque destination for CPM '1' - Deposit cheque into CPM pocket 1 '2' - Deposit cheque into CPM pocket 2 '3'- Deposit cheque into CPM pocket 3 'E' - Eject the cheque The host can determine the number of pockets present by retrieving the Hardware Configuration Data only message. If the Transaction Reply specifies a pocket which does not exist, the cheque will be captured to the reject pocket and the count for the reject pocket will be updated. If a Transaction Reply is sent that does not contain one of the above destination values (an invalid cheque destination field), a specific command reject with error code B13 - Unrecognised Document Destination will be returned. If the Transaction Reply does not include endorsement print data (see page 10-54), no endorsement data is printed and cheques are sent to pocket 2 (pocket 1 if only one pocket is available).
FS	1	O	*See* Table Note 50
y	8	O	Message Authentication Code (MAC) Data. Contains the transmitted value for authentication of this message. The characters can be 0-9, A-F.
z	Var	M	Trailer. Protocol-dependent.

Table Note 42: A group separator and optional fields 's/t', 'u/v', 'v1/v2' and so on, comprise a group. When included in the message, all fields of the group must be present. There may be up to thirteen print field groups within a message.

Table Note 43: When defining the Transaction Reply message for a CPM, the message must contain one or both of printer flags 'a' or 'b'. If neither flag is present all cheques are deposited in the reject bin.

Table Note 44: The fields 'w' and 'x', 'ae*', 'af*', 'ak*' to 'at*' including their field separators, comprise groups. If the field is not included, its preceding field separator must be omitted.

Table Note 45: A higher-numbered type can be omitted if no dispense of that type is requested.

Table Note 46: It is possible to dispense from as many cassette types as are present in the cash handler.

Table Note 47: The length of this field is dependent on the setting of Enhanced Configuration option 76. For details, see "Option 76 - Cash Handlers" on page 7-14. A specific command reject is sent if the field is too long.

Table Note 48: The maximum number of notes that can be dispensed is reported in the Hardware Configuration message. The maximum number of notes is taken from the service provider capability information. Any request for more than 999 notes is rejected as this is above the message reporting capacity

Table Note 49: The Time Variant Number, length eight bytes, is present if the MAC flag settings are correct. Otherwise, the Message Sequence Number, length three bytes, is optionally present. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table Note 50: The field separator and MAC data field 'y' are present if the Data Security feature is selected, and the MAC flag settings are correct. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table Note 51: This group separator should only be included if a coin dispense is required.

Table Note 52: Field 'j1' must be present if the preceding group separator is included. However, higher numbered hoppers may be omitted if no dispense from these hoppers is required. The total number of coins dispensed must not exceed 25.

Table Note 53: The maximum number of coins that can be dispensed is reported in the Hardware Configuration message. The maximum number of coins is taken from the service provider capability information. Any request for more than 999 coins is rejected as this exceeds the message reporting capacity.

Table Note 54: The message format can also support destinations '4' through '9' to deposit the cheque into CPM pocket 4 through 9 and 'a' through 'f' to deposit the cheque into CPM pocket 10 through 15. Advance NDC does not support these destinations.

Terminal Functions for Transaction Completion

Field 'l' of the Transaction Reply contains a Function Identifier. This tells the terminal what functions are to be performed to complete the transaction. The functions are as follows:

- Deposit and Print
- Dispense and Print
- Display and Print
- Print Immediate
- Set Next State and Print
- Night Safe Deposit and Print
- Card Before Cash
- Parallel Eject / Dispense and Print

- Card Before Parallel Dispense and Print
- Print Statement and Wait
- Print Statement and Set Next State
- BNA Refund and Set Next State
- BNA Encash
- BNA Encash, Print and Set Next State
- Process Cheque.

Note that dispense functions may have slightly different behaviour if a spray dispenser is present. This is because the spray dispenser drives each note straight out into a receiving pocket instead of stacking and presenting them as a standard dispenser does. Also, there is no possibility of retracting notes dispensed by a spray dispenser.

The following tables illustrate the sequence of events, and related screen displays, for each of these functions.

Table 10-17
Deposit And Print Sequence

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	
	Transaction Reply Command Screen (INSERT ENVELOPE)	Present envelope. *See* Table Note 55 Enable depository. Start slow beep. *See* Table Note 56. Switch on media entry indicator. Wait for cardholder to insert envelope. Stop beeping. (Enter Time-Out state if timer 04 expires. *See* Table Note 57 and Table Note 58). Print on envelope. Print on receipt and journal to defined level. Send status.
Next State in Transaction Reply Command	Next State Screen (for example, SELECT TRANSACTION)	Switch off media entry indicator. Cut and deliver receipt if necessary and eject card.
Eventual Close state	Close Screen (for example, TAKE CARD)	Wait for card to be taken or captured. Timer 02 Capture card if timer 09 expires. *See* Table Note 58. *See* Table Note 59.

Table Note 55: An envelope is presented only if an envelope has not previously been dispensed during the Envelope Dispenser State. For details, see "C - Envelope Dispenser State" on page 2-12

Table Note 56: If the beeper is not required, local configuration option digit 2C can be set to stop its operation. For details, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Table Note 57: The Cancel key is active when the 'Insert Envelope' screen is displayed. Pressing the Cancel key causes a time-out status to be sent to Central.

Table Note 58: For details of timers, see the "Configuration Parameters Load" section.

Table Note 59: Timer 02 is used to determine the length of time that the Close screen is displayed.

Table 10-18
Dispense and Print Sequence

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Dispense the requested cash and coins. *See* Table Note 60	
	Transaction Reply Screen (TAKE CASH)	Print on receipt and journal to defined level. *See* Table Note 61. Send status.	Timers (07 + 10) or (05 + 07)
Next State in Transaction Reply Command	Next State Screen (for example, SELECT TRANSACTION)		

Table Note 60: A dispense can consist of notes only, coins only, or a combination of notes and coins. If the dispense includes a combination of notes and coins, the notes must be successfully dispensed before the coins are dispensed.

Table Note 61: If the terminal is configured to inhibit notes retract, timers 07 and 10 are used as shown. See the *APTRA Advance NDC, Supervisor's Guide* for details of configuration options.

If the terminal is configured for notes retract, timers 05 and 07 are used. Timer 05 is started when notes are presented. If this timer expires before the notes are taken, a retract is attempted.

If some notes are retracted, the 'Presenter Error' message is logged to the journal, and an unsolicited error is reported to Central. For details, see the "Cash Handler (Solicited / Unsolicited)" section in Chapter 9, "Terminal to Central Messages".

If the notes are taken before the expiry of timer 05, the timer is cancelled.

If the local configuration option is selected, the beeper is sounded during the time that timer 05 is in use. For details of configuration options, refer to the *APTRA Advance NDC, Supervisor's Guide.*

In both cases, timer 07 is started and the next state is entered on expiry.

For details of timers, see the "Configuration Parameters Load" section.

Table 10-19
Display And Print Sequence

State	Screen	Operation	
Transaction Request	Transaction Reply Screen (for example, DISPENSE ERROR)	Print on receipt and journal to defined level. Send status.	Timer (05 + 07) or (07 + 10) *See* Table Note 62.
Next State in Transaction Reply Command	Next State Screen (for example, SELECT TRANSACTION)		

Table Note 62: On a terminal configured to inhibit notes retract, timers 05 and 07 are used as shown.

On a terminal configured for notes retract, timers 07 and 10 are used in the same way as for a Dispense and Print function.

For details of configuration options, see the *APTRA Advance NDC, Supervisor's Guide.*

For details of timers, see the "Configuration Parameters Load" section on page 10-13.

Table 10-20
Print Immediate Sequence

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Print on receipt and journal to defined level. Wait for another Transaction Reply command.

Print Immediate may also be received at other times. For details, see the "Messages Received in Wrong Operational Mode" section on page 10-85.

Table 10-21
Set Next State and Print

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Print on receipt and journal to defined level. Send status.
Next State in Transaction Reply Command	Next State Screen	

Table 10-22
Night Safe Deposit and Print

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Unlock night safe. Start slow beep.
	Transaction Reply Command Screen (INSERT BAG) *See* Table Note 63	Wait for cardholder to insert bag. Stop beeping. (Enter Time-Out state if timer 08 expires *See* Table Note 64). Print on receipt and journal to defined level. Send status.
Next state in Transaction Reply Command	Next State Screen (for example, Transaction State)	

Table Note 63: The Cancel key is active when the 'Insert Bag' screen is being displayed. Pressing the Cancel key causes an 'undetected deposit' status to be sent to Central.

Table Note 64: Timer 08 is started when the night safe door is unlocked to accept a night safe deposit.

Table 10-23
Card Before Cash

State	Screen	Operation	
Transaction Request *See* Table Note 65.	Transaction Request Screen (PLEASE WAIT)	Eject card. *See* Table Note 66.	Count and stack cash
	Transaction Reply Screen 1 (TAKE CARD)	Wait for card to be taken. (Capture card if timer 09 expires)	
	Transaction Reply Screen 2 (PLEASE WAIT FOR CASH AND RECEIPT)	Dispense the requested cash and coins. *See* Table Note 66 and Table Note 68. Print on receipt and journal to defined level. Send status. Cut and deliver receipt if necessary.	
Close	Close screen Table Entry 2 (TAKE RECEIPT AND CASH) **or** Table Entry 4 (TAKE CASH)	Timer 02 (Determines the length of time that the Close screen is displayed).	

Table Note 65: In normal usage the next state is always Close.

Table Note 66: Track 3 update can take place before card eject if new Track 3 data is contained in the transaction reply message.

Table Note 67: A dispense can consist of notes only, coins only, or a combination of notes and coins. If the dispense includes a combination of notes and coins, the notes must be successfully dispensed before the coins are dispensed.

Table Note 68: For a terminal configured for note retraction, timer 05 is started after the cash has been dispensed. For details of configuration options, see the *APTRA Advance NDC, Supervisor's Guide*.

If the notes have not been taken when this timer expires, retraction is attempted. If some notes are retracted, the 'Presenter Error' message is logged to the journal and an unsolicited error is reported to Central. For details, see the "Cash Handler (Solicited / Unsolicited)" section in Chapter 9, "Terminal to Central Messages". If the notes are taken before the timer expires, the timer is cancelled. In both cases, timer 07 is started, and the next state is

entered on expiry. For details of timers, see the “Timers” section on page 7-18 of Chapter 7, “Configuration Parameters”.

If local configuration option digit 2B is set at the SST, the beeper is sounded during the time that timer 05 is operative. For details, see the *APTRA Advance NDC, Supervisor’s Guide*.

Table Note 69: When the no retract option is set in a card before cash transaction, the recommended minimum value of timer 07 is 5 seconds.

Table 10-24
Parallel Eject/Dispense and Print (Fast Cash)

State	Screen	Operation	
Transaction Request *See* Table Note 70	Transaction Request Screen (PLEASE WAIT)	Parallel Eject / Dispense and Print. *See* Table Note 72, Table Note 73 and Table Note 75	
	Transaction Screen (TAKE CARD AND CASH)	Print receipt and journal to defined level. Send status. *See* Table Note 74. Cut and deliver receipt if necessary.	
Close	Close Screen Table Entry 2 (AND RECEIPT) **or** Table Entry 4 (NULL) *See* Table Note 71	Wait for card to be taken or captured, if not already taken.	Timer 02 *See* Table Note 76.

Table Note 70: In normal usage the next state is Close.

Table Note 71: NCR recommends that the Close screens add text to the Transaction Reply screen rather than clear the screen.

Table Note 72: On a terminal configured for notes retract, timer 07 is started. For details of timers, see the “Configuration Parameters Load” section. If this expires before the cash is taken a retract is attempted. If some notes are retracted the ‘Presenter Error’ message is logged to the journal, and an unsolicited error is reported to Central. For details, see the “Cash Handler (Solicited / Unsolicited)” section in Chapter 9, “Terminal to Central Messages”. If the notes are taken before the timer expires, it is cancelled and the next state is entered. If the local configuration option is selected, the beeper is sounded whilst timer 07 is in use. For details of configuration option, see the *APTRA Advance NDC, Supervisor’s Guide*.

Table Note 73: A transaction that uses the Parallel Eject / Dispense and Print reply is commonly referred to as a Fast Cash transaction. To achieve optimum performance with a Fast Cash transaction, this reply should be used together with the "T - Card Read - PIN Entry Initiation State" described in Chapter 2.

Table Note 74: Printer and card reader errors are reported as unsolicited status messages. A dispense error is reported by a solicited status message to give Central the option of printing an error report or displaying an error screen.

Table Note 75: A dispense can consist of notes only, coins only, or a combination of notes and coins. If the dispense includes a combination of notes and coins, the notes must be successfully dispensed before the coins are dispensed.

Table Note 76: Timer 02 is used to determine the length of time that the Close screen is displayed.

Table 10-25
Card Before Parallel Dispense and Print

State	Screen	Operation
Transaction Request *See* Table Note 77	Transaction Request Screen (PLEASE WAIT)	Wait for transaction reply
	Transaction Reply Screen 1 (TAKE CARD)	Eject card. Wait for card to be taken. (Capture card if timer 09 expires)
		Send status if failure and abort. *See* Table Note 80. Otherwise continue.
See Table Note 78	Transaction Reply Screen 2 (PLEASE WAIT FOR CASH AND RECEIPT)	Stack and dispense cash and print buffer 'r' and buffer 'f' if more than four coin hoppers are configured. Send status if failure and abort. Otherwise wait for cash and coins to be taken. Complete printing receipt and journal to defined level when cash is taken. Send status. *See* Table Note 81.
Close	Close Screen *See* Table Note 79	Cut and deliver receipt if necessary.

Table Note 77: In normal usage, the next state is a Close.

Table Note 78: A dispense can consist of notes only, coins only, or a combination of notes and coins. If the dispense includes a

combination of notes and coins, the notes must be successfully dispensed before the coins are dispensed.

Table Note 79: NCR recommends that the Close screens do not clear the screen but simply add text to the Transaction Reply screen.

Table Note 80: Printer and card reader errors are reported as solicited status messages. A dispense error is reported by a solicited status message to give Central the option of printing an error report or displaying an error screen.

Table Note 81: For a terminal configured for notes retract following the card eject, dispense and print, timer 07 is started. If this expires before the cash is taken, a retract is attempted, the 'Presenter Error' message is logged to the journal and an unsolicited error will be reported to Central if the local configuration option to delay status reporting is not set.

If the notes are taken before the timer expires, it is cancelled and the next state entered. For details of timers, see "Timers" on page 7-18.

If the local configuration option to sound the beeper is set and the no-retract option is not set, the beeper will be sounded during the time that timer 07 is operative.

For details of local configuration options, refer to the *APTRA Advance NDC, Supervisor's Guide*.

Table 10-26
Print Statement and Wait

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	
	Transaction Reply Screen (STATEMENT BEING PRINTED)	Print on statement or print sideways on receipt printer and journal to defined level. Send status (statement printer or receipt printer if printing sideways on the receipt). Wait for another Transaction Reply command.

Note: A local configuration option (option digit 3C) can be set to enable the Cancel key on the cardholder keyboard. For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table 10-27
Print Statement and Set Next State

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Print on Statement or print sideways on receipt printer.	
	Transaction Reply Screen (TAKE STATEMENT)	Print on receipt and journal to defined level. Send status (statement printer or receipt printer if printing sideways on the receipt)	Timer 96 *See* Table Note 82.
Next State in Transaction Reply Command	Next State Screen		

Table Note 82: Timer 96 is used only in the print statement and continue function and is started whether or not a statement is being delivered. When the timer expires, the next state specified by the Transaction Reply command is entered.

Table 10-28
BNA Refund and Set Next State

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Attempt to move notes from escrow to refund slot.	
	Transaction Reply Screen (PLEASE REMOVE NOTES FROM REFUND SLOT)	Wait for notes to be removed from refund slot. If specified, print on receipt and journal to defined level. Send status: If an error occurs, or 30 seconds expires before notes are removed, either retract notes, if the retract option is set, or send a solicited error message to Central. If notes are successfully refunded and taken, send a Ready 9 message to Central.	30 seconds
Next State in Transaction Reply Command	Next State Screen		

Table 10-29
BNA Encash

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	
	Transaction Reply Screen (YOUR CASH IS BEING DEPOSITED)	Attempt to move notes from escrow to cash deposit bin. Send status: If an error occurs, send solicited error message to Central. If notes are successfully encashed, send a Ready 9 message to Central. Wait for another Transaction Reply command.

Table 10-30
BNA Encash, Print and Set Next State

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Print on Statement or print sideways on receipt printer.
	Transaction Reply Screen (YOUR CASH IS BEING DEPOSITED)	Attempt to move notes from escrow to cash deposit bin. If specified, print on receipt and journal to defined level. Send status: If an error occurs, send solicited error message to Central. If notes are successfully encashed, send a Ready 9 message to Central.
Next State in Transaction Reply Command	Next State Screen	

Table 10-31
Process Cheque

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)		
	Transaction Reply Screen (YOUR CHEQUE IS BEING PROCESSED)	Endorse cheque, and attempt to move cheque to bin 1, 2 or 3. Cheque stamping is not supported by Advance NDC. Send status: - If cheque is successfully processed, send a Ready 9 message to Central. - If cheque is ejected, but not taken, retain in bin 2 and send unsolicited error message to Central.	Timer 94
Next State in Transaction Reply Command	Next State Screen		

Interactive Transaction Response

This message may be sent in response to a Transaction Request in order to obtain more information from the cardholder. This facility allows Central to communicate directly with the keyboard and display in those situations where state table sequencing is inappropriate. For example, a cardholder account selection can be handled in this way. Central can establish which accounts are available to the cardholder and build the screen accordingly. The message defines screen data and active keys. Key data is returned in a Transaction Request message. For details, see the “Terminal to Central Messages” section in Chapter 9, “Terminal to Central Messages”.

The terminal may support Touch Screen FDK Emulation instead of regular FDKs. In this case, eight fixed touch areas are defined on screen, which the cardholder touches instead of pressing the corresponding FDK. The touch areas are enabled / disabled in exactly the same way as the FDKs. For details, see the “FDK Emulation” section in Chapter 4, “Keyboard Data and Layouts”.

Alternatively, the terminal may support full touch screen keyboards. In this case, touch areas are defined on the screen for all the required keys. The cardholder touches these instead of pressing a key on the keypad or an FDK. For details, see Chapter 4, “Keyboard Data and Layouts”.

Table 10-32
Interactive Transaction Response

Field	Number of Characters	Mandatory/Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: ‘3’ - Data Command
c	1	O	Response Flag. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
d	3	O	Logical Unit Number (LUNO). This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.

Field	Number of Characters	Mandatory/Optional	Description
e	3	O	Message Sequence Number. This field is included for future use and is ignored by the terminal.
FS	1	M	Field Separator.
f	1	M	Message Sub-Class. The message sub-class is: '2' - Interactive Transaction Response
g	1	M	Display Flag. This one character field instructs the terminal display as follows: '0' - do not display cardholder keyboard entry '1' - display cardholder keyboard entry '2' - display '*' for cardholder keyboard entry The keyed response is stored in General Purpose Buffer 'B' (minimum data length 1 character), which is the only buffer included in a Transaction Request message following the Interactive Transaction Response. For more information on general purpose buffers refer to the *APTRA Advance NDC, Developer's Guide*.
h	Var (10)	M	Active Keys / Touch Areas. This is a variable length field which activates the required keys or touch areas for cardholder responses as follows: '0' - de-activate keys / touch areas '1' - activate keys / touch areas The first character of this field either activates or de-activates all numeric keys. **Char** **All Numeric Keys** 1 Numeric keys activator (0-9) The next nine characters either activate or de-activate the function keys or touch areas as follows: **Char** **Function Keys or Touch Areas** 2 FDK A / FDK A touch area and Enter Key 3 FDK B / FDK B touch area 4 FDK C / FDK C touch area 5 FDK D / FDK D touch area 6 Cancel Key E 7 FDK F / FDK F touch area

Field	Number of Characters	Mandatory/Optional	Description
			8 FDK G / FDK G touch area 9 FDK H / FDK H touch area 10 FDK I / FDK I touch area Trailing '0' characters may be omitted from this field. **Note:** If numeric keys are active and FDK A is also active (or FDK I if the option enabling the keys to the left of the cardholder screen is set), the Enter key will be active and equivalent to FDK A or FDK I.
FS	1	M	Field Separator.
i	3	M	Screen Timer Field. This three character field contains the time-out intervals from the cardholder screen display. The valid range is 001-255 ticks, to give a time-out from 0.8 to 204 seconds. Entering 000 gives indefinite display. If the timer expires, a code of 'T' is stored in the buffer and a Transaction Request message is sent.
FS	1	M	Field Separator.
j	Var	M	Screen Data Field. This is a variable-length field which represents data to be displayed on the cardholder screen.
k	Var	M	Trailer. Protocol-dependent.

EJ Commands

This section contains details of the EJ Commands:

- EJ Options and Timers
- Acknowledge EJ Upload Block
- Acknowledge and Stop EJ

The format and content of each command is described in the following passages, along with an explanation of continuous and batch upload methods.

Note: If the EJ is not configured, any EJ commands sent will be rejected with a command reject.

For details of the SST to Central upload message, see the "Upload EJ Data Message" in Chapter 9, "Terminal to Central Messages".

EJ Options and Timers

This command may be sent by Central at any time to enable electronic journal upload, and to specify the options and timer values to be used. It may also be sent after receiving a power fail message from the SST to re-instate the EJ upload feature.

Table 10-33
EJ Options and Timers

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '6' - Electronic Journal
FS	1	M	Field Separator
FS	1	M	Field Separator
FS	1	M	Field Separator
c	1	M	Command Type. The command type is: '3' - Options and Timers

Field	Number of Characters	Mandatory/ Optional	Description
d	2	O	Option Number. Possible values are: Option 60 - EJ Upload Block Size. Maximum size of the data portion of the EJ Upload block. For details, see the "Upload EJ Data Message" section in Chapter 9, "Terminal to Central Messages". Option 61 - Retry Threshold. The number of attempts to successfully send an EJ Upload block before the EJ is automatically disabled. *See* Table Note 83.
e	3	O	Option Value. For Option 60, the value range is 001-350. Default is 200. For Option 61, the value range is 000-999. Default is 000 (infinite retries).
Fields 'd' and 'e' are repeated if both options are being sent in the same message. No field separator is required between options, but a field separator is mandatory before field 'f', Timer Number.			
FS	1	M	Field Separator.
f	2	O	Timer Number. Possible value is: Timer 60 - EJ Acknowledgement Timer. Maximum time in seconds to wait for an acknowledgement message from Central before resending the block.
g	3	O	Timer Value. Range 000-255. Default is 255, 000 is infinite.

Table Note 83: If the value sent for Option 60 is out of the possible range, NDC+ will substitute it with the safety value of 350. The safety values for Option 61 and Timer 60 are the same as the default values.

Acknowledge EJ Upload Block

This command should be sent by Central each time a block of electronic journal data is received from the SST. It can also be sent unsolicited at any time to enable the EJ upload function. If this command is used to enable EJ upload instead of the EJ Options and Timers command, then the default option and timer values will be used.

If after sending an EJ block to Central, the SST does not receive an acknowledgement within the specified time, the SST will send the block again. On receipt of the acknowledgement message for the final EJ data block to be sent, the SST will erase the acknowledged data from its *ejdata.log* file.

Table 10-34
Acknowledge EJ Upload Block

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '6' - Electronic Journal
FS	1	M	Field Separator
FS	1	M	Field Separator
FS	1	M	Field Separator
c	1	M	Command Type. The command type is: '1' - Acknowledge Upload Block
d	6	O	Last Character Received. Range 000000-999999. *See* Table Note 84. The value in this field should be the same as the value in the Last Character This Block field in the last Upload EJ Data message sent by the SST. If it is not, the SST will not count this message as an acknowledgement and will continue to wait for an acknowledgement without re-setting its timer.

Table Note 84: The Last Char Previous Block and Last Char This Block values are based on a modulus 1,000,000 character count which starts at zero following a cold start of the SST. The count is incremented for each character written to the electronic journal. The count is not re-set for a warm start, that is, a power fail or reset during which the persistent memory is preserved.

Table Note 85: If the Acknowledge EJ Block command is being sent to enable the EJ upload function after a power fail or a communications loss then the Last Character Received field can be any value, but the recommended value is '000000'. This will cause the SST to enable the EJ upload function, then transmit its current EJ data, starting from the last unacknowledged block.

Acknowledge and Stop EJ

This command acknowledges the last EJ upload block received by Central, and in addition indicates that EJ upload is to cease. This will disable the EJ upload function until Central sends a new Acknowledge EJ Upload Block command or EJ Options and Timers command.

The Acknowledge and Stop EJ command may also be sent to disable EJ upload at any time (that is, not in response to an upload message).

If Central disables EJ upload, EJ data will accumulate at the SST until Central re-enables the upload function. This procedure can be used to control the upload of EJ data at peak line load times, as can lengthening the time period before sending an acknowledgement message. This time delay is configured in the EJ Options and Timers command.

Table 10-35
Acknowledge and Stop EJ

Field	Number of Characters	Mandatory/ Optional	Description
a	Var	M	Header. Protocol-dependent.
b	1	M	Message Class. The message class is: '6' - Electronic Journal
FS	1	M	Field Separator.
FS	1	M	Field Separator.
FS	1	M	Field Separator.
c	1	M	Command Type. The command type is: '2' - Acknowledge and Stop EJ
d	1	M	Last Character Received. Range 000000-999999. *See* Table Note 86. The value in this field should be the same as the value in the Last Character This Block field in the last Upload EJ Data message sent by the SST. If it is not, EJ upload will be disabled and when it is re-enabled the SST will send the last upload block again.

Table Note 86: The Last Char Previous Block and Last Char This Block values are based on a modulus 1,000,000 character count which starts at zero following a cold start of the SST. The count is incremented for each character written to the electronic journal. The count is not re-set for a warm start, that is, a power fail or reset during which the persistent memory is preserved.

Continuous and Batch Upload Methods

Continuous upload is the normal method of operation when the EJ upload function has been enabled. Central should acknowledge each uploaded block as soon as it is known to be properly stored, and the SST should mark EJ data in the *ejdata.log* file as being sent as soon as it has been properly acknowledged. Then the next block of EJ data will be sent as soon as the SST is able to do so.

Under normal circumstances, the only occasion for Central to be involved in a recovery situation is if the SST Retry Count (option 61 in EJ Options and Timers command) is other than '000' - infinite. In this situation the SST may automatically disable EJ upload after the specified number of failed attempts to transmit a data block. Central

must be able to recognise this event and re-enable EJ upload. An automatic disablement may be identified by the fact that transactions are being received but no accompanying upload data is seen.

Batch upload can be used to restrict EJ upload to certain times of the day, outside of which EJ upload is disabled. The recommended approach to using batch upload is as follows:

- Central puts the SST out-of-service, to ensure that no more transaction data can be put into the electronic journal log file while the upload is in progress.
- Central then enables EJ upload.
- Upload proceeds, paced by Central's acknowledgement messages, until all the EJ data has been sent to Central.
- When the last message has been received, Central acknowledges the message and then disables EJ upload.
  The last message can usually be recognised by the fact that it is the only message with a block length less than the maximum block length set in the EJ Options and Timers message. It is feasible that the last message could be exactly the same length as the maximum block length set, in this case the EJ upload would be terminated due to a time-out. See Note: below.
- Once EJ upload is disabled, Central returns the SST to In-service mode.

Note: If during the batch upload, the SST fails to send a new upload block within a reasonable time, this may be evidence of either a communications failure or of the final data block being exactly equal to the maximum block length, and therefore not recognised as being the final block. In either case, Central should send a Print Immediate command to the SST with a short message, such as 'END OF DAY', to be printed on the journal.

Central should then wait for this data to be sent back in an Upload EJ Data message with a short block size. If the message is received, EJ upload can terminate normally as described above. If nothing is received, it is evidence of a communications problem. In this case either the upload can be terminated or another Print Immediate attempted.

Message Validation

Validation checks are performed on all messages received from Central.

Command Reject Causes

The situations which cause a command reject are as follows:

- Illegal message class (legal classes are 1, 2, 3, 4, 6, 7 or 8*)
  * 8 enables EMV Smart Card Configuration
- Illegal message sub-class
- Illegal message identifier
- Illegal terminal command code
- Illegal terminal command modifier
- Field separator in illegal position
- Insufficient fields in message
- Insufficient memory to hold FIT entry (FIT number too large)
- The dispense amount requested is larger than the number of notes and / or coins reported in the Hardware Configuration message
- The message co-ordination number in a Transaction Reply message does not match the number in the Transaction Request, and is not '0'
- Illegal function ID in Transaction Reply command. An illegal function ID is one which is not supported by the NDC software or one which requires the use of a device which is not part of the hardware configuration.

  Note: Commands requesting receipt or journal print will not be rejected because of an unconfigured printer.

- An encryption key change message is received before the original key has been entered at the terminal
- More than 13 print fields in a Transaction Reply command
- Date / Time data invalid in date and time load command.

When the specific command reject option is set, these errors will generate an equivalent specific command reject.

Default operations include the following:

- Entry to default Close state. For example, non-existent state number

- Conversion of illegal parameters to default legal values. For example, non-numeric ASCII characters changed to numeric values by converting the top four bits to 3 hex. ‘A’ (41 hex) becomes ‘1’ (31 hex)
- Redundant information is ignored. For example, non-existent timer
- Default display. For example, if the screen does not exist the screen number is displayed on the cardholder screen.

The following are the conditions under which the specific command reject value / qualifier combinations are produced.

Table 10-36
Specific Command Reject Value/Qualifier Combinations

Value	Qualifier	Description
A		Message format errors.
	01	Message length error. An incomplete message is found under the following conditions: Report Logs / Tallies missing the group number. Load configuration ID incomplete or missing ID field. Option / Timer - incomplete number / value field in configuration message. Truncated MAC Field Selection Load, with expected MAC data missing. The Dispenser Currency Cassette Mapping Table is incomplete.
	02	Field Separator not found or found unexpectedly in the following circumstances: Found in the middle of an option / timer number and value field in configuration message. Not found when skipping the first three field separators in a Transaction Reply message. Not found at the end of the coinage field. Not found in MAC Field Selection Load Data. Mandatory last field separator not found or found unexpectedly in a Transaction Reply message.
	03	Too many print groups in the Transaction Reply message. More than 13 print groups are present in a Transaction Reply message.

Value	Qualifier	Description
	04	A group separator is missing or found unexpectedly. A group separator is required between fields ‘j’ and ‘j1’ as well as between ‘af2’ and ‘af3’ of the Transaction Reply message.
	06	Invalid dispense message, wrong format for current mode or a request has been made to dispense from multiple dispensers.
	09	Inconsistent configuration download, for example a message part received out of order. The download must be restarted.
B		Field Value Errors.
	01	Illegal Message Class. Message class was not ‘1’, ‘2’, ‘3’, ‘4’, ‘6’ or ‘7’, or message class was ‘7’ and exit support was not detected.
	02	Illegal Message Sub-Class or Identifier on a Configuration Load Message with class ‘3’ . The following will cause this report: Message sub-class outside the range ‘1’ - ‘4’ . Message identifier outside the range ‘1’ - ‘6’, ‘A’ - ‘C’ or ‘E’.
	03	Illegal Load Key Message Identifier. Within a load encryption key data message: The modifier field is outside the range ‘1’ - ‘9’ .
	04	Illegal Terminal Command Code: Returned if the command code is outside the range ‘1’ - ‘?’ .
	05	Illegal Terminal Command Modifier. Within a legal terminal command, if a modifier is required: Report tallies modifier outside the range ‘A’ - ‘N’ or ‘V’ or ‘Y’ or ‘ \ ’ or ‘[’ . Report error log modifier outside the range ‘A’ - ‘C’ . The terminal command code is 7 and the command modifier is outside the range 0-7.
	06	Illegal Function ID in Transaction Reply command: Function ID outside the range ‘1’ - ‘9’, ‘A’, ‘B’, ‘C’, ‘F’, ‘O’, ‘P’, ‘Q’, ‘S’, ‘T’, ‘*’, ‘-’, ‘’’ or ‘:’.

Value	Qualifier	Description
	07	Data Field contains non-numeric data. This is found in the following circumstances: Encryption key change message key data. Coinage field has at least one non-numeric character present. Option / Timer number or value in configuration message. Fields 'ae5' - 'ae10', 'af2' or 'as2' in the Transaction Reply message contain a non-numeric digit.
	08	Numeric value out of range. In a FIT message, FIT data value is greater than 255. Fields 'ae3' - 'ae10' or 'af2' in the Transaction Reply message contain a value exceeding their maximum values.
	09	Invalid Message Co-Ordination Number. In a Transaction Reply message, the co-ordination number is not zero and does not match the transmitted value.
	10	Illegal FIT number. A FIT in a FIT load message is not in the range of the reserved pool size. Legal values are 000-999.
	11	Too many notes in Transaction Reply command. The total number of notes requested exceeds the limit of 40.
	12	Reserved
	13	Unrecognised cheque destination. Returned if the destination specified in field 'as2' of the Transaction Reply is not one of the allowed values, or if the field is null.
	14	Reserved
	15	Unrecognised buffer identifier. Returned if the Transaction Reply contains a buffer identifier not currently supported.
	16-19	Reserved
	20	No data supplied to endorse cheque in CPM.
	21	Reserved

Value	Qualifier	Description
	22	Invalid key size sent in an Encryption Key Change message, or an Extended Encryption Key Change message. The key size may be incorrect (not 018 hex, 030 hex or 120 hex), not matching the key data length, or invalid for the current key entry mode.
	23	RSA Signature Verification Failed.
	24	Signature or Encryption Key PKCS#1 Packing Failed.
	25	Signature or Encryption Key PKCS#1 Unpacking Failed.
	26	Invalid Signature or Encryption Key PKCS#1 Pad Block Type.
	27	Fixed Header Decryption Failed.
	28	Null Byte After Padding Missing.
	29	Invalid Pad Byte Count.
C		Illegal Message Type for Current Mode.
	01	Message type only accepted while terminal is in In-Service mode and is expecting a Transaction Reply. The reject is caused by receipt of a Transaction Reply at other times while the terminal is In-Service.
	02	Message cannot be accepted while diagnostics is in progress. This reply is designed to draw attention to the fact that these programs are being executed. It applies to the following messages: Download messages for customisation. Transaction Replies (not Print Immediate).
	03	Message cannot be accepted while in Out-of-Service or Supply modes. The following messages cannot be accepted in these modes: Transaction Replies (not Print Immediate). Interactive Transaction Response.
	04	Message unacceptable in current mode. The following messages cannot be accepted while in In-Service mode: Terminal commands ‘4’, ‘5’, ‘6’, ‘8’, ‘9’, ‘:’ . Interactive Transaction Response when not in Transaction Request State.

Value	Qualifier	Description
		Also applies to terminal command '?' when attempting to enable Supervisor 'Dump Images' but terminal is performing a transaction. Dispenser Currency Cassette Mapping table.
	05 - 09	Reserved.
	10	Message not accepted while processing a Transaction Reply.
	11	Reserved.
	12	Cannot process a document while a statement print function is being carried out. Reported on 5665 only.
	13	Cannot perform a statement print function while processing a document. Reported on 5665 only.
	14	Reserved.
	15	Cannot perform a communications encryption key change during a cardholder transaction, or when the terminal is in suspend mode, or when the operator is initiating the execution of supervisory or settlement transactions.
	16	Reserved.
	17	Key change operation cannot be accepted in restricted mode.
D		Hardware Failure.
	01	Encryption Failure during key change message.
	02	Time-of-Day clock failure during data / time set command or invalid data sent.
	03-05	Reserved.
	06	Insufficient disk space.
E		Not Supported.
	01	Not supported by software: The requested function is not supported by the software version in use. VISA PIN verification key table load via Encryption key change message.

Value	Qualifier	Description
		The received communications Encryption Key Change message contains an invalid modifier (between '5' and '9'). MAC Field selection load.
	02	Not supported by hardware: Bunch Note Acceptor (BNA) function has been requested but the BNA is not available. Sideways printing on receipt has been requested but the option is not available.
	03 - 04	Reserved.
	05	Journal printer backup is inactive.

Other Invalid Parameters

Any other invalid parameter in a received message will be accepted and the appropriate default operation will occur, but system integrity will not be lost. As the operation is largely unpredictable, NCR recommends that you ensure that Central validation occurs before a message is sent, or check the terminal operation before going live.

Exits

If a rule file specifies a DLL that cannot be loaded, or a routine that cannot be accessed, the following will occur:

- The error is traced, using trace messages T93 or T94. *See* Appendix A, "Reserved Screens".
- If the error occurs during the execution of a user defined Exit State, Advance NDC will also put the terminal into a default Close state.

This will affect the following:

- Messages of class 7, subclass 1, from Central to an Exit, if the file *MISCONT* specifies an inaccessible DLL name or routine name with Point of Use 7
- Messages of classes 1, 2, 3 or 4 if the file *VCCONT* specifies an inaccessible DLL name or routine name as an intercept routine.

Messages Received in Wrong Operational Mode

The following tables describe what action is taken if a message is received by the terminal when it is in one of the following modes:

- Power-Up
- Out-of-Service
- Supply
- In-Service

The action taken will depend on which mode the terminal is in at the time of receiving the message. The messages include:

- Customisation Data Commands
- Transaction Reply Commands
- Terminal Commands.

Customisation Data Commands

For more details on these commands, see the “Customisation Data Commands” section in this chapter.

Table 10-37
Actions for Customisation Data Commands

Command Mode	Power-Up	Out-of-Service	Supply	In-Service
State Table Load	-	A	A	R
Screen / Keyboard Data Load	-	A	A	R
Configuration Parameters Load	-	A	A	R
Interactive Transaction Response	-	R	R	A2
FIT Data Load	-	A	A	R
Encryption Key Change	-	A	A	A3
Extended Encryption Key Change	-	A	A	A3
Configuration ID Number Load	-	A	A	R
Enhanced Configuration Parameters Load	-	A	A	R

Command Mode	Power-Up	Out-of-Service	Supply	In-Service
PIN Data Load	-	A	A	R
Date and Time Load	-	A	A	R
MAC Field Selection Load	-	A	A	R
Dispenser Currency Cassette Mapping Table Load	-	A	A	R

R - Command Reject.

A - Accept for processing. Response is Ready (‘9’) status.

A2 - Accept for processing. Response is Transaction Request if in Transaction Request state, else response is Command Reject.

A3 - Accept in In-Service mode only if a transaction is not taking place.

Transaction Reply Command

For more details of this command, see the earlier “Transaction Reply Command” section in this chapter.

Table 10-38
Actions for Transaction Reply Commands

Command Mode	Power-Up	Out-of-Service	Supply	In-Service (Not Tran. Req. State)	In-Service (Tran. Req. State)
Print Immediate	-	A	A1	R	A
Other	-	R	R	R	A

R - Command Reject.

A - Accept for processing. If completed successfully, response is Ready (‘9’) or Ready (‘B’) status. If device error, response is a device fault status message. If Format error, response is Command Reject.

A1 - If mode was entered from Out-of-Service, hold until Out-of-Service is re-entered and then process as A. Otherwise, response is Command Reject. If another Print Immediate is received, the first one is overwritten. There is no additional response.

Terminal Commands

For more details of these commands, see the "Terminal Commands" section on page 10-2.

Table 10-39
Actions for Terminal Commands

Command Mode	Power-Up	Out-Of-Service	Supply	In-Service
Go In-Service	-	A1	A2	A
Go Out-of-Service	-	A	A2	A3
Configuration ID Request	-	C	C	C
Configuration Information Request	-	D	D	D
Counters Request	-	D	P	R
Date/Time Request	-	D	P	R
BNA Retrieve Note Definitions	-	D	P	R

D - Response is requested information.

P - Hold until supply mode is exited and then process according to the mode entered. Note that the messages are not stacked and a new request overwrites the previous request to which no response is sent.

R - Response is Command Reject. In order to use these requests, the terminal should be put out-of-service. This is to avoid the information being updated by cardholder activity while the messages are being created.

A - Response is Ready ('9') status.

A1 - Change mode to In-Service. Response is Ready ('9') status.

A2 - Hold until Supply mode is exited and then process. Response is Ready ('9') status. Note that if more than one command is received while in Supply mode, only the last is recognised. The others are dropped, and no response is given.

A3 - Mode change to Out-of-Service when terminal is idle at the Card Read state. Response is Ready ('9').

C - Response is the terminal state message containing the Configuration ID.

Note: While In-Service, a received Config ID request will be processed and responded to immediately, whether the SST is in idle or a cardholder session. All other terminal commands are held until the terminal is idle and then processed. Commands are not stacked

and a new request, other than a Config ID, overrides the previous request to which no response is sent.

Chapter 11

Security Features

Overview

This chapter describes the security features in Advance NDC and provides guidelines under the following topics:

- BAPE and EPP security
- Remote PIN block
- Message authentication
- KVVs
- Initial RSA loading
- Double-length keys
- Journal printer backup

BAPE Security

The Basic Alpha PINpad and Encryptor (BAPE) provides an intermediate level of security for keys and PINs entered at the keyboard, with the following features:

- Supervisor entry of initial key values
- Storing of downloaded Master Key, Communications Key, VISA master key, VISA table keys and MAC key
- MAC generation
- Secure PIN entry and PIN block generation for remote schemes with VISA and ANSI PIN blocks. Secure entry is not allowed for touch screen data.
- Secure PIN entry for local VISA and DES schemes. Secure PIN entry for the local DES scheme is not supported if the terminal is in double-length key mode and the PANPD in the FIT specifies using the Master key.
- ISO Format 0 remote verification schemes, and DES and VISA local schemes, are emulated in software.

PIN blocks or key data are stored in the PC core protected by single encryption, and never in clear text.

EPP Security

When present on an NCR terminal, the Encrypting PIN Pad (EPP) provides a high level of security for keys and PINs entered at the keyboard, with the following features:

- Supervisor entry of initial key values
- Storing of downloaded Master Key, Communications Key, VISA master key, VISA table keys and MAC key
- MAC generation
- Secure PIN entry and PIN block generation for remote schemes with VISA and ANSI PIN blocks. Secure entry is not allowed for touch screen data.
- Triple DES encryption
- Secure PIN entry for local VISA and DES schemes. Secure PIN entry for the local DES scheme is not supported if the terminal is in double-length key mode and the PANPD in the FIT specifies using the Master key.
- Secure double-length key operations in hardware
- ISO Format 0 and ISO Format 3 remote verification schemes, and DES and VISA local schemes, are emulated in software
- Secure key entry enabled through CEN-XFS.

For guidelines on effective security with the EPP, see “Double-Length Keys” on page 11-28.

Remote PIN Block

The remote PIN block is formatted and encrypted as described in the following passages:

- FIT Fields
- PIN Block Formats
- PIN Block Encryption.

FIT Fields

The following FIT fields are used to define the PIN block format and PIN block encryption:

- PBFMT (PIN Block Format)
- PMXPN (Maximum PIN Digits Entered and PIN block format)
- PINPD (PIN Pad)

For details of these FIT field definitions, see the following sections in Chapter 8, “Financial Institution Tables”:

- “PBFMT (PIN Block Format)” on page 8-11
- “PMXPN (Maximum PIN Digits Entered)” on page 8-5
- “PINPD (PIN Pad)” on page 8-6.

These FIT fields enable selection of:

- PIN block format, as defined by PBFMT or PMXPN
- PAD digit, as defined by PINPD
- PIN block encryption mode.

For details of the PIN block encryption, see “PIN Block Encryption”.

PIN Block Formats

The Advance NDC software supports the following PIN Block formats:

- Diebold
- ISO Format 0 (ANSI)
- ISO Format 1
- ISO Format 3
- BANKSYS.

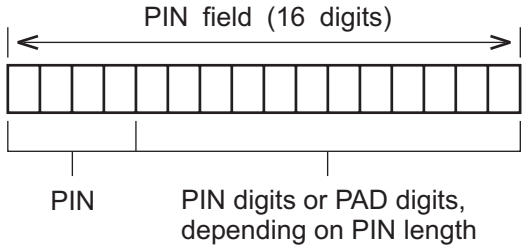
All PIN blocks consist of 16 digits, although the PIN length varies. The PIN Block formats are shown in the following sections.

For more information about the ISO PIN block formats, refer to the ISO publication *Banking - Personal Identification Number Management and Security (Part 1: PIN Protection Principles and Techniques) - ISO/CD 9564-1*.

Diebold PIN Block

The Diebold PIN Block consists of 16 hexadecimal digits. As Advance NDC does not support the message co-ordination number, it is not included.

Figure 11-1
Diebold PIN Block



Minimum PIN length = 4; maximum PIN length = 16.

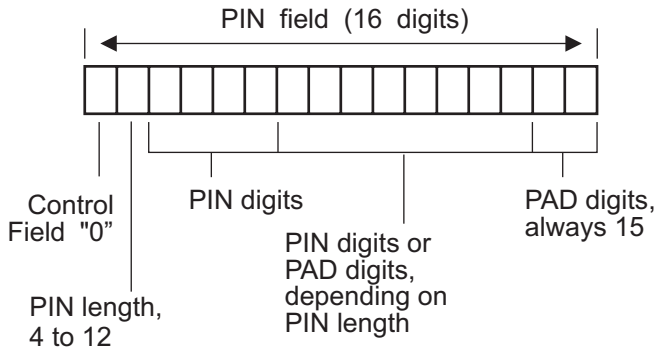
ISO PIN Block Format 0 (ANSI)

ISO PIN Block Format 0 consists of 16 hexadecimal digits, and conforms to ANSI standard X9.8.

ISO PIN Block Format 0 is created by XORing together the PIN block and the PAN block. For details of the PAN block, see "PAN Block".

ISO PIN Block Format 0 is as follows:

Figure 11-2
ISO PIN Block Format 0

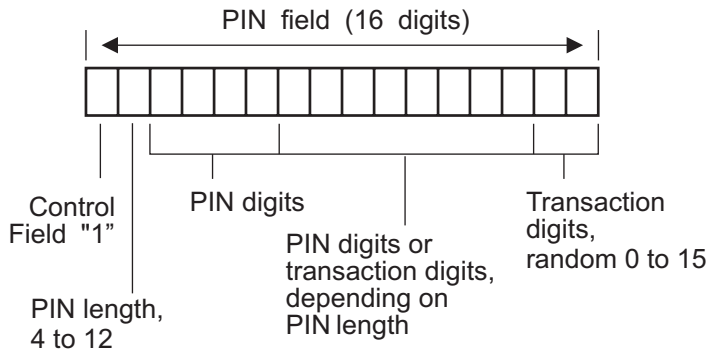


Minimum PIN length = 4; maximum PIN length = 12.

ISO PIN Block Format 1

ISO PIN Block Format 1 is as shown below:

Figure 11-3
ISO PIN Block Format 1



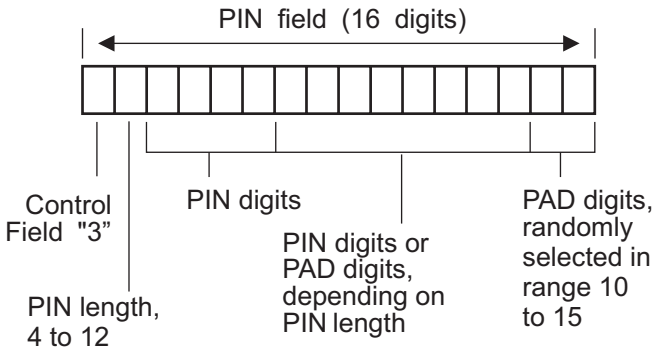
Minimum PIN length = 4; maximum PIN length = 12.

ISO PIN Block Format 3

ISO PIN Block Format 3 is created by XORing together the PIN block and the PAN block. For details of the PAN block, see "PAN Block".

ISO PIN Block Format 3 is as shown below:

Figure 11-4
ISO PIN Block Format 3



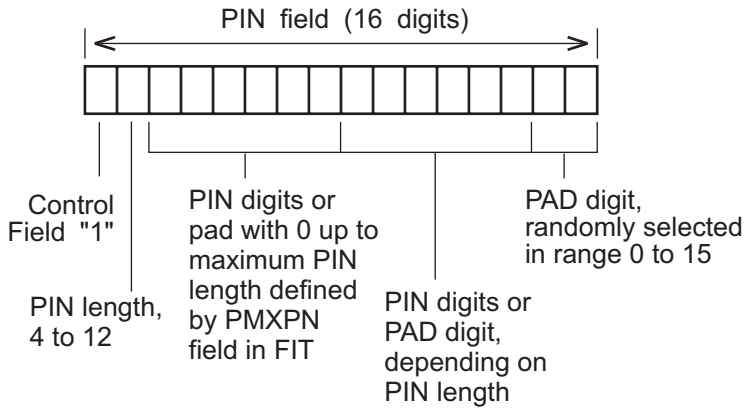
Minimum PIN length = 4; maximum PIN length = 12.

BANKSYS PIN Block

The BANKSYS PIN block is created by XORing together the PIN block and the PAN block. For details of the PAN block, see "PAN Block".

The BANKSYS PIN block is as follows:

Figure 11-5
BANKSYS PIN Block



Minimum PIN length = 4; maximum PIN length = 12.

When the cardholder enters the PIN, the digits are padded to the right with 0 hexadecimal to the maximum defined by the five least significant bits of the PMXPN field. The block is completed by padding the rest of the block with a pseudo-random digit based on time.

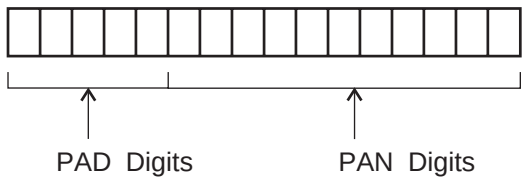
PAN Block

A PAN block is built for ISO Format 0 (ANSI), ISO Format 3 and BANKSYS PIN blocks.

The PAN block is made up of 16 hexadecimal digits, and contains the PAN digits selected from the cardholder's card using the FIT parameters PANDX and PINDX.

The PAN is located in the card data by using the PANDX FIT entry, which indicates the start of the PAN. The end of the PAN is found by searching for the next field separator, or the end of the track data. The check digit at the end of the PAN is discarded and then the least significant 12 digits are extracted to form the PAN block. This block is padded to the left with 0 hexadecimal in order to create the full 16 digits.

Figure 11-6
PAN Block



As a maximum of 12 PAN digits are placed in the PAN block, the first four digits are always 0 hexadecimal.

The PIN and PAN blocks are then XORed together, to create the PIN / PAN block. This is encrypted as defined by the FIT field PINPD and placed in the Transaction Request message.

PIN Block Encryption

For all PIN blocks, the first digit of the PINPD FIT field specifies the method of encryption and the encryption key.

The second digit is the digit used to pad the PIN.

The first digit is binary encoded.

The significance of each bit in the first digit is as follows:

Table 11-1
PINPD First Digit Bit Significance

Bit 0 (1 hex)	Double encryption sequence: 0 - MAST-COM 1 - PEKEY-COM
Bit 1 (2 hex)	Double / single designator: 0 - single 1 - double
Bit 2 (4 hex)	Encryption / no-encryption: 0 - encrypt 1 - no encrypt
Bit 3 (8 hex)	Co-ordination number / no co-ordination number: 0 - no co-ordination number 1 - co-ordination number included This bit has no effect if the PIN block format is specified using the PBFMT field.

Table 11-2
PINPD FIT Field

Hexadecimal Value	Type Of Encryption	Encryption Key and Sequence	
		First	Second
0	Single	COM	-
2	Double *See* Table Note 2.	MASTER	COM
3	Double	PEKEY	COM
4	(None) *See* Table Note 1.	-	-
8	Single	COM	-

Hexadecimal Value	Type Of Encryption	Encryption Key and Sequence	
		First	Second
A	Double	MASTER	COM
B	Double	PEKEY	COM
C	(None) *See* Table Note 1.	-	-

Table Note 1: The encryption commands 4 and C hexadecimal, which call for transmitting an unencrypted PIN are not secure, and are not supported by Advance NDC.

Table Note 2: Double encryption involves encrypting the PIN field using the first encryption key, then encrypting the encrypted PIN field using the second encryption key.

Message Authentication

When Message Authentication is used, either Central or the terminal sending the message appends a Message Authentication Code (MAC) to the end of the message. The MAC is calculated from the message content, and is therefore specific to the message that it is created from.

For single DES MACing, the message authentication procedure conforms to ANSI standard X9.9. Triple DES MACing conforms to ANSI standard X9.19.

Message Authentication Code

The Message Authentication Code field can be added to Transaction Request, Solicited Status (both device fault and terminal state), Transaction Reply, State Table, FIT Load, MAC Field Selection Load, Dispenser Currency Cassette Mapping Table and EMV Configuration messages.

MAC calculations are performed on the data in the same code as the transmission code. For example, if the transmission code is EBCDIC, then the data is converted to EBCDIC before a MAC calculation is performed. If the transmission code is ASCII, then the MAC calculation is performed on ASCII data. The actual message data is not changed in any way.

The MAC calculation is performed over the whole message, starting from the first field following the protocol-dependent header, up to the field separator preceding the MAC field, or on selected fields of the message that are specified by the MAC field selection table. When selected fields are used, they are taken in sequence from the start of the message and added together to form the data string that is used for Message Authentication. If this results in a null string, the Message Authentication code is set to 00000000. For all other cases, the Message Authentication code is generated in the following way:

1. The first eight bytes of the data are extracted and encrypted using the MAC key.
2. The encrypted eight bytes are XORed with the next eight bytes extracted from the data. If fewer than eight bytes remain, they are padded to the right with 0 hexadecimal.
3. This value is then encrypted using the MAC key.
4. Steps 2 and 3 are repeated until all the data has been dealt with.

5 The first four bytes of the final encryption form the MAC field. It is regarded as eight hexadecimal digits, each of which is converted to a character in the range ‘0’ - ‘9’, ‘A’ - ‘F’.

Double-length Keys

If the MAC key is double length, steps 1 to 4 are performed using the first half of the key. The final result is then decrypted using the second half of the key, and encrypted again using the first half. Step 5 is then performed to extract the MAC.

Note: Advance NDC only supports/uses the Last Block method to calculate double-length key MACs.

Sending the MAC Field from the Terminal to Central

The MAC field is calculated by the terminal and placed at the end of the message. The message is sent to Central where the same calculation is performed. The transmitted and calculated MAC fields are compared. If they are equal, Central continues with the processing. If they are unequal, Central treats this as an invalid request and acts accordingly.

Sending the MAC Field from Central to the Terminal

The MAC field is calculated by Central and placed at the end of the message. The message is sent to the terminal where the same calculation is performed. The transmitted and calculated MAC fields are compared. If they are equal, the terminal continues with the processing. If they are unequal, the terminal sends a specific command reject solicited status message to Central, and behaves as though a normal command reject has been sent.

Time Variant Number

The time variant number, TVN, is an additional security feature that is available when Message Authentication is used. It can be used in Transaction Request and Solicited status messages.

When this feature is used, the terminal calculates the TVN from the terminal time, and sends it in the message. Central should send the same TVN back to the terminal. If the MAC in the message is verified, the terminal compares the received TVN to the one it sent. If the TVN is the same, the message is accepted and processed. If not, a specific command reject (c-2) solicited status message is sent and a further reply awaited.

Full Message Authentication

Message Authentication is controlled by the entry of information into the terminal as part of the configuration process. See the *APTRA Advance NDC, Supervisor’s Guide* for details. This information contains flags that are described in the following tables.

Table 11-3
Message Authentication Configuration
Flag 1

Flag 1	
0	Do not check the time variant number in Transaction Reply messages, or the MAC in Transaction Reply, State Table, FIT Load or Dispenser Currency Cassette Mapping Table messages.
1	Check the time variant number in Transaction Reply messages, and the MAC in Transaction Reply, State Table, FIT Load and Dispenser Currency Cassette Mapping Table messages.

Table 11-4
Message Authentication Configuration
Flag 2

Flag 2	
0	Do not send the time variant number and the MAC data in Transaction Request messages.
1	Send the time variant number and the MAC data in Transaction Request messages.

Legal combinations of these flags are 00, 01 and 11. When the flag combination 01 is used, MAC and time variant fields are still expected in the specified messages from Central, but they are not checked.

Table 11-5
Message Authentication Configuration
Flag 8

Flag 8	
0	Do not check the Security Terminal Number in Transaction Reply messages.
1	Check the Security Terminal Number in Transaction Reply messages.

Table 11-6
Message Authentication Configuration
Flag 9

Flag 9	
0	The MAC calculation is performed on the whole message.
1	The MAC calculation is performed on the fields that are specified in the MAC field selection table.

Table 11-7
Message Authentication Configuration
Flag 10

Flag 10	
0	Do not send the time variant number and the MAC on Solicited device status messages.
1	Send the time variant number and MAC on Solicited device status messages (excluding RDY), if Flag 2 is set.

Flags 4-7 are not used, and must be zero when Flags 9 and 10 are used.

Flags 1, 2 and 10 determine whether the MAC is to be performed.

Flag 9 determines the type of MAC to use.

Flag 8 is used to determine if the received message is for this terminal.

Selective Message Authentication

In long messages, such as messages containing printer data, generating the MAC can add several seconds to the transaction time. Therefore, to derive the benefit of Message Authentication without the time penalty, Message Authentication across selected fields can be performed.

A field selection table is used to identify, for each message type, the fields that are to be included in the MAC. Flag 9 in the MAC flags indicates whether a full or selective MAC is to be used.

The field selection table consists of four fields, one each for Transaction Request, Transaction Reply, and Solicited Status messages, and one combined field for other types of message. These are followed by three fields, one each for Track 1, Track 2 and Track 3 data from the magnetic card stripe. A further field is present for a Smart Card. For details of Transaction Request and Transaction Reply offsets, see “Message Authentication Field Selection Load” on page 10-24.

Table 11-8
MAC Field Selection: Solicited Status Message

Solicited Status Message

Offset	Meaning
0	0 - MAC complete message. Ignore the remaining digits. 1 - Selectively MAC the fields below. *See* Table Note 3.
1	Fields b and c
2	Field d
3	Reserved
4	Field e
5	Field f
6	Field g1
7	Field g2. *See* Table Note 4.
8	Field g3

Solicited Status Message	
Offset	**Meaning**
9	Field g4
10	Field g5

Table Note 3: Fields are selected for inclusion in the MAC if the relevant offset byte is set to 1.

Table Note 4: When field 'g2' is set to be MACed selectively, any group separators within that field will not be MACed.

Table 11-9
MAC Field Selection - Other Messages

Other Messages	
Offset	**Meaning**
0	0 - Do not MAC FIT Load messages. 1 - MAC FIT Load messages.
1	0 - Do not MAC State Table Load messages. 1 - MAC State Table Load messages.
2	0 - Do not MAC Terminal State messages. 1 - MAC Terminal State messages.
3	0 - Do not MAC Dispenser Currency Cassette Mapping Table messages. 1 - MAC Dispenser Currency Cassette Mapping Table messages.

Table 11-10
MAC Field Selection - Track 1, Track 2, Track 3

Track 1, Track 2, Track 3	
Offset	**Meaning**
0	0 - MAC full track. Ignore bytes 1-n. 1 - Selectively MAC the fields below. *See* Table Note 5.
1	Sub-field 1 (including start sentinel)
2-n	Sub-fields 2-n

Table Note 5: Sub-fields are selected for inclusion in the MAC if the relevant offset byte is set to 1.

A maximum of five fields is possible on Tracks 1 and 2, and ten on Track 3.

If there are fewer than the maximum number of sub-fields present on the card, the excess bytes are set to zero. The last sub-field

contains the end sentinel. If the sub-fields that contain the start and end sentinels are specified for inclusion in the MAC, then the sentinels are included.

The track fields are only examined if the relevant offset byte is set in the Transaction Request / Reply field.

The following table is only relevant if you are using an EMV Integrated Circuit Card (ICC or 'Smart Card'):

Table 11-11
MAC Field Selection For EMV ICC Configuration Messages

EMV ICC (Smart Card) Configuration Messages	
Offset	**Meaning**
0	0 - Do not MAC ICC Currency Data Objects Table messages. 1 - MAC ICC Currency Data Objects Table messages.
1	0 - Do not MAC ICC Transaction Data Objects Table messages. 1 - MAC ICC Transaction Data Objects Table messages.
2	0 - Do not MAC ICC Language Support Table messages. 1 - MAC ICC Language Support Table messages.
3	0 - Do not MAC ICC Terminal Data Objects Table messages. 1 - MAC ICC Terminal Data Objects Table messages.
4	0 - Do not MAC ICC Terminal Acceptable AIDs Table messages. 1 - MAC ICC Terminal Acceptable AIDs Table messages.

Using Selective Message Authentication

A set of default field values are provided. These are as follows:

Table 11-12
Selective MAC Default Field Values

Transaction Request	Selective MAC on fields e, h (sub-field l), j, k, l, bd.
Transaction Reply	Selective MAC on fields e, g, h, i, j, j1-j4, k, l, at.
Solicited Status	Full MAC.
FIT / State tables	Full MAC.
Terminal State	No MAC.
Track 1	Full MAC.
Track 2	Selective MAC on first sub-field.

Track 3	Full MAC.
Dispenser Currency Cassette Mapping	Full MAC.
EMV ICC Configuration	Full MAC.

Table Note 6: These defaults can be changed by a download configuration message.

Table Note 7: When selective fields are used, they are taken in sequence from the message to build a single data string. Field and group separators are not included. Empty fields are omitted. If the complete data string is empty, no authentication is attempted and the MAC is set to zero.

Table Note 8: The selective MAC is calculated in the same way as for full Message Authentication.

Key Verification Values

Key Verification Values (KVVs) give positive confirmation of the correct loading of an encryption key.

The KVV is created by encrypting eight zero bytes, taking the first (leftmost) three bytes of the result and converting this to six hexadecimal digits.

For double-length keys, a triple DES encryption is performed.

The VISA key table is treated as 12 single length keys giving 12 separate KVVs.

Determining Encryptor Key Status

The host (Central) can determine the status of keys in the encryptor with the following message exchange:

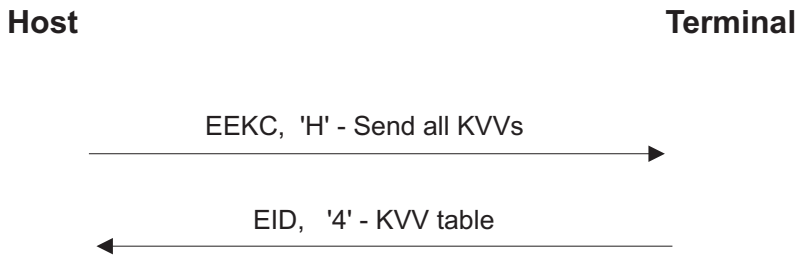


Figure 11-7
Obtain Key Status Message Exchange

Where:

EEKC = Extended Encryption Key Change (for details, see the “Extended Encryption Key Change” section in Chapter 10, “Central to Terminal Messages”).

EID = Encryptor Initialisation Data (for details, see the “Encryptor Initialisation Data” section in Chapter 9, “Terminal to Central Messages”).

KVV = Key Verification Value.

RSA Initial Key Loading

When an NCR terminal is fitted with the Encrypting PIN Pad (EPP), the Advance NDC application supports the loading of the initial encryption keys (A key, B key and V key) using RSA encryption, instead of local entry in Supervisor mode.

For further details of the RSA encryption and signature schemes, see the *RSA Laboratories Cryptographic Token Interface Standard - PKCS # 1 v2.0*.

Before using RSA encryption, the Host Security Module (HSM) at the host and the EPP in the terminal must perform an authentication process which satisfies the conditions given in the following passage.

EPP Authentication Process

The objective of initial key download is to transfer a DES encryption key from the HSM at the host to the EPP in the terminal. There are three important conditions to this transfer:

1. The DES key must remain secret. Only the source HSM and targeted EPP can know the key.
2. The EPP must only accept a key from an HSM identified as authentic.
3. The HSM must only send the key to an EPP identified as authentic.

RSA encryption is used to meet these conditions. RSA encryption is an asymmetric encryption scheme which uses a pair of keys; one key is used for encryption, and the other key is used for decryption.

One of the keys is kept secret (the Secret Key, **SK**) and the other key is made public (the Public Key, **PK**). During the authentication process, RSA encryption is used for encrypting secret data and for signing data.

With RSA encryption, anybody can encrypt data using the public key, but only the holder of the secret key can decrypt the data.

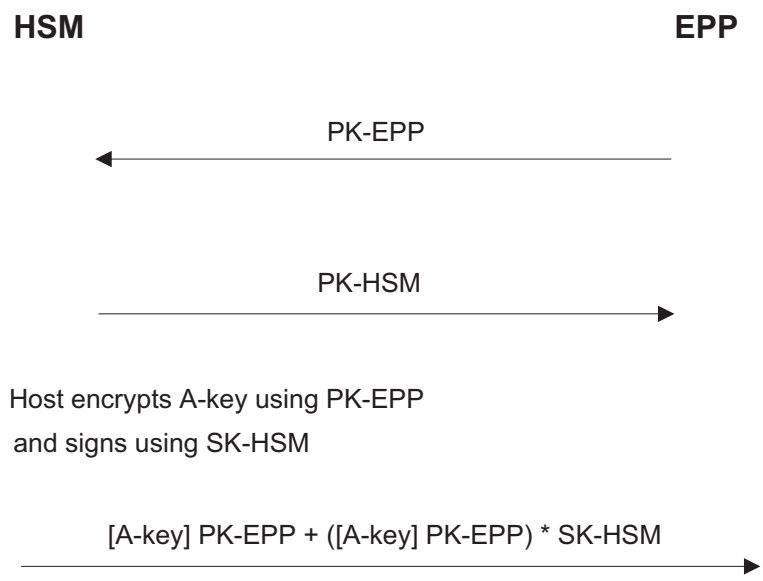
Signatures are used to prevent messages from being changed during transmission and the sender from being impersonated. A Secure Hashing Algorithm (SHA) is applied to the message and then the result is encrypted. With RSA encryption, the secret key is used for generating the signature. Only the holder of the secret key can generate the signature, but anybody can verify the signature using the public key.

In the following process, **[message]PK** is used to represent a **message** encrypted with Public Key **PK**, while **(message) * SK** represents a **message** signature using Secret Key **SK**.

Two pairs of RSA keys are used to transfer an initial DES key (**A-key**) from the HSM to an EPP. One pair of keys is associated with the HSM (**SK-HSM** and **PK-HSM**); the HSM retains SK-HSM and sends PK-HSM to the EPP. The other pair is associated with the EPP (**SK-EPP** and **PK-EPP**); the EPP retains SK-EPP and sends PK-EPP to the HSM.

The HSM can now use PK-EPP to encrypt A-key, represented **[A-key] PK-EPP,** so that only the EPP can decrypt it using SK-EPP. The HSM then signs the message using SK-HSM, represented **([A-key] PK-EPP) * SK-HSM,** so that the EPP can verify that the message came from the HSM and has not been altered. This is summarised in the following diagram:

Figure 11-8
HSM - EPP A-key message exchange



There are still a couple of problems to solve:

1. When the HSM receives PK-EPP, how does it check that PK-EPP came from an authentic EPP, rather than an impostor trying to steal the A-key?

2. When the EPP receives PK-HSM, how does it check that PK-HSM came from an authentic HSM, rather than an impostor attempting to load their own keys?

A further step is thus required to authenticate the EPP and HSM public keys. This uses a third pair of RSA keys generated by NCR

(**SK-NCR** and **PK-NCR**). SK-NCR will be kept in a security module in a highly secure location within NCR.

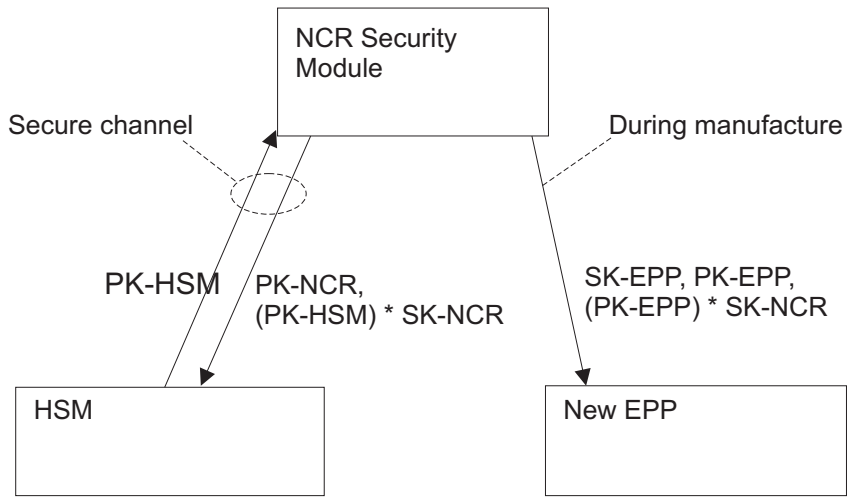
When PK-EPP and SK-EPP are generated and written to the EPP during the EPP manufacturing process, SK-NCR is used to sign PK-EPP to give **(PK-EPP) * SK-NCR**. This signature and PK-NCR is also written to the EPP.

Using some other secure channel, PK-HSM will arrive at the NCR secure location and be signed using SK-NCR to give **(PK-HSM) * SK-NCR**. Using a secure channel, this signature and PK-NCR will be written to the HSM.

Signing the HSM public key is a one-off operation, so the transfer of the key and signature can be performed manually. Although the data transferred is not secret, a secure transfer is required to authenticate the parties involved.

This is summarised in the following diagram:

Figure 11-9
Authentication of EPP/HSM Public Keys

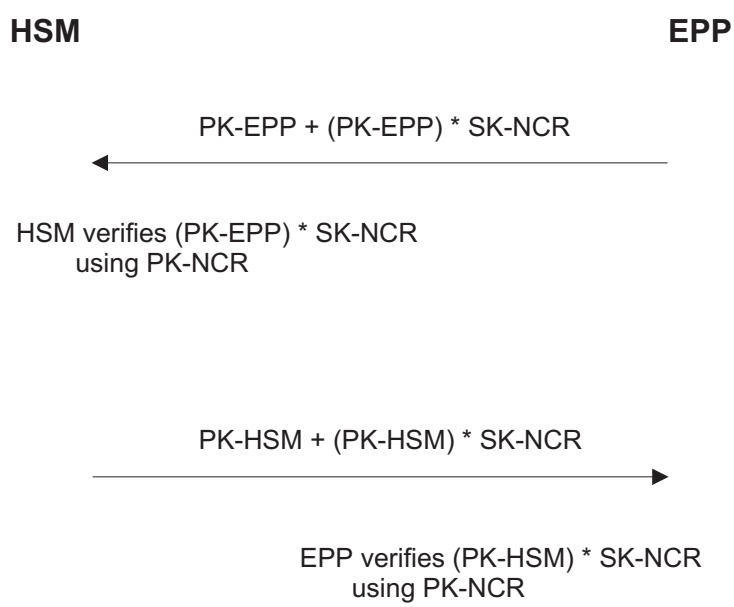


Thus when the HSM and EPP exchange public keys, the signatures created using SK-NCR are also exchanged.

The HSM and EPP can each authenticate the other's public key by verifying the signatures using NCR-PK.

This is summarised in the following diagram:

Figure 11-10
HSM/EPP Key Authentication/Exchange



As an additional authentication measure, every EPP has a unique serial number **SN-EPP** which is written to it during manufacture. The serial number is also signed with SK-NCR and can be transmitted to the host and the host's HSM.

A newly installed EPP requires an exchange of the above messages with the host, to authenticate the EPP to the HSM and the HSM to the EPP. Once the authentication is complete, RSA encryption can be used to load the initial keys (A, B and V) into the EPP.

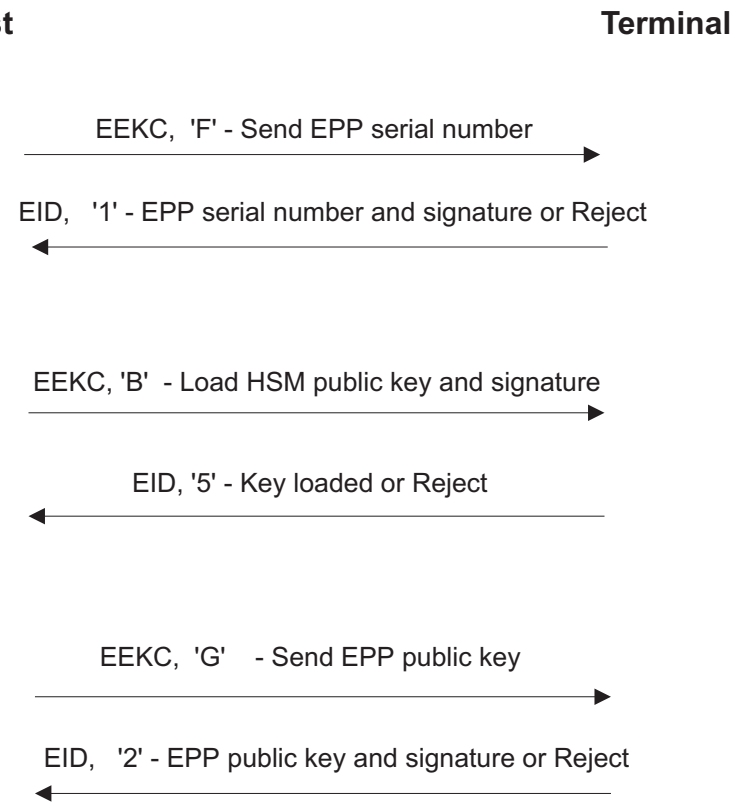
Note: Until the initial keys have been loaded into the encryptor, Advance NDC is restricted in the operations it can perform. In particular, it cannot MAC any messages without a MAC key or B key; therefore the authentication process cannot use message formats which would normally have a MAC.

The Extended Encryption Key change message is used for sending information to the terminal, and a new message format (Encryptor Initialisation Data) is used for sending information from the terminal to the host.

Authentication Message Sequence

The message sequence to authenticate an EPP in Advance NDC is as shown in the following diagram:

Figure 11-11
EPP Authentication Message Sequence



Where:

EEKC = Extended Encryption Key Change (for details, see the "Extended Encryption Key Change" section in Chapter 10, "Central to Terminal Messages").

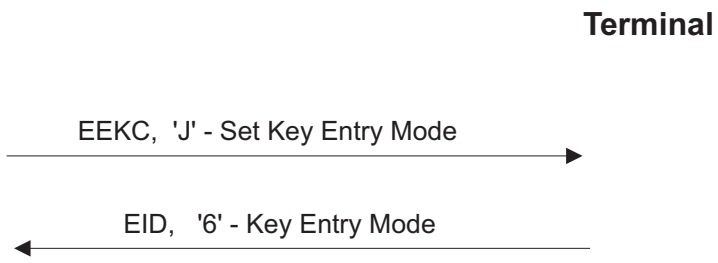
EID = Encryptor Initialisation Data (for details, see the "Encryptor Initialisation Data" section in Chapter 9, "Terminal to Central Messages").

Note: If the terminal does not contain an EPP, the messages will be rejected with a reject reason of E02 'Function not supported by hardware'.

Changing the Encryption Key Entry Mode

After the authentication sequence has been performed, the encryption key entry mode can be changed remotely using the following sequence:

Figure 11-12
Key Entry Mode Remote Change Sequence



Where:

EEKC = Extended Encryption Key Change (for details, see the "Extended Encryption Key Change" section in Chapter 10, "Central to Terminal Messages").

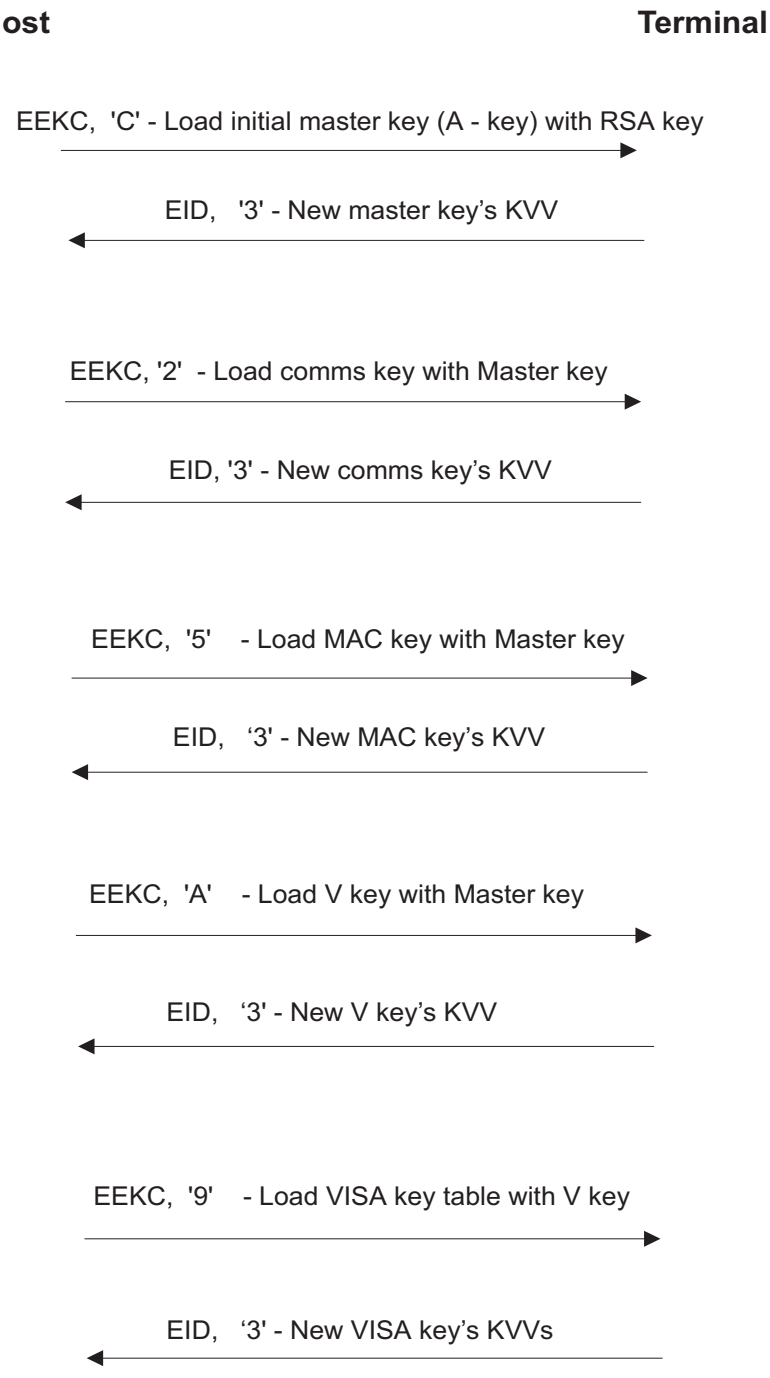
EID = Encryptor Initialisation Data (for details, see the "Encryptor Initialisation Data" section in Chapter 9, "Terminal to Central Messages").

Warning: Changing the key entry mode deletes all the DES keys in the encryptor.

Loading DES Keys

After performing the EPP Authentication Process, the DES keys can be loaded using the following message sequence:

Figure 11-13
DES Key Load Message Sequence



Where:

EEKC = Extended Encryption Key Change (for details, see the "Extended Encryption Key Change" section in Chapter 10, "Central to Terminal Messages").

EID = Encryptor Initialisation Data (for details, see the "Encryptor Initialisation Data" section in Chapter 9, "Terminal to Central Messages").

KVV = Key Verification Value (see the "Key Verification Values"section).

RSA Encrypted DES Key Format

When loading an initial DES key using RSA encryption, the 8 or 16 bytes of the key are encrypted using the RSAES-PKCS1-v1_5 scheme described in the *RSA Laboratories Cryptographic Token Interface Standard (PKCS #1 v2.0)*.

The terminal will decode the block as a single or double-length key, depending on the key entry mode selected in Supervisor mode.

For transmission to the terminal, the data is encoded as described in "Base 94 Encoding and Decoding".

Signature Format

Message signatures are generated using the RSASSA-PKCS1-v1_5 scheme described in the *RSA Laboratories Cryptographic Token Interface Standard (PKCS #1 v2.0)*. The Secure Hash Algorithm (SHA-1) is applied to the message, and the result is encrypted. SHA-1 is described in the *Federal Information Processing Standard (FIPS 180-1) Secure Hash Standard*.

For transmission between Central and the terminal, the signature is encoded as described in "Base 94 Encoding and Decoding".

Note: When a public key is transmitted from NDC to Central, only 256 bytes of the modulus are sent. The bytes describing the containing structure and the exponent of the key never change, so they are not transmitted. The complete key structure shown below must be reconstituted before the signing process.

`3082010A` - Tag: structure, length 266 bytes

`02820101` - Tag: integer, length 257 bytes

`00` - Leading 00 ensures modulus is positive

`MM..MM` - 256 byte modulus

`0203` - Tag: integer, length 3 bytes

`010001` - Exponent (always 65537)

Therefore, to reconstitute the key, bracket the modulus (MM..MM) with the following byte sequences:

3082010A0282010100MM..MM**0203010001**

Base 94 Encoding and Decoding

Base 94 encoding and decoding has been introduced to satisfy the following constraints:

- Public keys, RSA encrypted data and signatures consist of blocks of 256 bytes.
- During the initialisation of the EPP, both encrypted keys and signatures must be exchanged with the HSM in the host.
- Only graphic characters can be transmitted, as the control characters are used for the communications protocol and message formatting.

Currently, NDC uses hexadecimal or decimal encoding to transmit binary data. However, hexadecimal encoding doubles the number of bytes, and decimal encoding triples the number of bytes. Clearly, given the block size and the message length constraints, neither encoding method is suitable for RSA blocks; a new encoding method is required.

There are 94 graphic characters which can be included in the fields of an NDC message. These have ASCII codes in the range 20 hexadecimal (space) to 7E (tilde). Using these characters, it is possible to perform a base 94 encoding, which is far more efficient than a base 16 or base 10 encoding.

Unlike decimal or hexadecimal encoding, the result is unreadable. However, the original encrypted block was already unreadable, so this makes no difference.

The following base 94 encoding scheme gives a ratio for encoded bytes to binary bytes of 5 to 4. Thus a 256 byte RSA block can be transmitted in 320 bytes.

Encoding

In base 94 encoding, 256 bytes of source data are encoded into 320 bytes of encoded data. Every four bytes of binary data become five characters of encoded data.

The base 94 encoding process is as follows:

1 Take each set of four bytes of source data (src_data) and form a 32-bit word (acc), such that the first byte (src_data [0]) becomes the least significant byte of acc. See Note 1:

```
acc = 0
for i = 0 to 3
{
```

```
    acc = acc * 256 + src_data [3 - i]
}
```

2 Convert acc into five base 94 digits, by dividing by 94 and taking the modulus. To shift each digit into the usable character range, add 32 (ASCII space). Save the digits in the encoded data. The first digit is the least significant.

```
for i = 0 to 4
{
    enc_data [i] = acc % 94 + 32
    acc = acc / 94
}
```

Note 1: The ordering of bytes is selected so that the conversion between a 32-bit word and four bytes of data can be implemented efficiently on an Intel processor, by forcing the data type rather than using a loop.

Note 2: When EBCDIC is used for transmission, the encoding is still performed using the ASCII character set and then the result is converted to EBCDIC.

Decoding

In base 94 decoding, 320 bytes of encoded data are decoded into 256 bytes of binary data. Every five digits of encoded data become four bytes of binary data.

The base 94 decoding process is as follows:

1 Take each set of five digits of encoded data (enc_data) and convert from base 94 to create a 32-bit word (acc). Each digit is shifted into the range 0 to 93, by subtracting 32. The first digit is the least significant.

```
acc = 0
for i = 0 to 4
{
    acc = acc * 94 + enc_data [4 - i] - 32
}
```

2 Split acc up into four bytes of destination data (dst_data). The least significant bye of acc becomes dst_data [0].

```
for i = 0 to 3
{
    dst_data [i] = acc % 256
    acc = acc / 256
}
```

Double-Length Keys

For greater security, NCR recommends that double-length keys are used. For effective PIN and encryption key management, the following general and Advance NDC specific guidelines should be followed:

General Guidelines

The following general security guidelines should be applied:

- To protect sensitive information, all DES keys should be double length to support triple DES encryption. Keys used for PIN block encryption can still be single length.
- PINs and encryption keys should be triple DES encrypted when outside the terminal's security module.
- Keys should *not* have multiple uses. For example, the key used to protect other keys during transfer should *not* be used for transferring PIN blocks or for local PIN verification.
- Initial keys should be loaded or entered directly into the encryptor module in two or more full length components, and then XORed together to create the key.
- PIN blocks should be ISO format 3, unless the PIN block encryption keys are changed regularly, in which case ISO format 0 (ANSI) PIN block is acceptable.
- MACing should be used to prevent modification of sensitive data during transmission.

Advance NDC Guidelines

From release 2.04 onwards, Advance NDC supports the Encrypting PIN Pad (EPP) and double-length keys.

The above guidelines can be met by using the following modes of operation with Advance NDC 2.04 or above with an EPP:

- All keys used should be double length, including the master key (A-key), communications key (and B-key), MAC key and VISA master key.
- Use only the master key for loading other encryption keys, and *do not* use the master key for any other purpose.
- Use the communications key for PIN block encryption and ISO format 3 PIN block.
- Perform MACing in triple DES mode.
- Load the initial master key (A-Key) into the encryptor, and then use the master key to load all the other required keys. *Do not* use the master key as part of the local PIN verification or for PIN block encryption.

Although all keys used should be double length, it is possible to use a single length Encrypted PIN Key (PEKEY) provided the PIN block is also encrypted using the communications key.

Single length keys can still be used for local PIN verification schemes.

For strict adherence to the guidelines, no other mode of operation should be possible. However, for backwards compatibility all current operations are supported, with a locally configurable option to restrict the functionality to the recommended modes.

These guidelines can only be fully followed if an EPP is present in the terminal. The security features provided using a BAPE and an EPP are listed in “BAPE Security” and “EPP Security” respectively, earlier in this chapter.

‘Double Length Restricted’ Key Entry Mode

The Key Entry menu, available from Access Menu option 25, can be used to set the key entry mode to option 4 ‘Double length restricted’.

Note: Only Key A and Key V can be entered locally when using key mode 4.

This restricted double-length key entry mode prevents the following security violations:

- Deciphering a new Communications key with the current Communications key
- Deciphering a new Message Authentication Code (MAC) key with the current Communications key
- Using a Communications key as the current MAC key
- Sending a PIN block unencrypted
- Using single-length keys, except for PEKEY if the PIN block is also encrypted using the communications key.

In this key entry mode, any messages from Central which request these operations are rejected as ‘message illegal in restricted encryption mode’.

For further details of the menu options, see the *APTRA Advance NDC, Supervisor’s Guide*.

Journal Printer Backup

Journal printer backup lets journalling continue even when the journal printer is in a fatal state. To set the option, set one or both of options 16 and 17 in the Enhanced Configuration Parameters Load message.

Note: Options 16 and 17 are not supported when dual mode is active on the SST. If the options are sent, they are ignored.

Option 16 specifies the maximum time in hours that journal printer backup is allowed before all journalling is discontinued. Option 17 specifies the maximum number of print operations (in hundreds) to be buffered while the journal printer is fatal. For details of how to set these options, see the “Enhanced Configuration Parameters Load” section in Chapter 10, “Central to Terminal Messages”.

If journal printer backup is set and the journal printer enters a fatal state, journalling continues, using the journal backup mode and the buffer file resident on the system disk. The journalling includes the text of the last journal printer command sent to the journal printer before it entered the fatal state.

For details of what happens to the data when the journal printer becomes operational again, refer to the *APTRA Advance NDC, Supervisor’s Guide*.

For security reasons, reprinting from the journal backup log to the journal printer is suspended if the SST goes off-line, but continues as soon as communications have been re-established.

Chapter 12

EMV Smart Card Handling

Overview

The smart card handling described in this chapter illustrates how EMV smart cards can be used with Advance NDC.

For further details of using EMV smart cards, refer to the *EMV Integrated Circuit Card (ICC) Reference Manual* (B006-6297).

Accepting and Reading Cards

The process for accepting cards into the reader varies depending the type of reader, and whether smart cards are supported and required by the read conditions.

Motorised Readers

For motorised readers (MCRW or IMCRW), Advance NDC does not support non-magnetic accept, which permits a card without a magnetic stripe (a smart card) to be inserted into the reader.

DIP Readers

With a DIP reader, there is no control over what type of card is inserted into the reader. Except for the DASH reader in certain conditions, the cardholder is expected to dip the card, that is, insert and remove the card. The card is read as it is removed.

For a DASH reader the card will be latched on entry if the following conditions are met:

- The state type is 'T'
- The chip connect bit is set to 1.

Note: If using a DASH reader and state type 'T', but no chip connect bit is set, the DASH will behave as a standard DIP reader.

Once a smart read has been determined, no magnetic read is performed.

For information on additional fatal/suspend handling available for DASH readers, refer to the *APTRA Advance NDC, Developer's Guide*.

Read Conditions and FIT Match

The processing of the read conditions varies, depending on the use of the chip connect bit in the read conditions, and on the type of card reader.

If none of the read conditions has the chip connect bit set (or the reader does not support smart cards) then the processing is the same for all types of reader. The card read state will process the read conditions in order and read the required tracks to satisfy them.

If any read condition has the chip connect bit set (and the reader supports smart cards) then the processing varies between motorised readers (MCRW or IMCRW) and DIP readers (for example, DASH).

Motorised Readers

For motorised readers, the conditions are processed in order until the first condition which has the chip connect bit set. At this point

all remaining tracks that may be required to satisfy the remaining read conditions are read.

If a smart card is found, the next state will be the No FIT Match next state. If no smart card is found but one of the read conditions has been satisfied using magnetic tracks, a FIT search is performed. Depending on the result of the search, either the FIT Match or No FIT Match next state number will be used.

If the Smart Chip state is read first, the Magnetic Track Data is never read and therefore the Smart Chip state (008) should always be the last state to be defined in the Read Conditions.

DIP Readers

For a DIP reader, the magnetic tracks are read on card removal.

If the SST has a DASH card reader, and any of the Card Read Conditions (state entries 5-7) has the Chip Connect Bit set to 1, the card is latched on entry to the DASH card reader. Latching the card on entry to the reader allows EMV processing to begin. If the Answer To Reset from the chip on the card is successful, the No FIT Match next state is taken, and it is no longer possible to revert to magnetic stripe processing for the transaction.

Note: If using a DASH reader and Card Read State A, or Card Read State T with no chip connect bit set, the DASH will behave as a standard DIP reader.

If the Answer to Reset from the chip on the card fails, the DASH card reader will unlatch the card and the cardholder is asked to remove the card. Once the card is removed, normal magnetic stripe processing commences and the card read conditions are checked. If one of the read conditions is satisfied using magnetic tracks, a FIT search is performed. Depending on the result of the search, either the FIT Match or No Fit Match next state number will be used.

Using CAM2/EMV Exits for Advance NDC

If you are using your own Exits to process smart cards instead of CAM 2/EMV Exits for AANDC, the No FIT Match next state should be a C-Exit state with two functions, as follows:

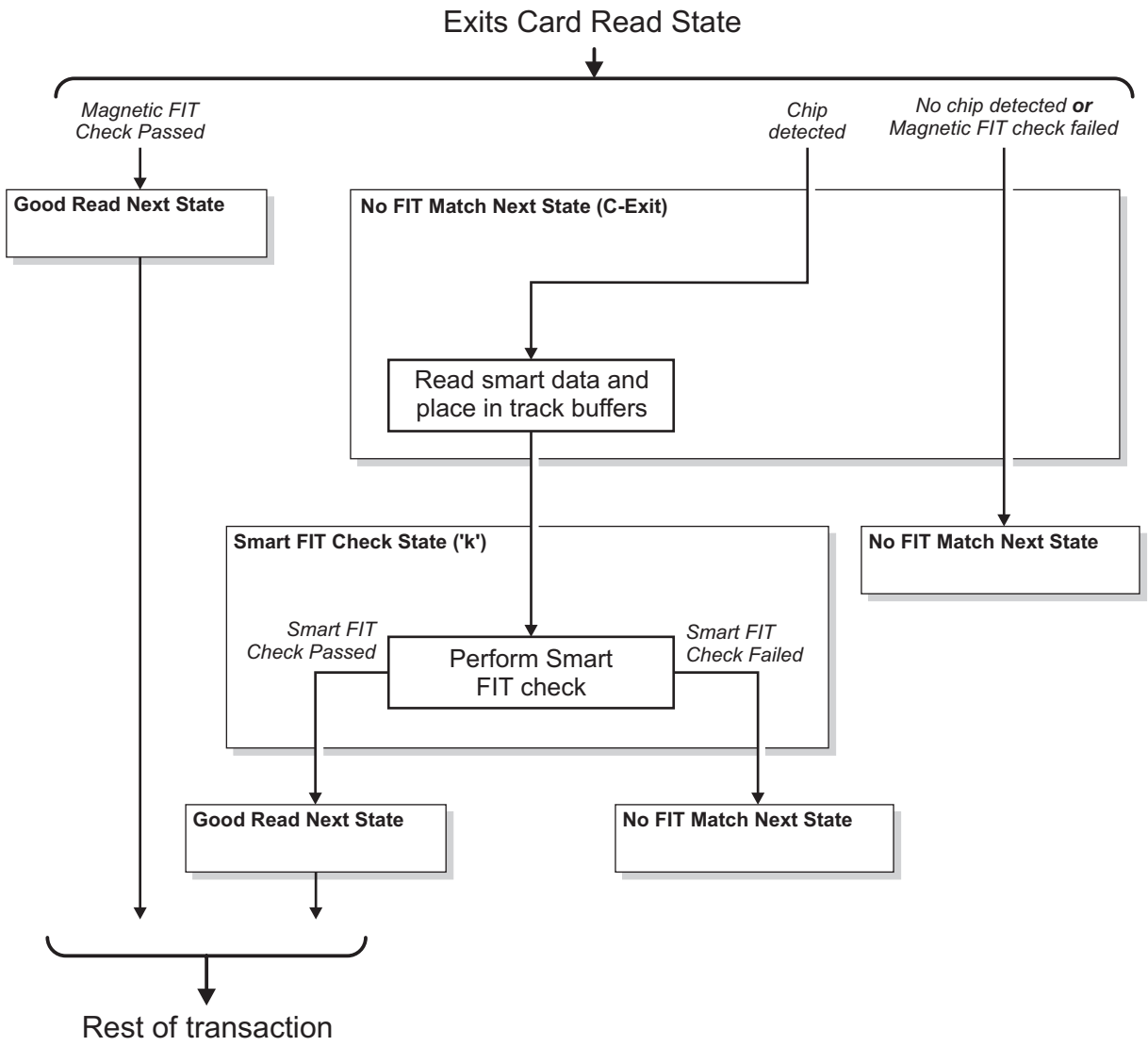
- If a chip has been detected, it reads any chip data and place the data in the magnetic track buffers before switching to the Smart FIT Check state.
- If no chip has been detected, or the card failed a magnetic FIT check within state A, then the No FIT Match state exits, probably to a Close state.

For details of creating C-Exit states, refer to the *Using NDC Exits* publication. For details on how a 'No FIT Match' next state might work, see the "Example Chip Data Read State" C-Exit State example later in this appendix.

If chip data has been successfully read from the card, and placed into the magnetic track buffers by the C-Exit state, the Smart FIT Check state ('k') will perform a FIT check on that data. For details of this state, refer to "k - Smart FIT Check State" in Chapter 2, "State Tables".

The read state handling is shown in the following illustration.

Figure 12-1 Smart Card Handling



Example Chip Data Read State

This state is an example of a C-Exit created to allow FIT checks to be performed on smart data. It would be defined as the No FIT Match next state entered from the Card Read state.

The Chip Data Read state has two distinct functions. The first is to handle failed magnetic data FIT checks from within the Card Read State. The second is to read smart card data and place it in the three data buffers ready for the Smart FIT Check state to perform a FIT check. The position of the card on entry to the Chip Data Read state will indicate which function is required.

The state table below shows the recommended parameters for a Chip Data Read state, but the exact functionality will be determined by individual customers, according to their needs. Four further parameters are available if required.

Table 12-1
Chip Data Read State

Table Entry	Number of Characters	Contents	Description
1	1	State Type	This should be a letter chosen from those available for C-Exit States. For a list of state types, see Chapter 2, “State Tables”.
2	3	Good Chip Read Next State	State to which the terminal proceeds if chip data is successfully read and the track buffers are set up. This should normally be a Smart FIT Check State.
3	3	Card Reject Next State	State to which the terminal proceeds if either a card has failed a magnetic card FIT check carried out in State A, or read conditions had the chip connect bit set but no chip could be found.
4	3	No Card Data Next State	State to which the terminal proceeds if the accept command was for non-magnetic cards, and no chip data or magnetic data was found. This state could indicate to the cardholder that the card has probably been inserted with the wrong orientation.
5	3	Cancel Next State Number	State to which the terminal proceeds if the cardholder presses the Cancel key.

Guidelines for Handling Smart Card Transactions

This section provides recommendations and guidelines on how to handle some of the possible transactions involving smart cards. Note that the different scenarios will require different values to be set in Enhanced Configuration Parameters Load option 39 (Non-magnetic Card Accept). The setting chosen will be determined by the type of cards to be accepted and whether or not you are

operating an SST network with a mixture of smart and non-smart card readers.

Magnetic Smart Card, FIT Check on Magnetic Data

This transaction involves a magnetic smart card only. A FIT check is performed on the magnetic data.

- Card Read State ('A' or 'T') - cardholder enters a magnetic smart card, and a FIT check is performed successfully on magnetic data tracks as defined by the read conditions.
- PIN Entry State ('B') - cardholder enters PIN, which is verified.
- FDK Selection State ('E' or 'Y') - cardholder selects to do a smart card transaction.
- Smart Card Transaction State (a user-defined C-Exit state) - the smart card is staged and, if a chip is detected, a menu of smart card transaction options is displayed. Further Advance NDC and C-Exit states may then be executed. See Note below.
- Close State ('J') - card is returned to the cardholder and the transaction ends.

Note: Where a smart card is moved to or from the staged position within a C-Exit state, it is important to update the shared data values before returning control of the transaction to Advance NDC.

Magnetic Smart Data, FIT Check on Smart Data

This transaction involves a magnetic smart card only. A FIT check is performed on the smart data.

- Card Read State ('A' or 'T') - cardholder enters a magnetic smart card. First read condition has chip connect bit set so magnetic data is read and then the card is staged in the smart card position. A chip is successfully detected, and so the next state is set to a Chip Data Read state.

  Note: If using a DASH reader and Card Read State A, or Card Read State T with no chip connect bit set, the DASH will behave as a standard DIP reader.

- Chip Data Read State (a user-defined C-Exit state) - chip data is read and placed in the magnetic card read buffers.
- Smart FIT Check State ('k') - a FIT check is performed successfully on the magnetic read buffers.
- PIN Entry State ('B') - cardholder enters PIN, which is verified.
- Transaction State - transaction is carried out. Further standard Advance NDC and C-Exit states may then be executed. See Note above.

- Close State (‘J’) - card is returned to the cardholder and the transaction ends.

Recommendations

Do not use non-magnetic card accept commands unless you have to handle non-magnetic smart cards.

During non-magnetic smart card accept, if no magnetic or chip data is found, display a screen during the Close state indicating to the cardholder the correct orientation for entering cards.

Where the same read conditions are to be used on SSTs with a mixture of magnetic card readers and smart card readers, make sure that there is at least one magnetic data only read condition in the Card Read State.

Chapter 13

CCM VISA2 Dialup System

Overview

With a dialup system, the application behaviour is not always the same as in other systems. This chapter discusses how messages are handled on SSTs that use CCM VISA2 dialup communications with Central.

Dialup System Setup

Dialup functionality is enabled through the registry and configured through the Dialup Configuration menu in Supervisor.

Baud Rate

As SST transaction messages for a transaction session are small in size and few in number, connecting quickly is more important than high-speed data transfer. Therefore, NCR recommends a fixed, low-speed baud rate to reduce dialling time and minimize re-transmission for error correction.

Dialup Timers

Timers determine the way that the Dialup component works and they must be set to the correct values for it to function correctly.

Modem Timers

The lower-level communications (modem) timers, such as the Modem Connect timer, the Modem Command Response timer and the Dial on Send timer, affect the values for the application-level timers such as Timer 3, and the Error Redial Timer.

Table 13-1
Modem Timers

Modem Timer	Description
Modem Connect	The amount of time CCM VISA2 will wait for a connection attempt to a host modem to be successful before trying to connect again
Modem Command Response	The amount of time CCM VISA2 will wait for a response acknowledgment from the host before trying to send the command response again.
DialonSend	When the SST sends a message such as an unsolicited message, an EJ upload, or a response to terminal command, this is done according to the DialonSend timer. The dialup connection is maintained until either the DialonSend timer expires or the host terminates the connection. The duration of this timer should therefore be short, but long enough to send the longest message and allow time for any host reply. This timer is configurable through Supervisor. The default is 20 seconds but for systems with long download messages, such as screen or state messages or EMV systems, this will probably need to be increased to at least 30 seconds

The modem timers are also affected by the number of times CCM VISA2 will retry failed connections or unacknowledged messages to the host. This setting can be configured in Supervisor. The default setting is 2.

Application Timers

The application-level timers must be configured according to the modem timers as described in the following table. These calculations represent the minimum recommended value for these timers, and they can be increased.

Table 13-2
Application Timer Settings for Dialup

Application Timers	Setting Calculation	Description
Timer 3	(Number of Retries + 1) x (Modem Connect timer + Modem Command Response timer)	Allows time for modem error processing to be completed if a Transaction Request fails to be sent or a connection fails to be established. The usual value for this on other systems (about 20-25 seconds) will probably not be long enough for a dialup system.
Error Redial Timer	(Number of Retries + 1) x (Modem Connect timer + Modem Command Response timer)	Can be any length of time depending on how often retries are required when a line error occurs; but for the modem link to perform error recovery, it must never be less than this calculation

Pre-Dial and Normal

Two options are available in Supervisor to configure when the SST will dial Central, as follows:

- Normal
  Dial only when the Transaction Request is ready to be sent. This is the default.
- Pre-dial
  Dial on card entry.

EJ Upload

Normally, EJ upload acknowledgements must be received within the EJ timer period. For a dialup system, the acknowledgement must be received within the Dial on Send timer period. NCR advises that the EJ timer is the same length of time as the Dial on Send timer.

Dialup Messages: SST to Central

In a dialup system, messages from the SST to Central always have a header, with the following format:

Table 13-3
SST Messages Header Format

Field	Number of Characters	Type	Contents	Description
Device Type	2	Alpha-numeric	50	Modified VISA II protocol.
BIN	7	Alpha-numeric	xxxxxxx	Routing information for communications access; configurable in Supervisor.
Terminal ID	12	Alpha-numeric	xxxxxxxxxxxx	Terminal ID, 12-character sequence comprised of the following: ● Positions 1 to 2: The first 2 characters of the six-digit Terminal ID as entered in Supervisor (Dialup Config menu) ● Positions 3 to 8: six-digit machine number as entered in Supervisor (Configure menu) ● Positions 9 to 12: Characters 3 to 6 of the six-character Terminal ID as entered in Supervisor (Dialup Config menu).
FS	1	Byte	1Ch	Field separator.
Message Type			RQ or EQ *See* Table Note 1	Transaction request message.
			CP or EP *See* Table Note 1	Communication Complete. Used with a solicited status Ready message to complete a normal transaction (withdrawal, balance, transfer) and disconnect. Also used in a status response to a new operational command with a 'disconnect' command code.
			CC or EC *See* Table Note 1	Connect Continuation. Used to maintain a connection with the host when the current sequence of messages is not complete; for example, with unsolicited status messages, or with a response to a Write Command (OAR or down loading).
Message Text	var.	Alpha-numeric		SST text message. *See* Table Note 2.

Table Note 1: When the system is configured to send a transaction completion message to Central, 'RQ', 'CC' and 'CP' are used; when it is not configured to send a completion message to Central, 'EQ', 'EC' and 'EP' are used. This allows Central to identify which mode the SST is operating in.

Table Note 2: Only numeric data can be entered through the Supervisor menus. For ways of providing alphabetic data, refer to the *APTRA Advance NDC, Developer's Guide.*

I'm Alive Message

The "I'm Alive" message is a solicited status message with a status descriptor of 'F' and a message identifier of '6'. This message is sent as if a network operational command message with a command code of '3' requesting configuration ID has been received and is controlled by two timers: the Activity timer and the Error Redial timer.

Table 13-4
I'm Alive Message Format

Field	Number of Bytes	Mandatory/ Optional	Description
a	Var	M	Header - Protocol-dependent.
b	1	M	Message Class. The message class is: '2' - Solicited message.
c	1	M	Message Sub-Class. The message sub-class is: '2' - Status message.
FS	1	M	Field Separator.
d	3 or 9	O	Logical Unit Number (LUNO). This Number is defined in a field transmitted to the terminal in a Configuration Parameters Load message. The default number is 000. If the data security feature is configured, an additional six characters are present that contain the machine number.
FS	1	M	Field Separator.
FS	1	M	Field Separator.
f	1	M	Status Descriptor. Describes the status message as follows: 'F' Terminal State.
FS	1	M	Field Separator.
g	Var	M	Status information.

Activity Timer

The Activity timer determines the length of time to wait before sending an I'm Alive message. The timer is started on disconnection of the line to Central and stopped on connection. If the timer expires, the SST attempts to establish a connection. If the attempt succeeds, an “I’m Alive” message is sent. The timer is configurable through the Dialup Config menu in Supervisor.

Error Redial Timer

When an error is encountered on the line, the SST goes off-line for the period of the Error Redial timer, after which it dials up and attempts to send an I'm Alive message. If the attempt succeeds, the SST will go in-service. If the attempt fails, the SST remains off-line and restarts the timer. The timer is configurable through the Dialup Config menu in Supervisor.

Transaction Completion

Normally, an SST responds to a transaction reply with a Ready message. In a dialup system, the default behaviour is for a Ready message to trigger a disconnection. However, Transaction Completion can be disabled through Supervisor. In this case, Central will be expected to disconnect as soon as the Transaction Reply has been acknowledged by the SST and no Ready message will be sent. A solicited error or reject message will cause the SST to redial Central.

Message on CP

When a CP message is sent to Central, the connection is normally terminated by Central. However, if Central does not terminate the connection and Message on CP is enabled, the connection is maintained after the CP message is sent, for the duration of the CP Message timer. This allows Central to send any additional messages such as the NOOP message, and allows the connection to be maintained over chained transactions. The CP Message timer is configurable through Supervisor.

Message Suppression

Message suppression is disabled by default but can be enabled through Supervisor. It allows suppression of Alarms and Supervisor Key Presses messages except for Supervisor Entry and Exit messages, which are always sent. The suppressed messages will still be journalled.

Dialup Messages: Central to SST

Some Central applications send messages with a header in the following format. The header allows Central to request the SST to dial when it is idle.

If a header is present on messages from Central, the Host Message Header option must be enabled through Supervisor (Dialup configuration menu).

Table 13-5
Central Messages Header Format

Field	Number of Characters	Type	Contents	Description
Command Pending Flag	1	Alpha-numeric	Y	A command is pending at Central
			Space	No command in pending at Central
Reserved	7	Alpha-numeric	Spaces	Reserved for future use.

Disconnect Message

Central can send a terminal command with a command code of 'F' to disconnect the line. When the SST sends a message to Central and Central does not have any messages to send to the SST, Central will send the disconnect command to the SST. If the SST has another message to send to the host, that message will be sent. If the SST does not have any other messages to send when the disconnect comment is received, the SST will send a Ready message to trigger disconnection.

Table 13-6
Disconnect Message Format

Field	Number of Bytes	Mandatory /Optional	Description
a	Var	M	Header - Protocol-dependent.
b	1	M	Message Class. The message class is: '1' - Terminal Command.
FS	1	M	Field Separator.

Field	Number of Bytes	Mandatory /Optional	Description
d	3 or 9	O	Logical Unit Number (LUNO). This Number is defined in a field transmitted to the terminal in a Configuration Parameters Load message. The default number is 000. If the data security feature is configured, an additional six characters are present that contain the machine number.
FS	1	M	Field Separator.
FS	1	M	Field Separator.
f	1	M	Command code. One character field used to identify the type of Terminal Command code. The code used in this field is: 'F' Disconnect.

No-Op Message

The No-Op terminal command, with a command code 'G', can optionally be sent to the SST. This command can be used to transfer control of the line back to the SST after a CP or EP/Ready message, and retain the connection. No message is sent in response to this command.

Table 13-7
No-Op Message Format

Field	Number of Bytes	Mandatory/ Optional	Description
a	Var	M	Header - Protocol-dependent.
b	1	M	Message Class. The message class is: '1' Terminal Command.
FS	1	M	Field Separator.
d	3 or 9	O	Logical Unit Number (LUNO). This Number is defined in a field transmitted to the terminal in a Configuration Parameters Load Message. The default number is 000. If the data security feature is configured, an additional six characters are present containing the machine number.
FS	1	M	Field Separator.
FS	1	M	Field Separator.
f	1	M	Command code. One character field used to identify the type of Terminal Command code. The code used in this field is: 'G' Maintain connection to complete transaction (No-Op).

Example Usage of the No-Op Command

One example of this use is where a customer transaction requires two request / reply completion transmissions in order to complete the transaction. The No-Op command sent after the first completion allows the second request to be sent without the SST hanging up and redialling. Message on CP must be enabled through Supervisor to allow a message to be sent after the CP message.

Go Out of Service (Supervisor Mode)

If the host sends a Go Out of Service command to the SST while the SST is in Supervisor mode, the SST will send a Ready message immediately. This is different from a leased-line system, where the command is queued at the SST and not processed until the SST exits Supervisor mode.

Appendix A

Reserved Screens

Overview

The tables in this appendix illustrate the default text for the Supervisor menu screens, and the other reserved screens not covered in Chapter 3, “Screen Data”. For all the reserved screens, refer to the *resrvd.def* file provided with Advance NDC.

Some screens contain long control sequences as well as screen text, for example, screen M06. The meaning of the control is explained in the table, instead of the control itself, which you can see in *resrvd.def*. Other screens have printer control sequences, for example, M15. For these, the ASCII text equivalent is shown in the table, with an explanation of what the control does.

In *resrvd.def*, the percent sign (%) is often used to indicate the *start* of text that is dynamically edited by the terminal before the screen is displayed or printed. For screens that use this convention, the percent sign acts as a placeholder and should be left in place if you edit or localise the text. The data is displayed without padding. In the tables, the percent sign is used to show the start and extent of the space used by the dynamically edited data.

For each reserved screen, the tables identify the screen number and the position of the text within the screen data (this is not necessarily the final position displayed on the cardholder screen / enhanced operator interface). Text position is displayed by the row and column positions for each screen, starting from row 1, column 1 in the top left corner. Operator screens are 16 rows by 32 columns and printer screens are 16 by 40.

Screens with an asterisk after the screen number indicate the screens are displayed only on other vendors’ SSTs. For more information, refer to the *APTRA Advance NDC, Multi-Vendor Support Reference Manual.*

Screens starting with a lower-case letter apply to functionality developed for Advance NDC and are placed after screens starting with an upper-case letter, which apply to both Advance NDC and NDC+. Additional Supervisor menus and functions starting with a lower-case ‘i’ for the BNA, communications configuration, and settlement are grouped at the end of the appendix.

Note: Sideways printing on the receipt is not supported when printing Supervisor reserved screens.

'A' Supervisor Acknowledgements

'A' screens include cardholder and enhanced operator interface (EOP) acknowledgement lines.

For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table A-1
Supervisor Acknowledgement Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
Acknowledgement Lines		
A04	1	SUPPLY STATE PRINTD
A05	1	ALL COUNTERS PRINTD
A06	1	PRINTER INITIALISED
A07		Reserved
A08	1	CONFIG PRINTED
A09	1	KEY A ENTERED
A10	1	KEY A STORED CHKSUM =
A11	1	KEY B ENTERED
A12	1	KEY B STORED CHKSUM =
A13		Reserved
A14	1	KEY V ENTERED
A15	1	KEY V STORED
A16		Reserved
A17	1	ACCESS DATA PRINTED
A18	1	ACCESS SET
A19	1	DEFAULT SET
A20	1	FUNCTION DONE
A21	1	FUNCTION CANCELLED
A22	1	E/JOURNAL ACTIVE
A23	1	EJ LOG COPIED OK

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
A24 - A40		Reserved
A41	1	COIN COUNTS CLEARED
A42		Reserved
A43	1	ENVELOPE TAKEN
A44	1	CAMERA INITIALISED *(not supported)*
A45	1	DEPOSIT INITIALISED
A46	1	FUNCTION EXITED
A47– A51		Reserved
A52	1	EJ LOG RECOPIED OK
A53– A60		Reserved
A61	1	EJ & JOURNAL ACTIVE
A62 – A69		Reserved
A70	1	KEY A STORED
A71	1	KEY B STORED
A72– A88		Reserved
A89	1	KEY LOADED
A90	1	SILENTDEBUG STARTED
A91	1	SILENTDEBUG STOPPED
A92	1	SILENTDEBUG LOGS CLEARED
A93	1	SILENTDEBUG LOGS COPIED
A94	1	SILENTDEBUG CONFIGURED
A95	1	STARTED
A96	1	STOPPED

'E' Error Screens

'E' or 'e' screens are error messages that appear on the cardholder screen and enhanced operator interface.

For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table A-2
Error Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E0000	1	EC00
E0001	1	EC01
E0002	1	EC02
E0003	1	EC03
E0004	1	ILLEGAL EKC KEYSPCE *(not supported)*
E0005	1	NO HALLMARK KEY *(not supported)*
E0006–E00015		Reserved
E0016	1	EJ NOT PRESENT
E0017		Reserved
E0018	1	TOO MANY DIGITS
E0019	1	NOT ENOUGH DIGITS
E0020	1	INVALID VALUE
E0021		Reserved
E0022	1	DEVICE NOT PRESENT
E0023	1	DISK I/O ERROR
E0024		Reserved
E0025	1	COMMAND NOT ALLOWED
E0026	1	COINS EXCEED LIMIT OF 65534
E0027-E0031		Reserved
E0032	1	CAMERA FAILURE *(not supported)*
E0033	1	INVALID MEI OPTION

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E0034–E0037		Reserved
E0038	1	EJ BACKUP INVALID
E0039	1	FRONT FEATURE ONLY
E0040	1	DCS FAILURE
E0041		Reserved
E0042	1	LOAD ERROR
E0043–E0046		Reserved
E0047	1	CALL ERROR
E0048	1	JRNL PRNTR PRESENT
E0049		Reserved
E0050	1	NO PART 1 SET
E0051–E0052		Reserved
E0053	1	PART 1 ALREADY SET
E0054–E0099		Reserved
E0100	1	INVALID FUNCTION
E0101	1	INVALID SELECTION
E0102	1	INCOMPLETE DATA
E0103	1	INVALID COMBINATION
E0104	1	INITIALISATION FAILURE
E0105	1	NO JOURNAL DEVICE
E0106	1	EJ ALREADY ACTIVE
E0107	1	PAPER JOURNAL ACTIVE
E0108	1	ERROR DURING ACTIVATION
E0109	1	COPY TO DRIVE FAILED
E0110	1	KEY DATA NOT PRESENT
E0111	1	INVALID KEY DATA

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E0112	1	FAILED TO STORE KEY V
E0113	1	FAILED TO STORE KEY A
E0114	1	FAILED TO STORE KEY B
E0115	1	NO VALID DATA PRESENT
E0116	1	PRINT FAILURE
E0117	1	EKC TIMEOUT *(not supported)*
E0118		Reserved
E0119	1	INVALID MODE
E0120–E1099		Reserved
E1100	1	CARD READER
E1101	1	CARD READER ERROR
E1102	1	CARD READER FATAL
E1103	1	CARD JAM
E1104	1	CARD POS UNKNOWN
E1105	1	SEC MOD NOT READY
E1106	1	CAPTURE BIN FULL
E1107	1	CAPT BIN FULL SOON
E1108–E1199		Reserved
E1200	1	CASH HANDLER
E1201	1	CASH HANDLER ERROR
E1202	1	CASH HANDLER FATAL
E1203	1	SAFE DOOR OPEN
E1204	1	SAFE DOOR UNLOCKED
E1205	1	SAFE DOOR ERROR
E1206	1	CASH UNITS FATAL
E1207	1	CASH UNITS ERROR
E1208	1	STACKER ERROR

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E1209	1	SHUTTER JAMMED
E1210	1	SHUTTER ERROR
E1211	1	PRESENTER ERROR
E1212	1	TRANSPORT FATAL
E1213	1	TRANSPORT ERROR
E1214	1	TOP CASS
E1215	1	SECOND CASS
E1216	1	THIRD CASS
E1217	1	BOTTOM CASS
E1218	1	REJECT CASS
E1219	1	ERROR
E1220	1	VALS ERR
E1221	1	NOTE ERR
E1222	1	REMOVED
E1223	1	FULL
E1224	1	FULL SOON
E1225	1	LOW
E1226	1	EMPTY
E1227	1	INTERLOCK OPEN
E1228–E1249		Reserved
E1250	1	CDM 01
E1251	1	CDM 01 ERROR
E1252	1	CDM 01 FATAL
E1253–E1263		Reserved
E1264	1	C1
E1265	1	C2
E1266	1	CDM 02

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E1267	1	CDM 02 ERROR
E1268	1	CDM 02 FATAL
E1269–E1299		Reserved
E1300	1	PINPAD
E1301	1	PINPAD ERROR
E1302	1	PINPAD FATAL
E1303	1	ENC NOT INITIALISED
E1304	1	ENC STATE UNKNOWN
E1305	1	ENC NOT READY
E1306	1	ENC BUSY
E1307–E1399		Reserved
E1400	1	RECEIPT PRINTER
E1401	1	JOURNAL PRINTER
E1402	1	RECEIPT ERROR
E1403	1	JOURNAL ERROR
E1404	1	RECEIPT FATAL
E1405	1	JOURNAL FATAL
E1406	1	MEDIA JAMMED
E1407	1	MEDIA NOT PRESENT
E1408	1	PAPER LOW
E1409	1	PAPER OUT
E1410	1	TONER LOW
E1411	1	TONER OUT
E1412	1	INK LOW
E1413	1	INK OUT
E1414	1	LAMP ERROR
E1415	1	RETRACT BIN FULL

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E1416	1	PRINTHEAD LOW
E1417	1	PRINTHEAD OUT
E1418	1	KNIFE LOW
E1419	1	KNIFE OUT
E1420	1	STATEMENT PRINTER
E1421	1	STATEMENT ERROR
E1422	1	STATEMENT FATAL
E1423–E1499		Reserved
E1500	1	ENV DISPENSER
E1501	1	ENV DEPOSITORY
E1502	1	ENV DISP/DEPOSITORY
E1503	1	ENV DISPENSER ERROR
E1504	1	ENV DEPOSIT ERROR
E1505	1	ENV DISPENSER FATAL
E1506	1	ENV DEPOSIT FATAL
E1507	1	CONTAINER ERROR
E1508	1	CONTAINER MISSING
E1509	1	CONTAINER FULL SOON
E1510	1	CONTAINER FULL
E1511	1	TRANSPORT ERROR
E1512	1	TRANSPORT UNKNOWN
E1513	1	DISPENSER EMPTY
E1514	1	DISPENSER LOW
E1515	1	DISPENSER FULL
E1516	1	DISPENSER ERROR
E1517	1	DISPENSER UNKNOWN
E1518	1	ENV UNIT MISSING
E1519	1	PRINTER ERROR

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E1520	1	PRINTER UNKNOWN
E1521	1	SHUTTER OPEN
E1522	1	SHUTTER JAMMED
E1523	1	SHUTTER UNKNOWN
E1524	1	NO DISPENSER
E1525	1	TONER LOW
E1526	1	TONER EMPTY
E1527–E1599		Reserved
E1600	1	NIGHT SAFE DEPOSITORY
E1601–E1649		Reserved
E1650	1	COIN DISPENSER
E1651	1	COIN DISPENSER ERROR
E1652	1	COIN DISPENSER FATAL
E1653	1	RACKING ERROR
E1654	1	RACKING OUT
E1655	1	HOPPERS FATAL
E1656	1	HOPPERS ERROR
E1657	1	COIN HOPPER 1
E1658	1	COIN HOPPER 2
E1659	1	COIN HOPPER 3
E1660–E1669		Reserved
E1670	1	COIN HOPPER 4
E1671	1	COIN HOPPER 5
E1672	1	COIN HOPPER 6
E1673	1	COIN HOPPER 7
E1674	1	COIN HOPPER 8

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
E1675–E1800		Reserved
E1801	1	COMMUNICATIONS CLOSED
E1802	1	COMMUNICATIONS FATAL
E1803	1	COMMUNICATIONS DOWN
E1804-E1900		Reserved
E1901	1	POSSIBLE TAMPERING
E1902	1	UNKNOWN ERROR
E1903	1	NUMBER OF FAULTS = %
E1904	1	<PRESS CANCEL TO EXIT>
e00	1	NOT CONFIGURED
e01	1	BIN NOT PRESENT
e02	1	FAILED TO CREATE CHECKSUM
e03	1	FAILED TO UPDATE CURRENCY
e04	1	FAILED TO UPDATE THRESHOLD
e05	1	DUPLICATE ENTRY - CASS % & %
e06*	1	FAILED TO UPDATE CONFIGURATION
e07*	1	FAILED TO CALIBRATE CASSETTE
e08		Reserved
e09	1 2	EJ UPLOAD MAY BE IN PROGRESS PRESS 1-CONTINUE 0-CANCEL
e10	1	INVALID, EJ MODE IS STANDARD
e11	1	INVALID; MAX POSSIBLE VALUE=%
e12	1	INSUFFICIENT HARD DISK SPACE
e13	1	FAILED TO OVERWRITE IN CDRW
e15	1	XML FILE ERROR
e16	1	FILE NOT FOUND
e17	1	SCHEDULED INIT NOT CONFIGURED
e18	1	INVALID PSWD (MIN 4,MAX 20 CHARS)

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
e19	1	AUTO INIT COPY DRIVE FAILED
e20	1	NO DRIVES AVAILABLE
e21	1	CHECKSUM FAILED
e22	1	COMPRESSION FAILED
e23	1	AUTO INIT COPY DRIVE NOT CONFIGURED
e24	1	SILENTDEBUG NOT STARTED
e25	1	SILENTDEBUG NOT STOPPED
e26	1	SILENTDEBUG LOGS NOT DELETED
e27	1	SILENTDEBUG LOGS NOT COPIED
e28	1	NO DRIVES SUITABLE FOR COPY
e29	1	SILENTDEBUG ALREADY STARTED
e30	1	SILENTDEBUG ALREADY STOPPED
e31	1	SILENTDEBUG CONFIG INVALID
e32	1	INVALID:MAX VALUE %%%%%

'I' Supervisor Information

'I' screens contain the following information:

- Encryption keys
- Cash and counter displays
- Configuration data
- Multiple card image selection for rear settlement
- EJ log file inspection.

For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table A-3
Supervisor Information Screens

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I00	1	
	2	
	3	
	4	
	5	
	6	ENCRYPTION KEY A
I01	1	
	2	
	3	
	4	
	5	
	6	ENCRYPTION KEY B
I02		Reserved
I03	1	TYPE 1 TYPE 2
	2	CASSETTE %%%%% %%%%%
	3	+REJECTED %%%%% %%%%%
	4	=REMAINING %%%%% %%%%%
	5	+DISPENSED %%%%% %%%%%
	6	=TOTAL %%%%% %%%%%
	7	
	8	TYPE 3 TYPE 4
	9	CASSETTE %%%%% %%%%%
	10	+REJECTED %%%%% %%%%%
	11	=REMAINING %%%%% %%%%%
	12	+DISPENSED %%%%% %%%%%
	13	=TOTAL %%%%% %%%%%
	14	LAST CLEARED %%/%%/%% %%:%%

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I04	1	
	2	CARDS CAPTURED %%%%%
	3	LAST CLEARED %%/%%/%% %%:%%
	4	
	5	DEPOSITS MADE %%%%%
	6	LAST CLEARED %%/%%/%% %%:%%
	7	
	8	ACTIVITY COUNT = %%%%%%%
I05	1	*SUPPLIES STATUS*
I06	1	*CONFIGURATION DATA*
See 'M'	2	ROLL WIDTH = %% JRNL=%
Supervisor	3	LEFT COLUMN = %% JRNL LVL=%
Menus	4	TRACK 1 TYPE = %%%%%%
	5	MESSAGE MODE = %%%%%%%%%%%%%%%%%%
	6	MACHINE NO = %%%%%%
	7	DATE = %%/%%/%% TIME = %%:%%:%%
	8	COUNT PRNTR = %%%%%%%
	9	RESTART MODE = %%%%%%%
	10	EJ BKUP = % NO. BKUPS = %%%%
	11	VOLUME SST = 0
	12	VOLUME JACK = 0
	13	MAX STATEMENT LENGTH = %%
I07	1	*CASH TEST*
I08	1	CURRENT SCREEN = %%%
I09	1	
	2	
	3	
	4	
	5	
	6	ENCRYPTION KEY V
I10	1	*ACCESS DATA*
	2	INITIAL ENT = %%%%%%
	3	INITIAL DISP = %%%%%
	4	EXIT MODE = %%%%%%%%%%
	5	MAC NUMBER = %%%%%%%%%%%%%%%%
	6	A KEY KVV = %%%%
	7	B KEY KVV = %%%%
	8	V KEY KVV = %%%%
	9	COMS KEY KVV = %%%%
	10	MAC KEY KVV = %%%%

Note: Digits in positions 17-32 of message mode are only displayed if the corresponding digits are entered. Trailing digits with default '0' values are omitted.

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I11	1	*HALLMARK VERIFICATION*
	2	
	3	
	4	HMQ = %%%%%%%%%%%%%%%%%%%%
	5	HMA = %%%%%%%%
	6	FAV = %%%%%%%%
	7	PEC = %
	8	IPE = %
	9	ROM FIRMWARE = %%%%%%%
	10	RAM FIRMWARE = %%%%%%%
	11	SERIAL NUMBER = %%%%%%%%
	12	
	13	PRESS <ENT> FOR MENU OR

Note: Hallmark verification is not supported in Advance NDC 2.06 or later.

I12		MODULE = 2
I13–I14		Reserved
I15	1	PAPER
I16	1	DISK
I17	1	NONE
I18	1	
	2	
	3	
	4	
	5	
	6	
	7	<<A B>>
	8	
	9	
	10	<<C D>>
	11	
	12	
	13	<<E F>>
I19	1	
	2	
	3	
	4	<<A B>>
	5	CURRENT DIGIT = %
	6	
	7	<<C D>>
	8	
	9	
	10	<<E F>>

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I20		Reserved
I21	1	* M/C DD/MM/YY HH:MM:SS *
I22-I26		Reserved
I27	1	MODULE = 2
I28		Reserved
I29	1	
	2	1 = SINGLE LENGTH WITHOUT XOR
	3	2 = SINGLE LENGTH WITH XOR
	4	3 = DOUBLE LENGTH WITH XOR
	5	4 = DOUBLE LENGTH WITHOUT XOR
	6	
	7	
	8	CURRENT MODE = %
	9	NEW MODE = %
	10	
	11	CHANGING MODE WILL
	12	DESTROY ALL KEYS
I30	1	ENTER SECURE KEY
	2	NCR PHYSICAL KEYBOARD LAYOUT
	3	----------
	4	| 1 | 2 | 3 | A |
	5	|---------- |
	6	| 4 | 5 | 6 | B |
	7	|---------- |
	8	| 7 | 8 | 9 | C |
	9	|---------- |
	10	| D | 0 | E | F |
	11	----------
	12	
	13	CURRENT DIGIT =

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I31	1	ENTER SECURE KEY
	2	PHYSICAL KEYBOARD LAYOUT
	3	-----------------------------
	4	| 1(B)| 2(C) | 3(D) | CLEAR |
	5	|-----------------------------|
	6	| 4(E)| 5(F) | 6 | CANCEL|
	7	|-----------------------------|
	8	| 7 | 8 | 9 | ENTER |
	9	|-----------------------------|
	10	|SHFT | 0(A) | | |
	11	-----------------------------
	12	
	13	CURRENT DIGIT =
I32		Reserved
I33	1	EJ CONFIGURATION DATA
	2	
	3	JRNL MODE = %
	4	EJ MODE = %
	5	MAX EJ BACKUPS = %%%%%
	6	MULTIPLE DESTINATIONS = %%%%%
	7	CUTOVER = %%%%%
	8	SCHEDINIT = %%%%% PATTERN = %%%%%%%
	9	AGENT = %%%%%
	10	AUTOMATIC INIT COPY DRIVE = %%%
	11	COMPRESSION = %%%%%
	12	PRIVACY PASSWORD = %%%%%%%%
	13	EJ FILE SIZE(KB) = %%%%%
	14	HOST CONTROL EJ MODE = %%%%%
I34–I36		Reserved
I37	1	*CASH TEST* MODULE = 1
I38	1	SWITCHED ON
I39	1	SWITCHED OFF
I40	1	THE CARD IMAGES PRESENT ARE
	2	MARKED WITH AN ''X'':
	3	
	4	0 1 2 3 4 5 6 7 8 9
I41		Reserved

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I42	1	
	2	COIN DISPENSER
	3	HOPPER % HOPPER %
	4	REMAINING %%%%% %%%%%
	5	+DISPENSED %%%%% %%%%%
	6	=TOTAL COINS %%%%% %%%%%
	7	
	8	HOPPER % HOPPER %
	9	REMAINING %%%%% %%%%%
	10	+DISPENSED %%%%% %%%%%
	11	=TOTAL COINS %%%%% %%%%%
	12	LAST CLEARED dd/mm/yy hh:mm
I43		Reserved
I44	1	*CONFIGURATION DATA*
	2	STANDARD COIN COUNTS
	3	HOPPER 1= %%%%% HOPPER 2= %%%%%
	4	HOPPER 3= %%%%% HOPPER 4= %%%%%
I45	1	*CHECK CDM*
I46–I62		Reserved
I63	1	DUAL
I64-I65		Reserved
I66	1	*CONFIGURATION DATA*
	2	STANDARD COIN COUNTS
	3	HOPPER 1= %%%%% HOPPER 2= %%%%%
	4	HOPPER 3= %%%%% HOPPER 4= %%%%%
	5	HOPPER 5= %%%%% HOPPER 6= %%%%%
	6	HOPPER 7= %%%%% HOPPER 8= %%%%%
I67–I69		Reserved
I70	1	
	2	CARDS CAPTURED %%%%%
	3	LAST CLEARED %%/%%/%% %%:%%
	4	
	5	
	6	
	7	
	8	ACTIVITY COUNT = %%%%%%%
I71–I95		Reserved
I96	1	
	2	KVV VALUE = %%%%

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
I97	1	SELECT TO ENTER KEY
	2	OR CHANGE KEY MODE
	3	
	4	0 ENTER KEY A
	5	1 ENTER KEY B
	6	2 ENTER KEY V
	7	
	8	9 CHANGE KEY ENTRY MODE
I98	1	
	2	1 = SINGLE LENGTH WITHOUT XOR
	3	2 = SINGLE LENGTH WITH XOR
	4	
	5	
	6	
	7	
	8	CURRENT MODE = %
	9	NEW MODE = %
	10	
	11	CHANGING MODE WILL
	12	DESTROY ALL KEYS
I99	1	
	2	3 = DOUBLE LENGTH WITH XOR
	3	4 = DOUBLE LENGTH RESTRICTED

'M' Supervisor Menus

'M' or 'm' screens contain information on keyboards and the following menus:

- Select
- Replenish
- Configure
- Access

For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Note: The following options are not supported in Advance NDC:

- On the Replenish menu, option 42 FILL CAMERA
- On the Access menu, option 14 HALLMARK

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Table A-4
Supervisor Menu Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
M01	1	
	2	REPLENISH
	3	
	4	0 DISP SPPLY 1 PRNT SPPLY
	5	2 DISP CASH 3 DISP CNTRS
	6	4 PRNT CNTRS 5 CLR CASH
	7	6 CLR CARDS 7 CLR DEPOS
	8	8 ADD CASH 9 INIT RECPT
	9	10 TEST CASH 12 STD CASH
	10	13 INIT STMNT 15 SPVR TRANS
	11	18 DISP COINS 19 CLR COINS
	12	20 ADD COINS 21 STD COINS
	13	99 MORE

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
M02	1	
	2	CONFIGURE
	3	
	4	0 DISP CONFIG 1 PRNT CONFIG
	5	2 TRACK 1 3 ROLL WIDTH
	6	4 MACHINE NO 5 DATE/TIME
	7	6 MSG MODE 7 DISP SCRN
	8	8 SET PRINT 9 SET CASH
	9	10 RST MODE 11 SET DEFAULT
	10	12 TRACE ON 13 TRACE OFF
	11	14 SET COINS 30 SET JRNL
	12	31 VOLUME SST 32 VOLUME JACK
	13	33 DISBL JRNL 99 MORE
M03	1	
	2	ACCESS
	3	
	4	0 DISP ACCESS 1 PRNT ACCESS
	5	2 SET PASSWRD 3 INIT ENTRY
	6	4 INIT DISPLY 5 EXIT MODE
	7	6 ENTER V 7 WRITE V
	8	8 ENTER A 9 WRITE A
	9	10 ENTER B 11 WRITE B
	10	12 ENTER MAC 13 SET ACCESS
	11	14 HALLMARK 25 KEY ENTRY
M04–M05		Reserved
M06	1	STD NON-SUP KEYBOARD NO. 0
	2	Sets the standard Transaction Processing keyboard 0 layout. For details, see "Standard Keyboard Layouts" in Chapter 4, "Keyboard Data and Layouts".

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
M07	1	
	2	REPLENISH
	3	
	4	40 INIT EJRNL 41 FILL ENV
	5	42 FILL CAMERA 43 INIT DEPOS
	6	44 CLR BINS 45 CHECK CDM
	7	47 DUMP IMAGES 50 RCOPY EJRNL
	8	51 DIRECT EJ BACKUP
	9	53 CLR BNA 54 INIT BNA
	10	58 DSP BNA CNTS 59 PRN BNA CNTS
	11	
	12	
	13	
	14	99 MORE
M08		Reserved
M09	1	ALT NON-SUP KEYBOARD NO. 1
	2	Sets the alternative Transaction Processing keyboard 1 layout. For details, see "Standard Keyboard Layouts" in Chapter 4, "Keyboard Data and Layouts".
M10	1	NOTES ACCEPTED - ESCROW SPACE
	2	1=% 2=% 3=% 4=% 5=% 6=%
	3	7=% 8=% 9=% 10=% 11=% 12=%
	4	13=% 14=% 15=% 16=% 17=% 18=%
	5	19=% 20=% 21=% 22=% 23=% 24=%
	6	25=% 26=% 27=% 28=% 29=% 30=%
	7	31=% 32=% 33=% 34=% 35=% 36=%
	8	37=% 38=% 39=% 40=% 41=% 42=%
	9	43=% 44=% 45=% 46=% 47=% 48=%
	10	49=% 50=%
	11	
	12	TOTAL NOTES ENTERED = %
M11	1	NOTES ACCEPTED - ESCROW FULL
	2	1=% 2=% 3=% 4=% 5=% 6=%
	3	7=% 8=% 9=% 10=% 11=% 12=%
	4	13=% 14=% 15=% 16=% 17=% 18=%
	5	19=% 20=% 21=% 22=% 23=% 24=%
	6	25=% 26=% 27=% 28=% 29=% 30=%
	7	31=% 32=% 33=% 34=% 35=% 36=%
	8	37=% 38=% 39=% 40=% 41=% 42=%
	9	43=% 44=% 45=% 46=% 47=% 48=%
	10	49=% 50=%
	11	
	12	TOTAL NOTES ENTERED = %

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
M12	1	
	2	SELECT
	3	
	4	4 REPLENISH 5 CONFIGURE
	5	6 ACCESS 7 DIAGNOSTIC
	6	8 TRANSFER 9 EXIT
	7	26 FAULT DISPLAY
	8	90 MISC FUNCS
M13–M14		Reserved
M15		ESC[00p ESC(1 ESC)6 Sets the left margin and the primary and secondary character sets. For details, see the "Special Features" section in Chapter 3, "Screen Data".
M16		DC2 ESC[00m ESCPi0 ESC \ FF Sets colours to default, screen blinking off, clears the screen, sets the cursor to the top left-hand corner and resets the display mode to the NDC+ default. For details, see the "Control Characters" and "Special Features" sections of Chapter 3, "Screen Data".
m00	1	
	2	TCP/IP CONFIG
	3	
	4	0 RMT ADDRESS 1 RMT PORT NO
	5	3 LCL PORT NO 4 CONFIG AS SRV
	6	
	7	5 ADVANCED
	8	
	9	6 DISP TCP/IP 7 PRNT TCP/IP
m01	1	
	2	ADVANCED TCP/IP CONFIG
	3	
	4	0 LEN SIZE 1 LEN SIZE
	5	2 LEN FORMAT 3 LEN ADJUST
	6	4 LEN OFFSET 5 LEN EMBED
	7	6 RCV TIMEOUT 7 RETRY TIMER
	8	8 KEEP ALIVE 9 RECON CLOSE

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
m02	1	
	2	CONFIGURE
	3	34 EJ OPTIONS
	4	35 JOURNAL LEVEL
	5	37 TCP/IP CONFIG
	6	38 DIALUP CONFIG
	7	39 GBXX CONFIGURATION
	8	44 TROUBLESHOOTING
	9	45 MAX STATEMENT LENGTH
	10	80 DISP CSH/ACC CONFIG
	11	81 PRNT CSH/ACC CONFIG
	12	82 GBNA.INI CONFIG
	13	
	14	99 MORE
m03	1	
	2	ACCESS
	3	
	4	0 DISP ACCESS 1 PRNT ACCESS
	5	2 SET PASSWRD 3 INIT ENTRY
	6	4 INIT DISPLY 5 EXIT MODE
	7	6 ENTER V 7 WRITE V
	8	8 ENTER A 9 WRITE A
	9	10 ENTER B 11 WRITE B
	10	12 ENTER MAC 13 SET ACCESS
	11	14 HALLMARK 15 COPYFILE
	12	20 PROMOTE MENU 25 KEY ENTRY
m04		Reserved
m05	1	
	2	MISC FUNCS
	3	
	4	0 PRNT CMPNT VERS
	5	1 PRNT SCRW VERS
m06–m11		Reserved

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
m12	1	
	2	TROUBLESHOOTING
	3	
	4	PD INVESTIGATION
	5	1 START 3 COPY LOGS
	6	2 STOP
	7	
	8	SILENTDEBUG: %%%%%%%
	9	4 START 7 COPY LOGS
	10	5 STOP 8 DELETE LOGS
	11	6 RECONFIGURE
	12	
	13	
m13	1	SELECT DRIVE
	2	
	3	%
	4	%
	5	%
	6	%
	7	%
	8	%
	9	%
m14–m17		Reserved
m23	1	
	2	RCOPY
	3	
	4	1 EJNNNNNN.XXX MM/DD/YY
	5	2 EJNNNNNN.XXX MM/DD/YY
	6	3 EJNNNNNN.XXX MM/DD/YY
	7	4 EJNNNNNN.XXX MM/DD/YY
	8	5 EJNNNNNN.XXX MM/DD/YY
	9	6 EJNNNNNN.XXX MM/DD/YY
	10	7 EJNNNNNN.XXX MM/DD/YY
	11	8 EJNNNNNN.XXX MM/DD/YY
	12	9 EJNNNNNN.XXX MM/DD/YY
	13	10 EJNNNNNN.XXX MM/DD/YY
	14	
	15	SELECT FROM LIST TO COPY:
	16	OR PRESS ENTER TO SEARCH:

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
m24	1	
	2	CONFIGURE EJ
	3	
	4	0 DISP EJ CONFIG
	5	1 EJ BACKUP MODE
	6	2 MAX NO OF BACKUPS
	7	3 ENABLE MULTIPLE DESTINATIONS
	8	4 AUTO INIT EJ OPTIONS
	9	5 COMPRESSION
	10	6 MAX FILE SIZE
	11	7 DSBL HOST CNTRL OF EJ MODE
	12	8 PRIVACY OPTIONS
m25	1	
	2	EJ BACKUP MODE
	3	
	4	0 STANDARD EJ
	5	1 MULTIPLE EJ
	6	
	7	
	8	CURRENT = %
m26	1	
	2	RCOPY
	3	
	4	1 DISPLAY EJ FILES
	5	2 SEARCH EJ BY DATE
	6	3 SEARCH EJ BY EXTENSION
m28	1	SCHEDULED INIT OPTIONS
	2	
	3	1 ENABLE/DISABLE EJ SCHEDULED INIT
	4	2 SCHEDULED INIT PATTERN
m29	1	SCHEDULED INIT PATTERN
	2	
	3	1 DAILY
	4	2 WEEKLY
	5	3 MONTHLY
m30	1	PRIVACY OPTIONS
	2	
	3	1 DISABLE EJ PRIVACY
	4	2 SET EJ PASSWORD

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
m31	1	AUTHENTICATION-EJ PRIVACY
	2	----------
	3	|1ABC|2DEF|3GHI|
	4	|----|----|----|
	5	|4JKL|5MNO|6PQR|
	6	|----|----|----|
	7	|7STU|8VWX|9YZ*|
	8	+----|----|----+
	9	|0(#)|
	10	------
	11	
	12	%%%%%%%%%%%%%%%%%%%%
m32	1	SET EJ PASSWORD
	2	----------
	3	|1ABC|2DEF|3GHI|
	4	|----|----|----|
	5	|4JKL|5MNO|6PQR|
	6	|----|----|----|
	7	|7STU|8VWX|9YZ*|
	8	+----|----|----+
	9	|0(#)|
	10	------
	11	
	12	%%%%%%%%%%%%%%%%%%%%
m55	1	* TCP/IP CONFIGURATION DATA *
	2	CONFIG SERVER = %
	3	REMOTE ADDR = %
	4	REMOTE PORT = %
	5	LOCAL PORT = %
	6	KEEP ALIVE = %
	7	RETRY TIMER = %
	8	RECON CLOSE = %
	9	MSG FORMAT = %
	10	LEN SIZE = %
	11	LEN FORMAT = %
	12	LEN ADJUST = %
	13	LEN OFFSET = %
	14	LEN EMBED = %
	15	RCV TIMEOUT = %
m60	1	AUTO INIT EJ OPTIONS
	2	
	3	1 CUTOVER
	4	2 SCHEDULED INIT OPTIONS
	5	3 AGENT
	6	4 AUTOMATIC INIT COPY DRIVE

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
m90	1	MV DIAGNOSTICS
m91	1	DEVICE FITNESS
m92	1	0 CLEAR ALL 8 BACK 9 NEXT
m93	1	0 CLEAR ALL
m94	1	26 FAULT DISPLAY 91 SHUTDOWN
m95	1	THERE ARE NO DEVICES
	2	CONFIGURED
m96	1	DEVICE SELF TEST
	2	
	3	%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
	4	
	5	
	6	%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

'P' Supervisor Prompts

'P' or 'p' screens are prompt lines that appear on the cardholder screen and enhanced operator interface.

For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table A-5
Supervisor Prompts Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
P00	1	SELECT FUNCTION-
P01		Reserved
P02	1	ENTER CASSETTE TYPE-
P03	1	ENTER NO. OF NOTES-
P04	1	ENTER TRACK1 FORMAT-
P05	1	ENTER MACHINE NO. -
P06	1	ENTER DATE (YYMMDD) -
P07	1	ENTER TIME (HHMM) -
P08	1	ENTER MSG MODE-
P09	1	ENTER LEFT COLUMN -
P10	1	ENTER NO. OF COLUMNS -
P11	1	ENTER KEY A -
P12	1	ENTER KEY B -
P13	1	ENTER SCREEN NO -
P14	1	ENTER PRINTER -
P15	1	ENTER INITIAL DISPLAY -
P16	1	ENTER INITIAL MENU -
P17	1	ENTER EXIT TYPE -
P18	1	ENTER MAC -
P19	1	ENTER PASSWORD -
P20	1	ENTER NEW PASSWORD -
P21	1	ENTER KEY V -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
P22	1	ENTER RESTART MODE -
P23	1	ENTER HALLMARK QUESTION - *(not supported)*
P24	1	PLEASE WAIT FOR HALLMARK *(not supported)*
P25-P32		Reserved
P33	1	ENTER JRNLING LEVEL
P34	1	PRESS <AUX> FOR HELP
P35	1	PRESS <ENT> FOR MORE
P36	1	ENTER COIN HOPPER
P37	1	ENTER NO. OF COINS
P38	1	PRESS <AUX> TO EXIT HELP MODE
P39-P41		Reserved
P42	1	SET JOURNAL OPTION -
P43–P52		Reserved
P53	1	KEY -
P54	1	ENTER KEY PART 1 -
P55	1	ENTER KEY PART 2 -
P56	1	CONFIRM KEY PART 1 -
P57	1	6 = CONFIRM NEW MODE -
P58	1	NEW KEY MODE -
P59	1	COMPONENT (1,2,3)-
P60–P72		Reserved

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
P73*	1	IN EXCHANGE MODE
	2	
	3	REMOVE OLD CASSETTES NOW
	4	AND REPLACE WITH NEW ONES
	5	
	6	WHEN REPLENISHMENT COMPLETE
	7	PRESS ENTER TO CONTINUE
P74*	1	START EXCHANGE FAILED
	2	
	3	PRESS ENTER TO CONTINUE
P75	1	NO DIAGNOSTICS APPLICATION
	2	
	3	PRESS ENTER TO SHUTDOWN ATM
	4	
	5	PRESS CANCEL TO RETURN TO MENU
P76	1	ATM IS SHUTTING DOWN...
P77	1	PLEASE WAIT...
P78	1	RESTART REQUIRED
	2	
	3	PRESS ENTER TO RESTART ATM
	4	PRESS CANCEL TO RESTART LATER
P70–P80		Reserved
P81		PLEASE WAIT...
		Note: This screen contains control characters and other display data that must not be edited.
P82	1	CONFIRM KEY PART 2
P83	1	CONFIRM KEY
P84	1	PRESS <ENTER> OR PRESS <CANCEL>
P85		Reserved
P86	1	CONFIGURATION FAILED
	2	
	3	DEVICE ERROR
	4	PRESS ENTER TO CONTINUE
P87	1	CONFIGURATION FAILED
	2	
	3	XML ERROR
	4	PRESS ENTER TO CONTINUE

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
P88	1	PLEASE WAIT
	2	
	3	
	4	
	5	THIS PROCEDURE MAY TAKE
	6	UP TO 5 MINUTES
P89	1	REGISTRY UPDATED
	2	
	3	SELECT GBRU/GBNA CONFIGURATION
	4	AGAIN AFTER MACHINE RESETS
	5	PRESS ENTER TO CONTINUE
P90	1	CONFIGURATION FAILED
	2	
	3	REGISTRY ERROR
	4	PRESS ENTER TO CONTINUE
P91	1	CONFIGURATION FAILED
	2	
	3	CONFIGURATION ERROR
	4	PRESS ENTER TO CONTINUE
P92	1	CONFIGURATION SUCCESSFUL
	2	
	3	PRESS ENTER TO CONTINUE
P93	1	CONFIRM PASSWORD-
P94	1	ENTER JOURNALLING LEVEL -
p00	1	PRESS ENTER EVERY 3 DIGITS -
p01	1	ENTER PORT NO -
p02	1	ENTER NEW CONFIG -
p03	1	ENTER MSG FORMAT -
p04	1	ENTER LEN SIZE -
p05	1	ENTER LEN FORMAT -
p06	1	ENTER LEN ADJUST -
p07	1	ENTER LEN OFFSET -
p08	1	ENTER LEN EMBED -
p09	1	ENTER RCVD TIMEOUT -
p10	1	ENTER RETRY TIMER -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
p11	1	ENTER KEEP ALIVE -
p12	1	ENTER RECONN CLS -
p13	1	ENTER GROUP RETRY SZ -
p14	1	ENTER MAXIMUM RETRYS -
p15	1	ENTER GROUP INTERVAL -
p16	1	ENTER RETRY INTERVAL -
p17	1	SELECT BIN -
p18	1	ENTER OFFLINE TIMER -
p19		Reserved
p20*	1	ENTER CURRENCY ID -
p21*	1	ENTER MEDIA TYPE -
p22*	1	ENTER MEDIA VALUE -
p23*	1	ENTER NEW THRESHOLD -
p24*	1 2 3	PRESS ANY <KEY> TO LOAD PRESS <CANCEL> FOR MAIN MENU
p30	1	STANDARD MODE ALREADY ACTIVE
p31	1	ENTER MAX EJ BACKUPS-
p32		Reserved
p33	1	ENTER MAXIMUM STMNT LENGTH-
p34	1	PRESS 1-ENABLE OR 0-DISABLE
p35	1	MULTIPLE DESTINATIONS ENABLED
p36	1	MULTIPLE DESTINATIONS DISABLED
p37	1 2	BACKUP FILES WILL BE DELETED PRESS 1 TO DELETE, 0 TO RETAIN
p38	1 2	SOME BACKUPS MAY BE DELETED PRESS 1 TO CONTINUE, 0 TO CANCEL
p39	1	SELECT DATE (MMDDYY):
p40	1	SELECT EXTENSION NO:
p41	1	CDM% ENTER CASSETTE TYPE-

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
p42	1	Reserved
p43	1	PREVIOUS
p44	1	NEXT
p45	1	CONFIRM
p46	1	ENTER NOTE TYPE TO (-)/(#):
p47	1	OPTION ONLY AVAILABLE FOR GBXX
p51	1	SET DAY OF THE WEEK-
p52	1	SET DAY OF THE MONTH-
p53	1	ENTER EJ FILE SIZE(KB)-
p54	1	RESTART REQUIRED
	2	GBNA.INI FILE UPDATED
	3	
	4	PRESS ENTER TO RESTART ATM
	5	
	6	PRESS CANCEL TO RESTART LATER

'S' Supervisor Information Lines

'S' or 's' screens contain the following messages:

- Media status
- Test cash.

For details, see the *APTRA Advance NDC, Supervisor's Guide*.

Table A-6
Supervisor Information Lines Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
S00	1	ALL SUPPLIES GOOD
S01	1	TYPE 1 CASH LOW
S02	1	TYPE 2 CASH LOW
S03	1	TYPE 3 CASH LOW
S04	1	TYPE 4 CASH LOW
S05	1	TYPE 1 CASH EMPTY/MISSING
S06	1	TYPE 2 CASH EMPTY/MISSING
S07	1	TYPE 3 CASH EMPTY/MISSING
S08	1	TYPE 4 CASH EMPTY/MISSING
S09	1	JOURNAL PAPER EXHAUSTED
S10	1	RECEIPT PAPER EXHAUSTED
S11	1	CASH REJECT BIN OVERFILL
S12	1	CARD BIN OVERFILL
S13	1	DEPOSIT BIN OVERFILL
S14	1	NO GOOD CASSETTES
S15	1	TOP CASSETTE GOOD
S16	1	SECOND CASSETTE GOOD
S17	1	THIRD CASSETTE GOOD
S18	1	BOTTOM CASSETTE GOOD
S19	1	JOURNAL PAPER LOW
S20	1	RECEIPT PAPER LOW

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
S21	1	STATEMENT PAPER EXHAUSTED
S22	1	STATEMENT PAPER LOW
S23	1	STATEMENT RIBBON EXHAUSTED
S24	1	STATEMENT RIBBON LOW
S25	1	DISPENSER FAULT
S26	1	NIGHT DEPOSIT OVERFILL
S27 - S30		Reserved
S31	1	RECEIPT RIBBON EXHAUSTED
S32	1	RECEIPT RIBBON LOW
S33	1	RECEIPT HEAD EXHAUSTED
S34	1	RECEIPT HEAD LOW
S35	1	RECEIPT KNIFE EXHAUSTED
S36	1	RECEIPT KNIFE LOW
S37	1	JOURNAL RIBBON EXHAUSTED
S38	1	JOURNAL RIBBON LOW
S39	1	JOURNAL HEAD EXHAUSTED
S40	1	JOURNAL HEAD LOW
S41	1	STATEMENT HEAD EXHAUSTED
S42	1	STATEMENT HEAD LOW
S43	1	STATEMENT KNIFE EXHAUSTED
S44	1	STATEMENT KNIFE LOW
S45	1	STATEMENT BIN OVERFILL
S46 - S59		Reserved
S60	1	E/JOURNAL LOG FULL
S61	1	E/JOURNAL LOG SPACE LOW
S62	1	CAN'T WRITE TO E/JOURNAL
S63 - S83		Reserved

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
S84	1	ENVELOPE DISPENSER LOW
S85	1	ENVELOPE DISPENSER EXHAUSTED
S86	1	CAMERA FILM LOW *(not supported)*
S87	1	CAMERA FILM EMPTY *(not supported)*
S88-S96		Reserved
S97	1	CASH REJECT BIN HIGH
S98	1	CARD CAPTURE BIN HIGH
s00	1	BNA BIN OVERFILL
s01	1	BNA BIN OUT
s02	1	BNA BIN ALMOST FULL
s03	1	ENDORSER RIBBON NEARLY EXHAUSTED
s04	1	ENDORSER RIBBON EXHAUSTED
s05	1	CPM STAMP INK LOW
s06	1	CPM STAMP INK EMPTY
s07	1	CPM BIN % OVERFILL
s08	1	CPM BIN % NEARLY FULL
s21	1	C1
s22	1	C2

'T' Journal Trace

'T' or 't' screens contain the following messages:

- Envelope serial number
- Security trace
- Presenter error
- Envelope length
- Journal reprint.

For details, refer to the *APTRA Advance NDC, Supervisor's Guide.*

Table A-7
Journal Trace Screens

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
T00	1	*ENVELOPE NUMBER = %%%% *
T01	1	CARD BIN REMOVED
T02	1	CARD BIN INSERTED
T03	1	REJECT BIN REMOVED
T04	1	REJECT BIN INSERTED
T05	1	TOP CASSETTE REMOVED
T06	1	TOP CASSETTE INSERTED
T07	1	SECOND CASSETTE REMOVED
T08	1	SECOND CASSETTE INSERTED
T09	1	THIRD CASSETTE REMOVED
T10	1	THIRD CASSETTE INSERTED
T11	1	BOTTOM CASSETTE REMOVED
T12	1	BOTTOM CASSETTE INSERTED
T13	1 2 3	DIAGNOSTIC DISPENSE REPORT TYPE 1 = %% TYPE 2 = %% TYPE 3 = %% TYPE 4 = %%
T14	1	POWER-UP/RESET
T15	1	SUPERVISOR MODE ENTRY

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
T16	1	SUPERVISOR MODE EXIT
T17	1	CASH COUNTS CLEARED
	2	CASH DISPENSED
	3	TYPE 1 = %%%%% TYPE 2 = %%%%%
	4	TYPE 3 = %%%%% TYPE 4 = %%%%%
	5	
	6	CASH REMAINING
	7	TYPE 1 = %%%%% TYPE 2 = %%%%%
	8	TYPE 3 = %%%%% TYPE 4 = %%%%%
T18	1	CARDS CLEARED = %%%%%
T19	1	DEPOSITS CLEARED = %%%%%
T20	1	CASH ADDED
	2	TYPE 1 = %%%%% TYPE 2 = %%%%%
	3	TYPE 3 = %%%%% TYPE 4 = %%%%%
T21	1	ENVELOPE NUMBER RESET
T22	1	KEY A STORED
T23	1	KEY B STORED
T24	1	TIME AND DATE SET
T25	1	DEPOSIT BIN REMOVED
T26	1	DEPOSIT BIN INSERTED
T27	1	CARD/DEPOSIT BIN REMOVED
T28	1	CARD/DEPOSIT BIN INSERTED
T29	1	KEY V STORED
T30	1	PRESENTER ERROR
T31	1	PASSWORD CHANGED
T32	1	PASSWORD ERROR
T33	1	ENVELOPE LENGTH ERROR
T34	1	DISK NOT AUTHORISED
T35	1	CARD CAPTURED A/C NO. UNKNOWN
T36	1	CARD CAPTURED A/C %%%%%%%%%%%%%
T37	1	SST OFF-LINE
T38	1	SST ON-LINE

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
T39–T42		Reserved
T43	1	EJ STARTED BY OPERATOR
T44	1	EJ LOG INITIALISED OK
T45	1	EJ LOG COPIED OK
T46	1	DUAL STARTED BY OPERATOR
T47	1	**** COMMENCING REPRINT ****
T48	1	**** REPRINT COMPLETED OK ***
T49–T50		Reserved
T51	1	**** REPRINT HALTED ****
T52	1	>>
T53	1	<<
T54	1	**** JOURNAL BACKUP STARTED ****
T55	1	**** JOURNAL LIMIT EXCEEDED ****
T56-T57		Reserved
T58	1	COIN COUNTS CLEARED
	2	COINS DISPENSED
	3	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	4	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
	5	
	6	COINS REMAINING
	7	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	8	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
T59	1	COINS ADDED
	2	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	3	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
T60		Reserved
T61	1	COIN DISPENSER REMOVED
T62	1	COIN DISPENSER INSERTED
T63	1	COIN HOPPER % REMOVED
T64	1	COIN HOPPER % INSERTED
T65-T75		Reserved

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
T76	1	POWER INTERRUPTION DURING
	2	DISPENSE
	3	NOTES DISPENSED
	4	TYPE 1 = %%%%% TYPE 2 = %%%%%
	5	TYPE 3 = %%%%% TYPE 4 = %%%%%
	6	NOTES REMAINING
	7	TYPE 1 = %%%%% TYPE 2 = %%%%%
	8	TYPE 3 = %%%%% TYPE 4 = %%%%%
T77–T82		Reserved
T83	1	EJ LOG RECOPIED OK
T84	1	RCOPY LOG FAIL
T86	1	BAD TIMEOUT KBD
T87	1	BAD SUPVSR KBD
T88	1	BAD HEX KBD
T89–T91		Reserved
T92	1	ACCOUNT NOT KNOWN
T93	1	DLL LOAD ERROR
T94	1	DLL CALL ERROR
T95	1	VAULTED NOTES COUNT
t01	1	CHQ PROCESSING MODULE CLEARED
t02	1	CPM PCKT 1 CLRD = %%
t03	1	CPM PCKT 2 / REJ BIN CLRD = %%
t04	1	CPM PCKT 3 CLRD = %%
t05	1	CHEQUE PROCESSOR INITIALISED
t06	1	CHQ PROCESSING MODULE TRANSPORT CLEARED
t07*	1	CASSETTE % UPDATED
	2	CURRENCYID = %
	3	MEDIA TYPE = %
	45	VALUE = %
t08	1	REJECT BIN THESHOLD
	2	UPDATED = %
t09		Reserved

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
t10	1	CASH ADDED
	2	TYPE 1 = %%%%% TYPE 2 = %%%%%
	3	TYPE 3 = %%%%% TYPE 4 = %%%%%
	4	TYPE 5 = %%%%% TYPE 6 = %%%%%
	5	TYPE 7 = %%%%%
t11	1	CASH COUNTS CLEARED
	2	CASH DISPENSED
	3	TYPE 1 = %%%%% TYPE 2 = %%%%%
	4	TYPE 3 = %%%%% TYPE 4 = %%%%%
	5	TYPE 5 = %%%%% TYPE 6 = %%%%%
	6	TYPE 7 = %%%%%
	7	
	8	CASH REMAINING
	9	TYPE 1 = %%%%% TYPE 2 = %%%%%
	10	TYPE 3 = %%%%% TYPE 4 = %%%%%
	11	TYPE 5 = %%%%% TYPE 6 = %%%%%
	12	TYPE 7 = %%%%%
t12-13		Reserved
t14	1	SP UPDATE - NEW VALUE FOR
	2	%
	3	CURRENCYID = %
	4	VALUE = %
t15	1	CARD: %%%%%%%%%%%%%%%%%%%%
	2	DATE %%%/%%/%% TIME = %%:%%:%%
t16–t18		Reserved
t19	1	REJECT COUNTS NOT UPDATED - ESCROW FULL
t20	1	NOTE ERROR OCCURRED DURING CASHINOK: %
t21	1	NOTE ERROR OCCURRED DURING RETRACT: %
t22	1	TRANSACTION START
t23		Reserved
t24	1	PIN ENTERED
t25		Reserved
t26	1	NOTES STACKED
t27	1	CARD TAKEN
t28	1	NOTES PRESENTED %
t29	1	NOTES TAKEN

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
t30	1	TRANSACTION END
t33	1	MISRECOGNITION ERROR OCCURED DURING CASHINEND
t34	1	CONFIGURE NOTE TYPES FAILED : %
t35	1	CUTOVER IS %%%%%%%
t36	1	SCHEDULED INIT IS %%%%%%%
t37	1	AGENT IS %%%%%%%
t38	1	COMPRESSION IS %%%%%%%
t39	1	AUTO INIT COPY DRIVE SET TO %
t40	1	ENABLED
t41	1	DISABLED
t42	1	CURRENT EJ FILE SIZE IS %%%%%
t43	1	EJ BACKUP MODE %
t44	1	NO OF EJ BACKUPS %%%%%
t45	1	HOST CONTROL EJ MODE IS %%%%%%%%
t46	1	INVALID - AUTO EJ INIT IN PROGRESS
t47	1	DIRECT EJ INIT PERFORMED
t48	1	DAY OF THE MONTH CHANGED TO %%
t49	1	SCHEDULED INIT TIME CHANGED TO %%%%
t50	1	DAILY
t51	1	WEEKLY
t52	1	MONTHLY
t53	1	INIT BY SUPERVISOR
t54	1	DAY OF THE WEEK CHANGED TO %%%
t55–57		Reserved
t58	1	CPM BIN % INSERTED
t59	1	CPM BIN % REMOVED
t60	1	SST IN SERVICE
t61	1	SST OUT OF SERVICE

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
t62	1	SST IN SUSPEND MODE
t63	1	SST OUT OF SUSPEND MODE
t64	1	40 COL TEST PRINT
	2	!"%$@#0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
	3	STUVWXYZ[\]^abcdefghijklmnopqrstuvwxyz
t65-t69		Reserved
t70	1	COIN COUNTS CLEARED
	2	COINS DISPENSED
	3	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	4	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
	5	HOPPER 5 = %%%%% HOPPER 6 = %%%%%
	6	HOPPER 7 = %%%%% HOPPER 8 = %%%%%
	7	
	8	COINS REMAINING
	9	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	10	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
	11	HOPPER 5 = %%%%% HOPPER 6 = %%%%%
	12	HOPPER 7 = %%%%% HOPPER 8 = %%%%%
t71	1	COINS ADDED
	2	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	3	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
	4	HOPPER 5 = %%%%% HOPPER 6 = %%%%%
	5	HOPPER 7 = %%%%% HOPPER 8 = %%%%%
t72-74		Reserved
t75	1	POWER INTERRUPTION DURING
	2	DISPENSE
	3	COINS DISPENSED %%%%%
	4	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	5	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
	6	HOPPER 5 = %%%%% HOPPER 6 = %%%%%
	7	HOPPER 7 = %%%%% HOPPER 8 = %%%%%
	8	COINS REMAINING
	9	HOPPER 1 = %%%%% HOPPER 2 = %%%%%
	10	HOPPER 3 = %%%%% HOPPER 4 = %%%%%
	11	HOPPER 5 = %%%%% HOPPER 6 = %%%%%
	12	HOPPER 7 = %%%%% HOPPER 8 = %%%%%

Screen Number	Row Position	Column Position 1 2 3 4 12345678901234567890123456789012345678901234567890
t76	1	POWER INTERRUPTION DURING
	2	DISPENSE
	3	NOTES DISPENSED %%%%%
	4	TYPE 1 = %%%%% TYPE 2 = %%%%%
	5	TYPE 3 = %%%%% TYPE 4 = %%%%%
	6	TYPE 5 = %%%%% TYPE 6 = %%%%%
	7	TYPE 7 = %%%%%
	8	NOTES REMAINING
	9	TYPE 1 = %%%%% TYPE 2 = %%%%%
	10	TYPE 3 = %%%%% TYPE 4 = %%%%%
	11	TYPE 5 = %%%%% TYPE 6 = %%%%%
	12	TYPE 7 = %%%%%
t77		Reserved
t78	1	CDM 1
t79	1	CDM 2
t80	1	C1
t81	1	C2
t82	1	RESET TO RETRACT AREA SUCCESSFUL
t83	1	RESET TO RETRACT AREA FAILED
t84	1	RESET TO REJECT AREA SUCCESSFUL
t85	1	RESET TO REJECT AREA FAILED
t86	1	CASH DISPENSE ERROR
t87	1	CASH ACCEPT ERROR
t88–t93		Reserved
t94	1	EJ PRIVACY IS %
t95	1	BUNCH NOTE ACCEPTOR INITIALISED
t97	1	INIT BY EJ CUTOVER
t98	1	INIT BY EJ AGENT
t99	1	INIT BY SCHEDULED INIT

'U' EMV Smart Card

The EMV Smart Card 'U' screens are as follows. In screen U070, the 'X' represents dynamically edited text.

Table A-8
EMV Smart Card Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012345
U0057	1	%%%%%% %%%%%%%%%%%%%%%%%%%% CAPTURED %%%%%%%% %%%%%%%%
U0058	1	CHEQUE CAPTURED TSN: %%%% CARD: %%%%%%%%%%%%%%%%%%%%
U0059	1	CHEQUE CAPTURE FAILED TSN: %%%% CARD: %%%%%%%%%%%%%%%%%%%%
U0067	1	EXTERNAL AUTHENTICATE: NO ARPC
U0068	1	EXTERNAL AUTHENTICATE: INVALID ARPC
U0069	1	SMART CARD READER NOT PRESENT
U0070	1	CARD INITIALISE ATTEMPT = X
U0071	1	COMPONENT VERSIONS
U0072	1	SCRW VERSION
U0073	1	SMART
U0074	1	**** CARD DETAILS UNKNOWN ****
U0075	1	**** AID NOT SELECTED ****
U0100	1 2 3	BNA CASSETTE COUNTERS DENOM % %
U0101	1 2 3	BNA AMOUNTS PER CASSETTE DENOM %%%%% %%%%%
U0102	1 2 3 4	TOTAL AMOUNTS PER DENOM DENOM TOTAL %* %*

The counts in this screen are variable and right justified

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012345
U0103	1	TOTAL AMOUNTS PER CURRENCY
	2	
	3	CURRENCY TOTAL
	4	%* %*
The counts in this screen are variable and right justified		
U0104	1	NOTES ACCEPTED - ESCROW SPACE
	2	
	3	%*
The counts in this screen are variable		
U0105	1	NOTES ACCEPTED - ESCROW FULL
	2	
	3	%*
The counts in this screen are variable		

'i' Supervisor TCP / IP

The following 'i' Supervisor TCP / IP screens are displayed:

Table A-9
Supervisor TCP/IP Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i00	1 2 3 4 5	CURRENT TCP/IP CONFIG REMOTE IP ADDRESS:
i01	1 2 3 4 5	CURRENT TCP/IP CONFIG REMOTE PORT NO:
i02	1 2 3 4 5	CURRENT TCP/IP CONFIG LOCAL IP ADDRESS:
i03	1 2 3 4 5	CURRENT TCP/IP CONFIG LOCAL PORT NO:
i04	1 2 3 4 5	CURRENT TCP/IP CONFIG CONFIG AS SRVR:
i05	1 2 3 4 5	CURRENT TCP/IP CONFIG MESSAGE FORMAT:
i06	1 2 3 4 5	CURRENT TCP/IP CONFIG LENGTH SIZE:

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i07	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	LENGTH FORMAT:
	5	
i08	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	LENGTH ADJUST:
	5	
i09	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	LENGTH OFFSET:
	5	
i10	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	LENGTH EMBED:
	5	
i11	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	RCVD TIMEOUT:
	5	
i12	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	HRTBT INTERVAL:
	5	
i13	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	DWNBT INTERVAL:
	5	
i14	1	
	2	CURRENT TCP/IP CONFIG
	3	
	4	MAX ROUNDTRP:
	5	

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i15	1 2 3 4 5	CURRENT TCP/IP CONFIG RECONN ON CLS:
i16	1 2 3 4 5	CURRENT TCP/IP CONFIG MAXIMUM RETRYS:
i17	1 2 3 4 5	CURRENT TCP/IP CONFIG KEEP ALIVE:
i18	1 2 3 4 5	CURRENT TCP/IP CONFIG RETRY INTERVAL:
i29	1 2 3 4 5	CURRENT TCP/IP CONFIG RETRY TIMER:

'i' Supervisor Dialup

The following 'i' Supervisor Dialup screens are displayed:

Table A-10
Supervisor Dialup Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i46	1	
	2	NETWORK ADDRESS
	3	
	4	1 N/A OPTION 2 N/A DLY TMR
	5	3 N/A RSP TMR
i47	1	CHOOSE AN OPTION -
i48	1	
	2	CURRENT APPLICATION CONFIG
	3	CURRENT BIN-
	4	+--------------+
	5	|1ABC|2DEF|3GHI|
	6	------+ |----|----|----| +------
	7	%()*+,| |4JKL|5MNO|6PQR| |!"#$%&
	8	------+ |----|----|----| +------
	9	------+ |7STU|8VWX|9YZ.| +------
	10	/;<]^_| +----|----|----+ |=>?@[\
	11	-----+ |0- :| +------
	12	+----+
	13	ENTER BIN-
i49	1	CURRENT APPLICATION CONFIG
	2	CURRENT TID -
	3	
	4	+--------------+
	5	|1ABC|2DEF|3GHI|
	6	------+ |----|----|----| +------
	7	%()*+,| |4JKL|5MNO|6PQR| |!"#$%&
	8	------+ |----|----|----| +------
	9	------+ |7STU|8VWX|9YZ.| +------
	10	/;<]^_| +----|----|----+ |=>?@[\
	11	-----+ |0- :| +------
	12	+----+'
	13	ENTER 6 DIGIT TID-

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i50	1	
	2	CURRENT APPLICATION CONFIG
	3	
	4	TRAN CMP MSG :
	5	
	6	
	7	
	8	1 - ENABLED
	9	
	10	0 - DISABLED
	11	
	12	
	13	
	14	
	15	ENTER TRAN CMP MSG -
i51	1	
	2	CURRENT APPLICATION CONFIG
	3	
	4	MSG SUPPRESS :
	5	
	6	
	7	
	8	1 - ENABLED
	9	
	10	0 - DISABLED
	11	
	12	
	13	
	14	
	15	ENTER MSG SUPPRESS -
i52	1	
	2	CURRENT APPLICATION CONFIG
	3	''
	4	ACTIVITY TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 25500 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER ACTIVITY TIMER -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i53	1	
	2	CURRENT APPLICATION CONFIG
	3	
	4	MSG ON CP:
	5	
	6	
	7	
	8	1 - ENABLED
	9	
	10	0 - DISABLED
	11	
	12	
	13	
	14	
	15	
	16	ENTER MSG ON CP -
i54	1	
	2	CURRENT APPLICATION CONFIG
	3	
	4	CP MSG TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 255 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER CP MSG TIMER -
i55	1	
	2	CURRENT APPLICATION CONFIG
	3	
	4	ERROR REDIAL TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 2550 SECONDS'
	10	
	11	
	12	
	13	
	14	
	15	ENTER ERROR REDIAL TMR -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i56	1	
	2	CURRENT SERIAL LINK CONFIG
	3	
	4	COM PORT :
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	ENTER COM PORT -
i57	1	
	2	CURRENT SERIAL LINK CONFIG
	3	
	4	BAUD RATE :
	5	
	6	
	7	1 = 300 2 = 1200'
	8	
	9	
	10	
	11	3 = 2400 4 = 4800'
	12	
	13	
	14	5 = 96OO 6 = 14400'
	15	
		CHOOSE AN OPTION -
i58	1	
	2	CURRENT SERIAL LINK CONFIG
	3	
	4	DATA BITS :
	5	
	6	
	7	
	8	ENTER A VALUE OF 7 OR 8
	9	
	10	
	11	
	12	
	13	
	14	
	15	ENTER DATA BITS -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i59	1	
	2	CURRENT SERIAL LINK CONFIG
	3	
	4	PARITY :
	5	
	6	
	7	1 = NONE 2 = ODD
	8	
	9	
	10	3 = EVEN 4 = MARK
	11	
	12	
	13	5 = SPACE
	14	
	15	CHOOSE AN OPTION -
i60	1	
	2	CURRENT SERIAL LINK CONFIG
	3	
	4	STOP BITS :
	5	
	6	
	7	
	8	ENTER A VALUE OF 1 OR 2
	9	
	10	
	11	
	12	
	13	
	14	
	15	ENTER STOP BITS -
i61	1	CURRENT MODEM LINK CONFIG
	2	PRIMARY NUMBER :
	3	
	4	+-----------+
	5	| 1 | 2 | 3 |
	6	|---|---|---|
	7	| 4 | 5 | 6 |
	8	|---|---|---|
	9	| 7 | 8 | 9 | +------'
	10	+-----------+ |COMMA>'
	11	| 0 | +------'
	12	+---+
	13	
	14	ENTER PRIMARY NUMBER-

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i62	1	MODEM LINK SECONDARY NUMBER
	2	
	3	PRESS <ENTER> FOR NO VALUE
	4	+-----------+
	5	| 1 | 2 | 3 |
	6	|---|---|---|
	7	| 4 | 5 | 6 |
	8	|---|---|---|
	9	| 7 | 8 | 9 | +------
	10	+-----------+ |COMMA>
	11	| 0 | +------
	12	+---+
	13	
	14	ENTER SECONDARY NUMBER-
i63	1	
	2	CURRENT MODEM LINK CONFIG
	3	
	4	MODEM CONNECT TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 255 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER CONNECT TIMER -
i64	1	
	2	CURRENT MODEM LINK CONFIG
	3	
	4	DIAL MODE :
	5	
	6	
	7	
	8	1 - TONE
	9	
	10	0 - PULSE
	11	
	12	
	13	
	14	
	15	ENTER DIAL MODE -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i65	1	
	2	CURRENT MODEM LINK CONFIG
	3	
	4	MODEM COMMAND RESPONSE TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	1 AND 20 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER CMD RSP TIMER -
i66	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	ENQ TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 255 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER ENQ TIMER -
i67	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	MESSAGE RETRIES :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 9
	10	
	11	
	12	
	13	
	14	
	15	ENTER MSG RETRIES -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i68	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	ACK TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 255 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER ACK TIMER -
i69	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	ENQ AFTER ACK :
	5	
	6	
	7	
	8	1 - ENABLED
	9	
	10	0 - DISABLED
	11	
	12	
	13	
	14	
	15	ENTER ENQ AFTER ACK -
i70	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	CONNECT LIFE TIME :
	5	
	6	
	7	1 = NORMAL 2 = PREDIAL
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	CHOOSE AN OPTION -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i71	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	DIAL ON SEND TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 255 SECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER DIAL ON SND TMR -
i72	1	
	2	CURRENT NETWORK ADDRESS CONFIG
	3	
	4	NETWORK ADDRESS OPTION :
	5	
	6	
	7	
	8	1 - ENABLED
	9	
	10	0 - DISABLED
	11	
	12	
	13	
	14	
	15	ENTER N/A OPTION -
i73	1	
	2	CURRENT NETWORK ADDRESS CONFIG
	3	
	4	N/A DELAY TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 1000 MILLISECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER N/A DELAY TMR -

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i74	1	
	2	CURRENT NETWORK ADDRESS CONFIG
	3	
	4	N/A RESPONSE TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	0 AND 5000 MILLISECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER N/A RESPONSE TMR -
i75	1	
	2	COPY DIALUP CONFIG
	3	
	4	
	5	DIALUP CONFIG
	6	
	7	1 = COPY ON 2 = COPY OFF
	8	
	9	
	10	
	11	APPLICATION SETTINGS
	12	
	13	3 = COPY ON 4 = COPY OFF
	14	
	15	
		CHOOSE AN OPTION -
i76	1	FILE OR DISK NOT PRESENT
i77	1	DISK NOT PRESENT IN DRIVE A

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i78	1	CURRENT MODEM STRING
	2	
	3	
	4	+--------------+
	5	|1ABC|2DEF|3GHI|
	6	------+ |----|----|----| +------'
	7	%()*+,| |4JKL|5MNO|6PQR| |!"#$%&'
	8	------+ |----|----|----| +------'
	9	------+ |7STU|8VWX|9YZ.| +------'
	10	/;<]^_| +----|----|----+ |=>?@[\'
	11	------+ |0- :| +------'
		+----+
		ENTER STRING:
i79	1	
	2	CURRENT APPLICATION CONFIG
	3	
	4	HOST MESSAGE HEADER :
	5	
	6	
	7	
	8	1 - ENABLED
	9	
	10	0 - DISABLED
	11	
	12	
	13	
	14	
	15	ENTER HOST MSG HEADER - '
i80	1	FILE COPIED
i81	1	CURRENT NETWORK STRING
	2	
	3	PRESS<ENTER><ENTER> FOR NO VALUE
	4	+--------------+
	5	|1ABC|2DEF|3GHI|
	6	------+ |----|----|----| +------
	7	%()*+,| |4JKL|5MNO|6PQR| |!"#$%&
	8	------+ |----|----|----| +------
	9	------+ |7STU|8VWX|9YZ.| +------
	10	/;<]^_| +----|----|----+ |=>?@[\
	11	-----+ |0- :| +------
	12	+----+
	13	ENTER STRING:

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i82	1	
	2	DIALUP
	3	
	4	1 APPL PARAM 2 SERIAL LINK
	5	3 MODEM LINK 4 VISA 2
	6	5 NETWORK ADD 6 COPY ON/OFF
	7	7 DIAGNOSTICS
i83	1	
	2	APPLICATION PARAMETERS
	3	
	4	1 BIN 2 TID
	5	3 TRAN CMP MSG 4 HOST MSG HEAD
	6	5 ACT TIMER 6 MSG SUPPRESS
	7	7 MSG ON CP 8 CP MSG TMR
	8	9 ERR REDIAL 10 SUPP CASH LOW
i84	1	
	2	MODEM LINK
	3	
	4	1 PRIMARY NO 2 SECONDARY NO
	5	3 CONNECT TMR 4 DIAL MODE
	6	5 CMD RSP TMR 6 MODEM INI STR
i85	1	
	2	SERIAL LINK
	3	
	4	1 COM PORT 2 BAUD RATE
	5	3 DATA BITS 4 PARITY
	6	5 STOP BITS
i86	1	
	2	VISA 2
	3	
	4	1 ENQ TMR 2 MSG RETRIES
	5	3 ACK TIMER 4 ENQ AFTR ACK
	6	5 CNT LIFE TIME 6 DIAL SND TMR
	7	7 BACKOFF TMR

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i87	1	
	2	CURRENT VISA 2 CONFIG
	3	
	4	BACKOFF TIMER :
	5	
	6	
	7	
	8	PLEASE ENTER A VALUE BETWEEN
	9	100 AND 10000 MILLISECONDS
	10	
	11	
	12	
	13	
	14	
	15	ENTER BACKOFF TIMER -

'i' Supervisor BNA

The following 'i' Supervisor Bunch Note Acceptor (BNA) screens are displayed:

Table A-11
Supervisor BNA Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i19	1	
	2	BUNCH NOTE ACCEPTOR COUNTS
	3	
	4	TYPE CONFIG DEPOSIT COUNT
	5	%%%% %%%%%%%% %%%%
	6	%%%% %%%%%%%% %%%%
	7	%%%% %%%%%%%% %%%%
	8	%%%% %%%%%%%% %%%%
	9	%%%% %%%%%%%% %%%%
	10	%%%% %%%%%%%% %%%%
	11	%%%% %%%%%%%% %%%%
	12	%%%% %%%%%%%% %%%%
i20	1	
	2	BUNCH NOTE ACCEPTOR COUNTS
	3	
	4	LAST CLEARED : %%/%%/%% %%:%%
	5	
	6	TYPE CONFIG COUNT
	7	%%%% %%%%%% %%%%
	8	%%%% %%%%%% %%%%
	9	%%%% %%%%%% %%%%
	10	%%%% %%%%%% %%%%
	11	%%%% %%%%%% %%%%
	12	%%%% %%%%%% %%%%
i21	1	
	2	BNA CNTRS
	3	
	4	LAST CLEARED : %%/%%/%% %%:%%
	5	
	6	COUNT
	7	ENCASHED %%%%%
	8	REJECTED %%%%%
	9	
	10	ESCRW DEPS %%%%%
	11	ESCRW RFND %%%%%

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i22	1	
	2	BUNCH NOTE ACCEPTOR CONFIG
	3	
	4	TYPE CONFIG ACT/INACT
	5	
	6	%%%% %%%%%%%% %%%% %%%%%%%%
	7	%%%% %%%%%%%% %%%% %%%%%%%%
	8	%%%% %%%%%%%% %%%% %%%%%%%%
	9	%%%% %%%%%%%% %%%% %%%%%%%%
	10	%%%% %%%%%%%% %%%% %%%%%%%%
	11	%%%% %%%%%%%% %%%% %%%%%%%%
	12	%%%% %%%%%%%% %%%% %%%%%%%%
	13	%%%% %%%%%%%% %%%% %%%%%%%%
i23	1	COUNT
	2	ENCASHED %%%%%
	3	REJECTED %%%%%
	4	
	5	ESCRW DEPS %%%%%
	67	ESCRW RFND %%%%%
i24	1	%%%% %%%%%%%% %%%% %%%%%%%%
	2	%%%% %%%%%%%% %%%% %%%%%%%%
	3	%%%% %%%%%%%% %%%% %%%%%%%%
	4	%%%% %%%%%%%% %%%% %%%%%%%%
	5	%%%% %%%%%%%% %%%% %%%%%%%%
	6	%%%% %%%%%%%% %%%% %%%%%%%%
	7	%%%% %%%%%%%% %%%% %%%%%%%%
	8	%%%% %%%%%%%% %%%% %%%%%%%%
	9	%%%% %%%%%%%% %%%% %%%%%%%%
	10	%%%% %%%%%%%% %%%% %%%%%%%%
	11	%%%% %%%%%%%% %%%% %%%%%%%%
	12	%%%% %%%%%%%% %%%% %%%%%%%%
i25	1	
	2	CARDS CAPTURED %%%%%
	3	LAST CLEARED %%/%%/%% %%:%%
	4	
	5	DEPOSITS MADE %%%%%
	6	LAST CLEARED %%/%%/%% %%:%%
	7	
	8	ACTIVITY COUNT = %%%%%%%
	9	PKT 1 %%%%% CLRD %%/%%/%% %%:%%
	10	PKT 2 / REJECT BIN
	11	%%%%% CLRD %%/%%/%% %%:%%
	12	PKT 3 %%%%% CLRD %%/%%/%% %%:%%

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i26	1	
	2	CARDS CAPTURED %%%%%
	3	LAST CLEARED %%/%%/%% %%:%%
	4	
	5	
	6	
	7	
	8	ACTIVITY COUNT = %%%%%%%
	9	PKT 1 %%%%% CLRD %%/%%/%% %%:%%
	10	PKT 2 / REJECT BIN
	11	%%%%% CLRD %%/%%/%% %%:%%
	12	PKT 3 %%%%% CLRD %%/%%/%% %%:%%
i27	1	CURRENT PATTERN - %%%%%%%
i28	1	
	2	CLEAR DEPOSITORY COUNTERS
	3	
	4	0: ALL POCKETS/BINS
	5	1: POCKET 1 = %%%%%
	6	2: POCKET 2 / REJECT = %%%%%
	7	3: POCKET 3 = %%%%%
i30–i32		Reserved
i33	1	
	2	CHECKSUM VALUE = %
i34–i36		Reserved
i37	1	
	2	CASSETTE TYPE 1 TYPE 2
	3	CURRENCY ID %%%%% %%%%%
	4	MEDIA TYPE %%%%% %%%%%
	5	MEDIA VALUE %%%%% %%%%%
	6	
	7	TYPE 3 TYPE 4
	8	CURRENCY ID %%%%% %%%%%
	9	MEDIA TYPE %%%%% %%%%%
	10	MEDIA VALUE %%%%% %%%%%
	11	
	12	REJECT BIN THRESHOLD = %%
i38–i42	-	Reserved

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i43	1	TYPE 1 TYPE 2
	2	CASSETTE %%%%% %%%%%
	3	+RETRACT %%%%% %%%%%
	4	+RECYCLED %%%%% %%%%%
	5	=DEPOSITED %%%%% %%%%%
	6	
	7	TYPE 3 TYPE 4
	8	CASSETTE %%%%% %%%%%
	9	+RETRACT %%%%% %%%%%
	10	+RECYCLED %%%%% %%%%%
	11	=DEPOSITED %%%%% %%%%%
i44	1	ACTIVATE(-)/DEACTIVATE(#)
	2	DENOMS IN GBNA.INI FILE
	3	
	4	TYPE
i88	1	CURRENT DAY -%
i89	1	CURRENT CONFIG TIME -%

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i90	1	0-SUN 1-MON 2-TUE
	2	3-WED 4-THU 5-FRI 6-SAT
i91	1	
	2	BNA CNTRS
	3	
	4	LAST CLEARED : %%/%%/%% %%:%%
	5	
	6	COUNT
	7	ENCASHED %%%%%
	8	REJECTED %%%%%
	9	RETRACTED %%%%%
	10	NOTES IN TRANSPORT %%%%%
	11	
	12	ESCRW DEPS %%%%%
	13	ESCRW RFND %%%%%
i92	1	
	2	CASSETTE MAPPING
	3	
	4	CUR VALUE
	5	TYPE 1 % %
	6	TYPE 2 % %
	7	TYPE 3 % %
	8	TYPE 4 % %
	9	TYPE
	10	1. TOP % % %
	11	2. 2ND % % %
	12	3. 3RD % % %
	13	4. BOT % % %

'i' Supervisor Settlement

The following 'i' Supervisor Settlement screens are displayed:

Table A-12
Supervisor Settlement Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i93	1	
	2	SETTLEMENT
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	FUNC-
i94	1	
	2	SETTLEMENT
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	ENTER BUFFER B-

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i95	1	
	2	SETTLEMENT
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	ENTER BUFFER C-
i96	1	
	2	SETTLEMENT
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	ENTER PIN-
i97	1	
	2	SETTLEMENT
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	PLEASE WAIT...

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
i98	1	
	2	SETTLEMENT
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	CASH-

j - Supervisor Misc Screens

The following ‘j’ Supervisor Misc screens are displayed:

Table A-13
Supervisor Misc Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
j0001- j0002		Reserved
j0003	1 2 3 4	*CONFIGURATION DATA* STANDARD NOTE COUNTS T1= %%%%% T2= %%%%% T3= %%%%% T4= %%%%%
		Note: If dual cash handlers are used with separated counters, the standard note counts are displayed with the primary cash handler count first (P), then the secondary cash handler count (S), as follows: T1=PPPPPP SSSSSS T2=PPPPPP SSSSSS T3=PPPPPP SSSSSS T4=PPPPPP SSSSSS
j0004	1 2 3 4 5 6	*CONFIGURATION DATA* STANDARD NOTE COUNTS T1= %%%%% T2= %%%%% T3= %%%%% T4= %%%%% T5= %%%%% T6= %%%%% T7= %%%%%
		Note: If dual cash handlers are used with separated counters, the standard note counts are displayed with the primary cash handler count first (P), then the secondary cash handler count (S), as follows: T1=PPPPPP SSSSSS T2=PPPPPP SSSSSS T3=PPPPPP SSSSSS T4=PPPPPP SSSSSS If Enhanced Configuration option 76 is set to 001, the display will be as follows: T1=PPPPPP SSSSSS T2=PPPPPP SSSSSS T3=PPPPPP SSSSSS T4=PPPPPP SSSSSS T5=PPPPPP SSSSSS T6=PPPPPP SSSSSS T7=PPPPPP SSSSSS

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
j0010	1	CURRENT APPLICATION CONFIG
	2	
	3	SUPP CASH LOW:
	4	
	5	
	6	
	7	PLEASE ENTER A VALUE BETWEEN
	8	0 AND 9
	9	
	10	
	11	
	12	
	13	
	14	ENTER SUPPCASH LOW -

d- Supervisor Diagnostic Screens

The following ‘d’ Supervisor Misc screens are displayed:

Table A-14
Supervisor Diagnostic Screens

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
d20	1	CASH HANDLER 1
d21	1	CASH HANDLER 2
d22	1	COIN DISPENSER
d23	1	CARD READER
d24	1	NOTE ACCEPTOR
d25	1	ENVELOPE DEPOSITORY
d26	1	CHEQUE PROCESSOR
d27	1	PAPER JOURNAL PTR
d28	1	RECEIPT PRINTER
d29	1	STATEMENT PRINTER
d30	1	ENVELOPE DISPENSER
d31	1	ENCRYPTOR
d32	1	NIGHT SAFE
d33	1	BARCODE READER
d50	1	TEST TIME OUT
d51	1	TEST FAILED
d52	1	INITIALISING...
d53	1	SELF TEST...
d54	1	TEST COMPLETE
d60	1	ENTER CARD OR WAIT FOR TIMEOUT
d61	1	TAKE CARD
d62	1	CAPTURING CARD
d63	1	PRINT TEST
d64	1	Reserved

Screen Number	Row Position	Column Position 1 2 3 12345678901234567890123456789012
d65	1	Reserved
d66	1	
	2	SELECT
	3	
	4	4 REPLENISH 5 CONFIGURE
	5	6 ACCESS 7 DIAGNOSTIC
	6	8 TRANSFER 9 EXIT
	7	26 FAULT DISPLAY 27 MV DIAG
	8	90 MISC FUNCS
d67	1	CASH RECYCLER

Appendix B

Character Sets

Overview

This appendix gives details of the default character sets provided for printers and cardholder screens. It also describes the code page character sets for the thermal printer. It also describes using a mapping file to assign an unknown character set to one that is recognised.

If you wish, you can also create or use your own fonts. For guidelines on font definition, refer to the *APTRA Advance NDC, Developer's Guide.*

Note: To enable an EMV Integrated Circuit Card (ICC or 'smart card') to be used, additional fonts and font designators are provided with Advance NDC. If you wish to use an EMV ICC, refer to the *EMV/CAM2 Exits for APTRA Advance NDC* provided with the 'EMV / CAM2 Exits for APTRA Advance NDC' product. The publication lists the additional EMV fonts and font designators.

Character Sets

The row and column identifiers used in the character sets define the ASCII (hex) for each graphics character shown.

For example, in Figure 1, ‘A’ is defined as 41 hex, ‘Z’ is defined as 5A hex.

For details of the supported characters sets, see the APTRA on-line documentation for your printer under **APTRA XFS | Programmers Reference | XFS Service Providers**.

Figure B-1
Alpha 1

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2		!	"	#	$	%	&	’	(	)	✱	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	£	Æ	ø	Å	Ä	Δ	N̄	Ō	Ā	Ç	Ć	₲	Ö	Ë	Ê	É
7	Ô	Ó	Ï	Ü	n̄	Ē	Ė	Ꞩ	¤	◆	Ş	Ğ	İ	cr	dr	r

Table B-1
Character Sets

Character Set	Designator	Number Of Characters Supported		
		CRT	PPD	R/J
Single Size Alpha 1 / Single Size Arabic 1	'1'	96	96	96
Single Size Alpha 2 / Single Size Arabic 2	'2'	96	-	96
Single Size Alpha 3 / Single Size Arabic 3	'7'	64	-	96
Single Size Alpha 4 / Single Size Arabic 4	'I'	-	-	96
Single Size Alpha 5 / Single Size Arabic 5	'J'	-	-	96
Single Size Alpha 6 / Single Size Arabic 6	'Q'			96
Standard Graphics 1	'3'	64	-	-
Standard Graphics 2	'4'	64	-	-
Standard Graphics 3	'5'	64	-	-
Double Size Alpha 1 / Double Size Arabic 1	'>'	96	-	96
Double Size Alpha 2 / Double Size Arabic 2	'?'	96	-	96
Double Size Alpha 3 / Double Size Arabic 3	'B'	64	-	96
Double Size Alpha 4 / Double Size Arabic 4	'K'	-	-	96
Double Size Alpha 5 / Double Size Arabic 5	'L'	-	-	96
Double Size Alpha 6 / Double Size Arabic 6	'R'	-	1	1
Condensed Size Alpha 1 / Condensed Size Arabic 1	'C'	-	-	96
Condensed Size Alpha 2 / Condensed Size Arabic 2	'D'	-	-	96
Condensed Size Alpha 3 / Condensed Size Arabic 3	'E'	-	-	96
Condensed Size Alpha 4 / Condensed Size Arabic 4	'M'	-	-	96

Character Set	Designator	Number Of Characters Supported		
		CRT	PPD	R/J
Condensed Size Alpha 5 / Condensed Size Arabic 5	'N'	-	-	96
Condensed Size Alpha 6 / Condensed Size Arabic 6	'S'	-	-	1
Chinese 1	':'	64	-	-
Chinese 2	';'	64	-	-

Note 1: Condensed print is not supported for the receipt and journal printers. It is supported for the thermal receipt in sideways mode only.

Note 2: Double size sets are not supported by the receipt printer in sideways printing mode and receipt of these designators will not change the current selected code set.

Note3: The Universal Serial Bus (USB) Receipt and Journal printers use code pages that are mapped to the character set. For details of the mapping file, see "Mapping Files".

USB Printers and Downloadable Character Sets

User-defined downloadable character sets can be used, but are sent as actual bits to the printer.

If using existing downloadable character sets with the USB receipt and journal printers, they must be modified to allow for the resolution change from 150 dpi to 203 dpi. This change results in a larger character cell size on 203 dpi printers.

The font definition for the downloadable character set should be updated for 203 dpi, as follows:

1. Change the number of bytes for a character cell from 2 *x x* to 3 *x x*
2. Change the header from 1D 26 02 to 1D 26 03
3. Change the number of columns value preceding each character definition as follows:
   - For standard pitch, from 0B to 0E
   - For compressed pitch, from 08 to 0A.

Statement Code Sets

The statement printer supports either six International Alpha sets or six Arabic sets. You can select these by a hardware switch.

Table B-2
Statement Printer Character Sets

Character Sets	Designator	Number Of Characters Supported
Single Size Alpha 1 / Single Size Arabic 1	'1'	96
Single Size Alpha 2 / Single Size Arabic 2	'2'	96
Single Size Alpha 3 / Single Size Arabic 3	'7'	96
Single Size Alpha 4 / Single Size Arabic 4	'I'	96
Single Size Alpha 5 / Single Size Arabic 5	'J'	96
Single Size Alpha 6 / Single Size Arabic 6	'Q'	1
Double Size Alpha 1 / Double Size Arabic 1	'>'	96
Double Size Alpha 2 / Double Size Arabic 2	'?'	96
Double Size Alpha 3 / Double Size Arabic 3	'B'	96
Double Size Alpha 4 / Double Size Arabic 4	'K'	96
Double Size Alpha 5 / Double Size Arabic 5	'L'	96
Double Size Alpha 6 / Double Size Arabic 6	'R'	1
Condensed Size Alpha 1 / Condensed Size Arabic 1	'C'	96
Condensed Size Alpha 2 / Condensed Size Arabic 2	'D'	96
Condensed Size Alpha 3 / Condensed Size Arabic 3	'E'	96
12cpi Size Alpha 1	'F'	96
12cpi Size Alpha 2	'G'	96
12cpi Size Alpha 3	'H'	96

Character Sets	Designator	Number Of Characters Supported
Condensed Size Alpha 4/ Condensed Size Arabic 4	'M'	96
Condensed Size Alpha 5/ Condensed Size Arabic 5	'N'	96
12cpi Size Alpha 4	'O'	96
12cpi Size Alpha 5	'P'	96
Condensed Size Alpha 6/ Condensed Size Arabic 6	'S'	1
12cpi Size Alpha 6	'T'	1

Code Pages

For details of the supported characters sets, see the APTRA on-line documentation for your printer under **APTRA XFS | Programmers Reference | XFS Service Providers**.

OS/2 Code Pages

The following control sequence allows the selection of one of the supported OS/2 code pages and sets the printer to code page mode:

Control Code: 1BH 25H 3xH 3yH 3zH

where 3xH 3yH 3zH represents the three-byte ASCII value of the code page.

Valid code pages are: 000, 437, 850, 851, 852, 855, 857, 860, 861, 862, 863, 864 and 866.

Code page 000 is the user-defined downloadable character set code page. The “Define Downloadable Character Set” control sequence described in Chapter 5 must be issued before the “Select OS/2 Code Page” control sequence.

Code pages 851, 855 and 866 cannot be used in condensed print mode.

For further information about code pages, refer to the *Programmer’s Manual for the 40 Column Printer* and the APTRA on-line documentation under **APTRA XFS | Programmers Reference | XFS Service Providers**.

USB Receipt and Journal Code Pages

USB Receipt and Journal printers support code pages rather than character sets. However, the code pages contain the same characters.

When the host requests an Arabic or International character set, the the corresponding section is located in the mapping file. If found, the specified character set is used, otherwise the control sequence is sent directly to the printer. For details of the mapping file, see “Mapping Files”.

Valid code pages are 437, 737, 850, 851, 852, 855, 857, 858, 860, 861, 862, 863, 864, 865, 866, and 1251

Mapping Files

Advance NDC uses mapping files to translate an unknown character to a known character.

The supplied mapping file to use depends on your printer, and requirements, as follows:

- For a USB Receipt or Journal printer, user-defined fonts and Arabic and International character sets are selected using the *UniversalCharSets.txt* mapping file. This file is located in *C:\Program Files\NCR APTRA\Advance NDC\data.*
- For other receipt or journal printers, user-defined fonts are selected using the *PersonasCharSets.txt* mapping file. This file is located in *C:\Program Files\NCR APTRA\Advance NDC\data*.

These files can be edited as required to define user-specified character mapping.

The name of the mapping file to use is held in the following registry key:

```
HKLM\SOFTWARE\NCR\Advance NDC\PRINTING\
CHAR_MAP_FILENAME
```

By default, the value is *UniversalCharSets.txt*.

When a character set is requested, it is identified using the file definition file. Whether the mapping file is checked for a corresponding section is set using the following registry keys:

```
HKLM\SOFTWARE\NCR\Advance NDC\PRINTING\
RECEIPT\MAP_REQUIRED

HKLM\SOFTWARE\NCR\Advance NDC\PRINTING\
JOURNAL\MAP_REQUIRED

HKLM\SOFTWARE\NCR\Advance NDC\PRINTING\
STATEMENT\MAP_REQUIRED
```

Valid values are as follows:

- 0 if mapping is not required. The mapping file is never checked
- 1 if mapping is required. The mapping file is always checked.

If the section is located, the Select Codepage control sequence is used to map the printable data. If the section is not located, the request is passed directly to the printer.

For information on the printer control codes, see “Printer Control Characters” on page 5-6.

The character designator sent by the host to select user-defined fonts must match that held in the appropriate registry key for the printer type, as follows:

```
HKLM\SOFTWARE\NCR\Advance NDC\PRINTING\
RECEIPT\CHAR_MAP_DESIGNATOR

HKLM\SOFTWARE\NCR\Advance NDC\PRINTING\
JOURNAL\CHAR_MAP_DESIGNATOR
```

By default, these registry keys are blank, so no user-specified character mapping occurs.

The mapping file, illustrated in Figure B-2, uses the conventions described in Table B-3.

Table B-3
Mapping File Conventions

Convention	Example
If the character does not require mapping, it does not need to be included in the mapping file	If character is the same whether mapped or not, there is no need to include a line converting it, as follows: 20H=20H
The source character, or range of characters, is given on the left of the equals sign This is the character that you want to map from	20H= 6A-6D=
The target character is given on the right of the equals sign This is the character that you want to map to	=20H
Source characters must be within the defined range Out of range characters are ignored	For International and Arabic character sets, 20H to 7FH For user-defined character sets, 20H to FFH
Target characters must be within the defined range Out of range characters are ignored	20H to FFH
Any line starting with a '/' is a comment	/Mapping file for International character set 1
Text within square brackets identifies a section The mapping file will have sections for each character set in both Arabic and International character types, plus any sections for user-defined fonts.	[International1]
A line starting with 'CP=' is setting the default code page	CP=437

Convention	Example
A line with ‘aa=bb’ converts character 0xaa to 0xbb using the default code page	60=9C
A line with ‘aa=bb,ccc’ converts character 0xaa to character 0xbb using code page ccc	65=83,737
A line with ‘aa1-aa2=bb’ converts the range of characters 0xaa1 to 0xaa2 to the character 0xbb using the default code page	60-62=9D
A line with ‘aa1-aa2=bb, ccc’ converts the range of characters 0xaa1 to 0xaa2 to the character 0xbb using code page ccc	6A-6D=8F, 852

Figure B-2
Example Mapping File

```
/Mapping file for the international character set 1
[International1]
CP=437
60=9C
61=92
62=9B
63=8F
64=8E
65=83,737
.
.
.
6A=8F,852
6C=99,852
6D=D3,852
6E=D3,850
6F=90,852
.
.
.
7F=72
/Mapping file for the user-defined character set R
[UserR]
60=9D
61=88
62=94
63=91
64=82
.
.
.
7F=9E
```

Appendix C

Cardholder Screen Graphics

Overview

This appendix lists the example cardholder screen graphics provided with Advance NDC.

Note: These graphics are provided as examples only; you will probably need to replace or amend them as required.

Cardholder Example Graphics

All the examples of cardholder graphics used by Advance NDC are located as follows:

- On the development PC in
  <install drive:>\<global>\final\xfs\dll
  <install drive:>\<global>\test\xfs\dll
- On the SST in
  <install drive:>\ssds\dll

The following cardholder graphic files (**.pcx*) are provided with Advance NDC and shown in this appendix:

- Insert Card (Screen G00)
- Press Key (Screen G01)
- Make a Deposit (Screen G03)
- Take Receipt (Screen G04)
- Take Cash (Screen G05)
- Take Statement (Screen G06).

Insert Card (*g00.pcx*)

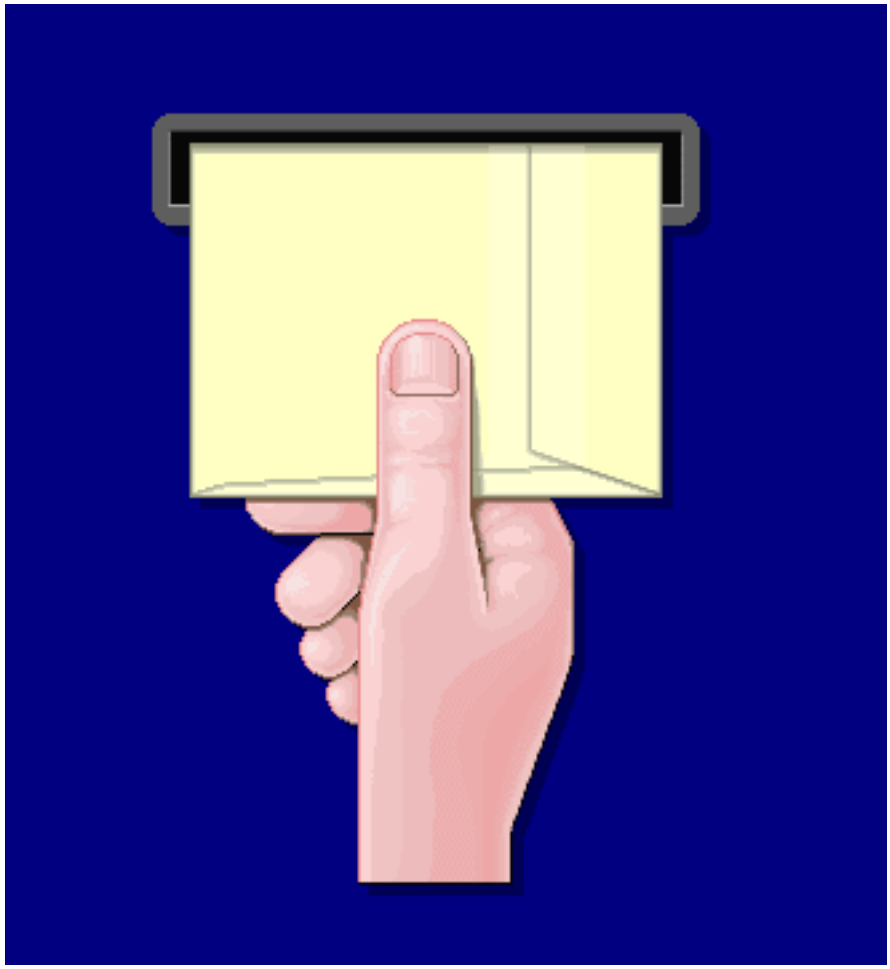
Figure C-1
Insert Card (g00.pcx)

Press Key (*g01.pcx*)

Figure C-2
Press Key (g01.pcx)

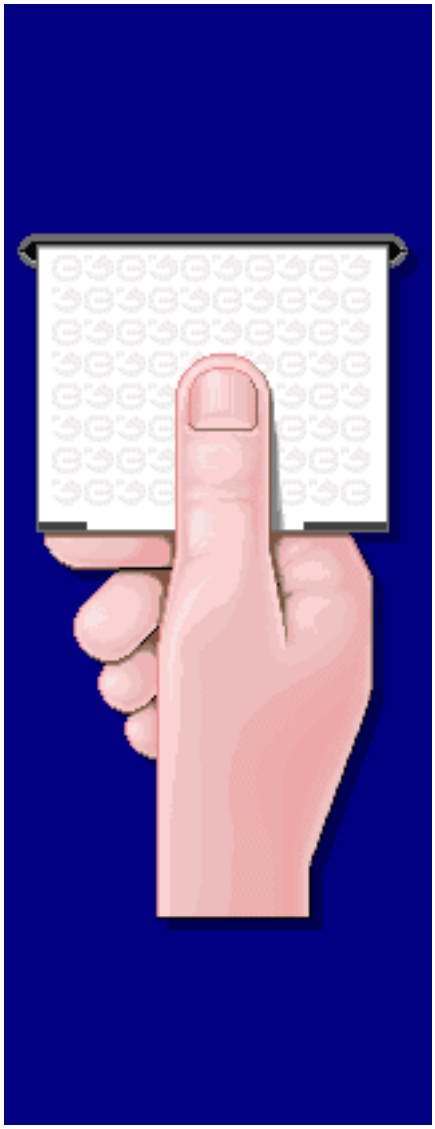
Make a Deposit (*g03.pcx*)

Figure C-3
Make a Deposit (g03.pcx)



Take Receipt (*g04.pcx*)

Figure C-4
Take Receipt (g04.pcx)

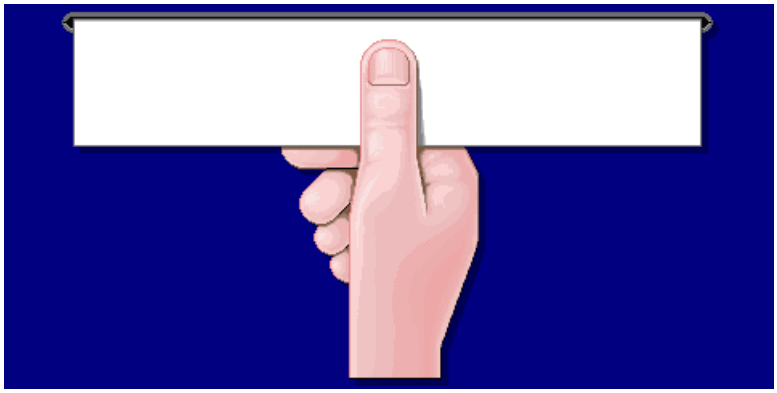


Take Cash (*g05.pcx*)

Figure C-5
Take Cash (g05.pcx)

Take Statement (*g06.pcx*)

Figure C-6
Take Statement (g06.pcx)



Appendix D

Quick Reference To Message Types

Overview

This appendix is for programmers designing the Central control application. It provides a quick reference to the types of message sent between Central and the terminal. For each message type, the message class and sub-class are shown, and each field within the message. This will help you to quickly identify the messages that pass to and from Central.

This appendix does not include information on the protocol-dependent headers and trailers.

Quick Reference to Message Types

Table D-1
Quick Reference to Message Types

Message Class	Message Sub-Class		LUNO			Message	Destination
1	1	~	000	~~~	...	Transaction Request	Central
1	2	~	000	~~	...	Unsolicited Status	Central
2	2	~	000	~~	...	Solicited Status	Central
2	3	~	000	~~	...	Encryptor Initialisation Data	Central
3	-	~	-	~~	...	TM-Alert Not supported by Advance NDC	Central
5	1	~	000	~	...	Exit To Host	Central
6	1	~	~	~~	...	Upload EJ Data	Central
1	-	~	-	~~	...	Terminal Commands	Terminal
3	1 or 3	~	-	~~	...	Customisation Data Commands	Terminal
3	2	~	-	~~	...	Interactive Transaction Response	Terminal
3	4	~	-	~~	...	Extended Encryption Key Change	Terminal
4	-	~	000	~	...	Transaction Reply	Terminal
5	-	~	-	~~	...	TM-Alert Not supported by Advance NDC	Terminal
6	1	~	~	~	...	Acknowledge EJ Upload Block	Terminal
6	2	~	~	~	...	Acknowledge and Stop EJ	Terminal
6	3	~	~	~	...	EJ Options and Timers	Terminal
7	1	~	000	~	...	Host To Exit	Terminal

~ field separator

... fields (each field is identified in the following pages)

Transaction Request

Table D-2
Transaction Request Message Format

Transaction Request		**11~000~~~...**
Field	**Description**	**Length**
f	Top of receipt transaction flag: 0 - will not print data at the top of receipt 1 - will print data at the top of receipt	1
g	Message co-ordination number	1
FS	Field separator	1
h	Track 2 data	Var (39)
FS	Field separator	1
i	Track 3 data	Var (106)
FS	Field separator	1
j	Operation code data	8
FS	Field separator	1
k	Amount entered	8 or 12
FS	Field separator	1
l	PIN buffer A	Var (32)
FS	Field separator	1
m	General purpose buffer B. Minimum data length is 3 digits.	Var (32)
FS	Field separator	1
n	General purpose buffer C	Var (32)
FS	Field separator	1
o	Track 1 identifier	1
p	Track 1 data	Var (78)
FS	Field separator	1
q	Transaction status data identifier	1
r	Last transaction status data	Var (65)
FS	Field separator	1
av1	CSP Data ID ‘U’	1

Transaction Request		**11~000~~~...**
Field	**Description**	**Length**
av2	CSP Data	Var (16)
FS	Field Separator	1
aw1	Confirmation CSP Data ID ‘V’	1
aw2	Confirmation CSP Data	Var (16)
FS	Field Separator	1
ax1	VC data ID ‘W’	1
ax2	VC data	1
FS	Field Separator	1
ay1	VC data ID ‘X’	1
ay2	VC data	1
FS	Field Separator	1
az1	VC data ID ‘Y’	1
az2	VC data	1
FS	Field Separator	1
ba1	VC data ID ‘Z’	1
ba2	VC data	1
FS	Field Separator	1
bb1	VC data ID ‘[‘	1
bb2	VC data ID	1
FS	Field Separator	1
bc1	VC data ID ‘\’	1
bc2	VC data	1
FS	Field Separator	1
bd1	Smart Card (EMV/CAM2) data ID ‘5’	1
bd2	Smart Card data	1
FS	Field Separator	1

Transaction Request		**11~000~~~...**
Field	**Description**	**Length**
ca1	BNA Device ID ‘w’	1
ca2*	BNA Denomination	2 or 3
ca3*	BNA Denomination notes total	2 or 3
*Note: ca2 and ca3 may be repeated for up to 50 denominations; the length can be 2 or 3 depending on the settings in Enhanced Configuration Parameters Load option 45.		
FS	Field Separator	1
cb1	CPM Document Data ID ‘a’	1
cb2	Magnetic Ink Code Recognition (MICR) detected	1
cb3	Magnetic Ink Code Recognition (MICR) value	Var(256)
ce1	Field ID ‘e’ shows that barcode data is being reported	1
ce2	Barcode Format identifier given in ASCII hex. If not known field is set to ‘0’	4
ce4	Scanned barcode data	Var
cf1*	Field id ‘f’. The value ‘f’ in this field shows that more than four coin hopper types are being reported.	1
cf2	Number of coins dispensed from hopper type 1	2
cf3	Number of coins dispensed from hopper type 2	2
cf4	Number of coins dispensed from hopper type 3	2
: The field is repeated for each hopper type specified in the Transaction Reply message :		
cf<*n+1*>	Number of coins dispensed from hopper type *n*	2

Transaction Request		**11~000~~~...**
Field	**Description**	**Length**
*Note: The cf fields are only present when buffer ‘f’ is used because more than four hopper types are configured. Otherwise, counts are shown in field ‘r’		
FS	Field Separator	1
x	Message Authentication Code	8

Unsolicited Status Messages

Table D-3
Unsolicited Status Message Format

Unsolicited Status Messages		**12~000~~(e1)...**
Field	**Description**	**Length**
e1	Status identifier	1
	A - Time-of-day clock	
	B - Power failure	
	D - Card reader / writer	
	E - Cash handler	
	F - Depository	
	G - Receipt printer	
	H - Journal printer	
	H - Electronic journal printer	
	K - Night safe depository	
	L - Encryptor	
	M - Camera (not supported)	
	N - Door access (not supported)	
	P - Sensors	
	Q - Touch screen keyboard	
	R - Supervisor keys	
	V - Statement printer	
	w - Bunch Note Acceptor (BNA)	
	Y - Coin dispenser	
	\ - Envelope dispenser	
	q - Cheque Processing Module (CPM)	

Solicited Status Messages

Table D-4
Solicited Status Message Fields

Solicited Status Messages		**22~000~~f~(g1)...**
Field	**Description**	**Length**
f	Status descriptor	1
g	Status information	1

Table D-5
Solicited Status Message Field Values

f	**g1**	**Description**
8		Device fault
	D	Card reader / writer
	E	Cash handler
	F	Depository
	K	Night safe depository
	V	Statement printer
	w	Bunch Note Acceptor (BNA)
	Y	Coin dispenser
	\	Envelope dispenser
	q	Cheque Processing Module (CPM)
9		Ready
A		Command reject
B		Ready (transaction reply)
C		Specific command reject
	1	MAC failure
	2	Time variant number failure
	3	Security terminal number mismatch
	A	Message format error
	B	Field value error
	C	Illegal message type
	D	Hardware failure
	E	Not supported

f	g1	Description
F	Terminal state	
	1	Send configuration information
	2	Send supply counters
	3	Send tally information
	4	Send error log information
	5	Send date/time information
	6	Send configuration ID
	F	EKC retrieve hallmark key *(unsupported)*
	H	Hardware configuration data
	I	Supplies data
	J	Fitness data
	K	Tamper and sensor status data
	L	Software ID and release number data
	M	Local configuration option digits

Encryptor Initialisation Data

Table D-6
Encryptor Initialisation Data

Encryptor Initialisation Data		
Field	**Description**	**Length**
e	Information Identifier	1
f	Encryptor Information	Var

Exit to Host Message

Table D-7
Exit to Host Messages

Exit To Host Messages		51~000~...
Field	**Description**	**Length**
f	Exit Supplied Data	Var

Upload EJ Data Message

Table D-8
Upload EJ Data Message

Upload EJ Data Message		61~~~~d
Field	**Description**	**Length**
d	Machine Number	6
e	Date	6
f	Time	6
g	Last Character Previous Block	6
h	Last Character This Block	6
i	Block Length	3
j	Response Data	Var (1 to 350)

Terminal Commands

Table D-9
Terminal Command Fields

Terminal Commands		1~~~fg
Field	**Description**	**Length**
f	Command code	1
g	Command modifier	1

Table D-10
Field Values for Terminal Commands

f	g	Description
1		Go in-service
2		Go out-of-service
	0	Standard out-of-service screen displayed
	1	'Temporary' out-of-service screen displayed
3		Send configuration ID
4		Send supply counters
	None	Send basic supply counters message
	1	Send basic supply counters message
	2	Send extended supply counters message
5		Send tally information
	A	Processor and system

f	g	Description
	B	High order communications
	C	System disk
	D	Card reader / writer
	E	Cash handler
	F	Depository
	G	Receipt printer
	H	Journal printer
	I	Reserved
	J	Reserved
	K	Night safe
	L	Encryptor
	M	Camera (not supported)
	N	Door access (not supported)
	O	Off-line disk
	V	Statement printer
	Y	Coin dispenser
	\	Envelope dispenser
6	Send error log information	
	A	Processor and system
	B	High order communications
	C	SST devices
7	Send configuration information	
	0	Send configuration information
	1	Send hardware information only
	2	Send supplies data only
	3	Send fitness data only
	4	Send tamper and sensor status data only
	5	Send software ID and release number data only
	6	Send enhanced configuration data
	7	Send local configuration option digits

f	g	Description
	8	Send BNA note definitions
8		Send date and time information
9		Reserved
:		Reserved
;		Reserved
=		EKC retrieve hallmark key *(not supported)*
<		Reserved
>		Enable FREE JDATA
?		Enable image dumping *(not supported)*
	0	Do not allow access to 'Dump Images'
	1	Allow access to 'Dump Images'

Customisation Data Commands

Table D-11
Customisation Data Command Fields

Customisation Data Commands		3~~~fg
Field	**Description**	**Length**
f	Message sub-class	1
g	Message identifier	1

Table D-12
Field Values for Data Commands

f	g	Description
1		Customisation data
	1	Screen and / or keyboard data load
	2	State tables load
	3	Configuration parameters load
	4	Reserved
	5	FIT data load
	6	Configuration ID number load
	A	Enhanced configuration parameters load
	B	MAC field selection load

f	g	Description
	C	Date and time load
	D	Reserved
	E	Dispenser currency cassette mapping table
	F	Initialise EKC *(not supported)*
	G	Override reserved screens command
2		Interactive transaction response
	0	Do not display cardholder keyboard entry
	1	Display cardholder keyboard entry
	2	Display '*' for cardholder keyboard entry
3		Encryption key change
	1	Decipher new master key with current master key
	2	Decipher new communications key with current master key
	3	Decipher new communications key with current communications key
	4	Use locally-entered communications key ('B' key) as current MAC key
	5	Decipher new MAC key with current master key
	6	Decipher new MAC key with current communications key
	7	Use locally-entered communications key ('B' key) as current MAC key
	8	Decipher new VISA master key with current VISA master key
	9	Key data is new VISA key table
4		Extended encryption key change
	1	Decipher new master key with current master key
	2	Decipher new communications key with current master key
	3	Decipher new communications key with current communications key
	4	Use locally-entered communications key ('B' key) as current MAC key
	5	Decipher new MAC key with current master key

f	g	Description
	6	Decipher new MAC key with current communications key
	7	Use locally-entered communications key ('B' key) as current MAC key
	8	Decipher new VISA master key with current VISA master key
	9	Key data is new VISA key table
	A	Decipher new VISA master key with current master key
	B	Load Host Security Module (HSM) public key and signature
	C	Load initial master key (A-key) with RSA key
	D	Load new initial communications key (B-key) with RSA key
	E	Load new initial VISA master key (V-key) with RSA key
	F	Send Encrypting PIN Pad (EPP) serial number
	G	Send EPP public key
	H	Send all Key Verification Values (KVVs)
	I	Reserved
	J	Set key entry mode
	K	Send current key entry mode

Transaction Reply

Table D-13
Transaction Reply

Transaction Reply		**4~000~...**
Field	**Description**	**Length**
e	Message sequence number	3 or 8
FS	Field separator	1
f	Next state identifier	3
FS	Field separator	1
g	Number of type 1 notes to dispense	2
h	Number of type 2 notes to dispense	2

Transaction Reply		**4~000~...**
Field	**Description**	**Length**
i	Number of type 3 notes to dispense	2
j	Number of type 4 notes to dispense	2
FS	Field separator	1
k	Transaction serial number	4
l	Function identifier: 1 - Deposit and print 2 - Dispense and print 3 - Display and print 4 - Print immediate 5 - Set next state and print 6 - Night safe deposit and print 7 - Deposit and print 8 - Dispense and print 9 - Display and print A - Eject card, dispense and print B - Parallel dispense, print and card eject C - Parallel dispense, print and card eject E - Reserved for NDC RMX F - Card before parallel dispense and print O - Reserved P - Print statement and wait Q - Print statement and set next state R - Reserved S - Process document with cash (*not supported)* T - DPM deposit envelope (*not supported)* * - Refund BNA deposited money and set next state - - Encash BNA deposited money, issue receipt if requested, and set next state	1

Transaction Reply		4~000~...
Field	**Description**	**Length**
	‘ - Encash BNA deposited money, and await Central instruction. : - Process cheque	
m	Screen number	3
n	Screen display update	Var
FS	Field Separator	1
o	Message co-ordination number	1
p	Card return / retain flag: 0 - Return card 1 - Retain card	1
q	Printer flag: 0 - Do not print 1 - Print on journal only 2 - Print on receipt only 3 - Print on receipt and journal 4 - Print on PPD if Function ID is ‘1’ or ‘7’ 5 - Print on PPD and journal if Function ID is ‘1’ or ‘7’ 8 - Print on statement only 9 - Reserved : - Reserved = - Sideways printing on receipt if Function ID is ‘P’ or ‘Q’ a - Stamp cheque, without printer data, if the Function ID is ‘:’ (Process cheque in CPM). b - Endorse cheque, with printer data, if the Function ID is ‘:’ (Process cheque in CPM).	1
r	Printer data field	Var (500)
GS	Group separator	1
s	Printer flag	1
t	Printer data	Var (500)
GS	Group separator	1

Transaction Reply		**4~000~...**
Field	**Description**	**Length**
u	Printer flag	1
v	Printer data	Var (500)
GS	Group separator	1
v1	Printer flag	1
v2	Printer data	Var (500)
	:	
	GS, v1 and v2 may be repeated up to nine further times	
	:	
FS	Field separator	1
w	Buffer identifier	1
x	Track 3 data	Var (106)
FS	Field separator	1
ak1	Buffer identifier K	1
ak2	Track 1 Data	Var (78)
FS	Field Separator	1
al1	Buffer identifier L	1
al2	Track 2 Data	Var (39)
FS	Field Separator	1
am1	VC data ID ‘M’.	1
am2	VC data	Var
FS	Field Separator	1
an1	VC data ID ‘N’.	1
an2	VC data	Var
FS	Field Separator	1
ao1	VC data ID ‘O’.	Var
ao2	VC data	Var
FS	Field Separator	1
ap1	VC data ID ‘P’.	1
ap2	VC data	Var

Transaction Reply		**4~000~...**
Field	**Description**	**Length**
FS	Field Separator	1
aq1	VC data ID ‘Q’.	1
aq2	VC data	Var
FS	Field Separator	1
ar1	VC data ID ‘R’.	1
ar2	VC data	Var
FS	Field Separator	1
as1	Reserved	1
as2	Reserved	1
FS	Field Separator	1
at1	EMV Smart Card data ID ‘5’	1
at2	EMV Smart Card data	1
FS	Field Separator	1
ba1	Cheque destination data ID ‘a’ for CPM	1
ba2	Cheque destination data for CPM	1
FS	Field Separator	1
y	MAC data	8

Host to Exit Message

Table D-14
Host to Exit Messages

Host to Exit Messages		**7~000~1~...**
Field	**Description**	**Length**
g	Data sent to Exit	Var

Acknowledge EJ Upload Block Command

Table D-15
Acknowledge EJ Upload Block Command

Acknowledge EJ Upload Block command		**6~~~1d.**
Field	**Description**	**Length**
d	Last Character Received	6

Acknowledge and Stop EJ Command

Table D-16
Acknowledge and Stop EJ Command

Acknowledge and Stop EJ command		**6~~~2d.**
Field	**Description**	**Length**
d	Last Character Received	6

EJ Options and Timers Command

Table D-17
EJ Options and Timers Command

EJ Options and Timers command		**6~~~3d.**
Field	**Description**	**Length**
d	Option Number	2
e	Option Value	3
f	Timer Number	2
g	Timer Value	3

Appendix E

Device Identifiers

Overview

The Device Identifiers referenced in “Device Fault Status Information Field” on page 9-60 indicate to which device the subsequent data in the configuration message applies.

The following tables show which terminal device these Device Identifiers relate to, the values they can take and the data accompanying them.

Hardware Configuration Data

The following table summarises the hardware configuration data associated with each device. For more information about the hardware configuration data returned in solicited status messages, see Chapter 9, “Device Fault Status Information Field”.

Table E-1
Device Hardware Configuration Data

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data		Data Length
A	41	**Time-of-Day Clock**		
		This Device Identifier is never returned in the configuration field		
B	42	**High Order Communications**		
		This Device Identifier is never returned in the configuration field		
C	43	**System Disk**		var (2)
		00	Hard disk drive present	
		01	Reserved	
		02	Reserved	
D	44	**Magnetic Card Reader/Writer**		var (2)
		00	No card reader attached	
		01	Track 2 (read only)	
		03	Track 1/2/3 MCRW (write on track 3 only) *(Also returned if card reader cannot be identified)*	
		05	PC Dip Reader	
		07	3 Track Write MCRW	
		08	Track 2 Smart Card Reader	
		09	Track 1/2/3 Smart Card Reader	
		0A	3 Track Write Smart Card Reader	
		0B	Track 1/2 and Track 2/3 Dip MSR	
		0C	Track 1/2/3 CIM86 MCRW	
		10	Track 1/2 Dip MSR	
		11	Track 1/2 Swipe Reader	
		1D	DASH Reader	
		1E	Track 1/2/3 with MM	
		1F	Track 1/2/3 Smart with MM	
		20	Track 3 Smart with MM	

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
E	45	**Cash Handler**	var (2)
		00 Not configured 01 Standard cash handler configured 02 Spray dispenser configured.	
		If extended cassettes are supported, the following is also reported:	
		Maximum Items Dispense	var (3)
		040-070 The total number of notes that can be dispensed for a transaction.	
F	46	**Envelope Depository**	var (2)
		00 Not configured 01 Reserved 02 Programmable printing depository 03 Reserved 04 Reserved	
G	47	**Receipt Printer**	var (2)
		00 Not configured 01 Plain paper 02 Black dot paper 03 Sideways printing, no black mark 04 Sideways printing, black mark 05 Thermal printer - no black mark 06 Thermal printer - black mark 07 Thermal printer - sideways printing, no black mark 08 Thermal printer - sideways printing, black mark	
H	48	**Journal Printer**	var (2)
		00 Not configured 01 Integral journal printer 02 Reserved 03 Thermal printer 80 Electronic journal 81 Electronic journal and integral journal printer 82 Reserved 83 Electronic journal and thermal printer 99 Reserved	
I	49	Reserved This Device Identifier is never returned in the configuration field	
J	4A	Reserved This Device Identifier is never returned in the configuration field	

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data		Data Length
K	4B	**Night Safe Depository**		var (2)
		00	Not configured	
		01	Configured	
		02	Reserved	
L	4C	**Encryptor**		var (2)
		?0	Not configured	
		?1	BAPE encryptor.	
		02	Reserved	
		03	Reserved	
		04	Reserved	
		05	EKC encryptor *(not supported)*	
		06	Reserved	
		?7	EPP encryptor ? = SST key entry mode (0, B or C) where: 0 = single-length keys without XOR key entry B = single length keys using XOR key entry C = double-length keys D = double-length restricted mode For example, C7 = double-length key entry with an EPP encryptor.	
M	4D	**Security Camera** *(not supported)*		var (2)
		00	Not configured	
N	4E	**Door Access System** *(not supported)*		var (2)
		00	Not configured	
O	4F	**Off-Line Flex Disk**		var (2)
		00	Not configured	
		01	1.44 MB flex disk drive	
		02	2.88 MB flex disk drive	
P	50	**TI Bins (Alarms)**		var (2)
		00	No TI Bins present	
		01	Secure cash, insecure cards, and either insecure deposit bin or no depository	
		02		
		03	Secure cash, insecure cards, and secure deposit bin Secure cash, secure cards, and either secure deposit bin or no depository.	
Note: To determine if a secure deposit bin is fitted, you need to check DIG 'F' for a PPD depository (02).				
Q	51	**Cardholder Keyboard**		var (2)
		00	Reserved	
		01	Standard (BAPE) keyboard	
		02	EPP keyboard	

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
R	52	**Operator Keyboard** 00 Not configured 01 Standard keyboard (basic) 02 Keyboard plus FDKs (enhanced)	var (2)
S	53	**Cardholder Display** BIT 0 Always zero BIT 1 Always zero BIT 2 0 - no voice BIT 2 1 - voice supported if digital audio present BIT 3 0 - standard FDKs BIT 3 1 - touch screen BIT 4 0 - VGA BIT 4 1 - VGM translator BITs 5-7 0 - (reserved - always zero)	var (2)
T	54	Reserved This Device Identifier is never returned in the configuration field	
U	55	Reserved This Device Identifier is never returned in the configuration field	
V	56	**Statement Printer** 00 Not configured 01 Configured 02 Reserved 03 Reserved 04 Reserved 05 Reserved 09 Enhanced thermal statement printer (SDC+)	var (2)
WW	58	Reserved This Device Identifier is never returned in the configuration field	
X	58	Reserved This Device Identifier is never returned in the configuration field	
Y	59	**Coin Dispenser** Byte: 1-2 — 00 - Not configured; 01 - Reserved; 02 - Coin dispenser with up to four hopper types; 03 - Coin dispenser with more than four hopper types	var (7) *See* Table Note 1

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data		Data Length
		Byte	**Description**	
		3-4	Number of hopper types. This is a two-digit decimal number.	
		5-7	Total number of coins that can be dispensed per transaction. This is a three-digit decimal number.	
Z	5A	**System Display**		var (2)
		00	Not configured	
		01	Reserved	
		02	Configured (16 x 32)	
[	5B	**Media Entry Indicators**		var (2)
		00	Not configured	
		01	Configured	
\	5C	**Envelope Dispenser**		var (2)
		00	Not configured	
		01	Configured	
		02	Reserved	
		03	Reserved	
d	64	**Cash Handler 0**		var (5)
		01	Not configured	
		02	Standard cash handler configured	
		03	Spray dispenser configured.	
		Maximum Items Dispense		
		040-070	The total number of notes that can be dispensed for a transaction.	
		This DIG is only reported when extended cassette types are supported.		
e	65	**Cash Handler 1**		var (5)
		01	Not configured	
		02	Standard cash handler configured	
		03	Spray dispenser configured.	
		Maximum Items Dispense		
		040-070	The total number of notes that can be dispensed for a transaction.	
		This DIG is only reported when extended cassette types are supported.		

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
f	66	**Barcode Reader** 0001 Barcode reader configured	var (4)
q	71	**Cheque Processing Module (CPM)** Configuration data length var(4) is an ASCII representation of a hexadecimal number. 0000 Not configured 00xx Configured When Option 83 is '000' the following is returned: Bit 0 = 1 MICR reader is supported Bit 1 = 1 Rear printer is supported Bit 2 = 0 Is currently reserved and is always 0 Bit 3 = 1 Front scanner is supported Bit 4 = 1 Rear scanner is supported Bits 5 to 6 Number of bins (1-3), with bit 5 as low bit. Bits 7 to 15 Reserved and are always 0 For example, '006B' indicates CPM configured with MICR reader, rear printer, front scanner and three bins. When Option 83 is '001' the following is returned: Bit 0 = 1 MICR reader is supported Bit 1 = 1 Rear printer is supported Bit 2 = 1 Cheque stamper is supported Bit 3 = 1 Front scanner is supported Bit 4 = 1 Rear scanner is supported Bits 5 to 8 Contains the number of bins. Bit 8 is the high bit and bit 5 is the low bit Bits 9 to 11 Reserved and are always 0 Bit 12 = 1 OCR codeline read is supported Bit 13 = 1 MICR reader supports E13B Bit 14 = 1 MICR reader supports CMC7 Bit 15 Reserved For example, '20AB' indicates CPM configured with E13B MICR reader with 5 bins, front scanner and rear printer.	var (4)
w	77	**Bunch Note Acceptor (BNA)** 00 Not configured 03 BNA cash deposit device	var (2)

Table Note 1: If Option 79 is set to 000 only the first two bytes are reported. If Option 79 is set to 001 all seven bytes are reported.

Supplies Data

The following table summarises the supplies data associated with each device.

Table E-2
Device Supplies Data

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
A	41	**Time-of-Day Clock**	
		This Device Identifier is never returned in the supplies field	
B	42	**High Order Communications**	
		This Device Identifier is never returned in the supplies field	
C	43	**System Disk**	
		This Device Identifier is never returned in the supplies field	
D	44	**Magnetic Card Reader/Writer**	var (1)
		Card capture bin	1
E	45	**Cash Handler**	var (5)
		Cash handler reject bin	1
		Cash handler cassette type 1	1
		Cash handler cassette type 2	1
		Cash handler cassette type 3	1
		Cash handler cassette type 4	1
		If extended cassettes are supported, this is extended to include the following:	
		Cash handler cassette type 5	1
		Cash handler cassette type 6	1
		Cash handler cassette type 7	1
			See Table Note 3
F	46	**Envelope Depository**	var (1)
		Envelope deposit bin	1

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
G	47	**Receipt Printer**	var (4)
		Receipt printer paper	1
		Receipt printer ribbon	1 *See* Table Note 2
		Receipt printer print-head	1
		Receipt printer knife	1
H	48	**Journal Printer**	var (3)
		Journal printer paper	1
		Journal printer ribbon	1 *See* Table Note 2
		Journal printer print-head	1
I	49	Reserved This Device Identifier is never returned in the supplies field	
J	4A	Reserved This Device Identifier is never returned in the supplies field	
K	4B	**Night Safe Depository**	var (1)
		Night safe bin	1
L	4C	**Encryptor** This Device Identifier is never returned in the supplies field	
M	4D	**Security Camera** *(not supported)*	
N	4E	**Door Access System** *(not supported)*	
O	4F	**Off-Line Disk** This Device Identifier is never returned in the supplies field	
P	50	**TI Bins (Alarms)** This Device Identifier is never returned in the supplies field	
Q	51	**Cardholder Keyboard** This Device Identifier is never returned in the supplies field	
R	52	**Operator Keyboard** This Device Identifier is never returned in the supplies field	
S	53	**Cardholder Display** This Device Identifier is never returned in the supplies field	

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
T	54	Reserved This Device Identifier is never returned in the supplies field	
U	55	Reserved This Device Identifier is never returned in the supplies field	
V	56	**Statement Printer** Statement printer paper Statement printer ribbon Statement printer print-head Statement printer knife Statement printer capture bin	var (5) 1 1 1 1 1
X	58	Reserved This Device Identifier is never returned in the supplies field	
Y	59	**Coin Dispenser*** Coin dispenser hopper type 1 Coin dispenser hopper type 2 Coin dispenser hopper type 3 Coin dispenser hopper type 4 : Coin dispenser hopper type*n*	var (4) 1 1 1 1 1 *See* Table Note 7
Z	5A	**System Display** This Device Identifier is never returned in the supplies field	
[	5B	**Media Entry Indicators** This Device Identifier is never returned in the supplies field	
\	5C	**Envelope Dispenser** Envelope dispenser hopper	var (1) 1

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
d	64	**Cash Handler 0**	var (29)
		Reject bin	1
		Cassette type 1	3
		Cassette type 1 supplies status	1
		Cassette type 2	3
		Cassette type 2 supplies status	1
		Cassette type 3	3
		Cassette type 3 supplies status	1
		Cassette type 4	3
		Cassette type 4 supplies status	1
		Cassette type 5	3
		Cassette type 5 supplies status	1
		Cassette type 6	3
		Cassette type 6 supplies status	1
		Cassette type 7	3
		Cassette type 7 supplies status	1
		This DIG is only reported when extended cassette types are supported.	*See* Table Note 3 and Table Note 4
e	65	**Cash Handler 1**	var (29)
		Reject bin	1
		Cassette type 1	3
		Cassette type 1 supplies status	1
		Cassette type 2	3
		Cassette type 2 supplies status	1
		Cassette type 3	3
		Cassette type 3 supplies status	1
		Cassette type 4	3
		Cassette type 4 supplies status	1
		Cassette type 5	3
		Cassette type 5 supplies status	1
		Cassette type 6	3
		Cassette type 6 supplies status	1
		Cassette type 7	3
		Cassette type 7 supplies status	1
		This DIG is only reported when extended cassette types are supported.	*See* Table Note 3 and Table Note 4

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
q	71	**Cheque Processing Module (CPM)**	var(1)
		When Option 83 is '000' supplies information is not reported to the host for the CPM device. DIG 'q' will not be present.	
		When Option 83 is '001' the following is returned:	
		Endorse printer Stamper Reserved Reserved Bin 1 Bin 2 : Bin *n*	1 1 1 1 1 1 : 1
		See Table Note 5	
w	77	**Bunch Note Acceptor (BNA)**	var (1)
		BNA Cash Bin	*See* Table Note 6

Table Note 2: Always 1 (Good State) for Thermal printers.

Table Note 3: When extended cassette types are supported, using Enhanced Configuration option 76, DIG 'E' reports the combined supplies status. Separate cash handler supplies status is given in DIG 'd' and DIG 'e'.

Table Note 4: The reject bin supplies status reports the combined status for both the reject bin and the retract bin, where present. The status takes the value of the fullest bin, as an overfill on either will prevent further use of the SST.

Table Note 5: A supplies value is reported for the number of bins reported within the CPM data in the hardware configuration message. In addition to the standard supplies values '0' to '4', the following supplies value is also possible:

Supplies Status Data Value	Description
'5'	Media high (almost full)

Table Note 6: With option 45 (see page 10-17) set to enable the extended message format, this field is extended to report multiple cassettes for the BNA as follows:

Table E-3
BNA Supplies: Extended Message Format

Character	Description
0	Retract / Reject / Level 2 Bin The “level 2” bin is for ECB6 category 2 notes; also referred to as the counterfeit bin
1 - 3	'001' The first logical cassette type
4	Supplies state of Cassette Type 1
5-7	'002' The second logical cassette type
8	Supplies state of Cassette Type 2
9 - 11	'003' The third logical cassette type
12	Supplies state of Cassette Type 3
13-15	'004' The fourth logical cassette type
16	Supplies state of Cassette Type 4

Table Note 7: Hopper positions 1 to 4 are always present, hopper positions 5 to *n* are only present when more than four hopper types are configured.

Fitness Data

The following table summarises the fitness data associated with each device. Where a device has multiple severities, they are given in the order in which they appear in the message.

Table E-4
Device Fitness Data

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
A	41	**Time-of-Day Clock**	var (1)
		Fitness Time of Day Clock	1
B	42	**High Order Communications**	var (1)
		Fitness High Order Communications	1
C	43	**System Disk**	var (1)
		Fitness system disk	1
D	44	**Magnetic Card Reader/Writer**	var (1)
		Fitness magnetic card	1
E	45	**Cash Handler**	var (5)
		Fitness cash handler Fitness cassette type 1 Fitness cassette type 2 Fitness cassette type 3 Fitness cassette type 4	1 1 1 1 1
		If extended cassettes are supported, this is extended to include the following:	
		Cash handler cassette type 5 Cash handler cassette type 6 Cash handler cassette type 7	1 1 1 *See* Table Note 8
F	46	**Envelope Depository**	var (1)
		Fitness depository	1
G	47	**Receipt Printer**	var (1)
		Fitness receipt printer	1

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
H	48	**Journal Printer**	var (1)
		Fitness journal printer	1
I	49	Reserved	
		This Device Identifier is never returned in the fitness field	
J	4A	Reserved	
		This Device Identifier is never returned in the fitness field	
K	4B	**Night Safe Depository**	var (1)
		Fitness night safe depository	1
L	4C	**Encryptor**	var (1)
		Fitness encryptor	1
M	4D	**Security Camera** *(not supported)*	
N	4E	**Door Access System** *(not supported)*	
O	4F	**Off-Line Flex Disk**	var (1)
		Fitness off-line flex disk	1
P	50	**TI Bins (Alarms)**	
		This Device Identifier is never returned in the fitness field	
Q	51	**Cardholder Keyboard**	var (1)
		Fitness cardholder keyboard	1
R	52	**Operator Keyboard**	
		This Device Identifier is never returned in the fitness field	
S	53	**Cardholder Display**	
		This Device Identifier is never returned in the fitness field	
T	54	Reserved	
		This Device Identifier is never returned in the fitness field	
U	55	Reserved	
		This Device Identifier is never returned in the fitness field	
V	56	**Statement Printer**	var (1)
		Fitness statement printer	1
X	58	Reserved	
		This Device Identifier is never returned in the fitness field	

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
Y	59	**Coin Dispenser** *	var (5)
		Fitness coin dispenser	1
		Fitness hopper[1] 1	1
		Fitness hopper 2	1
		Fitness hopper 3	1
		Fitness hopper 4	1
		Fitness hopper 5	1
		Fitness hopper *n*[2]	1
		[1]Note: Hopper refers to a single hopper or a logical combination of physical hoppers (a hopper type) depending on the hardware configuration. [2]Note: Hopper positions 1 to 4 are always present, hopper positions 5 to *n* are only present when more than four hopper types are configured.	
Z	5A	**System Display**	
		This Device Identifier is never returned in the fitness field	
[	5B	**Media Entry Indicators**	
		This Device Identifier is never returned in the fitness field	
\	5C	**Envelope Dispenser**	var (1)
		Fitness envelope dispenser	1
d	64	**Cash Handler 0**	var (29)
		Fitness cash acceptor	1
		Cassette type 1 (in the range 001-999)	3
		Cassette type 1 fitness status	1
		Cassette type 2 (in the range 001-999)	3
		Cassette type 2 fitness status	1
		Cassette type 3 (in the range 001-999)	3
		Cassette type 3 fitness status	1
		Cassette type 4 (in the range 001-999)	3
		Cassette type 4 fitness status	1
		Cassette type 5 (in the range 001-999)	3
		Cassette type 5 fitness status	1
		Cassette type 6 (in the range 001-999)	3
		Cassette type 6 fitness status	1
		Cassette type 7 (in the range 001-999)	3
		Cassette type 7 fitness status	1
		This DIG is only reported when extended cassette types are supported.	*See* Table Note 8

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
e	65	**Cash Handler 1**	var (29)
		Fitness cash acceptor	1
		Cassette type 1 (in the range 001-999)	3
		Cassette type 1 fitness status	1
		Cassette type 2 (in the range 001-999)	3
		Cassette type 2 fitness status	1
		Cassette type 3 (in the range 001-999)	3
		Cassette type 3 fitness status	1
		Cassette type 4 (in the range 001-999)	3
		Cassette type 4 fitness status	1
		Cassette type 5 (in the range 001-999)	3
		Cassette type 5 fitness status	1
		Cassette type 6 (in the range 001-999)	3
		Cassette type 6 fitness status	1
		Cassette type 7 (in the range 001-999)	3
		Cassette type 7 fitness status	1
		This DIG is only reported when extended cassette types are supported.	*See* Table Note 8
f	66	**Barcode Reader**	var (1)
		Fitness barcode reader	1
q	71	**Cheque Processing Module (CPM)**	var (1)
		When Option 83 is ‘000’ the following is returned:	
		Fitness CPM	1
		When Option 83 is ‘001’ the following is returned:	
		Fitness CPM	1
		Endorse printer	1
		Stamper	1
		Reserved	1
		Reserved	1
		Bin 1	1
		Bin 2	1
		Bin *n*	1
		See Table Note 9	
w	77	**Bunch Note Acceptor (BNA)**	var (1)
		Fitness bunch note acceptor	1 *See* Table Note 10

Table Note 8: When extended cassette types are supported, using Enhanced Configuration option 76, DIG ‘E’ reports the combined

fitness status. Separate cash handler fitness status is given in DIG ‘d’ and DIG ’e’.

Table Note 9: A fitness value is reported for the number of bins reported within the CPM data in the hardware configuration message.

Table Note 10: With option 45 (see page 10-17) set to enable the extended message format, this field is extended to report multiple cassettes as follows:

Table E-5
BNA Fitness: Extended Message Format

Character	Description
0	Retract / Reject / Level 2 Bin and overall fitness
1 - 3	'001' The first logical cassette type
4	Fitness of Cassette Type 1
5-7	'002' The second logical cassette type
8	Fitness of Cassette Type 2
9 - 11	'003' The third logical cassette type
12	Fitness of Cassette Type 3
13-15	'004' The fourth logical cassette type
16	Retract / Reject / Level 2 Bin and overall fitness

Tamper Data

The following table summarises the tamper data associated with each device when enhanced configuration option 24 is set to send extended tamper data. For details of option 24 see "Option 24 – Enhanced / TI Sensor Status Unsolicited Message" on page 7-8.

Table E-6
Device Tamper Data

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
D	44	**Magnetic Card Reader/Writer**	var (1)
		Card capture bin	1
E	45	**Cash Handler**	var (0)
		This is not reported. Cash handler 0 is reported using device identifier 'd'. *See* Cash Handler 0 on page E-20 Cash handler 1 is reported using device identifier 'e'. *See* Cash Handler 1 on page E-21	
F	46	**Envelope Depository**	var (4)
		Envelope Deposit Module Identifier. Always '001' - Envelope Deposit Bin	3
		Envelope Deposit Module State	1
G	47	**Receipt Printer**	var (102)
		Number of Retract positions. This is in the range 00 to 99	2
		Retract position 1	1
		:	
		Retract position *n*	1
K	4B	**Night Safe Depository**	var (4)
		Night Safe Module Identifier. Always '001' - Night Safe Bin	3
		Night Safe Module State	1
P	50	**TI Bins (Alarms)**	var (240)
See Table Note 11, Table Note 12, and Table Note 13		Sensor Type 1	3
		Sensor State 1. Always '001'	3
		:	
		Sensor Type *n*	3
		Sensor State *n*	3

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
V	56	**Statement Printer**	var (102)
		Number of Retract positions. This is in the range 00 to 99	2
		Retract position 1	1
		:	
		Retract position *n*	1
Y	59	**Coin Dispenser**	var
See Table Note 14 and Table Note 15		Number of Reject positions. This is in the range 00 to 99	2
		Reject position 1	1
		:	
		Reject position *n*	1
		Number of Retract positions. This is in the range 00 to 99	2
		Retract position 1	1
		:	
		Retract position *n*	1
		Number of Hopper positions. This is in the range 00 to 99	2
		Hopper position 1	1
		:	
		Hopper position *n*	1
d	64	**Cash Handler 0**	var
See Table Note 16 and Table Note 17		Number of Reject positions. This is in the range 00 to 99	2
		Reject position 1	1
		:	
		Reject position *n*	1
		Number of Retract positions. This is in the range 00 to 99	2
		Retract position 1	1
		:	
		Retract position *n*	1
		Number of Cassette positions. This is in the range 00 to 99	2
		Cassette position 1	1
		:	
		Cassette position *n*	1

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length
e	65	**Cash Handler 1**	var
See Table Note 18, Table Note 16 and Table Note 17		Number of Reject positions. This is in the range 00 to 99 Reject position 1 : Reject position *n*	2 1 1
		Number of Retract positions. This is in the range 00 to 99 Retract position 1 : Retract position *n*	2 1 1
		Number of Cassette positions. This is in the range 00 to 99 Cassette position 1 : Cassette position *n*	2 1 1
w	77	**Bunch Note Acceptor (BNA)**	var
See Table Note 19 and Table Note 20		Number of Retract positions. This is in the range 00 to 99 Retract position 1 : Retract position *n*	2 1 1
		Number of Retract positions. This is in the range 00 to 99 Retract position 1 : Retract position *n*	2 1 1
q	71	**Cheque Processing Module (CPM)**	var (102)
		Number of bins. This is in the range 00 to 99 Bin position 1 : Bin position *n*	2 1 1

Table Note 11: Only the alarms and sensors are reported using this field.

Table Note 12: Sensor types 001, 002, 003, and 004 must be reported within this field, as defined in Table E-7.

Table Note 13: Sensor states can be either ‘000’ - no alert (normal), or ‘001’ alert.

Table Note 14: The coin dispenser field contains an ordered list of coin containers, including hoppers, retract and reject bins. The list is ordered by physical type then physical position. The reporting order is: reject bins, retract bins, then hoppers. The limit on the

number of physical containers within each category is the maximum possible message length.

Table Note 15: If the coin dispense is part of a compound dispense or deposit device, this field reports the state of all physical cassettes, including deposit.

Table Note 16: The cash handler field contains an ordered list of cassettes and bins. The list is ordered by physical type then physical position. The reporting order is: reject bins, retract bins, then cassettes. The limit on the number of physical containers within each category is the maximum possible message length.

Table Note 17: If the cash handler is part of a compound dispense or deposit device, this field reports the state of all physical cassettes, including deposit.

Table Note 18: The cash handler 1 field is only reported as part of a dual cash handler system.

Table Note 19: The BNA field contains an ordered list of cassettes and bins. The list is ordered by physical type then physical position. The reporting order is: retract bins, then cassettes. The limit on the number of physical containers within each category is the maximum possible message length.

Table Note 20: If the BNA is part of a compound dispense or deposit device, this field reports the state of all physical cassettes, including dispense.

Table E-7
TI Bins (Alarms) Sensor Types

Sensor Type	Description
'001'	Vibration and / or heat sensor
'002'	Door contact sensor
'003'	Silent signal sensor
'004'	Electronics enclosure sensor
'005'	Reserved
'006'	Reserved
'010' to '040'	Fraud detection devices:
'010'	Card reader facia
'011'	Left cash slot facia
'012'	right cash slot facia
'013'	Auxiliary 1 facia

Sensor Type	Description
‘014’	Auxiliary 2 facia
‘015’	Auxiliary 3 facia
‘016’	Spy camera *(not supported)*
‘017’	IFD sensor
‘018’	IFD device
‘019’-‘040’	Reserved

Appendix F

ASCII / EBCDIC Conversion Table

Overview

This appendix provides a conversion table showing the mapping of ASCII character codes to EBCDIC and ASCII hexadecimal codes.

Code Conversion Table

The following table lists the ASCII control codes and characters and their equivalent in EBCDIC and ASCII hexadecimal codes:

Table F-1
ASCII to EBCDIC Code Conversion

ASCII Control Codes and Characters	EBCDIC (Hex)	ASCII (Hex)
NUL	00	00
SOH	01	01
STX	02	02
ETX	03	03
EOT	37	04
ENQ	2D	05
ACK	2E	06
BEL	2F	07
BS	08	08
HT	05	09
LF	15	0A
VT	0B	0B
FF	0C	0C
CR	0D	0D
SO	0E	0E
SI	0F	0F
DLE	10	10
DC1	11	11
DC2	12	12
DC3	13	13
DC4	3C	14
NAK	3D	15
SYN	32	16
ETB	26	17
CAN	18	18

ASCII Control Codes and Characters	EBCDIC (Hex)	ASCII (Hex)
EM	19	19
SUB	3F	1A
ESC	27	1B
FS	1C	1C
GS	1D	1D
RS	1E	1E
US	1F	1F
SP	40	20
!	4F	21
"	7F	22
#	7B	23
$	5B	24
%	6C	25
&	50	26
' (apostrophe or single quote)	7D	27
(	4D	28
)	5D	29
*	5C	2A
+	4E	2B
,	6B	2C
-	60	2D
.	4B	2E
/	61	2F
0	F0	30
1	F1	31
2	F2	32
3	F3	33
4	F4	34
5	F5	35

ASCII Control Codes and Characters	EBCDIC (Hex)	ASCII (Hex)
6	F6	36
7	F7	37
8	F8	38
9	F9	39
:	7A	3A
;	5E	3B
<	4C	3C
=	7E	3D
>	6E	3E
?	6F	3F
@	7C	40
A	C1	41
B	C2	42
C	C3	43
D	C4	44
E	C5	45
F	C6	46
G	C7	47
H	C8	48
I	C9	49
J	D1	4A
K	D2	4B
L	D3	4C
M	D4	4D
N	D5	4E
O	D6	4F
P	D7	50
Q	D8	51
R	D9	52
S	E2	53

ASCII Control Codes and Characters	EBCDIC (Hex)	ASCII (Hex)
T	E3	54
U	E4	55
V	E5	56
W	E6	57
X	E7	58
Y	E8	59
Z	E9	5A
[	4A	5B
\	EO	5C
]	5A	5D
^ (caret or circumflex)	5F	5E
_	6D	5F
` (grave accent)	79	60
a	81	61
b	82	62
c	83	63
d	84	64
e	85	65
f	86	66
g	87	67
h	88	68
i	89	69
j	91	6A
k	92	6B
l	93	6C
m	94	6D
n	95	6E
o	96	6F

ASCII Control Codes and Characters	EBCDIC (Hex)	ASCII (Hex)
p	97	70
q	98	71
r	99	72
s	A2	73
t	A3	74
u	A4	75
v	A5	76
w	A6	77
x	A7	78
y	A8	79
z	A9	7A
{	C0	7B
| (vertical bar)	6A	7C
}	D0	7D
~ (tilde)	A1	7E
DEL	07	7F

Appendix G

Related Documentation

Overview

This appendix lists the following documentation:

- Documentation provided with the Advance NDC CD-ROM
- Documentation that is historically linked to Advance NDC, but not provided on the Advance NDC CD-ROM
- Documentation from other sources, such as optional components and standards bodies. This documentation is not provided on the Advance NDC CD-ROM.

To read the Adobe Acrobat® Portable Document Format (PDF) documentation, you need Adobe Reader version 5.0 or later. The latest version is available free from *www.adobe.com*.

On a development system, the documentation can be installed alone or installed with the Advance NDC software. The documentation is not installed on a runtime system.

Advance NDC Documentation

The following publications are provided on the Advance NDC CD-ROM. Printed versions can be ordered from the *NCR Publications web site*.

Note: The Advance NDC Windows help files mentioned in Appendix Table G-1 are provided as part of the APTRA Author.

Table G-1
Advance NDC Documentation

Title	Format	Description
APTRA Advance NDC, Overview B006-6597	PDF/Paper	Provides an introduction to Advance NDC, including overviews of the components contained in the Advance NDC product and provided as part of the ANDC Package on CD-ROM.
APTRA Advance NDC, Developer's Guide B006-6046	PDF/Paper	Describes how to migrate to Advance NDC. It also identifies the functionality offered by Advance NDC, and describes how to enhance it.
APTRA Advance NDC, Reference Manual B006-6180	PDF/Paper	Provides application programmers with reference information for Advance NDC, including States, Screens, and the message formats between Central and the terminal.
APTRA Advance NDC, Multi-Vendor Support Reference Manual B006-6344	PDF/Paper	Provides users with information about running the Advance NDC application on other vendors' SSTs, describing the differences between Advance NDC on NCR SSTs and other vendors' SSTs.
APTRA Advance NDC, Supervisor's Guide B006-6062	PDF/Paper	Describes the Supervisor interface, how to set up the terminal's local configuration parameters, and how to replenish the terminal.
Advance NDC Help	Windows Help	Context-sensitive help for the Advance NDC Authoring components (excluding Application Core components).
Advance NDC Application Core Help	Windows Help	Context-sensitive help for the Application Core/Supervisor Authoring components.

APTRA Author Documentation

The following titles are provided on the Advance NDC CD-ROM to support the use of the authoring environment. A printed version of the PDF file can be ordered from the *NCR Publications web site*.

Note: Advance Application Development Environment (ADE) is no longer available as a separate product, but the APTRA Author is used in Advance NDC development.

Table G-2
Provided APTRA Author Documentation

Title	Format	Description
APTRA Author, User's Guide B006-6038	PDF / Paper	Describes how to install and use the Author and Runtime Components to design, develop and maintain a self-service application.
APTRA Author Help	Windows Help	Context-sensitive help for the Author user interface and authoring errors.
Runtime Core Help	Windows Help	Context-sensitive help for the Runtime Core Authoring components and runtime errors, which are part of Advance Core Self-Service.
GUI Help	Windows Help	Context-sensitive help for the GUI Authoring components, which are part of Advance Core Self-Service.
Self-Service Core Help	Windows Help	Context-sensitive help for the Self-Service Core Authoring components, which are part of Advance Core Self-Service.
ActiveX™ Help	Windows Help	Context-sensitive help for the ActiveX™ Authoring components and runtime errors, which are part of Advance Core Self-Service.
Basic Self-Service Help	Windows Help	Context-sensitive help for the Authoring components and runtime errors provided with Advance Basic Self-Service.
ATM Help	Windows Help	Context-sensitive help for the Authoring components and runtime errors provided with Advance ATM.
Special Self-Service Help	Windows Help	Context-sensitive help for the Authoring components and runtime errors provided with Advance Special Self-Service.
Statement Printer Help	Windows Help	Context-sensitive help for the Authoring components and runtime errors provided with Advance Statement Printer.

The PDF publications in Table G-3 below are not provided on the Advance NDC CD-ROM. These publications have not been updated, but may be useful if you are using the authoring environment to extend Advance NDC. Printed versions can be ordered from the *NCR Publications web site*.

Note: NCR recommends the use of C Exits to extend Advance NDC.

Table G-3
Additional Authoring Environment Documentation

Title	Format	Description
APTRA Advance ADE, Programmer's Guide B006-6042	PDF / Paper	Describes how application programmers should create their own C++ Worker Classes. It also contains information on using C routines to manipulate data.
APTRA Advance ADE, C++ Class Reference B006-6043	PDF / Paper	Provides application programmers with definitions for a number of C++ Runtime and Utility Worker Classes provided by NCR.

NDC+ Documentation

The publication in the following table is provided on the Advance NDC CD-ROM. A printed version can be ordered from the *NCR Publications web site*.

Table G-4
Provided NDC+ Documentation

Title	Format	Description
NCR Direct Connect (NDC), Using NDC Exits B006-5102	PDF / Paper	Introduces NDC Exits to experienced NDC programmers intending to develop customised terminal applications.

The publications in the following table are not provided on the Advance NDC CD-ROM. Printed versions can be ordered from the *NCR Publications web site*.

Table G-5
Additional NDC+ Documentation

Title	Format	Description
NDC, Programmer's Overview B006-2485	PDF / Paper	Provides an introduction to, and overview of, the NDC software.
NDC+, Programmer's Reference Manual B006-2486	PDF / Paper	Aimed at programmers who write host or switch applications to support NDC+ terminals, or who create the terminal configuration that customises NDC+.
NDC, Message Formats For Host Application Developers B006-4201	PDF / Paper	Designed for Central control application developers working with NDC RMX, NDCxa or NDC+. Intended to help in creating a control program that handles all the NDC variants.
NDC+, Supervisor's Reference Manual B006-2487	PDF / Paper	Designed for those people who are responsible for setting up the terminal's local configuration parameters, or for routine replenishment of the terminal.

Other NCR Documentation

The publications in the following table are provided with the software component to which they refer. Printed versions of the first two titles can be ordered from the *NCR Publications web site*.

Table G-6
Other NCR Documentation

Component	Title	Format	Description
EMV / CAM2 Exits for APTRA Advance NDC	*EMV Integrated Circuit Card (ICC) Reference Manual* B006-6297	PDF / Paper	Provides reference information for any Advance NDC developer who wishes to add EMV Integrated Circuit Card (ICC) Card Authentication Method (CAM) functionality to their Advance NDC application. Version 1.xx of the product is required for Advance NDC.
APTRA XFS	*NCR APTRA XFS Overview* B006-6166	PDF / Paper	Provides information about APTRA XFS, its features and functionality, and the requirements for its use.
NCR XFS Simulator for APTRA	*XFS Simulator for APTRA*	Microsoft HTML Help (CHM)	Context-sensitive help and reference for the NCR XFS Simulator. **Note:** The XFS Simulator provided with Advance NDC is a pre-release version.
40 Column Printer	*Programmer's Manual for the 40 Column Printer B006-4612*	PDF / Paper	Provides information about code pages for the 40-column printer.

Miscellaneous Documentation

This section lists any third-party manuals and documents that are referenced in the text. CEN-XFS documents are available from *http://www.cenorm.be/isss/Workshop/XFS*.

Table G-7
CEN-XFS Documentation

Title	Format	Description
Extensions for Financial Services (XFS) interface specification (CWA 14050)	PDF or zipped PDF	Provides reference information for CEN-XFS specifications, release 3.00 or later.
ActiveXFS Interface Specification (CWA 13849)	PDF or zipped PDF	Provides reference information for the ActiveXFS specifications.

Table G-8
Other Documentation

Title	Reference
Banking - Personal Identification Number Management and Security (Part 1: PIN Protection Principles and Techniques)	ISO 9564-1

Information about ISO standards is available at *http://www.iso.org*.

Glossary

A

ABA American Bankers Association.

ActiveX Control A type of COM component which implements standard interfaces, and can be included in a web page and used in languages such as VBScript.

Advance NDC NCR's Advance implementation of NDC.

API Application Programming Interface.

Application An application is a collection of Workers that can be built to create an executable. *See* **Self-Service Application**.

Application Core The Application Core performs the SST mode handling and message processing functions.

APTRA Author Tool that allows you to visually design and develop a self-service application.

ARPC Authorisation Response Cryptogram. An ICC application cryptogram produced by Central for submission to the ICC, to prove it is a genuine host.

ASCII American Standard Code for Information Interchange. This is a computer code for representing alphanumeric characters.

ATM Automated Teller Machine. *See* **SST**.

B

BAPE Basic Alpha PINpad and Encryptor. Combined PINpad and encryptor. Supports single length DES encryption with various local and remote PIN verification schemes.

Basic Remote Key Protocol A minimum command set for remote key management that complies with the mandatory requirements of ANS X9.24.2004 part 2.

BNA Bunch Note Acceptor

BOP Basic Operator Panel. Not supported by Advance NDC. *See* **EOP**.

C

Cardholder The SST customer.

Catalog In the APTRA Author, a means of organising workers or applications into manageable groups.

CDM Cash Dispenser Module**.** CEN-XFS class name for the Cash Dispenser service.

Coin Hopper A physical container holding coins.

Coin Hopper Type A logical representation of one or more Coin Hoppers containing the same type of coin. A Coin Hopper Type maps to one logical XFS CDM Cash Unit.

Cold Start The first time the terminal is powered up, with no previously downloaded software.

CEN Comité Européen de Normalisation (European Committee for Standardization). Responsible for the XFS interface specification.

COM Common Object Model. An open architecture for cross-platform development of client / server applications based on object-oriented technology. Clients have access to an object through interfaces implemented on the object (for example, access to Methods, Properties and Events).

cpi characters per inch.

CPM Cheque Processing Module.

CR Carriage Return.

CROPF Card Return on Power Fail.

CRT Cathode-ray tube. A type of screen used for cardholder display on the front interface of an SST.

CSP Customer Selectable PIN.

Currency Medium of exchange in a country, for example American dollars (USD) or British pounds (GBP).

Customisation Layer The Customisation Layer performs the 'In Service' activities associated with the cardholder.

D

D/A Digital / Analog.

DAPI Direct Application Programming Interface.

DASH Dip And Smart Hardware. Supported in Dip emulation mode only.

DEA2 Data Encryption Algorithm 2.

Denomination The values of the monetary units in a series.

DES Data Encryption Scheme.

DES encryption, Triple See **Triple DES encryption**.

Device ID Device Identifier. Another term for DIG.

DIG Device Identifier Graphic.

DLL Dynamically Linked Library.

E

EBCDIC Extended Binary-Coded Decimal Interchange Code. An eight-bit character code.

EJ Electronic Journal. The EJ log emulates the printed journal. All the data normally recorded on the journal printer is written to the EJ log on the terminal's system disk.

EKC Encryptor Keyboard Controller. A more complex and secure version of the BAPE, fitted to some terminals. Not supported in Advance NDC 2.06 or later.

EMV Europay, Mastercard, VISA. A consortium responsible for the the EMV standard for smart cards.

Enhanced Remote Key Protocol A command set for remote key management that allows the financial institution to implement some of the best practices recommended but not required in X9.24.2004 part 2.

EOP Enhanced Operator Panel.

EPP Encrypting PIN Pad. A new combined PINpad and encryptor, supporting triple DES encryption.

Exit A general term covering user-defined states, Supervisor features, virtual controllers, and special synchronisation routines called hooks.

Exit State A state defined and programmed by the user.

Exit Supervisor A Supervisor function defined and programmed by the user.

F

Fascia The front of an SST.

FDK Function Display Key. These keys are located on each side of the facia screen and enable various options to be chosen. Some screens have touch screen areas which emulate FDK functions.

FIID Financial Institution IDentification number.

FIT Financial Institution Table. This contains details of where and how information is stored on the card and how a transaction should be processed.

G

GBNA Global Bunch Note Acceptor.

GBRU Global Bill Recycling Unit.

GBXX GBNA and GBRU.

H

Hex Short form of hexadecimal.

HRI Human Readable Interpretation of a bar code.

Hooks General term for miscellaneous exits detailed in the *MISCONT* file. Refer to the NCR publication *Using NDC Exits*.

I

ICC Integrated Circuit Card. A card containing an integrated circuit. Also known as a 'smart card'.

ID Identifier.

IMCRW Integrated Magnetic Card Reader / Writer.

Intercept routine Another name for virtual controller.

ISO International Standards Organisation.

J

JIFF JPEG Image File Format.

L

lpi lines per inch.

LUNO Logical Unit Number.

M

MAC Message Authentication Code. A method of protecting messages passing between the terminal and Central from tampering.

MCN Message Coordination Number.

MCRW Magnetic Card Reader / Writer. This is used to read data from a standard magnetic stripe card and, depending on the MCRW variant, write data to one of the tracks on the card's magnetic stripe.

MEI Media Entry / Exit Indicator.

MICR Magnetic Ink Code Recognition, printed on and read from cheques.

MISCONT A rule file detailing miscellaneous Exits, or Hooks.

MSR Magnetic Stripe Reader. This is used to read data from the tracks of a magnetic stripe card. It provides a sub-set of the features of the Magnetic Card Reader / Writer.

Multiple EJ Backup Alternative setting for EJ backup. Allows multiple EJ backup files to be retained, as defined by the number of multiple backup settings.

N

NBS National Bureau for Standards.

NDC NCR Direct Connect. An NCR application that works in conjunction with a Central system to perform self-service transactions.

Nibble The first or second four bits of a byte (that is, half of a byte). Can be represented by one hexadecimal digit.

Note type The currency, value and version of a note. For example, an English five-pound note and a Scottish five-pound note have the same currency identifier (GBP) and denomination (unit value of 5), but different versions. Also known as bill type.

NVRAM See **Persistent memory**.

P

PAN Primary Account Number.

PDF Portable Document Format. The Adobe native file format for documents viewable in Adobe Reader.

Persistent memory This type of memory retains information when the power is switched off or lost. Also known as persistent storage.

PIN Personal Identification Number. A secret identification number that is issued to each cardholder.

PPD Programmable Printing Depository. One of the types of printer supported by Advance NDC.

PVKI PIN Verification Key Indicator. Part of the PIN offset data used in VISA PIN verification.

PVV PIN Verification Value. Another part of the PIN offset data used in VISA PIN verification.

R

RSA encryption An asymmetric encryption scheme using private and public keys, devised by Rivest, Shamir and Adleman.

Rule File A file that tells NDC+ which Supervisor functions or states are NDC+ standard, which are user written, and where the user-written routines are to be found. A rule file also gives information about the chaining of Virtual Controllers and Hooks.

S

SCRW Smart Card Reader Writer. A device which can interact with an ICC.

SDC Serial Distributed Control.

Self-Service Application This is the application which runs on an SST and processes all the necessary transactions.

Self-Service Support A 32-bit open software platform supplied by NCR for use on SSTs.

Smart Card Common name for a card which uses an integrated circuit (microchip) rather than a magnetic stripe. See **ICC**.

SO Shift Out.

SST Self-Service Terminal. Also known simply as a 'terminal'.

Standard Cash Handler A four-cassette stacking dispenser.

Standard EJ Backup The default setting for EJ backup. Creates a single electronic journal backup file.

Standard Output The destination where to which output is sent. Unless redirected, for example to a file, standard output is the command window from which the program was initiated.

STCONT A rule file defined by Exits when user defined states are added.

SUPCTR A rule file used by Exits when user defined supervisor features are added.

Supervisor The Supervisor application performs the out-of-service operations needed to maintain and run SSTs.

T

TABS Total Automatic Banking Services.

TCM Terminal Control Module.

TI Tamper Indication.

TOD Time Of Day.

TPA Transaction Processing Application (NDC Application).

Triple DES encryption DES encryption performed three times successively, for greater security.

TSN Transaction Serial Number.

TVN Time Variant Number.

U

USB Universal Serial Bus. A hardware interface for attaching peripheral devices, such as disk drives.

V

VBScript Microsoft Visual Basic Script. A scripting language which is an extension of the Microsoft Visual Basic language.

VC Virtual Controller (or intercept routine). A user-written routine to intercept and respond to messages. A type of **Exit**.

VCCONT A rule file used by Exits when virtual controllers are added.

VDM Vendor Dependent Mode.

W

WAVE WAVE or .WAV (Waveform Audio). A standard Windows based sound format.

Windows XP Microsoft Windows XP Professional operating system.

Work Group A Work Group contains a collection of Workers with similar roles in the Worker hierarchy.

Worker You develop a self-service application by visually linking Workers (graphical building blocks).

Worker Class Every Worker belongs to a Worker Class. The Worker Class defines the characteristics and functions that any given Worker will have.

X

XFS EXtensions for Financial Services. Application and service provider interface specifications from CEN.

Index

A

B

C

D

E

F

G

I

J

K

L

M

N

O

P

R

S

T

U

X

Cut

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